South Hampshire: Integrated Water Management Strategy

Partnership for Urban South Hampshire (PUSH)

Revision – March 2009

Plan Design Enable

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Document History

JOB NUMBER: 5056925			DOCUMENT REF: 5056925 / 70 / DG / 23			
06	Revision	PS	ED	ED	PS	02/03/09
05	Final for Distribution	PS	ED	HR	PS	2/12/08
04	Final	PS	RH	HR	PS	4/11/08
03	External Draft for Review	HR/JS/PS	AB	BSP	PS	
02	Internal draft review	HR/JS/PS	AB	AB	PS	
01	Draft in progress	HR/JS/PS	ED	BP	PS	
		Originated	Checked	Reviewed	Authorised	Date
Revision	Purpose Description	ATKINS				

Acknowledgements

The Atkins team would like to thank the Steering Committee for its advice and support throughout the project.

The technical specialists in the Environment Agency have also been very supportive. We would like to thank Tony Burch from the Environment Agency who has provided detailed comments and recommendations for improved flood risk management which we have included within this document. Susanne Grigsby, David Lowthian and Tim Sykes have also provided important advice which has helped to steer the project with respect to water quality and understanding the methodology and conclusions of the Review of Consents investigations.

Representatives of the Water Companies have also provided very helpful assistance on the assessments of water supply and wastewater management. In this regard, particular thanks are due to Mike Dannatt (Portsmouth Water) and Bob Tambling (Southern Water).

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Glossary of Terms

Term	Meaning / Definition
PWS	Public Water Supply
WRMU	Water Resource Management Unit
RSS	Regional Spatial Strategy
SRSS	Sub region spatial strategy
RoC	Review of Consents (Stage 4 Review of Consents for the Hampshire Natura 2000 sites)
LDF	Local Development Framework
EA	Environment Agency
PUSH	Partners for Urban South Hampshire
IWMS	Integrated Water Management Strategy
SFRA	Strategic Flood Risk Assessment
SEP	South East Plan
SEEDA	South East England Development Agency
DCLG	Department for Communities and Local Government
WWTW	Waste water treatment works
EiP	Examination in Public
Defra	Department for Environment, Food and Rural Affairs
LPA	Local Planning Authority
PPS	Planning Policy Statement
GOSE	Government Office for the South East
OFWAT	Water Services Regulation Authority
DWI	Drinking Water Inspectorate
HSE	Health and Safety Executive
CAMS	Catchment Abstraction Management Plans
RBMP	River Basin Management Plan
PINS	Planning Inspectorate
SEERA	South East England Regional Assembly
RES	Regional Economic Strategy
DPD	Development Plan Documents
WRMP	Water Resource Management Plan
EIA	Environmental Impact Assessment
PCC	Per Capita Consumption

WAFU	Water Available for Use
SWMP	Surface Water Management Plan
CIL	Community Infrastructure Levy
SDA	Strategic Development Area
SPA	Special Protection Area
SAC	Special Area of Conservation
SSSI	Special Site of Scientific Interest
STW	Sewage Treatment Works
CSH	Code for Sustainable Homes
ASR	Aquifer Storage and Recovery
WRSE	Water Resources in the South East
DWF	Dry Weather Flow
BOD	Biochemical Oxygen Demand
SS	Suspended Solids
BAT	Best Available Technique
BATNEEC	Best Available Technique Not Entailing Excessive Costs
EQS	Environmental Quality Standards
SMP	Shoreline Management Plan
CRoW	Countryside and Rights Of Way Act
CFMP	Catchment Flood Management Plans
WRZ	Water Resource Zones
WLMP	Water Level Management Plan
SDB	Supply/Demand Balance
SoP	Standard of Protection

Executive Summary

A key aim of PUSH is to promote economic growth in the South Hampshire sub-region while delivering sustainable communities. As part of this, the South East Plan (SEP) includes proposals for the development of 4,000 new homes a year for the next 20 years in the sub-region, giving an additional 80,000 new homes in the area by 2026. To inform the role of PUSH in this development, and in particular to assess the feasibility of the housing figures allocated to the area by the SEP, PUSH commissioned this sub-regional Integrated Water Management Strategy (IWMS).

The objectives of the IWMS are to:

- Guide and inform the level and location of development to be accommodated in South Hampshire in accordance with the Draft South East Plan;
- Identify a preferred high level strategy for water management for the period to 2026, including the general location and timing of infrastructure requirements, the agencies responsible and the means of funding the necessary work; and
- Identify the further work necessary to implement the preferred strategy and to monitor its effectiveness over the plan period.

This report sets out the relevant environmental background, the approach taken to the IWMS, key contributing organisations and the agreed issues warranting priority attention due to the nature and scale of their potential constraints on future development. These priority issues, and the organisations with whom PUSH will need to work most closely in addressing them, are:

- Water supply – Southern Water and Portsmouth Water
- Wastewater Management – Southern Water
- Flood risk – Environment Agency (EA)

In addition, a vitally important “cross-cutting” issue in each of the areas above is that of Environmental Protection, for which the EA carries the major strategic responsibility.

More general consideration has also been given to the issues of Biodiversity and Fisheries (primarily through the outcomes of the EA’s Restoring Sustainable Abstraction (RSA) programme), groundwater protection, surface water (sewer) flooding and diffuse pollution. Climate change has also been taken into account when assessing potential changes over the next 20-30 years (e.g. water demands, flood risk) as well as in the assessment of options (e.g. new water resource schemes).

With regard to the projections of future development, the agreed approach for this work has been to assume that the scale, timing and geographical distribution of growth would be in accordance with the latest figures provided by Hampshire County Council and would remain fixed for the purposes of this assessment.

The project was designed to draw on existing data from a range of sources. Although no new data have been generated, significant additional analyses have been undertaken for each of the three priority issues described above.

The main outcomes are summarised briefly in turn for each of the priority issues below and in the Summary Table following. A more detailed summary is provided in Section 7.

Water Supply

South Hampshire currently has sufficient licensed resources to meet future demands for water. However, there has been ongoing concern regarding the environmental sustainability of some of the licences and this has been reviewed by the EA under Stage 4 of the EU Habitats Directive Review of Consents. Licence changes proposed by the EA as a result of its review will create a deficit in the supply demand balance across South Hampshire in excess of 100 Ml/d. In response to these changes, combined with the designation of the area as "seriously water stressed" by the EA and Defra, the Companies are proposing a new range of measures to manage demand, the most significant of which will involve the installation of water meters on all households. Forecasts suggest that this may reduce demand by between 5-15% and, even allowing for the proposed growth in households, there is likely to be minimal net growth in demand over the next 25 years. The total cost of the demand side measures proposed by the two Water Companies is in the order of £60-70M.

Even with no net growth in demand, the proposed sustainability reductions in existing abstraction licences will still require the development of new supply options with a combined yield of at least 100 Ml/d. A shortlist of seven preferred options has been drawn up, along with approximate costs and the estimated time of implementation of each option. It is estimated that at least five of these options will be required at a cost of £100-130M.

The difficulties of delivering these options and demonstrating their sustainability should not be underestimated and at the time that this Study was completed several additional options were under consideration. The complexity of a number of the issues involved have yet to be fully explored and it is important that the Agency and the Water Companies continue to explore the ways in which the intended environmental benefits can be secured without incurring excessive cost. PUSH will have to work closely with the two Water Companies over the next 3-4 years to understand and, where possible, reduce the current level of uncertainty. In these circumstances, it is recommended that PUSH does not accept any additional targets for population and household growth in the area over and above those currently proposed. However, it does appear that viable options do exist to address both the proposed sustainability reductions (thus facilitating a reduction in the risk to the River Itchen environment) and the proposed growth.

Wastewater Management

For some time the EA has expressed significant concerns regarding the tension between the proposed growth in South Hampshire and the potential impact of existing and future wastewater discharges on the internationally designated river and coastal waters in the area. Using standard methods for forecasting growth in wastewater discharges, these concerns are warranted, with seven out of 13 (over 50%) of wastewater treatment works forecast to exceed their flow consents by 2020. Although improvements in discharge quality may compensate for this to some extent, the uncertainties are considerable and there is little or no "environmental capacity" left in the receiving waters for the consented loads of pollutants to be increased.

Despite this, the study has concluded that the situation may not be as serious as recent assessments suggest. The main reason for this is that the Water Companies are currently forecasting minimal net growth in water demand over the next 25 years (the importance of water demand is that over 95% of household water use is subsequently discharged to the wastewater system and this forms the major component of wastewater inflows to treatment works). Despite this linkage, the forecasts of wastewater demand are essentially

independent of forecasts of water demand and are based on a much less sophisticated forecasting methodology. In consequence, current wastewater forecasts miss trends such as changes in household occupancy rate and the re-distribution of population between new and existing housing. The alternative wastewater demand forecast used in this study provides an alternative approach to address this issue by linking the wastewater and water supply forecasts. The approach is still to be reviewed by the EA and Southern Water, and has at this stage only been developed with the purposes of this IWMS in mind. However it is considered to be a more realistic scenario and suggests that future wastewater demands may be considerably less than previously forecast.

Based on the alternative demand forecast, only one of the 13 treatment plants (Peel Common) will exceed its consented flow in the period to 2026. Furthermore, the potential reduction in the concentrations of consented water quality parameters that would be required at Peel Common to ensure compliance with the EA's 'no deterioration' policy is likely to be well within the capacity of current treatment technologies to deliver. At this stage, therefore, it is considered very unlikely that major new wastewater treatment infrastructure will be required during the next 20 years other than that already required to achieve the consents set by the EA under the Urban Wastewater Treatment Directive and those proposed to fulfil the requirements of the Habitats and Birds Directives.

As with the conclusions on the water supply side, there are a range of uncertainties that have still to be resolved and this is not considered to be a context in which PUSH should accept an increase in the targets for housing growth.

Flood Risk

As assessment of the spatial distribution of housing in the sub-regional strategy concluded that the housing requirement for Eastleigh, Test Valley, Winchester, Fareham and East Hampshire can all be accommodated in Flood Zone 1 (no risk) as are the proposed areas for the SDAs. However, of the 80,000 houses required within the PUSH region, approximately 11,000 are allocated within Flood Zones 2 and 3. This equates to approximately 15% of the total allocation. The local authorities which are affected are primarily Southampton (36% of properties identified in flood zone 2 and 3) and Portsmouth (37% in flood zones 2 and 3). Gosport and the New Forest each have one allocation within flood zones 2 and 3.

For Portsmouth, the shoreline management plan identifies that many of the coastal frontages are already defended (where necessary) and as such, the developments in themselves may not directly require new capital schemes to protect them but they will require enhanced protection measures. However these developments will be increasing the reliance on existing flood defence infrastructure and this has significant maintenance and renewal, cost implications to combat sea level rise which needs to be carefully considered.

There is considerable development proposed around the reclaimed Itchen and Solent coastal areas of Southampton. These areas do not have existing publicly owned formal defences. Significant land within these areas, and existing property around Ocean Village, Northam and other areas in Southampton adjacent to the River Itchen will be at increasing risk as sea level rises. This is likely to result in the need for flood defences around Southampton to protect existing and new development. The new developments will affect the decision-making for the type and scale of the sea defences required.

For areas such as Portsmouth where there are existing defences the situation is slightly different. Improvements and maintenance of existing defences may not be undertaken in line with the PUSH development programme. There may therefore be a need for developments to provide funds to bring forward such improvements or maintenance. There may also be the need for such defences to be in place prior to development being permitted.

The Local Authorities for Portsmouth and Southampton should undertake a more detailed assessment of the likelihood and consequence of existing defences overtopping or breaching to improve understanding of potential flood hazard and risks across the administrative areas. For Southampton, a review of the increasing risk and consequences of flooding with sea level rise should be undertaken for existing and new developments (which are currently not at risk and not defended). A flood risk management strategy should be produced for Southampton.

It is Government, EA and Local Authority policy to ensure new development in the floodplain does not increase flood risk. The PUSH authorities therefore need to work with the EA to ensure that where proposed developments are to be sited in areas at risk of flooding, they are planned effectively and use a wide variety of measures through the planning process to ensure that the new developments are safe and sustainable. The measures need to be integrated and agreed, designed, funded, delivered, operated, resourced and renewed for the lifetime of the development. It will be apparent from the conclusions above that this is most relevant is Portsmouth and Southampton, where the issues raised by the combination of proposed new development in the flood plain, the status and extent of existing sea defences and ongoing sea level rise will require an enhanced degree of commitment and co-operation between the EA and the Local Authorities.

There are considerable opportunities for PUSH authorities in their roles as LPAs and Operating Authorities to significantly influence the flood management process. Using the existing delivery mechanisms; the development, promotion and funding of a higher standard of protection for PUSH communities may be achievable.

Of concern is the number of issues associated with the management of flood risk to existing communities. There are serious information and management gaps for managing surface and groundwater flooding. Furthermore, the recent summer floods have shown the risk from flooding of critical infrastructure, significantly affecting communities at a sub-regional level and not just those within flood plains. This strategy has put forward a number of areas where PUSH can work to improve the management of flood risk for existing communities. This will in turn reduce the risk to the new development proposals.

The study has also identified that although the EA process for developing river and coastal flood risk management policies and plans is comprehensive, the process for implementing the necessary improvements is severely restricted by available Government funding; this is leaving existing communities vulnerable. It is recommended that PUSH work with the EA to understand the existing risk to communities and if the support from other funding mechanisms can accelerate the capital and maintenance programmes.

Planning and Water Management

A series of planning policy recommendations have been developed to provide the PUSH authorities with a toolbox of methods to influence more integrated water management. These recommendations are outlined under the following mechanisms:

- Lobbying and responding to consultations
- Developing sub-regional policies and guidance (includes draft policy text relating to issues such as water efficiency, SUDS, surface water management, groundwater protection and infrastructure provision)
- LDF preparation by individual authorities
- Determination of planning applications

- Working with partners
- Funding infrastructure provision
- Targeted research

Water Framework Directive

It is important to understand that at the time of undertaking this study the potential impacts of the implementation of the Water Framework Directive were poorly understood. These impacts will start to become more apparent following the publication of draft River Basin Management Plans at the end of 2008 and should be much better understood by the time the second round of plans is published in 2015. PUSH will need to work closely with the EA and the Water Companies to ensure that it maintains a clear understanding of what impacts the new Directive may have on integrated water management as new development progresses.

1 Introduction

1.1 Background to this Report

The Partnership for Urban South Hampshire (PUSH), is a voluntary sub-regional local authority partnership consisting of 10[1] Hampshire local authorities and the County Council. PUSH was initially formed to develop a Sub Regional Spatial Strategy (SRSS) for South Hampshire to support the South East Plan (SEP). The SEP will, when finally approved by Government, form the Regional Spatial Strategy (RSS) for the South East. As a key part of the Development Plan, the RSS will set the development strategy for the region over the period for 2026. The strategy for South Hampshire will be set in the SRSS for South Hampshire in the SEP.

PUSH aims to promote economic growth in the sub region while delivering sustainable communities. One of the key objectives of PUSH is to bring economic growth and improved infrastructure and investment in the sub region. Alongside and as part of this growth the sub-region will see the delivery of 4,000 new homes a year for the next 20 years, an additional 80,000 new homes in the area by 2026.

In October 2006, PUSH was selected by the Department for Communities and Local Government (DCLG) to be one of 29 "New Growth Points" in England. This is a long-term partnership with Government which, subject to the proposals for growth in South Hampshire being endorsed through the Regional Spatial Strategy, will mean continued support and funding from Government to enable PUSH to achieve its growth ambitions. PUSH is also one of eight "Diamonds for Investment and Growth" identified in the Regional Economic Strategy prepared by the South East England Development Agency (SEEDA).

PUSH is progressing and co-ordinating the future planning and development of the South Hampshire sub-region through a number of projects and initiatives. To inform this work, and in particular to assess the feasibility of the housing figures allocated to the area by the SEP, PUSH commissioned a sub-regional Integrated Water Management Strategy (IWMS).

1.2 Objectives of the South Hampshire IWMS

The aim of the IWMS is to reduce the risk to the proposed growth posed by coastal and fluvial processes, water management and the water environment and *vice versa*. One of the key means of doing this will be through informing the preparation of individual Local Development Documents and sub-regional guidance and policies. It will also enable PUSH to lobby Government, Water Companies and other organisations on issues relating to water management in South Hampshire.

The objectives of the IWMS are to:

- Guide and inform the level and location of development to be accommodated in South Hampshire in accordance with the Draft South East Plan;

[1] East Hampshire District Council, Eastleigh Borough Council, Fareham Borough Council, Gosport Borough Council, Hampshire County Council, Havant Borough Council, New Forest District Council, Portsmouth City Council, Southampton City Council, Test Valley Borough Council and Winchester City Council.

- Identify a preferred high level strategy for water management for the period to 2026, including the general location and timing of infrastructure requirements, the agencies responsible and the means of funding the necessary work; and

- Identify the further work necessary to implement the preferred strategy and to monitor its effectiveness over the plan period.

1.3 Approach to the IWMS

1.3.1 Review of relevant data and documentation

The focus of the IWMS has been to utilise existing research and information (particularly Environment Agency (EA) and Water Company assessments, plans and appraisals) to identify and assess options for delivering the water management requirements associated with the levels and locations of development identified in the SEP for South Hampshire.

Principal high level documentation reviewed that relates to the overall strategy for the South East included:

- The South East Plan and specifically Section E1 that relates directly to South Hampshire and that identifies proposed locations of housing and commercial developments;
- Responses from PUSH members to the South East Plan;
- Supporting documentation to the South East Plan with regard to water management and infrastructure (e.g. planning for water quality and growth in the south east (EA); a strategy for provision of environmental infrastructure to meet the needs of the South East Plan (EA); Twenty Year Strategy for Managing Environmental Infrastructure in the South East (EA); infrastructure development in the south east (SQW));
- Habitats Regulations Stage 4 Review of Consents for the Hampshire Natura 2000 sites (Environment Agency, due June 2007)];
- Draft Water Resource Management Plan for Southern Water;
- Draft Water Resource Management Plan for Portsmouth Water;
- Relevant Southern Water wastewater plans and supporting information; and
- Shoreline Management Plans, Catchment Flood Management Plans and Flood Erosion Risk Management Strategies.

Within the bounds of confidentiality the project team has drawn directly on the information generated in recent and ongoing projects.

1.3.2 Identification of Priority Issues

The original brief for the IWMS listed a wide range of issues that needed to be considered but it did not accord any particular priority to those issues. An early Workshop with the Steering Group and technical representatives from the EA was therefore convened in the first month of the project (August 2007) to agree what the priorities should be. This concluded that the three highest priority issues were those relating to:

- Water supply;

- Wastewater treatment; and
- Flood risk.

In all three cases, the assessments undertaken have focused on assisting PUSH in understanding how confident it can be that solutions are available that can sustain the proposed growth whilst being environmentally sustainable (the latter is of major importance given the range of concerns about the risks to the water environment posed by existing abstraction licences and wastewater discharges). Where relevant, the assessments have also required consideration of the potential impacts of, and on, climate change as well as the cost and deliverability of solutions.

The Flood Risk component has drawn mainly on the outputs of the separate PUSH Strategic Flood Risk Assessment (SFRA) which has run concurrently with the IWMS. Although drawing on Water Company and EA data, the water supply and wastewater assessments have necessitated a significant degree of additional analysis as part of the IWMS.

It was also agreed at the outset that the IWMS should assume that the number, geographical distribution and phasing of new development will be as set out in the data provided by Hampshire County Council. In other words, whilst one of the outcomes of the IWMS may be a recommendation that numbers and/or distribution and/or phasing be reconsidered, they would not be assessed as "variables" within the project itself.

1.3.2.1 Consideration of other Issues

Although water supply, wastewater treatment and flood risk have been accorded the highest priority in terms of time and detail, the identification and appraisal of sustainable solutions in these areas has required full consideration of other issues such as Biodiversity, Fisheries and Water Quality, either as part of the IWMS or as part of other work on which the IWMS has drawn (e.g. the EA's Review of Consents process).

In addition, consideration has also been given to the issues of Groundwater Protection, Surface water (sewer) flooding and Diffuse Pollution and recommendations made where relevant.

1.3.3 Engagement with Key Stakeholders

An important component of the project has been to try and understand the issues and their inter-linkages through the "eyes" of the main organisations that will have a major influence on future water management in South Hampshire. The means of engaging with these organisations have been as follows:

- Steering Group Meetings – the PUSH Steering Group comprises representatives of PUSH, the EA, Hampshire Wildlife Trust, Portsmouth Water and Southern Water. There have been five Steering Group Meetings during the project.
- Workshops – there have three project workshops during the project. Invitees have included all members of the Steering Group, representatives of all 10 PUSH Local Authorities and additional technical representatives from the EA.

- The EA – aside from Steering Group meetings and Workshops, an additional three meetings have been held with various representatives of the EA.

- The Water Companies – meetings have also been held with Southern Water and Portsmouth Water. Representatives of both companies have also made presentations to the Steering Group to outline the key issues facing them over the next 25 years.

1.3.4 Determining Environmental Capacity for Growth

Extensive work in recent years, in particular by the EA, has helped to clarify the acceptable limits of the environmental impacts arising from abstraction and wastewater discharges. This is a very complex undertaking and in many cases the requirements of environmental protection legislation are well in advance of relevant scientific understanding. The relevant items of legislation are summarised in Appendix A. The two with the most significant influence in this context are:

- The Urban Wastewater Treatment Directive (UWWTD) and its associated statutory instruments in the UK; and

- The Habitats and Birds Directives and their associated statutory instruments in the UK.

With regard to the UWWTD, improvements required in the quality of wastewater discharges are already underway and these are summarised in this report. The requirements of the Habitats and Birds Directives have given rise to an extensive Review of Consents (RoC) programme. This programme has included reviews of both abstraction licences and discharge consents and in October 2007 the EA published a set of proposals for modifying those consents that it considered were not sustainable in their present form. Although the proposals are directed at the protection of specific species and/or habitats, their implementation would also result in a higher level protection of more general biodiversity and fisheries' interests.

The implementation of the UWWTD and Habitats & Birds Directives will effectively mark a sharp change in the level of protection afforded to many aspects of the freshwater, estuarine and marine environment in South Hampshire. The new consents arising from this process will effectively define the volume and timing of abstractions and the volume and quality of discharges that the water environment can reasonably sustain. Such parameters thus become the "currency" by which the capacity of the water environment to sustain further growth in the South Hampshire area can be measured.

The translation of population and housing growth scenarios into additional demands on abstractions and discharges has therefore been a key component of this Study. Although not specifically an "environmental" assessment, the strategic flood risk assessment follows the same principles in its assessment of the number and location of additional properties that could be built without incurring additional unacceptable risks of flooding.

1.3.5 Identification and Appraisal of Options

Where there is clear evidence that one or more components of the "environmental capacity" will be exceeded if new development goes ahead as planned, options to facilitate that growth without exceeding the environmental capacity have been

identified and evaluated at a strategic level on the basis of available information. These evaluations have been based on a range of criteria, including:

- The contribution of the option to facilitating the planned development (i.e. its effectiveness)
- Environmental sustainability
- Economic viability
- Carbon footprint
- Robustness to climate change
- Social equity.

Where possible, opportunities for applying an integrated approach to future water management have also been explored.

1.3.6 Strategy Development

The outputs from the process described above are a set of conclusions relating to the potential risks to the development proposals or to the water environment. A strategy for minimising these risks is then proposed, comprising the following:

- Potential new infrastructure developments (including estimated costs and timescales)
- New or revised planning and development policies (or simply a re-emphasis of the importance of some existing policies)
- Further more detailed research and/or monitoring.

2 Context for the IWMS

2.1 Environmental Background

The South Hampshire sub-region extends to some 600km^2 in area and has a population of approaching one million people. It is the largest urban area in the South East region, comprising the Cities of Southampton and Portsmouth together with a series of towns and villages that effectively form their hinterland. Taken together these form a continuous, but outside the urban areas relatively loose knit developed area across coastal South Hampshire. Marine industry forms a significant component of the South Hampshire economy and the sub-regions waterways are heavily used for shipping.

The significant concentration of population and economic activity along the South Hampshire coast places pressures on the surrounding environment, particularly in relation to water management. The sub-region's water supply is derived from a combination of ground and surface water abstractions. Treated wastewater is returned to the environment through river and coastal discharges on a very significant scale.

There are large scale green gaps and undeveloped areas along the coast and estuaries that perform significant recreational and environmental roles. South Hampshire contains international, national and local landscape and nature conservation designations that constrain and shape future development within the sub-region. Existing and future water management has the potential to affect a number of these designations and the EA Review of Consents has identified a series of amendments that will be required to existing abstraction licences and discharge consents if adverse effects on European Sites are to be avoided. The detail and implications of these are considered in Sections 3 and 4 of this report.

As a coastal sub-region with significant estuaries and rivers flowing through it, it is perhaps unsurprising that the PUSH area contains communities vulnerable to fluvial and coastal flooding. The South Hampshire sub-region includes 270 km of tidally-influenced coastline, along which is situated key urban areas of Southampton, Portsmouth, Gosport, Fareham and Havant. The proximity of large parts of these communities to the extensive coastline puts them at risk of flooding from the sea, with predicted sea level rise due to climate change and post-glacial rebound likely to increase these risks in future. In addition, the sub-region contains approximately 350 km of designated 'Main River' and associated fluvial floodplain, including the Rivers Test, Itchen, Hamble, Meon and Wallington, and extensive areas of chalk geology that are susceptible to groundwater flooding.

The development of South Hampshire area has been planned through successive County Structure Plans that have sought to consider and respond to the considerable complex cross boundary issues within the sub-region. This role has been taken on through PUSH into the SRSS for South Hampshire which seeks to balance the need for growth and development with the protection and enhancement of environmental assets across the sub-region.

2.2 Environmental Context for the IWMS priority issues

The PUSH region is extremely important with a wealth of biodiversity and a mosaic of important freshwater and coastal habitats protected under European and International nature conservation legislation. Refer to Figure 2.1 for environmental designations. As such all activities within the PUSH region need to understand the environmental limitations within which to work, ensuring these important species and habitats are not degraded. Section 1 has already identified the priority activities in this respect as being water supply, wastewater management and flood risk management.

The following section provides a brief overview of the PUSH Region's natural environment, focusing upon the habitats and pressures which make the above three issues so important. This section is not intended to be a comprehensive review of the natural environment and environmental sensitivities of the PUSH region.

The majority of the rivers and coastal zone of South Hampshire is protected by European and international nature conservation standards. There are three primary pieces of legislation which protects these areas, these are:

- EU Birds Directive, designating much of South Hampshire as Special Protection Areas (SPA) to protect over-wintering wildflow, wader and breeding Annex 1 bird populations
- EU Habitats Directive, designating much of the river and coastal habitats of South Hampshire as Special Areas of Conservation (SAC)
- International Ramsar Convention (Ramsar sites) protecting internationally important habitats, species and wetland birds (these sites are coincident with the SPAs above).

The sub-region also has a number of sites which are protected under national legislation as Sites of Special Scientific Interest (SSSI) and have local and regional designations reflecting their importance for biodiversity and as ecologically sensitive sites. The area around Fareham is also designated as a groundwater protection zone.

2.2.1 Freshwater habitats

Within the South Hampshire region are lower catchment reaches of the renowned chalk rivers systems, the Test and Itchen. These river systems are fed by the chalk aquifers of the Hampshire Downs and within South Hampshire Region flow predominantly over the low permeability clays and silts of the Hampshire basin.

These groundwater rivers are afforded statutory protection under UK, European and International legislation as a result of the variety of life and habitats they support. Both streams are classified as Sites of Special Scientific Interest (SSSI) throughout their courses, with the Itchen additionally designated as a candidate Special Area of Conservation (SAC). Together, the catchments of the Test and Itchen provide most of the Hampshire region with its potable water supply. The Meon is also an important chalk river habitat but is not currently nationally or internationally designated.

The flow character of these chalk river systems relies, in part, on the maintenance of river-groundwater interactions; a function of the level of regional groundwater storage

and the hydraulic connectivity between aquifers and surface water features. Seasonally, the flow character of groundwater rivers is dependant on the balance between rainfall, run-off and the component of water that infiltrates into the ground to recharge groundwater stores. Disruption of these interactions will alter the surface water regime, which in turn can impact on ecological receptors through changes to hydro-geomorphological and chemical processes within rivers and their adjacent environments.

The Test (from Testwood to source) and Itchen (non-tidal to source) are designated under the Freshwater Fish Directive for salmonid fish which provide both imperative and guideline chemical standards that are to be achieved to maintain the fisheries requirements. In addition, the River Meon (from mouth at Hillhead Harbour to source) and the River Hamble (from tidal limit at Botley to source) are also designated as salmonid fisheries.

The EA in its Review of Consents for the River Itchen SAC identified a number of factors which can alter the surface water regime of rivers and therefore of relevance to the IWMS including:

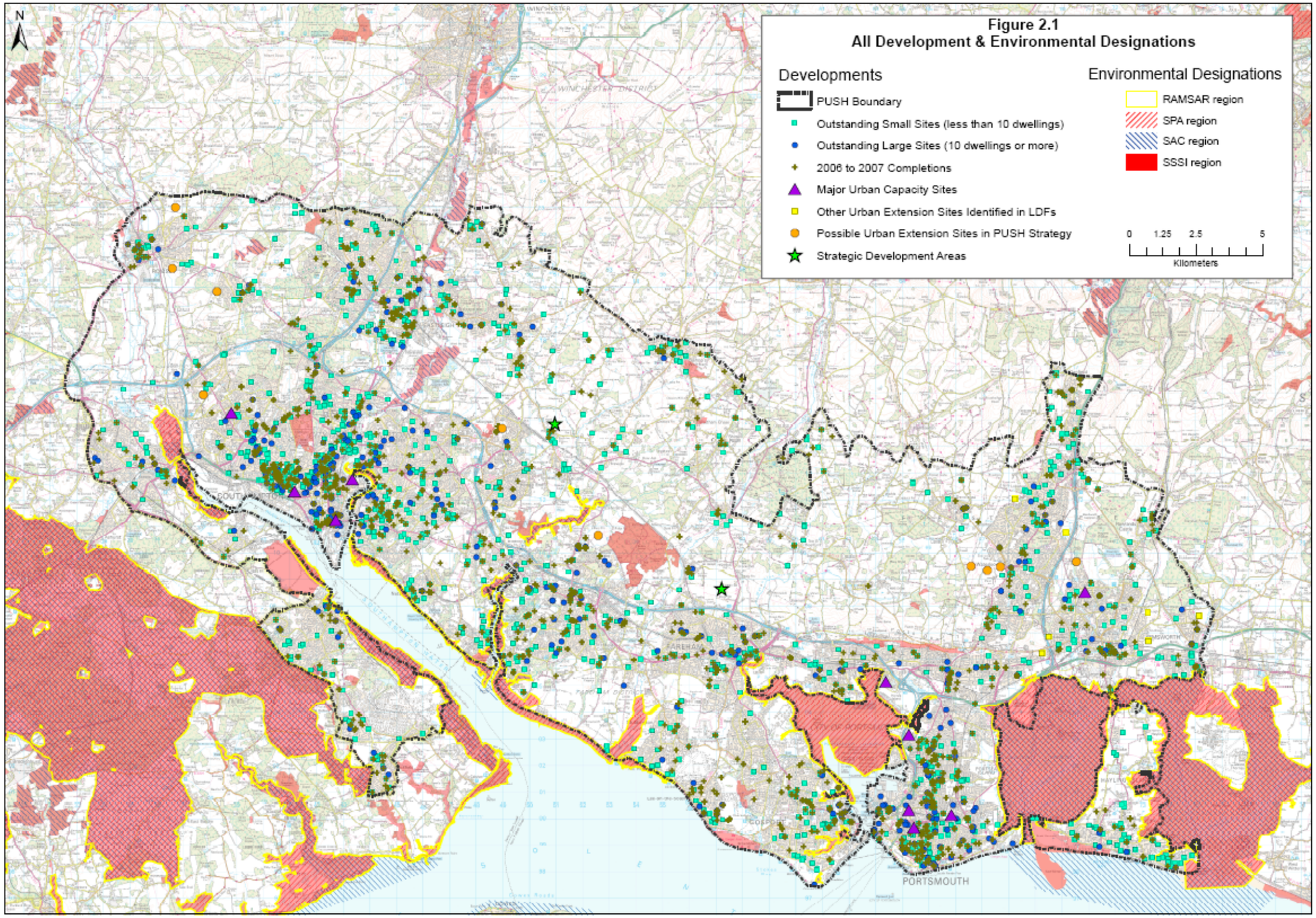
- Abstractions from groundwater aquifers
- Abstractions from surface waters[2]
- Discharges directly to surface water such as those from WWTWs
- Land-use changes impacting infiltration and surface water run-off rates.

It is recognised that these factors will influence the sensitive habitats and species which the Test and Itchen support.

Phosphorus has been highlighted by the EA as one of its main concerns potentially limiting growth in catchments which discharge into the PUSH rivers, particularly the River Itchen. The RoC for the River Itchen identified that the levels of soluble reactive phosphorus typically either only just meet the Agency / EN agreed phosphate standards or else show slight exceedance of the quality targets. The lower reaches particularly downstream of Harestock and Eastleigh STW discharges, show soluble reactive phosphorus levels substantially above the quality targets for these stretches. The EA has also identified non-compliance of the phosphorus guideline standards in the River Test associated with STW discharges e.g. Fullerton STW. In addition to consented point sources, diffuse inputs (particularly agricultural run-off) and in-river processes are recognised sources of nutrients input.

[2] The IWMS has not prioritised abstractions from groundwater aquifers as a priority issue because there are no groundwater abstractions within the PUSH region. It is recognised that IWMS activities can affect groundwater quality and these are addressed within the report.

Figure 2.1 Environmental Designations in South Hampshire



2.2.2 Marine Habitats

The coastal environment is also highly sensitive and important for coastal and marine biodiversity. The vast majority of the PUSH coastline and nearshore marine zone is designated under the Solent Maritime SAC and the Solent and Southampton Water SPA/Ramsar as well as designated SSSI. The Solent is a major estuarine complex and has the largest number of small estuaries in the tightest cluster anywhere in the UK. The Solent is unique in Britain for its complex tidal regime and the dynamic nature of the marine and estuarine habitats present. The Solent Harbours are also protected for their important bird interests as SPA/Ramsar sites and there are a number of important saline lagoons and other saline habitats across the region and some coastal areas are protected under the Shellfish Directive.

The EA RoC investigation required in support of the above designations has identified a number of issues which are of relevance to the IWMS investigations. These are nutrient enrichment, toxic contamination, thermal pollution, organic enrichment and nitrogen pollution.

Nutrient enrichment and in particular nitrogen pollution could arise from the wastewater treatment required in support of the IWMS. The EA has identified the effects of nutrient enrichment in the form of dense macroalgal mats occurring in inter-tidal areas throughout sheltered areas of the Solent Maritime SAC. The major sources of nitrogen to the SAC are from:

- Coastal background seawater from the English Channel
- Direct rivers and streams discharging into the site
- Indirect rivers and streams discharging elsewhere in the Solent
- Effluent discharges permitted by the EA.

The EA has identified that nitrogen is the most important constraint affecting the PUSH WWTW which discharge into the marine environment. The most important non-point sources of nitrogen are from coastal background seawater in the English Channel, natural and diffuse sources in rivers and streams and nitrogen bound within sediment. Future management of coastal inputs is not realistically achievable, but some limited management of agricultural diffuse sources is achievable as is the limitation of nitrogen concentrations in point source discharges.

The freshwater flow volume entering the Solent and Southampton water from fluvial sources also influences the habitat distribution and abstractions can potentially influence the habitat distribution of estuarine areas. Saline intrusion may occur in certain circumstances including shallow topography and in the absence of structures, which allow the freshwater/saline water interface to migrate inland. This will alter the habitat structure of inland features but will also have significant impacts on the human population if it affects water infrastructure (potable and non-potable water infrastructure as well as affecting integrity of flood defences). Saline intrusion can occur either in conjunction with low flows or storm surges and is likely to increase in severity as sea levels rise with corresponding changes to the water table.

2.3 Review of relevant environmental policy

A review of relevant environmental policy has been undertaken to identify the environmental policy context relevant to water management in South Hampshire. A summary of the legislation reviewed is set out in Appendix A to this Report.

The review included the following legislation, plans and guidance:

- The Urban Waste Water Treatment Directive (91/271/EEC) and associated UK Statutory Instrument;
- Dangerous Substances Directive;
- The Bathing Water Directive (2006/7/EC);
- The Freshwater Fish Directive (78/659/EEC) and associated UK Statutory Instrument;
- The Shellfish Waters Directive (2006/113/EC);
- The EU Water Framework Directive (2000/60/EC) and Daughter Directives;
- EC Habitats Directive (Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora);
- Council Directive 79/409/EEC on the conservation of wild birds;
- The Water Act (2003);
- The Water Industry Act (1999);
- The Conservation (Natural Habitats, &c.) Regulations 1994;
- Environment Act 1995 (c. 25);
- The CRoW Act (2000);
- Water Level Management Plans;
- River Basin Management Planning (The Water Framework Directive);
- Catchment Abstraction Management Strategies;
- Estuarine classification scheme;
- Environment Agency River Quality Objectives; and
- Environment Agency Water Quality Classification.

2.3.1 Key aspects of relevance for IWMS:

As identified in section 1.3.4 above, the Urban Waste Water Treatment Directive and the Habitats Directive are the most important legislation for understanding the environmental capacity of the PUSH sub-region and can be termed as the 'environmental currency' for water supply and wastewater management. However, the review has shown that due regard has to be taken to the full range of water

quality and biodiversity protection legislation and the planning documents which have been produced in support of their implementation.

The biodiversity importance of the sub-region's rivers and coastal zone has shown that environmental protection is the key constraint to PUSH development and for a number of parameters there are concerns that the sub-region has already reached its environmental capacity and this is discussed further in Sections 3 and 4.

2.4 Review of relevant planning policy

A review of relevant planning policy has been undertaken to identify the planning policy context within which water management in South Hampshire is planned. This considers national and regional planning policies and guidance. A brief overview of those documents reviewed is set out in Appendix B to this Report and includes the following documents:

- The Government set out its latest objectives in early 2005 in 'Securing the Future – Delivering UK Sustainable Development Strategy', which builds on the 1999 strategy 'A Better Quality of Life'
- The Government's new Water Strategy
- Environment Agency Consultation Paper – Water For People And The Environment July 2007
- Directing The Flow – Priorities For Future Water Policy 2002
- Circular 17/91 – Water Industry Investment: Planning Considerations
- Planning White Paper – Planning For A Sustainable Future (May 2007): Infrastructure Proposals
- Code For Sustainable Homes, Including The Technical Guide (October 2007)
- Planning Policy Statement 1 (PPS1): Delivering Sustainable Development 2005
- Planning Policy Statement: Planning and Climate Change, Supplement To PPS1, 2007
- Planning Policy Statement 9: Biodiversity and Geological Conservation 2005
- PPS12 – Local Development Frameworks
- Planning Policy Statement 23: Planning and Pollution Control 2004
- Planning Policy Statement 25: Development and Flood Risk 2006
- RPG 9 – Regional Planning Guidance for the South East, 2001
- South East Plan, A Clear Vision for the South East, Draft Plan For Submission To Government March 2006
- Panel Report on the Draft South East Plan August 2007.

2.4.1.1 Key aspects of relevance for IWMS:

One of the most important planning aspect for IWMS is the allocation of housing in the sub-region and the policy context within which the allocations have been determined. The Draft SEP identifies the scale and location of housing for South Hampshire, requiring 80,000 new homes between 2006 and 2026. Up to 2016 it is proposed that the new housing allocation be delivered through the development of existing urban brownfield sites with urban extensions being utilised as and when required. Growth post 2016 is proposed to be managed within two identified strategic development areas (SDA) at Fareham and an area north east/north of Hedge End.

These will be substantial new developments on greenfield sites with an anticipated 16,000 homes being constructed between 2016 and 2026. The scale and location of the proposed housing is set out under Policy SH12 is shown in Table 2.1 below.

	Total	Total	Total	Total	Total
	2006-11	2011-16	2016-21*	2021-26*	2006-26
New Forest (Part)	600	500	219	219	1,538
Test Valley (Part)	650	1,375	1,375	510	3,910
Southampton	5,100	4,000	3,600	3,600	16,300
Eastleigh	3,000	2,300	891	892	7,083
North-east/North of Hedgend SDA	0	0	2,600	3,400	6,000
Winchester	1,400	3,800	1,044	495	6,739
Fareham	1,700	1,100	469	460	3,729
Fareham SDA	0	0	5,000	5,000	10,000
Gosport	1,200	500	400	400	2,500
Portsmouth	4,650	2,950	3,550	3,550	14,700
East Hampshire (Part)	350	500	175	175	1,200
Havant	1,800	2,950	776	775	6,301
Total	**20,450**	**19,975**	**20,099**	**19,476**	**80,000**

Table 2.1 South Hampshire housing allocation by location and phasing between 2006 and 2026 distributed and phased as follows as set out under Policy SH12

*Allocation in phases 2016-21 and 2021-26 are subject to uncertainty over realisation of urban potential, especially within Southampton and Portsmouth. The delivery of new housing will be monitored and managed separately within the south-west and south-east sub-areas of the sub-region, as indicated in the supporting text to Policy SH5. If that monitoring identifies a potential shortfall in the capacity of previously developed land to achieve the current forecast of dwellings, the respective sub-area will bring forward measures to secure the delivery of the housing target within the plan period.

At the Examination in Public (EiP) into the SEP, concerns were expressed by some participants over the deliverability of certain aspects of the South Hampshire proposals, including the scale, location and timing of the proposed 80,000 dwellings and the potential impacts of the proposed new commercial zones. Critically, the Appropriate Assessment of the SEP identified that existing water abstractions and effluent discharges had the potential to adversely affect European Sites, and that the housing distribution, phasing and overall figures for the planned rates of residential development in the SEP may need to be revisited. The Panel recommended the inclusion of a caveat in the wording of Policy SH12 to recognise that the “phasing and distribution” of the planned residential development may need to be reviewed following subsequent iterations of the Habitats Regulations RoC.

Key policies for IWMS include:

- The Draft Plan includes a suite of cross cutting policies (Policies CC1 to CC4) that provide policy guidance on Climate Change, sustainable development, resource usage and sustainable design and construction;
- Policy NRM1 provides guidance on a series of interrelated issues relating to Sustainable Water Resources and River Quality Management. Water supply is to be maintained through a twin track approach to water efficiency and water resource development to manage the balance between supply and demand;
- Policy NRM2 in the Draft Plan provides guidance on the provision of Strategic Water Resource Developments;

- Policy NRM3 in the Draft Plan provides guidance on Sustainable Flood Risk Management, referring to the national guidance in PPS25; and
- Policy NRM6 in the Draft Plan identifies the need for an integrated approach to be taken to shoreline management;

The planning policy review has identified that with a few exceptions, the land use planning and water management planning systems currently operate as two separate systems with very limited interaction between them. The lack of co-ordination and co-operation has implications for both systems, particularly given the need for local planning authorities to be able to demonstrate an evidence base for their LDFs (the detailed implications are assessed in Section 6).

3 Water Supply

3.1 Overview

This section addresses the following issues:

- Who is responsible for water supply to the PUSH area and where does the water come from?
- How do Water Companies plan for the future in a way that ensures there is sufficient water supply to meet demand whilst also ensuring that the sources of supply are sustainable?
- What is the current balance in the PUSH area between the demand for water and the availability of supply?
- In the absence of the forecast growth in the PUSH area over the next 20 years, what would the balance between supply and demand look like and what steps would need to be taken to maintain that balance, including those required to address the potential impacts of climate change?
- How will the phased addition of a further 80,000 homes and an associated growth in commercial properties change the balance between supply and demand? What additional steps will need to be taken to maintain an adequate balance and at what economic and environmental cost?
- What are the environmental issues associated with the current sources of supply and how are these being addressed?

3.2 Responsibility for Water Supply

Two Water Companies are responsible for supplying customers in the PUSH area: Portsmouth Water (PW) and Southern Water (SW). Of the 420,000 current households in the PUSH area, PW supply 217,000 (51.7%) and SW 203,000 (48.3%). In accordance with EA guidelines for water resource planning in England & Wales, a number of distinct "Water Resource Zones" (WRZs) are defined by each of the companies and used for Supply/Demand balance planning. **Error! Reference source not found.** shows the extent of the PUSH area in relation to the PW supply area (the PUSH area covers parts of all three of PW's WRZs) and SW's Hampshire South WRZ.

For both PW and SW, the chalk aquifer is the dominant source of water for supply, whether directly through abstraction from boreholes or the interception of spring outflows, or indirectly through abstraction from rivers whose baseflow is derived from the chalk (as is the case with both the Test & Itchen).

Figure 3.1 Areas of PUSH supplied by Portsmouth Water and Southern Water

3.2.1 Portsmouth Water

PW's main water supply sources comprise a number of borehole sources (groundwater abstractions), two major spring sources at Havant & Bedhampton and Fishbourne, and one major river abstraction on the River Itchen at Gaters Mill. The licensed quantities for each source are shown in Table 3.1.

Table 3.1 Portsmouth Water Source Types and Licensed Quantities

	Current Licences (Ml/d)	
	Average	**Peak**
Groundwater*	302	407
Surface Water	46	46
TOTAL	348	453

*includes spring sources

3.2.2 Southern Water

SW's main water supply sources comprise a number of groundwater abstractions and two major river abstractions, one at Otterbourne on the River Itchen and the other at Testwood on the River Test. The licensed quantities for each source are summarised in Table 3.2.

Table 3.2 Southern Water Source Types and Licensed Quantities

	Current Licences (Ml/d)	
	Average	**Peak**
Groundwater	139	162
Surface Water	182	182
TOTAL	321	344

3.3 Forecasting the Balance between Supply and Demand

Every 5 years, Water Companies are required to submit Water Resource Management Plans (WRMPs) to Defra that set out a Company's plan of the investment and operational procedures that are needed over the next 25 years so that it can maintain a balance between supply availability and forecast water demands. The WRMPs feed into the Water Company 5-yearly Business Plans as part of the Periodic Review of prices undertaken by Ofwat, the Water Industry's Economic Regulator.

The WRMPs must strike an acceptable balance between the following requirements:

- Supplies to customers are maintained to the required levels of service;

- Water use is managed as efficiently as possible;
- The impacts of abstracting water from the environment are sustainable; and
- The planned programme is the "least-cost" programme, taking account of all relevant costs including environmental and social costs.

At times there is obviously some tension between these objectives. The "preferred strategy" set out in a WRMP reflects a Company's proposed approach to managing those tensions. The acceptability or otherwise of this preferred strategy is not only scrutinised by the EA and Ofwat, but is now the subject of "statutory" consultation with a much wider range of stakeholders and water users, including the general public.

The last set of WRMPs were finalised in 2004 and covered the period from 2005 to 2030 and are referred to in this report as the 2004 WRMPs. The next set of WRMPs for the period 2010 to 2035 are currently in preparation and will be finalised in 2009. These are referred to in this report as the Draft WRMPs and they are due to be issued for statutory consultation in May 2008. The completion of this report was delayed to ensure that this Study could effectively take on board the outcomes of the Draft WRMPs.

The Draft WRMPs are planned on the basis of the levels of growth set out in the Draft South East Plan, although sensitivity testing also assesses the implications of higher levels of growth.

3.3.1 Determining the Balance between Supply and Demand

The total volume of water available for supply at any given time (known as the "Water Available for Use" or WAFU) is not constant, but varies over time due to a number of factors including climatic variations (seasonal variability within years as well as from one year to the next) and the particular conditions on abstraction licences (which are often based on environmental protection requirements). Similarly, customer demand can be highly variable, with seasonal and longer term climatic variations again being the major factor. Under some more extreme conditions, Water Companies may actively seek to modify customer demands through restrictions such as hosepipe bans or through public appeals to avoid unnecessary use.

Thus, in order to evaluate the balance between supply and demand across a given area, the variation in the balance are tested under a range of "reference" conditions that reflect the variability through time described above. Three distinct conditions are routinely defined in water resource planning, all of which are set within the context of a defined "dry year", since it is in dry years that the supply demand balance is under most stress. These three conditions are:

- *The Annual Average condition* – this compares the estimated dry year annual average daily WAFU against the estimated dry year annual average daily demand.
- *The Peak Demand condition* – this compares the estimated average daily demand during a peak period (normally a hot dry week in June or July) with the estimated WAFU at the same time of year. For Southern Water, Peak Demand is typically between 1.4 and 2 times the Annual Average daily demand. For Portsmouth Water the factor is closer to 1.4.

- *The Minimum Deployable Output (MDO) condition* - this compares the estimated demand that is likely to occur at the time of year when WAFU is generally at its lowest (in an area such as South Hampshire which depends on chalk groundwater this is normally in early autumn (October and November) when groundwater levels are at their lowest and before the onset of winter recharge).

In all three cases, the means by which the Forecast Supply (WAFU) and Forecast Demand are determined follow industry agreed protocols which are reviewed prior to each 5-year WRP cycle. The Supply Demand Balance (SDB) is the difference between the two and this difference is known as "Available Headroom" (see below). However, the industry protocols recognise that forecasts of supply and demand are by definition "estimates" incorporating a range of uncertainties. To allow for these uncertainties in forward planning, an appropriate "buffer" between the Supply and Demand forecasts is determined by each Company. This buffer is known as "Target Headroom" and the "Demand plus Headroom" shown in Figure 3.2 thus defines the supply required to balance both the Forecast Demand and the Target Headroom. If WAFU is likely to be less than the Demand plus Headroom, the WRZ is considered to have a deficit in its SDB and the Company must plan for one or more interventions on the supply and/or demand side to ensure that a balance is maintained.

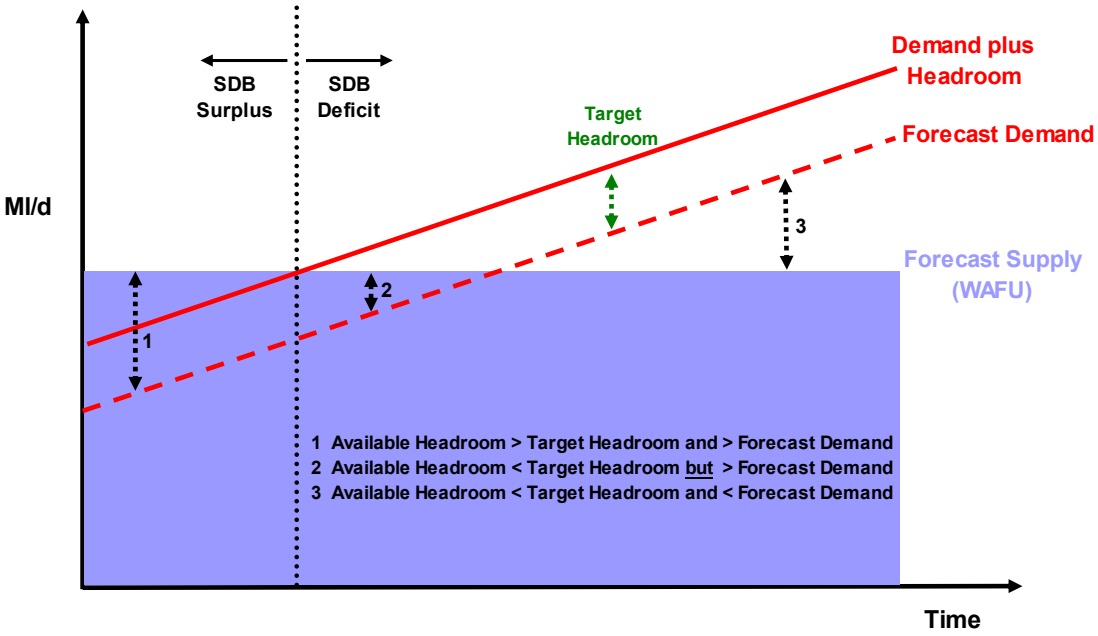


Figure 3.2 Schematic of the Supply Demand Balance (SDB)

3.3.2 The Supply Demand Balance in South Hampshire

Recent assessments have shown that in South Hampshire the SDB for both Southern Water and Portsmouth Water is most at risk under the "peak" demand reference condition. The analysis from this point forward therefore focuses on this aspect of the SDB.

The forecast peak period SDB for SW's Hampshire South Supply Zone and for the PW supply area (all zones) are shown in Table 3.3 for 2007. These figures are derived from the Draft WRMPs and it is important to understand that they are not the actual peak period demand and supply availability that occurred in 2007 but what demand and supply might have been had 2007 been a very warm dry year (it was

not!). What Table 3.3 shows, therefore, is that had 2007 been a very warm dry year, both Water Companies would have had sufficient water to supply peak demands.

Table 3.3 Peak Period SDB in South Hampshire in 2007

Reference Condition	Supply Demand Component	Southern Water (Hampshire South Zone) Ml/d	Portsmouth Water (All Zones) Ml/d
Peak	WAFU	241	294
	Demand plus Headroom	229	280
	Surplus/Deficit	+12	+14

3.3.3 Forecasting the Supply Demand Balance over the next 20 years

The key factors taken into account in developing a robust estimate of future supply and demand availability are summarised separately below. For more information, reference should be made to the Southern Water and Portsmouth Water Draft WRMPs.

3.3.3.1 Forecasting Demand

- *Population, Households and Household Occupancy Rate*

  Water demand is related both to the total number of people supplied and the total number of households in which that population live. There can be substantial differences in per capita consumption (the daily volume of water used by each person) with changes in the occupancy rate of households. Thus, forecasts of changes in all three factors in the PUSH area are required to forecast changes in demand over the next 20 years.

- *Proportion of Metered Households*

  Although there is much debate within the Water Industry regarding future trends, it is generally accepted that per capita consumption (PCC) in households that have a meter fitted is likely to be in the order of 10% less than in equivalent unmeasured households. For example, in 2006-07 average values for measured and unmeasured PCC were, respectively, 139 l/h/d and 157 l/h/d for SW and 149 l/h/d and 161 l/h/d for PW. This represents an 11% difference for SW and 8% for PW. Future plans for metering of household properties in South Hampshire (almost all commercial properties are already metered) are therefore an important factor in forecasting future demand.

- *Water Efficiency*

  This covers a range of measures that enable or encourage customers to use water more efficiently. Examples include the increased use of dual-flush toilets and water-efficient appliances and measures such as these are likely to be important to the scale of water use associated with new housing.

However, it remains difficult to disaggregate the impact of such measures from the impact of metering and longer term assumptions regarding trends in PCC. For the purposes of this study, the impact of water efficiency measures has therefore been incorporated as part of the assumptions on water use relating to future trends in metering and PCC.

- *Commercial Use*

  Commercial use in South Hampshire is currently about 40% of the total household use. Although a substantial component of water use, current projections suggest that demand from existing commercial uses is unlikely to grow over the next 20 years and this has been assumed to be the case in the forecasts outlined below. With respect to new commercial development, water use of 20 l/head/d has been based on CIRIA's W11 key performance indicators for water use in offices issued in Feb 2006.

- *Leakage*

  Losses to the distribution system through leakage have reduced substantially since the privatisation of the Water Industry in 1989 and most Water Companies are now operating at or below their Ofwat target for leakage. For Portsmouth Water and Southern Water, leakage levels currently average about 15-16% of the water pumped into the distribution system. Both SW and PW have now reached the stage where the costs of achieving further reductions in leakage may be substantially greater than the benefits gained and further reductions are therefore more likely to be at the Company's discretion, or in response to metered customers identifying leakage in supply pipes, rather than a regulatory requirement. For the purposes of the "baseline" demand forecast for the PUSH area, it has therefore been assumed that leakage will remain at current levels (this also assumes that there will be no additional leakage from new properties). Further leakage reduction is, however, considered later in this report as one of the options for balancing supply and demand in the longer term.

- *Climate Change*

  The effect of climate change on demand is estimated using the results from the *Climate Change and Demand for Water (CCDeW)* study, which was published in February 2003 (SI, 2003) as an update to the benchmark study by Herrington in 1996., (DoE, 1996). The CCDeW study examines the impact of the UKCIP02 climate change scenarios across a number of socio-economic customer groups to provide a range of potential impacts on water demands extending from the 2020's to the 2050's. Based on this work, climate change is estimated to lead to an increase in household and non- household of 1-1.5% (an increase in PCC of 1.5-2 l/h/d) over the next 25 years.

The figures and assumptions described above are reviewed and adjusted as a key component of the 5-year WRP cycle. This regular review also applies to the factors affecting supply, which are summarised below.

3.3.3.2 Forecasting Water Available for Supply (WAFU)

- *Source Deployable Outputs (DO)*

The DO of a given water source is the best estimate of the maximum licensed volume of water that can be obtained from a source under the reference conditions described previously. A source DO is derived from the abstraction licence conditions, historical precedent (i.e. what was actually obtained under given climatic and hydrological conditions), hydrological and/or network distribution models and pumping tests (in the case of groundwater sources).

There are several means through which the DO of a source may change through time and each of these needs to be considered when forecasting future availability of supply. The most important of these are:

- Reassessment of source yields (through improved testing and/or modelling) – ongoing monitoring and investigations of a source may lead to an increase or decrease in DO through better understanding of yield availability.

- Improvements in the efficiency of operation of a source, including any associated treatment works.

- Changes in raw water quality (groundwater or surface water) leading to intermittent or continuous changes in the usability of a source.

- Climate Change - as with the demand forecast, the potential impact of climate change on longer term availability of supply is based on protocols agreed with the EA, often through jointly funded research projects which build on UKCIP scenarios. The supply forecasts in the Draft WRMPs estimate that climate change is likely to reduce supply availability by less than 1% under the "peak" and "minimum resource" (MDO) conditions.

- Regulatory changes to licences – over the last 20 years an increasing number of questions have been raised regarding the environmental sustainability of some of the licences that enable abstraction for supply to the South Hampshire area. The environmental concerns relate primarily to the potential impacts of reduced river flows on water quality and aquatic ecology and that of reduced freshwater flows on important coastal habitats and bird populations. These issues have recently been the subject of a comprehensive and ongoing "Review of Consents" undertaken by the EA as it seeks to fulfil the requirements of the EU Habitats Directive and its own "Restoring Sustainable Abstraction" programme. In late 2007, the EA issued its first set of recommendations for changes to abstraction licences (recommendations relating to consented discharges are dealt with elsewhere in this report). These recommendations are made on a precautionary basis i.e. once implemented, the EA has a high degree of confidence that the revised licences will not represent any significant risk to the environment. Whilst addressing environmental concerns, however, the proposed licence changes will give rise to significant reductions in the DO of the sources concerned. These are known as "Sustainability Reductions". A further regulatory change is the move towards time limited abstraction licences, away from the open ended licences that have historically been issued.

- *Inter-Zone and Inter-Company Transfers*

  In addition to the water supply available from the sources within a water resource zone, water may be transferred into or out of a zone to other parts of the supply network. For example, at times of summer peak demands, Southern Water transfers water from South Hampshire via the cross-Solent pipeline to the Isle of Wight. Water may also be transferred to or from another Water Company (known as "bulk transfers"). For some years, Water Companies in the South East have entered into fixed term bulk supply agreements as a means of improving the efficient use of available resources across the region. These agreements state the volumes of water that will be available to transfer and the conditions (particularly timing) under which it will be made available.

  Forecasting supply availability thus also needs to take into account the future size and duration of such transfers in a given area.

3.3.4 Scenario Testing

The section above illustrates that there is a wide range of components that could influence the future status of the supply-demand balance in the PUSH area over the next 20 years. Supply-demand balance forecasts have therefore been developed for a set of defined supply and demand scenarios for the PUSH area for the period to 2030 and are these are discussed below. These scenarios take account of the most likely changes in demand components, the impacts of the forecast growth in the PUSH area, increased environmental protection and the potential impacts of climate change highlighted previously. The forecasts are also presented for the "Peak period" reference condition, since this is the period during which both Southern Water and Portsmouth Water are most constrained in the Hampshire supply area.

3.3.4.1 Scenario 1 - Baseline Forecast

This scenario assumes no major changes to the current components, including population and households (i.e. it assumes no growth across the PUSH area).

The supply and demand side components of the Baseline scenario are described below. Where relevant for comparison with other scenarios, actual values on the demand side *for the PUSH area alone* are summarised in Table 3.4. The resulting peak period supply demand balance is shown on Figure 3.3 and Figure 3.4 for the relevant Southern Water and Portsmouth Water supply areas, respectively.

Table 3.4 Scenario 1 (Baseline) Demand Forecast for the PUSH Area based on no population and household growth to 2026

SCENARIO 1 – BASELINE (NO GROWTH)		2006	2011	2016	2021	2026	Change (2006-26)
SOUTHERN WATER	Population	483,758	483,758	483,758	483,758	483,758	0
	Households	202,524	202,524	202,524	202,524	202,524	0
	Meter Penetration (%)	30%	40%	63%	76%	83%	53%
	Unmeasured PCC (l/h/d)	157	157	157	157	157	0
	Measured PCC (l/h/d)	139	139	139	139	139	0
	New Housing PCC (l/h/d)	N/A	N/A	N/A	N/A	N/A	N/A
	Total leakage (Ml)	18	18	18	18	18	0
	New Housing Demand (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
	Existing Housing Demand (Ml/d)	73.33	70.76	67.11	64.58	63.01	-10.32
	Commercial Demand (Ml/d)	29.33	29.33	29.33	29.33	29.33	0.00
	TOTAL DEMAND (Ml/d)	120.84	118.26	114.61	112.08	110.52	-10.32
	Average PCC (l/h/d)	152	150	146	143	142	-9.54
PORTSMOUTH WATER	Population	519,368	519,368	519,368	519,368	519,368	0
	Households	217,432	217,432	217,432	217,432	217,432	0
	Meter Penetration (%)	6%	15%	22%	29%	35%	29%
	Unmeasured PCC (l/h/d)	161	161	161	161	161	0
	Measured PCC (l/h/d)	149	149	149	149	149	0
	New Housing PCC (l/h/d)	N/A	N/A	N/A	N/A	N/A	N/A
	Total leakage (Ml)	22	22	22	22	22	0
	New Housing Demand (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
	Existing Housing Demand (Ml/d)	83.23	80.69	78.29	76.24	74.69	-8.54
	Commercial Demand (Ml/d)	33.29	33.29	33.29	33.29	33.29	0.00
	TOTAL DEMAND (Ml/d)	138.23	135.69	133.29	131.24	129.69	-8.54
	Average PCC (l/h/d)	160	159	158	158	157	-3.48

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Demand side components

- No growth in household or commercial properties in the PUSH area.
- Measured and unmeasured per capita consumption (PCC) remains at 2006-07 levels.
- Installation of meters continues in line with current Southern Water or Portsmouth Water policy. For Southern Water, this means any householder that opts for a meter and meter installation at all households on change of occupancy. This will see an estimated increase in metered households from 30% in 2007 to 83% in 2026. For Portsmouth Water, which recently decided to meter on change of occupancy, this equivalent increase will be from 11% to 30%.
- Impact of water efficiency measures accounted for within PCC and metering assumptions.
- Impacts of climate change on existing demand accounted for in line with Industry protocols outlined above (this is included within the Southern Water or Portsmouth Water baseline WRMP values used in this report).
- Demand from existing commercial properties remains constant.
- Leakage remains constant.

Supply side components

- Current abstraction licences remain as they are.
- No change in internal or external water transfers.
- Includes minor changes in DO identified in the Southern Water or Portsmouth Water WRMPs.
- Impacts of climate change on existing DOs are accounted for in line with industry protocols outlined above (as with the demand side, these are included within the Southern Water or Portsmouth Water baseline WRMP values used in this report).

Figure 3.3 illustrates that in the absence of any of the planned growth in the PUSH area beyond 2007, Southern Water will be able to maintain a surplus of supply over demand over the period to 2030 and that this is likely to grow from the current surplus of 12 Ml/d to nearly 30 Ml/d. This growth in surplus is due to a steady reduction in demand, with average PCC reducing from 152 l/h/d to 142 l/h/d. This reduction is driven by the significant increase in household metering and the assumption that historically observed reductions in demand with metered households will continue to be observed in the future.

Figure 3.4 shows that the situation is quite similar for Portsmouth Water, in that in the absence of any further growth a surplus of supply over demand would be maintained over the period to 2030 without the need for any new water resource schemes. In this instance, however, a slight reduction in the surplus is forecast. This reduction is driven by a steady rise in Target Headroom to over 45 Ml/d, primarily due to the

uncertainty associated with the renewal of its time-limited abstraction licences. This issue will be discussed further in later sections.

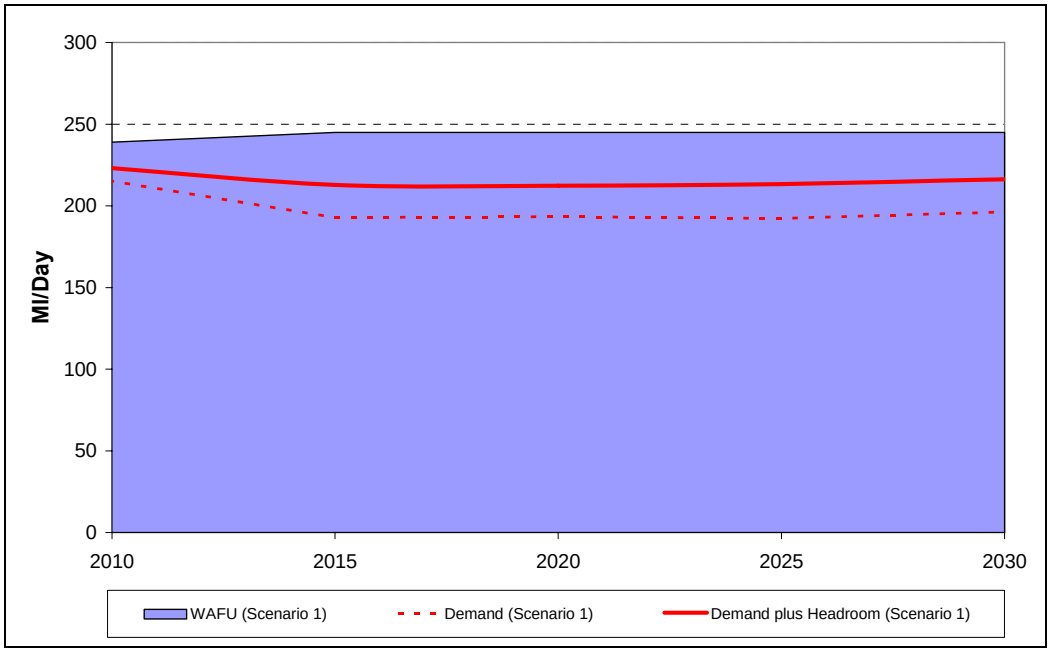


Figure 3.3 Scenario 1 (Baseline – No Growth) Forecast Peak Period Supply Demand Balance for Southern Water's Hampshire South WRZ

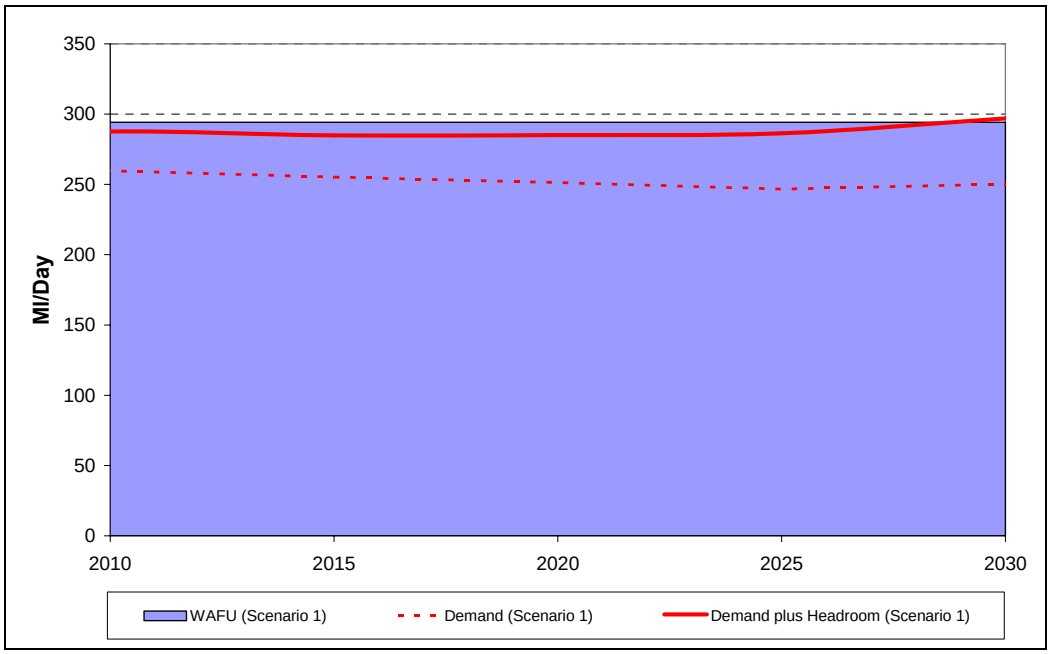


Figure 3.4 Scenario 1 (Baseline – No Growth) Forecast Peak Period Supply Demand Balance for Portsmouth Water's WRZs

3.3.4.2 Scenario 2 - Impact of Proposed Growth

The potential impact of the proposed levels of household and population growth is shown in Figure 3.5 and Figure 3.6 below. Since all new households will be metered, the initial assumption in this scenario is that per capita consumption in new households will be the same as that used for existing metered households in Scenario 1. Growth in commercial demand arising from new development is minimal (in the order of 0.5 Ml/d across each of the Water Company supply zones).

