SSJ Neighbourhood Plan
Water Resources

SSJ neighbourhood Plan is indebted to Dr Roger Walters for this study.

1. Introduction

Water is a precious finite resource that is necessary for life to exist. The amount of water on earth is constant because no new water is created, with all water being subject to a continuous cyclical process of evaporation and transpiration, condensation, precipitation and collection. Currently, it is estimated that 97% of the earth's water is in the oceans and 2% in the ice caps, ***with the remaining 1% being in use in an environmental water cycle***.

This finite water resource is already under pressure and will be further stressed in future as a result of climate change and increasing demand resulting from population growth and changing lifestyle. Careful strategic planning will be critical to ensure sustainable water provision for people, business, agriculture and the environment. The issue of the local availability of water is a microcosm of the world picture. Consequently there are many often conflicting and complex interactions between the expected need for growth in domestic housing development and sustainability issues associated with water companies' activities and the environment.

2. Surface Water

a. Local Geology

To the south, the gap between Basingstoke and the village of Sherborne St John lies on open chalk downland. To the north of the village lies an area of Reading Beds and London Clay deposits. The village is a spring line settlement, with numerous natural springs emerging from the chalk onto the sands and clays characteristic of the Thames valley to the north. A pond by the A340 at West End drains under the road and as the Wey brook (or Weybrook) passes through some disused watercress beds and across the north of the village, eventually flowing to The Vyne. Another spring in the east of the village, near Dark Lane, feeds watercress beds, which are still in cultivation and flows north to join Wey Brook near Sherborne Mill. A third water source rises in a wetland area near the church, designated as a Site of Importance to Nature Conservation (SINC), and feeds a large pond by Church Path, from where it flows north to join Wey Brook. These form a characteristic feature of the village and are part of Hampshire's world famous system of chalk drainage[i].

b. Flooding

The historical record shows that groundwater flooding is known to have occurred in the floodplain of the River Loddon and its many small tributaries to the north and east of Basingstoke. Indeed, planned flooding of water meadows was regularly used as part of the management of agricultural land, until the beginning of the 20th century.

Groundwater flooding is regularly observed in Sherborne St John village. The Strategic Flood Risk Assessment 2012, which forms part of the Evidence Base supporting the Basingstoke and Deane Local Plan[ii], includes a report dated 12th April 2001, of a drive in Sherborne St John having been "flooded all winter (but now subsiding)". Most recently, over the 2013/14 winter period, during a period of record rainfall, groundwater flooding occurred around the village, persisting for several weeks in places such as at junction between Elm Road and Cranes Road, where groundwater could be seen gushing from the road surface.

There is an increased risk of surface water flooding where changes of land use and urban development takes place in catchments and floodplains. This can lead to increased run-off and restriction of river flows and reduction of floodplain areas. Poor maintenance of water courses contributes, as do man made hydraulic changes that increase flow rates above capacity. The Strategic Flood Risk Assessment 2012 records examples of widespread surface water flooding in and around Sherborne St John on 30th January 2008, in most cases worsened by blocked drains or ditches. Again, winter 2013/4, saw persistent surface water flooding in the village, in many of the same places as 2008 and once again, blocked or inadequately maintained drains may well have contributed to the problem. Flooding has also occurred at other times in the past, for example in 1990.

Mitigation by the use of well designed, well maintained and managed sustainable drainage systems (SUDS) can be appropriate. ***However it is important to recognise the circumstances in which the use of sustainable drainage systems is inappropriate, for example where there are high groundwater levels or where clay soils do not allow free drainage***.

The Water Cycle Study[iii], commissioned by Basingstoke and Deane from Halcrow to inform their 2011-2029 Local Plan advises against residential development in Area 6 – which includes Sherborne St John, "due to the combination of groundwater and fluvial flood risk."

3. Water Supply

This is the responsibility of South East Water, a water supply company that takes 565 million litres/day and supplies it to 2.1 million customers. In the South East Water supply area water is sourced principally from aquifers with the balance coming from rivers and reservoirs. Basingstoke and Deane lies in Zone 4 of the South East Water supply area and derives its water supply solely from the aquifer located below the underlying North Hampshire chalk from which the clear fast flowing chalk steams of Hampshire arise, The River Loddon and its tributaries including the Lyde and the Whitewater flow north to the Thames Basin.

a. Water Quality

Water quality is governed by EU and UK legislation. It is dependent on the complex interaction of the surface and groundwater resources both in its quantity and its location, climate, the environment and its management, and the local management of water supply and sewage and wastewater disposal. This very complexity has resulted in a situation where water supply and management is taken for granted and it is only system breakdown or the threat of failure that raises public awareness.

For example, locally water quality is threatened by the risk posed by continued high abstraction rates from the aquifer at a time of relative drought which feeds through to reduced surface water flow in the rivers that are used to dilute the discharge from sewage treatments plants. This represents a

significant problem in the management of the River Loddon Catchment where high phosphate level in domestic waste water cause particular problems.

Locally the majority of the aquifer water is derived from rainfall falling on agricultural land permeating through chalk with a proportion arising from water recycled to the aquifer from sewage treatment works. The use of nitrogenous fertilisers in agriculture carries the risk of nitrate contamination of aquifer water by the rainwater falling on the agricultural land leaching nitrates into the groundwater. There is a complex interaction between the application of nitrogenous fertilisers, which is controlled by legislation, the timing and quantity of the rainfall and the amount of water in the aquifer and its abstraction rate. Suffice to note that rising and worryingly high nitrate concentrations have recently been found in borehole samples of local aquifer water that has resulted in the Environment Agency declaring a new Nitrogen Vulnerable Zone, covering the area of Basingstoke and its environs from which rainwater permeates into the aquifer.

b. Water Quantity

Domestic customers use about 100,000 litres in each of our homes every year with each person currently using about 160 litres per day. Data on domestic water usage indicate that 32% is accounted for by WC flushing, 17% by bathing and showering, and 12% by clothes washing indicating that these are the areas where the highest savings could be achieved. Industry accounts for 25% of the water consumption with electricity generation, sewage treatment, fire-fighting, leisure activities and leaks accounting for the remainder.

There is an increasing demand for water accounted for by population increase, rapid growth in housing numbers (*smaller houses use more water than large houses*), greater use of baths and showers, the use of more appliances such as washing machines and dishwashers and gardening.

Climate change is resulting in greater water demand as a result of higher temperatures and there is more variation in rainfall. This has already led to the imposition of water use restrictions in the South East.

Investment has been made in addressing the problem of leakages, one third of which occur in underground supply pipes, but the cost of repairs begs the question “what is the economic level of leakage.”

Water metering has at best a modest effect in reducing excessive water usage. Plans exist to roll out universal metering and subsequently the use of variable tariffs may play a part in containing excessive water use. However the economic case will depend on quantifying the effect of water efficiency measures and it is clear that the economic case will vary significantly between areas as it depends on the supply/demand balance, the costs of water delivered and the basis for the Water Utilities charges,

Increasing the efficiency of water use by education the public in the use of water saving devices, advice on garden watering and promoting self-help by the use of water butts and “grey” water has only a small effect.

South East Water holds a licence to abstract water from the Basingstoke Chalk aquifer. The West Ham Pumping Station that supplies water to urban Basingstoke operates at 97% of its licensed capacity in order to meet current demand. Even if *per capita* consumption were to be reduced, the planned

population growth will soon outstrip the effects of the water company's demand management initiatives. Furthermore the most recent guidance from the Environment Agency clearly indicates that no new abstraction licences will be issued in this part of the country and it is highly likely that limitations on abstraction under the "Restoring Sustainable Abstraction" initiative will result in a reduction of locally available groundwater for water supply.

4. Wastewater and Sewerage

Thames Water provides wastewater and sewerage services for Sherborne St John. The intensive use of water resources in the South East is reflected in the high standard of effluent treatment required in the freshwater catchments. Increasing quantities of water abstracted for supply lead to increased volumes of returned sewage but the dilution by remaining fresh water is obviously reduced. The fact that the South East is home to several nationally important chalk streams with much of the catchment being an important fishery together with the fact that the River Thames is a vital source of potable water means that the effluent standards in the South East are very stringent. The standards of this stringency are at the limits of conventional sewage treatment and what is often overlooked that such treatment is very energy-intensive. In the Thames area, the problem is exacerbated by the expanding towns tending to be at or near the headwaters of rivers; from a water resources point of view these are usually the last locations that should be recommended for development. Other considerations include the importance of local sewage disposal sites from which the effluent maintains flow in local brooks and ditches possibly at the cost of poorer quality, the economic cost diversion to large sewage treatment sites and the importance of preventing eutrophication by reducing nutrients such as phosphates which again increases energy use and results in the need to transport and recycle iron rich sludge.