In this instance, two sub-scenarios for the impact of growth on demand have been tested:

- Scenario 2a - apart from the new household and commercial demands, all other demand and supply side components (see Table 3.5) remain the same as Scenario 1.

- Scenario 2b - measured and unmeasured PCC grows by 2 l/h/d every 5 years (from 2006-07 levels) to reflect the forecast reduction in household occupancy rates.

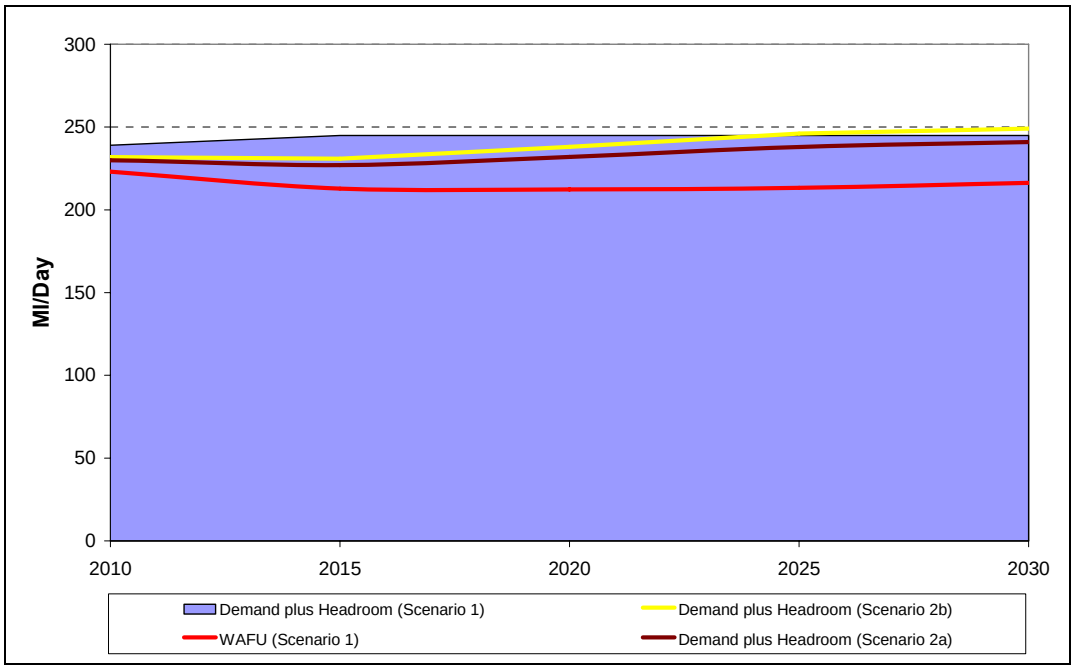


Figure 3.5 Scenario 2 (a&b) Peak Period Forecast Supply Demand Balance for Southern Water's Hampshire South WRZ

Figure 3.5 shows that even with the increased demand from the proposed growth in new households, current supply would still meet demand in 2030 if household PCC remains at current levels for both measured and unmeasured households (the average PCC reduces by 10 l/h/d due to the significant increase in the proportion of measured households). Were the forecast growth to be accompanied by a rise in measured and unmeasured PCC in the order of 5% (average PCC would still remain at or below current levels), as projected in Scenario 2b, there may be a minor deficit in supply by 2030. However, at less than 5 Ml/d, this deficit is well within the bounds of "headroom" uncertainty and it is therefore far from certain at this stage that the forecast deficit will necessitate new resource development nearer the time.

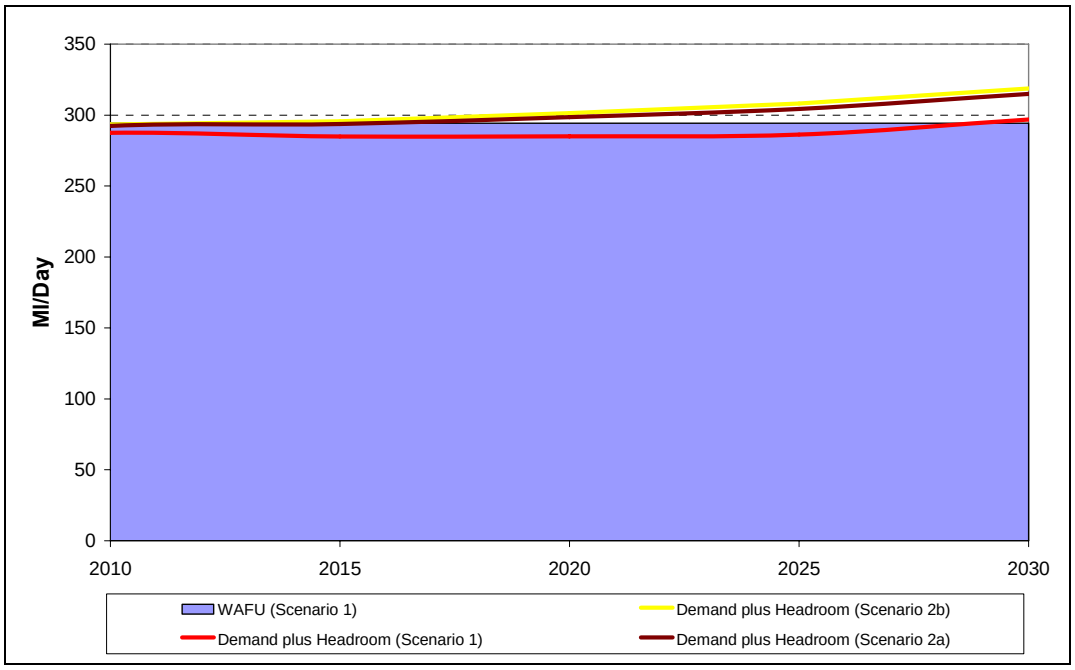


Figure 3.6 Scenario 2 (a&b) Peak Period Forecast Supply Demand Balance for Portsmouth Water's WRZs

With regard to Portsmouth Water, Figure 3.6 shows a slightly different picture. Here, the proposed growth in households is forecast to give rise to a deficit in the supply demand balance of between 21 Ml/d (Scenario 2a) and 25 Ml/d (Scenario 2b) by 2030. However, these deficits are also well within the headroom component (45 Ml/d) of Demand plus Headroom. In other words, under both scenarios forecast demand in 2030 is still below the forecast supply (Forecast WAFU) and the need for new schemes would be driven primarily by the headroom component of the supply demand balance.

Table 3.5 Scenario 2a Demand Forecast for the PUSH Area based on population and household growth to 2026

SCENARIO 2a – BASELINE PLUS GROWTH		2006	2011	2016	2021	2026	Change (2006-26)
SOUTHERN WATER	Population	483,758	497,323	512,243	523,142	534,699	50,941
	Households	202,524	213,274	225,249	234,978	244,094	41,570
	Meter Penetration (%)	30%	40%	63%	76%	83%	53%
	Unmeasured PCC (l/h/d)	157	157	157	157	157	0
	Measured PCC (l/h/d)	139	139	139	139	139	0
	New Housing PCC (l/h/d)	139	139	139	139	139	0
	Total leakage (Ml)	18	18	18	18	18	0
	New Housing Demand (Ml/d)	0.00	3.48	7.18	10.04	12.66	12.66
	Existing Housing Demand (Ml/d)	73.33	70.76	67.11	64.58	63.01	-10.32
	Commercial Demand (Ml/d)	29.33	29.61	29.80	29.89	29.98	0.64
	TOTAL DEMAND (Ml/d)	120.84	122.03	122.26	122.68	123.82	2.98
	Average PCC (l/h/d)	152	150	146	143	142	-9.54
PORTSMOUTH WATER	Population	519,368	529,638	534,719	546,572	560,477	41,109
	Households	217,432	227,132	235,132	245,502	255,862	38,430
	Meter Penetration (%)	6%	15%	22%	29%	35%	29%
	Unmeasured PCC (l/h/d)	161	161	161	161	161	0
	Measured PCC (l/h/d)	149	149	149	149	149	0
	New Housing PCC (l/h/d)	149	149	149	149	149	0
	Total leakage (Ml)	22	22	22	22	22	0
	New Housing Demand (Ml/d)	0.00	3.37	6.00	9.31	12.54	12.54
	Existing Housing Demand (Ml/d)	83.23	80.69	78.29	76.24	74.69	-8.54
	Commercial Demand (Ml/d)	33.29	33.47	33.78	33.81	33.84	0.55
	TOTAL DEMAND (Ml/d)	138.23	139.24	139.77	141.06	142.77	4.55
	Average PCC (l/h/d)	160	159	158	158	157	-3.48

Table 3.6 Scenario 2b Demand Forecast for the PUSH Area based on population and household growth to 2026

SCENARIO 2b – BASELINE + GROWTH + PCC RISE		2006	2011	2016	2021	2026	Change (2006-26)
SOUTHERN WATER	Population	483,758	497,323	512,243	523,142	534,699	50,941
	Households	202,524	213,274	225,249	234,978	244,094	41,570
	Meter Penetration (%)	30%	40%	63%	76%	83%	53%
	Unmeasured PCC (l/h/d)	157	159	161	163	165	8
	Measured PCC (l/h/d)	139	141	143	145	147	8
	New Housing PCC (l/h/d)	139	141	143	145	147	8
	Total leakage (Ml)	18	18	18	18	18	0
	New Housing Demand (Ml/d)	0.00	3.56	7.49	10.62	13.66	13.66
	Existing Housing Demand (Ml/d)	73.33	71.68	68.85	67.20	66.29	-7.04
	Commercial Demand (Ml/d)	29.33	29.61	29.80	29.89	29.98	0.64
	TOTAL DEMAND (Ml/d)	120.84	123.02	124.31	125.88	128.10	7.26
	Average PCC (l/h/d)	152	152	150	149	150	-1.54
PORTSMOUTH WATER	Population	519,368	529,638	534,719	546,572	560,477	41,109
	Households	217,432	227,132	235,132	245,502	255,862	38,430
	Meter Penetration (%)	6%	15%	22%	29%	35%	29%
	Unmeasured PCC (l/h/d)	161	163	165	167	169	8
	Measured PCC (l/h/d)	149	151	153	155	157	8
	New Housing PCC (l/h/d)	149	151	153	155	157	8
	Total leakage (Ml)	22	22	22	22	22	0
	New Housing Demand (Ml/d)	0.00	3.44	6.24	9.81	13.47	13.47
	Existing Housing Demand (Ml/d)	83.24	81.34	79.37	77.73	76.47	-6.77
	Commercial Demand (Ml/d)	33.30	33.48	33.78	33.81	33.84	0.55
	TOTAL DEMAND (Ml/d)	138.24	139.96	141.09	143.05	145.48	7.24
	Average PCC (l/h/d)	160	161	162	164	165	4.52

3.3.4.3 Scenario 3 – "Sustainability Reductions" to Abstraction Licences

Whilst Scenarios 1 and 2 were defined by changes in "demand side" components of the supply demand balance, Scenario 3 is defined by potential changes to the supply side.

The brief for this project highlighted the concerns that the EA and other stakeholders have expressed regarding the sustainability of existing abstractions. Scenario 3 takes account of the EA's initial proposals, formulated as part of its regulatory duties, to modify abstraction licences to a level at which it is satisfied that there will be no adverse effects on aquatic habitats or species protected by the EU Habitats Directive. The proposals for the public water supply abstractions on the River Itchen constitute the most radical revision of abstraction licences on the grounds of environmental protection yet seen in the UK. They can be summarised as follows:

- No change to licensed abstraction on any single day.
- Reductions in the aggregate monthly abstraction in the June to September period (this impacts both the Peak and MDO period supply availability).
- The imposition of a Minimum Residual Flow (MRF) at the Allbrook & Highbridge and Gaters Mill gauging stations.

For more information on the EA's review of abstractions on the River Itchen, reference should be made to its Site Action Plan issued in October 2007.

The likely impact of the proposed "Sustainability Reductions" on the supply demand balance for the PUSH area is shown in Figure 3.7 and Figure 3.8 for the Southern Water and Portsmouth Water supply areas, respectively. The figures are based on the assumption that the reductions are implemented during 2015, the first year of the AMP6 planning period.

With regard to Southern Water, the sustainability reductions reduce the water available for supply in very dry years during periods of peak demand by about 86 Ml/d (35%). As can be seen, this will create a very significant deficit in the supply demand balance, varying from 57 Ml/d in 2030, if plans for growth in the PUSH area were abandoned with immediate effect, up to 90 Ml/d if the growth went ahead as planned and PCC were to rise as forecast in Scenario 2b. These two demand scenarios thus provide an initial estimate of the "deficit envelope" that Southern Water will need to address as and when the proposed reductions are implemented.

With regard to Portsmouth Water, the impact of the proposed sustainability reductions is a reduction in available supply of about 10 Ml/d in dry year peak periods. Whilst much less than for Southern Water it is still significant, with the total deficit under Scenario 2b forecast to be as much as 35 Ml/d by 2030.

Combining the forecasts for the Southern Water and Portsmouth Water supply areas in South Hampshire gives rise to a "deficit envelope" of between 70 Ml/d for Scenario 1 (no growth in the PUSH Area) and 125 Ml/d for Scenario 2b (growth in the PUSH area including a rise in PCC).

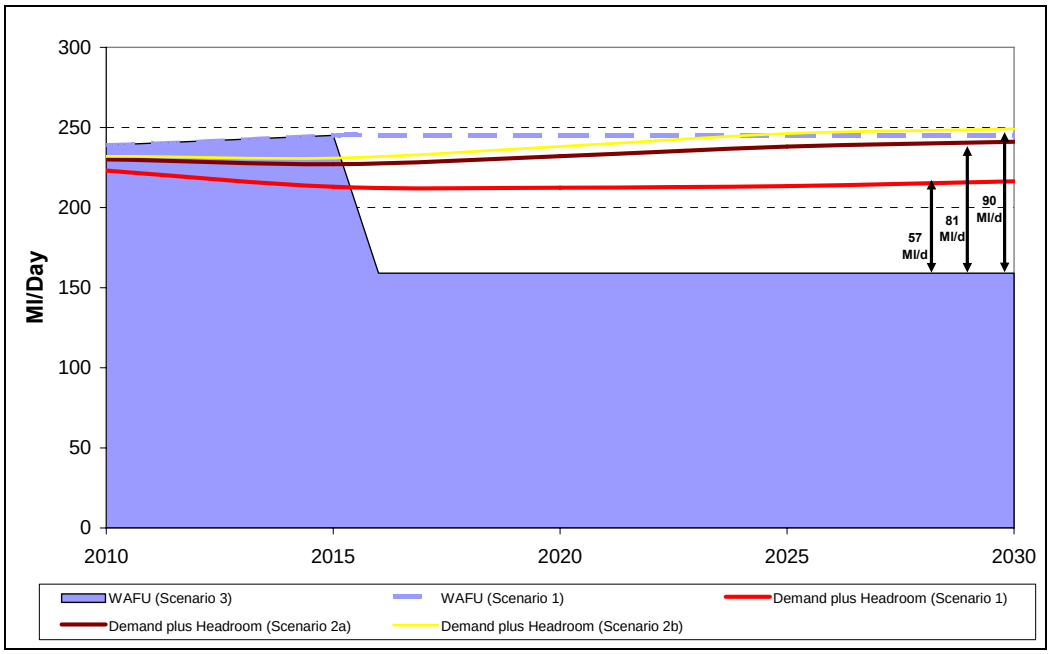


Figure 3.7 Scenario 3 Peak Period Forecast Supply Demand Balance for Southern Water's Hampshire South WRZ

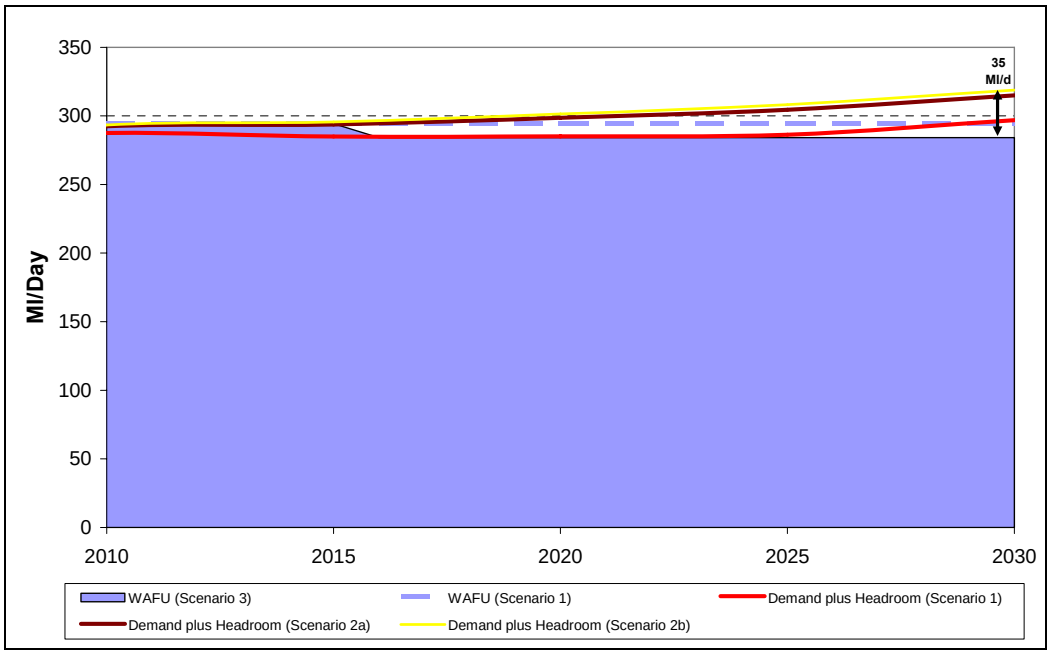


Figure 3.8 Scenario 3 Peak Period Forecast Supply Demand Balance for Portsmouth Water's WRZs

3.3.5 Additional Demand Forecast Scenarios

The EA has given the Water Companies notice that they will face "sustainability reductions" in their licences and, as part of the water resource planning process, the Companies are obliged to identify, appraise and schedule the implementation of options to address the forecast deficit in the supply demand balance. The final two scenarios below examine the extent to which two of the key demand management options might contribute toward reducing the forecast deficits.

3.3.5.1 Scenario 4 – Universal Compulsory Metering of all Households

Much of the South East, including Hampshire, has recently been accorded "water scarcity" status by Defra. The significance of this is that it gives enhanced powers to Water Companies to install meters on all households. Alongside this, Defra has asked all Water Companies in the South East to include the option for universal compulsory metering in their Draft WRMPs and Southern Water and Portsmouth Water have both included it as part of their preferred investment strategies. Scenario 4 assumes that Southern Water and Portsmouth Water implement their programme of compulsory metering in line with their preferred strategy. This means full implementation by 2015 for Southern Water and by 2035 for Portsmouth Water. The demand forecasts presented below in Table 3.7, Figure 3.9 and Figure 3.10 assume a linear rate of meter installation up to a maximum of 93% meter penetration (for various reasons metering of a small minority of properties will not be viable and 93% is taken to effectively be full meter penetration).

3.3.5.2 Scenario 5 – Universal Compulsory Metering of all Households and Significantly Reduced Demand in New Houses

One of the policy recommendations of this report is that all new houses must as a minimum be constructed in accordance with the requirements of the Code for Sustainable Homes (CSH) Level 1. With regard to water use, the design elements are such that occupiers should be able to achieve a per capita consumption of 120 l/h/d. Scenario 5 assumes that not only are all new homes built to fulfil these requirements but, more importantly, subsequent occupier behaviour with regard to water use actually achieves a PCC of 120l/h/d. It must be noted that this scenario is highly optimistic since there is little evidence to date to suggest that occupiers of water efficient dwellings are more water efficient than occupiers of non-water efficient dwellings. The Demand Forecasts for this scenario are summarised in Table 3.8 and the supply demand balance forecasts for Scenarios 4 and 5 are summarised in Figure 3.9 and Figure 3.10, along with the forecasts for the previous scenarios.

Table 3.7 Scenario 4 Demand Forecast for the PUSH Area based on population and household growth to 2026

SCENARIO 4 – COMPULSORY METERING		2006	2011	2016	2021	2026	Change (2006-26)
SOUTHERN WATER	Population	483,758	497,323	512,243	523,142	534,699	50,941
	Households	202,524	213,274	225,249	234,978	244,094	41,570
	Meter Penetration (%)	30%	40%	93%	93%	93%	63%
	Unmeasured PCC (l/h/d)	157	157	157	157	157	0
	Measured PCC (l/h/d)	139	139	139	139	139	0
	New Housing PCC (l/h/d)	139	139	139	139	139	0
	Total leakage (Ml)	18	18	18	18	18	0
	New Housing Demand (Ml/d)	0.00	3.48	7.18	10.04	12.66	12.66
	Existing Housing Demand (Ml/d)	73.33	70.76	64.61	63.26	62.24	-11.10
	Commercial Demand (Ml/d)	29.33	29.61	29.80	29.89	29.98	0.64
	TOTAL DEMAND (Ml/d)	120.84	122.03	119.77	121.36	123.04	2.20
	Average PCC (l/h/d)	152	150	140	140	140	-11.34
PORTSMOUTH WATER	Population	519,368	529,638	534,719	546,572	560,477	41,109
	Households	217,432	227,132	235,132	245,502	255,862	38,430
	Meter Penetration (%)	6%	21%	36%	51%	66%	60%
	Unmeasured PCC (l/h/d)	161	161	161	161	161	0
	Measured PCC (l/h/d)	149	149	149	149	149	0
	New Housing PCC (l/h/d)	149	149	149	149	149	0
	Total leakage (Ml)	22	22	22	22	22	0
	New Housing Demand (Ml/d)	0.00	3.37	6.00	9.31	12.54	12.54
	Existing Housing Demand (Ml/d)	83.23	80.35	77.47	74.95	72.91	-10.32
	Commercial Demand (Ml/d)	33.30	33.48	33.78	33.81	33.84	0.55
	TOTAL DEMAND (Ml/d)	138.23	138.90	138.95	139.77	141.00	2.77
	Average PCC (l/h/d)	160	158	157	155	153	-7.20

Table 3.8 Scenario 5 Demand Forecast for the PUSH Area based on population and household growth to 2026

SCENARIO 5 – LEVEL 3 DEMAND IN NEW HOMES PLUS COMPULSORY METERING		2006	2011	2016	2021	2026	Change (2006-26)
SOUTHERN WATER	Population	483,758	497,323	512,243	523,142	534,699	50,941
	Households	202,524	213,274	225,249	234,978	244,094	41,570
	Meter Penetration (%)	30%	40%	93%	93%	93%	63%
	Unmeasured PCC (l/h/d)	157	157	157	157	157	0
	Measured PCC (l/h/d)	139	139	139	139	139	0
	New Housing PCC (l/h/d)	120	120	120	120	120	0
	Total leakage (Ml)	18	18	18	18	18	0
	New Housing Demand (Ml/d)	0.00	2.96	6.10	8.53	10.75	10.75
	Existing Housing Demand (Ml/d)	73.33	70.76	64.61	63.26	62.24	-11.10
	Commercial Demand (Ml/d)	29.33	29.61	29.80	29.89	29.98	0.64
	TOTAL DEMAND (Ml/d)	120.84	121.50	118.68	119.84	121.13	0.29
	Average PCC (l/h/d)	152	149	138	137	137	-14.87
PORTSMOUTH WATER	Population	519,368	529,638	534,719	546,572	560,477	41,109
	Households	217,432	227,132	235,132	245,502	255,862	38,430
	Meter Penetration (%)	6%	21%	36%	51%	66%	60%
	Unmeasured PCC (l/h/d)	161	161	161	161	161	0
	Measured PCC (l/h/d)	149	149	149	149	149	0
	New Housing PCC (l/h/d)	120	120	120	120	120	0
	Total leakage (Ml)	22	22	22	22	22	0
	New Housing Demand (Ml/d)	0.00	2.67	4.75	7.37	9.93	9.93
	Existing Housing Demand (Ml/d)	83.23	80.35	77.47	74.95	72.91	-10.32
	Commercial Demand (Ml/d)	33.30	33.48	33.78	33.81	33.84	0.55
	TOTAL DEMAND (Ml/d)	138.23	138.20	137.70	137.84	138.39	0.16
	Average PCC (l/h/d)	160	157	155	152	149	-11.52

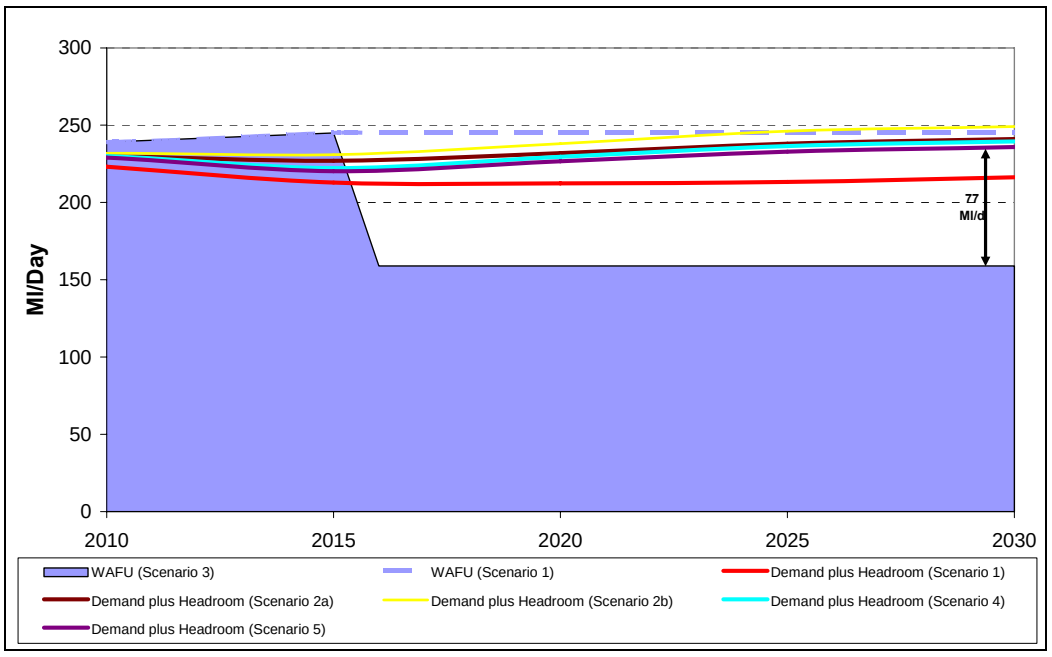


Figure 3.9 Summary of Scenarios 1-5 for the Peak Period Demand Forecast for Southern Water's Hampshire South WRZ

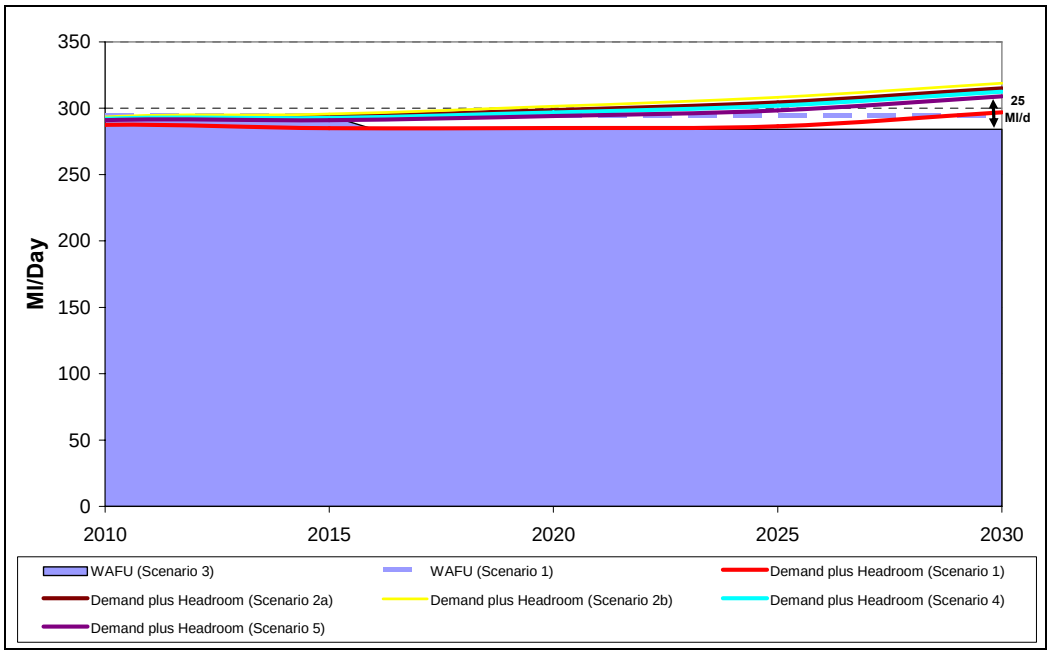


Figure 3.10 Summary of Scenarios 1-5 for the Peak Period Demand Forecast for Portsmouth Water's WRZs

For Southern Water, a programme of universal compulsory metering will reduce the PUSH area peak demand by nearly 1 Ml/d by 2030 compared with its current policy of installing meters on new homes and on change of occupancy at existing homes. Assuming that the PCC of customers in new homes is around the CSH target of 120 l/h/d, there may be scope for a further saving of 4 Ml/d on peak demand by 2030. However, as Figure 3.9 illustrates, the impact of the proposed sustainability

reductions on supply would still leave a peak period supply demand deficit in South Hampshire of nearly 80 Ml/d.

For Portsmouth Water, its strategy of achieving universal compulsory metering by 2035 is likely to reduce the PUSH area peak demand by about 6 Ml/d. A PCC in new homes of 120 l/h/d would again give rise to a further 4 Ml/d reduction in peak demand.

Thus, of the forecast maximum deficit of 125 Ml/d in South Hampshire, a maximum of 15 Ml/d may be met through Water Company plans for universal compulsory metering and through the realisation of significant (though perhaps optimistic) reductions in PCC in new households. It is reasonable to assume that a further 5 Ml/d might be realised through further reductions in leakage (largely arising from customer supply pipes) and additional water efficiency measures such as retro-fitting of dual flush devices at existing households.

An optimistic forecast of potential demand side reductions across the PUSH area would therefore be 20 Ml/d. A more realistic forecast would probably be 15 Ml/d. Although significant, it is clear that additional options with a total peak period deployable output of at least 100 Ml/d will still be required.

In its Draft WRMP, Southern Water estimates the cost of its entire strategy for demand side measures in Hampshire to be in the order of £40M. The majority of this cost will be incurred in the Hampshire South Water Resource Zone. It is probably reasonable to estimate at least a similar figure for Portsmouth Water (the figures are not disclosed in its Draft WRMP). Given that not all these costs would be incurred in the PUSH area, the total investment over the next 25 years in the PUSH area will probably be in the order of £60-70M.

3.4 Identification and Appraisal of Resource Options

3.4.1 Background

Partly in recognition of the potential impact of the sustainability reductions on the supply demand balance in Hampshire, Ofwat agreed in 2004 that investigations proposed by Southern Water and Portsmouth Water in their respective Business Plans for the 2005-2010 period should be funded. These investigations were as follows:

- Southern Water – a comprehensive assessment of the options available for maintaining the supply demand balance in the light of the EA's proposals for amending licences. This two year project was completed in 2007 and the findings have been incorporated as part of the Company's Draft WRMP. The EA was also involved as part of the Steering Group for the options appraisal process.

- Portsmouth Water – investigations and preparation of the necessary documentation in support of a planning application for a winter storage reservoir at Havant Thicket. The relevant findings have contributed to the Water Company's Draft WRMP and a planning application is due to be submitted in 2009. This work has been undertaken with the input of a Stakeholder Group, including relevant local authority representatives and the EA.

This appraisal draws on the outcomes of these two assessments, which together have identified and appraised in excess of 100 potential resource options. The majority of these were excluded in a first screening assessment on the basis of one or more of the following considerations:

- Does the option provide a SDB benefit? The option(s) should be able to ensure that the predicted need for water within the relevant WRZs is satisfied to the appropriate service level.

- Technical feasibility. There may be water related environmental constraints (particularly for borehole developments, aquifer recharge or run-of-river abstractions) that mean a scheme cannot achieve any useable DO, or there could be physical or chemical constraints (although these are more likely to relate to issues over practicability of deliverability, rather than basic technical feasibility).

- Practicality, reliability and deliverability. Are there water quality constraints or issues that would lead to unacceptable risks to the consumer, or grossly excessive monetary or environmental costs, in comparison to other available options? Would the scheme require significantly disproportionate capital or operational costs compared to the anticipated DO, in comparison to other available options? Would the scheme be reliant on technologies that are as yet unproven in the commercial environment, meaning that there are excessive risks surrounding its deliverability, in comparison to other available options?

- Environmental or social impacts that mean the option is likely to be sufficiently unacceptable to exclude at an early stage.

3.4.2 Categories of Resource Options

The general categories of resource options and, where relevant, the problems and benefits that tend to be associated with their development are summarised below:

i) Area specific "Local"

These options are specific to the Water Resource Zones and may include:

- New surface storage reservoirs;

- Increases in abstraction from existing sources up to licence by removing treatment or other infrastructure constraints;

- Enlarging existing reservoirs;

- New transfer pipelines to increase the capacity to move water from one area of supply to another. Although these options may not themselves represent any "new" resource, they can be critical in ensuring that such resources are able to supply those zones most in need;

- Re-commissioning licensed sources that are either mothballed or not currently used for water quality reasons; and

- Licence variations to increase current licensed quantities.

A generalised summary of problems and benefits associated with these options is not possible since they tend to be specific to the options being considered.

ii) Desalination

A regional desalination study was conducted by Southern Water for the entire zone as this treatment option offers the potential to use saline groundwater, costal or tidal water which could not otherwise be exploited by traditional treatment techniques. The study investigated coastal desalination, offshore desalination, deep groundwater desalination, coastal aquifers and tidal rivers.

The main problems to be addressed with desalination tend to be:

- Availability of appropriate sites given the highly developed built up areas and the environmental sensitivity of the undeveloped South Hampshire coastline.
- The degree of treatment required (this varies depending on whether the source is groundwater, estuarine, or marine i.e. the more saline the water, the more treatment is required).
- Generates concentrated brine waste which can present disposal difficulties at some sites.
- Energy use in treatment can be very high.
- Capital costs of investment are generally high.
- Environmental and capital costs of transfer pipelines.

The main benefits of desalination tend to be:

- Reliable yield of water.
- Robust to climate change.
- Proven technology.
- Flexible – generally lends itself to intermittent use.

iii) Transfer Schemes

A range of possible transfer options such as transfers within the Southern Water Supply area, Inter-company bulk transfers within the south east region, termination of existing bulk supplies to other Water Companies and transfers from outside the south east region have been considered.

iv) Wastewater recycling

As many of SW Wastewater Treatment Works (WWTW) are located in coastal areas, a significant proportion of water abstracted from rivers and aquifers is discharged directly to estuaries or to the sea and is effectively lost as a freshwater source. The recycling of treated effluent from municipal WWTW for direct potable re-use, direct non-potable reuse, indirect potable use (recharge of

groundwater aquifers) and indirect potable use (supplementing river flows and surface water storage) has been considered.

The main problems to be addressed with wastewater re-use tend to be:

- Quality standards for treatment.
- The costs of and energy use of pumping wastewater from coastal areas back up the catchment. This tends to rule out all but the most "local" of schemes.
- Public concern about the re-use of wastewater for potable water and the complexity of explaining the different implications of the various options for re-use.
- Capital and operating costs are generally high.
- Environmental and construction costs associated with transfer pipelines.

The main benefits of wastewater re-use tend to be:

- Reliable yield of water – even in dry weather there is a steady yield of wastewater.
- Robust to climate change – dry weather flows are unlikely to change significantly with climate change.
- Freshwater is used much more intensively before being ultimately "lost" to sea.

v) Aquifer Storage and Recovery (ASR)

The principle of ASR is that either potable water or raw water that could be used for potable purposes is injected into a confined or semi-confined aquifer to create a bubble of fresh water that can be re-abstracted when required. Unconfined aquifers were not considered to be a suitable target for the study.

3.4.3 Resource Options rejected at the Screening Stage

More than 70 options or sub-options were rejected during the Screening appraisals undertaken by the two Water Companies. Some of the most significant were:

- Abstraction from the Basingstoke Canal. The only active waterway within Hampshire is the Basingstoke canal, owned by Hampshire and Surrey County Councils and managed by the Basingstoke Canal Authority. Any abstraction is likely to have an adverse impact on navigation so is not considered to be feasible.
- Use of existing Flood Storage Reservoirs. There are no existing flood storage reservoirs within Hampshire that could be used for public water supply.
- Purchase of other abstraction licences. Given the CAMS designations across Hampshire, it is highly unlikely that the EA would amend an existing licence by changing the designated use to public water supply.

- Transfers by sea into Hampshire via tankers or towing icebergs are not considered to be environmentally sustainable, let alone cost-effective

- Bulk transfers. Neighbouring companies do not at present have spare resources for transfers into Hampshire. There are proposals for a new reservoir in the Upper Thames which could theoretically provide additional resources into Hampshire from the north. However, the scheme is unlikely to have been successfully promoted, constructed and commissioned for at least 20 years and its successful promotion is far from guaranteed. There are also significant environmental concerns about the transfer of raw water between catchments with specific concerns about water quality and potential impacts on fisheries and other in-river ecology.

- ASR – there are no suitable opportunities for ASR in the Hampshire area.

3.4.4 Appraisal of "Constrained" Resource Options

Those options which passed the initial screening carried through to the next stage were then defined in much greater detail. Their relative benefits and dis-benefits were then compared using a multi-criteria analysis (MCA) and this is summarised below in Table 3.9. The purpose of this exercise was to identify a shortlist of "preferred" options, since no single option will be sufficient on its own to meet the forecast supply demand deficit with the sustainability reductions. Since there can be no guarantee that every option would deliver the required yield on time, if at all, the aim was that the total peak period deployable output of shortlisted options should be well in excess of the 100 Ml/d forecast deficit in the supply demand balance.

Table 3.9 Multi-Criteria Analysis of Resource Options

Ref	Option Name	Water Resource Suitability	Technical Reliability	Economic Viability[2]	Aquatic Environmental Impact	Terrestrial Environmental Impact	Social Impact and Planning Risks	Climate Change Impact[1]	Preferred Option?	Comments
"LOCAL"										
SWL01	Testwood – increase treatment capacity to 136 Ml/d PDO = 31 Ml/d	**Good:** Efficient works operation is required to minimise process losses and maximise DO	**Good**: Known treatment processes; DAF plant has already been trialled	**Good:** Maximises use of existing assets	**Medium:** Increased abstraction from River Test but well within Minimum Residual Flow (MRF) and existing licence	**Low:** Construction within Works boundary	**Medium:** Some distribution improvement may be required. May need EIA.	**Low**	**Y**	The best option available to Southern Water
SWL02	Testwood – increase capacity and licence to 160 Ml/d & upgrade transfer pipeline to Otterbourne PDO = 24 Ml/d	**Good:** Efficient works operation is required to minimise process losses and maximise DO	**Good**: Known treatment processes; DAF plant has already been trialled	**Medium:** Use of existing assets at Testwood but requires new pipeline to Otterbourne with high pumping costs	**Medium:** Increased abstraction from River Test but still within MRF	**Medium:** Additional infrastructure at works and long pipeline required. Some tree felling.	**Medium:** New abstraction licence will be required. Full EIA will be required.	**Medium:** Significant pumping required.	**Y**	More problematic than SWL02 and subject to greater regulatory uncertainty
SWL03	Colden Common – new pumped impoundment reservoir PDO = 2 Ml/d	**Poor**: Updated assessment suggests very limited yield	**Medium**: Reliant on abstraction from Itchen	**Poor**: High AISC	**High**: Impoundment of Bow Lake stream and abstractions from the Itchen	**High**: Loss of two SNCI woodlands	**High**: Loss of business and major disruption during construction	**Medium**: Additional pumping into and from reservoir	**N**	Significant environmental impacts and very limited yield
SWL04	Testwood Lakes – increase capacity of existing lakes for use as a water resource PDO = 15 Ml/d	**Poor:** Extent of additional resource uncertain	**Poor**: Clay cores have not been constructed; lakes will have to be emptied to allow excavation of embankment materials	**Poor**	**High** – short term	**High**	**Medium** – planning permission exists to expand lake capacity (but expires in 2010)	**Low**	**N**	Multiple obstacles and uncertainties for relatively limited yield
SWL05	Relocate Otterbourne abstraction downstream to gain benefit from Chickenhall	**Medium**: Effective use of wastewater but at expense of Portsmouth Water	**Good**	**Good**: Low AISC	**Medium:** Reduction of flows and dilution between Chickenhall discharge and	**Medium/ High:** short term impact of long pipeline	**Medium/High**: Pipeline may affect SAC – need EIA & Appropriate Assessment;	**Medium**	**Y**	Beneficial to Southern Water but equally detrimental to Portsmouth Water. Needs to

Ref	Option Name	Water Resource Suitability	Technical Reliability	Economic Viability[2]	Aquatic Environmental Impact	Terrestrial Environmental Impact	Social Impact and Planning Risks	Climate Change Impact[1]	Preferred Option?	Comments
	effluent PDO = 30 Ml/d (Zero net yield to PUSH area)				Gater's Mill		traffic disruption during pipeline construction			be considered alongside other options e.g. Portswood.
PWL01	Additional Boreholes at Lavant & Brickkiln within existing licence PDO = 5 Ml/d	**Good:** Close to existing boreholes and infrastructure	**Medium:** Additional yield uncertain	**Good:** Low AISC	**Low:** Development is within existing licences	**Low:** Minor impacts possible during drilling	**Low**	**Low**	**Y**	If yield available, should be realisable within next AMP period
PWL02	Farlington Washwater Recovery PDO = 5 Ml/d	**Good:** Maximising efficiency at existing treatment works	**Good**	**Good**	**Low**	**Low**	**Low**	**Medium:** Additional energy use in treatment	**Y**	The best option available to Portsmouth Water, although of limited yield
PWL03	Increase licence of Eastergate Group PDO = 8 Ml/d	**Good:** Yield known to be available and infrastructure in place	**Good**	**Medium:** Environmental costs potentially high	**Medium:** Impacts have been the subject of significant scrutiny and uncertainty in the past	**Low**	**High:** Delivery very uncertain due to regulatory constraints (new licence application)	**Low**	**N**	Will be difficult to secure an increased licence
PWL04	Havant Thicket Winter Storage Reservoir PDO = 30 Ml/d	**Good:** Confident in yield.	**Good:** Site is suitable in many ways	**Medium**	**Low**	**Medium:** Significant mitigation of habitat disturbance will be required but designations not a major barrier	**Medium/High:** Reservoir development; subject to planning risks	**Medium/High** Significant pumping plus energy use during construction	**Y**	Only really viable reservoir development in Hampshire area
DESALINATION										
SWD01	Coastal Desalination – Millbrook PDO = 30 Ml/d	**Medium** – Surplus water must be transferred to WSRs serving Southampton	**Medium** – Intake position to avoid pollution and damage from shipping	**Poor**: High AISC	**Medium**: Fairly good mixing of brine discharge	**Low**: construction within working docks	**Medium:** High construction in limited space	**High**	**N**	Actual carbon impact depends on frequency of use
SWD02	Coastal	**Poor** – Provides	**Medium** – Intake	**Poor**: High AISC	**Medium**: Fairly	**Low**:	**Medium:** High	**High**	**N**	Actual carbon

Ref	Option Name	Water Resource Suitability	Technical Reliability	Economic Viability[2]	Aquatic Environmental Impact	Terrestrial Environmental Impact	Social Impact and Planning Risks	Climate Change Impact[1]	Preferred Option?	Comments
	Desalination – Marchwood PDO = 20 Ml/d	additional water to Testwood areas	position to avoid pollution and damage from shipping		good mixing of brine discharge	construction within industrial area	construction			impact depends on frequency of use
SWD03	Coastal Desalination Fawley Power station PDO = 25 to 60 Ml/d	**Good** – Provides additional water to Esso and IOW to maximise transfer from Testwood To Otterbourne	**Medium –** high tech but proven technology	**Medium:** AISC decreases with increasing DO	**Low** - brine well mixed in existing 5500 Ml/d cooling water discharge	**Low**: Construction within Power Station site, subject to no impact on National Park	**High:** May not be possible to locate such a plant at Fawley	**High**	**N**	Best desalination option and potential "reserve" option but not "preferred"
PWD01	Portsmouth Harbour Desalination PDO = 25 Ml/d	**Good**	**Medium –** high tech but proven technology	**Poor:** High AISC	**High** – mixing unlikely to be good	**Low** – construction within working docks	**High** – high construction impact	**High**	**N**	High cost, high energy and very uncertain delivery
WASTEWATER RECYCLING										
SWR01	Wastewater Recycling from Sandown WWTW to WSW PDO = 14 Ml/d (net PDO impact on the Hampshire South WRZ)	**Good**: Allows increased abstraction and provides improved autonomy to the island.	**Poor**: Wastewater treatment testing the limits of available technology	**Good**: Low AISC	**Medium**: Slight detriment in quality	**Medium:** short term impact of long pipeline	**High**: Potential public perception problems with Wastewater Recycling	**High**: Additional energy intensive treatment and pumping	**Y**	Strategically important benefits for both Hampshire South WRZ and the Isle of Wight
PWR01	Portswood Wastewater Recycling (transfer to Gater's Mill plus tertiary treatment) PDO = 24 Ml/d	**Good:** Would enable SWL05 to proceed without significant DO impact on PW	**Medium:** Level of treatment depends a bit on precise location of discharge	**Medium**:	**Medium**: trade off of slight improvements and deteriorations in different reaches	**Medium:** mainly short-term construction and pipeline impacts	**High**: Public perception, planning and licensing risks	**High:** Additional energy intensive treatment and pumping	**Y**	Retained for consideration in combination with SWL05
PWR02	Budds Farm Wastewater Re-use PDO = 21 Ml/d	**Good**	**Poor**: Quality and storage issues would have to be overcome	**Poor**: High AISC	**Low**	**Medium**: short-term construction and pipeline impacts	**High**: Public perception, planning and licensing risks	**High: E**nergy intensive treatment and pumping	**N**	High cost, high energy and very uncertain delivery

Note[1] Climate change impact ≡ carbon footprint ≡ electricity used Note[2] AISC = Average Incremental Social Cost

3.4.5 Shortlist of "Preferred" Resource Options

The shortlist of preferred options arising from the MCA process is summarised in Table 3.10 below. This includes the contribution of each option toward the peak period supply demand balance in South Hampshire (PDO), estimates of the capital costs of their development, and the earliest possible date by which they could be implemented. At this stage, the relocation of the Otterbourne (SWL05) intake and the recycling of wastewater from Portswood (PWR01) have been considered as a single scheme yielding a net 24 Ml/d to the South Hampshire area.

The shortlist comprises seven schemes with an estimated total peak period deployable output of 133 Ml/d and a total capital cost of between £165M and £220M. The schemes are listed in a general order of priority, although more detailed consideration of the order of implementation will be required as part of the WRSE modelling process prior to the submission of the Final WRMPs in 2009.

Table 3.10 "Short-list" of Preferred Resource Options

Option	PDO (Ml/d)	Capital cost (£M)	AISC*	Date of Implementation**
PWL02 - Farlington Washwater Recovery	5	<5	Low	2012
PWL01 – Additional boreholes at Lavant & Brickkiln	5	<5	Low	2015
SWL01 – Increase Treatment Capacity at Testwood to 136 Ml/d	31	15-20	Low	2015
SWR01 – Wastewater Recycling at Sandown WWTW on the Isle of Wight	14	40-50	Medium	2015
PWL04 – Winter Storage Reservoir at Havant Thicket	30	30-40	Medium	2021
SWL05 and PWR01 – Relocation of Otterbourne intake and Wastewater Recycling from Portswood WWTW	24	45-55	Medium	2015
SWL02 – Increase treatment capacity and licence at Testwood to 160 Ml/d and new pipeline to Otterbourne	24	25-35	Medium	2024
TOTAL	133	165-220		

*AISC is an estimate of the total unit cost of an option, including capex, opex, carbon and, where appropriate, social and environmental costs. Low = <50 p/m^3. High = >150 p/m^3.

**Most likely deliverable date, if option required

3.5 Reducing Forecast Uncertainty (Target Headroom)

Section 3.3 drew attention to the significant increase in Target Headroom by 2030 in the demand forecasts for both Portsmouth and Southern Water. Despite the forecast growth in housing and population, the Company's preferred strategies, which include for universal compulsory metering, forecast that demand will remain almost unchanged between 2010 and 2030. Over the same period, however, Target Headroom, which allows for the uncertainties in the forecast supply demand balance, increases from about 35 Ml/d to over 65 Ml/d.

To put this in context, of the possible 125 Ml/d deficit in the forecast supply demand balance in South Hampshire by 2030, 65 Ml/d is derived from uncertainties intrinsic to the forecast. It is likely that at least 45 Ml/d of this is derived from supply side uncertainty.

This level of Target Headroom seems high and an initial appraisal suggests that there might be scope for reducing it by as much as 20 Ml/d. The implications of this would be an equivalent saving in any planned water resource development options. The allowances for Target Headroom in the Draft WRMPs will be reviewed over the next few months by the EA and any changes will be incorporated as part of the Final WRMPs issued in 2009.

3.6 Summary

The water supply component of this IWMS has examined the issue of how the PUSH area can sustain the development of an additional 80,000 homes over the next 20 years in a context in which there is already perceived to be over abstraction from the water environment in South Hampshire. In addressing this issue, the Study has drawn on two key drivers behind future water management in the area. These are:

- *The EA's Restoring Sustainable Abstraction (RSA) Programme* In particular, the EA's review of abstraction licences covered by the EU Habitats Directive. The outcomes of this review for the priority sites in Hampshire were published in October 2007. Although its review does not fully cover all abstractions supplying the PUSH area, the EA's proposed changes to abstraction licences provide a clear framework for what it considers to be a sustainable level of abstraction that is consistent with current environmental protection legislation. These proposed changes have been taken forward into this Study.

- *The Water Company Water Resource Management Plans (WRMPs)* – these plans are produced on a 5-yearly cycle and set out the Companies' preferred strategies for meeting demands for water over the next 25 years. The latest Draft WRMPs produced by Southern Water and Portsmouth Water, which cover the planning period from 2010 to 2035, will be published for consultation in May 2008. The supply and demand forecasts in the WRMPs include the following:

  - An evaluation of the impact of climate change on supply and demand in accordance with Industry protocols agreed with the EA.

  - Requirements for environmental improvements (i.e. changes in abstraction licences) stipulated by Defra (these are derived from the recommendations of the EA's RSA Programme).

- Additional water resource management requirements stipulated by Defra (e.g. to include universal compulsory metering as an option).

- Full allowance for the forecast growth in housing and population across the South East.

- A rigorous assessment of demand side and supply side (the "Twin Track" approach) options available for maintaining the required balance between supply and demand through to 2035.

3.6.1 Conclusions and implications for the PUSH Authorities

Current Abstraction Licences

Were existing abstraction licences sustainable, and not subject to change, the proposed growth in households and population in the PUSH area could be sustained without the need for any additional resources.

Impact of "Sustainability Reductions" on the Supply Demand Balance

However, following a review by the EA, a number of important abstraction licences are likely to be amended to a level of abstraction that the EA considers to be environmentally sustainable. The amendments proposed by the EA will create a significant deficit in the peak period supply demand balance in South Hampshire even if population and households remain at their current level. By 2030, this deficit will range between 70 Ml/d and 125 Ml/d depending on the assumptions used with regard to growth and changes in demand. To put this in context, the yield of a new reservoir at Havant Thicket would be 30 Ml/d.

Potential savings in Demand

Demand side savings have the potential to reduce this "deficit envelope" to between 60 and 110 Ml/d. The total investment in demand side measures proposed by Southern Water and Portsmouth Water across the PUSH area over the next 25 years is likely to be of the order of £60-70M. Key areas of activity will include:

- Leakage reduction – although both Portsmouth Water and Southern Water are at or below their target leakage levels set by Ofwat, there are likely to be further reductions in the future and these could realistically amount to as much as 5 Ml/d.

- Universal Compulsory Metering - the most significant contribution to these savings will be those realised through plans by both Southern Water and Portsmouth Water to install meters on all households (new and existing). Perhaps not surprisingly, charging for the volume of water used tends to drive a range of customer initiated water efficiency measures. A range of studies suggest that this is likely to lead to a sustained reduction of 5-15% in per capita consumption compared with households that are still charged on the basis of the rateable value of the house. This could yield a further saving of 7 Ml/d by 2030.

- Installation of Low use Fittings in new Households – the construction of new homes in accordance with the Code for Sustainable Homes Level 1 or higher has the potential to significantly reduce per capita consumption in new households compared with existing households. Achieving these savings is

reliant on individual local authorities securing high standards of water efficiency in the new dwellings permitted. Notwithstanding this, however, the desired savings will only be fully realised if this is accompanied by behavioural changes in water use by householders. Potential savings are calculated to be between 3 Ml/d (probably realistic) and 8 Ml/d.

- Other water saving initiatives, such as retrofitting water efficient devices in existing homes, could yield a further 1 to 3 Ml/d in the South Hampshire area. At the current time there are no mechanisms for securing retrofitting other than on a voluntary basis. The local authorities could perhaps work closely with registered social landlords to seek to implement retrofitting on a wider basis.

Review of Supply Side Options

Although the demand side savings are significant, the reality is that to accommodate the projected growth and ensure that river habitats and species in Hampshire are afforded adequate protection from over-abstraction, a further 100 Ml/d of supply availability during periods of peak demand will be required if the two Water Companies are to be confident of maintaining the supply demand balance over the next 25 years. In this regard, the water resource planning process undertaken (separately) by Southern Water and Portsmouth Water has identified and assessed more than 70 options and sub-options, including:

- 2 new winter storage reservoirs;
- A range of potential improvements to water treatment works or boreholes to improve the yield of existing sources within their current licences;
- Various options for recycling wastewater currently discharged to estuaries or out to sea;
- Wastewater recycling;
- A spectrum of desalination options, from the treatment of saline groundwater and brackish estuarine waters through to full treatment of sea water; and
- Bulk transfers – options to transfer water from other supply zones within the Company supply area or from other Water Companies.

In addition to the volumetric contribution of each option, the assessment took account of the likely "deliverability" of each option, together with its potential economic, social and environmental impacts, including its potential impact on climate change (i.e. carbon cost) and its robustness to climate change.

Shortlist of Preferred Supply Side Options

The main outcome of this assessment is that "viable" options are available to address the forecast deficit and a shortlist of 7 "preferred" options has been drawn up in this report with a combined peak period deployable output of over 130 Ml/d. The shortlisted options are summarised briefly below:

- Washwater recovery at **Farlington Treatment Works** (Portsmouth Water). This scheme is expected to increase peak period deployable output by 5 Ml/d and would have a target completion date of 2012. The scheme would not be expected to give rise to significant environmental concerns for the Local Planning

Authority. It is not anticipated that any land use allocations would be needed as a precursor to any application for this scheme. Portsmouth Water would be responsible for developing the scheme and the proposed funding route would be through the Ofwat's review of price limits for the 2010-2015 (AMP5) period.

- Additional boreholes at **Lavant and Brickkiln** (Portsmouth Water). The aim of this scheme would be to increase the peak deployable output of the sources by 5 Ml/d within the existing licences. There would be a target completion date of 2015 and it would not be expected to give rise to any significant environmental concerns for the Local Planning Authority. It is not anticipated that any land use allocations would be needed as a precursor to any application for this scheme. Portsmouth Water would be responsible for developing the scheme and the proposed funding route would be through the Ofwat's review of price limits for the 2010-2015 (AMP5) period.

- Increase the capacity of the treatment works at **Testwood to 136 Ml/d** (Southern Water). This would increase the peak deployable output of the Testwood abstraction by 31 Ml/d whilst remaining within the current licensed abstraction. Target completion date would be 2015. It is not known whether the proposal would require EIA, although it is not anticipated that any land use allocations would be needed as a precursor to any application for this scheme. Southern Water would be responsible for developing the scheme. However, since the requirement for the scheme is driven by the proposed reductions in existing licences, the route for funding remains unclear.

- **Wastewater Recycling at Sandown** on the Isle of Wight (Southern Water). This scheme would increase the self-sufficiency of the Isle of Wight during periods of peak demand, making it less reliant on the Cross Solent Transfer. The knock-on benefit to South Hampshire is that the water (14 Ml/d) currently transferred to the island during peak periods would be available to the Hampshire South Resource Zone. There are no significant implications for any Local Planning Authority in PUSH, although any permissions that may be required would need to be granted by Isle of Wight Council. The scheme would only be required in 2026 if there were no reductions in existing abstraction licences. Reducing licences would mean that the scheme is required in 2013. As for the Testwood scheme above, Southern Water would be responsible for developing the scheme but the precise route for funding remains unclear.

- New winter storage reservoir at **Havant Thicket** (Portsmouth Water). This scheme has been well documented and publicised and was included in the Draft South East Plan. The target completion date would be 2021 and it would have a peak period deployable output of 30 Ml/d. It is anticipated that a land use allocation would be needed as a precursor to any application for this scheme. The scheme would also require EIA and an Appropriate Assessment. Portsmouth Water would be responsible for developing the scheme and the proposed funding route would be through the Ofwat's review of price limits for the 2010-2015 (AMP5) period and probably the 2015-20 (AMP6) period.

- **Relocation of the Otterbourne abstraction** intake further downstream on the River Itchen (Southern Water) combined with the transfer (recycling) of treated wastewater from the **Portswood Wastewater Treatment Works** to Gaters Mill (Portsmouth Water). This scheme is complicated by the fact that the relocation of the Otterbourne intake on its own will yield 30 Ml/d for Southern Water but at the direct expense of Portsmouth Water, hence the need for the Portswood wastewater to compensate. The precise scope, timing and viability of the

scheme(s) will depend on the progression of other schemes, the balance of the respective needs of and options available to the two Water Companies, and further discussions between the Companies and the EA regarding their Draft WRMPs. The scheme would require EIA and Appropriate Assessment, and may give rise to environmental concerns to the Local Planning Authority given the environmental sensitivity of the Itchen. The implementation of the scheme would require a high degree of co-operation between Southern Water and Portsmouth Water. As for the Testwood and Sandown schemes, the precise route for funding remains unclear.

- Increase the licence at **Testwood to 160 Ml/d** and upgrade the treatment works accordingly. This would also require an upgraded transfer pipeline between the Testwood and Otterbourne treatment works. The scheme could yield an additional peak deployable output of 24 Ml/d whilst remaining within the constraints of the Minimum Residual Flow set by the EA for the River Test. A new abstraction licence would be required from the EA, however, the granting of which could not be guaranteed. The scheme would require EIA and Appropriate Assessment, and may give rise to environmental concerns to the Local Planning Authority given the environmental sensitivity of the Test and the likely pipeline route. Southern Water would be responsible for developing the scheme but the precise route for funding remains unclear.

It is likely that only five or six of the preferred options would be implemented. The capital cost of six schemes is estimated to be between £120M and £165M.

The Benefits of Reducing Uncertainty

As might be expected, the forecasts of supply and demand over the next 25 years contain areas of uncertainty. A failure to take account of this uncertainty may lead to a shortfall of supply in critical periods. To protect against this, a "buffer" known as Target Headroom is added to a Company's Demand Forecast in its Supply Demand Balance. As a general principle, however, Ofwat is of the view that major water resource schemes should not be driven by Target Headroom alone. Given that several major schemes may be required in South Hampshire in the next 10 to 15 years, it is important to understand how much the need for new schemes is driven by increases in Target Headroom and how much it is driven by increases in forecast demand. With regard to the Draft WRMPs submitted by Southern Water and Portsmouth Water, the combined Target Headroom in the supply demand balances is forecast to be over 65 Ml/d by 2030. On the face of it, there should be some scope for reducing this, possibly by as much as 20 Ml/d. This would probably reduce the number of supply side options required to five and the capital costs to between £95 and £130M.

Accounting for Climate Change impacts

The potential impacts of climate change on supply and demand over the next 25 years are likely to be relatively minor but have been accounted for in the assessments undertaken in this Study.

Risks relating to Water Supply

At present, the Draft WRMPs prepared by the Water Companies are seeking to integrate the requirements of the Environment Agency's Restoring Sustainable Abstraction (RSA) Programme with the challenges of increasing population and household numbers and the potential impacts of climate change. One of the

outcomes is a "Twin Track" approach in which measures to manage to demand and options to develop new resources may both play a major role. Whilst encouraging, there are underlying risks that PUSH should be aware of. These are:

i) The EA's proposals for reducing current abstraction licences under the RSA Programme (known as sustainability reductions) may be legally challenged by either or both Southern Water and Portsmouth Water. This could lead to delays before a coherent strategy for maintaining the supply demand balance is agreed by all parties. One of the principal factors underlying such a challenge is the uncertainty regarding the route through which the schemes required to maintain the supply demand balance will be funded. Historically, such schemes would normally be funded through the price limits agreed by Ofwat for Water Company customer bills. However, there remains uncertainty about this and it is possible that an alternative route for funding, via compensation paid by the EA and recovered through abstraction licence charges, may be stipulated by Defra. Although in both cases Water Company customers will ultimately pay, until the Water Companies are clearer about how, when and through which route the schemes will be funded there is a high risk of delay in scheme implementation.

ii) At the current time, the Draft WRMPs remain as the Companies' Preferred Strategies. They have yet to be subject to scrutiny by the Environment Agency, Ofwat, and wider consultation that will be taking place during Summer 2008. There may be a need for a hearing or Inquiry before the Draft WRMPs are finalised and there is a risk that the final approval of the WRMPs may slip beyond the current April 2009 deadline. The options identified in the Companies' draft WRMPs may change before the WRMPs are finalised. None of the above provides the certainty that PUSH and the individual local planning authorities require for their "Evidence Base" to underpin sub-regional work or Local Development Documents. It may be appropriate for the local planning authorities to plan for the provision of all of the seven shortlisted options identified above, on a precautionary basis, pending the approval of the final WRMPs. PUSH and the individual planning authorities should also have full regard to potential water resource developments and policy mechanisms to promote demand management measures when preparing their Local Development Documents.

iii) A further risk to PUSH and the individual planning authorities at the current time is that whilst options to meet the sustainability reductions proposed by the Environment Agency are described in its Draft WRMP, this is not the Company's preferred strategy at present. This may mean that, at the current time, planning authorities are not able to meet the Habitat Regulation requirements for Appropriate Assessment of Local Development Documents. The EA Review of Consents has concluded that **existing** abstraction licences may have an adverse effect on European Designated Sites. Until measures to rectify this situation are planned for implementation, any Appropriate Assessment may be unlikely to be able to conclude that additional development proposed through a Local Development Document would have no adverse effects on the Sites. PUSH or individual local planning authorities may wish to seek further advice on this issue.

iv) To date, the EA's review of abstraction licences has focused as a priority on the requirements of the EU Habitats Directive. What is not yet clear is whether the EA's implementation of the EU Water Framework Directive will give rise to further constraints on abstraction.

v) There is currently a potential imbalance between the deficits that Southern Water and Portsmouth Water are forecasting and the "preferred" solutions available to each Company. For example, it is possible that, when viewed from a regional perspective, the case for developing Portsmouth Water's Havant Thicket reservoir scheme may be driven primarily by Southern Water's need for additional resources. As it stands, the structure of the UK Water Industry and the nature of the water resource planning process, does not readily lend itself to such "boundaryless" planning. The Water Resources in the South East Group (WRSE), which is led by the EA, will need to take a lead in seeking to ensure that obstacles to ensuring sensible, sustainable, least cost planning solutions are minimised.

Although there is a high degree of confidence that sufficient water can be made available to meet the demands of new housing, this will require the development of a number of major new resources. Furthermore, there is much less certainty with regard to quite how much new resource will be required, when it will be required and which schemes will be developed by the two Water Companies to provide it. This obviously has knock-on impacts on questions such as cost, funding routes and provision for planning requirements. The period leading up to the publication of the Final WRMPs may also see a number of adjustments to Company plans, either in response to consultation or regulatory requirements.

3.6.2 Recommendations

In view of the conclusions above, the following recommendations are made:

No additional growth should be planned beyond that already proposed

PUSH should be very cautious before accepting any growth targets over and above the levels currently proposed. This report has illustrated that in order to address the risks posed to the water environment, the reductions in current abstraction licences proposed by the Environment Agency will create a significant deficit in the supply demand balance even without any growth in population and housing. Although viable solutions are potentially available, a wide range of issues will have to be resolved before they can be implemented. This does not appear to be the context in which to add still further to the strain on the supply demand balance.

Respond to the consultation on the Water Company Draft WRMPs

PUSH cannot have a strategy for water supply that is separate from that of the two Companies responsible for water supply. In their Draft WRMPs, the companies have outlined their preferred strategies for maintaining the supply demand balance over the period to 2035. Whilst this Study has drawn on many components of the Company strategies, the Draft WRMPs are now published for consultation and PUSH should make the most of the opportunity to influence the Final Plans.