These factors are of relevance to Sherborne St John because of the location of a sewage works to the north of the village which operates at the limits of its capacity. Sherborne St John STW is unable to remove phosphates, is not suitable for modernization and discharges into the Vyne Stream (historically the R. Sher).

5. Strategic Planning Issues

Water resources in Hampshire are based on groundwater stored in the Chalk aquifer of the Hampshire Downs and replenished every year by winter rainfall. Historically resilient, this system is now at risk from increased abstraction associated with population growth, new development and rising personal consumption, changes to groundwater recharge and river flows caused by climate change and the environmental requirements of designated rivers and wetlands.

The location of Basingstoke and Deane is at the headwaters of the River Loddon and its tributaries that flow **north** to the River Thames covered by the Thames River Basin Management Plan. As indicated above, responsibility for the water supply lies with South East Water which holds the water abstraction licence for the aquifer, while Thames Water has the responsibility for the disposal of sewage and waste water. This divided responsibility may be a contributory factor to the apparently poor understanding by the local authorities of the pressures facing the Water Companies. Both companies have recently published their water resources management plans 2015-2040. Although both companies acknowledge that they operate in areas of serious water stress and high environmental sensitivity, there is little to suggest that there has been strategic thinking about water

resources management in the South East as a whole. Thames Water is mentioned in the SEW plan in the context of water transfer schemes and the Thames Water plan has omitted the River Loddon from the figure showing its water resources zones.

Experts from Thames Water set out the specific problems to be anticipated in Basingstoke in a paper "Basingstoke Case Study" presented at the CIWEM Central Southern Branch Annual Seminar on South East Housing Development – the Quest for Sustainability on 18 October 2000. Time has shown that these experts were correct.

Basingstoke and Deane Borough Council's draft Local Plan does not make specific reference to the major issues surrounding the local water and sewerage infrastructure and developers have not been required either to demonstrate how proposed developments will impact on the water supply, water quality, sewerage and wastewater management and flood risk or how they would contribute to its mitigation.

However, as part of the evidence base in support of the Local Plan, Basingstoke and Deane commissioned a Water Cycle Study from Halcrow Group Ltd, which considers these issues. This study specifically assessed whether growth would cause deterioration of the current water quality and ecology in the River Loddon catchment. In the Executive Summary it concedes that water quality in the catchment was already failing to meet 'good' status under the Water Framework Directive. It goes on to conclude that an increase in pollutant load from an additional 15,000 to 20,000 dwellings would not cause a significant deterioration in chemical quality of the river system. They could not however, quantify the possible impact on biological quality.

The study also concludes that "water resources are not considered to be a critical issue for growth". It does however concede that the region is water stressed and that "firm implementation of water efficiency standards……. is essential to manage demand on the water environment"[iv]

Thames Water have in the past pointed out that Basingstoke and Deane Borough Council should "take account of the capacity of the existing offsite water and sewerage/wastewater treatment infrastructure appropriate to planned developments so that ***the improvements necessary are completed prior to the occupation of the development***". This point is supported by the Water Cycle Study.

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[i] Sherborne St John Village Design Statement 2004

[ii] Strategic Flood Risk Assessment 2012: http://www.basingstoke.gov.uk/Resources/A/D/%7BAD6D9464-42D3-45DB-8D87-CF9FE8C96482%7D/Documents/1%20Strategic%20Flood%20Risk%20Assessment.pdf

[iii] Water Cycle Study- Documents: http://www.basingstoke.gov.uk/browse/environment-and-planning/planning/emerging-local-plan/evidencebase/water-cycle-study.htm

[iv] Water Cycle Study- Phase II Executive Summary: http://www.basingstoke.gov.uk/Resources/2/D/%7B2D76DF7B-B53E-4E4E-A6A1-3DAAD06D5831%7D/Documents/Phase%202/5%20Executive%20Summary.pdf

Annex 1

Extract from the Revised Basingstoke and Deane Pre-Submission Local Plan 2011-2029

Infrastructure Delivery Plan

{Most relevant text highlighted in red}

32 Water Supply

32.1 Lead Organisations

- Environment Agency (EA)
- Southern Water (SW)
- South East Water (SEW)