The Agency and Water Companies continue to explore the most cost-effective and sustainable solutions to the SD deficit

The scale of the potential impacts of the sustainability reductions on the SD balance are without precedent. There are many issues such as the phasing of licence changes, the frequency with which alternative resources will be required (and thus the nature of the potential solutions), and the structure and complexity of new licences which have yet to be fully understood and the choices made in regard to

these issues may significantly alter the cost implications of the changes without an equivalent impact on the environmental benefits derived. It is therefore very important that every effort is made by the Agency and the Water Companies to understand these issues before final plans are put in place.

Creation of a PUSH Water Supply Forum

Following on from the previous point, in addition to responding to the consultation on the Draft WRMPs, it is recommended that a Forum is set up to facilitate effective cooperation and regular communication between the PUSH Authorities, the EA and two Water Companies as they seek to implement their respective plans. Some of the specific objectives of the Forum would be to ensure that:

- The PUSH Authorities are fully aware of the Water Company plans for meeting projected demands, in particular any changes that occur over the next 12 months between the Draft and Final WRMPs.
- Any planning-related issues arising from the plans for new water resources are being captured by the two Companies.
- PUSH can keep track of progress on issues such as metering and leakage and updates on how this may impact future demand projections.
- PUSH is aware of what it can do to help the two Water Companies secure the necessary supplies to meet forecast demands. This may involve some lobbying of Ofwat and Defra to ensure that the structure of the industry and/or the water resource planning process itself do not become obstacles to ensuring that the best regional solutions are implemented.
- PUSH is aware of the potential implications of the Water Framework Directive on water supply issues as and when they become apparent. Draft River Basin Plans are due to be published by the EA by the end of 2008 and these should be reviewed in the light of the proposed developments across the PUSH area.

It is suggested that the Forum convenes either shortly before or shortly after the publication of the Final WRMPs. The frequency of subsequent meetings can then be agreed but it is not envisaged that it would need to be more often than once or at most twice a year. The requirement for the Forum may not extend beyond the next 4-5 years, by which time some of the current uncertainty should have been resolved.

Continue to drive the Sustainable Housing Agenda

Whilst the potential to reduce the per capita consumption of water will ultimately depend on behavioural changes of water users, creating the conditions that support and encourage such behavioural changes is vital. Universal compulsory metering will not on its own reduce water usage, but charging customers for the amount of water they use will cause many to consider much more carefully how much water they are using. Similarly, designing a house in accordance with the Code for Sustainable Homes provides a context for reduced water usage, even if the savings are not as great as the design objectives.

An important “unknown” in this context is how the widespread impact of compulsory metering will affect the market for more efficient appliances. The drive for energy efficiency and low carbon usage is helping to sustain a wider drive for sustainable

resource use, including water, and it is therefore quite possible that greater changes in water use behaviour may be achieved than are currently accounted for in the draft WRMPs. The important of keeping these issues high on the public agenda should not be under-estimated and this is an area in which Hampshire County Council have taken a lead with some success in recent years. The recommendation is that these efforts continue even if the benefits in terms of water use are not always immediate and tangible.

How aspects of this might translate into a policy framework is dealt with separately in the "Planning and Water Management" section.

4 Wastewater Management

4.1 Overview

4.1.1 Background

Southern Water provides all of the wastewater management services in the PUSH region. The location and outline catchments for the main wastewater treatment works (WWTW) are shown in Figure 4.1.

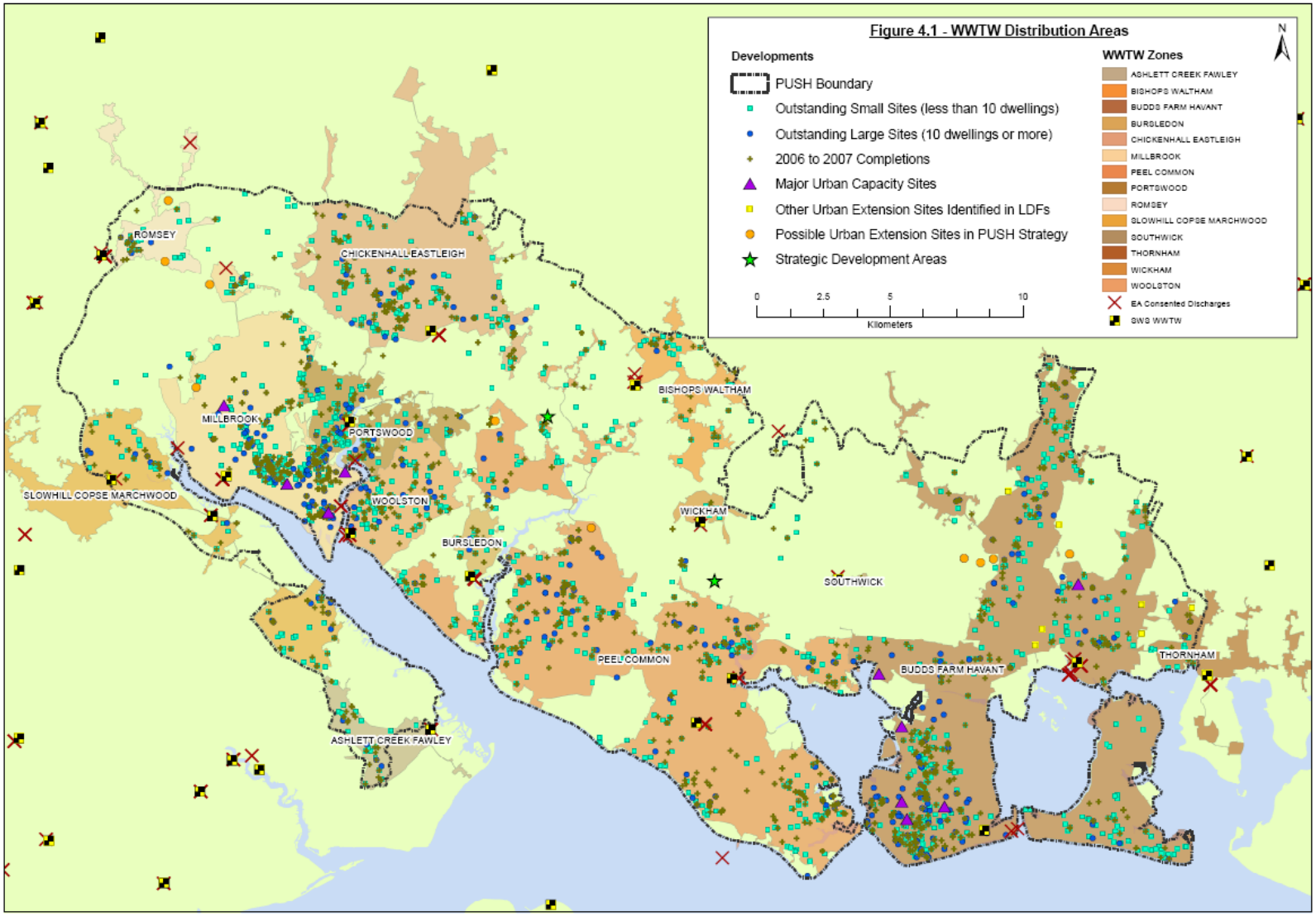
The issues that require addressing in the context of this study are:

- Whether or not there is sufficient existing physical and environmental capacity to accept the forecast growth;
- Whether or not options, including the provision of significant new infrastructure, are required to mitigate any shortfall in existing capacity; and
- Identification and high level assessment of those options that may be required.

In undertaking the assessment Southern Water has provided data in relation to its works and information on the mechanisms it uses in evaluating the potential impacts of growth on its works. The Environment Agency (EA) has provided background information on its consenting process and in particular how it arrived at its conclusions with regard to Nitrogen standards under the Habitats Regulation Review of Consents programme.

The method used in this study to derive the additional flows at works resulting from population growth has been developed independently of Southern Water although it does use aspects of its forecast process. One of the issues with long term projections is the reliability of the forecast methodology given that there is essentially no 'right' way to do it. As part of its PR09 planning process Southern Water has supplied to the EA its flow forecasts through to 2020. A comparison of the methodology used by Southern Water and that used in this study is presented later in Section 4.3 however, in summary the comparison shows less than 10% difference between the two sets of flow forecasts.

Figure 4.1 Location and outline catchments for wastewater treatment works in the PUSH region



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4.1.2 Capacity – flow and effluent consents

In the context of wastewater treatment, capacity is a function of:

- The physical ability of the existing assets to accept new flows; and
- The environmental capacity of the receiving waters to accept additional effluent loads, in particular those associated with the nutrient compounds nitrogen and phosphorous.

In both cases a primary factor governing capacity is a WWTW's Dry Weather Flow (DWF).

The DWF is essentially a measure of the flow load on a WWTW that is derived from human activity (it includes both domestic and trade) and excludes such elements as storm/rainfall event flows. The mechanism for deriving DWFs has changed in recent years. All WWTW should now have certified flow monitoring equipment installed that enables effluent flows from the works to be monitored accurately. The DWF is a calculated figure based on the 20th percentile flow on the basis of 12 months daily data i.e. that flow which is exceeded 80% of the time. The physical design capacity of a WWTW is generally governed by DWF. For a particular works the EA will set a maximum allowable DWF (based primarily on effluent quality standards – see below); this is known as a works 'consented DWF'. It should be noted that the DWF consents (with the exception of those for Peel Common and Budds Farm) used in this study are those that have been set under the previous policy. When the new policy of setting DWF consents on the basis of a 20th percentile has been fully implemented some of the existing consent flow values may stay the same, others will change. Where a change is necessary it is understood from the EA that SW will be asked to base any new consents on their forecast 2020 flows.

Environmental capacity relates to the nature of the receiving water (surface or groundwater) and its ability to accept the biological, solids, nutrient and metal loads contained within WWTW effluents. Effluent discharges are strictly regulated and acceptable loads are determined and consented by the EA. For all parameters monitored, the allowable discharge load is calculated and concentration limits set as a function of DWF. As an example, if the acceptable nitrogen load from a works is determined to be 10 kg/d and the consented DWF is 1000 m^3/d; then the maximum effluent concentration (i.e. the N consent) will be 10 mg/l. The acceptable load determined by the EA will be a function of the sensitivity of the receiving water and whether or not it has been designated as such under environmental protection legislation.

The quality parameters consented and how these are governed by the various regulatory requirements is briefly outlined in the following section.

4.1.3 Effluent standards

4.1.3.1 General

The quality of effluents discharged from WWTW is highly regulated and a raft of legislative instruments has been put in place to minimise the impacts that effluent discharges may have on the environment. In implementing the legislative requirements WWTW are 'consented' to discharge effluents. All consents are issued

by the environmental regulator (the Environment Agency). Consents are set to minimise pollution of receiving waters and may include the requirements of European Directives, national legislation or local water quality objectives. Consents specify the discharge location, total volume of treated water permitted and the quality conditions of the discharged water, such as the biochemical oxygen demand (BOD), limits for suspended solids (SS), ammonia, nitrogen, phosphorous, metals and toxic substances.

EU Directives and UK legislative instruments that are currently driving quality consent conditions include: The Water Act (2003); The Water Industry Act (1999); The Urban Waste Water Treatment Directive (91/271/EEC) and associated UK Statutory Instrument; The Bathing Water Directive (2006/7/EC); The Freshwater Fish Directive (78/659/EEC) and associated UK Statutory Instrument; The Shellfish Waters Directive (2006/113/EC); The EU Water Framework Directive (2000/60/EC) and Daughter Directives; and The Habitats and Birds Directive (92/43/EEC) and associated UK Statutory Instrument.

4.1.3.2 BAT and BATNEEC

For the primary quality parameters of BOD, SS and Ammonia generic wastewater treatment options exist for reducing their concentrations in effluents. For others where specific consent requirements are set (e.g. nitrogen [N] and phosphorous [P]), more specialised technologies/processes may be required. The Pollution Prevention and Control Regulations 2000 introduced the concept of Best Available Technique and defined it as:

“Best” – means the most effective techniques for achieving a high level of protection of the environment as a whole.

“Available” – means techniques developed on a scale which allows them to be used in the relevant industrial sector, under economically and technically viable conditions, taking into account of the costs and advantages.

“Techniques” – includes both the technology and the way the installation is designed, built, maintained, operated and decommissioned.

As an example, if a BAT consent was applied to a WWTW for nitrogen removal; the implications would be that those technologies/process capable of achieving a generally accepted lowest effluent concentration (assumed to be 10mg/l and agreed between the EA, Thames Water and Southern Water [EA, Creating A Better Place: Planning For Water Quality And Growth In The South East, 2006]) would be installed at the works. This doesn’t mean the technologies cannot treat to a lower standard, it is more that the standard is one that should be ‘guaranteed’ using the appropriate technology.

Associated with BAT is the concept of Best Available Technique Not Entailing Excessive Cost (BATNEEC). This may be considered one step back from BAT and recognises that in order to achieve a BAT standard would likely entail significant costs (without necessarily producing a significant quality/environmental benefit).

There will always be arguments over what is in fact BAT and what is BATNEEC (both of which will be subject to agreement either nationally or locally between the Water Companies and the EA); however, this is not the forum for that discussion.

4.1.4 Implications of the Habitats Review of Consents

The EA, in response to its obligations under the Habitats Regulations, has undertaken an extensive review of the impacts of its permissions (abstraction licences and discharge consents) on designated Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) in South Hampshire (referred to throughout this document as the Habitats Review of Consents [RoC] process]). Extensive modelling has been undertaken in both freshwater (River Itchen) and marine environments with a view to determining specific habitat impacts of controlled quality parameters.

For the River Itchen the primary concern has been the levels of phosphates in the river and the potential for its permissions to exacerbate the situation where many of the reaches modelled currently exceed their quality targets. The principle outcome in relation to this project is the application of BATNEEC of a 1mg/l consent for phosphorous at the Chickenhall Eastleigh WWTW. The impact of population growth to Chickenhall and the extent of any constraints posed by the tight consent limit are outlined in subsequent sections.

The impact of EA permissions on the marine SPAs and SACs has involved the development of a complex model for both flows and for quality. The primary concern has been the impacts of nitrogen in effluents and the link between this element and the growth of algae/green weed mats within the designated areas. The principle outcome has been the EA's intention to apply consents at BAT for total nitrogen of 10mg/l at the following WWTWs in the PUSH area: Budds Farm; (proposed consent actually 9.7mg/l in 2012); Bursledon; Millbrook; Peel Common (proposed consent actually 9.1mg/l in 2012); Slowhill Copse Marchwood; Thornham; and Woolston. The impacts of population growth to these works and the extent of any constraints posed by the tight consent limits are outlined in subsequent sections.

4.1.5 Implications of growth causing flows to exceed a DWF consent

Should a works be forecast to exceed its consented DWF the Water Company can apply to the EA to increase the consented flow. Whether or not the application is granted will be a function of the environmental standards required for the effluent receiving water and the concentration limits currently being applied to the works. Whilst any increase in consented DWF will be the subject of negotiation between the Water Company and the EA, the general policy of the EA is to apply its 'no deterioration' policy. In practice what this means is that the total load for a particular parameter cannot be allowed to increase and any new DWF consent will have to take this on board. For example, if a works has a consented DWF of 1,000m^3/d and a nitrogen (N) standard of 10 mg/l then its existing consented N load would be 10 kg/d. If the Company wanted to increase its DWF to 2,000m^3/d then in order to maintain its consented load at 10kg/d the Company would have to treat its effluent to a 5mg/l N standard.

4.1.6 Impacts of the Water Framework Directive (WFD)

The Water Framework Directive (WFD) sets the objective for identified water bodies meeting at least good ecological status by 2015, subject to feasibility and cost effectiveness. Good ecological status can only be achieved if both chemical and biological classification criteria are met. The chemical status of a water body is determined by measuring chemical concentrations within the water body and comparing them with defined Environmental Quality Standards (EQS). Environmental

Quality Standards have been set for nutrients and sanitary determinants (e.g. phosphorus, ammonia, BOD, DO, nitrates) by the UK Technical Advisory Group (UKTAG).

Environmental Quality Standards for priority and priority hazardous substances (as defined by Annex 10 of the WFD) have been set at an EU level for 33 substances or groups of substances including metals, pesticides, solvents and industrial chemicals. Specific Pollutants (as defined under Annex VIII of the WFD) including metals, pesticides, cyanide, residual chlorine have been set by the Environment Agency.

There are, therefore, numerous chemical quality standards applicable to a water body under the WFD. The study presented here focuses its attention on the issues relating to nitrogen (N) and phosphates (P) and the implications for controls on discharges under the Habitats Regulations. The WFD requires a significantly more in-depth investigation across a wider range of determinands; however, at this point in time there is a high level of uncertainty as to what the EQSs will be. Given this uncertainty this study has not expanded its scope beyond the potential impacts of N and P.

4.2 Capacity Assessment

4.2.1 Population growth forecasts and catchment allocation

PUSH has supplied forecast growth figures for properties and has allocated these to appropriate wastewater treatment works catchments. Table 4.1 below provides a summary of these figures on a property, population equivalent (PE) and catchment allocation basis for the years 2006/07 (baseline), 2015/16 and 2025/26. Note that the conversion from property to PE uses a fixed occupancy rate of 2.4 PE per property. Occupancy rates are forecast to decline over the period being considered; as such the PE figures are a conservative estimate.

The following assumptions have been made in forecasting PE growth:

- PUSH property numbers are inclusive of all proposed development within the region. No assumptions have been made for any additional infill growth not accounted for;
- 2006/07 total PE numbers have been taken from figures produced by Southern Water as part of its 2007 June Return to Ofwat (JR07);
- Tourist growth of 1% cumulative per annum has been included;
- With the exception of the numbers provided by PUSH, no additional trade growth has been forecast.

Table 4.1 Summary of PE growth

	2006/07	2015/16							2025/26						
	Total PE	Properties	Resident PE	Tourist PE	Trade PE	Cess PE	**Total PE**	**% change from 06/07**	Properties	Resident PE	Tourist PE	Trade PE	Cess PE	**Total PE**	**% change from 06/07**
ASHLETT CREEK FAWLEY	**14116**	158	14323	185	86	0	**14594**	**3**	253	14551	205	86	0	**14842**	**5**
BISHOPS WALTHAM	**12818**	282	13182	304	172	0	**13658**	**7**	567	13866	336	172	0	**14374**	**12**
BUDDS FARM HAVANT	**364647**	12609	356296	14640	31709	6344	**408989**	**12**	21377	377339	16172	33159	6344	**433014**	**19**
BURSLEDON	**6856**	76	6948	97	0	0	**7046**	**3**	166	7164	108	0	0	**7272**	**6**
CHICKENHALL	**102791**	4082	94934	1594	15926	6986	**119440**	**16**	5501	98339	1761	21156	6986	**128242**	**25**
MILLBROOK	**134634**	5740	132188	3372	25682	0	**161242**	**20**	8207	138109	3725	25682	0	**167516**	**24**
PEEL COMMON + WOOLSTON	**303962**	10524	315326	4965	18338	5816	**344445**	**13**	30763	363899	5484	29008	5816	**404208**	**33**
PORTSWOOD	**74879**	1428	72868	1266	4479	0	**78613**	**5**	2381	75155	1398	4479	0	**81033**	**8**
ROMSEY	**19656**	1402	22161	385	544	0	**23090**	**17**	2765	25432	426	544	0	**26402**	**34**
SLOWHILL COPSE	**84965**	946	62782	1126	9193	15455	**88556**	**4**	1338	63723	1244	9193	15455	**89615**	**5**
SOUTHWICK	**1342**	6	1350	6	0	0	**1357**	**1**	6	1350	7	0	0	**1358**	**1**
THORNHAM	**20792**	606	21647	552	174	0	**22374**	**8**	1263	23224	610	174	0	**24008**	**15**
WICKHAM	**3300**	35	3241	71	77	77	**3466**	**5**	75	3337	79	77	0	**3493**	**6**

4.2.2 Flow forecast scenarios and assessment methodology

In assessing impacts of flow growth on capacity, a baseline and two forecast scenarios have been evaluated. The following should be noted:

- Southern Water is already considering the transfer of flows from Woolston to Peel Common (as recommended in the Habitats RoC). In doing so the consented DWF available at Woolston would be 'transferred' to Peel Common. In this study the impacts of growth allocated to both works have been combined and attributed to Peel Common.

- Regulatory changes mean that the Water Companies are now required to have certified flow monitoring equipment installed at all works and flow data is required to be reported to the EA. Budds Farm and Thornham had certified flow measurement installed in 2005. Peel Common and Chickenhall works have only recently had certified flow measurement installed (2008). For these two works, in order to avoid abortive expenditure, Southern Water requested a delay in certified flow measurement installation until after process upgrade work in the AMP4 period was completed. The measured DWFs used in this study, provided by Southern Water, have been based on measured flows but in the case of Peel Common and Chickenhall works these were not certified and therefore not formally reported to the EA as part of the regulatory process.

- Since inception of this study and production of the draft Final Report the DWF consents at Budds Farm and Peel Common have been increased from 105754 m^3/d to 108853m^3/d at Budds Farm and from 54950m^3/d to 59683m^3/d for Peel Common. The impacts of growth on DWF in the respective catchments have been reassessed on the basis of these revised consent figures.

- It should be noted that for the Peel Common/Woolston combined discharge the standstill N load is 699.5 kg-N/d i.e. that effluent load which must be maintained on the basis of 'no deterioration' (See section 4.1.5 for discussions of 'no deterioration'). This was established from the Environment Agency's Review of Consents analysis for the Habitats Directive and was based on 10 mg-N/l total N for the assessed 2005 flow for Peel Common (54,950 m^3/d) plus the consented DWF for Woolston (15,000 m^3/d) giving a combined flow of 105754 m^3/d. As a result, the impacts of growth in the Peel Common/Woolston catchments on the N quality consent (Section 4.2.4.7) have been assessed on the basis of this previously established standstill load.

The following sections detail the methodologies used in developing the forecast scenarios.

4.2.2.1 Baseline

The baseline situation is taken as the treatment works' certified/measured DWF (or in the case of Budds Farm Havant, Chickenhall Eastleigh, Peel Common and Thornham, Southern Water's measured flows) in the period 2006/07. For each works the consented DWF, measured DWF and calculated levels of foul flow from current PE have been assessed. This latter is derived using the following Southern Water formula:

Calculated foul flow = ((Resident PE +1/3 Tourist PE) x flow 1) + (Trade PE x flow 2) + (Cess PE x flow 3)

Where:

Flow 1 = 160 litres/pe/day – Southern Water's current assumed return to sewer figure. This figure increases to 170 litres/pe/day from 2015 onwards to account for reduced occupancy rates

Flow 2 = 100 litres/pe/day – an average obtained from Southern Water figures for trade PE and trade volume in the region

Flow 3 = 16 litres/pe/day – Southern Water figure (covers all imports from, for example, septic tanks)

4.2.2.2 Scenario 1

Forecast methodology

Scenario 1 forecasts growth at WWTW using a standard methodology used in wastewater planning. The growth in DWFs at each works is modelled taking the baseline situation and adding on flows associated with growth in resident, tourist, trade and cess PE. In undertaking the modelling the following assumptions have been made:

- The return to sewer flow for current (2006/07) resident and tourist populations increases from 160 l/pe/day to 170 l/pe/day from 2015 onwards.
- Tourist populations are forecast to increase by 1% on an annual basis.
- The return to sewer for all PUSH resident growth is taken as 500 l/property/day. This is a general planning figure used by both Southern Water and the EA (EA: Creating a Better Place: Planning for Water Quality and Growth in the South East) and which includes an allowance for infiltration.
- No additional trade growth above that provided by PUSH is accounted for. Trade volumes are low compared to those related to resident populations and, as such, this assumption is considered reasonable. Trade PE volumes are those used in the baseline assessment i.e. 100 l/pe/day.
- No increases in cess volumes have been included. Cess volumes are low compared to those related to resident populations and, as such, this assumption is considered reasonable.

Using the above assumptions, WWTW flows under Scenario 1 have been derived using:

Calculated foul flow = Baseline flow + (PUSH property growth x 500l/property) + (1/3 Tourist growth x Flow 1 [see above]) + (Trade pe growth x Flow 2 [see above])

Comparison between Southern Water and Atkins forecast methodology

As indicated previously, one of the issues with long term projections is the reliability of the forecast methodology given that there is essentially no formally agreed approach. As part of its PR09 planning process Southern Water have supplied to the EA its flow forecasts through to 2020. In order to test the robustness of the methodology used in this study comparisons have been made with Southern Water's figures (shown below in Table 4.2).

In developing its flow forecasts Southern Water has used:

- Population growth figures as determined by its consultants. These are confidential and therefore not presented here.

- DWF's calculated using forecast PE values for 2020 and the equation detailed in Section 4.2.2.1. Southern Water have applied an allowance for infiltration of 40% of the calculated resident and tourist foul flow growth (i.e. [resident PE + 1/3 tourist PE] x return to sewer [170 l/pe/day] x 0.4). This differs from the methodology used in this study where a return to sewer figure for all new growth of 500 l/property/day, which includes for a measure of infiltration, has been used.

Table 4.2 DWF comparison between study and Southern Water figures

Works	DWF consent (m^3/d)	SWS 2020 DWF (m^3/d)	ATK 2020 DWF (m^3/d)	% difference between SWS 2020 and Atkins 2020 flows	SWS forecast to exceed consented DWF	ATK forecast to exceed consented DWF
ASHLETT CREEK FAWLEY WTW	3024	2750	2494	9	N	N
BISHOPS WALTHAM WTW	3100	2969	2748	7	N	N
BUDDS FARM HAVANT WTW	108853	106655	108984	2	N	Y
BURSLEDON WTW	1550***	1720	1586	8	Y	Y
CHICKENHALL EASTLEIGH WTW	32000**	31547	32226	2	N	Y
MILLBROOK WTW	40000	40007	40704	2	Y	Y
PEEL COMMON WTW + WOOLSTON	74683*	76512	82154	7	Y	Y
PORTSWOOD WTW	27700	21426	20320	5	N	N
ROMSEY WTW	7379	8094	8016	1	Y	Y
SLOWHILL COPSE MARCHWOOD WTW	14971	16317	15416	6	Y	Y
SOUTHWICK WTW	540	281	286	2	N	N
THORNHAM WTW	6565	6028	6329	5	N	N

Works	DWF consent (m^3/d)	SWS 2020 DWF (m^3/d)	ATK 2020 DWF (m^3/d)	% difference between SWS 2020 and Atkins 2020 flows	SWS forecast to exceed consented DWF	ATK forecast to exceed consented DWF
WICKHAM WTW	750	791	767	3	Y	Y

Notes:

* Peel Common – increased DWF consent of 59,683m^3/d has recently been applied to Peel Common; total consent including Woolston 74,683 m^3/d. It is proposed that the total consent be increased to 76,512 m^3/d in 2012.

** As of December 2008

*** Proposed 1,720 m^3/d in 2012

Given that separate methods and data sources have been used in forecasting DWF growth, there is generally good agreement on both the outturn flows and those works forecast to exceed their DWF consents in 2020.

In the case of Chickenhall Eastleigh there is little difference between the forecast 2020 flows and, given the inherent uncertainties in such long term forecast, it may be concluded that the works will likely be operating close to its consent under Scenario 1.

4.2.2.3 Scenario 2

Scenario 2 links the forecast changes in water supply with the forecast return to sewer, since the former is the primary driver for the latter. This scenario therefore takes account of demand forecasts developed by Portsmouth Water and Southern Water in their Draft WRMPs at a time when a combination of environmental impacts, climate change and recent droughts are driving a number of significant changes on the water supply side. The logic behind the development of Scenario 2 is as follows:

- Over 95% of household water use is subsequently discharged to the wastewater system and this forms the major component of wastewater inflow to the treatment works. Any significant changes in the volume of household water use would be expected to have a similarly significant impact on the volume of wastewater discharges. In the preferred strategies set out in their Draft WRMPs, both Southern Water and Portsmouth Water are proposing the introduction of universal compulsory metering and a range of other water efficiency measures. The introduction of universal compulsory metering, if supported by Ofwat, is potentially the most significant change in the management of household water demand since privatisation of the water industry in 1989. The resulting demand forecasts, which include the forecast growth in housing over the next 20 years, suggest that there will be little or no net increase in total household demand over the next 25 years.

- The standard method for forecasting growth in wastewater discharges allows for a fixed volume per household or occupant. These values are understandably conservative but, more importantly, are applied independently of any forecasts in water demand and only to new households. They do not take account of potential changes in demand in existing households. The upshot of this independent approach is that there is now a significant mis-

match between the water demand forecasts and the equivalent wastewater discharge forecasts.

- An alternative forecast for future wastewater discharges (known as Scenario 2) based on future forecasts for water supply demand has therefore been developed. Although based on slightly more conservative assumptions than the Water Company demand forecasts, it suggests that the growth in wastewater discharges will be much less than currently predicted. This is considered to be a more realistic forecast.

A combination of measures, in particular the proposals by both Water Companies for universal compulsory metering, suggest strongly that even with the forecast growth in households there may be little, if any, net increase in water demand across South Hampshire by 2026. The corollary of this is that there may be little, if any, net increase in the water discharged from households into the wastewater system.

Scenario 2 thus assumes that the increase in DWF across the PUSH area will be no more than 6.5 Ml/d. This takes a conservative view that some increase in infiltration may accrue following new development and that allows for the fact that there may be slight variations in the change in water demands across the different wastewater catchments. On this basis the method used in Scenario 1 has been applied with the following changes:

- The return to sewer flow for current (2006/07) resident and tourist populations increases from 160 l/pe/day to 170 l/pe/day from 2015 onwards.

- Tourist populations are forecast to increase by 1% on an annual basis.

The return to sewer for all PUSH resident growth is taken as 80 l/property/day (6.5Ml/d divided by 80,000 properties). This figure reflects that some increase in infiltration may accrue for new growth and that there may be some local variations.

4.2.3 Summary of scenario forecasts

This section provides a summary of the outputs from the flow growth scenarios described above.

4.2.3.1 Baseline

Table 4.3 presents for each works the baseline situation with respect to consented DWF, measured DWF and calculated levels of foul flow from current PE. As indicated previously the DWF consent figures for Budds Farm and Peel Common represent those figures used in the RoC modelling and are effectively current 'consent' flows.

The difference between the measured DWF and the calculated PE foul flow is considered to provide an indication of infiltration into the sewerage system. Infiltration is primarily due to the ingress of groundwater and can occur for a number of reasons. These include:

- Deterioration in the condition and performance of a Water Company's underground assets;

- Unstable ground conditions causing pipework to shift, opening up joints;

- High water table levels – the hydrostatic head can force water into pipe joints.

For the majority of works infiltration does not impact on either capacity or effectiveness of the treatment process; however, where flows are a potential constraint to the growth in properties in a wastewater catchment, the problem posed by infiltration takes on greater significance. Whilst there is no methodology for determining an 'economic level of infiltration' i.e. that level of infiltration below which it is considered uneconomic to manage (c.f. the economic level of leakage within the clean water distribution system), infiltration rates in excess of 40% of the current flow suggest that there is likely to be scope for securing reasonable reductions in infiltration. The table above highlights those works where infiltration is estimated to be above 40%.

The management of infiltration as an option to increase capacity at a works is considered within the individual works assessment presented in later sections.

Table 4.3 Baseline situation in 2006/07

	DWF consent (m^3/d)	Measured DWF (m^3/d)	PE related volume flow (m^3/d)	Calculated infiltration (m^3/d)	Estimated infiltration as a %ge of measured DWF
ASHLETT CREEK FAWLEY	3024	2242	2240	2	0.1
BISHOPS WALTHAM	3100	2394	2019	375	16
BUDDS FARM HAVANT	108853	95687	54863	40824	43
BURSLEDON	1550	1457	1087	370	25
CHICKENHALL	32000	28000	14732	13268	47
MILLBROOK	40000	34710	20423	14287	41
PEEL COMMON + WOOLSTON	74683*	66920	47098	19822	30 (PC – 32; Woolston – 19)
PORTSWOOD	27700	18638	11600	7038	38
ROMSEY	7379	6612	3077	3535	53
SLOWHILL COPSE	14971	14104	10780	3324	24
SOUTHWICK	540	269	214	55	20
WICKHAM	750	707	516	191	27

Note:

* - See note for Table 4-2

For the baseline situation the table shows that, with the exception of Peel Common, all works are operating below their consented DWFs. Peel Common alone is currently operating above its official DWF consent of 40,772 m^3/d but, in combination with Woolston, below that flow used in the RoC modelling and the new combined flow consent.

4.2.3.2 Scenarios 1 and 2

Table 4.4 below summarises the forecast DWFs for each of the works at years 2007/08, 2010/11, 2015/16, 2020/21 and 2025/26. Those cells highlighted in red indicate where a flow is forecast to exceed the relevant consented DWF. The baseline situation is included again for ease of comparison.

Table 4.4 Summary of scenario growth forecasts

	Scenario	DWF Consent (m^3/d)	2007	2010	2015	2020	2025
ASHLETT CREEK FAWLEY	Baseline	3024	2242	2242	2242	2242	2242
	Scenario 1		2257	2307	2330	2494	2519
	Scenario 2		2247	2260	2264	2268	2273
BISHOPS WALTHAM	Baseline	3100	2394	2394	2394	2394	2394
	Scenario 1		2414	2480	2550	2748	2821
	Scenario 2		2402	2420	2432	2444	2457
BUDDS FARM HAVANT	Baseline	108853	95687	95687	95687	95687	95687
	Scenario 1		96941	100060	103359	108984	111301
	Scenario 2		96068	96858	98063	98535	99009
BURSLEDON	Baseline	1550	1457	1457	1457	1457	1457
	Scenario 1		1461	1473	1495	1586	1609
	Scenario 2		1458	1460	1464	1467	1471
CHICKENHALL EASTLEIGH	Baseline	32000	28000	28000	28000	28000	28000
	Scenario 1		28287	29090	30722	32226	32822
	Scenario 2		28096	28302	29007	29335	29655
MILLBROOK	Baseline	40000	34710	34710	34710	34710	34710
	Scenario 1		35687	37799	38854	40704	41307
	Scenario 2		35199	36042	36443	36557	36663
PEEL COMMON + WOOLSTON	Baseline	74683	66920	66920	66920	66920	66920
	Scenario 1		67829	69783	73691	82154	87830
	Scenario 2		67321	68026	69271	70620	71990
PORTSWOOD	Baseline	27700	18638	18638	18638	18638	18638
	Scenario 1		18750	19137	19379	20320	20563
	Scenario 2		18663	18737	18779	18822	18864
ROMSEY	Baseline	7379	6612	6612	6612	6612	6612
	Scenario 1		6675	6813	7319	8016	8192
	Scenario 2		6623	6648	6730	6812	6842
SLOWHILL COPSE	Baseline	14971	14104	14104	14104	14104	14104

	Scenario	DWF Consent (m^3/d)	2007	2010	2015	2020	2025
MARCHWOOD	Scenario 1		14235	14476	14706	15416	15519
	Scenario 2		14166	14269	14309	14328	14348
SOUTHWICK	Baseline	540	269	269	269	269	269
	Scenario 1		270	271	273	286	287
	Scenario 2		269	270	270	270	271
THORNHAM	Baseline	6565	5650	5650	5650	5650	5650
	Scenario 1		5669	5800	5963	6329	6494
	Scenario 2		5656	5682	5708	5735	5762
WICKHAM	Baseline	750	707	707	707	707	707
	Scenario 1		709	715	725	767	777
	Scenario 2		707	708	710	712	714

The outcomes may be summarised:

- For Scenario 1: 7 of the 13 works are forecast to exceed their current DWF consents by 2020; Peel Common (including the Woolston flows) is forecast to exceed its consent by 2020.

- For Scenario 2: None of the works is forecast to exceed their current DWF consents.

Whilst under Scenario 1 the number of works forecast to exceed their consented DWF in 2025/26 may appear a concern, it is important to understand:

1) That Scenario 2 is considered to be a more realistic situation given that it is based on well established methods for forecasting water demand; and

2) The fact that a works has exceeded its flow consent is not in itself an issue as Southern Water could apply to the EA for a new consented flow. Where it is a concern is the extent to which the revised quality standards driven by the new consented flow (and the need to protect the quality of the receiving waters) are achievable using current technologies and the degree of investment required to achieve this.

As outlined in Section 4.1.4, in determining whether or not to grant consent for the additional flows the EA will take into consideration the environmental quality of the receiving water and, in general, will apply a 'no deterioration' policy i.e. total loads will be required to be maintained with the result that load concentrations within those higher flows will be reduced on a pro-rata basis. For many of the consented quality parameters (e.g. BOD, SS, Ammonia) this can be achieved relatively easily (provided sufficient land is available at the WWTW) through either operational changes or the installation of tertiary treatment where such treatment does not already exist. The primary concerns within the context of this study are the consents that have been applied for the nutrient elements of Nitrogen (N) and Phosphorous (P) through the Habitat Review of Consents.

Section 4.2.4 below assesses each of the WWTW in the PUSH region is assessed individually with respect to flow and quality consents and the potential implications are discussed where constraints are identified.

4.2.4 Capacity assessment of individual WWTW

This section provides an assessment of each of the WWTW in the PUSH region. The following elements have been considered:

- Flow growth under Scenarios 1 and 2;
- Impacts on quality consents – Biochemical Oxygen Demand (BOD), Suspended Solids (SS), Ammonia (A), Nitrogen (N) and Phosphorous (P);
- Potential mitigation options where capacity constraints are identified; these are discussed in more detail later in this section; and
- Estimate of available capacity to take additional growth above that forecast to 2026 – this can only be determined based on Scenario 1 outputs and applies a per property flow of 500l/property/day to provide an estimate of additional properties that could be connected; the methodology applied for Scenario 2 requires an understanding of water demand and cannot therefore be considered in determining 'spare' capacity.

It should be noted that in each of the figures presented the step change in Scenario 1 flows at 2015/16 is a result of the change in return to sewer figure for existing resident populations and predicted tourist populations from 160 to 170 l/pe/day.

For the consented quality parameters the following should be noted with respect to the types of limit:

- 95%ile – 95% of those samples analysed have to be below the limit value;
- Upper tier – no samples should exceed this value;
- Annual average – the annual average should not exceed the value indicated; and
- Max. – no sample should exceed this concentration

Options to mitigate against capacity constraints

Where constraints to growth have been identified the following options have been evaluated with a view to identifying mechanisms by which capacity may be increased or flow loads decreased.

1. Managing infiltration

Whilst managing infiltration may be considered to be a pragmatic solution to capacity constraints the reality of the situation is more complex. Without doing extensive surveys the exact location of where infiltration is occurring is difficult to predict. The primary issues with attempting to manage the impacts of infiltration may be summarised:

- Cost – as indicated extensive surveys (e.g. using CCTV) would be required to assess where infiltration is occurring. This is both costly and time consuming. Once identified significant infrastructure works would likely be required to replace either assets that have deteriorated or those pipes where joints have been corrupted.

- Managing infiltration in one section of a sewer could solely result in the problem being transferred to another section of the network.

- Any pipework replacement schemes would likely result in significant traffic disruption.

There have been instances recorded where the management of infiltration has been linked to an increase in nearby flooding, particularly of cellars. In such cases infiltration to sewers is artificially lowering the local water table and Southern Water, along with other sewerage undertakers, are concerned about the potential liabilities arising in such situations. From the mechanism involved, these situations are also likely to be some of the most significant volumetric contributors to infiltration.

2. Flow transfers

As the title suggests this option evaluates whether or not the potential exists to transfer the flows from new developments to alternative catchments. In practice it can only be applied where 'distinct' new developments are occurring. Examples where such an option could be valid include urban extensions and strategic development areas.

3. Relocating treatment works discharges

Under this option the potential to relocate effluent discharge points outside of the sensitive area to which a works currently discharges. This is only really an option where alternative locations which are not environmentally constrained exist.

4. Load based consent manipulations

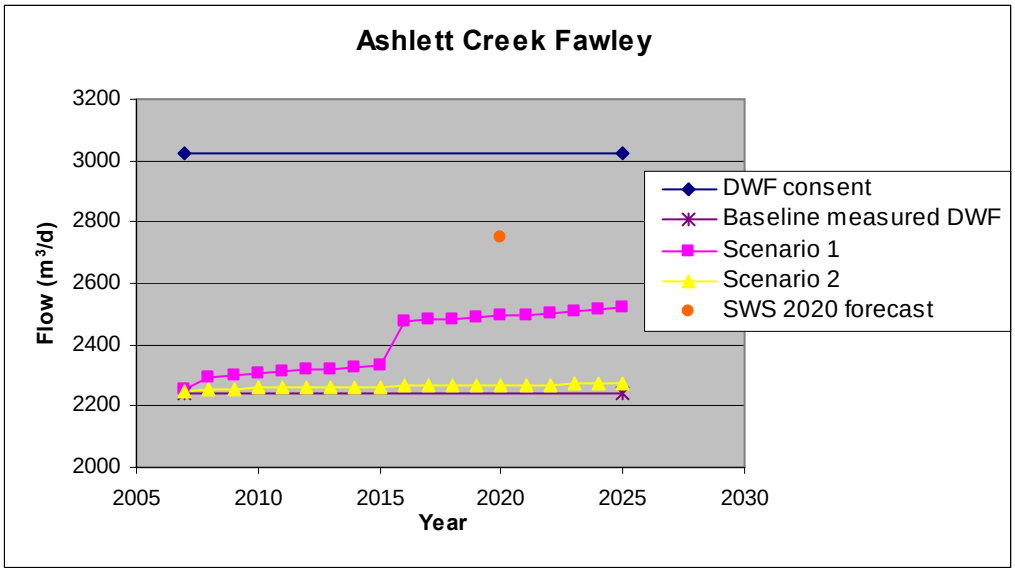
This option involves balancing consented loads within a catchment to maintain an overall 'neutral' load position. For simple catchments this is relatively straightforward; however, for large catchments with multiple works this can be a complex procedure not only to implement but also to monitor.

4.2.4.1 Ashlett Creek Fawley

Figure 4.2 presents the situation at Ashlett Creek Fawley.

Flow exceedance and quality consent impacts

Flows under both Scenarios are not forecast to exceed the consent DWF; as such there will be no impact on quality consent parameters.



Scenario	DWF Consent (m^3/d)	2007	2010	2015	2020	2025	Exceedance of DWF consent (%)
Baseline	3024	2242	2242	2242	2242	2242	-
Scenario 1		2257	2307	2330	2494	2519	-
Scenario 2		2247	2258	2261	2405	2409	-

	Quality Parameter and Limit Type				
Consent Folio No.	BOD (mg/l)		SS (mg/l)		Cu (mg/l)
	95%ile	Upper tier	95%ile	Upper tier	Max
A00797	40	80	60	-	65

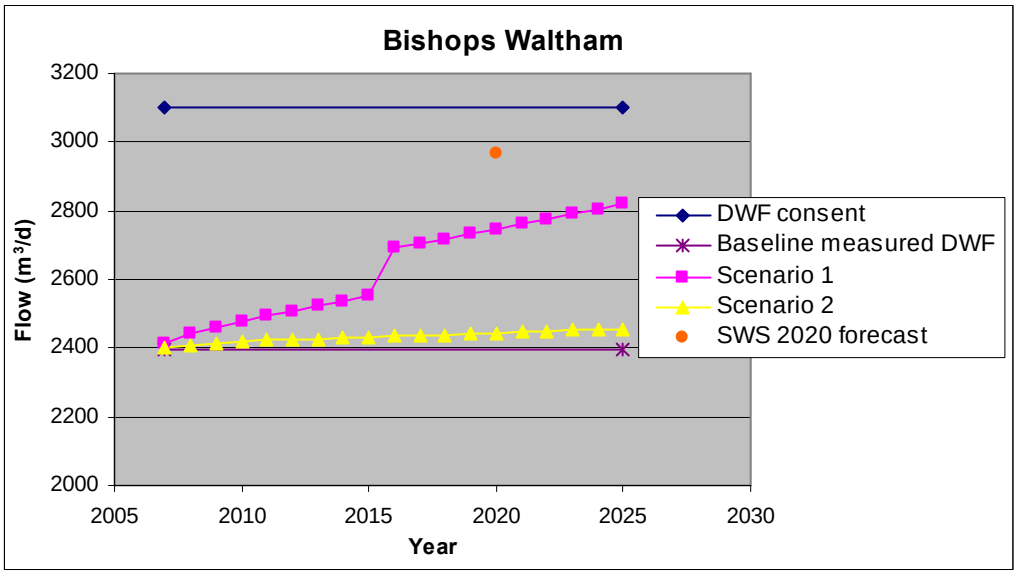
Figure 4.2 Forecast flow growth and quality consents at Ashlett Creek Fawley

4.2.4.2 Bishops Waltham

Figure 4.3 presents the situation at Bishops Waltham.

Flow exceedance and quality consent impacts

Flows under both Scenarios are not forecast to exceed the consent SWF; as such there will be no impact on quality consent parameters.



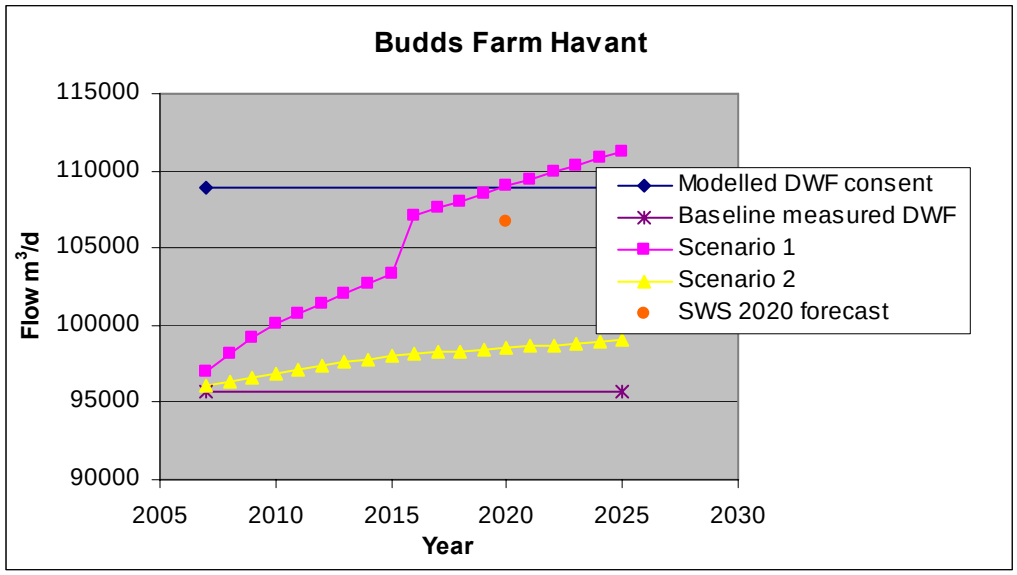
Scenario	DWF Consent (m^3/d)	2007	2010	2015	2020	2025	Exceedance of DWF consent (%)
Baseline	3100	2394	2394	2394	2394	2394	-
Scenario 1		2414	2480	2550	2748	2821	-
Scenario 2		2402	2420	2432	2444	2457	-

	Quality Parameter and Limit Type					
Consent Folio No.	BOD (mg/l)		SS (mg/l)		Ammonia (mg/l)	
	95%ile	Upper tier	95%ile	Upper tier	95%ile	Upper tier
W00006	15		15		5	

Figure 4.3 Forecast flow growth and quality consents at Bishops Waltham

4.2.4.3 Budds Farm Havant

Figure 4.4 shows the situation at Budds Farm Havant.



Scenario	DWF Consent (m^3/d)	2007	2010	2015	2020	2025	Exceedance of DWF consent (%)
Baseline	108853	95687	95687	95687	95687	95687	-
Scenario 1		96941	100060	103359	108984	111301	2.3
Scenario 2		96068	96858	98063	98535	99009	-

	Quality Parameter and Limit Type				
Consent Folio No.	BOD (mg/l)		SS (mg/l)		Total Nitrogen N (mg/l)
	95%ile	Upper tier	95%ile	Upper tier	Annual mean
A00751	40	80	60	-	10*

Note: * Total nitrogen consent as applied under UWWT regulations (same level as would be applied under the RoC)

Figure 4.4 Forecast flow growth and quality consents at Budds Farm Havant

General

During the current AMP period Budds Farm has had a significant treatment upgrade in order to achieve the 10mg/l N consent applied under the UWWT regulations.

Flow exceedance and quality consent impacts

Under ***Scenario 1*** Budds Farm is forecast to exceed its DWF consent by 2.3% in 2025/26. On the basis of the EA's no deterioration policy it would be anticipated that quality consent conditions would reduced on a pro-rata basis. Table 4.5 shows predicted quality consent conditions on the basis of the 2025/26 flow consent.

Table 4.5 Predicted quality consents on the basis of Scenario 1 2025/26 flows

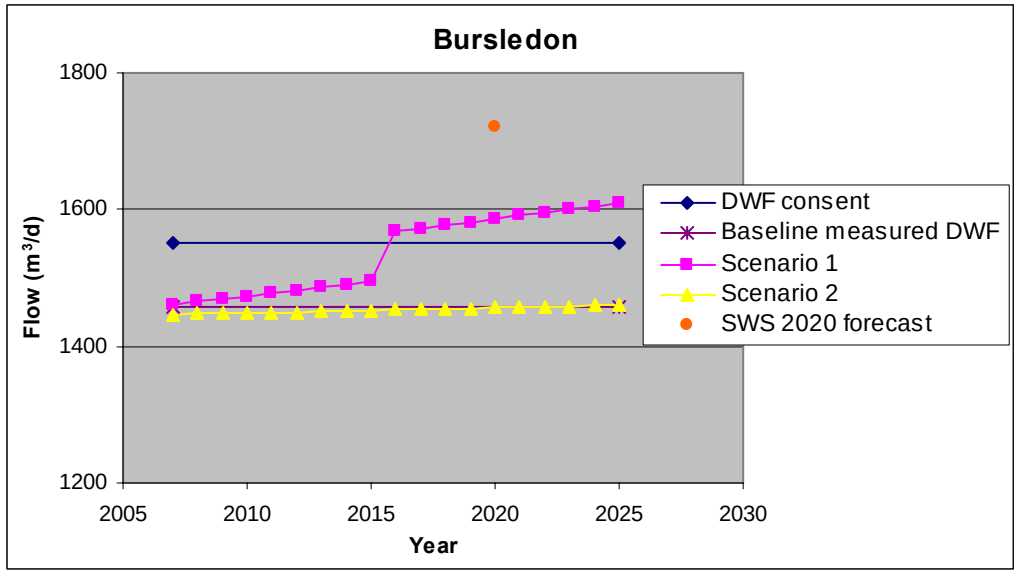
	Quality Parameter and Limit Type				
Consent Folio No.	**BOD (mg/l)**		**SS (mg/l)**		**Total Nitrogen N (mg/l)**
	95%ile	**Upper tier**	**95%ile**	**Upper tier**	**Annual mean**
A00751	39	78	59	-	9.77

On the basis of no deterioration it is predicted that an N consent concentration of 9.77mg/l would be applied. This is within the 9-10mg/l N concentration which, in our view, the works could reasonably be expected to achieve. As such this level is not considered to be a constraint to the planned growth allocated to Budds Farm. The reductions in BOD and SS concentrations are not considered significant.

Under ***Scenario 2*** the works is not expected to exceed its DWF consent; given that there will be an increase in biological load to the works associated with the population growth the works will be working harder to stay within its consented N concentration.

4.2.4.4 Bursledon

Figure 4.5 presents the situation at Bursledon.



Scenario	DWF Consent (m^3/d)	2007	2010	2015	2020	2025	Exceedance of DWF consent (%)
Baseline	1550	1457	1457	1457	1457	1457	-
Scenario 1		1461	1473	1495	1586	1609	3.8
Scenario 2		1458	1460	1464	1467	1471	-

	Quality Parameter and Limit Type				
Consent Folio No.	BOD (mg/l)		SS (mg/l)		Total Nitrogen N (mg/l)
	95%ile	Upper tier	95%ile	Upper tier	Annual mean
W00318	30	65	30	-	10*

Note: * - consent likely to be applied under Habitats RoC; no current N consent

Figure 4.5 Forecast flow growth at Bursledon

General

Bursledon will likely have a 10mg/l consent applied to it as a result of the Habitats RoC study. The assessment here uses this value in order to provide an indication of whether or not growth constraints would occur. It is understood that treatment technologies for N are currently being evaluated for inclusion with Southern Water's business plan for the period 2010-2015.

Flow exceedance and quality consent impacts

Under ***Scenario 1*** Bursledon is forecast to exceed its DWF consent by 3.8% in 2025/26. On the basis of the EA's no deterioration policy it would be anticipated that quality consent conditions would reduced on a pro-rata basis. Table 4.6 shows

predicted quality consent conditions on the basis of the 2025/26 flow consent. It should be noted that if the proposed DWF consent increase in 2012 to 1,720m^3/d is approved then no consent exceedance would be forecast.

Table 4.6 Predicted quality consents on the basis of Scenario 1 2025/26 flows (assuming no change in existing DWF consent)

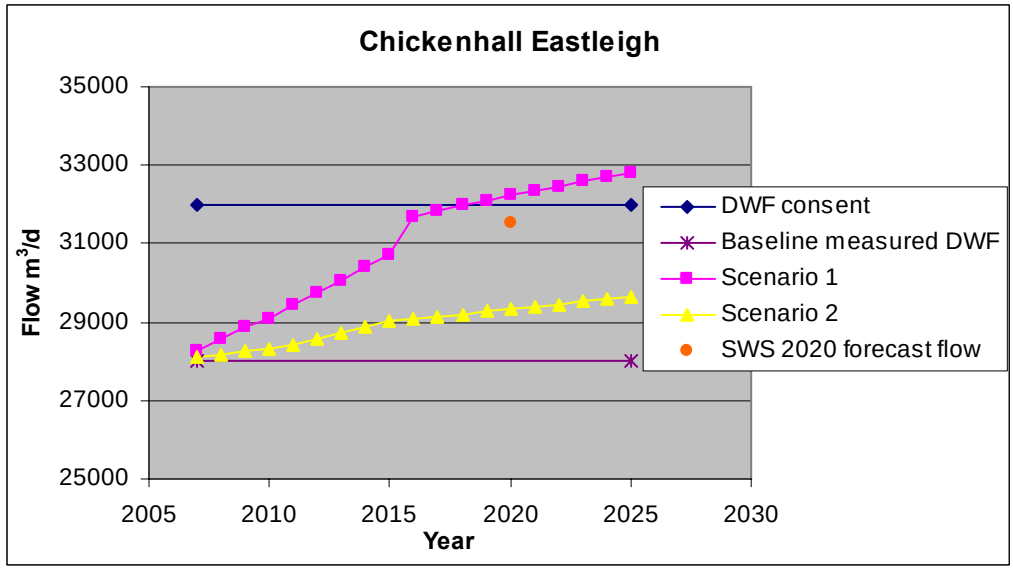
	Quality Parameter and Limit Type				
Consent Folio No.	**BOD (mg/l)**		**SS (mg/l)**		**Total Nitrogen N (mg/l)**
	95%ile	**Upper tier**	**95%ile**	**Upper tier**	**Annual mean**
W00318	29	63	29	-	9.62

On the basis of no deterioration it is predicted that an N consent concentration of 9.62mg/l would be applied. This is within the 9-10mg/l N concentration which, in our view, the works could reasonably be expected to achieve. As such this level is not considered to be a constraint to the planned growth allocated to Bursledon. The reductions in BOD and SS concentrations are not considered significant.

Under ***Scenario 2*** the works is not expected to exceed its DWF consent; given that there will be an increase in biological load to the works associated with the population growth the works would have to be working harder to stay within its consented N concentration.

4.2.4.5 Chickenhall Eastleigh

Figure 4.6 presents the situation at Chickenhall Eastleigh.



Scenario	DWF Consent (m^3/d)	2007	2010	2015	2020	2025	Exceedance of DWF consent (%)
Baseline	32000	28000	28000	28000	28000	28000	-
Scenario 1		28287	29090	30722	32226	32822	2.6
Scenario 2		28096	28302	29007	29335	29655	-

	Quality Parameter and Limit Type									
Consent Folio No.	BOD (mg/l)		SS (mg/l)		Ammonia (mg/l)		P (mg/l)	Fe (mg/l)	Sulphate (mg/l)	Ag (µg/l)
	95%ile	Upper tier	95%ile	Upper tier	95%ile	Upper tier	Annual mean	Max	Max	Max
A00154	12	46	20	50	3 (2.8)*	14	1	4	220	5

Note: * Habitats RoC indicates a consent of 2.8mg/l as preferred option

Figure 4.6 Forecast growth at Chickenhall Eastleigh

General

Under the Habitats RoC the EA has undertaken detailed modelling of water quality issues affecting the River Itchen SAC. The impacts of BOD and Ammonia inputs were assessed against the allowable river loads for a River Ecosystem class 1 (RE1) target. These are the tightest targets given in Natural England's favourable condition tables and represent the water quality required by Atlantic salmon. The preferred options to come out of the modelling were:

- BOD consent of 12 mg/l (95%ile limit).
- Ammonia consent of 2.8 mg/l (95%ile limit).

The impacts of P inputs were evaluated against allowable river loads using guideline standards for river water quality devised specifically for the Habitats Regulations and agreed by the Water Quality Technical Advisory Group and Natural England. The modelling undertaken by the EA has indicated that large stretches of the River Itchen fail to meet the relevant river loads for P. In an attempt to address the issue, the EA's preferred option was to place a 1mg/l P consent on the Chickenhall discharge. This value represents BATNEEC and has been agreed by the EA and Southern Water.

It should be noted that, even with a 1mg/l P consent, the river reach below Chickenhall is still likely to fail the P standard. Whilst the inputs are primarily of a diffuse nature e.g. agricultural and urban run-off, the EA is concerned about the extent to which any further growth to Chickenhall might exacerbate the current P situation.

The assessment of the impacts of flow exceedance on quality consents has used the figures from the preferred options in addition to the other quality parameters.

In developing the flow forecasts for Chickenhall an issue has arisen in that the Chickenhall catchment extends beyond the PUSH boundary; the EA has expressed concern that not all growth within the catchment has been included within the figures provided by PUSH. This issue has been discussed with PUSH and assurance received that all currently available growth information within the catchment as a whole, not just that part within the PUSH boundary, has been included. There is therefore a high degree of confidence in the property numbers used in the forecast.

Flow exceedance and quality consent impacts

Under ***Scenario 1*** Chickenhall is forecast to marginally exceed its DWF consent by 2.6% in 2025/26. On the basis of the EA's no deterioration policy it would be anticipated that quality consent conditions would be reduced on a pro-rata basis. Table 4.7 shows predicted quality consent conditions on the basis of the 2025/26 flow consent.

Table 4.7 Predicted quality consents on the basis of Scenario 1 2025/26 flows

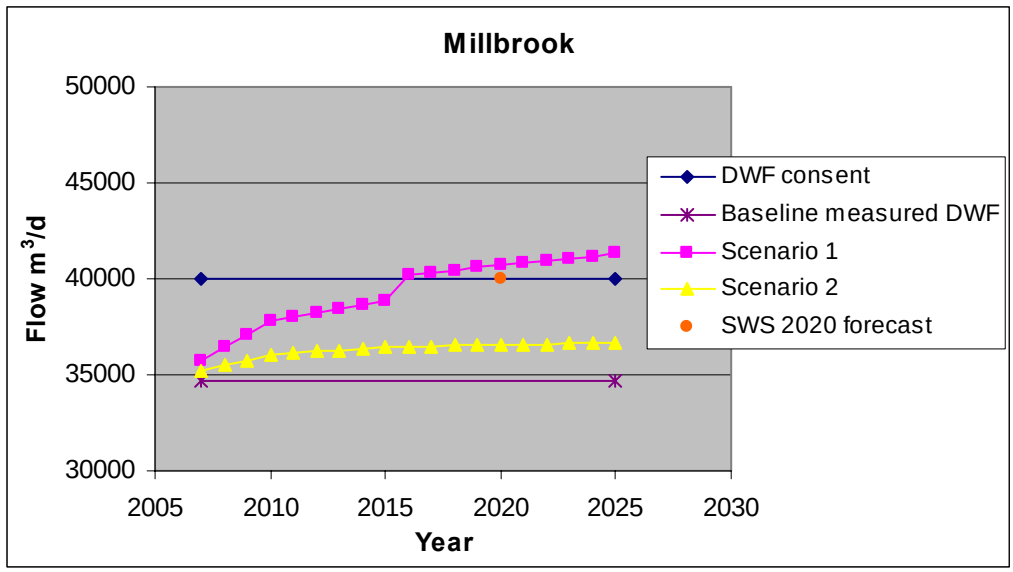
	Quality Parameter and Limit Type									
Consent Folio No.	**BOD (mg/l)**		**SS (mg/l)**		**Ammonia (mg/l)**		**P (mg/l)**	**Fe (mg/l)**	**Sulphate (mg/l)**	**Ag (µg/l)**
	95%ile	**Upper tier**	**95%ile**	**Upper tier**	**95%ile**	**Upper tier**	**Annual mean**	**Max**	**Max**	**Max**
A00154	12	45	19	49	2.7	13	0.97	3.9	214	4.9

Of the parameters considered to be of prime concern within the RoC modelling, the change in level of consent for P to a level below that considered BATNEEC may be an issue. However, given that the figure is an annual average and that to achieve even a 1 mg/l consent Southern Water would be looking to treat to below this standard to avoid any non-compliance issue, in our view it is anticipated that the marginal reduction in P concentration indicated could be achieved. As it stands the forecast reduced P consent is not considered a constraint and the works should be in a position to accept all the growth currently allocated. Growth post 2026 under this Scenario would likely be constrained without management options that could include infiltration management.

Under ***Scenario 2*** the works is forecast not to exceed its DWF consent.

4.2.4.6 Millbrook

Figure 4.7 presents the situation at Millbrook.



Scenario	DWF Consent (m^3/d)	2007	2010	2015	2020	2025	Exceedance of DWF consent (%)
Baseline	40000	34710	34710	34710	34710	34710	-
Scenario 1		35687	37799	38854	40704	41307	3.3
Scenario 2		35199	36042	36443	36557	36663	-

	Quality Parameter and Limit Type				
Consent Folio No.	BOD (mg/l)		SS (mg/l)		Total Nitrogen N (mg/l)
	95%ile	Upper tier	95%ile	Upper tier	Annual mean
A00016	25	-	40	-	10*

Figure 4.7 Forecast flow growth at Millbrook

General

Millbrook will likely have a 10mg/l consent applied to it as a result of the Habitats RoC. The assessment here uses this value in order to provide an indication of whether or not growth constraints would occur. It is understood that treatment technologies for N are currently being evaluated for inclusion with Southern Water's business plan for the period 2010-2015.

Flow exceedance and quality consent impacts

Under ***Scenario 1*** Millbrook is forecast to exceed its DWF consent by 3.3% in 2025/26. On the basis of the EA's no deterioration policy it would be anticipated that quality consent conditions would reduced on a pro-rata basis. Table 4.8 shows predicted quality consent conditions on the basis of the 2025/26 flow consent.

Table 4.8 Predicted quality consents on the basis of Scenario 1 2025/26 flows

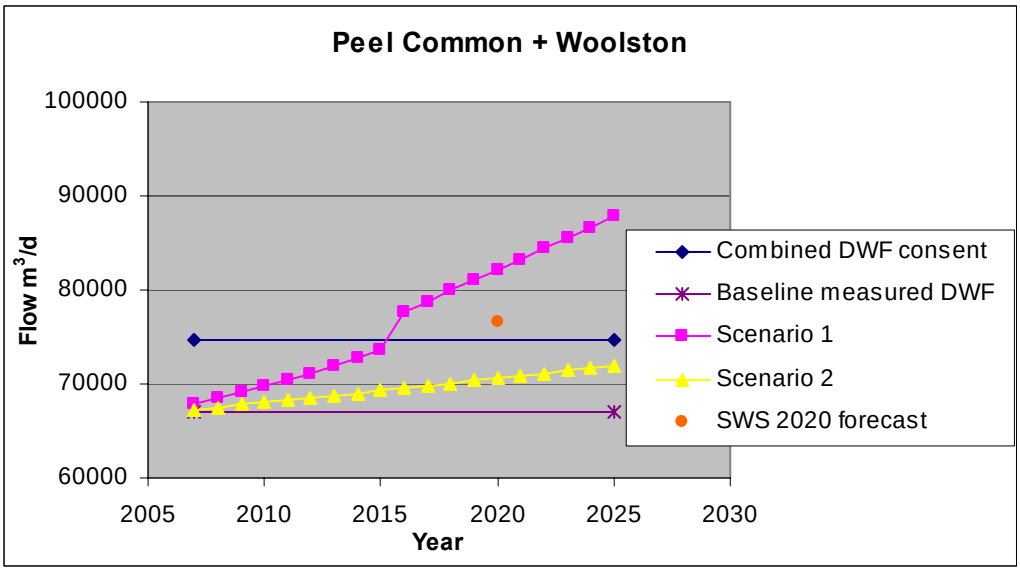
	Quality Parameter and Limit Type				
Consent Folio No.	**BOD (mg/l)**		**SS (mg/l)**		**Total Nitrogen N (mg/l)**
	95%ile	**Upper tier**	**95%ile**	**Upper tier**	**Annual mean**
A00016	24	-	39	-	9.67

On the basis of no deterioration it is predicted that an N consent concentration of 9.67mg/l would be applied. This is within the 9-10mg/l N concentration which, in our view, the works could reasonably be expected to achieve. As such this level is not considered to be a constraint to the planned growth allocated to Millbrook. The reductions in BOD and SS concentrations are not considered significant.

Under ***Scenario 2*** the works would not be expected to exceed its DWF consent; given that there will be an increase in biological load to the works associated with the population growth the works would have to be working harder to stay within its consented N concentration.

4.2.4.7 Peel Common (including Woolston flows)

Figure 4.8 presents the situation at Peel Common. Note that the quality consent parameters are those currently applied to Peel Common alone.



	Impact of growth on DWF						
Scenario	**DWF Consent (m^3/d)**	**2007**	**2010**	**2015**	**2020**	**2025**	**Exceedance of DWF consent at 2025 (%)**
Baseline	74683	66920	66920	66920	66920	66920	-
Scenario 1		67829	69783	73691	82154	87830	18
Scenario 2		67321	68026	69271	70620	71990	-

	Quality Parameter and Limit Type

Consent Folio No.	BOD (mg/l)		SS (mg/l)		Total Nitrogen N (mg/l)
	95%ile	Upper tier	95%ile	Upper tier	Annual mean
W00131	40	80	60	120	10*

	Impact of growth on N load against standstill load (on the basis of 10mg/l consent)						
Scenario	Stand-still load (Kg-N/d)	2007 N Load Kg-N/d	2010 N Load Kg-N/d	2015 N Load Kg-N/d	2020 N Load Kg-N/d	2025 N Load Kg-N/d	Exceedance of standstill load at 2025 (%)
Baseline	699.5	669.2	669.2	669.2	669.2	669.2	-
Scenario 1		678.3	697.8	736.9	821.5	878.3	26
Scenario 2		673.2	680.2	692.7	706.2	719.9	3

Note: * Total nitrogen consent as applied under UWWT regulations (same level as would be applied under the RoC)

Figure 4.8 Forecast flow growth at Peel Common (including Woolston)

General

Peel Common is one of the largest works in the PUSH region; the catchment it serves is forecast to receive significant growth (approx. 33% increase in PE at 2025/26 from a 2006/07 baseline if no change in occupancy is assumed) with both the SDAs allocated to the catchment. As a result of its size and location it has figured prominently in the RoC procedure for the marine Natura 2000 sites. The works is already subject to a tight N consent applied under the UWWT regulations. Within the RoC, this consent was confirmed.

As part of the RoC options appraisal, it was recommended that consideration was given to relocating the discharge from Woolston to Peel Common. Southern Water has taken this on board and it is understood that this option is one that is being pursued. As such, the flow forecasts have been undertaken using flows from both catchments.

On the basis of the increased DWF consent at Peel Common (59,683m^3/d) there are no issues with baseline current measured flows when compared to existing consents at either works.

The assessment of the impacts of growth in the Peel Common/Woolston catchments is relatively complex. Two aspects have been considered:

- The combined DWF consent has, given the increase at Peel Common, risen to 74,683m^3/d. The assessment of DWF impacts are therefore measured against this new figure;

- As discussed in Section 4.2.2 the Peel Common/Woolston combined discharge standstill N load is 699.5 kg-N/d i.e. that effluent load which must be maintained on the basis of 'no deterioration'. This was established from the Environment Agency's Review of Consents analysis for the Habitats Directive and was based on 10 mg-N/l total N for the assessed 2005 flow for Peel Common (54,950 m^3/d) plus the consented DWF for Woolston (15,000 m^3/d) giving a combined flow of 105754 m^3/d. As a result, the impacts of growth in the Peel Common/Woolston

catchments on the N quality consent have been assessed on the basis of this previously established standstill load.

Flow exceedance and quality consent impacts

Under ***Scenario 1*** Peel Common/Woolston is forecast to exceed its combined DWF consent by 18% in 2025/26. Exceedance of the N load standstill figure is forecast to be 26%.

Under ***Scenario 2*** Peel Common/Woolston is not forecast to exceed its combined DWF consent; however, the combined flow is forecast to exceed the N load standstill by 3%.

On the basis of the EA's no deterioration policy it would be anticipated that quality consent conditions would reduced on a pro-rata basis. Table 4.9 shows predicted quality consent conditions on the basis of the 2025/26 flow and load consents for Scenarios 1 and 2.

Table 4.9 Predicted quality consents on the basis of 2025/26 flows and loads

	Quality Parameter and Limit Type				
Consent Folio No. – W00131	**BOD (mg/l)**		**SS (mg/l)**		**Total Nitrogen N (mg/l)**
	95%ile	**Upper tier**	**95%ile**	**Upper tier**	**Annual mean**
Scenario 1	34	68	51	102	7.96
Scenario 2	40	80	60	120	9.72

For ***Scenario 2***, on the basis of no deterioration it is predicted that an N consent concentration of 9.74mg/l would be applied. This is within the 9-10mg/l N concentration which, in our view, the works could reasonably be expected to achieve. The reductions in BOD and SS concentrations are not considered significant.

For ***Scenario 1***, on the basis of no deterioration it is predicted that an N consent concentration of 7.96mg/l would be applied. This is significantly below the 9-10mg/l concentration that is, in our view, currently considered achievable and as such has the potential to pose a significant constraint to growth.

As part of Southern Water's current investment programme Peel Common has been upgraded to include for treatment to remove N to meet the 10mg/l consent that has been applied under the UWWT regulations. The works has recently been commissioned and initial performance is encouraging; however, it is far too early to suggest that significant improvements can be made to the 9mg/l limit that we suggest may be achievable.

There is always uncertainty in the forecasting forward of growth flows; however, what should be noted is that the 7.96 mg/l N figure would be the consent set on the basis of flows and load exceedance in 2026.

Table 4.10 presents details of an assessment of how predicted N consents would change under Scenario1 with time based on the phasing in of allocated growth.

Table 4.10 Peel Common predicted interim N consents – Scenario 1

	Scenario	DWF Consent/ N Stand-still load (m^3/d) / (kg-N/d)	2015		2020		2025	
			Forecast DWF (m^3/d)	Predicted N consent (mg/l)	Forecast DWF (m^3/d)	Predicted N consent (mg/l)	Forecast DWF (m^3/d)	Predicted N consent (mg/l)
PEEL COMMON + WOOLSTON	Baseline	74683 / 699.5	66920	-	66920	-	66920	-
	Scenario 1		73691	9.49	82154	8.51	87830	7.96

From the predicted interim N consents detailed in the table it can be seen that the issue of a consent figure which may be difficult to achieve does not rise until between 2015/16 and 2020/21. What this essentially provides is a 'grace' period over which the performance of the N removal technologies at Peel Common may be closely monitored, in order to gain information on exactly what level of treatment can be achieved, and the impacts of growth on flow volumes assessed.

The EA have indicated that in addition to providing Southern Water with an N concentration consent on any new DWF consent, it would also give a load based consent (concentration x flow). If, for example, Southern Water were to negotiate with the EA an interim consent to 2015, the provision of two forms of N consent would allow Southern Water the flexibility to manage its works over the next 3 or 4 years in such a way as to enable a full evaluation of its performance capabilities. This may seem a long time; however, given that the systems are biological in nature i.e. undertaken by bacteria, it can take some time to reach stable conditions following any operational adjustments.

It is considered that only through extensive monitoring of both works flows and effluent N concentrations can a full understanding of the issues at Peel Common be gained. Given the extent of the growth allocated to the works, a fuller understanding of its capabilities will be a key factor in understanding what constraints may exist in the longer term.

However unlikely, if growth in DWF were to require treatment beyond the capabilities of the Peel Common works, a range of alternative options would have to be considered. These might include:

- Reducing the size of the SDA's.
- Reducing infiltration - despite the potential difficulty, costs and localised flooding risks associated with this, reducing infiltration does present itself as one of the most obvious solutions to the capacity issue.
- Re-directing flows to other works - for the majority of infill growth (and potentially the urban extensions) this is not an option; for the SDA's, however, it may be possible to reallocate flows, although the options appear to be very limited.
- Relocation of discharge points – the relocation of the Peel Common discharge point to outside of the marine SAC could be considered; however, the costs, environmental impacts of construction and energy usage would all be major obstacles.

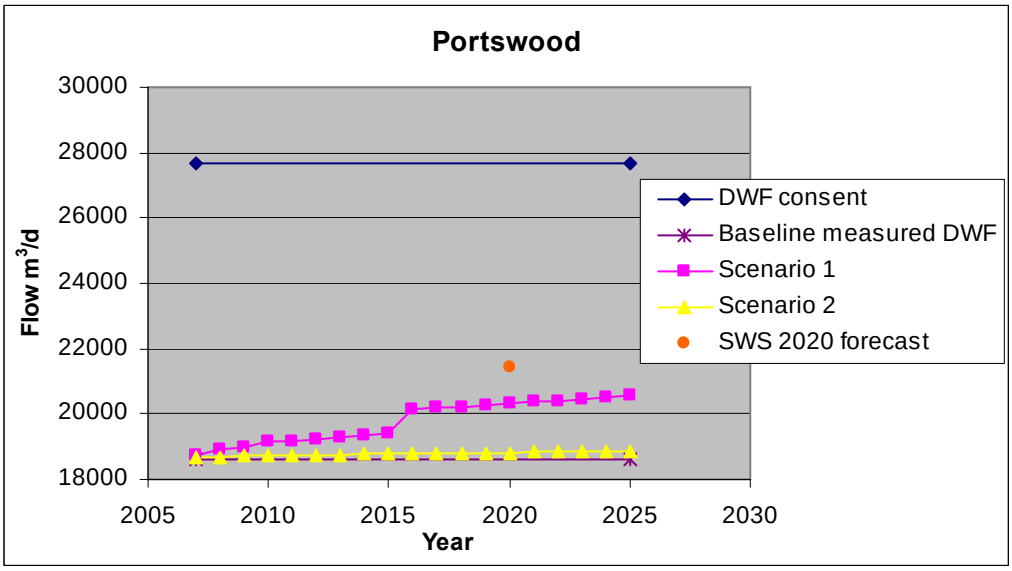
- Putting N treatment at Woolston and maintaining the works with no transfer to Peel Common – this would reduce flows at Peel Common; however, at this point in time there is 'spare' capacity at Woolston. Under the current plans this would be transferred to Peel Common, removing this 'spare' capacity would in fact exacerbate the Scenario 1 situation.

- Load based consenting – as discussed previously this would, given the number of WWTW and sensitive areas to be protected, be a complex option to implement. This option would not be without cost implications as it may require treatment for N to be installed at treatment works where currently this is not a specific requirement.

Although some additional feasibility work may be beneficial, the expectation that DWF will be much more in line with Scenario 2 than Scenario 1, and the urgent need to improve the understanding of current flows at Peel Common, mean that a detailed feasibility assessment of options is not warranted at this stage.

4.2.4.8 Portswood

Figure 4.9 presents the situation at Portswood.



Scenario	DWF Consent (m^3/d)	2007	2010	2015	2020	2025	Exceedance of DWF consent (%)
Baseline	27700	18638	18638	18638	18638	18638	-
Scenario 1		18750	19137	19379	20320	20563	-
Scenario 2		18663	18737	18779	18822	18864	-

	Quality Parameter and Limit Type			
Consent Folio No.	BOD (mg/l)		SS (mg/l)	
	95%ile	Upper tier	95%ile	Upper tier
W00314	35	-	80	-

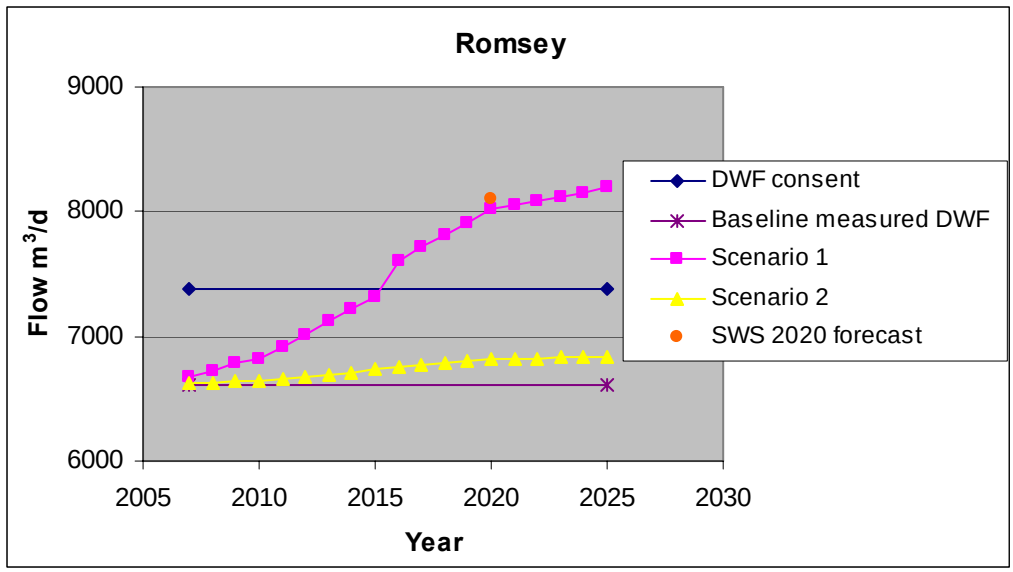
Figure 4.9 Forecast flow growth at Portswood

Flow exceedance and quality consent impacts

Flows under both Scenarios are not forecast to exceed the consent SWF; as such there will be no impact on quality consent parameters.

4.2.4.9 Romsey

Figure 4.10 presents the situation at Romsey.



Scenario	DWF Consent (m^3/d)	2007	2010	2015	2020	2025	Exceedance of DWF consent (%)
Baseline	7379	6612	6612	6612	6612	6612	-
Scenario 1		6675	6813	7319	8016	8192	11.0
Scenario 2		6623	6648	6730	6812	6842	-

	Quality Parameter and Limit Type								
Consent Folio No.	BOD (mg/l)		SS (mg/l)		Ammonia (mg/l)		P (mg/l)	Fe (mg/l)	Ag (µg/l)
	95%ile	Upper tier	95%ile	Upper tier	95%ile	Upper tier	Annual mean	Max	Max
W00219	25	60	40	101	8	30	1	4	5

Figure 4.10 Forecast flow growth at Romsey

General

Romsey is a relatively small works that serves a catchment where significant growth is planned (approx. 34% increase in PE at 2025/26 from a 2006/07 baseline). The works currently has relatively stringent BOD and Ammonia consents and a P consent that represents a level of treatment considered BATNEEC by both the EA and Southern Water.

Flow exceedance and quality consent impacts

Under ***Scenario 1*** Romsey is forecast to exceed its DWF consent by 11% in 2025/26. On the basis of the EA's no deterioration policy it would be anticipated that quality consent conditions would be reduced on a pro-rata basis. Table 4.11 shows predicted quality consent conditions on the basis of the 2025/26 flow consent.

Table 4.11 Predicted quality consents on the basis of Scenario 1 2025/26 flows

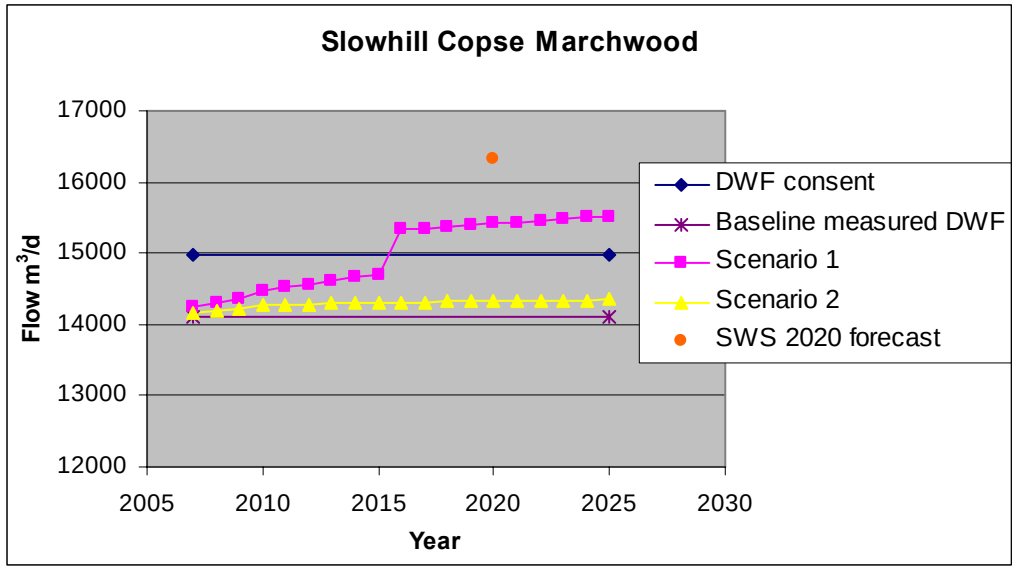
	Quality Parameter and Limit Type								
Consent Folio No.	**BOD (mg/l)**		**SS (mg/l)**		**Ammonia (mg/l)**		**P (mg/l)**	**Fe (mg/l)**	**Ag (µg/l)**
	95%ile	**Upper tier**	**95%ile**	**Upper tier**	**95%ile**	**Upper tier**	**Annual mean**	**Max**	**Max**
W00219	22	53	36	90	7	27	0.89	3.6	4.5

The change in level of consent for P to a level below that considered BATNEEC is a potential issue. In principle where iron salts are being dose to precipitate out the P, increased levels of removal can be achieved by simply increasing the dose. However, given the works also has an Iron (Fe) consent, consideration must be given to maintaining compliance with this standard. Additional infrastructure for P removal is being installed as part of Southern Water's AMP4 investment programme and it would be anticipated that this would be sufficient to treat to a standard marginally below BATNEEC. Monitoring of the new process will be required to enable more informed conclusions as to the level of treatment that could be provided to be made. At this point in time it is considered that the works has sufficient capacity, despite the tightened P consent, to accept the forecast growth. Options should this not be the case include infiltration management; estimates of infiltration in the catchment are high and strategic management of, for example, 20% may provide sufficient additional capacity to mitigate any reduction in P consent below BATNEEC.

Under ***Scenario 2*** the works will remain within its DWF consent.

4.2.4.10 Slowhill Copse Marchwood (Slowhill)

Figure 4.11 presents the situation at Slowhill.



Scenario	DWF Consent (m^3/d)	2007	2010	2015	2020	2025	Exceedance of DWF consent (%)
Baseline	14971	14104	14104	14104	14104	14104	-
Scenario 1		14235	14476	14706	15416	15519	3.7
Scenario 2		14166	14269	14309	14328	14348	-

	Quality Parameter and Limit Type				
Consent Folio No.	BOD (mg/l)		SS (mg/l)		Total Nitrogen N (mg/l)
	95%ile	Upper tier	95%ile	Upper tier	Annual mean
W00288	30	60	60	150	10*

Figure 4.11 Forecast flow growth at Slowhill Copse Marchwood

General

Slowhill will likely have a 10mg/l consent applied to it as a result of the Habitats RoC study. The assessment here uses this value in order to provide an indication of whether or not growth constraints would occur. It is understood that treatment technologies for N are currently being evaluated for inclusion with Southern Water's business plan for the period 2010-2015.

Flow exceedance and quality consent impacts

Under ***Scenario 1*** Slowhill is forecast to exceed its DWF consent by 3.7% in 2025/26. On the basis of the EA's no deterioration policy it would be anticipated that quality consent conditions would reduced on a pro-rata basis. Table 4.12 shows predicted quality consent conditions on the basis of the 2025/26 flow consent.

Table 4.12 Predicted quality consents on the basis of Scenario 1 2025/26 flows

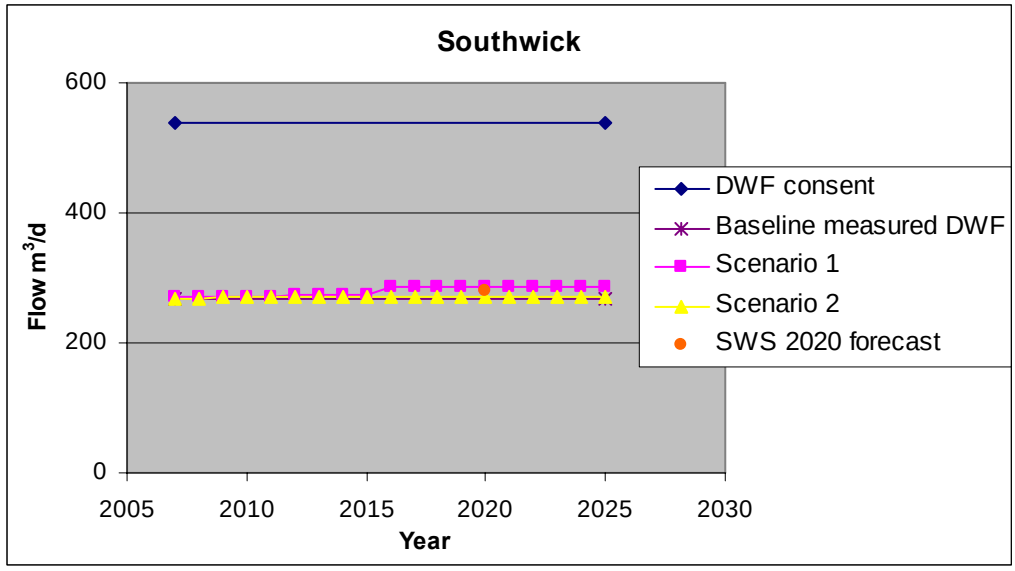
	Quality Parameter and Limit Type				
Consent Folio No.	**BOD (mg/l)**		**SS (mg/l)**		**Total Nitrogen N (mg/l)**
	95%ile	**Upper tier**	**95%ile**	**Upper tier**	**Annual mean**
W00288	29	58	58	144	9.63

On the basis of no deterioration it is predicted that an N consent concentration of 9.63mg/l would be applied. This is within the 9-10mg/l N concentration which, in our view, the works could reasonably be expected to achieve. As such this level is not considered to be a constraint to the planned growth allocated to Millbrook. The reductions in BOD and SS concentrations are not considered significant.

Under ***Scenario 2*** the works would not be expected to exceed its DWF consent; given that there will be an increase in biological load to the works associated with the population growth the works would have to be working harder to stay within its consented N concentration.

4.2.4.11 Southwick

Figure 4.12 presents the situation at Southwick.



Scenario	DWF Consent (m^3/d)	2007	2010	2015	2020	2025	Exceedance of DWF consent (%)
Baseline	540	269	269	269	269	269	-
Scenario 1		270	271	273	286	287	-
Scenario 2		269	270	270	270	271	-

	Quality Parameter and Limit Type			
Consent Folio No.	**BOD (mg/l)**		**SS (mg/l)**	
	95%ile	**Upper tier**	**95%ile**	**Upper tier**
W00248	20	-	30	-

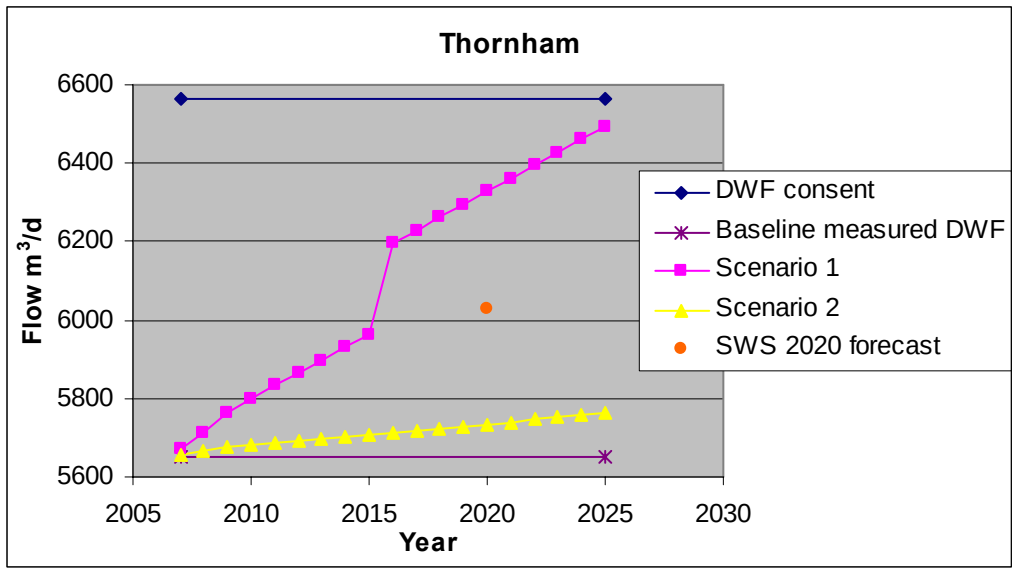
Figure 4.12 Forecast flow growth at Southwick

Flow exceedance and quality consent impacts

Flows under both Scenarios are not forecast to exceed the consent SWF; as such there will be no impact on quality consent parameters.

4.2.4.12 Thornham

Figure 4.13 presents the situation at Thornham.



Scenario	DWF Consent (m^3/d)	2007	2010	2015	2020	2025	Exceedance of DWF consent (%)
Baseline	6565	5650	5650	5650	5650	5650	-
Scenario 1		5669	5800	5963	6329	6494	-
Scenario 2		5656	5682	5708	5735	5762	-

	Quality Parameter and Limit Type				
Consent Folio No.	BOD (mg/l)		SS (mg/l)		Total Nitrogen N (mg/l)
	95%ile	Upper tier	95%ile	Upper tier	Annual mean
W00354	30	-	60	-	15 (10)*

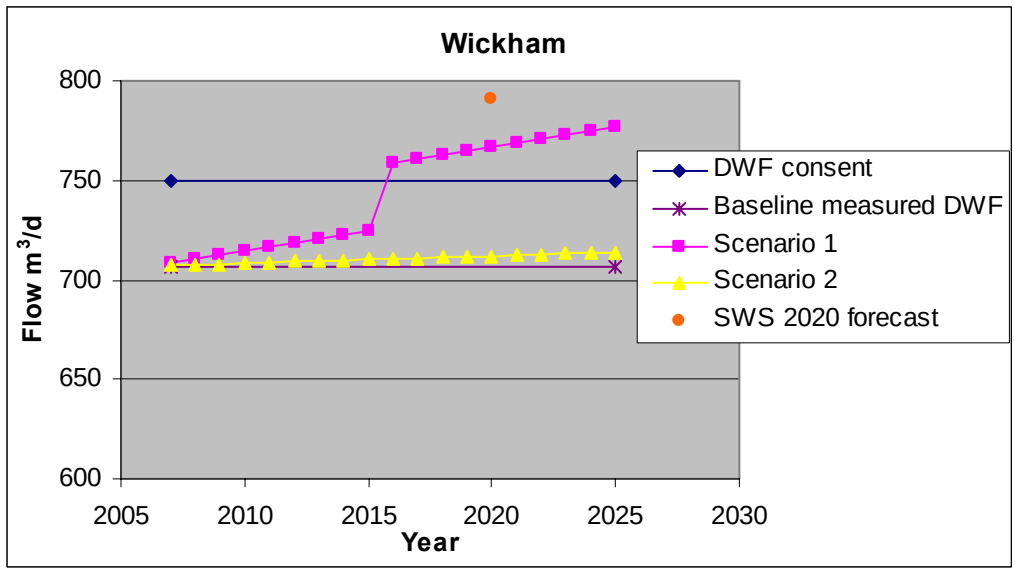
Figure 4.13 Forecast flow growth at Thornham

Flow exceedance and quality consent impacts

Flows under both Scenarios are not forecast to exceed the consent SWF; as such there will be no impact on quality consent parameters.

4.2.4.13 Wickham

Figure 4.14 presents the situation at Wickham.



Scenario	DWF Consent (m^3/d)	2007	2010	2015	2020	2025	Exceedance of DWF consent (%)
Baseline	750	707	707	707	707	707	-
Scenario 1		709	715	725	767	777	3.6
Scenario 2		707	708	710	712	714	-

	Quality Parameter and Limit Type			
Consent Folio No.	BOD (mg/l)		SS (mg/l)	
	95%ile	Upper tier	95%ile	Upper tier
W00598	20	-	35	-

Figure 4.14 Forecast flow growth at Wickham

Flow exceedance and quality consent impacts

Under ***Scenario 1*** Wickham is forecast to exceed its DWF consent by 3.6% in 2025/26. On the basis of the EA's no deterioration policy it would be anticipated that quality consent conditions would reduce on a pro-rata basis. Table 4.13 shows predicted quality consent conditions on the basis of the 2025/26 flow consent. The reductions in BOD and SS concentrations are not significant.

Table 4.13 Predicted quality consents on the basis of Scenario 1 2025/26 flows

	Quality Parameter and Limit Type			
Consent Folio No.	BOD (mg/l)		SS (mg/l)	
	95%ile	Upper tier	95%ile	Upper tier
W00598	19	-	34	-

Under ***Scenario 2*** the works is not forecast to exceed its DWF consent.

4.3 Summary

4.3.1 Conclusions

Using a standard approach to forecasting discharges

For some time the EA has expressed significant concerns regarding the tension between the proposed growth in South Hampshire and the potential impact of existing and future wastewater discharges on the internationally designated river and coastal waters in the area. This assessment has demonstrated that, using standard methods for forecasting growth in wastewater discharges, these concerns are warranted – by 2020, seven out of 13 (over 50%) of wastewater treatment works in the area are forecast to exceed their flow consents.

If there is to be no deterioration in pollutant loads, the EA will only permit increases in consented flows if they are matched by an "equivalent" improvement in the quality of the wastewater discharged. Whilst it is likely that most of the works will be able to achieve some further improvement in the quality of wastewater discharged to compensate the additional flows, this will almost certainly not be possible at works such as Peel Common. Furthermore, with major improvements in treatment already the subject of ongoing work at a number of the sites concerned, there are legitimate concerns that further improvements in 10-15 years time may not be technologically or economically viable or environmentally sustainable, given that additional treatment tends to require significantly more energy use.

Integrating wastewater forecasts with water supply forecasts

Despite the above, this Study has concluded that the situation may not be as problematic as the standard method of wastewater forecasting suggests. The main reason for this is that a combination of environmental impacts, climate change and recent droughts are driving a number of significant changes on the water supply side. These can be summarised as follows:

- Over 95% of household water use is subsequently discharged to the wastewater system and this forms the major component of wastewater inflow to the treatment works. Any significant changes in the volume of household water use would be expected to have a similarly significant impact on the volume of wastewater discharges. In the preferred strategies set out in their Draft WRMPs, both Southern Water and Portsmouth Water are proposing the introduction of universal compulsory metering. This is potentially the most significant change in the management of household water demand since privatisation of the water industry in 1989. The resulting demand forecasts, which include the forecast growth in housing over the next 20 years, suggest that there will be little or no net increase in total household demand over the next 25 years.

- The standard method for forecasting growth in wastewater discharges allows for a fixed volume per household or occupant. These values are understandably conservative but, more importantly, are applied independently of any forecasts in water demand and only to new households. They do not take account of potential changes in demand in existing households. The upshot of this independent approach is that there is now a significant mis-match between the water demand forecasts and the equivalent wastewater

discharge forecasts. It is issues such as this that an Integrated Water Management Study is designed to capture and address.

- An alternative forecast for future wastewater discharges (known as Scenario 2) based on future forecasts for water supply demand has therefore been developed. Although based on slightly more conservative assumptions than the Water Company demand forecasts, it suggests that the growth in wastewater discharges will be much less than currently predicted. This is considered to be a more realistic forecast.

The need for major new wastewater infrastructure

Based on Scenario 2 flows, the only works forecast to exceed its consented flow in the period to 2026 is Peel Common (assumed to include the Woolston discharge). However, the potential reduction in the concentrations of consented water quality parameters that would be required at peel Common to ensure compliance with the EA's 'no deterioration' policy is likely to be well within the capacity of current treatment technologies to deliver.

At this stage, it is therefore considered very unlikely that major new wastewater treatment infrastructure will be required during the next 20 years other than that already required to achieve the consents set by the EA under the Urban Wastewater Treatment Directive and those proposed to fulfil the requirements of the Habitats and Birds Directives.

Risks relating to Wastewater Management

There are a number of risks relating to the assessment and conclusions set out above that need to be understood and managed where required. These are:

i) In reviewing the Water Company Draft WRMPs, Ofwat don't approve the proposals for universal compulsory metering. This is only really likely to be on the ground of cost. The assessment of costs and benefits of the metering proposals are unlikely to have included any allowance for the potential benefits to wastewater flows and the capacity for growth.

ii) Effective, routine monitoring of the inflows and outflows at wastewater treatment works has only been in place for a few years. At works such as Peel Common, the data remain inadequate. This not only impacts on current estimates of DWF (with knock-on impacts on forecasts for the future), but also hinders the understanding of the performance of the works.

iii) At this stage, assessments of nitrogen removal rates are encouraging at those works fitted with new enhanced nitrogen removal technologies. These trials are ongoing. Our own view is that concentrations at or below 10 mgN/l should be achievable. Obviously, how far below the 10 mg/l concentration the works can reliably go and at what cost will be a key factor in defining what "contingency" exists to handle the proposed growth.

iv) It is possible that the demand forecasts set out in the Water Company Draft WRMPs will prove to be an under-estimate, either because universal compulsory metering does not reduce demand by as much as anticipated or because the impact of climate change or reduced household occupancy rates on per capita consumption is much greater than anticipated. However, even much more conservative (and almost certainly unrealistic) estimates of demand

would still produce increases in wastewater discharges that are well below those forecast using the standard approach. In this situation, the Peel Common discharge would remain the main issue of concern.

v) In the absence of any serious attempt to reduce infiltration to sewers, infiltration does not remain at current levels but increases.

vi) Current assessments of "environmental capacity" do not at this stage take account of any additional constraints that may arise from the EA's implementation of the EU Water Framework Directive. Current levels of diffuse pollution are already high and unless further action is taken by the EA and other relevant parties in this area it is not inconceivable that further tightening of "end of pipe" consents, particularly for N and P may be considered by the EA.

vii) Finally, PUSH and the EA are aware that the area may come under further pressure from central government to increase its housing and population projections further.

4.3.2 Recommendations

No additional growth should be planned beyond that already proposed

As with the Water Supply side, the Wastewater aspects of this Study suggest that PUSH should be very cautious before accepting any growth targets over and above the levels currently proposed. There are uncertainties in each of the areas of environmental capacity, treatment capability and current and future discharge volumes and although this report indicates that the proposed growth can be accommodated in a sufficiently sustainable manner, it would be unwise to plan any further growth until the assumptions made in this assessment have been thoroughly tested and verified.

Planning requirements at additional works should be clarified

Although this report has concluded that major new wastewater treatment infrastructure is unlikely to be required, the PUSH Authorities and Southern Water do need to ensure that where existing works need to be upgraded to fulfil the EA's proposed consents, appropriate provision for land allocation and planning requirements have been made. It is recommended that land allocation be considered through a series of meetings with individual Local Authorities or through a combined meeting.

Verification of the forecasting approach used in this Report

The importance of the approach taken to forecasting the growth in wastewater discharges has been well illustrated in this report. It is therefore recommended that some verification of the approach taken to the forecast used in this work is undertaken by Southern Water and the Agency and steps are taken to ensure greater integration between household demand forecasts and wastewater forecasts. The EA may wish to include this as a component of its Regional Water Quality Study, which is due to commence in May 2008.

Improvement of Wastewater Flow Monitoring

The importance of effective monitoring data is similarly apparent. This applies to both the monitoring of flows and treatment works performance. Effective monitoring over the next 3-4 years will enable a much more robust reassessment of current discharges and future capacity can be undertaken. This will also enable a much better understanding of what BAT (Best Available Technology) actually represents in this context. This issue is already the subject of ongoing discussions between the EA and Southern Water.

Identify where reductions in sewer infiltration may be most viable

Reducing infiltration to sewers appears to be one of the most obvious ways of reducing the potential pressure on consented DWFs. The situation is complex, with Southern Water expressing concerns about feasibility, costs and the potential liabilities associated with any consequential flooding in areas where the sewer has effectively been acting as a land drain. Given the scale of infiltration, however, the issue does appear to warrant a more detailed investigation, particularly in those wastewater catchments such as Peel Common where the benefits of reduced infiltration may potentially outweigh the costs. It is recommended that a joint PUSH/EA/Southern Water study is commissioned to assess this issue. A budget of £100k is suggested, including a £25k scoping stage.

Identify the benefits of securing reductions in diffuse pollution and the areas of greatest need and/or viability

Southern Water's concerns about reducing infiltration are matched by a similar range of concerns expressed by the EA and others with regard to reducing diffuse pollution. As it stands, the benefits of improved removal of P from works such as Chickenhall may not be realised if similar resources are not directed at reducing diffuse pollution. As for the issue of infiltration, the scale of the diffuse pollution problem, and its knock-on effects on the "environmental capacity" of the area, is such that it warrants more detailed investigation at a local scale. Again, it is recommended that a joint PUSH/EA/Southern Water study is commissioned to assess this issue. A budget of £75k is suggested, including a £15k scoping stage.

Investigation of WFD implications

Since inception of the PUSH study the EA have commissioned an additional study to examine the implications of the WFD requirements on effluent discharge quality for a range of works including the following in the PUSH region: Chickenhall, Bursledon, Thornham, Budds Farm, Peel Common/Woolston and Millbrook. As such no additional work is recommended for PUSH to pursue in this area at this point in time. As the potential implications of the WFD become clearer there may need to be additional investigations to confirm the findings of the EA study.

5 Flood Risk Management

5.1 Overview

'Food Risk' is defined as a combination of the probability of flooding and the consequences of flooding. Reducing flood risk therefore involves reducing either the probability of flooding or the consequences of flooding or both. Conversely an increase in the amount of development behind existing defences will increase the consequences of flooding, so it will increase the flood risk. The 'source – pathway – receptor' risk management model is used to manage flood risks. In the case of coastal flooding the source is the sea, the receptor is the settlement and the pathway is the sea defences between the sea and the settlement.

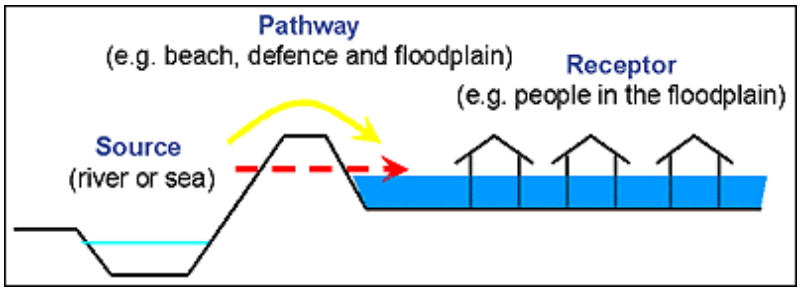


Figure 5.1 Source-Pathway-Receptor Model

The Department for the Environment Food and Rural Affairs (Defra) administers and provides funds to remedy flooding of existing settlements. The funds, in the form of 'The Block Grant' are distributed by the EA on behalf of Defra to Operating Authorities (Local Authorities and the EA) who have powers to provide flood risk management measures for both existing settlements and for new development. In the main, they only use these powers for existing settlements because Defra will only fund this.

Coast Protection Authorities (CPAs) have permissive powers to manage coastal erosion under the Coast Protection Act. Funding by CPAs was previously sought directly from Defra but recent policy changes have given the EA the responsibility for distributing the Defra block grant.

The process of managing flood risk for existing communities is currently undertaken through the development and implementation of a hierarchy of plans and strategies. Coastal flooding is managed through the development of high level 'Shoreline Management Plans' which set the overarching policies for flood and coastal erosion management. These are supplemented by Coastal Defence Strategy Studies which develop options for implementing these policies. These plans have a 100 year time horizon and must take account of future climate change. The options are implemented through the development of individual schemes or the implementation of non-structural remedial measures such as flood warning systems by the EA or Operating Authorities. Riparian owners can also undertake works with the relevant consents and permissions.

A similar approach is taken for fluvial (river) flood management by the production of over-arching policies through the development of Catchment Flood Management Plans (CFMPs) and Fluvial Flood Risk Management Strategies. The EA is the

primary operating authority for Government funded fluvial flood management. The plans are reviewed on an approximate five year rolling programme and the SMPs and Coastal Defence Strategies are in various phases of review, awaiting approval or completion. The SMP and CFMP policies for the sub region can be found in Appendix C as well as a summary of key legislation.

The management processes for flood and coastal erosion risk management are integrated with policies and strategies for erosion and flood risk addressed within the SMP and Coastal Strategy planning documents. For the ease of reporting, the IWMS will simply refer to flood risk management but by implication also refers to coastal erosion management where relevant.

Flooding can also occur through surface and groundwater flooding. There are currently no similar strategic mapping and management processes to manage these sources of flooding. Management of surface water flooding is currently ad hoc and split between various organisations including local authorities and private owners. Recent flooding events have resulted in Government reviews (including the recent Pitt Report (Cabinet Office, March 2008)), the outcomes of which may introduce similar approaches of fluvial and coastal flood risk management to surface water flooding.

5.1.1 Flood Risk Management and the Natural Environment

The coastal, estuarine and river habitats of the PUSH region are extremely important for biodiversity and nature conservation. Flood and coastal defences can result in adverse impacts on these habitats, by direct impact of construction and through indirect habitat loss through coastal squeeze. Coastal squeeze occurs as coastal habitats (predominantly mudflat and saltmarsh) cannot roll back naturally as sea level rises due to the presence of hard defences. In the PUSH region where much of the coastal zone is protected under the European Birds and Habitats Directives, the coastal squeeze losses must be offset through the creation of new coastal habitat.

The Water Level Management Plan (WLMP) process is seeking to return freshwater SSSIs to favourable status through water management. In many cases the proposals are seeking to increase water levels in flood plains for ecological purposes. For the PUSH region, this includes the floodplains of the Test and the Itchen as well as many smaller SSSIs. The WFD will also be looking at the restoration of flood plains to meet ‘good ecological status’. These biodiversity conservation measures are looking at water management for ecological benefit but working with nature can also have flood risk management benefits for existing communities and new development.

Increased development behind existing flood defences along the coastline of the PUSH region will increase the level of residual risk (due to greater consequences if a flood event exceeded the design standard of the defences). This is likely to increase the demand for a higher standard of protection. As such, the current flood management process remains the primary tool for protecting the existing PUSH settlements from river and coastal flooding and the delivery mechanism for offsetting coastal squeeze. However, offsetting coastal squeeze and creating new coastal habitats may mean realigning the coastal flood plain which is currently defended.

Increasing pressure in the long term for habitat creation and restoration of flood plains may increase the risk of conflict between future development and ecological needs, particularly when WLMP and WFD needs are taken into account.

PUSH authorities need to work with the EA and coast protection authorities to ensure that they are not allocating housing or commercial development in areas which could be sites for habitat compensation or enhancement and that there is sufficient opportunity for making space for water in the long term.

Furthermore, there are a number of biodiversity opportunities associated with the implementation of SuDS. For example, ponds, reedbeds and swales provide bio-remediation and wider enhancement opportunities in urban and rural areas, and can provide significant added ecological value to development proposals.

5.1.2 Flood Risk Management for Existing Development

The planning process for flood risk management for existing settlements is comprehensive and there are mechanisms for involving LPAs as key consultees or as their role as Operating Authorities.

The primary limitation for flood risk management lies in funding the implementation of the policies and options identified in the plans and strategies. Government (Defra) funding is severely limited and there is insufficient government funding to implement all the options identified in the strategies across England. As such there may be a significant delay in the development and implementation of schemes/remedial measures which have been identified through the flood risk management planning process. The previous method for nationally prioritising schemes/remedial measures was the 'Priority Scoring System'. It used a series of economic and environmental calculations to identify the most important/beneficial schemes across the country. This system is currently being replaced by Outcome Measures.

Climate change with sea level rise and increased storminess will increase the pressure on limited government funding. There will be an increasing need for LPAs to work with Defra, the EA and Operating Authorities to identify funding contributions to help implement the schemes/remedial measures identified through the flood risk management planning process.

It should also be noted that Treasury rules do not allow the value of proposed development to be included in the benefit/cost assessment which largely controls the provision of Government funding. Defra expects the spatial planning system 'to ensure that development does not lead to the wasteful expenditure of public resources on remedial works', i.e. development should not take place in the floodplain or if there is no alternative, then the developers or others should pay for appropriate flood protection measures with the benefit of advice on the suitability of those measures from the EA.

5.1.3 Flood Risk Management for New Development

Flood risk management for new development is addressed through the spatial planning and development control processes and by the application of Government legislation and policy at the national, regional and local level. Planning Policy Statements (PPS) set out the Government's national policies on different aspects of land use planning in England. PPSs are prepared by the Government to explain statutory provisions and provide guidance to local authorities and others on planning policy and its application to new development. Flood risk is referred to in a number of PPS's and the most important are PPS1 Delivering Sustainable Development and PPS25 'Development and Flood Risk' (discussed below). The aim of planning policy is to facilitate economic growth in a safe, sustainable way, which avoids adverse

impacts to our natural and built environment, including those impacts which increase the risk of flooding to people and property.

The aim of flood risk management for new development is to avoid flood risk hazard locations wherever possible to reduce the reliance on flood defence infrastructure.

Strategic Flood Risk Mapping

Strategic flood risk mapping is undertaken separately to support the above plans/strategies and to inform LPA plans and decisions relating to future development (PPS25). The mapping is undertaken by the EA to fulfil the specific objectives of their obligation under Section 105 of the Water Resources Act (1991), *"to undertake surveys in support of flood risk management*". The primary output of these surveys is the production of high quality, large scale flood plain maps. Mapping is undertaken in GIS and is often derived from detailed hydraulic modelling of watercourses and coastlines and their floodplains.

5.2 Planning Policy & Flood Risk

The Department for Communities and Local Government (DCLG) advises on flood risk for new development via the spatial planning system with the benefit of advice from the EA. There are two important Planning Policy Statements dealing with flood risk, PPS1 and PPS25.

PPS1 'Delivering Sustainable Development' makes two strategic references to flood risk:

- s20 states… *Development plan policies should take account of… potential impact of the environment on proposed development by avoiding new development areas at risk from flooding and sea level rise* and

- s27 (iv) states ... *In preparing Development Plans planning authorities should seek…. to bring forward land….in appropriate locations… taking into account the need to avoid flood risk and other natural hazards*.

PPS1 is at the core of sustainable development policy, so ss20 & 27 put Development Plan policy on flood risk and the location of development in relation to flood risk areas at the core of sustainable development. These PPS1 statements on flood risk are often overlooked in favour of PPS25, even though PPS1 and the statements on flood risk are over-arching sustainability issues.

Planning Policy Statement 25: Development and Flood Risk (PPS25), published in December 2006, sets out the Government's polices for development and flood risk. It sets out the "decision-making principles" at the following stages of the planning process: Regional Spatial Strategies, Local Development Frameworks and planning application determination.

The aims of PPS25 are to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk. Where new development is, exceptionally, necessary in such areas, policy aims to make it safe without increasing flood risk elsewhere and where possible, reducing flood risk overall.

PPS25 does not state what standard of flood protection is appropriate for new development. Rather, the statements on 'flood zoning' and 'vulnerability' only give a steer on this and it leaves it to planning authorities to decide what level of protection is appropriate for their community, so long as it does not lead to the wasteful expenditure of public resources (Defra funds) on remedial works upon which the EA advises the LPA (i.e. it is not below the Defra 'remedial standard').

5.2.1 Guiding Principles for PPS25

PPS25 includes the same guiding principles as its predecessor PPG25, however, notably it introduces:

- A more strategic planning approach to managing flood risk.
- Stronger guidance on Flood Risk Assessments, at all stages of the planning hierarchy.
- A clarified Sequential Test.
- A new Exception Test, to account for instances where large developed areas have extensive areas within Flood Zones 2 and 3 and where a blanket ban on development would cause extensive social and economic blight.
- Clearer guidance on how to assess the impacts of climate change.

PPS25 is the key policy statement which has been instrumental in bringing forward Strategic Flood Risk Assessments (SFRAs). Under PPS25, Local Planning Authorities (LPAs) are required to complete SFRAs to inform the preparation of their Local Development Documents. A Stage 1 SFRA should be used by the LPA to avoid Flood Zones 2 and 3 where possible. If having applied the sequential test in Stage 1 and Flood zones 2 and 3 are required for development, a State 2 SFRA is required. This should then be used to inform the Exception Test: "This should additionally, consider the beneficial effects of [existing] flood risk management infrastructure in generally reducing the extent and severity of flooding when compared to the Flood zones on the Flood Map (PPS25 Annex E) i.e. the defended flood plain.

PPS25 provides a Sequential Test to enable LPAs to apply a risk-based approach to site allocations within their authority boundary. The Sequential Test can be described as a decision process for identifying the probability of flooding for a given site, ignoring the presence of defences. The test classifies sites into one of four flood plain zones based on the annual probability of flooding as described in Table 5.1.

Table 5.1 Descriptions of the Flood Zones

Flood Zone	Annual probability of flooding
Flood Zone 1: Low Probability	< 1 in 1,000 (<0.1%).
Flood Zone 2: Medium Probability	Between 1 in 1,000 (0.1%) and 1 in 100 (1%) for river flooding, 1 in 200 (0.5%) for flooding from the sea.
Flood Zone 3a: High Probability	> 1 in 100 (>1%) for river flooding and > 1 in 200 (>0.5%) for flooding from the sea.
Flood Zone 3b: Functional Floodplain	Land that: • would flood with an annual probability of 1 in 20 (5%) or greater in any year, or at another probability to be agreed between the

	LPA and the EA, or • is designed to flood in an extreme (0.1 per cent) flood, or at another probability to be agreed between the LPA and the EA.

The Sequential Test gives preference to locating new developments, wherever possible in Flood Zone 1. By applying the Sequential Test, LPAs should demonstrate that there are no reasonably available sites within Flood Zone 1 before considering site allocations within Flood Zones 2 and 3.

PPS25 states that the risk-based Sequential Test should be applied at all stages of the planning process. Its aim is to guide new development to areas with the lowest probability of flooding. When applying the Sequential Test, the flood vulnerability of the proposed development type should also be taken into account during the decision process.

PPS25 sets out the types of development that are appropriate in each Flood Zone, which vary depending on the vulnerability classification of each development type. Application of the Sequential Test requires a development to be assigned to the zone of lowest probability of flooding appropriate to its classification. If the development cannot be located in this zone, it may be located in higher flooding probability zones, if appropriate, or if it passes the Exception Test.

The Exception Test is a set of criteria that must be met to permit development in the zone of highest probability appropriate to the vulnerability classification of the development. These criteria include demonstration that the wider sustainability benefits of the development outweigh flood risk and that the development will be located on previously developed land and is safe in terms of flood risk.

5.2.2 Recent Government Guidance for Flood Risk Management

Following the floods of summer 2007, Government ministers asked Sir Michael Pitt to carry out a review of the floods and the associated response of operating authorities. In December 2007, an interim report of the review was published, which allowed key stakeholders and members of the public a period of consultation in which they could comment on the content of the interim report and provided input to shape the direction and findings of the final review.

One of the key objectives of issuing an interim report was to identify issues which required urgent action. The interim report identified 15 urgent recommendations and 72 interim conclusions.

Two of the urgent recommendations which the review identified are aimed at improving the understanding of and risks from, surface and groundwater flooding. These were:

- That more frequent and systematic monitoring of groundwater levels at times of high risk should be undertaken by the EA, which should begin as soon as possible to predict and mitigate further serious ground water flooding from winter 2007 onwards.

- That the EA, supported by local authorities and Water Companies, should urgently identify areas at highest risk from surface water flooding where known, inform Local Resilience Forums and take steps to identify remaining high risk areas over the coming months.

The second of these recommendations recognises the current ad hoc management of surface water flooding and seeks to promote the EA as the lead authority for developing improvements to surface water management, with support from local authorities and Water Companies.

In February 2008 the Government, through Defra, published its water strategy for England, 'Future Water'. The issue of 'Future Water' provides a timely response to some of the urgent recommendations identified by the Pitt Review. The strategy promotes the coordination of inputs from surface water drainage stakeholders (EA, LA, Water Companies, IDBs etc) through Surface Water Management Plans (SWMP). A further document, *'Improving Surface Water Drainage'* which follows on from 'Future Water' outlines the proposed approach to:

- Implementing Surface Water Management Plans;
- Clarifying responsibility for adoption and maintenance of SUDS; and
- Reviewing the automatic right to connect to the public sewerage system.

This document is currently out for stakeholder consultation. The findings, conclusions and recommendations from the documents outlined above look to be shaping the future of surface water management in a positive direction. The LAs which make up PUSH should be aware of these recent developments and where possible contribute to the development of policies which will shape the development SWMP. In particular it should be noted that the Pitt Report promotes the EA as the lead authority for surface water whilst 'Future Water' is promoting LAs. These plans will be instrumental in bringing forward sustainable management of surface water across the PUSH sub regions, especially in those region which are currently experiencing problems with the capacity of the their existing drainage networks.

5.3 Strategic Flood Risk Assessment

The draft SE Plan allocated the PUSH sub region a housing target of 80,000 new houses to support the planned regeneration and economic development. PUSH estimated that in the order of 10,000 of these new houses would need to go in the coastal flood plain. The Examination in Public reviewed this proposal and the Panel concluded (s16.42)

"**The strategy is based on the assumption: the developed coast will continue to be defended in its existing position. To that extent, flood risk has not influenced the proposals**"…….consequently…….**"it is essential that the strategy takes account of the results of the SFRA and in our view this may mean looking again at the precise district apportionment of the new housing."**

The key conclusions from the SFRA report are provided in Appendix C for each PUSH Local Authority and summarised below. Following the SFRA PUSH has reviewed the precise district apportionment of the new housing as required by the EiP panel. This more detailed review showed that 12,000 rather than 10,000 houses need to be located in the coastal floodplain, primarily in Southampton and Portsmouth.

The SFRA outputs provided planners with the spatial flood risk information they require to enable them to avoid areas of highest flood risk when allocating sites and thus allowing them to demonstrate compliance with PPS25. Appendix C of the SFRA

report contains individual Guidance Documents for each LPA which were developed to assist local authority planners and the Environment Agency when allocating future development sites in line with PPS25 and when specifying the requirements for and assessing the compliance of site specific FRAs. The content of the Guidance Documents for each LPA is tailored to the types of flood risks present within each administrative boundary.

The Guidance Documents aim to promote the use of the SFRA and its outputs by:

- Summarising the key findings of the SFRA, tailored for the specific flood risks found in each LPA area.
- Relating planning policy (PPS25) to specific SFRA information and data.
- Providing guidance on the requirements of site-specific FRAs.

To facilitate the dissemination of the mapping outputs, an online web-GIS system has been set up which is publicly accessible at the following web address:

http://push.atkinsgeospatial.com/

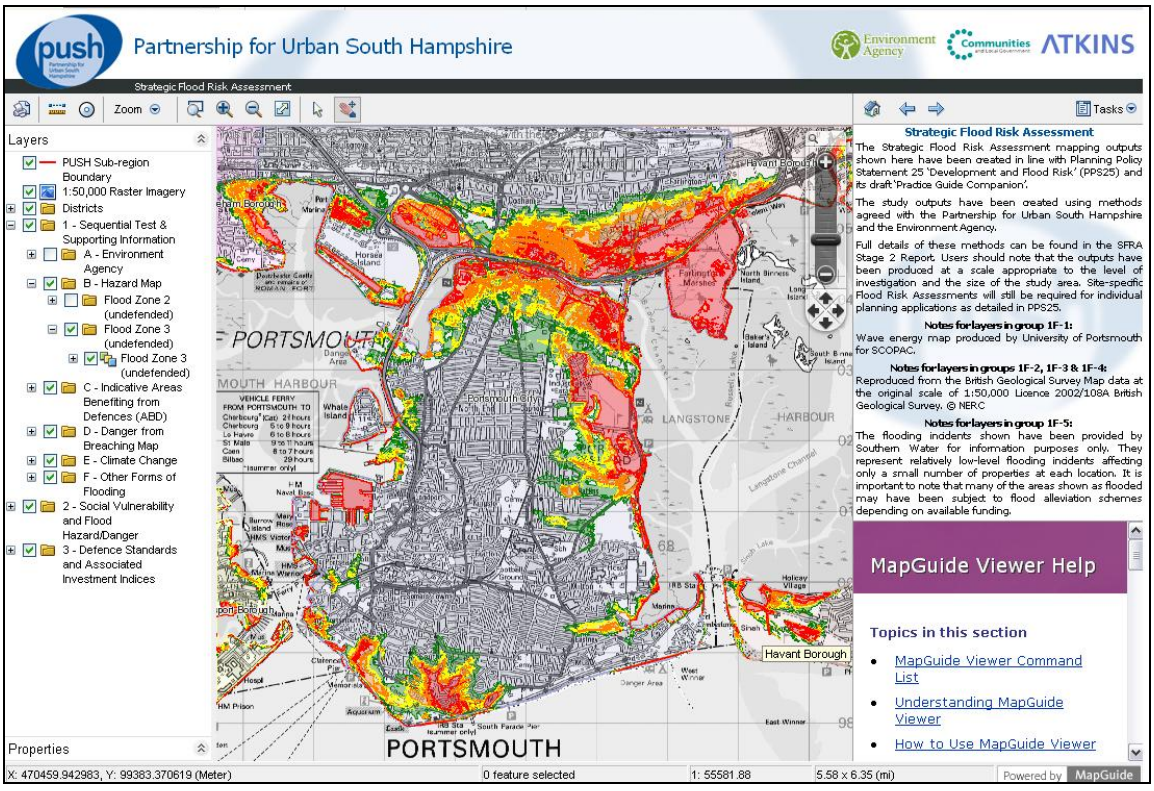


Figure 5.2 Extract from the PUSH SFRA website, showing the variation in flood hazard across Portsmouth.

5.3.1 Limitations of the SFRA

Two key limitations of the current PUSH SFRA are:

- Limited data to accurately define the functional floodplain (Flood Zone 3b); and

- Assessment focused upon extreme events (events which are not extreme can and do cause flooding).

It should be noted that the SFRA considers extreme events (as required under PPS25) but with sea level rise 'normal' tides will also become higher and this has increasing flood risk management consequences for coastal settlements which need to be considered.

Flood Zone 3b: Functional Floodplain, its definition and corresponding planning policy, is currently a topic of some debate amongst planners, developers and flood risk engineers. The draft Practice Guide which accompanies PPS25 describes Flood Zone 3b as land that:

- *would flood with an annual probability of 1 in 20 (5 per cent) or greater in any year, or at another probability to be agreed between the LPA and the Environment Agency (EA), or:*

- *is designed to flood in an extreme (0.1 per cent) flood, or at another probability to be agreed between the LPA and the EA.*

Furthermore, the Practice Guide also states that:

"Whilst developed areas are not generally considered to comprise Functional Floodplains, the definition within PPS25 does not differentiate between developed and undeveloped areas. This is because some developed areas may still provide an important flood storage and conveyance function such as a car park that has been designed to flood periodically to preserve flood storage volumes at a riverside commercial development. The functionality of such areas should be considered when defining Zones 3a and 3b, taking into account strategic flood risk management policies."

The EA was a key stakeholder in the development of the PUSH SFRA and was instrumental in shaping the direction of the assessment and outputs. The EA provided data, where available, to inform the designation of fluvial Flood Zone 3b for the SFRA. However, in areas where information was not available to inform such designation, the SFRA adopted the assumption recommended by Atkins in accordance with the draft Practice Guide and agreed by the EA that 'all areas within fluvial Flood Zone 3 should be considered as Zone 3b (Functional Floodplain) unless or until appropriate data is available to demonstrate that it can be considered as falling within Zone 3a (high probability)'.

The areas classified as Flood Zone 3b by the SFRA are therefore indicative only and represent a zone of floodplain where further investigation at the site specific level may be required to inform the application of PPS25 and the Sequential Test.

5.3.2 SFRA Conclusions and Recommendations

A review of the SFRA by the Agency and Atkins as part of the IWMS has drawn the following conclusions (some are taken word for word from the SFRA itself):

- The PUSH sub-region is exposed to flood risk from a number of sources. Flooding from the sea, due to extreme tides, is the primary source of flooding risk to the sub-region's low lying coastlines and affects some of the most populated areas in Portsmouth, Southampton, Gosport, Havant, Fareham, Eastleigh and the New Forest. All of the PUSH LPAs contain areas at risk of flooding from

rivers and watercourses, with the Rivers Test, Itchen, Hamble, Meon, Wallington, Hermitage Stream and Lavant Stream passing through existing developed areas. In addition, the coastal frontages of Portsea and Hayling Island have experienced flooding caused by wave overtopping; a number of areas in Winchester, Test Valley and East Hampshire have been affected by groundwater flooding; and flooding due to excessive overland flow has historically caused significant problems in East Hampshire".

- Parts of the sub-region are protected from flooding from the sea by a combination of flood defences and other structures such as dock and harbour walls (e.g. Portsea Island) and by the nature of existing land levels for much of its developed coastal frontages. However, this protection is diminishing due to sea level rise. For example, whilst the majority of Southampton was founded on high ground, the areas of reclaimed tidal mudflats, onto which the city has expanded for port and other uses, are now threatened by sea level rise.

- Where present, the height of the defences and other structures along the different PUSH frontages varies considerably. Areas such as Portsea Island, parts of Gosport and Southampton, and Hayling Island generally have defences or docks with a higher level than other frontages in the sub-region.

- There are no significant raised flood defences on rivers in the sub-region, although localised flood protection measures such as bank protection and maintenance of river level control structures provide flood risk benefits in a number of locations.

- Climate change poses a significant threat to the sub-region. Predicted sea-level rise over the coming century will reduce the standard of protection provided by most of the sub-region's flood defences and if unmanaged, is likely to result in the inundation of larger settled areas by extreme tidal floods. Normal tides will also be higher and could conceivably cause flooding in some circumstances. In addition, the increasing severity of storm events is predicted to result in an increase in river flood flows, which will subsequently increase the probability of flooding from rivers.

- The statistical analysis undertaken during Stage 1 of the SFRA concluded that the draft SEP housing target of 80,000 new dwellings in the PUSH sub-region by 2026 is feasible, with regard to flood risk, when assessed at the sub-regional level. That is, Flood zone 1, the higher 'non-floodplain land' in the PUSH area, is physically large enough to accommodate the 80,000 houses, but its use for this purpose may be constrained by other planning objectives and policies.

- However, when assessed at the LPA area scale, some of the housing targets may not be feasible due to the extent of the Flood Zones 2 and 3, the lower flood plain land, within some LPA areas. In particular, the administrative areas of Portsmouth, Southampton and Gosport are significantly constrained by the extent of Flood Zones 2 and 3.

- Consideration may need to be given to revising the distribution of dwellings across the LPA areas to ensure that the individual LPA housing targets are feasible in terms of flood risk constraints.

5.4 IWMS review of development and flood risk

In July 2008 the Secretary of State published proposed changes to the South East Plan. The Government's proposals did not include any modifications to the housing numbers or distribution for the PUSH region outlined in the draft South East Plan, although these proposals were not ultimately informed by a review undertaken by PUSH in 2007 of the precise district apportionment of the housing distribution against the results of the SFRA.

The key conclusions of the IWMS review are:

- Of the 80,000 houses required within the PUSH region, nearly 12,000 are allocated within Flood Zones 2 and 3. This equates to approximately 15% of the total allocation. As might be expected, there remain several ongoing issues that require resolution between the EA and the PUSH Authorities and doing so will need to be a high priority if problems with implementing the strategy are to be avoided further down the line. Application of the "exception test" in areas of Portsmouth and Southampton are two of the issues that need resolution (see below).

- The housing requirement for Eastleigh, Test Valley, Winchester, Fareham and East Hampshire can all be accommodated in Flood Zone 1 (no risk).

- In the New Forest, of approximately 1,500 dwellings required, less than 6% need to be located in Flood Zone 2 and about 5% located in Flood Zone 3. These 5% of houses will need to be subjected to the exception test but the Local Authority believes there is only limited potential for relocating these dwellings without impacting other spatial planning objectives. The properties identified in Zones 2 and 3 are within a single site allocation.

- In Gosport, of the 2,500 houses required, all are to be located in Flood Zone 1 with the exception of approximately 14% in Flood Zone 3. The exception test will need to be applied but the Local Authority does not believe there is any potential to relocate these houses to Flood Zone 1. The properties identified in Zone 3 are within a single site allocation.

- Portsmouth and Southampton have the greatest restriction in available land for development outside of the SFRA floodplains.

- Portsmouth needs to accommodate approximately 15,000 dwellings. Of these, 63% have been allocated in Flood Zone 1, 15% in Flood Zone 2 and 22% in Flood Zone 3. This is due to the low lying, constrained nature of Portsea Island. The Local Authority does not believe that there is any potential to relocate these houses into Flood Zone 1.

- The constraints associated with redevelopment in Southampton appear to be the largest. Of the 16,300 houses identified 30% are located in Flood Zone 3. This is due to the large redevelopment proposals in the low lying reclaimed dock area of Southampton. Approximately 6% of the houses are identified within Flood Zone 2. The Local Authority believes there is only limited potential to relocate this development into Flood Zone 1.

- The housing review noted the substantial housing allocations within flood risk zones in Portsmouth and Southampton but PUSH believes that the allocations are essential to the PUSH strategic principle of 'Cities First' which seeks to

maximise development in these locations to secure the greatest level of economic growth and regeneration potential. On this basis PUSH has concluded "that there should be no attempt to redistribute development across boundaries from the 2 cities to other authorities within the sub region on a sequential basis. To do so would fundamentally undermine the overall PUSH strategy" (2007). The EA is to be convinced of this and, as indicated above, this issue requires priority attention from the organisations involved.

5.4.1 Managing Flood Risk for new developments

The flood risk to the PUSH region is predominantly tidal although the SFRA has identified areas at risk of fluvial flooding. The above review (undertaken by PUSH) has identified those areas at risk of flooding in Portsmouth, Southampton, Gosport and the New Forest where development is needed to deliver the PUSH economic and spatial plans. There are a number of basic options for managing flood risk when looking at new coastal developments *(T.Burch - Evidence to HCC Commission of Inquiry into Adapting to Climate Change, 2007)*, these were summarised as:

Raise: Raise land levels or property threshold levels at receptors to elevate the development out of the flood plain (taking into account the flood risk implications for critical infrastructure and emergency access). This adds less residual risk than building flood defence walls (resisting)

Resist: Build sea walls to obstruct the pathway. This is likely to be in the form of raised defences seaward of the developments or protecting specific critical infrastructure. It is likely that these defences would need to be planned and implemented prior to the new development. Opportunities should be sought to link such defences with the management of existing flood risk infrastructure. The down side of sea walls is they can be overtopped which mobilises residual risks, they will need to be continually raised to keep pace with sea level rise, they separate the development and people from the sea they are there to enjoy and profit from.

Retreat – retreat the defence line inland. This is not likely to be an option from the PUSH authorities with respect to the current housing distributions.

Resilience: Making the developments flood resilient though a number of urban and building design measures and linking to flood warning and evacuation measures.

The flood risk management measures will be different depending upon the needs of existing and new developments. For example, commercial and industrial areas can be more readily made flood resilient with less risk to public safety than residential developments. Discussions between PUSH and the EA need to be undertaken at this strategic level to agree an holistic approach to managing these areas, in accordance with the modern flood risk management approach set out in Making Space for Water, in advance of site specific planning applications. This will ensure that a strategic approach to flood risk management can be effectively implemented and integrated with the needs of existing infrastructure and the communities they serve.

5.4.2 Implications of PUSH developments on existing fluvial and coastal defence infrastructure

The Water Resources Act 1991 and the Land Drainage Act 1991 (as amended by the Land Drainage Act 1994) provide the enabling primary legislation for sea defence

works for the control of flooding. Under the acts drainage is defined as "defence against water, including sea water; irrigation and warping", and as such duties include both coastal and inland flood defence. The EA and Operating Authorities (which includes Local Authorities) have *permissive* powers to manage flood risk under these acts.

It should be noted that the EA and Operating Authorities have responsibility for managing flood risk to *existing* communities but it is the LPAs responsibility to ensure that new development avoids flood risk hazard locations wherever possible and to reduce the reliance on flood defence infrastructure (refer to section 5.1.3 above). In the case of Portsmouth and Southampton, the new developments will be *increasing* the reliance on existing infrastructure and/or increasing development which will be at risk of flooding in the future with sea level rise.

As discussed in Appendix C, the management of existing river and coastal defences is undertaken through the shoreline management and catchment flood management planning processes and resulting strategies and schemes. These can be led by the EA or Local Authorities depending upon who is the lead authority. A review of the shoreline management policies for the PUSH region undertaken as part of this project (documents summarised in Appendix C) has shown that the proposed new developments do not in themselves pose significant constraints for existing flood management infrastructure and the implementation of shoreline management policies.

The proposed areas of the SDAs (which are to date only identified at a regional spatial strategy level) are located inland, significantly outside the coastal floodplain and will therefore not be at risk, or contribute to, coastal flood risk. For Portsmouth the shoreline management plan identifies that many of these frontages are already defended (where necessary) and as such, the developments in themselves may not directly require new capital schemes to protect them but they will require enhanced protection measures. However these developments will be increasing the reliance on existing flood defence infrastructure and this has significant maintenance and renewal, cost implications to combat sea level rise which needs to be carefully considered.