32.2 Strategies

- The Environment Agency Water Resources Strategy for England and Wales (March 2009) sets out how the Agency believes water resources should be managed over the coming decades so that water can be abstracted and used sustainably.
- SW published its Water Resource Management Plan (WRMP) in October, 2009, covering the 25-year period from 2010 to 2035
- SEW Water Resource Management Plan December 2010

32.3 Existing provision

32.4 South East Water and Southern Water supply drinking water to Basingstoke and Deane.

32.5 Planned provision

32.6 Water resources are recognised as an issue in the South East and the region is acknowledged as being water stressed. However, water supply to meet the needs of future growth can be provided for over the plan period as outlined in Southern Water and South East Water's Water Resource Management Plans. Sustainable use of water is a key issue for the borough and firm implementation of water efficiency standards is essential to manage demand on the water environment.

32.7 The water companies have a legal duty to prepare a Water Resource Management Plan (WRMP). This plan sets out how demand for water is balanced against the available supply over the next 25 years. Southern Water published its WRMP in October, 2009, covering the 25-year period from 2010 to 2035. SW describes the challenges to water resources in this region as significant, but the water company believe that the options identified in the WRMP are robust and appropriate to meet these challenges.

A summary of the components of the overall water resources strategy for the company for the south/west of the borough is shown as:

- Universal Metering
- Asset improvement schemes for groundwater sources
- (1.2 Ml/d peak only)

A summary of the components of the overall water resource strategy for the SEW for the borough is shown as:

- Universal Metering
- Promote water efficiency
- Reduction in per capita consumption
- Management of leakage

32.8 SEW and SW are currently developing their plans which cover the period 2015 to 2040. The draft plans will be published for public consultation in May 2013, subject to approval from the Secretary of State. These need to be finalised in 2014 and once approved will replace the previous WRMP identified above.

32.9 Infrastructure required to support the Local Plan

32.10 There is no identified supply deficit for the area during the plan period and it is therefore anticipated that the level of planned development within Basingstoke and Deane to 2029 can be accommodated without the need for further water resources schemes to be implemented.

32.11 However, there may be a need for additional water supply infrastructure, in the form of pumping stations, supply pipe work etc, and the water companies will work closely with landowners and developers in relation to site specific requirements.

32.12 It is considered that subject to any necessary consents, and funding being secured either through the WRMP process or where appropriate, from the developer, necessary improvements will be implemented during the plan period. Phasing conditions may be required, to ensure that upgrades are implemented in line with development phasing. The infrastructure policy will require connection at nearest point of available capacity.

33 Wastewater Treatment

33.1 Lead Organisations

- Environment Agency (EA)
- Thames Water Utilities Ltd (TWUL)
- Southern Water

33.2 Strategies

- TWUL's 25 Year Strategic Direction Statement 2010 – 2035 'Taking care of Water' (2007) sets out what the future holds in relation to water services infrastructure and how TWUL intends to respond to this. The Water Resources Management Plan (2010-2035) was agreed in 2012 and outlines how the water company aims to meet predicted demand for water over the next 25 years. Thames Water is carrying out a public consultation on: its draft business plan for AMP 6 (2015-2020); its draft long term strategy 2015-2040; and its draft Water Resource Management Plan 2015- 2040 from 1 May to 25 June 2013.
- River Thames Basin Management Plan December 2009 sets out actions that are needed to meet the objectives for the river basin district by 2015
- Basingstoke Water Cycle Study Phase 1 and 2 (2009) is a study to better understand the relationship between development and the water environment around Basingstoke by examining the potential impacts of future growth on three main aspects of the water cycle

33.3 Existing provision

33.4 Thames Water is responsible for wastewater and sewerage infrastructure for the north eastern part of Basingstoke and Deane and Southern Water is the statutory undertaker for the Overton, Whitchurch and Oakley area. There are many wastewater treatments works (STW) within Basingstoke with the Chineham Wastewater/Sewage Treatment works and the treatment works being the largest facility, with other facilities serving the needs of other towns and villages. Also substantial network growth upgrades have been carried out in Basingstoke in previous years which involved the construction of a new large diameter trunk sewer to serve development sites around the Popley area. However, there exist some sewerage infrastructure problems in some part of the Borough, which may be linked to poor management.

33.5 Planned provision

33.6 The WCS has shown that there is planned infrastructure capacity in Basingstoke for planned allocations and commitments up until 2016, and that strategic water services have been assessed up to 2021.