Southampton

There is considerable development proposed in Southampton. This is principally in the reclaimed dock area of Southampton which does not have existing defences. Significant land within this dock area and property around Ocean Village, Northam and other areas in Southampton adjacent to the River Itchen will be at increasing risk as sea level rises. This is likely to result in the need for flood defences around Southampton to protect existing and new development. The new developments will affect the decision-making for the type and scale of the sea defences required. The existing developments in this area of Southampton are a mixture of commercial developments (around the reclaimed dock area) and residential (principally around Northam and Ocean Village).

There is no Flood Risk Management Strategy (involving spatial planning, urban design, infrastructure measures etc) for the Southampton frontage and this should be undertaken urgently. It is recommended that PUSH and the Southampton City Council planners work closely with the EA and others in preparation of this Strategy to ensure that the issues of the new developments are fully addressed within the Strategy. Such a partnership was undertaken between the EA and Ashford Borough Council in the assessment of flood risk for the Upper Sour Catchment.

Portsmouth

For areas such as Portsmouth where there are existing defences the situation is slightly different. Improvements and maintenance of existing defences may not be undertaken in line with the PUSH development programme. There may therefore be a need for developments to provide funds to bring forward such improvements or maintenance. There may also be the need for such defences to be in place prior to development being permitted.

The developments will result in increased flood risk within the floodplain (with the increased number of people and properties requiring protection) as discussed in the SFRA section above which has implications under PPS11 (Regional Spatial Strategies) and 12 (Local Spatial Planning). However, with the existing defences along many of the frontages this could be managed through the PPS25 and shoreline management process to the remedial standard of defence only, so enhancements will need to be planned to meet the Portsmouth's proposed 1 in 1,000 year target sustainable development standard of defence.

It is recommended that the economics of the Flood Risk Management Strategy for Portsea Island are reviewed with the inclusion of the PUSH developments to identify if its preferred options and priority for implementation are likely to change.

Way Forward

A more detailed review needs to be undertaken to identify if the new developments merit an increase in the level of flood protection. This issue is discussed in Section 5 and further research is necessary to understand the implications for the LPAs and developers. Section 5 also discusses the options for LAs to increase the standard of protection for communities and an investigation to understand the opportunities and constraints associated with this approach is recommended in combination with the above review. This is discussed in more detail in the recommendations below.

There are some concerns that the current shoreline management policies and preferred capital options/remedial measures put forward in the coastal management strategies are not being implemented in a timely manner. There are considerable financial limitations on the Treasury and available budget for flood risk management. All schemes are scored against their 'Priority Score' and contribution to the Government's 'Outcome Measures' and schemes which are important at a regional level may not be a national priority. The timescales for the approval and provision of Government (Defra) funding and thus implementation by the EA and Operating Authorities can be over ten years and in some cases, where the economic justification is marginal, the timescale cannot be determined. This does not appear to be satisfactory in a context in which the risk of flooding to existing communities may increase due to additional development.

It is recommended that the spatial plans promote the provision of flood defence infrastructure at a strategic level to ensure that development proposals at scheme level are not rejected or delayed due to flood risk issues.

5.4.3 Surface Water Flooding

PPS25 also highlights the importance of flooding from other sources and the PPS25 Practice Guide states (Section 3.10, p.68):

"Information regarding the probability of other forms of flooding may not always be available and in many situations, the physical processes which may lead to flooding may be poorly understood. If information is available, it is likely that this will be measured and stored in ways that are quite different to river flow and tidal data used to generate the Flood Zones. In many cases this will preclude the accurate mapping of flood risk probability from other sources within Regional Flood Risk Assessments (RFRAs) and SFRAs, however expert judgement can be used to identify those areas in which flood risk from other sources of flooding is likely to be higher. The sequential approach may then be applied in an effort to steer new development away from higher risk areas."

This IWMS has identified a considerable knowledge gap in understanding the magnitude and impacts of surface, groundwater and infrastructure flooding and recommendations have been put forward to address this for the PUSH sub-region.

The PPS25 Practice Guide summaries policy regarding surface water runoff as follows (Section 2.47, p.54):

"Both the rates and volumes of run-off from new developments should be no greater than the rates prior to the proposed development, unless specific off-site arrangements are made which result in the same net effect"

Assessment of surface water runoff in this way is usually undertaken at the site specific level. Identification of those areas where changes in land use could potentially increase surface water runoff rates and volumes can strategically aid spatial planning in avoiding areas where significant mitigation of surface water runoff following development may be required. With this aim in mind the SFRA provided an index to inform planners of the potential impacts of land use changes on the local surface water runoff regime. Based on a geological assessment of surface permeability at the sub-regional scale, the index shows the relative impact of developing on Greenfield areas based on the change in runoff rates before and after development (See Figure 5.6 for details.)

In principle, developing in existing highly permeable areas will have the highest impact on surface water runoff regimes, as a high proportion of rainfall would have previously been able to infiltrate into the ground. This index does not assume that in these 'high impact' areas, excess surface water runoff from development will be difficult to mitigate, as highly permeable areas are often better suited to the implementation of SUDS, which will cope better with potentially high amounts of surface water to be mitigated. However, the specific nature of planned development may influence the type of drainage systems to be implemented, and the SFRA provided a high level, relative, assessment of the magnitude of surface water mitigation required which allows planners to compare sites with one another with regard to surface water runoff mitigation measures.

The IWMS project has used the outputs from the SFRA to assess the spatial distribution of the housing sites and the subsequent impacts on land use change. The majority of development in the PUSH sub-region is proposed to occur on existing brownfield sites or sites with relatively low permeability, meaning that developments are not likely to have a significant impact on runoff regimes on the catchment scale. The analysis identified that the majority of Greenfield development is proposed to occur in areas where the impact on surface water runoff is classified by the SFRA as low or moderate. However, due to the limited availability of data, this assessment can only provide a high level indication of the potential impacts of new development on surface water flooding. There still remains the risk of significant local scale

impacts and it is recommended that the use of SUDS is promoted for all sites by the LPAs through the planning process.

5.4.4 Implementation of SUDS

There are a variety of different SUDS techniques, which can be development specific or can be implemented at a strategic level to benefit wider communities and development areas. Such solutions can include strategic attenuation facilities, increases in river conveyance or surface water sewers to rivers or the sea. Addressing such issues at the strategic level, such as in the production of LDFs can bring wider benefits. The section below outlines some of the different SUDS techniques available.

Infiltration Systems

Infiltration systems allow surface water to discharge directly into the ground. These systems are only appropriate 1) where ground conditions permit a suitable water acceptance potential and 2) in locations where groundwater recharge will not adversely affect drinking water supplies as identified by the Environment Agency source protection zones, available on their website http://www.environment-agency.gov.uk. Such systems may include but are not limited to:

- Permeable surfaces
  - Gravel
  - Permeable Paving
  - Block Paving with voids
  - Grassed areas
- Sub Surface Infiltration
  - Filter Drains
  - Geocellular Systems
  - Soakaways

Infiltration systems may not be appropriate in areas of potentially contaminated land. In such circumstances, other systems, such as contained attenuation systems, that avoid mobilisation of contaminants may be more appropriate.

Attenuation Systems

If ground conditions cannot support infiltration systems, surface water may need to be attenuated using measures to store surface water. Attenuation systems, if designed above ground, have the potential to take up large areas of development sites. Early consideration of such constraints is therefore essential. Attenuation systems may include but are not limited to:

- Landscaped
  - Detention Basins
  - Balancing Ponds
  - Retention Ponds
  - Wetlands
  - Lagoons
- Engineered

- Underground Tanks
- Ornate Water Features
- Rainwater Harvesting
- Green Roofs
- Oversized Pipes

Combined Systems

SUDS designs for most sites can include a combination of infiltration and attenuation systems and they have been categorised above according to the dominant process. Other forms of SUDS which can provide more balanced benefits of infiltration and attenuation include:

- Swales
- Filter Strips

The suitability of the different SUDS options will depend upon the nature of the site and the changes which would result from the proposed development. These factors include:

- the pollutants present in runoff
- the size of and drainage strategy for the catchment area
- the hydrology of the area and infiltration rate of the soil

The sensitivity of the surrounding environment will also be a major factor such as the proximity to groundwater source protection zones and other potable water supplies, and the sensitivity of the receiving watercourse. Liaison with the EA would be required at planning stage to ensure that the SUDS proposals do themselves lead to environmental degradation.

It is recommended that PUSH and the EA produce guidance to developers on this subject following similar advice produced as Supplementary Planning Guidance by Poole Borough Council.
(http://www.poole.gov.uk/downloads/assets/Supplementary_Planning_Guidance_-_Sustainable_Urban_Drainage_Systems_(SuDS).PDF)

5.4.4.1 Groundwater Flooding

The PUSH SFRA provided high level information regarding the potential risk of groundwater flooding, by analysing the spatial variation of permeability across the PUSH sub-region. Groundwater flooding is a complex phenomenon which occurs with great spatial and temporal variability. As such it is difficult to define precise risk areas at a sub-regional scale. By referring to the geological structure of the sub-region, however, the PUSH SFRA was able to ascertain that most incidents of groundwater flooding have historically occurred along the northern boundary of the sub-region in East Hampshire, Winchester, Eastleigh and Test Valley where highly permeable geological formations meet formations with lower permeability. See Figure 5.7. These historical incidents of groundwater flooding have been shown where available. However, the potential for groundwater flooding should be considered in the whole of the sub-region by assessing any alterations to groundwater flow created by development. It is therefore possible to recommend that groundwater flooding is considered in development planning across the sub-region and in particular, in those areas along the northern border of the sub-region where this geological pattern occurs. It should also be noted that the risk of groundwater flooding is likely to increase with sea level rise.

Section 14 of the Environment Agency's Groundwater Protection: Policy and Practice (GP3) contains information and polices on groundwater flooding, available at http://www.environment-agency.gov.uk/subjects/waterres/groundwater/1463256/

5.4.4.2 Flooding from Infrastructure Failure

Flooding from infrastructure failure has historically caused a number of problems across the PUSH region with significant incidents recorded in Portsmouth and Havant as well as a number of other locations such as Hordean, Totton, Hythe. Romsey and Chandlers Ford. The age, capacity and condition of the existing sewers, particularly in Portsmouth where surface water drains into a combined sewer system, often lead to incidents of hydraulic overload.

During the consultation period of the PUSH SFRA, Southern Water provided PUSH with their DG5 list, which records locations of flooding incidents (internal/curtilage/highway) which have occurred in the last 10 years. These incidents, as illustrated in Figure 5.8 relate to flooding caused solely by the incapacity of the drainage infrastructure, termed 'hydraulic overload' by Southern Water. The historical incidents tend to be clustered around Portsmouth, Havant, Fareham, Southampton and Eastleigh. It should be noted that some of the incidents shown on this Figure may have been addressed through Southern Water's ongoing asset management programme and as such the list may no longer reflect an area where incapacity is a problem or where flooding is likely to occur.

Within the context of strategic planning, identification of these locations of previous flooding can inform LPAs of areas where further development may have a significant impact on the existing sewer system, and where Southern Water may be required to invest in measures to improve capacity to support the proposed development.

Given the number of incidents which have historically affected locations within Portsmouth, it is likely that the delivery of the 700 sites planned for Portsmouth will need to be linked to substantial improvements to the current surface water drainage networks. The pressure on this existing infrastructure is likely to increase in the coastal floodplain as sea level rise increases the water table and frequency of hydraulic overload increases. Options to deliver improvements to the drainage system should be discussed with Southern Water and if widespread benefits can be achieved through improvement options, Local Authorities, especially Portsmouth, could look to add an infrastructure levy to each of these sites to fund the proposed improvements. This is discussed further in Section 5.6.2.

5.5 Conclusions

- The housing requirement for Eastleigh, Test Valley, Winchester, Fareham and East Hampshire can all be accommodated in Flood Zone 1 (no risk).
- The proposed SDAs are located inland, significantly outside the coastal floodplain (Flood Zone 1) and therefore not at risk.
- Of the 80,000 houses required within the PUSH region, nearly 12,000 are allocated within Flood Zones 2 and 3. This equates to approximately 15% of the total allocation.
- Gosport and New Forest have one site allocation each within the flood plain.

- Portsmouth and Southampton have the greatest flood risk constraints and have significant areas of development in the flood plain.

- For Portsmouth the shoreline management plan identifies that many of these frontages are already defended (where necessary) and as such, the developments in themselves may not directly require new capital schemes to protect them but they will require enhanced protection measures. However these developments will be increasing the reliance on existing flood defence infrastructure and this has significant maintenance and renewal, cost implications to combat sea level rise which needs to be carefully considered

- There is considerable development proposed, around the reclaimed Itchen and Solent coastal areas of Southampton. These areas do not have existing publicly owned formal defences. Significant land within these areas, and existing property around Ocean Village, Northam and other areas in Southampton adjacent to the River Itchen will be at increasing risk as sea level rises. This is likely to result in the need for flood defences around Southampton to protect existing and new development. The new developments will affect the decision-making for the type and scale of the sea defences required.

- For areas such as Portsmouth where there are existing defences the situation is slightly different. Improvements and maintenance of existing defences may not be undertaken in line with the PUSH development programme. There may therefore be a need for developments to provide funds to bring forward such improvements or maintenance. There may also be the need for such defences to be in place prior to development being permitted.

- There is an urgent need to understand the programme of implementation of the policies and options promoted through the existing flood risk management process to understand the current and future risk to communities.

- The flood risk strategy for Portsea Island needs to be reviewed to understand the implications of the proposed developments and a flood risk strategy (taking account of the proposed development in Southampton) needs to be undertaken.

- There are opportunities through PPS25 for LPAs and communities to increase the standard of protection from that funded by Defra which is constrained by strict benefit /cost rules linked to the value of the existing settlement and not to the added value which growth and regeneration brings.

- Other sources of flooding need to be considered during the development of masterplans and development schemes for new development. Current information on these sources of flooding, including groundwater flooding, surface water sewer flooding and overland flow flooding, cannot, at this stage, be used to rule out development in any area, as the physical processes that lead to these types of flooding are generally less understood than flooding from rivers or the sea. Further information is likely to become available regarding other sources of flooding as the recommendations of the Pitt Review are implemented and as modelling technologies, historic data records and general understanding improves.

- The management of surface water and groundwater flooding is disjointed and ad hoc. Responsibility is split between private individuals, local authorities and highway authorities, the Environment Agency, internal drainage boards and different infrastructure providers share some responsibility for existing systems.

- There is a critical need to improve the understanding of surface water and groundwater flooding through improved monitoring, research and coordinated planning and management, particularly the consequences for critical infrastructure.

- Climate change will result in increasing pressure on water infrastructure as sea level rise increases levels of inundation but also increases indirect flooding through increased tide-locking of CSO and other critical infrastructure.

- Reducing infiltration to the sewerage network would provide benefits to the wastewater infrastructure by increasing capacity; however this can result in increasing surface and groundwater flood risk. The integration of wastewater planning into the wider water management process is likely to result in benefits for both wastewater and surface water management.

5.6 Recommendations

5.6.1 Avoiding development in flood risk areas

Whilst the construction of improved or new flood defences may in the first instance appear to be an effective solution to protecting new developments from flooding, the long term sustainability of new defences is questionable in light of predicted sea level rise and increases in fluvial flows. An option which places new housing development and people at risk of flooding, albeit a residual risk, cannot be considered an effective way to manage flood risk across an area as large as the PUSH sub-region. PPS1 and PPS25 primarily recommend a policy of avoidance from hazardous areas of flooding. The first option, therefore, should be and has been a non structural approach through the relocation of sensitive development to areas with a lower probability of flooding.

An important decision facing the PUSH authorities is how far they should go to seek alternative, lower risk locations, for their current sites, before considering site allocations in areas at risk of flooding. A balance needs to be found between safety from flooding (including the long term costs of maintaining safety in the face of sea level rise) and the economic drivers for regeneration and development within existing urban areas, particularly with reference to PUSH's strategic policy of 'Cities First'.

Portsmouth and Southampton should undertake a more detailed assessment of the likelihood and consequence of existing defences overtopping or breaching to improve their understanding of potential flood hazard and risks across their administrative area. For Southampton, a review of the increasing risk and consequences of flood risk with sea level rise should be undertaken for existing and new developments (which are currently not at risk and not defended). A flood risk management strategy should be produced for Southampton, using holistic flood risk management measures such as spatial planning, urban design, resilience and infrastructure solutions.

5.6.2 Improved planning for development in flood risk areas

The PUSH authorities have reviewed their apportionment across the Local Authorities in the light of the existing SFRA. In addition to the proposed housing in the coastal floodplain, it appears from the SE Plan that there could also be a significant increase in the business, commercial and retail use of the coastal

floodplain to meet the planned growth, regeneration and economic development. This has not been taken into account so far and it is recommended that this is fully included in future assessments.

It is Government, EA and Local Authority policy to ensure new development in the floodplain does not increase flood risks and an Integrated Regional Framework objective of the draft SE Plan, objective 2, is:

"To reduce the risk of flooding and the resulting detriment to public wellbeing, the economy and the environment"

The PUSH authorities therefore need to work with the EA to ensure that where proposed developments are to be sited in areas at risk of flooding, they are planned effectively and use a wide variety of measures through the planning process to ensure that the new developments are safe and sustainable. The measures need to be integrated and agreed, designed, funded, delivered, operated, resourced and renewed for the lifetime of the development. To ensure their effectiveness for the life-time of the developments, they need to be planned well ahead of time to ensure they can be put in place in place before or in parallel with the planned development.

These measures could include where appropriate:

- Local Development Framework flood risk mitigation and adaptation policy;
- Infrastructure planning;
- Innovative master-planning;
- A Local Development Framework contributions policy (if appropriate);
- Contribution to flood defences (where appropriate);
- Urban, Buildings, Highways and Services design;
- Land raising;
- Flood resilient buildings;
- Flood warning;
- Emergency response;
- Post emergency after care;
- Social care; and
- Surface Water Management Planning.

5.6.2.1 Seeking the protection of PUSH communities to the existing Standard of Protection

The EiP Panel stated that "the South Hampshire sub-regional strategy is based on the assumption that the developed coast will continue to be defended in its existing position". Section 5.4.2 has outlined the effectiveness of the existing flood risk management planning process for existing communities but it has *significant*

limitations in implementing the options identified. This leaves *existing* communities vulnerable to flooding where the residual life of defences deteriorates and standards of protection reduce as sea levels rise. The limitations on Government funding mean that to ensure the security of existing communities to the existing agreed standard of protection, additional funding is likely to be required to support the flood risk management process.

It is recommended that the PUSH authorities work with the EA to:

- Test the validity of the assumption that the developed coast will continue to be protected in its existing position. The review should identify the uncertainties associated with the management of existing infrastructure and the spatial planning delivery risks associated with the PUSH proposals. The RSS and LDF process can then help to manage these risks.

- Audit the current coastal and river flood risk management strategies to identify the likely programme of implementation for the preferred schemes and remedial measures under the current funding arrangements.

- Resolve the issue of Exception Testing for those areas where housing allocations fall in Flood Zones 2 or 3.

- Undertake an analysis of the residual risk to existing communities and the development planned in the SE Plan from the delay in implementation of the strategies.

- Integrate the spatial-planning and delivery processes with the flood risk management planning processes and undertake a critical path analysis to understand the key actions and time-frames which are necessary to deliver the sub regional strategy.

5.6.3 Increasing the Standard of Protection for new and existing communities

The planned regeneration and growth in the PUSH area is likely to rely on significant development in the coastal flood plain (not just housing), particularly in areas of Portsmouth and Southampton. There is a need to consider where the different types of development should or should not be located, what standard of flood protection they merit and what measures are needed to make them safe and sustainable in the face of sea level rise.

As indicated in Section 5.1.2 above, Treasury funding will 'remedy' only existing development and communities but will not fund the protection of new development. In addition, the current economic rules, in effect, put an economic ceiling on the standard of protection (SoP) which Operating Authorities can provide for these existing settlements. The decision-making process usually results in SoP levels to a maximum 1:100 year event for river flooding and a maximum 1:200 year event for coastal flooding. Smaller communities may be protected to a lower standard than this due to the small economic returns arising from protecting to this higher standard.

PPS25 does provide the opportunity for LPAs to use their powers to seek protection greater than this 'remedial' Government SoP. However, this would need to be justified and arrangements for its funding and implementation would have to be sought outside of the current funding arrangements.

There are considerable opportunities for PUSH authorities in their roles as LPAs and Operating Authorities to significantly influence the flood management process. Using the existing delivery mechanisms; the development, promotion and funding of a higher SoP for PUSH communities may be achievable.

To do this, the PUSH authorities will need to work closely with the EA and Operating Authorities in the planning and flood risk management planning processes to:

- Understand the condition, the standard of protection and residual life of the existing sea defences.
- Understand the programme for implementing the existing policies and options promoted through the current flood risk management process. This will enable a clear understanding of the current and future risk to the PUSH communities.
- Identify what enhanced 'sustainable development standard' of protection is needed to safeguard the planned growth, regeneration and economic development which relies on the use of the coastal and river floodplains.
- Identify where there are opportunities for upgrading the existing SoP to the 'sustainable development standard'.
- Develop a critical path for the synchronisation of delivery of the appropriate flood risk management measures with new development and vice versa.
- Identify how the measures required for the 'sustainable development standard' can be funded and implemented.
- Integrate the EA and Operating Authorities flood risk management plans for existing settlements with the LPAs spatial development plans.
- Plan contingency measures in accordance with PPS12.

5.6.4 Reviewing and updating the SFRA

The PUSH stage 1 SFRA provided a snapshot of flood risk issues throughout the PUSH sub-region using flood risk, climate change and flood defence asset information available in 2007. The project also highlighted the number of gaps and limitations in the flood risk and asset data which is currently available across the sub region. The SFRA datasets were used in this assessment are likely to be updated, expanded or revised in the future. One option is therefore to ensure that both the SFRA and the IWMS are considered as live studies that are reviewed and updated at appropriate intervals to account for new information, so that they can continue to provide a sound basis for future spatial planning decisions.

A review of the housing allocations using the Stage 1 SFRA has been undertaken by PUSH which included discussion on the sequential and exception tests required under PPS25. It is likely that the EA will require more detailed evidence in support of the exception tests, in particular a more detailed understanding of the level of residual risk with the existing flood defences in place. This is likely to take the form of a more detailed Stage 2 SFRA. Further investigation and discussions between PUSH, the LA and Portsmouth and Southampton City Councils will be required to address this issue.

Currently, there is no guidance on the appropriate frequency for updating SFRA or IWMS studies. We would therefore recommend that updates are undertaken following significant spatial planning developments and revisions to key flood risk datasets and policy guidance or, as a minimum, every three to five years. It will be important, however to link any future updates to the timetables for future reviews of the sub-regional strategy and/or individual Local Development Documents. These plans need to be front-loaded, being based on a clear evidence base that will include the SFRA/IWMS.

5.6.5 Recording and Monitoring Strategy for surface water flooding

There is no coordinated mechanism for gathering information on surface water flooding and no datasets available to understand the scale and location of flooding. For example, the PUSH SFRA does not have sufficient information on surface or groundwater flooding to confidently identify risk areas. Data available was limited to surface water flooding from SW infrastructure failure but there was no data available from non-main river, highways, groundwater or other flooding mechanisms.

As the Pitt Review identified, the management of surface water flooding is often ad hoc and undertaken by a range of operating authorities. To ensure that surface water across the PUSH region is managed in a sustainable manner that avoids unnecessary flood risk, it is recommended that the operating authorities within the PUSH sub region adopt a partnering approach to managing the surface water runoff from future development. A range of data sets relating to surface water is currently held by various operating authorities across the sub region. Integrating and sharing such data sets would help to develop a sound basis from which to develop strategies for future surface water management.

There is also a need for the development and management of a coordinated Recording and Monitoring Strategy to capture the nature, location, cause and extent of future surface and groundwater flood events.

5.6.6 Development of Surface Water Management Plans

This project has identified that surface water flood risk is an issue that is yet to be effectively managed and this will become an increasing problem with climate change. The Government Consultation “Improving Surface Water Drainage” (2008) has promoted the establishment of Surface Water Management Plans (SWMP). The consultation paper has suggested that they will be the responsibility of individual LAs to ensure they are prepared, with EA playing an advisory or regulatory role for them.

It is recommended that PUSH take the lead in developing and promoting the establishment of surface water management plans. In support of the Plan development, the detailed data gathering exercise discussed above will be required to gain a thorough knowledge of the current problem and an assessment of the implications of climate change (and new developments).

To support this data collection (and the ongoing management required) a database of surface water flood events should be developed and kept up to date.

5.6.7 Development of Groundwater Management Plans

The SFRA has also highlighted the lack of information on inland groundwater flooding and a potential increase in coastal groundwater flooding due to sea level rise. A similar approach to surface water management plans could be developed for the production of groundwater plans.

5.6.8 Review of critical infrastructure at risk of flooding

As discussed, there is also concern about the vulnerability of existing communities to flood risk. The 2007 flooding highlighted the vulnerability of our critical infrastructure to flooding and the serious and wide-spread implications of loss of key infrastructure. To improve the protection of existing communities from flooding, coordinated monitoring and data gathering is required and a database of vulnerable infrastructure developed to understand the risks now and over the next 100 years. Critical infrastructure should include wastewater and water resource infrastructure, emergency services (including fire stations, hospitals etc) and schools, libraries and other public buildings which may be used as emergency shelters.

Various organisations, including infrastructure and emergency service providers are currently assessing the vulnerability and risks to their own infrastructure. The PUSH authorities, either individually or collectively, could consider acting in a co-ordinating role to pull together the ongoing risk assessment work into a single area or sub-regional assessment of risk, identifying whether existing assets can be maintained or whether new facilities are required. This would be an invaluable tool for the individual local authorities LDFs, particularly feeding into their LDF Local Infrastructure Plans.

Figure 5.3 PUSH Site Allocations

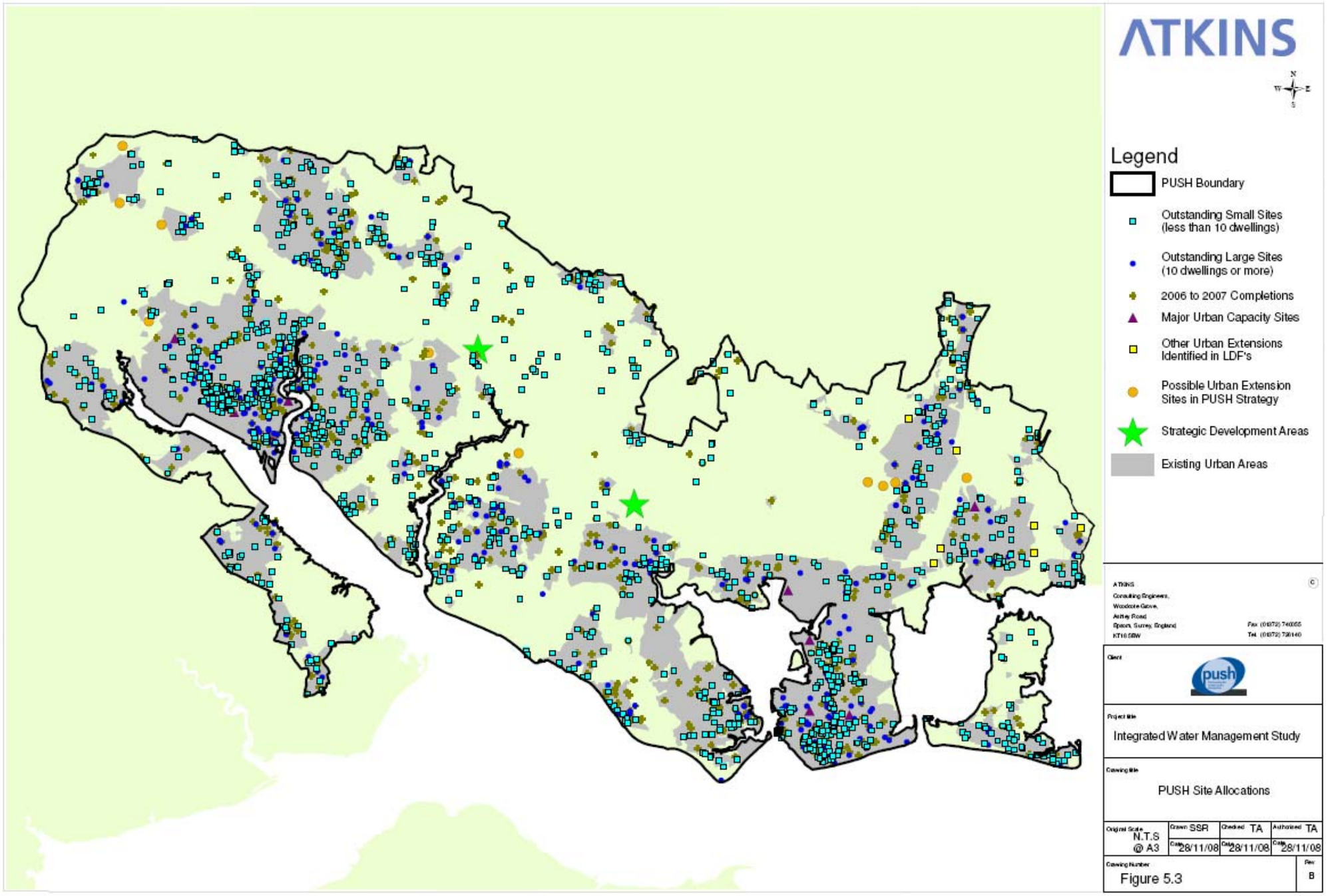


Figure 5.4 Flood Zones (2007)

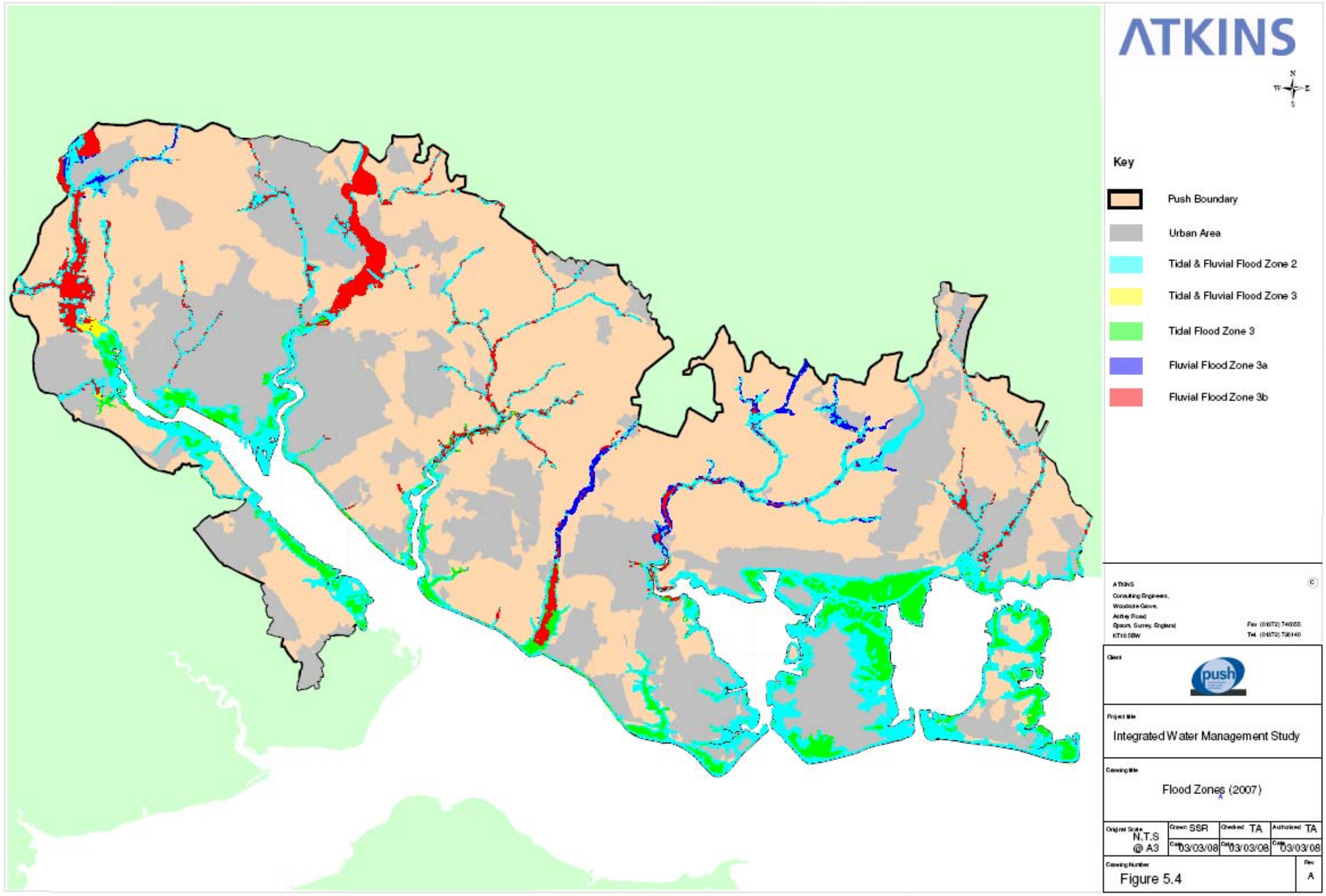


Figure 5.5 Flood Zones (2115)

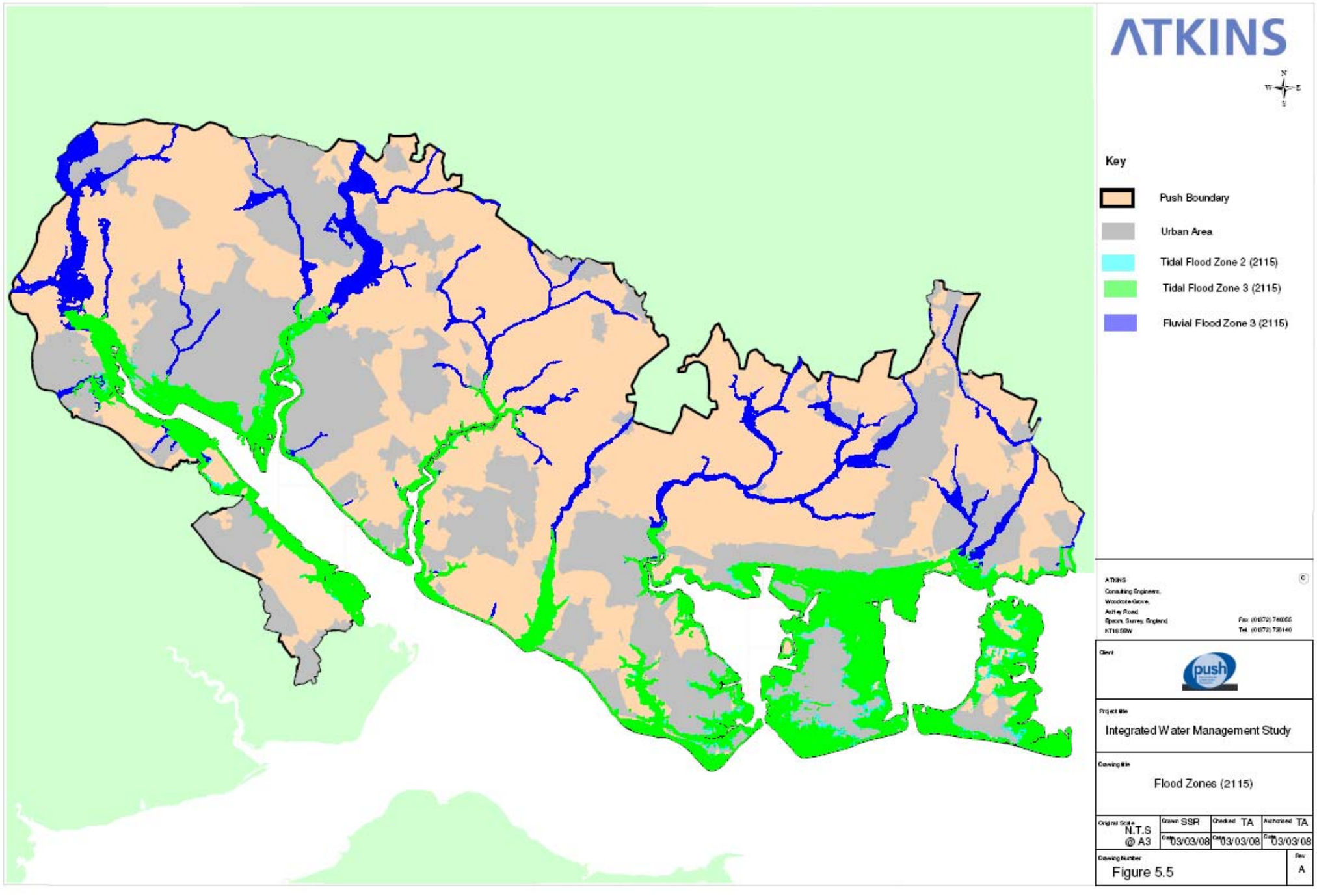


Figure 5.6 Impact of Land Use Change on Surface Water Runoff

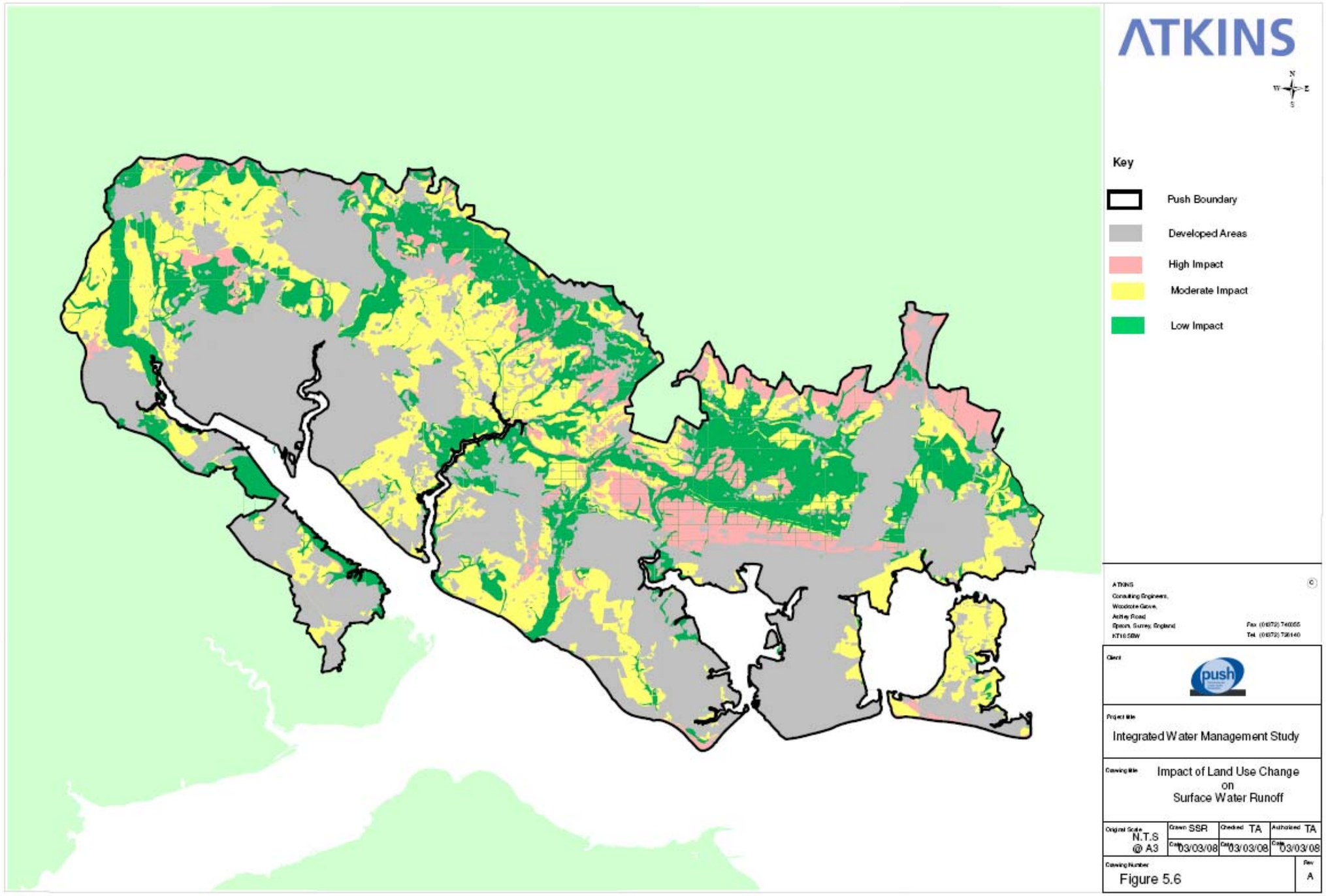


Figure 5.7 Groundwater Flooding

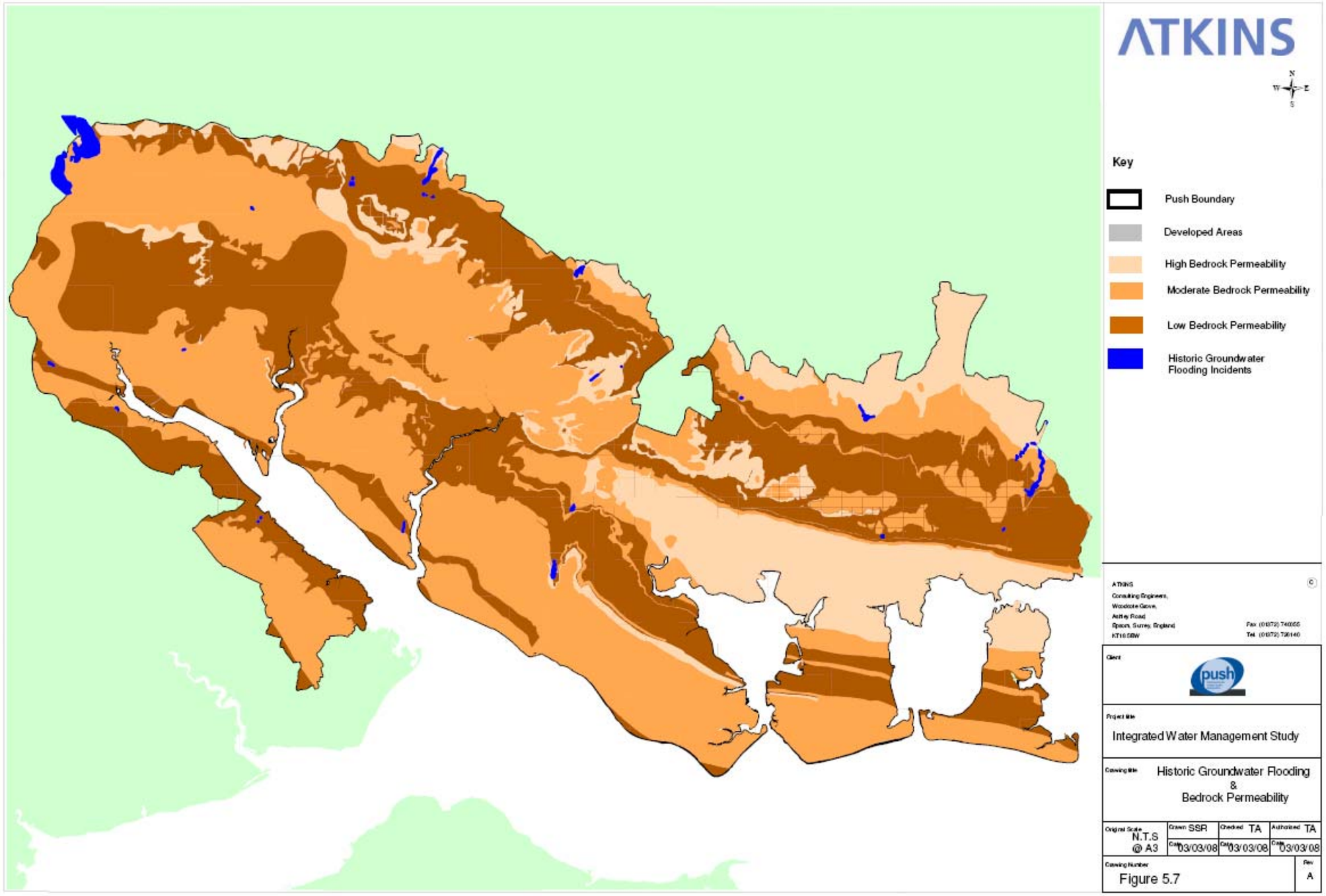
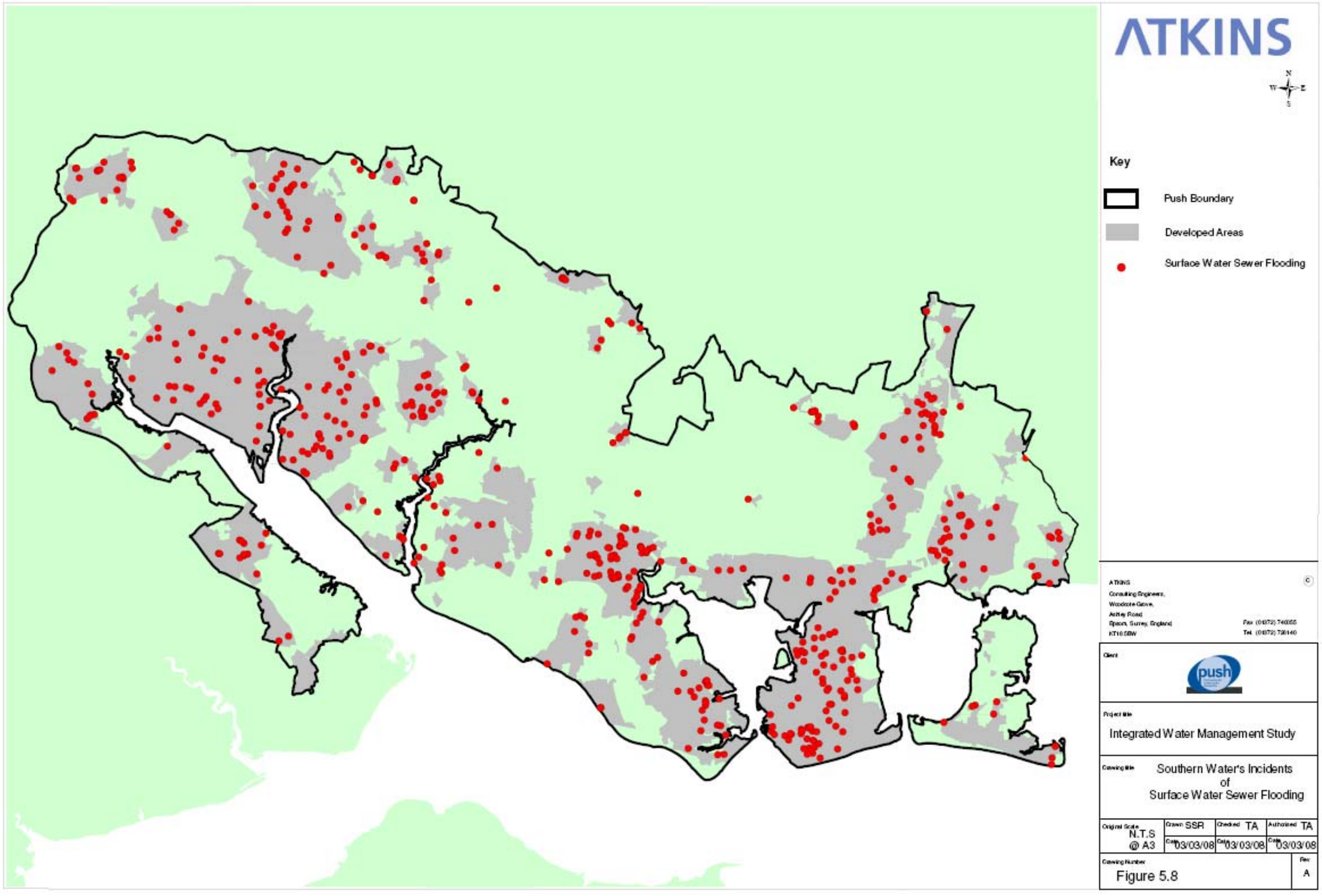


Figure 5.8 Surface Water Sewer Flooding



6 Planning and Water Management

6.1 Water Management and the Planning System

The planning policy review concluded that the land use planning system and the water management systems are not integrated and the study had identified a number of opportunities for improvement. There are numerous points of interaction between the planning system and the various systems in place to regulate the water industry. The organisations involved can have a number of different roles to play, sometimes in more than one system, and this can sometimes lead to confusion and uncertainty amongst those involved and within the wider public.

A summary of the current main roles of the various parties in the context of planning and water management in South Hampshire is provided below, as a precursor to Section 6.2 which reviews the current operation and integration with the planning system.

Central Government has a clear responsibility for the preparation of national statements of planning policy and national water policies and strategies. The Government's (Defra) most recent national water strategy, *Future Water*, was published in February 2008.

In addition to the current portfolio of Planning Policy Statements (PPS), the Government has announced its intention to publish National Policy Statements, including one for Water Supply and Wastewater Treatment Infrastructure, to establish the context for the preparation and determination of applications for nationally significant infrastructure.

The Government is responsible for approving the final content of the Regional Spatial Strategy (RSS) for the South East (the South East Plan). In terms of individual planning applications, ministerial decisions are made on the final determination of called-in or recovered planning applications and appeals. The Government Office for the South East (GOSE) provides advice to planning authorities on the interpretation of planning policies, and on the preparation of their Local Development Frameworks (LDFs).

There are various Government Agencies with key roles in the planning and water management systems, OFWAT is responsible for the economic regulation of the water industry, and advises the Government (Defra) on Water Company plans. The Drinking Water Inspectorate (DWI) is responsible for the regulation of public water supplies, and the HSE is responsible for wider health and safety working closely with the Water Companies. The Health and Safety Commission is responsible for the regulation of health and safety across Great Britain, with the enforcement of health and safety undertaken jointly by the HSE and local authorities.

The Government agency with perhaps the widest role within both the water management and planning systems is the EA. It operates, nationally, regionally and locally, holds regulatory and policy development roles and is a key statutory consultee for the preparation of LDFs and the determination of planning applications, providing advice and consultation responses across the topics of water quality, water resources, waste, navigation and recreation, land quality, fishing and air quality. The EA regulates water abstraction, discharge consents, land drainage consents, flood management, pollution prevention and control, waste management and also

navigation (for those parts of England not covered by a separate navigation authority). The Plans and strategies prepared by the EA include CAMS, SMPs, Coastal Defence Strategies, CFMP, Drought Plans and River Basin Management Plans.

Other Government agencies that interact with the planning and water management systems include English Heritage and Natural England. Specific consents may need to be sought from these agencies depending on the nature and impacts of a particular scheme. They are also statutory consultees for the preparation of LDFs and the determination of planning applications. In the coastal zone, there may be other consents which may be required through the Marine Fisheries Agency (MMO), if the development includes areas below mean high water mark. The process for marine consenting is likely to change in the near future with the development of a Marine Management Organisation which is being proposed by the draft Marine Bill (Defra April 2008). Consents may also be required from the relevant Harbour Authorities depending upon location.

The Planning Inspectorate (PINS) is a further key Government agency that influences the planning and water management systems. Inspectors hold examinations into the emerging RSS and make recommendations on their content for Government to consider in finalising the Plan. Inspectors also make binding decisions on LDF documents, and on individual planning applications considered at Appeal, or make recommendations to be taken into account by Ministers in making final decisions on call-in or recovered planning applications. The Government has recently announced that it intends to form a new Independent infrastructure Planning Commission to determine nationally significant infrastructure applications.

At a Regional level, the South East England Regional Assembly (SEERA) is responsible for the preparation of the RSS for the south east and its submission to Government (as noted above it is the Government that finally approves the document). Once approved, SEERA is responsible for its subsequent implementation and monitoring. SEERA is responsible for issuing statements on the extent to which individual LDF documents are in conformity with the RSS, and it has a statutory consultee role to provide comments on individual planning applications considered to be of regional or sub-regional significance. Separately, the South East England Development Agency (SEEDA) is responsible for the preparation and implementation of the Regional Economic Strategy (RES) for the South East. Both SEERA and SEEDA have the opportunity to comment on emerging national, regional and local planning and water management plans, policies and strategies. The Government is proposing to combine the existing regional planning and regional economic bodies into a single regional body, with responsibility for preparing and implementing a single regional strategy.

The strategic planning authorities Hampshire County Council, Southampton City Council and Portsmouth City Council are jointly responsible for the preparation of the Hampshire Minerals and Waste Development Framework. This provides the planning policy framework for future minerals and waste development across Hampshire, including the allocation and safeguarding of specific sites, and the provision of policies against which minerals or waste planning applications are judged. Individually, the three authorities are responsible for the determination of minerals and waste planning applications within their local authority areas, liaising closely with statutory and non-statutory consultees as part of this process. The three authorities also have the opportunity to comment on emerging national, regional and local policies and strategies.

The 11 local authorities within the PUSH area work jointly in the preparation of the future development strategy for South Hampshire, and in securing its implementation. As part of the PUSH agreement between the constituent authorities, PUSH is also an automatic consultee on planning policies, proposals and applications relating to "strategically important sites" within the sub-region.

At the local level, the ten local planning authorities within PUSH are responsible for the preparation of LDFs and for the determination of planning applications within their own areas, liaising closely with statutory and non-statutory consultees as part of both processes. The authorities also have the opportunity to comment on emerging national, regional and local policies and strategies, and will be consulted on the LDFs being prepared by adjoining Districts, and on planning applications with potential cross-boundary impacts.

Southern Water and Portsmouth Water have a statutory duty to supply clean and safe drinking water or their own areas of supply, undertaking necessary works and action to facilitate this supply. Southern Water is additionally responsible for wastewater treatment across the South Hampshire area. The Water Companies' operations are regulated by DEFRA, OFWAT, DWI and the EA as indicated above. They have extensive permitted development rights to undertake works without the need for an application for planning permission. These rights are, however, automatically removed if there is a need for environmental impact assessment (EIA) relating to the project, meaning that planning permission must be sought for the whole of the project. The Water Companies are consultees on certain types of planning applications. They are also consultees on LDF documents being prepared by LPAs.

6.1.1 The Primacy of the Development Plan

Section 38 (6) of the Planning and Compulsory Purchase Act (PCPA) 2004 re-states the importance of the Development Plan in the operation of the planning system in England. The Section states that:

"If regard is to be had to the development plan for the purpose of any determination to be made under the planning Acts the determination must be made in accordance with the plan unless material considerations indicate otherwise".

The key consideration in determining planning applications is therefore the provisions of the Development Plan. A decision must be in accordance with the Plan unless material consideration indicates otherwise. There is extensive case law on what constitutes a material consideration, with the courts holding a wide interpretation of this phrase. Material considerations are, however, generally accorded less weight than the provisions of the Development Plan and it is a matter for the decision maker to decide how much weight to be accorded to each factor.

In South Hampshire at the current time, the Development Plan comprises:

- RPG9 - Regional Planning Guidance for the South East (as amended).
- Saved Policies in the Hampshire, Portsmouth and Southampton Structure Plan (1996-2011).
- Saved Policies in the Hampshire, Portsmouth and Southampton Minerals and Waste Local Plan.

- Hampshire, Portsmouth and Southampton Minerals and Waste Core Strategy (2007).

- Saved policies in Adopted Local Plans for individual Districts

Whilst not finalised, and so not yet forming part of the Development Plan at the current time, policies and proposals in the emerging South East Plan and emerging LDF documents are material considerations in the development control process.

6.2 Opportunities and Constraints of the Current System

6.2.1 Different processes, timescales, and planning horizons

The systems for preparing Development Plan documents and other plans and strategies are invariably different. These differences inhibit the integration of plans and strategies, particularly those of the EA, Water Companies and those of the regional and local planning authorities. The individual systems are complex, with specific plan preparation processes to be followed, and differing requirements for consultation and evidence gathering. These complexities and different approaches can represent a real obstacle to working more closely together.

One of the principal barriers to greater integration of the Plans is that they tend to be prepared at different times, and so are not able to take account of each other in their preparation. The Plans can also have differing planning horizons. RSS tends to look over at least a 15 to 20 year plan period, with subsequent DPDs prepared by LPAs looking over 15 years ahead (PPS3 Housing requires LPAs to indicate its housing land supply up to 15 years ahead). The Water Company WRMPs also look ahead over a 20-25 year period, providing an apparent opportunity for co-ordination and consistency between the documents. In reality, however, the RSS and WRMPs are not always prepared alongside each other and thus opportunities to integrate the plans can be limited. The EA flood risk management process produces plans over a 100 year time horizon but these are non-statutory plans which can only include existing developments, thus also limiting integration with the RSS.

At the current time in the South East, the RSS has been through its Examination and the Government's Proposed Changes are awaited. Whilst Water Companies did have the opportunity to comment on and seek to influence the content of the RSS, their Draft WRMPs are only now in the process of being prepared. It is not yet known if the strategic schemes identified in the Draft RSS will continue to be promoted in the WRMPs. There is also a risk that, in approving the final RSS, the Government might increase the housing requirements for the South East to a level that additional water resources, wastewater or other significant infrastructure is required.

6.2.2 The move to the LDF system of plan making

The Development Plan system in England has been through a radical period of change over the last four years, since the enactment of the Planning & Compulsory Purchase Act in 2004. It is fair to say that the introduction of the new system of LDFs has not been painless, with more Development Plan Documents (DPDs) being rejected or withdrawn than being approved to date. There remains some confusion and uncertainty as to the requirements that must be met for a DPD to be found "Sound" and thus approved. Government Agencies, Water Companies and other consultees have been inundated with requests for comments on emerging DPDs with, at times, considerable resource implications for those organisations.

LDFs and the DPDs they contain are "spatial" plans, thus providing an opportunity for them to be much wider than the more traditional land-use plans of the past. In water management terms, LDFs have the potential to be the vehicle for integrating the plans and strategies of a number of different organisations, bringing together a co-ordinated plan of action and set of policies that would form the basis for future decisions. The requirement for planning authorities to prepare a Local Infrastructure Plan could assist with this process.

6.2.3 Long term planning versus short term funding

A number of the plans and strategies that are prepared relating to water management are long term in nature. These long term strategies provide real opportunities to make strategic choices about the future management of water. These strategies are not, however, matched with long term funding decisions and the short term nature of funding has the potential to undermine the effective implementation of the Plans. Government funding works on a three year cycle, whereas Water Companies work to five year periods of investment. Local Authorities and the EA traditionally work to annual budget processes that are in turn dependant on the level of central Government funding provided for that year.

6.2.4 Long lead in times for major infrastructure schemes

Infrastructure providers can take many years to assess the range of options available to them in a particular area, and in developing a specific scheme and assessing its potential impacts. As part of this process they may also need to seek funding or regulatory approval for the proposals, perhaps on a number of occasions, and to seek planning permission for its development. It is not uncommon for this process to take five or more years, and up to 10 years for particularly complex or controversial schemes, with construction adding another two years plus to the process. The longer the lead in times, the greater the risk and uncertainty the scheme faces.

There are also specific concerns with the implementation of capital flood defence and coastal erosion schemes promoted by the flood risk management process which is discussed in detail in Section 5.1 above.

6.2.5 Responsibilities for infrastructure provision

Different organisations have their own roles and responsibilities in relation to water management. Some are very clear – for example the Water Companies duty to supply, and the EA's responsibilities for flood risk policy and management. Local Authorities have a wider role to consider the availability of infrastructure both in preparing their LDFs and in determining individual planning applications and infrastructure provision will be one of many factors that they will need to take into account. The issue of flood risk is a prime example, where the EA prepares SMPs and CFMPs and provides advice to LPAs on Flood Risk Assessments and the application of the Sequential Test (PPS25). The LPA then has to decide whether to follow the advice or not, referring any decisions against EA advice to the Government.

There are much less clear responsibilities in relation to surface water drainage where private individuals, Local Authorities and highway authorities, the EA, internal drainage boards and different infrastructure providers share some responsibility for existing systems. The Government has recognised the lack of co-ordination in surface water management as a concern and is consulting on proposals that would lead to local authorities being responsible for the preparation of Surface Water Management Plans for areas identified in their SFRAs to be at risk of surface water

flooding. In time these Plans may direct new development away from areas of surface water flood risk, and include policies to secure sustainable surface water management in new developments, linking with the local authorities LDFs.

The recent flooding events in England have also highlighted the vulnerability of some items of essential infrastructure to flooding. This is primarily an issue for the relevant infrastructure providers, many of whom are reviewing their existing assets. It is anticipated, however, that this will have planning implications as some infrastructure sites may need to be relocated out of flood risk areas.

6.2.6 The justification of need and robustness of the evidence base

An infrastructure provider has to prove the need for a scheme at the time it applies for planning permission for it. This is separate from the need case it may have advanced in securing funding or other prior regulatory consents.

Water Company plans that are based on a “least cost” approach may not, indeed in some cases are not, consistent with the wider approach taken within the planning system of seeking to minimise environmental impacts. This is not to say that Water Companies, or OFWAT, are seeking to implement environmentally damaging schemes; rather that the focus of the Plans has traditionally been on cost as the foremost consideration, with environmental and other issues as secondary factors. The Government has issued guidance to the Water Companies and OFWAT, in time for PR09, to seek to address this.

Water Companies WRMP, Asset Management Plans and Business Plans all fall to be considered as material considerations in the planning system. Until the current round of WRMP there was no statutory basis for the Plan and no requirement for public consultation and Strategic Environmental Assessment. The fact that a specific infrastructure scheme is identified in one of the Water Company plans, and that this has been approved by OFWAT and Defra is a material consideration and will assist in proving the Need for the scheme. It will not, however, provide any form of guarantee that the individual scheme will be granted planning permission. Each planning application is assessed on its merits, and the detailed design of that scheme is as important as justifying the overall Need for it. There are many examples where the Need for a scheme is accepted, but the application was still refused as its design or access proposals were considered to be deficient.

The primacy of the Development Plan can cause difficulties for Water Companies seeking permission for new infrastructure. It is currently often the case that the specific infrastructure scheme is not identified in the Development Plan as a specific development proposal. In these circumstances the Water Company then needs to rely on more generic policies that permit new infrastructure provision, if such a policy exists. Alternatively, the Water Company would need to advance a case that the proposal, whilst strictly a departure from the Development Plan, will not cause any harm to any interests of acknowledged importance and so should be approved. This latter route is not always available for major infrastructure schemes, as the identification of the scheme in the Development Plan is an indication of the need and justification for the scheme, essential components if the EIA Need test is to be met.

6.2.7 Flexibility versus certainty

The planning of water management infrastructure is, in many ways, all about planning flexibly so that future uncertainty can be accommodated. In this way, future uncertainties over climate change scenarios, levels of flood risk, and water efficiency or demand management reductions in PCC can all be accommodated within an

overall plan or strategy. It is not always the case, however, that the Planning system is capable of flexible planning. In preparing their LDFs, the local authorities have to provide a clear and robust evidence base for their plans, policies and proposals. The evidence must be available up front at the time the plan is prepared. Future uncertainty can clearly be described and taken into consideration as part of the decision making process. However, the greater the uncertainty, the greater the risk that the case for the infrastructure scheme being approved at that time will be undermined. There will always be objectors who will argue that you should "wait and see", rather than make a difficult but important decision.

6.2.8 Cumulative effects of small development proposals

The planning system is good at identifying the infrastructure constraints and requirements arising from large scale new development proposals. Working closely with the statutory and non-statutory consultees the LPAs can identify the impact that a development may have, and then ensure the impacts will be mitigated or compensated for, securing new infrastructure provision or financial contributions towards its provision.

The planning system is not so good at assessing the cumulative effects of a number of much smaller development proposals, even when cumulatively they would amount to the same impacts as a large scale proposal. Each planning application must be considered on its merits. Identifying the cumulative effects of a number of small developments can be extremely difficult, particularly the identification of a tipping point when major new infrastructure is required, and then attributing the infrastructure back to a specific development proposal.

6.2.9 Securing Financial Contributions

Planning obligations (otherwise referred to as s106 agreements) are secured through the development control process where new development proposals can be demonstrated to have an impact that needs to be mitigated or compensated for. Obligations can be met through the provision of specific infrastructure or the provision of financial contributions towards its provision. The current guidance highlights five tests to be met in full, where Planning obligations have to be;

"*relevant to planning; necessary to make the proposed development acceptable in planning terms; directly related to proposed development; fairly and reasonably related in scale and kind to the proposed development; and reasonable in all other aspects*".

Planning obligations should not be used as a means to redress existing infrastructure deficiencies in an area; rather they are a mechanism to ensure that new development meets the additional infrastructure requirements associated with its development.

The Government is currently consulting on proposals for a new Community Infrastructure Levy that would operate as a "roof tax" in securing financial contributions towards additional infrastructure provision in the area. Site specific infrastructure and contributions, including affordable housing, would remain to be considered under the current s106 system.

6.2.10 Democratic Accountability

The planning system operates to balance the interests of the individual with the wider interests of the community, and to minimise adverse impacts on the environment in

its widest sense. The overall objective is to contribute "*to the achievement of sustainable development*" (S39 PCPA). The planning system can at times seem to work against the plans and strategies prepared by other organisations, albeit for good reasons. Planning applications for infrastructure schemes are not always approved, even if they may be seen as essential or in the public interest. Democratically elected Councilors on a planning committee may choose to give greater weight to concerns over traffic, noise or construction impacts and refuse planning permission as a result. An appeal can be submitted, although this can further delay the delivery of the infrastructure and add considerably to the cost.

6.3 Recommendations

This IWMS has sought to understand the different aspects of the land use and water management planning processes. The objective of the Strategy is to provide recommendations for integrated water management. The inclusion of the land use planning process is therefore fundamental if we are to maximise opportunities for water management.

The technical water supply, waste water and flood risk assessments have provided a combination of infrastructure and management recommendations to aid integrated water management. This section provides recommendations on the fourth strand of integrated water management - the planning system.

The planning policy recommendations have been developed to provide the PUSH authorities with a toolbox of methods to influence the current regulatory system to provide more integrated water management. These recommendations are outlined under the following mechanisms:

- Lobbying and Responding to Consultations.
- Developing sub-regional Policies and Guidance.
- LDF Preparation by Individual Authorities.
- Determination of Planning Applications.
- Working with Partners.
- Funding Infrastructure Provision.
- Targeted Research.

6.3.1 Lobbying and responding to consultations

The PUSH authorities already actively engage in lobbying Government and other agencies, submitting consultation responses on plans and strategies affecting the future development of South Hampshire. There is a clear need for this to continue as there are numerous forthcoming consultations relating to water management on which PUSH will wish to submit its views. The following opportunities have been identified to date:

- Government has already consulted and decided that the Code for Sustainable Homes should become Mandatory, assisting PUSH in seeking to meet its

planned reductions in household water use. However, it would be appropriate for PUSH to lobby Government to seek a commitment that the standards in the Code become increasingly tight over time, and also to seek Government to require similar increases in efficiency in non-residential developments.

- The Government's recently published National Water Strategy Future Water identifies a series of Government proposals for changing the system for water management in England over the period to 2030. A number of the proposals are directly relevant to South Hampshire, and it would be appropriate for PUSH to respond to the document's publication and to support the measures it contains. There will be a series of subsequent consultations on detailed matters, including a review of Building Regulations to set a minimum standard for water efficiency, a review of the Water Supply (Water Fitting Regulations) 1999, and proposals to withdraw permitted development rights for the use of non-porous surfaces in front gardens. PUSH should consider formally responding to these and other detailed consultations.

- Alongside the National Water Strategy the Government is consulting on proposals to improve Surface Water Drainage. This has been identified as a critical issue for some areas within PUSH, including Portsmouth where large areas are at risk of surface water flooding. Essentially the Government is consulting on proposals for Surface Water Management Plans; on proposals to encourage the wider take up of SUDS, and a review of the Right to Connect to Public Sewers that current exists. PUSH should take the opportunity to respond to this consultation, identifying the potential benefits to South Hampshire from the Government's proposals.

- Government is also currently consulting on proposals for the Community Infrastructure Levy. Once finalised this will be a key mechanism to secure financial contributions towards future infrastructure provision in South Hampshire, including for water management infrastructure.

- PUSH should consider responding to the forthcoming WRMP consultations by both Southern Water and Portsmouth Water. It is recommended that it should seek the Government's support for an aggressive policy of compulsory metering across South Hampshire, and the adoption of a tariff based approach to paying for future water usage once meter penetration is achieved.

- In relation to the promotion of water efficiency, whilst there is much that can be achieved locally, working closely with the Water Companies, PUSH could also consider lobbying Government to secure a national water efficiency education and awareness campaign in the national and local media, and through schools and colleges. PUSH should also consider lobbying Government to improve manufacturing standards to improve water efficiency in white gods.

6.3.2 Developing sub-regional policies and guidance

PUSH has a clear role in co-ordinating policy development and sharing good practice across the sub-region. This includes the development of consistent policy approaches, and undertaking sub-regional research studies to provide the evidence base for subsequent individual LDFs and planning applications. Arising from this Study, the following areas of potential further work have been identified:

- The wording of the Policy Framework seeks to promote sustainable forms of development, with a consistent approach to be taken across the PUSH area. It is considered that the Policy wording relating to water management could potentially go even further, particularly in relation to water demand management and water neutrality in major developments. A draft suggested Policy is provided below.

- Leading on from any SWMP the PUSH authorities could, in close liaison with the EA, Water Companies, highways authorities and developers, develop detailed guidance on the implementation of SUDS within South Hampshire. This guidance could support a common policy approach within LDFs, suggested wording is provided below.

- The flooding events in England during 2007 highlighted the vulnerability of critical utility and service infrastructure. Alongside the consideration of infrastructure requirements, PUSH could develop Policy wording to provide the basis for facilitating the delivery of necessary infrastructure, suggested wording for which is included later in this report. This Policy could be incorporated within individual LDFs.

- The Government is to publish its Good Practice Companion Guide to PPS25 in Spring 2008. Depending on the content of this document, PUSH may wish to consider developing, in close liaison with the EA, guidance to individual planning authorities on a consistent approach to the application of the PPS25 Sequential Test and Exception Test to development proposals on previously developed land in flood risk areas. This is considered to be particularly relevant to Portsmouth and other urban areas identified at risk of flooding.

6.3.2.1 Policy Text: to promote incorporation of water efficiency and demand management measures in new developments

The PUSH sustainability policy framework identifies a consistent policy approach to be taken across the PUSH area to the promotion of sustainable forms of development. In relation to water efficiency and demand management, it is considered that the Policy wording could potentially go even further.

The following Policy wording is suggested for inclusion within relevant DPD, to provide the basis for promoting water efficiency measures in new development proposals. It is recognised that the PUSH authorities are in the process of drafting guidance on sustainability policies, and that the following policy wording may need to be amended as a result.

The Council will require development proposals to be designed to meet high standards of water efficiency. Planning applications for development will be approved, where:

residential development is designed to achieve at least the following level of credits for internal water use in the Code for Sustainable Homes:

- *for applications submitted prior to 31st December 2012, 3 credits (equivalent to 105l/p/d)*
- *for applications submitted prior to 31st December 2015, 4 credits (equivalent to 90l/p/d)*
- *for applications submitted after 1st January 2016, 5 credits (equivalent to 80l/p/d)*

additionally, applications for residential development submitted after 1 January 2013 will be required to achieve 1 credit for external water use

mixed use and non-residential developments with a total floor space over 500 sqm are designed to achieve at least the following level of credits for internal and external water use in BREEAM

- *for applications submitted prior to 31st December 2012, 4 credits*
- *for applications submitted prior to 31st December 2015, 5 credits*
- *for applications submitted after 1st January 2016, 6 credits*

applications for development proposals exceeding 250 dwellings or 5,000sqm of mixed use or non-residential development that are submitted after 1 January 2016 will be required to be water neutral. Water neutrality will be achieved through the incorporation of on site water efficiency measures and/or the implementation of a programme of retro-fitting of water efficiency measures in residential and non-residential properties within the local authority area.

6.3.2.2 Draft Policy Text: to promote SUDS and Surface Water Management

The following Policy wording is suggested for inclusion within relevant DPD, to provide the basis for promoting SUDS within new development proposals. The Policy wording may need to be amended, depending on the eventual approach taken to Surface Water Management Plans in South Hampshire, and any policy recommendations arising from that work.

The Council will require development proposals to demonstrate avoidance, reduction and management of unacceptable harm to natural watercourses, groundwater and the risk of flooding arising from systems to manage surface water from the proposed development. Information on these measures must be submitted with an application and include detailed proposals for the long term maintenance of proposed surface water management systems.

The Council will require that for applications on previously developed sites, all developments over 500m2 and residential developments proposing either 10 dwellings or more or having an area of 0.5 hectares or more, should demonstrate through calculations that the rate of run-off of surface water from the site is less than the conditions before development.

The Council will require that for applications on greenfield sites, all developments over 500m2 and residential developments proposing either 10 dwellings or more or having an area of 0.5 hectares or more should demonstrate through calculations that the rate of run-off of surface water from the site will be equal to or less than the original conditions before development.

Calculations should take account of the unavoidable climate change anticipated in the locality over the lifetime of the development. Best practice design of SUDS will follow a hierarchy from control at source and infiltration, to a range of management features including; Permeable surfaces; Filter drains/strips; Basins, ponds and wetlands; Soakaways; Infiltration trenches; Rainwater re-use; and Green Roofs.

Further guidance on sustainable drainage systems will be included in a SPD.

6.3.2.3 Draft Policy Text: to facilitate the provision of necessary water management infrastructure

The following Policy wording is suggested for inclusion within relevant DPD, to provide the basis for the subsequent determination of planning applications for new infrastructure. The Policy wording would need to be amended to reflect the DPD that it sits within, i.e. reference to waste water treatment would only be appropriate in a Waste DPD.

Planning applications for water management infrastructure will be permitted on sites within and outside exiting built-up areas, provided:

- *the infrastructure is either required to meet an existing need or a need that is reasonably expected to arise during the Plan period; and*
- *the infrastructure is located and designed so as to minimise its impact on the environment, having regard to the locational and operational requirements of the infrastructure proposed.*

Where infrastructure is proposed outside existing built-up areas, the Applicant should demonstrate that a sequential approach has been adopted to the identification of the site, having regard to the locational requirements of the infrastructure proposed, considering:

- *firstly, available sites within the built-up area;*
- *secondly, available previously developed sites outside built-up areas; and*
- *finally, undeveloped sites outside built-up areas.*

The term water management infrastructure is defined as the provision of water supply and wastewater treatment infrastructure, and infrastructure designed to mitigate the risk of surface water, fluvial, tidal or groundwater flooding.

6.3.2.4 Draft Policy Text: to ensure sufficient water management infrastructure exists, or can be made available to serve new development

The following Policy wording is suggested for inclusion within relevant DPD, to provide the basis for the determination of planning applications with potential implications for infrastructure capacity.

Planning permission will be granted for developments provided that:

- *sufficient water supply, surface water drainage, foul drainage and sewage treatment capacity already exist; or*
- *additional capacity will be provided in time to serve any individual phase of the development without unacceptably reducing the level of service to existing users, or causing harm to the environment.*

The Council will seek to ensure that there is adequate water supply, surface water drainage, foul drainage and sewage treatment capacity to serve all new developments. Developers will be expected to demonstrate that there is adequate capacity both on and off site to service the development, through the submission of appropriate information in support of their planning application. In some circumstances this may make it necessary for developers to arrange for

appropriate studies to ascertain whether the proposed development will lead to the overloading of existing infrastructure.

When there is a capacity problem and improvements in off-site infrastructure are not programmed, developers will be expected to requisition or otherwise fund infrastructure improvements. Planning conditions and section 106 agreements may be necessary to accommodate this process. These will include phasing arrangements if appropriate.

6.3.3 LDF preparation by individual authorities

Working within the context of the policies in the South East Plan, and taking into account any sub-regional policy approaches and guidance developed by PUSH, it remains the responsibilities of the individual planning authorities to prepare their own LDFs. The preceding section has sought to identify a series of common approaches that could be developed across the PUSH area. Building on these, it is critical that:

- Individual Local Development Documents allocate specific areas of land identified as being required for water management infrastructure, with the LPAs working closely with the infrastructure providers and EA in their identification and allocation. It is important that land is allocated for necessary development, including any necessary as replacements for current facilities vulnerable to flooding. This infrastructure may need to be provided in a different local authority area from the development to which it relates, emphasising the need for collaborative working amongst the PUSH authorities and their partner organisations;

- LDF policies and proposals are flexible to accommodate future changes to infrastructure requirements that could arise from climate change or tighter environmental legislation and constraints. Future changes to abstraction licenses or discharge consents may necessitate additional treatment processes to be accommodated within already constrained utility infrastructure sites. Potential areas for expansion could be identified within LDFs, although it is accepted that the uncertainty over the timing or specific need for such expansion land may give rise to questions of Soundness under the current LDF system;

- Individual Local Development Documents include policies that facilitate the delivery of necessary water management infrastructure. These are considered to be most likely to be criteria based policies, including the tests to be met for proposals to be acceptable within the terms of the Policy;

- Individual Local Development Documents include policies to require and promote sustainable urban drainage systems, consistent with existing and emerging national guidance, any SWMPs, and with any sub-regional PUSH policy approaches that have been developed;

- LPAs consider the potential contribution that new residential, employment or other development may make towards meeting wider water management objectives. In considering potential allocations of land for new development, locations that would secure additional tidal, fluvial or surface water flood infrastructure could be selected, benefiting existing communities through improved flood protection.

- In identifying areas of land for new development the LPAs seek advice from infrastructure providers including the Water Companies, so as to ensure that new residential and other development does not take place in locations that would inhibit the operation of existing utility sites and facilities, or any future extensions to them. This is particularly important in relation to the potential sitting of residential or other sensitive development in proximity to wastewater treatment works.

6.3.4 Determination of Planning Applications

The determination of individual planning applications remains the responsibility of the individual planning authorities, with PUSH automatically being consulted on "strategically important sites". In order to promote sustainable water management within South Hampshire, it is considered important that:

- PUSH ought to be made a consultee on a wider range of planning applications than its current remit in relation to strategically important sites. There is considerable merit in extending its role to consultations on infrastructure proposals of wider than local significance.

- Consideration is given to making Water Companies automatic consultees on planning applications with potential implications for their networks and infrastructure. This should happen within the current development control systems that are in place, although we can see merit in agreement being reached with the respective Water Companies on the type of applications and/or locations in which they would wish to be consulted. This may also provide a mechanism for establishing standard consultation responses for applications that do not raise significant concerns or the Companies.

- All parties make maximum use of the opportunity to engage in meaningful discussions on development proposals at pre-application stage. LPAs, the Water Companies and the EA should all commit sufficient resources through the pre-application process to ensure that adequate consideration is given to infrastructure implications of new development before applications are submitted. Consideration could also be given to adding an additional requirement onto the local lists associated with the standard planning application form 1APP, for an Infrastructure Statement to be submitted with all qualifying applications identifying the existing infrastructure capacity and how the proposed development will impact on this. For strategic development proposals, including for significant water management infrastructure schemes, pre-application engagement with SEERA is also recommended as SEERA is a statutory consultee on strategic planning applications.

- Individual LPAs should give consideration to the provision of training or workshop sessions for Councillors, planning officers, agents and developers on the issues relating to water management infrastructure that are identified in this report. This should include notifying applicants and agents of any new guidance or policies that may be developed in relation to water management, highlighting the particular requirements that will need to be met within the development control process, for example in relation to SUDS.

6.3.5 Working with partners

The importance of partnership working cannot be understated in relation to water management infrastructure, particularly given the complex interrelationship between planning and other systems of regulation, and the number of separate organisations involved in the processes. PUSH provides a key mechanism for bringing together the various organisations and co-ordinating water management infrastructure provision.

- In this co-ordinator role, PUSH could consider maintaining a central "forward plan" of emerging plans and strategies being prepared by the PUSH authorities and the various partner organisations. Web-based, this could be a central source of information and act as an early-warning system for forthcoming consultations on key documents. This could also usefully include emerging plans and strategies for areas adjoining the sub-region that have the potential to affect the PUSH area, or be affected by it.

- With the agreement of the PUSH authorities, PUSH could also potentially act as a single sub-regional consultee on emerging plans and strategies, potentially removing the need for each PUSH authority to individually respond to consultations.

- Additionally, a written concordat or agreement could be prepared on the levels of engagement that the organisations will have in each others plans and strategies, identifying including levels of information to be shared, the timing of responses etc.

- In relation to water efficiency and flood risk management, it is considered that PUSH could work with the Water Companies, EA and individual local authorities to develop a pack of information to be delivered to each household and non-domestic property in South Hampshire. This pack could contain educational information promoting water efficiency, and also alerting residents and business to what action they can take to minimise any potential flood risks. This literature could potentially be jointly funded by PUSH, local authorities, the EA and Water Companies.

Further recommendations on partnership working are outlined in the flood risk section.

6.3.6 Funding Infrastructure Provision

6.3.6.1 Developer Contributions/Infrastructure Levy

The forthcoming Community Infrastructure Levy (CIL) provides the mechanism by which the PUSH authorities could develop a mechanism for collecting and sharing developer contributions towards water management infrastructure on an area basis (site specific requirements remaining to be considered through s106). This would have the benefit of enabling the cumulative effects of small developments to be addressed, with the inclusion of mechanisms for sharing infrastructure costs across an area. Subject to the development of the detailed method of calculating contribution levels, contributions to high level water management infrastructure including water supply; wastewater treatment; and area based SUDS and flood management systems.

This is specifically relevant for flood management where proposed developments which include the provision of new flood mitigation measures, should generally be funded on the whole by the developer. Developers proposing new mitigation measures which solely benefit new development should not call on public resources as a means of funding. Where the infrastructure proposed provides benefit to the wider community, or where the proposed works include upgrade or replacement of existing defences or flood alleviation schemes, it may be reasonable for the developer to contribute a proportion of the funding in partnership with the operating authority responsible for the existing works. This may be especially relevant to LAs with a significant proportion of in-fill development in locations at risk such as Portsmouth, Gosport and Southampton. Further guidance on developer contribution for flood mitigation measure can be found in Annex G of PPS25.

Draft text of a policy which could require the contributions of developers through an Infrastructure Levy is provided below.

6.3.6.2 Draft Policy Text: Potential Water Management Infrastructure "Infrastructure Tax" policy

More detailed work will need to be undertaken on the level at which such a levy would be set, and the mechanisms for collecting and spending the revenue that is generated from it. It is difficult, at this stage, to recommend a precise Policy wording as the detailed proposals for the CIL are still subject to consultation. The following Policy wording is that adopted by Milton Keynes Council in its Adopted Local Plan, supplemented by a number of SPG/SPD documents.

The Council will seek to ensure that development proposals make adequate provision for both infrastructure and community facilities that directly relate to the proposed development. In making an assessment of such needs, it may be necessary to take into account the cumulative effect of a number of developments on the existing infrastructure of the surrounding area.

Developers will be expected to meet the full costs of facilities required as a consequence of development and contribute to resolving existing deficiencies where these would be made worse by the development.

6.3.6.3 Forward Funding by PUSH

PUSH has already successfully secured Government funding for the investigation and implementation of a series of infrastructure schemes across South Hampshire. There is clear potential for PUSH to continue this approach, applying it to water management infrastructure in areas where funding could overcome potential barriers to new development. PUSH could also consider forward funding some of the water management infrastructure necessary for development to take place, recouping this money through subsequent s106 agreements. This approach could benefit both the large scale development proposals outlined in the South East Plan, and also specific areas where infrastructure constraints or flood risk is preventing development from currently taking place.

6.3.7 Targeted Research

This is an area where PUSH has already, and is continuing to undertake a considerable body of work, including in relation to sustainability policies, Flood Risk, Green infrastructure, and the infrastructure requirements and delivery of the SDAs. These ongoing studies may give rise to additional site specific and general recommendations in relation to water management infrastructure. The following additional areas of research are recommended.

- PUSH has developed a Sustainability Policy Framework, building on Policy SH14 in the Draft South East Plan, for incorporation into individual LDFs. The Policy framework is to be considered by the PUSH Joint Committee in March 2008, with further work being undertaken on more detailed guidance relating to the Policy, potentially for future adoption as SPD. This could helpfully also act as a "**developer's handbook**", identifying detailed water management requirements to be provided on and off site if developments are to be acceptable within the PUSH area, and identifying the roles and key contacts for organisations in the area.

- Linked to the implementation of the Sustainability Policy Framework is the need to assess the enforceability and enforcement options relating to the levels of water efficiency required to be provided in new homes. As currently worded, it is a requirement for the homes to meet the relevant standards when permitted. It is a well stated concern of the Water Companies that the homes can be designed to be water efficient, but it is not possible to force the residents to act in a water efficient manner, or to prevent them subsequently installing water inefficient equipment such as power showers. It is considered unlikely that the planning authorities will wish to take on the ongoing enforcement of water efficiency levels within new homes, although without any enforcement options being available, there is the risk that the levels of planned water efficiency will not actually be achieved. Research could be undertaken into this issue and guidance subsequently provided to the PUSH authorities.

7 Summary

7.1 Scope of Work undertaken

A key aim of PUSH is to promote economic growth in the South Hampshire sub-region while delivering sustainable communities. As part of this, the South East Plan (SEP) includes proposals for the development of 4,000 new homes a year for the next 20 years in the sub-region, giving an additional 80,000 new homes in the area by 2026. To inform the role of PUSH in this development, and in particular to assess the feasibility of the housing figures allocated to the area by the SEP, PUSH commissioned this sub-regional Integrated Water Management Strategy (IWMS).

The objectives of the IWMS are to:

- Guide and inform the level and location of development to be accommodated in South Hampshire in accordance with the Draft South East Plan;
- Identify a preferred high level strategy for water management for the period to 2026, including the general location and timing of infrastructure requirements, the agencies responsible and the means of funding the necessary work; and
- Identify the further work necessary to implement the preferred strategy and to monitor its effectiveness over the plan period.

This report sets out the relevant environmental background, the approach taken to the IWMS, key contributing organisations and the agreed issues warranting priority attention due to the nature and scale of their potential constraints on future development. The priority issues are:

- Water supply;
- Wastewater treatment; and
- Flood risk.

In addition, some consideration has also been given to the issues of Biodiversity and Fisheries (primarily through the outcomes of the EA's Review of Consents programme), Groundwater Protection, Surface water (sewer) flooding and Diffuse Pollution.

The outcome is a series of conclusions and recommendations which together address the objectives set out above. In this context it is important to emphasise that in regard to the development of a "high level strategy", the most important issue is to work closely with those organisations responsible for managing the priority areas and ensure that their respective strategies are as consistent as possible with PUSH objectives. These organisations are:

- Water Supply – Southern Water and Portsmouth Water
- Wastewater Management – Southern Water
- Strategic Flood Risk Management – Environment Agency

A vitally important cross-cutting issue in each of the areas above is that of Environmental Protection, for which the Environment Agency carry the major strategic responsibility.

With regard to future development, the agreed approach has been to assume that the scale, timing and geographical distribution of growth would be in accordance with the latest figures provided by Hampshire County Council i.e. they are fixed rather than variable parameters within the context of this assessment.

The project was designed to draw on existing data and information derived from a range of sources. Although no new data have been generated, significant additional analyses have been undertaken for each of the three priority issues described above.

The main conclusions and recommendations are summarised in turn for each of the priority issues below. The recommendations also include a section on how water management issues can be more closely aligned with and/or influenced by the planning system.

7.2 Conclusions

7.2.1 Water Supply

Current Abstraction Licences

Were existing abstraction licences sustainable, and not subject to change, the proposed growth in households and population in the PUSH area could be sustained without the need for any additional resources.

Impact of "Sustainability Reductions" on the Supply Demand Balance

However, following a review by the EA, a number of important abstraction licences are likely to be amended to a level of abstraction that the EA considers to be environmentally sustainable. The amendments proposed by the EA will create a significant deficit in the peak period supply demand balance in South Hampshire even if population and households remain at their current level. By 2030, this deficit will range between 70 Ml/d and 125 Ml/d depending on the assumptions used with regard to growth and changes in demand. To put this in context, the yield of a new reservoir at Havant Thicket would be 30 Ml/d.

Potential savings in Demand

Demand side savings have the potential to reduce this "deficit envelope" to between 60 and 110 Ml/d. The total investment in demand side measures proposed by Southern Water and Portsmouth Water across the PUSH area over the next 25 years is likely to be of the order of £60-70M. Key areas of activity will include:

- Leakage reduction – although both Portsmouth Water and Southern Water are at or below their target leakage levels set by Ofwat, there are likely to be further reductions in the future and these could realistically amount to as much as 5 Ml/d.

- Universal Compulsory Metering - the most significant contribution to these savings will be those realised through plans by both Southern Water and Portsmouth Water to install meters on all households (new and existing).

Perhaps not surprisingly, charging for the volume of water used tends to drive a range of customer initiated water efficiency measures. A range of studies suggest that this is likely to lead to a sustained reduction of 5-15% in per capita consumption compared with households that are still charged on the basis of the rateable value of the house. This could yield a further saving of 7 Ml/d by 2030.

- Installation of Low use Fittings in new Households – the construction of new homes in accordance with the Code for Sustainable Homes Level 1 or higher has the potential to significantly reduce per capita consumption in new households compared with existing households. Achieving these savings is reliant on individual local authorities securing high standards of water efficiency in the new dwellings permitted. Notwithstanding this, however, the desired savings will only be fully realised if this is accompanied by behavioural changes in water use by householders. Potential savings are calculated to be between 3 Ml/d (probably realistic) and 8 Ml/d.

- Other water saving initiatives, such as retrofitting water efficient devices in existing homes, could yield a further 1 to 3 Ml/d in the South Hampshire area. At the current time there are no mechanisms for securing retrofitting other than on a voluntary basis. The local authorities could perhaps work closely with registered social landlords to seek to implement retrofitting on a wider basis.

Review of Supply Side Options

Although the demand side savings are significant, the reality is that to accommodate the projected growth and ensure that river habitats and species in Hampshire are afforded adequate protection from over-abstraction, a further 100 Ml/d of supply availability during periods of peak demand will be required if the two Water Companies are to be confident of maintaining the supply demand balance over the next 25 years. In this regard, the water resource planning process undertaken (separately) by Southern Water and Portsmouth Water has identified and assessed more than 70 options and sub-options, including:

- Two new winter storage reservoirs;

- A range of potential improvements to water treatment works or boreholes to improve the yield of existing sources within their current licences;

- Various options for recycling wastewater currently discharged to estuaries or out to sea;

- Wastewater recycling;

- A spectrum of desalination options, from the treatment of saline groundwater and brackish estuarine waters through to full treatment of sea water; and

- Bulk transfers – options to transfer water from other supply zones within the Company supply area or from other Water Companies.

In addition to the volumetric contribution of each option, the assessment took account of the likely “deliverability” of each option, together with its potential economic, social and environmental impacts, including its potential impact on climate change (i.e. carbon cost) and its robustness to climate change.

Shortlist of Preferred Supply Side Options

The main outcome of this assessment is that "viable" options are available to address the forecast deficit and a shortlist of seven "preferred" options has been drawn up in this report with a combined peak period deployable output of over 130 Ml/d. The shortlisted options are summarised briefly below:

- Washwater recovery at **Farlington Treatment Works** (Portsmouth Water). This scheme is expected to increase peak period deployable output by 5 Ml/d and would have a target completion date of 2012. The scheme would not be expected to give rise to significant environmental concerns for the Local Planning Authority. It is not anticipated that any land use allocations would be needed as a precursor to any application for this scheme. Portsmouth Water would be responsible for developing the scheme and the proposed funding route would be through the Ofwat's review of price limits for the 2010-2015 (AMP5) period.

- Additional boreholes at **Lavant and Brickkiln** (Portsmouth Water). The aim of this scheme would be to increase the peak deployable output of the sources by 5 Ml/d within the existing licences. There would be a target completion date of 2015 and it would not be expected to give rise to any significant environmental concerns for the Local Planning Authority. It is not anticipated that any land use allocations would be needed as a precursor to any application for this scheme. Portsmouth Water would be responsible for developing the scheme and the proposed funding route would be through the Ofwat's review of price limits for the 2010-2015 (AMP5) period.

- Increase the capacity of the treatment works at **Testwood to 136 Ml/d** (Southern Water). This would increase the peak deployable output of the Testwood abstraction by 31 Ml/d whilst remaining within the current licensed abstraction. Target completion date would be 2015. It is not known whether the proposal would require EIA, although it is not anticipated that any land use allocations would be needed as a precursor to any application for this scheme. Southern Water would be responsible for developing the scheme. However, since the requirement for the scheme is driven by the proposed reductions in existing licences, the route for funding remains unclear.

- **Wastewater Recycling at Sandown** on the Isle of Wight (Southern Water). This scheme would increase the self-sufficiency of the Isle of Wight during periods of peak demand, making it less reliant on the Cross Solent Transfer. The knock-on benefit to South Hampshire is that the water (14 Ml/d) currently transferred to the island during peak periods would be available to the Hampshire South Resource Zone. There are no significant implications for any Local Planning Authority in PUSH, although any permissions that may be required would need to be granted by Isle of Wight Council. The scheme would only be required in 2026 if there were no reductions in existing abstraction licences. Reducing licences would mean that the scheme is required in 2013. As for the Testwood scheme above, Southern Water would be responsible for developing the scheme but the precise route for funding remains unclear.

- New winter storage reservoir at **Havant Thicket** (Portsmouth Water). This scheme has been well documented and publicised and was included in the Draft South East Plan. The target completion date would be 2021 and it would have a peak period deployable output of 30 Ml/d. It is anticipated that a

land use allocation would be needed as a precursor to any application for this scheme. The scheme would also require EIA and an Appropriate Assessment. Portsmouth Water would be responsible for developing the scheme and the proposed funding route would be through the Ofwat's review of price limits for the 2010-2015 (AMP5) period and probably the 2015-20 (AMP6) period.

- **Relocation of the Otterbourne abstraction** intake further downstream on the River Itchen (Southern Water) combined with the transfer (recycling) of treated wastewater from the **Portswood Wastewater Treatment Works** to Gaters Mill (Portsmouth Water). This scheme is complicated by the fact that the relocation of the Otterbourne intake on its own will yield 30 Ml/d for Southern Water but at the direct expense of Portsmouth Water, hence the need for the Portswood wastewater to compensate. The precise scope, timing and viability of the scheme(s) will depend on the progression of other schemes, the balance of the respective needs of and options available to the two Water Companies, and further discussions between the Companies and the EA regarding their Draft WRMPs. The scheme would require EIA and Appropriate Assessment, and may give rise to environmental concerns to the Local Planning Authority given the environmental sensitivity of the Itchen. The implementation of the scheme would require a high degree of co-operation between Southern Water and Portsmouth Water. As for the Testwood and Sandown schems, the precise route for funding remains unclear.

- Increase the licence at **Testwood to 160 Ml/d** and upgrade the treatment works accordingly. This would also require an upgraded transfer pipeline between the Testwood and Otterbourne treatment works. The scheme could yield an additional peak deployable output of 24 Ml/d whilst remaining within the constraints of the Minimum Residual Flow set by the EA for the River Test. A new abstraction licence would be required from the EA, however, the granting of which could not be guaranteed. The scheme would require EIA and Appropriate Assessment, and may give rise to environmental concerns to the Local Planning Authority given the environmental sensitivity of the Test and the likely pipeline route. Southern Water would be responsible for developing the scheme but the precise route for funding remains unclear.

It is likely that only five or six of the preferred options would be implemented. The capital cost of 6 schemes is estimated to be between £120M and £165M.

The Benefits of Reducing Uncertainty

As might be expected, the forecasts of supply and demand over the next 25 years contain areas of uncertainty. A failure to take account of this uncertainty may lead to a shortfall of supply in critical periods. To protect against this, a "buffer" known as Target Headroom is added to a Company's Demand Forecast in its Supply Demand Balance. As a general principle, however, Ofwat is of the view that major water resource schemes should not be driven by Target Headroom alone. Given that several major schemes may be required in South Hampshire in the next 10 to 15 years, it is important to understand how much the need for new schemes is driven by increases in Target Headroom and how much it is driven by increases in forecast demand. With regard to the Draft WRMPs submitted by Southern Water and Portsmouth Water, the combined Target Headroom in the supply demand balances is forecast to be over 65 Ml/d by 2030. On the face of it, there should be some scope for reducing this, possibly by as much as 20 Ml/d. This would probably reduce the

number of supply side options required to 5 and the capital costs to between £95 and £130M.

Accounting for Climate Change impacts

The potential impacts of climate change on supply and demand over the next 25 years are likely to be relatively minor but have been accounted for in the assessments undertaken in this Study.

Risks relating to Water Supply

At present, the Draft WRMPs prepared by the Water Companies are seeking to integrate the requirements of the Environment Agency's Restoring Sustainable Abstraction (RSA) Programme with the challenges of increasing population and household numbers and the potential impacts of climate change. One of the outcomes is a "Twin Track" approach in which measures to manage to demand and options to develop new resources may both play a major role. Whilst encouraging, there are underlying risks that PUSH should be aware of. These are:

vi) The EA's proposals for reducing current abstraction licences under the RSA Programme (known as sustainability reductions) may be legally challenged by either or both Southern Water and Portsmouth Water. This could lead to delays before a coherent strategy for maintaining the supply demand balance is agreed by all parties. One of the principal factors underlying such a challenge is the uncertainty regarding the route through which the schemes required to maintain the supply demand balance will be funded. Historically, such schemes would normally be funded through the price limits agreed by Ofwat for Water Company customer bills. However, there remains uncertainty about this and it is possible that an alternative route for funding, via compensation paid by the EA and recovered through abstraction licence charges, may be stipulated by Defra. Although in both cases Water Company customers will ultimately pay, until the Water Companies are clearer about how, when and through which route the schemes will be funded there is a high risk of delay in scheme implementation.

vii) At the current time, the Draft WRMPs remain as the Companies' Preferred Strategies. They have yet to be subject to scrutiny by the Environment Agency, Ofwat, and wider consultation that will be taking place during Summer 2008. There may be a need for a hearing or Inquiry before the Draft WRMPs are finalised and there is a risk that the final approval of the WRMPs may slip beyond the current April 2009 deadline. The options identified in the Companies' draft WRMPs may change before the WRMPs are finalised. None of the above provides the certainty that PUSH and the individual local planning authorities require for their "Evidence Base" to underpin sub-regional work or Local Development Documents. It may be appropriate for the local planning authorities to plan for the provision of all of the seven shortlisted options identified above, on a precautionary basis, pending the approval of the final WRMPs. PUSH and the individual planning authorities should also have full regard to potential water resource developments and policy mechanisms to promote demand management measures when preparing their Local Development Documents.

viii) A further risk to PUSH and the individual planning authorities at the current time is that whilst options to meet the sustainability reductions proposed by the Environment Agency are described in its Draft WRMP, this is not the

Company's preferred strategy at present. This may mean that, at the current time, planning authorities are not able to meet the Habitat Regulation requirements for Appropriate Assessment of Local Development Documents. The EA Review of Consents has concluded that **existing** abstraction licences may have an adverse effect on European Designated Sites. Until measures to rectify this situation are planned for implementation, any Appropriate Assessment may be unlikely to be able to conclude that additional development proposed through a Local Development Document would have no adverse effects on the Sites. PUSH or individual local planning authorities may wish to seek further advice on this issue.

ix) To date, the EA's review of abstraction licences has focused as a priority on the requirements of the EU Habitats Directive. What is not yet clear is whether the EA's implementation of the EU Water Framework Directive will give rise to further constraints on abstraction.

x) There is currently a potential imbalance between the deficits that Southern Water and Portsmouth Water are forecasting and the "preferred" solutions available to each Company. For example, it is possible that, when viewed from a regional perspective, the case for developing Portsmouth Water's Havant Thicket reservoir scheme may be driven primarily by Southern Water's need for additional resources. As it stands, the structure of the UK Water Industry and the nature of the water resource planning process, does not readily lend itself to such "boundaryless" planning. The Water Resources in the South East Group (WRSE), which is led by the EA, will need to take a lead in seeking to ensure that obstacles to ensuring sensible, sustainable, least cost planning solutions are minimised.

7.2.2 Managing Wastewater

Using a standard approach to forecasting discharges

For some time the EA has expressed significant concerns regarding the tension between the proposed growth in South Hampshire and the potential impact of existing and future wastewater discharges on the internationally designated river and coastal waters in the area. This assessment has demonstrated that, using standard methods for forecasting growth in wastewater discharges, these concerns are warranted – by 2020, seven out of 13 (over 50%) of wastewater treatment works in the area are forecast to exceed their flow consents.

If there is to be no deterioration in pollutant loads, the EA will only permit increases in consented flows if they are matched by an "equivalent" improvement in the quality of the wastewater discharged. Whilst it is likely that most of the works will be able to achieve some further improvement in the quality of wastewater discharged to compensate the additional flows, this will almost certainly not be possible at works such as Peel Common. Furthermore, with major improvements in treatment already the subject of ongoing work at a number of the sites concerned, there are legitimate concerns that further improvements in 10-15 years time may not be technologically or economically viable or environmentally sustainable, given that additional treatment tends to require significantly more energy use.

Integrating wastewater forecasts with water supply forecasts

Despite the above, this Study has concluded that the situation may not be as problematic as the standard method of wastewater forecasting suggests. The main reason for this is that a combination of environmental impacts, climate change and recent droughts are driving a number of significant changes on the water supply side. These can be summarised as follows:

- Over 95% of household water use is subsequently discharged to the wastewater system and this forms the major component of wastewater inflow to the treatment works. Any significant changes in the volume of household water use will therefore have a similarly significant impact on the volume of wastewater discharges. In the preferred strategies set out in their Draft WRMPs, both Southern Water and Portsmouth Water are proposing the introduction of universal compulsory metering. This is potentially the most significant change in the management of household water demand since privatisation of the water industry in 1989. The resulting demand forecasts, which include the forecast growth in housing over the next 20 years, suggest that there will be little or no net increase in total household demand over the next 25 years.

- The standard method for forecasting growth in wastewater discharges allows for a fixed volume per household or occupant. These values are understandably conservative but, more importantly, are applied independently of any forecasts in water demand and only to new households. They do not take account of potential changes in demand in existing households. The upshot of this independent approach is that there is now a significant mis-match between the water demand forecasts and the equivalent wastewater discharge forecasts. It is issues such as this that an Integrated Water Management Study is designed to capture and address.

- An alternative forecast for future wastewater discharges (known as Scenario 2) based on future forecasts for water supply demand has therefore been developed. Although based on slightly more conservative assumptions than the Water Company demand forecasts, it suggests that the growth in wastewater discharges will be much less than currently predicted. This is considered to be a more realistic forecast.

The need for major new wastewater infrastructure

Based on Scenario 2 flows, the only works forecast to exceed its consented flow in the period to 2026 is Peel Common (assumed to include the Woolston discharge). However, the potential reduction in the concentrations of consented water quality parameters that would be required at peel Common to ensure compliance with the EA's 'no deterioration' policy is likely to be well within the capacity of current treatment technologies to deliver.

At this stage, it is therefore considered very unlikely that major new wastewater treatment infrastructure will be required during the next 20 years other than that already required to achieve the consents set by the EA under the Urban Wastewater Treatment Directive and those proposed to fulfil the requirements of the Habitats and Birds Directives.

Risks relating to Wastewater Management

There are a number of risks relating to the assessment and conclusions set out above that need to be understood and managed where required. These are:

viii) In reviewing the Water Company Draft WRMPs, Ofwat don't approve the proposals for universal compulsory metering. This is only really likely to be on the ground of cost. The assessment of costs and benefits of the metering proposals are unlikely to have included any allowance for the potential benefits to wastewater flows and the capacity for growth.

ix) Effective, routine monitoring of the inflows and outflows at wastewater treatment works has only been in place for a few years. At works such as Peel Common, the data remain inadequate. This not only impacts on current estimates of DWF (with knock-on impacts on forecasts for the future), but also hinders the understanding of the performance of the works.

x) At this stage, assessments of nitrogen removal rates are encouraging at those works fitted with new enhanced nitrogen removal technologies. These trials are ongoing. Our own view is that concentrations at or below 10 mgN/l should be achievable. Obviously, how far below the 10 mg/l concentration the works can reliably go and at what cost will be a key factor in defining what "contingency" exists to handle the proposed growth.

xi) It is possible that the demand forecasts set out in the Water Company Draft WRMPs will prove to be an under-estimate, either because universal compulsory metering does not reduce demand by as much as anticipated or because the impact of climate change or reduced household occupancy rates on per capita consumption is much greater than anticipated. However, even much more conservative (and almost certainly unrealistic) estimates of demand would still produce increases in wastewater discharges that are well below those forecast using the standard approach. In this situation, the Peel Common discharge would remain the main issue of concern.

xii) In the absence of any serious attempt to reduce infiltration to sewers, infiltration does not remain at current levels but increases.

xiii) Current assessments of "environmental capacity" do not at this stage take account of any additional constraints that may arise from the EA's implementation of the EU Water Framework Directive. Current levels of diffuse pollution are already high and unless further action is taken by the EA and other relevant parties in this area it is not inconceivable that further tightening of "end of pipe" consents, particularly for N and P may be considered by the EA.

xiv) Finally, PUSH and the EA are aware that the area may come under further pressure from central government to increase its housing and population projections further.

7.2.3 Flood Risk and Surface Water Management

Extent of Flood Risk Zones

- Of the 80,000 houses required within the PUSH region, nearly 12,000 are allocated within Flood Zones 2 and 3. This equates to approximately 15% of the total allocation.

- The proposed SDAs are located inland, significantly outside the coastal floodplain (Flood Zone 1) and therefore not at risk.

- The housing requirement for Eastleigh, Test Valley, Winchester, Fareham and East Hampshire can all be accommodated in Flood Zone 1 (no risk).

- Gosport and New Forest have one site allocation each within the flood plain.

- Portsmouth and Southampton face the most significant flood risk issues and have significant areas of development in the flood plain (approximately 11,000 houses in Flood Zone 3).

Current Policy Framework

- For Portsmouth the shoreline management plan identifies that many of these frontages are already defended (where necessary) and as such, the developments in themselves may not directly require new capital schemes to protect them but they will require enhanced protection measures. However these developments will be increasing the reliance on existing flood defence infrastructure and this has significant maintenance and renewal, cost implications to combat sea level rise which needs to be carefully considered

- There is considerable development proposed, around the reclaimed Itchen and Solent coastal areas of Southampton. These areas do not have existing publicly owned formal defences. Significant land within these areas, and existing property around Ocean Village, Northam and other areas in Southampton adjacent to the River Itchen will be at increasing risk as sea level rises. This is likely to result in the need for flood defences around Southampton to protect existing and new development. The new developments will affect the decision-making for the type and scale of the sea defences required.

- For areas such as Portsmouth where there are existing defences the situation is slightly different. Improvements and maintenance of existing defences may not be undertaken in line with the PUSH development programme. There may therefore be a need for developments to provide funds to bring forward such improvements or maintenance. There may also be the need for such defences to be in place prior to development being permitted.

- The pressure for development in the flood plain in Southampton and Portsmouth, combined with the very variable nature and presence of existing sea defences and the increased risk posed by ongoing sea-level rise gives rise to a range of issues that will require a high degree of commitment and co-operation between the EA and the relevant PUSH authorities to resolve.

Other sources of flooding

- There is an urgent need to understand the programme of implementation of the policies and options promoted through the existing flood risk management process to understand the current and future risk to communities.

- The flood risk strategy for Portsea Island needs to be reviewed to understand the implications of the proposed developments and a flood risk strategy (taking account of the proposed development in Southampton) needs to be undertaken.

- There are opportunities through PPS25 for LPAs and communities to increase the standard of protection from that funded by Defra which is constrained by strict benefit /cost rules linked to the value of the existing settlement and not to the added value which growth and regeneration brings.

- Other sources of flooding need to be considered during the development of masterplans and development schemes for new development. Current information on these sources of flooding, including groundwater flooding, surface water sewer flooding and overland flow flooding, cannot, at this stage, be used to rule out development in any area, as the physical processes that lead to these types of flooding are generally less understood than flooding from rivers or the sea. Further information is likely to become available regarding other sources of flooding as the recommendations of the Pitt Review are implemented and as modelling technologies, historic data records and general understanding improves.

- The management of surface water and groundwater flooding is disjointed and ad hoc. Responsibility is split between private individuals, local authorities and highway authorities, the Environment Agency, internal drainage boards and different infrastructure providers share some responsibility for existing systems.

- There is a critical need to improve the understanding of surface water and groundwater flooding through improved monitoring, research and coordinated planning and management, particularly the consequences for critical infrastructure.

- Reducing infiltration to the sewerage network would provide benefits to the wastewater infrastructure by increasing capacity; however this can result in increasing surface and groundwater flood risk. The integration of wastewater planning into the wider water management process is likely to result in benefits for both wastewater and surface water management.

Climate Change

- Climate change will result in increasing pressure on water infrastructure as sea level rise increases levels of inundation but also increases indirect flooding through increased tide-locking of CSO and other critical infrastructure.

7.3 Recommendations

7.3.1 Water Supply

Although there is a high degree of confidence that sufficient water can be made available to meet the demands of new housing, this will require the development of a number of major new resources. Furthermore, there is much less certainty with regard to quite how much new resource will be required, when it will be required and

which schemes will be developed by the two Water Companies to provide it. This obviously has knock-on impacts on questions such as cost, funding routes and provision for planning requirements. The period leading up to the publication of the Final WRMPs may also see a number of adjustments to Company plans, either in response to consultation or regulatory requirements.

In view of this, the following recommendations are made:

No additional growth should be planned beyond that already proposed

PUSH should be very cautious before accepting any growth targets over and above the levels currently proposed. This report has illustrated that in order to address the risks posed to the water environment, the reductions in current abstraction licences proposed by the Environment Agency will create a significant deficit in the supply demand balance even without any growth in population and housing. Although viable solutions are potentially available, a wide range of issues will have to be resolved before they can be implemented. This does not appear to be the context in which to add still further to the strain on the supply demand balance.

Respond to the consultation on the Water Company Draft WRMPs

PUSH cannot have a strategy for water supply that is separate from that of the two Companies responsible for water supply. In their draft WRMPs, the companies have outlined their preferred strategies for maintaining the supply demand balance over the period to 2035. Whilst this Study has drawn on many components of the Company strategies, the Draft WRMPs are now published for consultation and PUSH should make the most of the opportunity to influence the Final Plans.

The Agency and Water Companies continue to explore the most cost-effective and sustainable solutions to the SD deficit

The scale of the potential impacts of the sustainability reductions on the SD balance are without precedent. There are many issues such as the phasing of licence changes, the frequency with which alternative resources will be required (and thus the nature of the potential solutions), and the structure and complexity of new licences which have yet to be fully understood and the choices made in regard to these issues may significantly alter the cost implications of the changes without an equivalent impact on the environmental benefits derived. It is therefore very important that every effort is made by the Agency and the Water Companies to understand these issues before final plans are put in place.

Creation of a PUSH Water Supply Forum

Following on from the previous point, in addition to responding to the consultation on the Draft WRMPs, it is recommended that a Forum is set up to facilitate effective cooperation and regular communication between the PUSH Authorities, the EA and two Water Companies as they seek to implement their respective plans. Some of the specific objectives of the Forum would be to ensure that:

- The PUSH Authorities are fully aware of the Water Company plans for meeting projected demands, in particular any changes that occur over the next 12 months between the Draft and Final WRMPs.

- Any planning-related issues arising from the plans for new water resources are being captured by the two Companies.

- PUSH can keep track of progress on issues such as metering and leakage and updates on how this may impact future demand projections.

- PUSH is aware of what it can do to help the two Water Companies secure the necessary supplies to meet forecast demands. This may involve some lobbying of Ofwat and Defra to ensure that the structure of the industry and/or the water resource planning process itself do not become obstacles to ensuring that the best regional solutions are implemented.

- PUSH is aware of the potential implications of the Water Framework Directive on water supply issues as and when they become apparent. Draft River Basin Plans are due to be published by the EA by the end of 2008 and these should be reviewed in the light of the proposed developments across the PUSH area.

It is suggested that the Forum convenes either shortly before or shortly after the publication of the Final WRMPs. The frequency of subsequent meetings can then be agreed but it is not envisaged that it would need to be more often than once or at most twice a year. The requirement for the Forum may not extend beyond the next 4-5 years, by which time some of the current uncertainty should have been resolved.

Continue to drive the Sustainable Housing Agenda

Whilst the potential to reduce the per capita consumption of water will ultimately depend on behavioural changes of water users, creating the conditions that support and encourage such behavioural changes is vital. Universal compulsory metering will not on its own reduce water usage, but charging customers for the amount of water they use will cause many to consider much more carefully how much water they are using. Similarly, designing a house in accordance with the Code for Sustainable Homes provides a context for reduced water usage, even if the savings are not as great as the design objectives.

An important "unknown" in this context is how the widespread impact of compulsory metering will affect the market for more efficient appliances. The drive for energy efficiency and low carbon usage is helping to sustain a wider drive for sustainable resource use, including water, and it is therefore quite possible that greater changes in water use behaviour may be achieved than are currently accounted for in the draft WRMPs. The important of keeping these issues high on the public agenda should not be under-estimated and this is an area in which Hampshire County Council have taken a lead with some success in recent years. The recommendation is that these efforts continue even if the benefits in terms of water use are not always immediate and tangible.

How aspects of this might translate into a policy framework is dealt with separately in the "Planning and Water Management" section.

7.3.2 Management of Wastewater

No additional growth should be planned beyond that already proposed

As with the Water Supply side, the Wastewater aspects of this Study suggest that PUSH should be very cautious before accepting any growth targets over and above the levels currently proposed. There are uncertainties in each of the areas of environmental capacity, treatment capability and current and future discharge volumes and although this report indicates that the proposed growth can be accommodated in a sufficiently sustainable manner, it would be unwise to plan any further growth until the assumptions made in this assessment have been thoroughly tested and verified.

Planning requirements at additional works should be clarified

Although this report has concluded that major new wastewater treatment infrastructure is unlikely to be required, the PUSH Authorities and Southern Water do need to ensure that where existing works need to be upgraded to fulfil the EA's proposed consents, appropriate provision for land allocation and planning requirements have been made. Whilst this may be achieved through a series of meetings with individual Local Authorities or through a combined meeting, it is recommended that the discussions are held prior to the completion of Southern Water's Final Business Plan in 2009.

Verification of the forecasting approach used in this Report

The importance of the approach taken to forecasting the growth in wastewater discharges has been well illustrated in this report. It is therefore recommended that some verification of the approach taken to the forecast used in this work is

undertaken by Southern Water and the Agency and steps are taken to ensure greater integration between household demand forecasts and wastewater forecasts. The EA may wish to include this as a component of its Regional Water Quality Study, which is due to commence in May 2008.

Improvement of Wastewater Flow Monitoring

The importance of effective monitoring data is similarly apparent. This applies to both the monitoring of flows and treatment works performance. Unfortunately, the Peel Common works, which will take a major share of the wastewater from new households, is of greatest concern in terms of capacity and also has the least robust flow monitoring data. This situation needs to be addressed as a matter of urgency, so that in 3-4 years time a much more robust reassessment of current discharges and future capacity can be undertaken. This will also enable a much better understanding of what BAT (Best Available Technology) actually represents in this context. This issue is already the subject of ongoing discussions between the EA and Southern Water.

Identify where reductions in sewer infiltration may be most viable

Reducing infiltration to sewers appears to be one of the most obvious ways of reducing the potential pressure on consented DWFs. The situation is complex, with Southern Water expressing concerns about feasibility, costs and the potential liabilities associated with any consequential flooding in areas where the sewer has effectively been acting as a land drain. Given the scale of infiltration, however, the issue does appear to warrant a more detailed investigation, particularly in those wastewater catchments such as Peel Common where the benefits of reduced infiltration may potentially outweigh the costs. It is recommended that a joint PUSH/EA/Southern Water study is commissioned to assess this issue. A budget of £100k is suggested, including a £25k scoping stage.

Identify the benefits of securing reductions in diffuse pollution and the areas of greatest need and/or viability

Southern Water's concerns about reducing infiltration are matched by a similar range of concerns expressed by the EA and others with regard to reducing diffuse pollution. As it stands, the benefits of improved removal of P from works such as Chickenhall may not be realised if similar resources are not directed at reducing diffuse pollution. As for the issue of infiltration, the scale of the diffuse pollution problem, and its knock-on effects on the "environmental capacity" of the area, is such that it warrants more detailed investigation at a local scale. Again, it is recommended that a joint PUSH/EA/Southern Water study is commissioned to assess this issue. A budget of £75k is suggested, including a £15k scoping stage.

Investigation of WFD implications

Since inception of the PUSH study the EA have commissioned an additional study to examine the implications of the WFD requirements on effluent discharge quality for a range of works including the following in the PUSH region: Chickenhall, Bursledon, Thornham, Budds Farm, Peel Common/Woolston and Millbrook. As such no additional work is recommended for PUSH to pursue in this area at this point in time. As the potential implications of the WFD become clearer there may need to be additional investigations to confirm the findings of the EA study.

7.3.3 Flood Risk Management

Minimise development in flood risk areas

Whilst the construction of improved or new flood defences may in the first instance appear to be an effective solution to protecting new developments from flooding, the long term sustainability of new defences is questionable in light of predicted sea level rise and increases in fluvial flows. An option which places new housing development and people at risk of flooding, albeit a residual risk, cannot be considered an effective way to manage flood risk across an area as large as the PUSH sub-region. PPS1 and PPS25 primarily recommend a policy of avoidance from hazardous areas of flooding. The first option, therefore, should be and has been a non structural approach through the relocation of sensitive development to areas with a lower probability of flooding.

An important decision facing the PUSH authorities is how far they should go to seek alternative, lower risk locations, for their current sites, before considering site allocations in areas at risk of flooding. A balance needs to be found between safety from flooding (including the long term costs of maintaining safety in the face of sea level rise) and the economic drivers for regeneration and development within existing urban areas, particularly with reference to PUSH's strategic policy of 'Cities First'.

Portsmouth and Southampton should undertake a more detailed assessment of the likelihood and consequence of existing defences overtopping or breaching to improve their understanding of potential flood hazard and risks across their administrative area. For Southampton, a review of the increasing risk and consequences of flood risk with sea level rise should be undertaken for existing and new developments (which are currently not at risk and not defended). A flood risk management strategy should be produced for Southampton, using holistic flood risk management measures such as spatial planning, urban design, resilience and infrastructure solutions.

Improved planning for development in flood risk areas

The PUSH authorities have reviewed their apportionment across the Local Authorities in the light of the existing SFRA. In addition to the proposed housing in the coastal floodplain, it appears from the SE Plan that there could also be a significant increase in the business, commercial and retail use of the coastal floodplain to meet the planned growth, regeneration and economic development. This has not been taken into account so far and it is recommended that this is fully included in future assessments.

It is Government, EA and Local Authority policy to ensure new development in the floodplain does not increase flood risks and an Integrated Regional Framework objective of the draft SE Plan, objective 2, is:

"To reduce the risk of flooding and the resulting detriment to public wellbeing, the economy and the environment"

The PUSH authorities therefore need to work with the EA to ensure that where proposed developments are to be sited in areas at risk of flooding, they are planned effectively and use a wide variety of measures through the planning process to ensure that the new developments are safe and sustainable. The measures need to be integrated and agreed, designed, funded, delivered, operated, resourced and

renewed for the lifetime of the development. To ensure their effectiveness for the life-time of the developments, they need to be planned well ahead of time to ensure they can be put in place in place before or in parallel with the planned development.

These measures could include where appropriate:

- Local Development Framework flood risk mitigation and adaptation policy;
- Infrastructure planning
- Innovative master-planning;
- A Local Development Framework contributions policy (if appropriate);
- Contribution to flood defences (where appropriate);
- Urban, Buildings, Highways and Services design
- Land raising;
- Flood resilient buildings;
- Flood warning;
- Emergency response;
- Post emergency after care; and
- Social care.
- Surface Water Management Planning

Seeking the protection of PUSH communities to the existing Standard of Protection

The EiP Panel stated that "the South Hampshire sub-regional strategy is based on the assumption that the developed coast will continue to be defended in its existing position". Section 5.4.2 has outlined the effectiveness of the existing flood risk management planning process for existing communities but it has *significant limitations* in implementing the options identified. This leaves *existing* communities vulnerable to flooding where the residual life of defences deteriorates and standards of protection reduce as sea levels rise. The limitations on Government funding mean that to ensure the security of existing communities to the existing agreed standard of protection, additional funding is likely to be required to support the flood risk management process.

It is recommended that the PUSH authorities work with the EA to:

- Test the validity of the assumption that the developed coast will continue to be protected in its existing position. The review should identify the uncertainties associated with the management of existing infrastructure and the spatial planning delivery risks associated with the PUSH proposals. The RSS and LDF process can then help to manage these risks.

- Audit the current coastal and river flood risk management strategies to identify the likely programme of implementation for the preferred schemes and remedial measures under the current funding arrangements.

- Resolve the issue of Exception Testing for those areas where housing allocations fall in Flood Zones 2 or 3.

- Undertake an analysis of the residual risk to existing communities and the development planned in the SE Plan from the delay in implementation of the strategies.

- Integrate the spatial-planning and delivery processes with the flood risk management planning processes and undertake a critical path analysis to understand the key actions and time-frames which are necessary to deliver the sub regional strategy.

Increasing the Standard of Protection for new and existing communities

The planned regeneration and growth in the PUSH area is likely to rely on significant development in the coastal flood plain (not just housing), particularly in areas of Portsmouth and Southampton. There is a need to consider where the different types of development should or should not be located, what standard of flood protection they merit and what measures are needed to make them safe and sustainable in the face of sea level rise.

As indicated in Section 5.1.2 above, Treasury funding will 'remedy' only existing development and communities but will not fund the protection of new development. In addition, the current economic rules, in effect, put an economic ceiling on the standard of protection (SoP) which Operating Authorities can provide for these existing settlements. The decision-making process usually results in SoP levels to a maximum 1:100 year event for river flooding and a maximum 1:200 year event for coastal flooding. Smaller communities may be protected to a lower standard than this due to the small economic returns arising from protecting to this higher standard.

PPS25 does provide the opportunity for LPAs to use their powers to seek protection greater than this 'remedial' Government SoP. However, this would need to be justified and arrangements for its funding and implementation would have to be sought outside of the current funding arrangements.

There are considerable opportunities for PUSH authorities in their roles as LPAs and Operating Authorities to significantly influence the flood management process. Using the existing delivery mechanisms; the development, promotion and funding of a higher SoP for PUSH communities may be achievable.

To do this, the PUSH authorities will need to work closely with the EA and Operating Authorities in the planning and flood risk management planning processes to:

- Understand the condition, the standard of protection and residual life of the existing sea defences.

- Understand the programme for implementing the existing policies and options promoted through the current flood risk management process. This will enable a clear understanding of the current and future risk to the PUSH communities.

- Identify what enhanced 'sustainable development standard' of protection is needed to safeguard the planned growth, regeneration and economic development which relies on the use of the coastal and river floodplains.
- Identify where there are opportunities for upgrading the existing SoP to the 'sustainable development standard'.
- Develop a critical path for the synchronisation of delivery of the appropriate flood risk management measures with new development and vice versa.
- Identify how the measures required for the 'sustainable development standard' can be funded and implemented.
- Integrate the EA and Operating Authorities flood risk management plans for existing settlements with the LPAs spatial development plans.
- Plan contingency measures in accordance with PPS12

Reviewing and updating the SFRA

The PUSH stage 1 SFRA provided a snapshot of flood risk issues throughout the PUSH sub-region using flood risk, climate change and flood defence asset information available in 2007. The project also highlighted the number of gaps and limitations in the flood risk and asset data which is currently available across the sub region. The SFRA datasets were used in this assessment are likely to be updated, expanded or revised in the future. One option is therefore to ensure that both the SFRA and the IWMS are considered as live studies that are reviewed and updated at appropriate intervals to account for new information, so that they can continue to provide a sound basis for future spatial planning decisions.

A review of the housing allocations using the Stage 1 SFRA has been undertaken by PUSH which included discussion on the sequential and exception tests required under PPS25. It is likely that the EA will require more detailed evidence in support of the exception tests, in particular a more detailed understanding of the level of residual risk with the existing flood defences in place. This is likely to take the form of a more detailed Stage 2 SFRA. Further investigation and discussions between PUSH, the LA and Portsmouth and Southampton City Councils will be required to address this issue.

Currently, there is no guidance on the appropriate frequency for updating SFRA or IWMS studies. We would therefore recommend that updates are undertaken following significant spatial planning developments and revisions to key flood risk datasets and policy guidance or, as a minimum, every three to five years. It will be important, however to link any future updates to the timetables for future reviews of the sub-regional strategy and/or individual Local Development Documents. These plans need to be front-loaded, being based on a clear evidence base that will include the SFRA/IWMS.

Recording and Monitoring Strategy for surface water flooding

There is no coordinated mechanism for gathering information on surface water flooding and no datasets available to understand the scale and location of flooding. For example, the PUSH SFRA does not have sufficient information on surface or groundwater flooding to confidently identify risk areas. Data available was limited to

surface water flooding from SW infrastructure failure but there was no data available from non-main river, highways, groundwater or other flooding mechanisms.

As the Pitt Review identified, the management of surface water flooding is often ad hoc and undertaken by a range of operating authorities. To ensure that surface water across the PUSH region is managed in a sustainable manner that avoids unnecessary flood risk, it is recommended that the operating authorities within the PUSH sub region adopt a partnering approach to managing the surface water runoff from future development. A range of data sets relating to surface water is currently held by various operating authorities across the sub region. Integrating and sharing such data sets would help to develop a sound basis from which to develop strategies for future surface water management.

There is also a need for the development and management of a coordinated Recording and Monitoring Strategy to capture the nature, location, cause and extent of future surface and groundwater flood events.

Development of Surface Water Management Plans

This project has identified that surface water flood risk is an issue that is yet to be effectively management and this will become an increasing problem with climate change. The Government Consultation "Improving Surface Water Drainage" (2008) as promoted the establishment of Surface Water Management Plans (SWMP). The consultation paper has suggested that they will be the responsibility of individual LAs to ensure they are prepared, with EA playing an advisory or regulatory role for them.

It is recommended that PUSH take the lead in developing and promoting the establishment of surface water management plans. In support of the Plan development, the detailed data gathering exercise discussed above will be required to gain a thorough knowledge of the current problem and an assessment of the implications of climate change (and new developments).

To support this data collection (and the ongoing management required) a database of surface water flood events should be developed and kept up to date.

Development of Groundwater Management Plans

The SFRA has also highlighted the lack of information on inland groundwater flooding and a potential increase in coastal groundwater flooding due to sea level rise. A similar approach to surface water management plans could be development for the production of groundwater plans.

Review of critical infrastructure at risk of flooding

As discussed, there is also concern about the vulnerability of existing communities to flood risk. The 2007 flooding highlighted the vulnerability of our critical infrastructure to flooding and the serious and wide-spread implications of loss of key infrastructure. To improve the protection of existing communities from flooding, coordinated monitoring and data gathering is required and a database of vulnerable infrastructure developed to understand the risks now and over the next 100 years. Critical infrastructure should include wastewater and water resource infrastructure, emergency services (including fire stations, hospitals etc) and schools, libraries and other public buildings which may be used as emergency shelters.

Various organisations, including infrastructure and emergency service providers are currently assessing the vulnerability and risks to their own infrastructure. The PUSH authorities, either individually or collectively, could consider acting in a co-ordinating role to pull together the ongoing risk assessment work into a single area or sub-regional assessment of risk, identifying whether existing assets can be maintained or whether new facilities are required. This would be an invaluable tool for the individual local authorities LDFs, particularly feeding into their LDF Local Infrastructure Plans.

7.3.4 Planning and Water Management

The planning policy recommendations have been developed to provide the PUSH authorities with a toolbox of methods to influence the current regulatory system to provide more integrated water management. These recommendations are outlined under the following mechanisms:

- Lobbying and Responding to Consultations
- Developing sub-regional Policies and Guidance
- LDF Preparation by Individual Authorities
- Determination of Planning Applications
- Working with Partners
- Funding Infrastructure Provision
- Targeted Research

Lobbying and responding to consultations

The PUSH authorities already actively engage in lobbying Government and other agencies, submitting consultation responses on plans and strategies affecting the future development of South Hampshire. There is a clear need for this to continue as there are numerous forthcoming consultations relating to water management on which PUSH will wish to submit its views. The following opportunities have been identified to date:

- Government has already consulted and decided that the Code for Sustainable Homes should become Mandatory, assisting PUSH in seeking to meet its planned reductions in household water use. However, it would be appropriate for PUSH to lobby Government to seek a commitment that the standards in the Code become increasingly tight over time, and also to seek Government to require similar increases in efficiency in non-residential developments.

- The Government's recently published National Water Strategy Future Water identifies a series of Government proposals for changing the system for water management in England over the period to 2030. A number of the proposals are directly relevant to South Hampshire, and it would be appropriate for PUSH to respond to the document's publication and to support the measures it contains. There will be a series of subsequent consultations on detailed matters, including a review of Building Regulations to set a minimum standard for water efficiency, a review of the Water Supply (Water Fitting Regulations) 1999, and proposals to withdraw permitted development rights for the use of non-porous surfaces in

front gardens. PUSH should consider formally responding to these and other detailed consultations.

- Alongside the National Water Strategy the Government is consulting on proposals to improve Surface Water Drainage. This has been identified as a critical issue for some areas within PUSH, including Portsmouth where large areas are at risk of surface water flooding. Essentially the Government is consulting on proposals for Surface Water Management Plans; on proposals to encourage the wider take up of SUDS, and a review of the Right to Connect to Public Sewers that current exists. PUSH should take the opportunity to respond to this consultation, identifying the potential benefits to South Hampshire from the Government's proposals.

- Government is also currently consulting on proposals for the Community Infrastructure Levy. Once finalised this will be a key mechanism to secure financial contributions towards future infrastructure provision in South Hampshire, including for water management infrastructure.

- PUSH should consider responding to the forthcoming WRMP consultations by both Southern Water and Portsmouth Water. It is recommended that it should seek the Government's support for an aggressive policy of compulsory metering across South Hampshire, and the adoption of a tariff based approach to paying for future water usage once meter penetration is achieved.

- In relation to the promotion of water efficiency, whilst there is much that can be achieved locally, working closely with the Water Companies, PUSH could also consider lobbying Government to secure a national water efficiency education and awareness campaign in the national and local media, and through schools and colleges. PUSH should also consider lobbying Government to improve manufacturing standards to improve water efficiency in white gods.

Developing sub-regional policies and guidance

PUSH has a clear role in co-ordinating policy development and sharing good practice across the sub-region. This includes the development of consistent policy approaches, and undertaking sub-regional research studies to provide the evidence base for subsequent individual LDFs and planning applications. Arising from this Study, the following areas of potential further work have been identified:

- The wording of the Policy Framework seeks to promote sustainable forms of development, with a consistent approach to be taken across the PUSH area. It is considered that the Policy wording relating to water management could potentially go even further, particularly in relation to water demand management and water neutrality in major developments. A draft suggested Policy is provided below.

- Leading on from any SWMP the PUSH authorities could, in close liaison with the EA, Water Companies, highways authorities and developers, develop detailed guidance on the implementation of SUDS within South Hampshire. This guidance could support a common policy approach within LDFs, suggested wording is provided below.

- The flooding events in England during 2007 highlighted the vulnerability of critical utility and service infrastructure. Alongside the consideration of infrastructure requirements, PUSH could develop Policy wording to provide the basis for

facilitating the delivery of necessary infrastructure, suggested wording for which is included later in this report. This Policy could be incorporated within individual LDFs.

- The Government is to publish its Good Practice Companion Guide to PPS25 in Spring 2008. Depending on the content of this document, PUSH may wish to consider developing, in close liaison with the EA, guidance to individual planning authorities on a consistent approach to the application of the PPS25 Sequential Test and Exception Test to development proposals on previously developed land in flood risk areas. This is considered to be particularly relevant to Portsmouth and other urban areas identified at risk of flooding.

Draft Policy Text 1: To promote incorporation of water efficiency and demand management measures in new developments.

The PUSH sustainability policy framework identifies a consistent policy approach to be taken across the PUSH area to the promotion of sustainable forms of development. In relation to water efficiency and demand management, it is considered that the Policy wording could potentially go even further.

The following Policy wording is suggested for inclusion within relevant DPD, to provide the basis for promoting water efficiency measures in new development proposals. It is recognised that the PUSH authorities are in the process of drafting guidance on sustainability policies, and that the following policy wording may need to be amended as a result.

The Council will require development proposals to be designed to meet high standards of water efficiency. Planning applications for development will be approved, where:

residential development is designed to achieve at least the following level of credits for internal water use in the Code for Sustainable Homes:

- *for applications submitted prior to 31st December 2012, 3 credits (equivalent to 105l/p/d)*
- *for applications submitted prior to 31st December 2015, 4 credits (equivalent to 90l/p/d)*
- *for applications submitted after 1st January 2016, 5 credits (equivalent to 80l/p/d)*

additionally, applications for residential development submitted after 1 January 2013 will be required to achieve 1 credit for external water use

mixed use and non-residential developments with a total floor space over 500 sqm are designed to achieve at least the following level of credits for internal and external water use in BREEAM

- *for applications submitted prior to 31st December 2012, 4 credits*
- *for applications submitted prior to 31st December 2015, 5 credits*
- *for applications submitted after 1st January 2016, 6 credits*

applications for development proposals exceeding 250 dwellings or 5,000sqm of mixed use or non-residential development that are submitted after 1 January 2016 will be required to be water neutral. Water neutrality will be achieved through the incorporation of on site water efficiency measures and/or the implementation of a programme of retro-fitting of water efficiency measures in residential and non-residential properties within the local authority area.

Draft Policy Text 2: To promote SUDS, Surface Water Management and Groundwater Protection

The following Policy wording is suggested for inclusion within relevant DPD, to provide the basis for promoting SUDS within new development proposals. The Policy wording may need to be amended, depending on the eventual approach taken to Surface Water Management Plans in South Hampshire, and any policy recommendations arising from that work. Although it will remain largely unaltered, the approach to Groundwater Protection and the importance of the EA's Groundwater Protection Policy should be re-emphasised. SUDS are only appropriate outside groundwater source protection zone 1 (or greater than 50m from any other potable source) and where they will not cause pollution of groundwater due to leaching of ground contamination into the water environment. Of particular importance in this regard is the Fareham SDA, the location of which coincides with an area of high groundwater vulnerability and this will require specific measures to be taken or avoided in accordance with EA requirements.

The Council will require development proposals to demonstrate avoidance, reduction and management of unacceptable harm to natural watercourses, groundwater and the risk of flooding arising from systems to manage surface water from the proposed development. Information on these measures must be submitted with an application and include detailed proposals for the long term maintenance of proposed surface water management systems.

The Council will require that for applications on previously developed sites, all developments over 500m^2 and residential developments proposing either 10 dwellings or more or having an area of 0.5 hectares or more, should demonstrate through calculations that the rate of run-off of surface water from the site is less than the conditions before development.

The Council will require that for applications on greenfield sites, all developments over 500m^2 and residential developments proposing either 10 dwellings or more or having an area of 0.5 hectares or more should demonstrate through calculations that the rate of run-off of surface water from the site will be equal to or less than the original conditions before development.

Calculations should take account of the unavoidable climate change anticipated in the locality over the lifetime of the development. Best practice design of SUDS will follow a hierarchy from control at source and infiltration, to a range of management features including; Permeable surfaces; Filter drains/strips; Basins, ponds and wetlands; Soakaways; Infiltration trenches; Rainwater re-use; and Green Roofs.

Further guidance on sustainable drainage systems will be included in a SPD.

Draft Policy Text 3: To facilitate the provision of necessary water management infrastructure

The following Policy wording is suggested for inclusion within relevant DPD, to provide the basis for the subsequent determination of planning applications for new infrastructure. The Policy wording would need to be amended to reflect the DPD that it sits within, i.e. reference to waste water treatment would only be appropriate in a Waste DPD.

Planning applications for water management infrastructure will be permitted on sites within and outside exiting built-up areas, provided:

- *the infrastructure is either required to meet an existing need or a need that is reasonably expected to arise during the Plan period; and*
- *the infrastructure is located and designed so as to minimise its impact on the environment, having regard to the locational and operational requirements of the infrastructure proposed; and*

Where infrastructure is proposed outside existing built-up areas, the Applicant should demonstrate that a sequential approach has been adopted to the identification of the site, having regard to the locational requirements of the infrastructure proposed, considering:

- *firstly, available sites within the built-up area;*
- *secondly, available previously developed sites outside built-up areas; and*
- *finally, undeveloped sites outside built-up areas*

The term water management infrastructure is defined as the provision of water supply and wastewater treatment infrastructure, and infrastructure designed to mitigate the risk of surface water, fluvial or tidal flooding.

Draft Policy Text 4: To ensure sufficient water management infrastructure exists, or can be made available to serve new development

The following Policy wording is suggested for inclusion within relevant DPD, to provide the basis for the determination of planning applications with potential implications for infrastructure capacity.

Planning permission will be granted for developments provided that:

- *sufficient water supply, surface water drainage, foul drainage and sewage treatment capacity already exist; or*
- *additional capacity will be provided in time to serve any individual phase of the development without unacceptably reducing the level of service to existing users, or causing harm to the environment.*

The Council will seek to ensure that there is adequate water supply, surface water drainage, foul drainage and sewage treatment capacity to serve all new developments. Developers will be expected to demonstrate that there is adequate capacity both on and off site to service the development, through the submission of appropriate information in support of their planning application. In some circumstances this may make it necessary for developers to arrange for appropriate studies to ascertain whether the proposed development will lead to the overloading of existing infrastructure.

When there is a capacity problem and improvements in off-site infrastructure are not programmed, developers will be expected to requisition or otherwise fund infrastructure improvements. Planning conditions and section 106 agreements may be necessary to accommodate this process. These will include phasing arrangements if appropriate.

LDF preparation by individual authorities

Working within the context of the policies in the South East Plan, and taking into account any sub-regional policy approaches and guidance developed by PUSH, it remains the responsibilities of the individual planning authorities to prepare their own LDFs. The preceding section has sought to identify a series of common approaches that could be developed across the PUSH area. Building on these, it is critical that:

- Individual Local Development Documents allocate specific areas of land identified as being required for water management infrastructure, with the LPAs working closely with the infrastructure providers and EA in their identification and allocation. It is important that land is allocated for necessary development, including any necessary as replacements for current facilities vulnerable to flooding. This infrastructure may need to be provided in a different local authority area from the development to which it relates, emphasising the need for collaborative working amongst the PUSH authorities and their partner organisations;

- LDF policies and proposals are flexible to accommodate future changes to infrastructure requirements that could arise from climate change or tighter environmental legislation and constraints. Future changes to abstraction licenses or discharge consents may necessitate additional treatment processes to be accommodated within already constrained utility infrastructure sites. Potential areas for expansion could be identified within LDFs, although it is accepted that the uncertainty over the timing or specific need for such expansion land may give rise to questions of Soundness under the current LDF system;

- Individual Local Development Documents include policies that facilitate the delivery of necessary water management infrastructure. These are considered to be most likely to be criteria based policies, including the tests to be met for proposals to be acceptable within the terms of the Policy;

- Individual Local Development Documents include policies to require and promote sustainable urban drainage systems, consistent with existing and emerging national guidance, any SWMPs, and with any sub-regional PUSH policy approaches that have been developed;

- LPAs consider the potential contribution that new residential, employment or other development may make towards meeting wider water management objectives. In considering potential allocations of land for new development, locations that would secure additional tidal, fluvial or surface water flood infrastructure could be selected, benefiting existing communities through improved flood protection.

- In identifying areas of land for new development the LPAs seek advice from infrastructure providers including the Water Companies, so as to ensure that new residential and other development does not take place in locations that would inhibit the operation of existing utility sites and facilities, or any future extensions to them. This is particularly important in relation to the potential sitting of residential or other sensitive development in proximity to wastewater treatment works.

Determination of Planning Applications

The determination of individual planning applications remains the responsibility of the individual planning authorities, with PUSH automatically being consulted on "strategically important sites". In order to promote sustainable water management within South Hampshire, it is considered important that:

- PUSH ought to be made a consultee on a wider range of planning applications than its current remit in relation to strategically important sites. There is considerable merit in extending its role to consultations on infrastructure proposals of wider than local significance.

- Consideration is given to making Water Companies automatic consultees on planning applications with potential implications for their networks and infrastructure. This should happen within the current development control systems that are in place, although we can see merit in agreement being reached with the respective Water Companies on the type of applications and/or locations in which they would wish to be consulted. This may also provide a mechanism for establishing standard consultation responses for applications that do not raise significant concerns or the Companies.

- All parties make maximum use of the opportunity to engage in meaningful discussions on development proposals at pre-application stage. LPAs, the Water Companies and the EA should all commit sufficient resources through the pre-application process to ensure that adequate consideration is given to infrastructure implications of new development before applications are submitted. Consideration could also be given to adding an additional requirement onto the local lists associated with the standard planning application form 1APP, for an Infrastructure Statement to be submitted with all qualifying applications identifying the existing infrastructure capacity and how the proposed development will impact on this. For strategic development proposals, including for significant water management infrastructure schemes, pre-application engagement with SEERA is also recommended as SEERA is a statutory consultee on strategic planning applications.

- Individual LPAs should give consideration to the provision of training or workshop sessions for Councillors, planning officers, agents and developers on the issues relating to water management infrastructure that are identified in this report. This should include notifying applicants and agents of any new guidance or policies that may be developed in relation to water management, highlighting the particular requirements that will need to be met within the development control process, for example in relation to SUDS.

Working with partners

The importance of partnership working cannot be understated in relation to water management infrastructure, particularly given the complex interrelationship between planning and other systems of regulation, and the number of separate organisations involved in the processes. PUSH provides a key mechanism for bringing together the various organisations and co-ordinating water management infrastructure provision.

- In this co-ordinator role, PUSH could consider maintaining a central "forward plan" of emerging plans and strategies being prepared by the PUSH authorities and the various partner organisations. Web-based, this could be a central source of information and act as an early-warning system for forthcoming consultations

on key documents. This could also usefully include emerging plans and strategies for areas adjoining the sub-region that have the potential to affect the PUSH area, or be affected by it.

- With the agreement of the PUSH authorities, PUSH could also potentially act as a single sub-regional consultee on emerging plans and strategies, potentially removing the need for each PUSH authority to individually respond to consultations.

- Additionally, a written concordat or agreement could be prepared on the levels of engagement that the organisations will have in each others plans and strategies, identifying including levels of information to be shared, the timing of responses etc.

- In relation to water efficiency and flood risk management, it is considered that PUSH could work with the Water Companies, EA and individual local authorities to develop a pack of information to be delivered to each household and non-domestic property in South Hampshire. This pack could contain educational information promoting water efficiency, and also alerting residents and business to what action they can take to minimise any potential flood risks. This literature could potentially be jointly funded by PUSH, local authorities, the EA and Water Companies.

Further recommendations on partnership working are outlined in the flood risk section.

Funding Infrastructure Provision

i) Developer Contributions/Infrastructure Levy

The forthcoming Community Infrastructure Levy (CIL) provides the mechanism by which the PUSH authorities could develop a mechanism for collecting and sharing developer contributions towards water management infrastructure on an area basis (site specific requirements remaining to be considered through s106). This would have the benefit of enabling the cumulative effects of small developments to be addressed, with the inclusion of mechanisms for sharing infrastructure costs across an area. Subject to the development of the detailed method of calculating contribution levels, contributions to high level water management infrastructure including water supply; wastewater treatment; and area based SUDS and flood management systems.

This is specifically relevant for flood management where proposed developments which include the provision of new flood mitigation measures, should generally be funded on the whole by the developer. Developers proposing new mitigation measures which solely benefit new development should not call on public resources as a means of funding. Where the infrastructure proposed provides benefit to the wider community, or where the proposed works include upgrade or replacement of existing defences or flood alleviation schemes, it may be reasonable for the developer to contribute a proportion of the funding in partnership with the operating authority responsible for the existing works. This may be especially relevant to LAs with a significant proportion of in-fill development in locations at risk such as Portsmouth, Gosport and Southampton. Further guidance on developer contribution for flood mitigation measure can be found in Annex G of PPS25.

Draft text of a policy which could require the contributions of developers through an Infrastructure Levy is provided below.

Draft Policy Text 5: Potential Water Management Infrastructure "Infrastructure Tax" policy

More detailed work will need to be undertaken on the level at which such a levy would be set, and the mechanisms for collecting and spending the revenue that is generated from it. It is difficult, at this stage, to recommend a precise Policy wording as the detailed proposals for the CIL are still subject to consultation. The following Policy wording is that adopted by Milton Keynes Council in its Adopted Local Plan, supplemented by a number of SPG/SPD documents.

The Council will seek to ensure that development proposals make adequate provision for both infrastructure and community facilities that directly relate to the proposed development. In making an assessment of such needs, it may be necessary to take into account the cumulative effect of a number of developments on the existing infrastructure of the surrounding area.

Developers will be expected to meet the full costs of facilities required as a consequence of development and contribute to resolving existing deficiencies where these would be made worse by the development.

ii) Forward Funding by PUSH

PUSH has already successfully secured Government funding for the investigation and implementation of a series of infrastructure schemes across South Hampshire. There is clear potential for PUSH to continue this approach, applying it to water management infrastructure in areas where funding could overcome potential barriers to new development. PUSH could also consider forward funding some of the water management infrastructure necessary for development to take place, recouping this money through subsequent s106 agreements. This approach could benefit both the large scale development proposals outlined in the South East Plan, and also specific areas where infrastructure constraints or flood risk is currently preventing development from taking place.

Targeted Research

This is an area where PUSH has already, and is continuing, to undertake a considerable body of work, including in relation to sustainability policies, Flood Risk, Green infrastructure, and the infrastructure requirements and delivery of the SDAs. These ongoing studies may give rise to additional site specific and general recommendations in relation to water management infrastructure. The following additional areas of research are recommended.

- PUSH has developed a Sustainability Policy Framework, building on Policy SH14 in the Draft South East Plan, for incorporation into individual LDFs. The Policy framework is to be considered by the PUSH Joint Committee in March 2008, with further work being undertaken on more detailed guidance relating to the Policy, potentially for future adoption as SPD. This could helpfully also act as a "**developer's handbook**", identifying detailed water management requirements to be provided on and off site if developments are to be acceptable

within the PUSH area, and identifying the roles and key contacts for organisations in the area.

- Linked to the implementation of the Sustainability Policy Framework is the need to assess the enforceability and enforcement options relating to the levels of water efficiency required to be provided in new homes. As currently worded, it is a requirement for the homes to meet the relevant standards when permitted. It is a well stated concern of the Water Companies that the homes can be designed to be water efficient, but it is not possible to force the residents to act in a water efficient manner, or to prevent them subsequently installing water inefficient equipment such as power showers. It is considered unlikely that the planning authorities will wish to take on the ongoing enforcement of water efficiency levels within new homes, although without any enforcement options being available, there is the risk that the levels of planned water efficiency will not actually be achieved. Research could be undertaken into this issue and guidance subsequently provided to the PUSH authorities.

8 References

A strategy for provision of environmental infrastructure to meet the needs of the South East Plan, 2007, Environment Agency/Jacobs

Climate Change and Demand for Water (CCDeW), 2003

Code for Sustainable Homes: The Technical Guide, 2008, Department for Communities and Local Government, RIBA Publishing, ISBN 9781859461945

Directing the Flow – Priorities for Future Water Policy, 2002, Defra

Draft Water Resource Management Plan, 2008, Portsmouth Water

East Hampshire Catchment Abstraction Management Strategy, 2003, Environment Agency

Future Water – The Government's water strategy for England, 2008, Defra, TSO Publications, ISBN 9780101731928

Guidance on Water Level Management Plans for European Sites, 2004, Defra

Improving Surface Water Drainage, Consultation to accompany proposals set out in the Government's Water Strategy, Future Water, 2008, Defra

New Forest Catchment Abstraction Management Strategy, 2008 Update, Environment Agency

Planning for a Sustainable Future: White Paper, 2007, HM Government, ISBN 9780101709422

Planning for Water Quality and Growth in the South East, 2006, Environment Agency

Planning Policy Statement 1 (PPS1): Delivering Sustainable Development, 2005, Office of the Deputy Prime Minister, HMSO, ISBN 9780117539396

Planning Policy Statement 9: Biodiversity and Geological Conservation, 2005, Office of the Deputy Prime Minister, HMSO, ISBN 9780117539549

Planning Policy Statement 12: Local Spatial Planning, 2008, Department of Communities and Local Government, TSO, ISBN: 978 0 11 753996 9

Planning Policy Statement 23: Planning and Pollution Control, 2004, Office for the Deputy Prime Minister, HMSO, ISBN 0 11 753927 9

Planning Policy Statement 25: Development and Flood Risk, 2006, Department of Communities and Local Government, TSO, ISBN 9780117539747

Planning Policy Statement: Planning and Climate Change - Supplement to Planning Policy Statement 1, 2007, Office of the Deputy Prime Minister, HMSO

PUSH Strategic Flood Risk Assessment, 2007, Atkins Ltd

Regional Planning Guidance for the South East (RPG9), 2001, Government Office for the South East, TSO, ISBN 0 11753562 1

Securing the Future – Delivering UK Sustainable Development Strategy, 2005, Defra, TSO Publications, ISBN 9780101646727

Test & Itchen Catchment Abstraction Management Strategy, 2008 Update, Environment Agency

The South East Plan, 2006, South East England Regional Assembly, ISNB 1-904664-21-0

Twenty Year Strategy for Managing Environmental Infrastructure in the South East, 2006, Environment Agency

Water for People and the Environment – Developing our Water Resource Strategy for England and Wales, 2007, Environment Agency

Water Industry Investment – Planning Considerations (Circular 17/91), 1991, Department for Environment, ISBN-10: 0117524522

Water Resource Management Plan: A consultation on our strategic plan for water resources, 2008, Southern Water

Water Services, Customers and the Community: A summary of Southern Water's Draft Business Plan for 2010 – 2015, 2008

Water Supply Services 2010 – 2015: An Overview of our Draft Business Plan, 2008, Portsmouth Water

9 Appendices

Appendix A: Review of Relevant Planning Policy and Guidance

National Guidance

Sustainable Development

Sustainable development is at the core of planning policy. The Government set out its latest objectives in early 2005 in 'Securing the Future – Delivering UK Sustainable Development Strategy', which builds on the 1999 strategy 'A Better Quality of Life', and stresses the importance of achieving integrated solutions to problems, rather than relying on trading off different potential benefits (economic, social and environmental) in decision making.

'Securing the Future' states the goal of sustainable development is "to enable all people throughout the world to satisfy their basic needs and enjoy a better quality of life, without compromising the quality of life for future generations". The goal is to be pursued "in an integrated way through a sustainable, innovative and productive economy that delivers high levels of employment; and a just society that promotes social inclusion, sustainable communities and personal wellbeing. This will be done in ways that protect and enhance the physical and natural environment, and use resources and energy as efficiently as possible" (Securing the Future, Chapter 1, Section 3).

This statement reflects a concern that in furthering the sustainability aims of 'A Better Quality of Life', agencies focused on those aims most relevant to them to the detriment of the other aspects of sustainable development.

'Securing the Future' therefore seeks to achieve the goal through five guiding principles: living within environmental limits; ensuring a strong, healthy and just society; achieving a sustainable economy; promoting good governance, and using sound science responsibly. Four priority areas identified for immediate action across the UK are:

- Sustainable consumption and production;
- Climate change and energy;
- Protecting natural resources and enhancing the environment, and
- Creating sustainable communities and a fairer world.

National Water Strategy

The Government's new Water Strategy will set out a coherent policy framework for water availability and quality and is due for publication later in the year. A number of workshops with key stakeholders, including Water Companies, have already been held. The overarching aim of the new Water Strategy is to improve standards of service and quality, through sustainable water management, whilst achieving a balance between environmental impacts, water quality of surface and ground waters, supply and demand, and social and economic effect. In launching the Water Strategy debate in April 2007, Ian Pearson, Minister for the Environment, called on Water

Companies to explore the potential for renewable energy in the water sector. Current Government policy is contained in the strategy 'Directing the Flow' published in 2002.

ENVIRONMENT AGENCY CONSULTATION PAPER – WATER FOR PEOPLE AND THE ENVIRONMENT JULY 2007

In 2001, the Environment Agency produced a document entitled "Water Resources for the Future: A Strategy for England and Wales". This has since been updated by the 2007 document *Water for People and the Environment*. The key principles stated in the document include:

- 'Improved quality of life'
- 'A better water environment'
- 'Sustainable development'
- 'Water is valued'
- 'Reduced impact on climate change'

DIRECTING THE FLOW – PRIORITIES FOR FUTURE WATER POLICY 2002

In 2002 the Government defined its strategic vision for water policy in England and identified how this fits into the broader Government objectives of sustainable development and other key policy areas, including land use planning. The strategy also identifies main future priorities and direction over the longer term, integrating other aspects of water policy such as the inland and coastal water environment, water resources and the water and sewerage industry, and looks ahead to the next 20 years. It notes that a strong water industry with a secure future is essential for delivering public policy objectives on water. To achieve this "*it is vital that the industry is able to maintain and renew infrastructure to ensure that services can continue to be provided to the high standards currently required*" as well as achieving higher environmental and drinking water standards (paragraph 4.71).

The aims and key points of this strategy are taken forward through the implementation of the EU Water Framework Directive and the Water Act 2003.

CIRCULAR 17/91 – WATER INDUSTRY INVESTMENT: PLANNING CONSIDERATIONS

Circular 17/91 provides guidance to planning authorities on the need to plan for the long-term requirements and the implications of the investment programme being undertaken by the water industry. Circular 17/91 notes that the sitting of water treatment works is constrained by the location of relevant infrastructure and that such considerations may be sufficient to outweigh planning objections which would otherwise give grounds for refusal for planning permission. The Circular also highlights the need to avoid delays in obtaining planning consent and the need to expedite works that meet Water Companies' obligations. The circular advises, "*in considering development proposals expeditiously, local planning authorities should nevertheless assess and weigh thoroughly all material considerations and any conflicting demands*".

PLANNING WHITE PAPER – PLANNING FOR A SUSTAINABLE FUTURE (MAY 2007): INFRASTRUCTURE PROPOSALS

The Planning White Paper identified proposals to improve the way that infrastructure proposals are dealt with. The Government proposes National Policy Statements (NPSs) on key infrastructure sectors including water, and the establishment of an Infrastructure Planning Commission to determine applications for such schemes.

The NPSs would set out how actual and projected capacity and demand are to be taken into account, and would be as locationally specific as appropriate in order to provide a clear framework for investment and planning decisions. The Government proposes NPSs should have a timeframe of 10-25 years, depending on their sector, with the Government considering whether they remain up to date or require a review "*at least every five years*".

Once NPSs are finalised they would be the primary consideration for the Infrastructure Planning Commission (IPC) in determining applications for development consent for nationally significant infrastructure projects. The IPC would approve applications consistent with the national statements unless "*adverse local consequences outweighed the benefits*".

CODE FOR SUSTAINABLE HOMES, INCLUDING THE TECHNICAL GUIDE (OCTOBER 2007)

The 'Code for Sustainable Homes Technical Guide' follows the 2006 document 'Code for Sustainable Homes: A step-change in sustainable home building practice' which introduced the idea of using a national standard for the design and construction of new homes in England. A rating system has been devised to monitor the efficiency of homes in terms of, for example, energy and water.

The system is designed around a credit-based system whereby the design of homes achieves certain credits for meeting predetermined standards across the different categories of design and construction factors. The credits are then added to identify the level within the code that is achieved for that home, with possible levels ranging from Level One (the lowest) to Level Six (the highest). As the credits are added together, homes can include very different efficiency measures and yet achieve the same Code for Sustainable Homes level or rating.

For the internal use of water in a home, up to five credits are available, depending on the level of water use that the home is designed for. The levels are:

- 1 credit - less than or equal to 120 litres per person per day (l/p/d)
- 2 credits - less than or equal to 110 l/p/d
- 3 credits - less than or equal to 105 l/p/d
- 4 credits - less than or equal to 90 l/p/d
- 5 credits - less than or equal to 80 l/p/d

For water use, as for other design factors, a home has to meet certain mandatory standards before it can attain a particular Code for Sustainable Homes Level. For internal water use, a level of 120l/p/d has to be achieved for Level One or Two; 105l/p/d for Level Three or Four; and 80l/p/d for Level Five or Six.

In addition to the (up to) five credits available in relation to internal water use identified above, an additional single credit is also available where a home includes a system to collect rainwater for internal or external irrigation. This is not a mandatory requirement.

The Government consulted during 2007 on making the Code mandatory for all new homes, and on whether the levels in the code should be made progressively tighter over time.

National Planning Policy Guidance

National planning policy guidance is found in Planning Policy Statements (PPSs) and Planning Policy Guidance notes (PPGs). Those considered to be of most relevance are:

Planning Policy Statement 1 (PPS1): Delivering Sustainable Development 2005

'Planning Policy Statement 1 (PPS1): Delivering Sustainable Development', which followed in 2005, establishes overarching policies for the delivery of sustainable development through the planning system. Planning policy statements may be material considerations in respect of decisions on individual planning applications.

PPS1 describes the important role of the planning system in achieving sustainable development and building sustainable communities. Key principles should be followed to ensure planning for sustainable development through development plans and planning applications.

The Government's four aims for sustainable development (at paragraph 4) are:

- Social progress which recognises the needs of everyone;
- Effective protection of the environment;
- The prudent use of natural resources, and
- The maintenance of high and stable levels of economic growth and employment.

Reflecting 'Securing the Future', PPS1 advises these aims should be pursued in an integrated way. Planning is encouraged to facilitate and promote sustainable and inclusive patterns of urban and rural development by:

"- making suitable land available for development in line with economic, social and environmental objectives to improve people's quality of life;
- contributing to sustainable economic development;
- protecting and enhancing the natural and historic environment, the quality and character of the countryside, and existing communities;
- ensuring high quality development through good and inclusive design, and the efficient use of resources; and
- ensuring that development supports existing communities and contributes to the creation of safe, sustainable, liveable and mixed communities with good access to jobs and key services for all members of the community" (paragraph 5).

The sustainable use of water resources is highlighted in PPS 1 (paragraph 22). Water supply facilities are items of essential community infrastructure that are needed to achieve social (health) and environmental objectives. PPS 1 points to the role of planning to ensure that these community benefits are delivered, but not at the expense of the quality of life for local communities.

PPS 1 advises that planning decisions should be based on the potential impacts on the environment of development proposals and that planning authorities should seek to enhance the environment as part of development proposals. Significant adverse impacts on the environment should be avoided (paragraphs 19 and 20).

Planning authorities are required, amongst other things, to recognise that economic development can deliver environmental and social benefits (paragraph 23(i)); and that all economies are subject to change, and to be sensitive to these changes and the implications for development and growth (paragraph 23(v)); ensure that

infrastructure and services are provided to support new and existing economic development and housing (paragraph 23 viii); and, identify opportunities for future investment to deliver economic objectives.

Planning Policy Statement: Planning and Climate Change, supplement to PPS1, 2007

The supplement to PPS1 'Planning and Climate Change' (2007), sets out how spatial planning should contribute to reducing emissions and stabilising climate change (mitigation) and take into account the unavoidable consequences (adaptation). It builds on Government Energy Policy and targets for reducing carbon emissions, including encouraging businesses to improve the efficiency with which they use energy; and stresses that climate change considerations need to be integrated with almost all areas of planning practice.

Although much attention has focused on the guidance on on-site renewable energy provision, the Statement requires LPAs to take various matters into account in both the preparation of their Development Plan Documents, and through the operation of the development control system. These include considering the desirability of avoiding development in areas with likely increased vulnerability to the effects of climate change, particularly where it is not viable to manage likely risks through suitable measures to provide resilience, and to bring forward adaptation options for existing development in likely vulnerable areas. The guidance also requires LPAs to take account of the capacity of existing and potential infrastructure (including for water supply, sewage and sewerage) to serve new developments in ways consistent with cutting carbon dioxide emissions.

The Statement enables LPAs to develop their own local sustainability standards that may, in response to local circumstances, go beyond any national standards that may exist – e.g. the Code for Sustainable Homes. LPAs are encouraged to consider the environmental performance of proposed developments and to take particular account of the climate that the development is likely to experience over its lifetime. LPAs should give priority to the use of SUDS, paying attention to the potential contribution of water harvesting from impermeable surfaces and to encourage layouts that accommodate waste water recycling. They should also consider the role that open space can play in providing opportunities for flood storage.

Planning Policy Statement 9: Biodiversity and Geological Conservation 2005

PPS 9 sets out planning policies on the protection of biodiversity and geological conservation through the planning system and identifies the key principles that regional planning bodies and local planning authorities should adhere to, to ensure that the potential impacts of planning decisions on biodiversity and geological conservation are fully considered. Water infrastructure provision has the potential to affect nature conservation sites and features, whether designated or not, The Statement notes that:

> "*(vi) The aim of planning decisions should be to prevent harm to biodiversity and geological conservation interests, local planning authorities will need to be satisfied that the development cannot reasonably be located on any alternative sites that would result in less or no harm. In the absence of any such alternatives, local planning authorities should ensure that, before planning permission is granted adequate mitigation measures are put in place. Where a planning decision would result in significant harm to biodiversity and geological*

interests which cannot be prevented or adequately mitigated against, appropriate compensation measures should be sought. If that significant harm cannot be prevented, adequately mitigated against, or compensated for, then planning permission should be refused" (para 1).

PPS 9 confirms a hierarchy of designated sites, from international, national and local sites, with the most important sites for biodiversity being those identified through international conventions and European Directives.

Circular 06/05 – Biodiversity and Geological Conservation supports PPS9, it gives guidance to local planning authorities on how to deal with proposals that may affect internationally and nationally designated sites, conservation habitats, and conservation of species protected by law, including the requirement for Appropriate Assessment under the Habitat Regulations.

PPS12 – Local Development Frameworks

The Statement identifies the important role that LDFs play in ensuring that adequate provision is made for development and infrastructure provision. LPAs need to ensure that their proposals for new residential and other development are based on realistic expectations of the future availability of infrastructure. Annex B to the Statement provides specific guidance on how to take account of infrastructure provision in preparing LDFs. It notes that LPAs must develop a strategic approach to infrastructure provision. This in turn enables the bodies that are responsible for infrastructure provision to plan on the basis of a clear picture of the future shape of the community. They can also contribute to the preparation of local development documents to influence the pattern of new development so that it takes account of likely infrastructure limitations and makes best use of existing infrastructure. The Statement reinforces the importance of these roles, noting as it does that the adequacy of infrastructure can be a material consideration at the development control stage.

The Government is consulting on potential changes to the system of LDF preparation, although the guidance relating to infrastructure in PPS12 is considered unlikely to be significantly changed. LPAs are, however, to be expected to prepare a Local Infrastructure Plan in support of their LDF. The Infrastructure Plan will have to clearly identify the infrastructure required to deliver the development proposals in the LDF, including considering issues of funding and timing of delivery.

Planning Policy Statement 23: Planning and Pollution Control 2004

Paragraph 10 of PPS 23 advises on the relationship between the separate but complementary systems of pollution and planning control, and states: "*Pollution control is concerned with preventing pollution through the use of measures to prohibit or limit the release of substances to the environment from different sources to the lowest practicable level. It also ensures that ambient air and water quality meets standards that guard against impacts to the environment and human health. The planning system controls the development and use of land in the public interest.... The planning system should focus on whether the development itself is an acceptable use of the land, and the impact of those uses, rather than the control of the processes or emissions themselves. Planning authorities should work on the assumption that the relevant pollution control regime will be properly applied and enforced*".

PPS 23 acknowledges the key role of the planning system in determining the location of development which may give rise to pollution and in ensuring that other uses and developments are not, as far as possible, affected by major existing or potential sources of pollution. PPS 23 advises "*any consideration of the quality of land, air or water and potential impacts arising from development, possibly leading to an impact on health, is capable of being a material planning consideration, in so far as it arises or may arise from any land use*" (paragraph 2).

PPS 23 advises that development control decisions can have a significant effect on the environment, and that close cooperation with the Environment Agency and/or pollution control authority and other relevant bodies is required to ensure that potential releases can be adequately regulated under the pollution control framework.

This is considered further in Appendix A to PPS 23, which refers to material considerations in determining planning applications where the effects of pollution consideration arise. Such material considerations are identified as the potential sensitivity of the area and the environmental benefits that the development might bring; the economic and wider social need for development (including potentially polluting development) such as the provision of a product or service; impacts on air and water quality; and, the need to limit and, where possible, reduce the adverse impact of light pollution, e.g. on local amenity, rural tranquillity and nature conservation, are all highlighted.

Planning Policy Statement 25: Development and Flood Risk 2006

The aims of PPS 25 on development and flood risk are to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk. Where new development is, exceptionally, necessary in such areas, planning policy aims to make it safe without increasing flood risk elsewhere and where possible, reducing flood risk overall. A sequential test need to be applied to direct development towards locations at lowest risk of flooding.

REGIONAL POLICY

RPG 9 – Regional Planning Guidance for the South East, 2001

Regional Planning Guidance for the South East (RPG 9), published in March 2001, now forms part of the statutory Development Plan. RPG 9 provides the regional framework for the preparation of local authority development plans and the spatial framework for other strategies and programmes in the south east. RPG 9 calls for local authorities to establish or maintain ongoing liaison with the Environment Agency and water statutory undertakers in order to ensure timely and sustainable provision of infrastructure for the supply of water and sewage treatment and discharge systems. Those RPG policies of particular relevance are:

Policy INF2: Water Cycle – Supply and Quality states that *'New development should be located and its implementation planned in such a way as to allow for sustainable provision of water services and enable timely investment in sewage treatment and discharge systems to maintain the appropriate standard of water quality. Techniques which improve water efficiency and minimise adverse impacts on water resources, on the quality, regime, and ecology of rivers, and on groundwater, should be encouraged. Redevelopment should identify and make provision for rectification of any legacy of contamination and drainage problems'.*

Policy Q6: Management and Provision of Services states that 'Health, education and other social considerations and infrastructure requirements need to be taken into account fully in development planning throughout the Region'. This Policy's supporting text goes on to describe the importance of partnership working between 'various agencies including local authorities, housing associations, service providers and the utilities such as Water Companies to ensure that infrastructure provision is adequate and maintained'.

South East Plan, A Clear Vision for the South East, Draft Plan for Submission to Government March 2006

Produced by the South East England Regional Assembly (SEERA), the South East Plan covers the period 2006 – 2026 and once approved, will replace RPG 9 as the Regional Spatial Strategy (RSS) and form part of the Development Plan framework. This draft guidance sets out Government Policy for the South East, establishes a framework for the region's development, and provides advice on the economy, the environment and land use, housing and transport. At this stage it is a material consideration in the determination of the planning applications.

A key theme of the draft South East Plan is sustainable natural resource management, ensuring greater efficiency in use of natural resources, the reduction of pollution and waste, and ensuring that features of importance are protected and enhanced, including wildlife and landscapes.

The Draft Plan includes a suite of cross cutting policies (Policies CC1 to CC4) that provide policy guidance on Climate Change, sustainable development, resource usage and sustainable design and construction. Policy CC5 gives specific guidance on infrastructure provision and the key linkages between this and the implementation of the other development proposals in the Plan. The Policy notes that the scale and pace of development in the region will depend on there being sufficient capacity in existing infrastructure to meet the area's current needs, and the provision of new infrastructure to meet the needs of new development. The Policy notes that the Assembly expects all relevant infrastructure providers and agencies to align their investment proposals to help deliver the proposals in the Plan. Equally, the Plan requires LPAs to help facilitate the delivery of necessary infrastructure both through the preparation of LDFs and the operation of the development control process.

Policy NRM1 provides guidance on a series of interrelated issues relating to Sustainable Water Resources and River Quality Management. Water supply is to be maintained through a twin track approach to water efficiency and water resource development to manage the balance between supply and demand. The Policy seeks to ensure that the rate of development broadly accords with infrastructure provision. Local authorities are required to work with Water Companies and the Environment Agency to identify infrastructure needs and allocate areas for and permit necessary infrastructure.

Policy NRM2 in the Draft Plan provides guidance on the provision of Strategic Water Resource Developments, including identifying that the proposed Havant Thicket Reservoir in Hampshire may be required to be operational over the Plan period (indicatively by 2020/21). Local Authorities are required to work with the Water Companies and EA in assisting in the timely delivery of schemes.

Policy NRM3 in the Draft Plan provides guidance on Sustainable Flood Risk Management, referring to the national guidance in PPS25. The Policy requires the incorporation of SUDS and other water retention and flood storage measures. It also

identifies the need to take account of increased sewage effluent flows on fluvial flood risk.

Policy NRM6 in the Draft Plan identifies the need for an integrated approach to be taken to shoreline management, planning for climate change and requiring a cross boundary and cross organisation joint approach to the issue.

The suite of policies relating to South Hampshire provide strategic guidance on a range of matters including the scale or housing and employment development that is proposed across the sub-region, the role of different town centres and the transport strategy that will be pursued. The Strategy for South Hampshire seeks to deliver improvements in the economic performance of the sub-region to at least the regional average. The target is to reach a Gross Value Added (GVA) of 3.5% per annum by 2026, the end date for the Plan.

The Strategy will be achieved through a combination of increased jobs and productivity. Significant new residential and employment development is proposed across the sub-region, with a focus on supporting and facilitating the regeneration and continued development of the two Cities. The Strategy is for "conditional managed growth", with the pace of growth and development "determined by and conditional on" the rate of infrastructure investment across the sub-region. Significant infrastructure improvements are required if the strategy is to be achieved.

The Draft South East Plan identifies the scale and location of housing for South Hampshire, requiring 80,000 new homes between 2006 and 2026. Up to 2016 it is proposed that the new housing allocation be delivered through the development of existing urban brownfield sites with urban extensions being utilised as and when required. Growth post 2016 is proposed to be managed within two identified strategic development areas (SDA) at Fareham and an area north east/north of Hedge End. These will be substantial new developments on greenfield sites with an anticipated 16,000 homes being constructed between 2016 and 2026. The scale and location of the proposed housing is set out under Policy SH12 is set out below.

Table 9.1 South Hampshire housing allocation by location and phasing between 2006 and 2026 distributed and phased as follows as set out under Policy SH12

	Total	Total	Total	Total	Total
	2006-11	2011-16	2016-21[3]	2021-26[3]	2006-26[3]
New Forest (Part)	600	500	219	219	1,538
Test Valley (Part)	650	1,375	1,375	510	3,910
Southampton	5,100	4,000	3,600	3,600	16,300
Eastleigh	3,000	2,300	891	892	7,083
North-east/North of Hedgend SDA	0	0	2,600	3,400	6,000
Winchester	1,400	3,800	1,044	495	6,739
Fareham	1,700	1,100	469	460	3,729
Fareham SDA	0	0	5,000	5,000	10,000

[3] Allocation in phases 2016-21 and 2021-26 are subject to uncertainty over realisation of urban potential, especially within Southampton and Portsmouth. The delivery of new housing will be monitored and managed separately within the south-west and south-east sub-areas of the sub-region, as indicated in the supporting text to Policy SH5. If that monitoring identifies a potential shortfall in the capacity of previously developed land to achieve the current forecast of dwellings, the respective sub-area will bring forward measures to secure the delivery of the housing target within the plan period.

Gosport	1,200	500	400	400	2,500
Portsmouth	4,650	2,950	3,550	3,550	14,700
East Hampshire (Part)	350	500	175	175	1,200
Havant	1,800	2,950	776	775	6,301
Total	**20,450**	**19,975**	**20,099**	**19,476**	**80,000**

At the Examination in Public (EiP) into the South East Plan, concerns were expressed by some participants over the deliverability of certain aspects of the South Hampshire proposals, including the scale, location and timing of the proposed 80,000 dwellings and the potential impacts of the proposed new commercial zones. Critically, the Appropriate Assessment of the South East Plan identified that existing water abstractions and effluent discharges had the potential to adversely affect European Sites, and that the housing distribution, phasing and overall figures for the planned rates of residential development in the South East Plan may need to be revisited. The Panel recommended the inclusion of a caveat in the wording of Policy SH12 to recognise that the "phasing and distribution" of the planned residential development may need to be reviewed following subsequent iterations of the Habitats Regulations Review of Consents.

Policy SH14 provides specific guidance on Environmental Sustainability. It is effectively a commitment on the part of the South Hampshire planning authorities to work together to co-ordinate the future development of South Hampshire so as to promote sustainable forms of development. It includes a commitment to planning infrastructure provision to make effective use of natural resources, and to manage the coastal zone in the light of climate change and the need to minimise the risk of flooding.

Draft Policy SH14 specifically requires new commercial and residential buildings to achieve at a minimum an equivalent rating to Ecohomes/BREEAM Very Good, and post 2012 an equivalent rating to Ecohomes/BREEAM Excellent, with particular emphasis on water efficiency, unless such requirement is impractical due to the size of the development. The Policy also states that the LPAs will "Achieve a decrease of between 8% and 20% in water use (compared to the national average in 2005) for all new development, help promote more efficient water use in existing developments and require implementation of sustainable urban drainage systems where feasible in all new developments".

On 28th January 2008, the PUSH Joint Committee considered a Sustainability Policy Framework for integration within each PUSH partner authorities LDF at the earliest opportunity. The Policy Framework builds upon the Draft Policy SH14 and also incorporates the more recent Code for Sustainable Homes. In summary, the Policy requires the following standards to be met:

All residential development achieves at least the following level of the Code for Sustainable Homes		All multi-residential and non-residential developments with a floor space over 500 sq m must achieve at least the following BREEAM standards
Until the end of 2011	3	BREEAM 'very good'
From 2012	4	BREEAM 'excellent'
From 2016	6	BREEAM 'excellent'

The Draft South East Plan is supplemented by a detailed Implementation Plan that

identifies the infrastructure that will be required to support the levels of development proposed in the Plan. It is the intention of the Assembly that this Implementation Plan will be regularly reviewed in cooperation with the LPAs and infrastructure providers across the south east region.

Panel Report on Draft South East Plan August 2007

The EiP Panel Report recommends changes to the wording of the Draft South East Plan following the Panel's consideration of the representations made on it. The Panel's recommended wording of the Policies is as follows:

Policy CC5 – Infrastructure and Implementation
The scale and pace of development will be dependent on there being sufficient capacity in existing infrastructure to meet the area's current needs and the provision of new infrastructure to meet the needs of new development. The funding for this infrastructure will require substantial contributions from central Government. In addition, partnerships between central Government, local government and the private sector have the capacity to lever in additional funding.

To help achieve this:
i. The Assembly expects all the relevant infrastructure agencies and providers to align their investment programmes to help deliver the proposals in the Plan
ii. Local Development Documents should identify the necessary additional infrastructure and services including green infrastructure required to serve the area and the development they propose together with the means, broad cost and timing of their provision related to the timing of development
iii. Contributions from development will also be required to help deliver the necessary infrastructure. To provide clarity for landowners and prospective developers, local authorities should include policies and prepare clear guidance in their Local Development Documents, in conjunction with other key agencies, on the role of development contributions towards infrastructure.

The phasing of development will be closely related to the provision of infrastructure. In order to create confidence and assurance in the timely delivery of infrastructure in relation to new housing a more pro-active approach to funding will be adopted. This will involve a joint approach by regional bodies, local authorities, infrastructure providers and developers. Consideration will be given to the pooling of contributions towards the cost of facilities, development tariffs and local delivery vehicles. Mechanisms to enable forward funding of strategic infrastructure will be agreed between regional bodies and Government including a possible Regional Infrastructure Fund.

In order to further secure effective delivery of the Plan, and particularly the timely delivery of the necessary supporting infrastructure, an Implementation Plan will be prepared, monitored and reviewed, which will set out the requirements and obligations for public and private sector bodies at the national, regional and local levels. The Implementation Plan will include a regional and sub-regional investment framework identifying the strategic infrastructure schemes needed to deliver the Plan. The schemes will aim to deliver efficiency by improved management of existing assets and to reduce demand by promoting behavioural changes as well as providing additional capacity by extending or providing new infrastructure.

Policy NRM1: Sustainable Water Resources and Groundwater

Water supply and ground water will be maintained and enhanced through avoiding adverse effects of development on the water environment. A twin-track approach of demand management and water resource development will be pursued.

In preparing Local Development Documents, and determining planning applications, local authorities should:

i. Ensure compatibility with River Basin Management Plans and take account of other plans and strategies including water company asset management plans, the Environment Agency's Regional Water Resources Strategy, Catchment Abstraction Management Strategies, groundwater vulnerability maps and groundwater source protection zone maps
ii. Require development to incorporate measures to achieve high levels of water efficiency, and reflect current best practice including BREEAM "very good" and increasingly "excellent" standards (or equivalent) for water. Sustainable drainage solutions must be utilised where these are consistent with protection of groundwater quality
iii. Encourage winter water storage reservoirs and other sustainable farming practices which reduce summer abstraction, diffuse pollution and runoff, increase flood storage capacity and benefit wildlife and recreation
iv. Not permit development that presents a risk of pollution or where satisfactory pollution prevention measures are not provided in areas of high groundwater vulnerability (in consultation with the Environment Agency and Natural England).

The Regional Assembly will work with Government, the Environment Agency, Ofwat and regional stakeholders to ensure that development provided for in the RSS is matched with substantial improvements in water efficiency, which will be delivered through a progressive, year on year, reduction in per capita consumption rates. Savings should be monitored against a per capita per day consumption target that will be set out in the Regional Assembly's monitoring framework.

Policy NRM1A: River Water Quality Management
River water quality will be maintained and enhanced through avoiding adverse effects of development on the water environment.

In preparing Local Development Documents, and determining planning applications, local authorities should:

i. take account of water cycle studies undertaken by the Environment Agency, and water and sewerage company asset management plans;
ii. Ensure that the rate and location of development does not lead to unacceptable deterioration of water quality.

Local authorities will work with water and sewerage companies and the Environment Agency to:

i. identify infrastructure needs, allocate areas and safeguard these for infrastructure development
ii. ensure that adequate waste water and sewerage capacity is provided to meet planned demand, and
iii. take full account of the cumulative impacts of waste water discharges on inland and marine receiving waters.

Local authorities should promote land management initiatives to reduce diffuse agricultural pollution.

Policy NRM2: Strategic Water Resources Development
There is a demonstrable need for new water resource schemes and increased demand management over the period of the Plan to cater for water supply needs of current and future development and the protection of the environment.

Strategic new water resource options that may be required to be operational over the Plan period include:

i. Upper Thames reservoir, Oxfordshire by 2019/20
ii. Enlargement of Bewl reservoir, Kent by 2014/15
iii. Broad Oak reservoir, Kent by 2019/20
iv. Clay Hill reservoir, East Sussex by 2014/15
v. Havant Thicket reservoir, Hampshire by 2020/21

Local authorities should work with the Water Companies and Environment Agency in assisting in the timely delivery of schemes. Local Development Documents should allocate and safeguard sites for the reservoir schemes identified in this policy and others that are identified by the companies and Environment Agency as being required to deliver necessary water infrastructure.

Additional resource schemes, including enlargement of Darwell reservoir, a strategic option in north-west Sussex, together with bulk water transfers, effluent re-use and desalination may also be required.

In considering applications for new water resource schemes, consideration should be given to:

i. Need at local, sub-regional, regional, and inter-regional scales
ii. Presence of alternative options and environmental impact including water efficiency in new and existing properties
iii. Potential to deliver social and environmental benefits.

Policy NRM3 – Sustainable Flood Risk Management
The sequential approach to allocating areas for development in flood risk areas set out in PPS25 will be followed. Inappropriate development should not be allocated or permitted in Zones 2 and 3 of the floodplain (Map NRM2) or areas with a history of groundwater flooding, or where it would increase flood risk elsewhere, unless there is over-riding need and absence of suitable alternatives.

Local authorities with advice from the Environment Agency should undertake a Strategic Flood Risk Assessment (SFRA) to provide a comprehensive understanding of the flood risk and put in place a framework for applying the PPS25 sequential approach. This will facilitate allocating sites in a decreasing probability of flood risk. The SFRA would assess future climate change and identify appropriate types of development in accordance with the PPS25 sequential test and flood vulnerability of different land uses.

Existing flood defences will be protected from development. Where development is permitted in appropriately defended floodplains it must be designed to be resilient to flooding (to minimise potential damage) and to allow for the future maintenance,

realignment or management of the defences to be undertaken.

In the preparation of Local Development Documents and considering planning applications, local authorities in conjunction with the Environment Agency, should also:

i. Take account of River Basin Management Plans, Catchment Flood Management Plans and Shoreline Management Plans in developing Local Development Documents and other strategies. Where locationally specific flood risk and land management options such as flood storage, managed realignment and set back from coastal defences are identified, land should be safeguarded for these purposes and appropriate land management practices should be encouraged

ii. Consider the associated social and environmental costs and benefits to fisheries and biodiversity in the assessment of new flood management schemes

iii. Require incorporation and management of Sustainable Drainage Systems (SuDS), other water retention and flood storage measures to minimise direct surface run-off, unless there are practical or environmental reasons for not doing so

iv. Take account of increased sewage effluent flows on fluvial flood risk.

Policy SH14 – Environmental Sustainability

The South Hampshire authorities will:

i. Produce a common framework, for incorporation into Local Development Frameworks, that establishes density ranges for development related to accessibility to services and public transport, that favours development around transport hubs and community infrastructure within a reasonable radius to encourage pedestrian and bicycle movement, and where possible joins development to the natural environment through linked and accessible open spaces that promote both recreational opportunities and high biodiversity

ii. Jointly plan the infrastructure and approaches necessary to make effective management and use of natural resources an integral part of a growing economy in the sub-region

iii. Co-operate on assessment of and planning for effective coastal zone management to address the risk of sea level rise, and co-operate to minimize the risk of other forms of flooding and realise opportunities for more sustainable flood risk management options.

iv. Require new commercial and residential buildings in the sub-region to achieve at minimum an equivalent rating to Ecohomes/BREEAM Very Good, and post 2012 an equivalent rating to Ecohomes/BREEAM Excellent, with particular emphasis on water efficiency, unless such requirement is impractical due to the size of the development

v. Adopt measures to encourage the use of recycled materials in all construction

vi. Require developments to incorporate energy efficient passive solar design principles to the extent possible, promote high standards of energy efficiency in new and existing development, and require developers to provide at least 10% of energy demand from renewable sources in housing schemes of over 10 dwellings and commercial schemes of over 1,000 square metres

vii. Deliver a minimum of 100 MW of renewable energy in the sub-region by 2020

viii. Achieve a decrease of between 8% and 20% in water use (compared to the national average in 2005) for all new development, help promote more efficient water use in existing developments and require implementation of sustainable urban drainage systems where feasible in all new developments.

ix. Seek to ensure that decisions on additional wastewater treatment infrastructure will be taken on the basis of environmental sustainability as well as cost.

The authorities will develop common policies to achieve these aims in their Local Development Frameworks.

Appendix B: REVIEW OF RELEVANT ENVIRONMENTAL POLICY & GUIDANCE

The environmental importance of south Hampshire is significant and there is a wealth of environmental legislation and water quality standards to which the IWMS must adhere. The legislation and guidance most relevant for the IWMS is discussed below. It should be noted that this is the most relevant legislation and guidance and is not a comprehensive account.

European Directives

The Urban Waste Water Treatment Directive (91/271/EEC) and associated UK Statutory Instrument;

The Urban Waste Water Treatment Directive was adopted by the EU Council of Ministers in May 1991and transposed into legislation across the UK by the end of January 1995. There have also been amendments Regulations in 2003 which concern the publicity/dissemination given to decisions taken on the reviews under the main regulations and provision of information on the web. The objective of the UWWT Directive is to protect the environment from the adverse effects of sewage discharges. It sets treatment levels on the basis of sizes of sewage discharges and the sensitivity of waters receiving the discharges. By the end of 1998 the UK had stopped all disposal of the sewage sludge left over from treatment processes at sea or to other surface waters in accordance with its requirements.

Amongst other matters, the principal Regulations require the Secretary of State to keep under review the identification of "sensitive areas" and "high natural dispersion areas", which are areas of water defined in accordance with specified criteria. Discharges into areas designated as 'sensitive' will require more stringent treatment than secondary treatment, for example the removal of nutrients (such as nitrogen and phosphorus).

Dangerous Substances Directive (76/464/EEC);

The Dangerous Substances Directive (DSD) (76/464/EEC) and its 'daughter' directives control discharges that are liable to contain dangerous substances and that go to inland, coastal and territorial surface waters. Dangerous substances are defined as toxic substances that pose the greatest threat to the environment and human health.

The Directive specifies two lists of Dangerous Substances. List I covers those which are particularly toxic, persistent, and which may tend to accumulate in the environment. List II covers substances whose effects are still toxic, but less serious.

The Environment Agency defines pollution by dangerous substances as exceedence of Environmental Quality Standards (EQSs) in the water. The EQS of a substance is based on the toxicity of the substance. It defines a concentration in the water below the substance will not have a polluting effect or cause harm to plants and animals. If

the concentration in the water is less than the EQS then pollution has been eliminated. The 'daughter' directives set the EQSs for List I substances across Europe. Each country in the EU is required to set its own EQSs for List II substances.

Dangerous substances can potentially harm human health, aquatic life and water quality. They include certain industrial chemicals, pesticides and metals. They are found in sewage and trade discharges as well as in water passing through contaminated land and old mines. Rainwater runoff from roads and some industrial sites can also release dangerous substances into watercourses.

The WFD will take over the provisions of the DSD which will be finally repealed in 2013. The substances identified under the DSD will be split between those substances identified as Specific Pollutants or Priority Substances (and its subset - the Priority Hazardous Substances). Management at European, national and local levels may be required to meet the WFD requirements to ensure cessation of discharges, emissions and losses of 'priority hazardous substances'.

The Bathing Water Directive (2006/7/EC);

The Bathing Waters Directive (76/160/EEC) sets out water quality standards to protect the environment at bathing waters throughout the bathing season (mid-May to September). It requires bathing waters to be 'designated' and monitored for water quality, particularly for human waste from sewage treatment works. In March of 2006, a revised Bathing Water Directive (2006/7/EC) was adopted and will become law in the UK in March 2008. This Directive provides stricter water quality standards, and a requirement to provide more detailed and standardised information about bathing waters across Europe.

The Directive sets minimum 'mandatory' values to be achieved by 95 per cent of samples taken during the bathing season. The tighter guideline water quality standards are based on compliance with three microbiological standards specified in the Bathing Water Directive (which sets maximum permitted levels of total and faecal coliforms and faecal streptococci). These standards are one of the requirements for a beach to achieve 'Blue Flag' status.

In England there are 414 identified and monitored bathing waters which include relevant territorial waters, coastal waters and inland waters. There are 11 designated Bathing Waters in the PUSH sub-region.

The Freshwater Fish Directive (78/659/EEC) and associated UK Statutory Instrument;

The EC Freshwater Fish Directive (78/659/EEC) seeks to protect those fresh water bodies identified by Member States as waters suitable for sustaining fish populations. The Directive sets out both guideline and imperative physical and chemical water quality objectives and an obligation on the Environment Agency to ensure that designated waters meet their objectives. All river and canal reaches which are designated under FFD are to be aligned with the Environment Agency's General Quality Assessment (GQA) network to aid in the reporting of national statistics on overall water quality across England and Wales.

The Directive identifies two categories of water; those that are suitable for:

- Salmonid fish (salmon and trout) - these are generally fast flowing stretches of river that have a high oxygen content and a low level of nutrients
- Cyprinid fish (coarse fish - carp, tench, barbel, rudd, roach) - these are slower flowing waters, that often flow through lowlands

Imperative standards are those that must be met if the stretch is to pass the Directive (for the stretch to be 'compliant'). Values have been set for dissolved oxygen, pH, non-ionised ammonia, total ammonium, total residual chlorine, zinc and (for thermal discharges) temperature. The guideline standards are those that should be achieved where possible and include other chemical parameters, such as copper, biochemical oxygen demand (BOD) and suspended solid load.

Within the Push boundary there are a number of river systems that are designated under the FFD. These include:

- River Test – Salmonid designation from Testwood to source;
- River Itchen – Salmonid designation for the whole of the non-tidal River Itchen (above Woodmill) to source;
- River Meon - Salmonid designation from mouth (at Hillhead Harbour) to source; and
- River Hamble - Salmonid designation from tidal limit (at Botley) to source.

The Shellfish Waters Directive (2006/113/EC);

The European Community (EC) Shellfish Waters Directive aims to protect shellfish populations. It sets water quality standards in areas where shellfish grow and reproduce. The Directive requires that certain substances are monitored in the water in which the shellfish live. These substances can threaten the survival of shellfish or inhibit their growth (see **Error! Reference source not found.** below).

Table 9.2 Substances monitored under the Shellfish Waters Directive

Substances monitored under the Shellfish Waters Directive		
Metals	**Organohalogens**	**Other parameters**
Arsenic	DDT	Colour
Cadmium	Dieldrin	Dissolved oxygen
Chromium	Lindane	Faecal coliforms
Copper	Parathion	Hydrocarbons
Lead		pH
Mercury		Salinity
Nickel		Suspended solids
Silver		Temperature
Zinc		

For each substance, the Directive specifies the minimum number of samples to be taken, the standards to be met and the percentage of samples that must meet these standards. The standards can either be a numeric limit or a descriptive standard (Such as “must not reach or exceed levels harmful to shellfish and larvae”).

The standards have been met if the following percentage of the samples analysed do not exceed the limit values:

- 100% for metals and organo-halogen compounds

- 95% for salinity and dissolved oxygen
- 75% for other substances

There must also be no evidence of harm to the shellfish from organo-halogenated compounds. There are five shellfish monitoring areas in the PUSH sub-region (excluding the Isle of Wight and Western Solent) these are: Stanswood Bay; Bramble Bank; Chilling; Browndown Bank and Ryde Middle. Defra is currently revising the standards that must be met.

The EU Water Framework Directive (2000/60/EC) and Daughter Directives;

The core environmental aims of the Water Framework Directive (WFD) are to:

- Prevent deterioration of aquatic ecosystems;
- Protect, enhance and restore polluted waters and groundwater to 'good status'. 'Good status' is based on ecological and chemical factors for surface water, and water quantity and chemical status for groundwaters;
- Comply with water related standards and objectives for environmentally protected areas established under other EU legislation;
- Progressively reduce pollution from priority substances and cease or phase out discharges from priority hazardous substances; and
- Prevent or limit input of pollutants into the groundwater, and to reverse any significant or sustained upward trends in the concentration of any groundwater pollutant.

The WFD is an opportunity to protect and improve the water environment by driving towards more sustainable use of water as a natural resource, with integrated catchment management through River Basin Planning to maximise synergies and minimise conflicts.

WFD will focus water resource assessments on the ecological 'health' of the water environment. Its primary objectives are to prevent deterioration of ecological status, and where necessary to restore 'good ecological status' for surface water or 'good status' for groundwater.

The Resource Assessment and Management (RAM) framework for CAMS includes some of the principles of the WFD, such as applying flow targets to prevent ecological deterioration of rivers. Measures to be outlined in the RBMP are the means of achieving environmental objectives under the WFD. Abstraction control is just one of several 'basic measures' that include measures to promote efficient and sustainable water use, and to address Significant Water Management Issues (SWMIs).

The first CAMS cycle is due for completion in 2008, with provision for a second cycle to be completed by March 2014. The second cycle CAMS assessments will take account of WFD classification at the water body scale. Likewise, the information gathered for CAMS will feed directly into RBMP.

National Legislation

The Conservation (Natural Habitats, &c.) Regulations 1994: Habitat Regulations;

The Conservation (Natural Habitats, &c.) Regulations 1994 transpose Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive) and the EC Birds Directive into national law. The Regulations provide for the designation and protection of 'European sites', the protection of 'European protected species', and the adaptation of planning and other controls for the protection of European Sites.

Conservation of Natural Habitats and Habitats of Species

The Regulations place a duty on the Secretary of State to propose a list of sites which are important for either habitats or species (listed in Annexes I and II of the Habitats Directive respectively) to the European Commission. The Regulations also require the compilation and maintenance of a register of European sites, to include SACs and Special Protection Areas (SPAs) classified under Council Directive 79/409/EEC on the Conservation of Wild Birds (the Birds Directive). These sites form a network termed Natura 2000.

The Regulations make special provisions for the protection of European marine sites, requiring the country agencies to advise other authorities of the conservation objectives for a site, and also of the operations which may affect its integrity. The Regulations also enable the establishment of management schemes and byelaws by the relevant authorities and country agencies respectively, for the management and protection of European marine sites.

Adaptation of Planning and Other Controls

The Regulations require Competent Authorities to consider or review planning permission, applied for or granted, affecting a European site, and, subject to certain exceptions, restrict or revoke permission where the integrity of the site would be adversely affected. Equivalent consideration and review provisions are made with respects to highways and roads, electricity, pipe-lines, transport and works, and environmental controls (including discharge consents under water pollution legislation). Special provisions are also made as respects general development orders, special development orders, simplified planning zones and enterprise zones.

The EA is the Competent Authority under the Regulations with respect to abstractions and discharges. As part of its requirements as a Competent Authority the EA has undertaken a Review of Consents for the following designated habitats in the PUSH boundary:

- Solent Maritime SAC;
- Chichester & Langstone Harbours SPA;
- Solent and Southampton Water SPA;
- Portsmouth Harbour SPA; and
- River Itchen cSAC.

The Water Act (2003);

The four broad aims of the Act are to ensure the sustainable use of water resources; strengthen the voice of consumers, provide a measured increase in competition; and the promotion of water conservation.

The main provisions of the Act are set out below.

The Act amends the Water Resources Act 1991 to improve long-term water resource management by:

- Creating two new forms of abstraction licence - the transfer licence and the temporary licence;
- Widening the control over impoundments so that licences are required for the whole duration of impoundment works;
- Replacing licensing exemptions based on water use with a new exemption threshold of less than 20 cubic metres of water per day;
- Ending the current exemption for irrigation (other than spray irrigation) and dewatering from the abstraction licensing regime;
- Requiring all new abstraction licences to be time-limited;
- Empowering the Environment Agency to revoke or vary an abstraction licence without compensation if it has not been used for four years; and
- Removing the entitlement to compensation if the Secretary of State (or the Assembly) directs that a licence without a time limit should be curtailed, on or after 15 July 2012, on the grounds of serious environmental damage.

It also amends the Water Industry Act 1991 so that Water Companies:

- Are given a duty to prepare and publicise drought plans;
- Are placed under a duty to agree and publicise water resource management plans; and
- Are placed under an enforceable duty to further water conservation.
- The Act introduces provisions for the better operation and regulation of the water industry by amending the Water Industry Act 1991 to:
- Replace the Director General of Water Services with a Regulatory Authority;
- Set up a new independent Consumer Council for Water to replace the Customer Service Committees and the Ofwat National Consumer Council (known as WaterVoice);
- Require the Authority and the Council to consult on and publish forward work programmes and annual reports;
- Give both the Authority and Council a new duty to contribute to sustainable development; and
- Give the Authority a duty to further the consumer objective wherever appropriate, through promoting effective competition.
- The Act includes provisions which aim to increase the opportunities for competition in the supply of water services, by:
- Setting up a system to license new entrants to supply water to large commercial and industrial customers based on a water consumption threshold; and

- Providing the Authority with new regulatory powers to administer the competition framework.

The Act also amends the Water Industry Act 1991 to include a new statutory obligation for Water Companies to accede to requests from Strategic Health Authorities (in relation to England) and the Assembly (in relation to Wales) to enter into arrangements to fluoridate water supplies. This transfers responsibility for the decision to fluoridate from the undertaker to the Strategic Health Authority and the Assembly, in consultation with local communities. There are also a number of other miscellaneous provisions.

Water Industry Act (1991);

The Water Industry Act came into force in 1991 and consolidates various enactments relating to the appointment of water and sewerage undertakers, conditions of appointment, supply of water and the provision of sewerage services. The Sections of the Act which are of particular importance to industry, concern the criteria for discharging effluent into the sewerage system.

The key issues for industry are summarised below:

Waste, Contamination and Misuse of Water

It is an offence for an owner or occupier of premises to intentionally or, through negligence, unintentionally allow water fittings to remain in disrepair, so as to cause contamination, waste or misuse of water. Water authorities are entitled to cut off the water supply or serve a notice on consumers for contamination or waste of water.

Disposal of Effluents into Sewers

Water Industry Act contains the criteria for discharging trade effluent in the sewers. Trade effluent is any liquid waste, in any quantity, that is produced from an organisation's operations. Trade effluent can include liquid process wastes, wash water, cooling water, condensate water from compressed air installations, and waste chemicals. No effluent can be discharged into the sewer which may damage the sewer, injure the people working in it or interfere with the working of the sewage treatment works.

Discharges to sewer must be authorised by the sewerage undertaker (the relevant Water Service Company) and application should include details of the effluent, quantity to be discharged in any one day and the highest rate at which it is proposed to discharge. In granting a trade effluent consent the sewerage undertaker may impose conditions such as the volume of discharge, composition of the discharge (chemical oxygen demand, temperature, concentration of suspended solids) and the sewer into which it may be discharged. The conditions of discharge may also include the provision for maintenance of inspection chambers and meters, equipment for testing the effluent, keeping of records and the payments to the sewerage undertaker. The sewerage undertaker must refer all applications covering special category waste to the Environment Agency, who decide if the discharge should be prohibited or permitted, subject to conditions.

NERC Act 2006;

The Natural Environment and Rural Communities Act was given Royal Assent in March 2006. The act aimed to improve the management and priorities for rural communities and the natural environment. The act created the new Government agency Natural England, combining English Nature, the Countryside Commission and some divisions of Defra (countryside stewardship).

The Act is summarised as follows:

- The establishment of Natural England will, for the first time ever, unite in a single organisation the responsibility for enhancing biodiversity and landscape – in rural, urban and coastal areas - with promoting access and recreation. It is about conserving and enhancing places and nature and helping people to enjoy them – taking a wider view, pursuing environmental management which encompasses access and recreation, and aiming where possible to achieve economic and social outcomes alongside conservation goals. People throughout the country will benefit from the more integrated approach offered by Natural England.
- Formal establishment of the new Commission for Rural Communities to act as an independent advocate, adviser and watchdog for rural people, designed to ensure that the Government's policies make a real and tangible difference to people in rural areas, especially in tackling social and economic exclusion and disadvantage. It will be a powerful new rural advocate unhampered by delivery functions.
- The Act delivers our commitment to curtail the inappropriate use of byways by motor vehicles by putting an end to claims for motor vehicle access on the basis of historical use by horse-drawn vehicles. Some of the worst damage is happening in our national parks, which is why we have given National Park Authorities the power to make traffic regulation orders.
- Powers for the Secretary of State to directly fund activities within Defra's remit, as a tidying up measure following the creation of Defra and to provide maximum flexibility.
- Powers to allow both the Secretary of State, and designated bodies, to delegate Environment, Food and Rural Affairs (EFRA) functions to one another by mutual consent, to provide simple and more effective access to customers. These powers are limited so that regulatory and enforcement functions cannot be delegated to private bodies.
- Powers to take forward the findings of a current review of levy bodies, due to report later this year.

Other Measures

The Act also contains a number of additional measures designed to help streamline delivery and simplify the legislative framework:

- Changes to the competence, remit and constitution of the Joint Nature Conservation Committee (JNCC) to extend the remit of this GB body to the UK and to improve its governance arrangements.
- Reconstitution of the Inland Waterways Amenity Advisory Council as an independent body supported by Defra and the Scottish Executive, with a statutory remit to advise on the inland waterways generally.
- Improving the governance arrangements for the National Parks, to implement the findings of recent reviews.

- A small change to the Countryside and Rights of Way (CROW) Act 2000 to define the meaning of "statutory undertaker", currently undefined in this Act.
- Provisions to address a small number of gaps and uncertainties which have been identified for Sites of Special Scientific Interest (SSSIs).
- Provisions to make eight amendments to Part 1 of the Wildlife and Countryside Act 1981 to improve wildlife protection, following a consultation exercise.
- Extension of the CROW biodiversity duty to public bodies and statutory undertakers to ensure due regard to the conservation of biodiversity.
- Provisions to amend the flood defence byelaw-making powers of the Environment Agency, Local Authority and Internal Drainage Board to allow them to take nature conservation into account when determining consent for flood defence works.
- Provisions to clarify the use of mechanically propelled vehicles on public rights of way.
- Repealing provisions for three Defra-sponsored statutory committees which have become defunct: the Hill Farming Advisory Committee and two Committees covering Food and Drink – the Consumer Committee for Great Britain and the Committee for Investigation.

The Environment Act (1995)

The Environment Act (1995) is a United Kingdom Act of Parliament which created a number of new agencies and set new standards for environmental management. This Act provided for the establishment the Environment Agency and Scottish Environment Protection Agency and the National Park authorities.

In England and Wales the EA has responsibility for the following aspects of environmental protection:

- Flood risk management: Creating and maintaining flood defences and providing flood warning systems, control of water levels, monitoring planning applications in line with legislation e.g. PPS25;
- Waste regulation: Licensing of sites landfill and incineration facilities, regulation of the movement of hazardous wastes;
- Pollution control: Main regulator of discharges to the aquatic environment, air and to land, issuer of formal consents;
- Air and water quality management: Monitoring and reporting of quality;
- Navigation; and
- Fisheries: Maintenance and improvement of the quality of fisheries.

Countryside Rights of Way (CRoW) Act (2000);

The Countryside and Rights of Way Act 2000 (CRoW Act 2000), which applies to England and Wales only, contains five Parts and 16 Schedules. The Act provides for public access on foot to certain types of land, amends the law relating to public rights of way, increases protection for Sites of Special Scientific Interest (SSSI) and strengthens wildlife enforcement legislation, and provides for better management of Areas of Outstanding Natural Beauty (AONB).

The Act places a duty on Government Departments and the National Assembly for Wales to have regard for the conservation of biodiversity and maintain lists of species and habitats for which conservation steps should be taken or promoted, in accordance with the Convention on Biological Diversity.

Schedule 9 of the Act changes the Wildlife and Countryside Act 1981, amends the procedures for SSSI notification as well as providing increased powers for the protection and management of SSSIs. Schedule 12 of the Act strengthens the legal protection for threatened species. In addition, the Act clarifies the procedure and purpose of designating AONBs, and consolidates the provisions of previous legislation.

Planning and Guidance

Water Level Management Plans

Defra guidelines for the creation of Water Level Management Plans (WLMP) describe a WLMP as a:

"written statement of the water level management objectives for a given area, and considers the means by which the objectives may be achieved. It considers the water level requirements for a range of activities, including agriculture, flood defence and conservation, and how these can be balanced and integrated.

"WLMPs are prepared by the Environment Agency, Internal Drainage Boards and certain local authorities. Priority is given to preparing plans for Sites of Special Scientific Interest (SSSIs), i.e. sites of national nature conservation importance. The main requirement for these sites is to maintain or rehabilitate their designated interest."

Defra has set Public Service Agreement (PSA) target to ensure that 95% of SSSI land is in favourable or unfavourable recovering condition by 2010. The WLMPs of significance to the objectives of the South Hampshire IWMS include:

- The River Itchen WLMP – Environment Agency
- The River Test WLMP – Environment Agency
- Alresford Pond WLMP – Environment Agency
- The Moors, Bishops Waltham WLMP – Environment Agency

WLMPs are often developed alongside land management agreements between land owners or tenants and Natural England. The most widely used agreement on SSSI land is Environmental Stewardship. Entry into the scheme is possible on three different levels: Entry, Organic and Higher Level Stewardship. The primary objectives of Environmental Stewardship are to conserve wildlife; maintain and enhance landscape quality and character; protect the historic environment and natural resources; promote public access and understanding of the countryside; and to protect natural resources. Application for monies to undertake proposals within WLMPs can also be made to the Environmental Stewardship scheme.

The development of WLMPs on riverine and floodplain SSSIs has the potential to conflict with other water resource needs within the catchments since many WLMP proposals necessitate abstractions from the river for biodiversity interest on the floodplain. However, such abstractions will be subject to the licensing requirements

outlined by the Water Act 2003 and are likely to be subject to conditions determined by the Environment Agency.

River Basin Management Planning (The Water Framework Directive);

River Basin Management Planning is the Environment Agency's approach to managing the water environment driven by the policies set out by the Water Framework Directive (WFD). It aims to manage and improve all water bodies, including rivers, lakes, groundwater, estuaries and our coastal waters, as a single whole. It provides a structure for introducing climate change impacts into water management and river basin planning and the opportunity to better assess impacts on the water environment and can co-ordinate not only the demand for water in various sectors but also their capacity for supporting water management adaptation. To bring this new way of working about, the Environment Agency plans to identify specific environmental objectives for each water body and develop a River Basin Management Plan (RBMP).

The characterisation process is important as it enables the Environment Agency to target monitoring and management policies to the most appropriate areas. Characterisation will continue until the publication of the first RBMPs in December 2009.

One of the most important first steps of RBMP is to identify the significant water management issues (SWMIs) for each of the River Basin Districts (RBD). The headline objectives at a national level are as follows:

Table 9.3 Significant Water Management Issues identified through the RBMP process.

Clean water for drinking, bathing, communities and economic uses	Protecting water from point source pollution, including discharges from sewage treatment works and industry.
	Protecting water from diffuse pollution, including the impacts from activities such as farming and transport.
Wiser, sustainable use of water	Ensuring enough water supply for public and commercial use whilst managing the impact on aquatic life caused by abstraction and other artificial flow pressures.
Better habitats for wildlife that lives in and around water	Improving rivers, estuaries and shorelines where they have been damaged by navigation, flood defences and the legacy of our industrial past.
Protected and improved native aquatic wildlife	Protecting ecosystems from the damage caused by the introduction of alien plant and animal species. Reducing pollution generally associated with farming and industrial activities.
	Protecting and improving the condition of wetlands.
Protected natural landscapes and more opportunities for recreation	Protecting and improving characteristic and valuable landscapes and recreational features.

The PUSH region lies within the South East RBD. To help to identify the key issues relating to this RBD the South East Region (Environment Agency, 2007). The consultation document sets out what the panel believe are the most significant issues (SWMIS) that face the South East RBD. These include:

- Abstraction and other artificial flow regulation
- Nitrates
- Organic pollution
- Pesticides
- Phosphates
- Physical modification (estuaries and coasts)
- Physical modification (rivers and lakes)
- Sediment
- Urban and transport pollution pressures

The growth in housing and associated infrastructure, industry, and the effects of climate change has been taken into account in determining these significant issues. Managing flooding and coastal erosion are dealt with in more detail as part of the Catchment Flood Management and Shoreline Management planning processes. Acidification, alien species, commercial fisheries, faecal indicator organisms, mines and minewaters, metals, priority hazardous substances and chlorinated solvents, and recreation were issues not selected as significant in this RBD.

Consultation on the SWMIs for the South East RBD ends on 24 January 2008. A summary of the SWMIs in the South East RBD is provided in the following sections. The summaries outline the problem within the RBD as well as providing details on what control measures are currently carried out by the Environment Agency and other bodies and what additional measures could be put in place to address these issues.

Diffuse pollution from rural areas

SWMIs: nitrates, organic pollution, pesticides, phosphates, sediment.

58% of the length of river water bodies in the RBD is either at risk or probably at risk of failing WFD objectives by 2015, due to diffuse agricultural pressures. For pesticides and sheep dip this figure is 26%. About 70% of the area of groundwater is at risk or probably at risk from diffuse nutrient nitrogen. Chalk rivers in the RBD are particularly sensitive to the impacts of diffuse pollution, with concerns ranging from poor plant diversity to health of fly life.

The existing measures to control diffuse pollution from rural areas in the RBD include:

- Enforcing regulations including Nitrates Directive (Nitrate Vulnerable Zones, Source Protection Zones), Groundwater Regulations, Silage Slurry and Fuel Oil Regulations, Sludge (Use in Agriculture) Regulations;
- Sheep Dip Pollution Reduction Programme;
- Environmental Stewardship;
- Codes of good agricultural practice;
- Catchment Sensitive Farming;

- Partnership project work, e.g. Landcare; and
- National Pesticides Voluntary Initiative.

Additional measures to control diffuse pollution in rural areas suggested by the consultation document include:

- Treasury review of taxes;
- Land use policies to reflect social and economic value in agricultural production;
- Amended Sludge (Use in Agriculture) regulations;
- Nitrate Vulnerable Zone extension if announced following 2006 review;
- Review of minimum requirements for nutrient and soil management under Cross Compliance and environmental stewardship entry;
- Extend assurance schemes such as Assured Combinable Crops (ACC), Red Tractor and LEAF;
- Extend National Pesticides Voluntary Initiative;
- Extend use of Catchment Sensitive Farming;
- Local voluntary initiatives and partnerships, for example to promote flagship agri-environment schemes; and
- Develop/improve catchment approaches to delivering farm specific advice.

Diffuse pollution from urban areas and transport

SWMIs: nitrates, organic pollution, pesticides, phosphates, sediment, urban and transport pollution. 14.7% of the length of river water bodies in the RBD is at risk or probably at risk from diffuse urban pollution. The existing measures to control diffuse pollution from urban areas in the RBD include:

- Upgrade of combined sewer overflows through Water Company Asset Management Plans;
- Capital maintenance works to address leaking sewers;
- Consideration of drainage issues in the development planning process;
- Buffer strips and other pollution control measures on the road network;
- Gully-pots cleaning to remove sources of bacteria;
- Regulation of waste disposal to land;
- Pollution prevention work including targeted campaigns; and
- Partnership projects such as the Green Blue to help deal with boating issues.

Additional measures suggested by the consultation document include:

- General Binding Rules for activities that contribute to urban diffuse pollution, for example, to require sewerage misconnections to be dealt with at change of house ownership;
- Further works to improve combined sewers through the Asset Management Plan process;
- Factor the effect of climate change into sewer design;
- More integrated planning of urban drainage;
- Greater use of sustainable urban and road drainage systems in appropriate areas, and retrofitting measures such as rainwater tanks where feasible; and

- New voluntary codes of practice aimed at septic tank users.

Flow problems

SWMIs: abstraction and other artificial flow regulation, physical modification (rivers and lakes). The RBD has 15 rivers and 32 out of 44 Water Resource Management Units (WRMU) that are either unsustainably abstracted or over licensed. Approximately 11% of river waterbodies and over 55% of the area of groundwater water bodies in the RBD are either at risk or probably at risk of failing WFD objectives as a result of abstraction and other artificial flow regulation. The existing control measures in place include:

- Water resources regulation, including licensing, consenting and prohibition practices;
- Water Company Water Resource Plans including development of new water resources and demand management;
- Environment Agency Catchment Abstraction Management Strategies (CAMS);
- Restoring Sustainable Abstraction (RSA) programme;
- Review of consents under the Habitats Directive; and
- Encouraging water efficiency and domestic rainwater harvesting.

Additional measures suggested by the consultation document include:

- More effective demand management, for example installing meters in existing and new properties, influencing building regulations, use of smart tariffs, and market development for water efficiency devices;
- Spatial planning to favour development in areas with a sustainable water supply;
- Examine role of effluent re-use;
- Water industry and agriculture to develop additional storage; and
- Habitat restoration.

Physical modifications

SWMIs: physical modification (rivers and lakes), physical modification (estuaries and coasts). It is estimated that 76% of coastal area in the RBD is at risk from morphological pressures. 84% of the length of river water bodies, and 96% of estuarine area is at risk or probably at risk. In the Solent the distance between high and low tides has reduced by between 50% and 90% in places. This consequence of hard sea defences is known as ‘coastal squeeze’. Environment Agency control measures already in place include:

- Catchment Flood Management Plans (CFMP) and Shoreline Management Plans (SMP) that agree policies for sustainable flood risk management.
- Regulation and consenting of dredging activity to reduce the risk of harm to the environment.
- Promotion of river naturalisation through the development planning process.
- Habitat enhancement work such as installing eel and fish passes and buffer strips.

Additional measures that could be put in place include:

- Removal and modification of obstructions to fish passage including weirs and tidal gates;
- Switching to soft flood defences in floodplains and on coasts;
- Restoration of natural floodplains and coastal environments and re-naturalisation of rivers and intertidal habitats;
- Modification of dredging regimes, especially in rivers, and review dredging practices where appropriate; and
- Raising awareness to prevent bank damage by river boat traffic, livestock, horses and aquaculture.

Point Source Pollution

SWMIs: nitrates, organic pollution, pesticides, phosphate. It has been estimated that 20% of the length of river water in the RBD is at risk or probably at risk of failing WFD objectives by 2015. This is due to point discharges of nutrients such as phosphate and nitrate. Pressure from new development will increase the challenge. Current discharges of nitrates from wastewater treatment works are believed to be affecting the integrity of European wildlife sites (SAC or SPA) at Southampton Water, Portsmouth Harbour, Solent Maritime, Chichester and Langstone Harbours, and Solent and Isle of Wight Lagoons. The measures in place to control point source pollution in the RBD include:

- Over £500M of investment in wastewater treatment between 2004 and 2009 through Southern Water's Asset Management Plan;
- Discharge consent permitting system managed by the Environment Agency; and
- Activities linked to the Pollution Prevention and Control (PPC) Regulations.

Additional control measures that are suggested include:

- National controls and customer persuasion to limit phosphorous in detergents;
- Enhance levels of effluent treatment;
- Improve combined sewers to reduce overflows;
- Water Cycle Strategies;
- Manage or reduce intensity and impact of point aquaculture emissions; and
- Complement these activities with catchment sensitive/low nitrogen farming practices.

Catchment Abstraction Management Strategies

There are three Catchment Abstraction Management Strategies (CAMS) that are relevant to the study. These are:

- The New Forest CAMS;
- The Test & Itchen CAMS; and
- The East Hampshire CAMS

Southern Region CAMS policies

The following policies are common to licensing strategies across the Environment Agency's Southern Region:

- The precautionary principle
- Presumption against consumptive groundwater abstractions
- Presumption against consumptive summer surface water abstractions
- Revocation of unused abstraction licences
- Habitats Regulations review of consents
- Time-limiting of licences
- Restoring Sustainable Abstraction Programme (RSA)

The Environment Agency policies that are common to catchments within the PUSH region are as follows:

- The Environment Agency will continue to reduce and revoke unused or partially unused licences;
- When determining new applications or reviewing time-limited licences the Environment Agency will apply a test of reasonable need, sustainability and the efficient use of water;
- The Environment Agency will continue to operate a policy of no further consumptive abstractions from the unconfined Chalk;
- The Environment Agency will continue to have a presumption against consumptive abstraction of summer surface water;
- The Environment Agency will continue to encourage winter storage schemes where these are shown to be environmentally acceptable and where there are no adverse water resource impacts;
- A 50% flow level will continue to be used for setting Hands Off Flow conditions unless the applicant can show good reason for why it is not required;
- The Environment Agency will continue to set local level conditions for new winter storage abstraction licences where there is no gauging station to establish a flow condition.
- The impact of variations and applications for new licences which have potential to impact Habitats Directive sites (SPA, SAC) will be considered and an Appropriate Assessment may be required by the Regulations in support of applications for new licences.

A summary description and the specific licensing strategy for each of the WRMUs in the CAMS within the PUSH Region are summarised in Table 9.4 below.

Table 9.4 Summary description and licensing strategy for WRMUs.

Water Resource Management Unit and Resource Availability Status	**Summary description and licensing strategy**
NEW FOREST	
Beaulieu River No water available at low	This is one of two WRMU in the New Forest CAMS within the boundary of the PUSH region. The following licensing strategies are relevant for new licences:

flows	Consumptive surface water licences considered for winter storage with appropriate flow/ level conditions; New licences will be time limited with and common end date of 2014; The impact of new licences on the New Forest SAC, SPA and Solent Maritime SAC and Solent & Soton Water SPA will be considered. And for existing licences: Licence variations will be time limited with and common end date of 2014; There will be a presumption of renewal of time limited licences subject to satisfaction of the test of reasonable need, sustainability and the efficient use of water.
Barton Sands Water available	This unit is the only groundwater unit in the New Forest CAMS. The strategy for this unit is to maintain the present water available status. Therefore for new licences: All applications will have to be preceded by an application to the Environment Agency for drilling and test pumping consent. Comprehensive monitoring of the impact of any new abstraction on surrounding groundwater levels and water features will be required. Depending upon the specific conditions of each application, it may be appropriate to apply conditions which restrict abstraction to periods of high groundwater levels and river flows. The impact of new licences on the New Forest SAC, SPA; Solent Maritime SAC; and Solent & Southampton Water SPA will be considered and an Appropriate Assessment may be required in support of an application. All new licences will generally be time limited to a common end date of 2014. And for existing licences: Licence variations will generally be time limited to a common end date of 2014. There is a presumption of renewal of time limited licences subject to the test of reasonable need, sustainability and the efficient use of water.
TEST & ITCHEN	
Lower Itchen Over-abstracted	This unit covers the main River Itchen from Easton to Riverside Park at Woodmill, Southampton. PWS dominates abstraction accounting for nearly 85% of the total licensed quantity. The two main sources are Otterbourne in the mid-reaches and Gaters Mill in the lower reaches. There are also a number of fish farms and one watercress bed within the unit. The major discharge from the WWTW near Eastleigh requires the operation of the previously mentioned augmentation schemes for dilution purposes during severe droughts. There is a presumption against issuing licences for summer consumptive abstraction from surface water. Applications for abstractions from

	surface water between November and March using winter storage will be considered. A “hands-off flow” of a winter Q50 is likely to be applied. There is a presumption against issuing consumptive licences from the chalk. Non-consumptive licences will generally be considered subject to environmental assessment and meeting the three tests of: need for water, making efficient use of water and not causing any environmental damage. New licences will normally be time limited to expire with a common end date of 2013, with a normal renewal period of 12 years. The impact of new licences on the River Itchen SAC will be considered and an Appropriate Assessment may be required in support of applications for new licences. There is a presumption of renewal of licences subject to the other renewal criteria and local considerations. Licence conditions may be subject to minor changes including the addition of water efficiency conditions. The Environment Agency is reviewing existing abstraction licences which could have an impact on the River Itchen SAC. This WRMU excludes the Monks Brook which enters the Itchen near Riverside Park. Although, not been formally assessed, preliminary investigations assessed classified the Monks Brook as *water available* overridden to *no water available,* due to the downstream needs of the Lower Itchen.
Blackwater No water available	This unit covers the River Blackwater from its source in the Whiteparish area to its confluence with the River Test at Testwood and includes its tributary, the Cadnam River. Two thirds of abstraction is for the Paultons Adventure Park amenity lake whilst a number of golf courses use spray irrigation, about half with winter storage reservoirs. There is also a significant amount of spray irrigation for agricultural and horticultural use. In the Wellow area there is a significant amount of presently exempt trickle irrigation which will require licences in the next few years. There are no PWS sources within the unit. The Broadlands fish farm carrier brings chalk stream water from the Test into the Blackwater near Testwood, augmenting its flow. There is a presumption against issuing licences for summer consumptive abstraction from surface water. Flows in the River Blackwater respond more quickly to rainfall than the nearby chalk streams and there is better scope for capturing high flows for winter storage. Due to these different characteristics it is considered reasonable to allow abstraction for winter storage when flows are above the winter Q95 flow of 0.2 cumecs as recorded at the gauging station at Ower. Non-consumptive licences will generally be considered subject to environmental assessment and meeting the three tests of: need for water, making efficient use of water and not causing any environmental damage.

	New licences will normally be time limited to expire with a common end date of 2013, with a normal renewal period of 12 years. There is a presumption of renewal of licences subject to the other renewal criteria and local considerations. Licence conditions may be subject to minor changes including the addition of water efficiency conditions.
Lower Test Over-licensed	This unit covers the main River Test from Timsbury north of Romsey to Redbridge at the mouth of Southampton Water and includes the Tadburn Stream. Abstraction is approximately split between two thirds licensed for non-consumptive fish farming and a third for PWS at Testwood. Water is supplied from Testwood, through a cross-Solent pipeline, to the Isle of Wight where it meets up to a quarter of the Island's requirements. Testwood supplies approximately 600,000 people in south Hampshire and the Isle of Wight. There is also a pipeline supplying Fawley refinery. Testwood is an important strategic resource and will be used to meet future demands for water in large parts of South Hampshire. In addition, if reductions in abstraction are required on the River Itchen, it is likely that abstraction will increase at Testwood. There is a presumption against issuing licences for summer consumptive abstraction from surface water. The Environment Agency will consider applications for abstractions from surface water between November and March using winter storage. A "hands-off flow" of a winter Q50 is likely to be applied. Non-consumptive licences will generally be considered subject to environmental assessment and meeting the three tests of: need for water, making efficient use of water and not causing any environmental damage. New licences will normally be time limited to expire with a common end date of 2013, with a normal renewal period of 12 years. There is a presumption of renewal of licences subject to the other renewal criteria and local considerations. Licence conditions may be subject to minor changes including the addition of water efficiency conditions.
Mid Test No water available	This unit covers the main River Test from Chilbolton to Timsbury north of Romsey. It includes the Wallop Brook, the River Dun, Somborne Stream and the associated chalk groundwater catchments. Virtually all licensed abstraction within the unit is for non-consumptive fish farming. There are three PWS abstractions within the unit at West Tytherley, Timsbury and Horsebridge. There is very little abstraction on the River Dun and the Wallop Brook. The WWTW draining Andover discharges into the northern section of the unit above Leckford. There is a presumption against issuing licences for summer consumptive abstraction from surface water. The Environment Agency will consider applications for abstractions from surface water between November and March using winter storage. A "hands-off flow" of a winter Q50 is likely to be applied. There is a presumption against issuing consumptive licences from the chalk Non-consumptive licences will generally be considered subject to

	environmental assessment and meeting the three tests of: need for water, making efficient use of water and not causing any environmental damage. New licences will normally be time limited to expire with a common end date of 2013, with a normal renewal period of 12 years. There is a presumption of renewal of licences subject to the other renewal criteria and local considerations. Licence conditions may be subject to minor changes including the addition of water efficiency conditions.
EAST HAMPSHIRE	
River Hamble to Maddoxford Water available	Western arm of the River Hamble. There is no gauging station and monitoring is carried out monthly at Maddoxford. There are no major abstractions or discharges. Sites likely to be impacted by abstraction include Moorgreen Meadow SSSI; a water level dependent site and the River Hamble. The Hamble Estuary is also part of the Solent Maritime SAC and discharges to Solent & Soton Water SPA & Ramsar. Presumption against new licences from unconfined Chalk. Consumptive surface water licences considered for winter storage with appropriate flow/ level conditions. New licences will be time limited with and common end date of 2016 and 12-year renewal period. Presumption of renewal of licences subject to the other renewal criteria and local considerations. May be subject to conditions. Habitats Directive Review of Consents applies to some licences in this unit due to potential impacts on SAC and SPA sites.
River Hamble to Frogmill Over-abstracted	Eastern Arm of the River Hamble. A STW below Bishops Walton supports flows, but adequate natural flows are required to provide dilution. Sites likely to be impacted by abstraction include The Moors SSSI, The North Ponds at Bishops Waltham and the River Hamble. Abstraction is currently affecting local water features. Presumption against new licences from unconfined Chalk. Consumptive surface water licences considered for winter storage with appropriate flow/ level conditions. New licences will be time limited with and common end date of 2016 and 12-year renewal period. Presumption of renewal of licences subject to the other renewal criteria and local considerations. May be subject to conditions. Habitats Directive Review of Consents applies to some licences in this unit due to potential impacts on Solent Maritime SAC and Solent & Soton Water SPA. Over-licensing and over-abstraction has been reduced by implementing AMP3 obligation to revoke the Hoe PWS abstraction licence.

Brownwich Stream to Brownwich Pond No water available	Abstractions in this unit are for spray irrigation. There is little hydrometric monitoring so there are some uncertainties associated with the assessment. Consumptive surface water licences considered for winter storage with appropriate flow/ level conditions. New licences will be time limited with and common end date of 2016 and 12-year renewal period. Presumption of renewal of licences subject to the other renewal criteria and local considerations. May be subject to conditions. Habitats Directive Review of Consents applies to some licences in this unit due to potential impacts on Solent & Soton Water SPA.
River Meon to Mislingford Over-abstracted	The river naturally suffers from low flows and upstream of Warnford can dry up in drought summers. There are four PWS abstractions, all from groundwater close to the river, the largest of which is at Soberton. There is significant abstraction for watercress farming at Warnford although water is returned to the river close by. The river is designated as a Site Important for Nature Conservation (SINC). Presumption against new licences from unconfined Chalk. Consumptive surface water licences considered for winter storage with appropriate flow/ level conditions. New licences will be time limited with and common end date of 2016 and 12-year renewal period. Presumption of renewal of licences subject to the other renewal criteria and local considerations. May be subject to conditions. Habitats Directive Review of Consents applies to some licences in this unit due to potential impacts on Solent & Soton Water SPA. The strategy includes a reduction of the PWS licence from Soberton.
River Meon to Titchfield Over-abstracted	There are large summer spray irrigation licences allowing direct abstraction from the river. Dilution is important for the STW at Wickham and Knowle. The status of the river downstream of Mislingford is determined by the large abstractions upstream of here. Titchfield Haven SSSI is a water level dependent site in the lower part of the catchment. Presumption against new licences from unconfined Chalk. Consumptive surface water licences considered for winter storage with appropriate flow/ level conditions. New licences will be time limited with and common end date of 2016 and 12-year renewal period. Presumption of renewal of licences subject to the other renewal criteria and local considerations. May be subject to conditions. Habitats Directive Review of Consents applies to some licences in this unit due to potential impacts on Solent & Soton Water SPA.

River Wallington to North Fareham Over-abstracted	The river suffers low flows in the summer. There are large groundwater abstractions and their impact on river flows has never been fully investigated. The ecological status of the river is otherwise good. Further investigations combined with data from recent work carried out by the EA and Portsmouth Water will give more information about the catchment to guide future assessments. The river flows into Portsmouth Harbour SPA, Ramsar. Presumption against new licences from unconfined Chalk. Consumptive surface water licences considered for winter storage with appropriate flow/ level conditions. New licences will be time limited with and common end date of 2016 and 12-year renewal period. Presumption of renewal of licences subject to the other renewal criteria and local considerations. May be subject to conditions. Habitats Directive Review of Consents applies to some licences in this unit due to potential impacts on Portsmouth Harbour SPA.
Wallington, Portsdown and Butser Chalk Over-licensed	The Chalk of South East Hampshire is complex and boundaries between catchments are difficult to determine. The outflow for most of the unit is the large springs at Havant and Bedhampton. Within this unit, 995 of all licenced abstraction is for PWS and made up of four abstractions. Groundwater feeds springs and rivers which flow into Portsmouth Harbour SPA, Ramsar and Chichester & Langstone Harbour SPA, Ramsar. Presumption against new licences from unconfined Chalk. New licences will be time limited with and common end date of 2016 and 12-year renewal period. Presumption of renewal of licences subject to the other renewal criteria and local considerations. May be subject to conditions. Habitats Directive Review of Consents applies to some licences in this unit due to potential impacts on Portsmouth Harbour SPA, Langstone & Chichester Harbour SPA and Solent & Isle of Wight Lagoons SAC. In particular, the reduction of Havant and Bedhampton springs licence is being consider through the Habitats Directive review.

There are some resources that have not been included in the CAMS assessments. In the East Hampshire CAMS these include the tributary streams of the Hamble, The River Alver, the Hermitage Stream, the Lavant Stream and the Upper Greensand aquifer. The Environment Agency's proposed catchment licensing strategy will also apply to these resources. In addition to this, the CAMS identifies the following issues that will also need to be considered:

- Most catchments drain to a Habitats Directive site and the impact of each licence on that site will need to be assessed;
- Abstractions from the Upper Greensand will need to consider impacts on other abstractions and the River Rother; and

- Abstractions from the river Alver will be considered with regard to potential improvements in water and biological quality.

In The Test & Itchen CAMS the Monks Brook at Eastleigh, Tanners Brook flowing through Millbrook in Southampton and other small coastal and urban streams are not formally assessed (although the Monks Brook has been informal assessed as *no water available,* see the summary description for the Lower Itchen. The following licensing strategy policies apply to these resources:

- A presumption against issuing licences for summer consumptive abstraction from surface water. Applications for winter storage abstractions from surface water between November and March will be considered. A “hands-off flow” of a winter Q50 is likely to be applied;
- The impacts of each licence on Habitat Directive sites will need to be assessed;
- Non-consumptive licences will generally be considered subject to environmental assessment and meeting the three tests of: need for water, making efficient use of water and not causing any environmental damage; and
- New licences will normally be time limited to expire with a common end date of 2013, with a normal renewal period of 12 years.

Restoring Sustainable Abstraction Programme

In June 1998 the Government issued a consultation paper proposing a number of administrative and legislative changes to the present system of water abstraction licensing in England and Wales.

In response, the Government made the following decisions which reflected the its intention that the abstraction authorisation system should contribute to sustainable development by protecting and, where possible, enhancing the aquatic environment whilst facilitating economic growth and higher living standards with minimum impact on water customers' bills. These decisions were published in the Taking Water Responsibly paper, and included commitments to:

- Provide the Environment Agency with additional tools for the conduct of its duty to manage water resources, whilst encouraging a voluntary approach to necessary changes by abstractors;
- Increase the scope and public availability of information on water resources, enabling abstractors to review their present operations and plan ahead in an environmentally responsible manner;
- Increase the system's flexibility, accountability and administrative efficiency, thereby increasing the ease of access to sustainable water resources for existing and new entrants to the sectors for which water abstraction is vital; and
- Incorporate appropriate transitional arrangements, both for existing abstractors and for those who will be subject to controls for the first time.

Following Taking Water Responsibly, the Government instructed the Environment Agency to use its powers to revoke damaging licences. The Restoring Sustainable Abstraction (RSA) Programme was set up by the Environment Agency in 1999 to identify and catalogue those sites which may be at risk from abstraction. The remediation strategy for England and Wales addresses concerns highlighted by the Agency, conservation groups and environmental groups about unsustainable abstraction and will aim to investigate these sites in detail. It will also address the recent European Birds and Habitats Directive requirement for the Agency to pay heed to unsustainable abstraction by reviewing consents in designated areas.

Groundwater Protection

The Environment Agency has responsibility for protecting groundwater resources and has a number of guidance documents. Reference should be made to the Environment Agency's Groundwater Protection: Policy and Practice (GP3). It is available on the EA's website

http://www.environment-agency.gov.uk/subjects/waterres/groundwater/1463256/

Water Quality Drivers

Estuarine classification scheme

The Environment Agency reports estuarine water quality in England and Wales every five years. This is based on an assessment and classification scheme prepared by the Classification of Estuaries Working Party (CEWP) in the 1970s.

Based biological, aesthetic and chemical (DO) quality estuaries are classified as either Good, Fair, Poor, or Bad quality following the allocation of a score according to a set of criteria. In the assessment of biological quality issues relating to fish migration, fisheries population structure and benthic invertebrate population structure and bioaccumulation of toxins are used. Scores are allocated based on the degree to which the bathing water:

- Allows passage to and from fresh water of all relevant species of migratory fish, when this is not prevented by physical barriers. Relevant species include salmonids, eels, flounders;
- Supports a residential fish population which is broadly consistent with the physical and hydrographical conditions;
- Supports a benthic community which is broadly consistent with the physical and hydrographical conditions; and
- Shows absence of substantially elevated levels in the biota of persistent toxic or tainting substances from whatever source.

Aesthetic quality scores are determined by the volume of polluting input received and the degree to which this affects the usage of the Bathing Water by the public. Both biological and aesthetic quality is assessed in conjunction with dissolved oxygen saturation levels. Assessments have in the past been made using a combination of data from statutory monitoring programmes and local knowledge. Common to a number of assessments has been a lack of information for determining the levels of toxins in biota. In such incidences, data reported for the Dangerous Substances Directive (sediment monitoring) were used to make an assessment where possible.

Environment Agency River Quality Objectives

The Environment Agency has classified about 40,000 km of rivers and canals in England and Wales. These watercourses are split into about 8,000 stretches, each one of which has been given a river quality objective (RQO). The RQO scheme is based on the recognised uses of a river as assessed through the chemical quality requirements of different types of aquatic ecosystems.

RQOs are adopted in the plans for maintenance and improvement of river quality and provide a basis for setting discharge consent standards. Compliance is reported

annually using a three-year assessment period. Where river quality does not meet set objectives, an improvement plan is established. Factors affecting compliance include interactions between natural and anthropogenic effects, such as sewage treatment discharges and river flows.

Environment Agency Classification

The EA methodology for classifying water quality of rivers and canals is known as the General Quality Assessment scheme (GQA). It is designed to provide an accurate and consistent assessment of the state of water quality and changes in state over time. Water quality is assessed by the Environment Agency using four separate categories relating to chemistry, biology, nutrients and aesthetics that best reflect the most common types of pollution including discharges of treated waste from sewage treatment works, agriculture and industry. An overview if these assessments are provided below.

Chemical GQA

The chemical GQA describes water quality in terms of chemical measurements which detect the most common types of pollution. It allocates one of six grades (A to F) to each stretch of river, using the same, strictly defined procedures, throughout England and Wales. The grade is defined by standards of biological oxygen demand (BOD), ammonia and dissolved oxygen. These determinates are indicators of pollutant loading that apply to all rivers and are important in the assessment of toxicity to aquatic life, including fish, macroinvertebrates and algae.

Biological GQA

The biological classification scheme is based on the macroinvertebrate communities of rivers and canals. Macroinvertebrates are the most widely used biological unit for assessment because they are found in virtually all fresh waters, they lead relatively sedentary life-styles and respond to chemical and physical changes to their environment. The macroinvertebrate community structure will respond to pollutants that occur infrequently or in very low concentrations and which may be overlooked by routine chemical sampling programmes. The assessment describes biological quality in terms of the difference between biological indices calculated from the macroinvertebrate community actually found (observed) in the river, compared to those which would be expected under natural conditions (expected).

The assessment is undertaken through the use of use of the RIVPACS (River Invertebrate Prediction and Classification System) computer program developed by Centre for Ecology and Hydrology. This tool predicts the number and type of taxa that would be expected at each site if the environmental quality was good based on an extensive reference data set. Outputs are expressed as Ecological Quality Indices (EQIs) based on the proportion of the observed score against the expected value predicted by RIVPACS. An EQI of about 1 indicates that the site from which the macroinvertebrate community was sampled is not damaged ecologically, and is not unpolluted. Lower values of EQI indicate that the environment is damaged or the river is polluted.

Nutrient GQA

A grade is allocated separately for both phosphate and nitrate concentrations. These are not combined into a single nutrients grade and as such differ in approach from

the chemical and aesthetic classifications. There are no set "good" or "bad" concentrations for nutrients in rivers in the way we describe chemical and biological quality. Rivers in different parts of the country have naturally different concentrations of nutrients. "Very low" nutrient concentrations, for example, are not necessarily good or bad; the classification merely states that concentrations in this river are very low relative to other rivers.

Aesthetic GQA

The aesthetic quality assessment of rivers and canals is based on litter (gross litter, general litter, sewage litter and dog faeces) oil, surface scum, foam, sewage fungus, ochre colour and odour within predefined river reaches. The standard sampling unit consists of an area extending 50m along the riverbank and up to 5m from the water's edge plus the river and its bed. The general rule is that a standard site comprises both riverbanks and the water.

Litter items are counted in the water and on banks where there is public access. Oil, surface scum, foam, sewage fungus and ochre are assessed as percentage cover of the water surface or river bed. Colour is assessed in the field using a modified Standing Committee of Analysts 'Blue Book' method. Odour is qualitatively assessed from the bankside.

The scheme has been designed so that a site can be classified as 'bad' by one parameter with a high perception of poor quality scoring highly, or by a combination of several parameters being present during sampling. The scheme was tested in rivers across England and Wales in November and December 2000. As a result, methodologies have been adapted and the Environment Agency are working with the National Aquatic Litter Group to establish a new protocol that can be used by any organisation to monitor the aesthetic quality of rivers.

Appendix C: FLOOD RISK MANAGEMENT

The most important legislative drivers for flood risk and coastal protection management are summarised below. The primary legislation relating to the protection from erosion and permanent occupation of the land by sea is the Coast Protection Act 1949 (CPA); and where flooding relates to temporary sea and tidal flooding incidents the primary Acts are the Water Resources Act 1991 and the Land Drainage Act 1991.

Water Resources Act (1991) and Land Drainage Act (1991)

The Water Resources Act 1991 and the Land Drainage Act 1991 (as amended by the Land Drainage Act 1994) provide the enabling primary legislation for sea defence works for the control of flooding. Under the acts drainage is defined as “defence against water, including sea water; irrigation and warping”, and as such duties include both coastal and inland flood defence. The Environment Act 1995 amended this definition to include the management of water levels as part of the roles of the Environment Agency, Internal Drainage Boards (IDBs) and Local Authorities. The EA has permissive powers under the Act in respect of "main rivers", which deal with maintenance, improvement works and construction.

The Agency is also a formal consultee on certain planning and development control matters relating to land drainage and flood defence.

Coast Protection Act (1949)

The Coastal Protection Act gives the coast protection authorities permissive powers to carry out coast protection works to guard against the incursion of the sea where the natural defences are being eroded. Under the Act such works relate to the construction, alteration, improvement, repair, maintenance, demolition or removal of works for the purpose of protecting land against erosion or encroachment by the sea.

Responsibility for coastal protection work falls to the “Coast Protection Authorities” (nominally maritime district or unitary councils), who are given powers to undertake duties in connection with the protection of land within the limits of their jurisdiction. The CPA is enabling legislation and does not carry with it any requirement, although a Coast Protection Authority owes a common law duty of care in performing its functions. The Act does not apply to works in non-tidal inland waters

Flood Risk management

The process of managing river and coastal flood risk management for existing communities is currently undertaken through the development and implementation of a hierarchy of plans and strategies. Coastal flooding is managed through the development of high level ‘Shoreline Management Plans’ which set the overarching policies for flood management. These are supplemented by Coastal Defence Strategy Studies which develop Options for implementing these policies. These plans have a 100 year time horizon and must take account of future climate change. The Options are implemented through the development of individual schemes or the

implementation of non-structural measures such as flood warning systems by the EA or Operating Authorities. Riparian owners can also undertake works, if it is in agreement with the overarching policy and with the relevant consents and permissions.

A similar approach is taken for fluvial (river) flood management by the production of over arching policies through the development of Catchment Flood Management Plans (CFMPs) and Fluvial Flood Risk Management Strategies. The EA is the primary authority for Government funded fluvial flood management.

The following section highlights the key conclusions from the relevant plans and strategies for the region.

Shoreline Management Plans

A Shoreline Management Plan (SMP) is a non-statutory document that provides a broad assessment of the long-term risks associated with coastal processes. It offers guidance to coastal engineers and managers to identify and recommend strategic and sustainable coastal defence policy options for particular lengths of coast to reduce these risks to people, the developed and natural environments. SMPs are an important part of the Defra strategy for flood and coastal defence. They must take account of existing planning initiatives and legislative requirements and use the best present knowledge on the possible effects of climate change and sea level rise. The plan should inform, and be supported by, the statutory planning process.

SMPs aim to determine sustainable policies for management of the shoreline management and to set a framework for the future management of erosion and flood risks along the coastline. An SMP considers the objectives, policies and management requirements for 3 epochs; (a) present day (0-20 years); (b) medium-term (20-50 years); and (c) long-term (50-100 years). The Objectives of an SMP are:

- To define the flooding and erosion risks to people, and the developed, historic and natural environments
- To identify the preferred policies for managing those risks
- To identify consequences of implementing the preferred policies
- To set out procedures for monitoring the effectiveness of the policies
- To inform others so future land use and coastal zone development can take account of the risks and the policies
- To comply with international and national nature conservation legislation and obligations

The coastline is sub-divided into Policy Units, based on natural sediment movements and coastal processes, rather than administrative boundaries. The management policies are defined by Defra and are summarised below:

Hold the line	Maintain or upgrade level of protection provided by defences
Advance the line	Build new defences seaward of existing defences
Managed realignment	Allowing retreat of shoreline with management to control or limit movement
No active intervention	Not to invest in providing or maintaining defences

The following table (Table 9.5) details the shoreline management policies for each Management Unit, as determined through the first round of SMPs (the Western Solent and Southampton Water SMP 1998, and the Eastern Solent and Harbours SMP 1997).Units which have a Beach Management Plan (BMP) are also indicated.

Table 9.5 SMP Policies from the Western Solent and Southampton Water SMP 1998 and the Eastern Solent and Harbours SMP 1997.

Management Unit	Start unit	End unit	First round SMP Policy
WESTERN SOLENT			
LYM5	Elmers Court	Pitts Deep	Retreat the Line
LYM6	Pitts Deep	Warren Beach Cottage	Hold the Line
LYM7	Warren Beach Cottage	Gull Island	Do Nothing
LYM8	Gull Island	Beaulieu River	Hold the Line
LYM9	Inchmery	Lepe	Hold the Line
LYM10	Lepe	Stone Point	Hold the Line
LYM11	Stone Point	Bourne Gap	Hold the Line
LYM12	Bourne Gap	Hillhead	Hold the Line
LYM13	Hillhead	Calshot Spit	Hold the Line
LYM14	Calshot Spit	Calshot Spit (jetty)	Hold the Line
SOUTHAMPTON WATER AND RIVERS TEST, ITCHEN & HAMBLE			
FAW1	Calshot Spit (jetty)	Lee Of Calshot Spit	Hold the Line
FAW2	Lee of Calshot Spit	Fawley Power station	Hold the Line
FAW3	Fawley Power station	Fawley Power station	Hold the Line
FAW4	Fawley Power station	Fawley Oil Refinery	Hold the Line
FAW5	Fawley Oil Refinery	Fawley Oil Refinery	Hold the Line
FAW6	Fawley Oil Refinery	Hythe Sailing Club	Retreat the Line
FAW7	Hythe Sailing Club	Hythe Marina	Hold the Line
TEST1	Hythe Marina	Marchwood Military Port	Hold the Line
TEST2	Marchwood Military Port	Cracknore Hard	Hold the Line

TEST3	Cracknore Hard	Royal Navy Armaments Depot	Hold the Line
TEST4	Royal Navy Armaments Depot	Eling Creek	Do Nothing
TEST5	Eling Creek	Redbridge	Hold the Line
TEST6	Redbridge	Southampton Port	Hold the Line
ITCH1	Southampton Port	Ocean Village	Hold the Line
ITCH2	Ocean Village	Woodmill Lane Bridge	Hold the Line
ITCH3	Woodmill Lane Bridge	Cobden Bridge	Hold the Line
ITCH4	Cobden Bridge	Weston Point	Hold Line
NET1	Weston Point	Netley Castle	Hold / Retreat the Line
NET2	Netley Castle	Netley Hard	Hold the Line
NET3	Netley Hard	Cliff House	Hold / Retreat the Line
NET4	Cliff House	Ensign Industrial Park	Retreat the Line
NET5	Ensign Industrial Park	Hamble Oil Terminal	Hold the Line
NET6	Hamble Oil Terminal	Hamble Common Point	Hold the Line
HAM1	Hamble Common Point	Satchell Marshes	Hold the Line
HAM2	Satchell Marshes	Badnam Creek	Retreat the Line
HAM3	Badnam Creek	Lands End Lane	Do Nothing
HAM4	Lands End Lane	Swanwick Shore Road	Hold the Line
HAM5	Swanwick Shore Road	Crableck Marina	Do Nothing
HAM6	Crableck Marina	Crableck Marina	Hold the Line
HAM7	Crableck Marina	Warsash North	Do Nothing
HAM8	Warsash North	Hook Park	Hold the Line
EASTERN SOLENT			
CPU14	Solent Breezes	Hook Lake	Hold the Line
CPU13	Hill Head Harbour	Solent Breezes	Hold the Line / Do

			Nothing
CPU12	Lee-on-the -Solent	Hill Head Harbour	Hold the Line / BMP[4]
CPU11	Fort Gilkicker	Browndown Ranges	Do Nothing
CPU10	Portsmouth Harbour Entrance	Fort Gilkicker	Hold the Line
CPU9	Southsea Castle	Portsmouth Harbour Entrance	Hold the Line
CPU8	Langstone Harbour entrance	Southsea Castle	Hold the Line
CPU7	Inn On The Beach	Langstone Harbour entrance	Hold the Line / Do Nothing / BMP*
CPU6	Sandy Point	Inn On Beach, Hayling Island	Hold the Line / BMP*
CPU5	Cakesham Estate	East Head	Hold the Line / BMP*
CPU4	Bracklesham	East Wittering	Hold the Line
CPU3	West Beach	Bracklesham	Hold the Line
CPU2	East Beach	West Beach	Hold the Line
CPU1	Pagham entrance	East Beach	Hold the Line
PORTSMOUTH HARBOUR			
• Eastern Shore of Portsmouth Harbour up to Fort Brockhurst			Hold the Line
• North East Shore from Fort Brockhurst to Foxbury Point			No intervention
• Foxbury Point to Porchester			Hold the Line
• Porchester to Old Portsmouth view Point (including Whale Island)			Hold the Line
LANGSTONE HARBOUR			
• Eastern side of Portsea Island			Hold the Line
• Farlington Marshes			Hold the Line/investigation into long term managed realignment
• Northern edge of Langstone Harbour			Hold the Line
• North Western shore of Hayling Island			Hold the Line

[4] Beach Management Plan

• South Western shore of Hayling Island	Hold the Line / No Intervention.
CHICHESTER HARBOUR	
• Eastern Shore of Hayling Island up to Northney Road Marina	Hold the Line
• Northney Road Marina to Langstone Road	No Intervention
• Langstone Road to Thorney Island	Hold the Line
• Thorney Island (except southern tip)	Hold the Line
• Southern tip of Thorney Island	No intervention
• Prinstead round to Broadbridge	Hold the Line
• Broadbridge to Bosham	No Intervention
• Bosham to Lowerhone Farm	Hold the Line
• Lowerhone Farm round to Fishbourne	Mainly No Intervention/ small areas of Hold the Line
• Fishbourne to Dell Quay	Hold the Line
• Dell Quay to Marina	No Intervention
• Marina to West Itchenor	Hold the Line
• West Itchenor to Ellanor Lane	No Intervention
• Ellanor Lane to East Head	Hold the Line / No Intervention

Catchment Flood Management Plans

The purpose of CFMPs is to develop sustainable and complementary policies for managing fluvial flood risk in catchments in the long term. This needs to take account of how catchments are likely to change, over the next 50 to 100 years, particularly in terms of climate, development, land use and land management. This will help bring about a range of benefits to the communities and environment within the catchment, while contributing towards sustainable development. The catchments are subdivided into policy units. These are areas where a particular policy and certain actions will apply. Each policy unit is assigned one of six flood risk management policies which cover the range of options available. These include:

1. No active intervention (including flood warning and maintenance). Continue to monitor and advise.

2. Reduce existing flood risk management actions (accepting that flood risk will increase over time).

3. Continue with existing or alternative actions to manage flood risk at the current level (accepting that flood risk will increase over time from this baseline).

4. Take further action to sustain current scale of flood risk into the future (responding to the potential increases in flood risk from urban development, land use change, and climate change).

5. Take further action to reduce flood risk (now and/or in the future).

6. Take action to increase the frequency of flooding to deliver benefits locally or elsewhere, which may constitute an overall flood risk reduction (for example for habitat inundation).

A summary of policy units and selected policies is outlined in Table 9.6 below. These are taken from the following CFMP documents:

- Test & Itchen CFMP
- South East Hampshire CFMP

The New Forest CFMP is currently under development.

Table 9.6 Policy units and selected policies

Policy Unit	Policy	Consequence of the selected policy
TEST & ITCHEN		
Policy Unit B - *Romsey*	5	A long term reduction in flood risk will be achieved primarily through a number of measures to be determined through a flood risk management strategy. This is likely to focus on improving defences and channel/ structure conveyance on the Tadburn Lake Stream. There is some potential for flood storage on this tributary, and opportunities to open out the river corridor should be sought as part of any redevelopment plans. There may be opportunities for strategic works as part of planned significant development proposals. Emergency response plans should be developed due to the complexities of the flooding mechanism and potentially high consequences. A limited amount of flood risk benefit might be gained through enhancing the Fishlake Meadows washland area upstream, with further possibilities in terms of controlling side channel flow splits and upstream washlands (policy unit D), though these may result in greater environmental gains through providing enhancements to wetland habitats and the River Test SSSI.
Policy Unit C – *Upper and Middle Test*	3	This will support the existing flood risk management activities, though allowing alternatives to be examined. These need to be aligned with the WLMP for the River Test SSSI. The understanding of flood risk needs to be improved through more detailed modelling, as part of a feasibility study, in particular at Stockbridge.
Policy Unit D – *Dun and Test to Romsey*	6	This will support many of the existing flood risk management activities, but will examine opportunities for increasing the frequency and depths of flooding to provide attenuation to flood peaks in Romsey (policy unit B). These need to be aligned with WLMP for the River Test SSSI. More detailed modelling will improve knowledge of the flood system and investigate flood storage potential, as part of a

		prefeasibility study to be incorporated within the flood risk management strategy for Romsey (Policy Unit B). This will look for environmental gains where possible.
Policy Unit E - *Winchester*	5	A long term reduction in flood risk will be achieved primarily through a number of measures to be determined through a flood risk management strategy, though it is appreciated that there are significant constraints to implementing solutions. This is likely to focus on channel conveyance improvements together with local defences. Opportunities to open out the river corridor or to implement strategic works should be sought as part of any redevelopment plans. Emergency response plans should be developed due to the complexities of the flooding mechanism and potentially high consequences. A limited amount of flood risk benefit might be gained through enhancing the washland area upstream of Winchester, with further possibilities in terms of controlling side channel flow splits and upstream washlands (policy unit G), though these may result in greater environmental gains through providing enhancements to wetland habitats and the River Itchen SSSI.
Policy Unit F – *Monks Brook*	4	Sustaining the level of flood risk in the long term is likely to require a significant response, due to the high sensitivity to climate change impacts. This will be achieved primarily through a number of measures to be determined through a flood risk management strategy, likely to focus on channel conveyance, improving local defences, and restoring the natural channel. Flood storage upstream is also an option, though may be too expensive. Opportunities to open out the river corridor or to implement strategic works should be sought as part of any redevelopment plans. In the shorter term the improved understanding of the flooding issues should allow the development of integrated urban drainage plans for the area.
Policy Unit G – *Middle Itchen*	6	This will support many of the existing flood risk management activities, but will examine opportunities for increasing the frequency and depths of flooding to provide attenuation to flood peaks in Winchester (policy unit E). These need to be aligned with the WLMP for the River Itchen SSSI. More detailed modelling will improve knowledge of the flood system and investigate flood storage potential, as part of a prefeasibility study to be incorporated within the flood risk management strategy for Winchester (Policy Unit E). This will look for environmental gains where possible.
Policy Unit H - *Lower Itchen*	4	Sustaining the level of flood risk in the long term is likely to require only limited responses over time, due to relatively low sensitivity to climate change impacts and uncertainty over this impact for groundwater-fed rivers. This will be achieved primarily through a number of measures to be determined through a flood risk management strategy, likely to focus on channel conveyance, improving local defences, and maximizing upstream storage (policy unit G). Opportunities should be sought to implement strategic works as part of any redevelopment plans, and to provide enhancements to wetland habitats and the River Itchen SSSI.
Policy Unit I – *Lower Test*	3	This will support the existing flood risk management activities, maintaining a relatively low level of flood risk. These need to be aligned with the WLMP for the River Test SSSI, and ensure no adverse impacts on downstream designated sites. The most significant long term impact is likely to be from rising sea levels which will require defences to be maintained, in line with the SMP, and which will give rise to changes between freshwater and saline

		habitats.
Policy Unit J – *Coastal Urban*	5	Sustaining the level of flood risk in the long term is likely to require a significant response, due to the high sensitivity to climate change impacts. Due to the present lack of data on this area, Tanners Brook in particular, a feasibility study will initially confirm the level of flood risk and consider response options further. It is likely to focus on channel conveyance and restoring the natural channel. Flood storage upstream is also an option, though may be too expensive. Opportunities to open out the river corridors or to implement strategic works should be sought as part of any redevelopment plans.
Policy Unit K - *Chalk*	4	Sustaining the level of flood risk in the long term is likely to require only limited responses over time, due to relatively low sensitivity to climate change impacts and uncertainty over this impact for groundwater areas. These may be numerous and widespread however. They will be achieved through partnerships with local authorities to ensure that drainage systems function effectively, raising awareness of groundwater flooding, promoting property flood proofing, enhancing groundwater knowledge and flood warning and good land management and development control. Opportunities should be sought to implement local works as part of any redevelopment plans, and to provide enhancements to chalk stream habitats.
Policy Unit L - *Clay*	3	This will support the existing flood risk management activities, maintaining a relatively low level of flood risk. These need to ensure no adverse impacts on downstream designated sites. Opportunities should be sought to provide enhancements to wetland habitats and improve the favourable condition of the various SSSIs including the New Forest.
SOUTH EAST HAMPSHIRE		
Policy Unit A – Portsmouth and Langstone Harbours	5	The combination of increased urban development and density, combined with increased storminess resulting from climate change means that flood risk will increase in this policy unit. The policy supports drainage investigations to identify improvements and to improve capacity. Improvements will result in less properties being flooded by overwhelming of the surface water drainage network
Policy Unit B – Hamble	4	The policy will improve the current situation and address the known locations where surface water flooding has occurred in the past. Measures will be taken to ensure the increased storminess due to climate change does not significantly increase flood risk in the future. New development in the unit will need to demonstrate that it will not increase the risk of flooding. Some surface drainage flooding is still likely to occur due to the unpredictable nature of the causes and locations of flooding.
Policy Unit C – Lower Hamble and Lower Meon	6	The consequence of this policy is that flooding will be encouraged on Titchfield Haven. River management will increase and the condition of the environmentally designated site is expected to improve. Channel conveyance improvements are expected to reduce flood risk to Titchfield. Further action may be required in the future if sediment build up in the channel reduces capacity, especially where the River Meon flows under the M27.
Policy Unit D –	5	Measures will be taken to reduce flood risk, especially in Wallington.

Wallington River		Flood risk will be reduced in the longer term. Measures will be taken to reduce the increased risk that will result from climate change.
Policy Unit E – Havant	4	The policy will improve the current situation and address the known locations where surface water flooding has occurred in the past. Measures will be taken to ensure the increased storminess due to climate change does not significantly increase flood risk in the future. New development in the unit will need to demonstrate that it will not increase the risk of flooding. Some surface drainage flooding is still likely to occur due to the unpredictable nature of the causes and locations of flooding.
Policy Unit F – Chalk Catchment	5	Through a proactive awareness raising campaign property owners will understand the mechanisms by which groundwater flooding occurs and will be able to take a role in reducing flood risk from groundwater flooding. Measures will be taken to ensure that emergent groundwater is able pass downstream with minimal obstruction. Individual property owners will be able to take a role in reducing flood risk to their property.

Coastal Defence Strategy Studies and Flood Risk Management Strategies are being produced for the rivers and coastal zone of the PUSH area by the relevant operating Authorities. These Strategies put forward the preferred approach for implementing the policies highlighted above. Section 5 of the main report discusses the opportunities and constraints for the PUSH development resulting from the flood risk management policies promoted in these documents.

Strategic Flood Risk Assessment

A Strategic Flood Risk Assessment (SFRA) has recently been completed by Atkins for the whole of the PUSH region. The main sources of flooding in each local authority area as described by the Guidance Notes on the SFRA are summarised in the following sections. A map of SFRA flood zones is provided in the main report.

East Hampshire District Council

East Hampshire has no coastal frontages and only 4km of designated Main River all of which is found south of Rowlands Castle. The presence of dry valleys which have in the past flooded along the upper reaches of both the River Wallington west of Horndean and the Lavant Stream which flows through Horndean and Rowlands Castle do pose a risk of flooding. At present, approximately 3% of the land area in this part of the borough is designated as within Flood Zones 2 and 3a/3b.

The SFRA has shown that unlike all other districts in the PUSH sub-region, the primary source of flood risk to this part of the District is not from fluvial or tidal flooding but from overland flow flooding from intense rainfall. The upper reaches of the River Wallington and the Lavant Stream are dry valleys, due to the permeable nature of the geology in this area, which in the past (significantly in May 2000) have flooded because of intense rainfall over a short period, normally associated with summer storms. Due to their topography, these dry valleys have been developed in parts and serve as the location for main roads, further enhancing the topographic 'funnelling effect' of intense surface water flows. Clanfield and Horndean have been flooded in this way in the past and Flood Zones 2 and 3 do take account of this potential flow route despite the ephemeral nature of the watercourse. It should be noted, that due to the geology of this part of East Hampshire District, this type of

flooding is only likely to occur following extreme rainfall events, the frequency of which cannot be directly compared with the return periods assigned to river flows or extreme tide levels. It is therefore suggested that this part of East Hampshire does not face the same high-level flood risk challenges as posed to the other Local Planning Authorities that constitute the PUSH sub-region.

Historical incidents of groundwater flooding in this part of the District have occurred mainly in the Lavant Stream valley south of Rowlands Castle, where the South Downs chalk ends and the stream meet less permeable bedrock. The affected areas have been flooded for long durations, but within the PUSH sub-region, they are undeveloped, in contrast to other areas in East Hampshire District which have previously been affected by groundwater flooding. This part of the District has also been susceptible to flooding from other sources including surface water and flooding caused by infrastructure failure.

Eastleigh Borough Council

Eastleigh Borough has 6 km of open coastal frontage and 21 km of frontage onto the tidal River Hamble. The Rivers Itchen and Hamble and the Monks Brook flow through the Borough, with a total main river length of 88 km. At present, approximately 8% of the Borough's land area is designated as within Flood Zones 2 and 3a/3b.

The SFRA has shown that the primary source of flood risk to Eastleigh Borough is from rivers. The River Itchen and the Monks Brook have extensive flood outlines which cover a number of existing developed areas in the Borough, including parts of Chandler's Ford, Eastleigh town centre and Bishopstoke.

The secondary source of flood risk to Eastleigh Borough is from the sea. The key parts of the Borough which are currently at risk of flooding from the sea are Netley, Hamble and Bursledon.

Historically, there have been some instances of groundwater flooding at the northern boundary of the Borough, marking the location where the South Downs chalk ends and the River Itchen meets less permeable bedrock. Eastleigh has also been susceptible to flooding from other sources including surface water and flooding caused by infrastructure failure.

Fareham Borough Council

Fareham Borough has 8.5 km of open coastal frontage, 14.5 km of frontage on the tidal River Hamble and 11.5 km of frontage onto Portsmouth Harbour. The Rivers Wallington and Meon flow through the Borough, with a total main river length of 35 km. At present, approximately 9% of the Borough's land area is designated as within Flood Zones 2 and 3a/3b.

The SFRA has shown that the primary source of flood risk to Fareham Borough is from the sea. The key parts of the Borough which are currently at risk of flooding from the sea are the Fareham frontage to Portsmouth Harbour, Portchester, Lower Swanick and Warsash.

The secondary source of flood risk to the Borough is from rivers. The River Meon in Fareham Borough has a large floodplain in its downstream reach which is designated as a National Nature Reserve downstream of the village of Titchfield. The River Meon is defended from tidal inundation by the harbour frontage at Hill Head. If this

defence were to fail, the River Meon would be inundated regularly by tidal flows. As such, 'undefended' Flood Zones show the Meon valley as predominantly at risk of tidal flooding. The River Wallington flows through the village of Wallington before discharging into Portsmouth Harbour. A number of properties in Wallington lie within the predicted flood outline of the Wallington River and its functional floodplain (Flood Zone 3b) and flooding recently occurred in the village in 2000. Upstream of Wallington, large areas of Greenfield land are covered by the river's predicted flood outlines.

There have been some previous incidents of groundwater flooding adjacent to the upper part of the River Meon in Fareham Borough, while Fareham has also been susceptible to flooding from other sources including surface water and flooding caused by infrastructure failure.

Gosport Borough Council

Gosport Borough has 10 km of open coastal frontage and 23 km of frontage onto Portsmouth Harbour. The River Alver is the only watercourse in the Borough, with a total main river length of 5 km. At present, approximately 21% of the Borough's land area is designated as within Flood Zones 2 and 3a.

The SFRA has shown that the primary source of flood risk to Gosport Borough is from the sea. The key parts of the Borough which are currently at risk of flooding from the sea are the entire frontage of Haslar Creek, Stokes Bay, the Alver Valley and the southern half of the Portsmouth Harbour frontage, particularly around Priddy's Hard.

The secondary source of flood risk to the Borough is from the River Alver. The River Alver discharges into the sea via a tidal outfall which is flapped to prevent tidal inundation of the river valley. If this defence were to fail, the Alver valley would be regularly inundated by tidal flows. As such, 'undefended' Flood Zones show the Alver valley as predominantly at risk of tidal flooding. The River Alver originates from a very small catchment and flows largely through an unconstrained and undeveloped floodplain such that the risk of fluvial flooding is therefore considered minimal.

Historically, Gosport has also been susceptible to flooding from other sources including surface water and flooding caused by infrastructure failure.

Havant Borough Council

Havant Borough has approximately 56 km of coastal frontage (including 42 km around Hayling Island) and 32 km of main river. At present, approximately 22% of the Borough's land area is designated as within Flood Zones 2 and 3a/3b.

The SFRA has shown that the primary source of flood risk to Havant is from the sea. The key parts of the Borough which are currently at risk of flooding from the extreme tides include Brockhampton, Langstone and Emsworth on the mainland and Eastoke, Selsmore and Mengham on Hayling Island. Flooding due to wave overtopping is known to occur on Hayling Island, particularly along the southern frontage. Land behind this frontage has suffered significant flooding from wave overtopping even though the land is relatively high and is shown to lie within Flood Zone 1, i.e. the zone of low probability of tidal flooding.

The secondary source of flood risk to Havant Borough is from fluvial sources including the Lavant Stream, the Hermitage Stream and associated tributaries. These watercourses flow through the town centre of Havant and discharge into Langstone Harbour. Additionally, the upper reaches of the Wallington River rise near Waterlooville in Havant Borough. The key parts of the Borough which are currently at risk of fluvial flooding include Havant town centre, Leigh Park, West Leigh and Stockheath.

Historically, Havant has also been susceptible to flooding from other sources including; groundwater, surface water and flooding caused by infrastructure failure. A number of previous groundwater flooding incidents have been observed in the upper parts of the Lavant Stream between Rowlands Castle and Havant in the north of the Borough. The town of Havant has a drainage system which in many places dates back to before the mid-1960s. As such, flooding from surface water drainage systems and sewers has occurred at many locations, including along The Florins, Petersfield Road, Park Lane and Holborn Road.

New Forest District Council

Only part of the New Forest District is within the PUSH sub-region, covering a total area of approximately 42 km². This part of the District has 40 km of coastal frontage onto Southampton Water. There are 29 km of main rivers in this part of the District, the principal watercourse being the Bartley Water which flows through Totton and Eling. At present, approximately 18% of the land area in this part of the District is designated as within Flood Zones 2 and 3a / 3b.

The SFRA has shown that the primary source of flood risk to this part of New Forest District is from the sea. The key parts of the District which are currently at risk of flooding from the sea are parts of Eling and Brockenford, the coastal areas and industrial/port areas at Marchwood, Hythe town centre and coastal frontage and Fawley Oil Refinery.

The secondary source of flood risk to this part of the District is from rivers. Flooding from the Bartley Water is consistently a problem for a number of areas bordering the river in Totton and Eling. A number of smaller watercourses in the area also frequently cause localised flooding issues for handfuls of existing properties in locations such as Calmore. The District Council has a genuine concern that a number of watercourses in this part of the District are unable to take increased runoff from new developments without increasing flooding to existing properties.

Historically, this part of New Forest District has been susceptible to flooding from other sources. There have been some previous incidents of groundwater flooding in the northern half of this part of the District, usually located around the upper limits of some of the smaller watercourses that feed into the Bartley Water. A number of surface water related localised flooding incidents have occurred, with overland flow from saturated ground causing problems at a number of locations.

Portsmouth City Council

Portsmouth has approximately 45 km of open coastal frontage, 32 km around Portsea Island and 11.5 km on the mainland. 3 km of drainage channels are designated as main river. At present, approximately 47% of the city's land area is designated as within Flood Zones 2 and 3a.

The SFRA has shown that the primary source of flood risk to Portsmouth is from the sea. At present, all coastal parts of the city are at risk of flooding from the sea, particularly large parts of north west Portsea island, Southsea and large parts of the mainland around Farlington, Highbury and Hornsea Island. Areas that are often flooded by storm tides are around Broad Street near Town Quay, around Eastern Road near Great Salterns Quay and Southampton Road (A27) to the north west of Port Solent. A complex scheme of flood gates is in place at Town Quay to protect areas from tidal inundation and along the promenade to protect pedestrians from overtopping waves and shingle.

Historically, Portsmouth has also been susceptible to flooding from other sources including surface water and flooding caused by infrastructure failure. Southsea and Farlington are key areas where incidents of surface water flooding have previously occurred.

Southampton City Council

Southampton has 35 km of tidal frontage including the Itchen estuary, the tidal influence of which extends almost up to the administrative boundary of the city. Additionally there is 15 km of main river in Southampton. The Monks Brook stream joins the River Itchen at Swaythling and the Tanner's Brook and Holly Brook streams flow through and combine in Shirley in the west of the city, passing under Southampton Docks before discharging into Southampton Water. At present, approximately 13% of Southampton's land area is designated as within Flood Zones 2 and 3a/3b (see SFRA Map Set 1A).

The SFRA has shown that the primary source of flood risk to Southampton is from the sea. The key parts of the city which are currently at risk of flooding from the sea are the Docks, the Itchen frontage on both sides of the Itchen Bridge, the Northam and Millbank areas, Bevois Valley, St Denys and the Bitterne Manor Frontage.

The secondary source of flood risk to the city is from rivers and streams. The Monks Brook flood outline covers parts to the north of Swaythling and the Tanners Brook and Holly Brook flood outline covers parts of Lordswood, Lord's Hill, Shirley and Millbrook.

Historically, previous incidents of groundwater flooding have been noted in the Shirley area, while Southampton has also been susceptible to flooding from other sources including surface water and flooding caused by infrastructure failure, previous incidents of which tend to have been isolated and localised, often due to blockage of drains or gulleys.

Test Valley Borough Council

Only part of the Test Valley Borough is included in the PUSH sub-region, covering a total area of approximately 63 km². The southern boundary of the Borough is marked by the point at which the River Test is joined by the River Blackwater and becomes tidally influenced. Test Valley Borough has no coastal frontages. This part of the Borough has 49 km of designated main river. The River Test catchment comprises the majority of this length, but the Monks Brook and Tanner's Brook also flow through the Borough in their upper reaches. At present, approximately 12% of the land area in this part of the Borough is designated as within Flood Zones 2 and 3a/3b.

The SFRA has shown that the primary source of flood risk to Test Valley Borough is from rivers. The predicted flood outlines for the River Test and its tributaries cover some developed parts of the town of Romsey, while the flood outlines of the upper reaches of the Monks Brook include large developed areas in the Valley Park area to the west of Chandler's Ford.

Historically, there have been some instances of groundwater flooding at the northern boundary of the Borough around Romsey, marking the location where the South Downs chalk ends and the River Test meets less permeable bedrock, although these incidents within the part of the Borough in the PUSH sub-region have generally been less severe than those experienced in all other parts of the Borough. This part of Test Valley Borough has also been susceptible to flooding from other sources including surface water and flooding caused by infrastructure failure.

Winchester City Council

Only part of the Winchester City administrative area is within the PUSH sub-region, covering a total area of approximately 63 km² and not including the city itself. Winchester has no coastal frontage and this part of Winchester has 88 km of designated main river, including large parts of the River Wallington, upper reaches of the Rivers Hamble and Meon and a small length of the River Itchen. At present, approximately 6% of the land area in this part of Winchester is designated as within Flood Zones 2 and 3a/3b.

The SFRA has shown that the primary source of flood risk to this part of Winchester is from rivers. Parts of a number of settlements such as Bishops Waltham, Wickham, Southwick and Denmead are located in or adjacent to fluvial Flood Zones 2 and 3a/3b.

Historically, there have been some instances of groundwater flooding in this part of Winchester, mainly along the northern boundary of the PUSH sub-region, where the South Downs chalk ends and the various rivers and streams meet less permeable bedrock. These incidents were, in general, less severe than those experienced north of the PUSH sub-region. This part of Winchester has also been susceptible to flooding from other sources including surface water and flooding caused by infrastructure failure.

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