33.7 Thames Water, along with the other UK water and sewerage companies, is funded in 5 year planning periods known as Asset Management Plans (AMP). The money available to spend on Water Services Infrastructure during an AMP period is determined by the Office of Water Services (Ofwat) in consultation with the Government, the Environment Agency and consumer organisations amongst others. The consultation process is known as the Periodic Review, and the next review, which will determine how much money TWUL have to spend between 2015 and 2020 (AMP 6) commences in 2014 (PR14). TWUL will be submitting its draft Business Plan for AMP6 to OFWAT in the first quarter of 2014.

33.8 In addition to the £10-20m TWUL has identified as sewage treatment improvements need to support growth to 2021, TWUL has planned for approximately an additional up to £10m sewage and sludge treatment infrastructure upgrades to be delivered between 2010 and 2015 to improve serviceability at the STW. This figure does not relate to growth and is related to maintenance of the existing treatment works infrastructure.

33.9 Southern Water also plans investment through the five yearly price review process undertaken by Ofwat, the water industry's economic regulator. The next price review is in 2014, covering the investment period 2015 to 2020. A further price review will take place in 2019, covering the investment period 2020 to 2025, etc. The wastewater treatment capacity and water resources required to meet demand from new development can be planned and funded through this process. In terms of local sewerage and water distribution infrastructure, new development will need to connect to the sewerage system and the water distribution network at the nearest point of adequate capacity. This may require off-site infrastructure if capacity is insufficient in the immediate vicinity of the site. This off-site infrastructure would need to be provided by the development.

33.10 Infrastructure required to support the Local Plan

33.11 The Water Framework Directive allows the achievement of less stringent environmental objectives where environmental and socioeconomic needs cannot be achieved by other measures and conditions make this infeasible or disproportionately expensive. The Directive also states that emissions are controlled, based on best available technologies. Good status can only be achieved through tightening discharges from sewage effluent. Basingstoke Sewage Treatment Work is currently operating at the tightest form of consent in relation to discharge. Any improvements are beyond that of currently best available technology. The opportunities of new technology and the cost of implementing new technology, if developed, are as yet unknown.

33.12 The modelling in the WCS has shown that the impact of additional treated sewage effluent from the additional development scenarios modelled (that is, between 14,800 and 18,900 dwellings) (higher numbers than those now being used by the council) is unlikely to cause a deterioration of current physiochemical status in the River Loddon. Whilst there is confidence that there will be no deterioration in chemical or physiochemical status, there remains uncertainty regarding the impact upon biological status that may result from additional developments and an on-going monitoring program is recommended to manage this risk. This is set out in the water quality policy EM6 of the emerging Local Plan.

33.13 Thames Water (TW) advise that they have assessed the requirement to provide capacity at BSTW to serve growth until 2021 and that between £10m and £20m is required to be spent on infrastructure to ensure that the STW can treat growth until 2021. The delivery of this infrastructure has been split into two phases to be funded from their asset management plan. Phase 1 of the improvements are planned to be delivered between 2010 and 2015 (AMP5), and Phase 2 will be

implemented during 2015 and 2020, subject to agreement by their financial regulator in the final determination of their business plan.

33.14 TW require a three to five year lead in time for the provision of extra capacity and will work closely with Council, landowners and the developers in relation to future sewerage and STW infrastructure. TW will seek funding from developers for impact studies where these are necessary to gauge what upgrades to infrastructure are required. It is considered that subject to any necessary consents, and funding being secured either through the Thames Water Business Plan process or where appropriate, from the developer, necessary improvements will be implemented during the plan period. Phasing conditions may be required, to ensure that upgrades are implemented prior to new development, depending on their scale, location and nature. The infrastructure policy CN5 aims to ensure that new infrastructure to support new development must be provided and phased to meet the needs of the development and to mitigate the impact on the community.

33.15 Thames Water have advised that the cumulative effect of the development sites listed in the Basingstoke and Deane Infrastructure and Service Provision correspondence will necessitate the need for some significant infrastructure upgrades to the network to convey sewage to the Sewage Treatment Works near Chineham. The network model for Basingstoke has to be re-verified to determine the exact size and nature of the upgrades. Developers will be expected to fund this modelling work to show what off site upgrades will be required to serve their development. This could take up to 24 weeks from commencement.

33.16 With regard to development in Overton and Whitchurch Southern Water have advised that in principle sites could drain to the local wastewater treatment works and that there is some existing capacity in the local STW that could accommodate some developments. The current environmental permits can accommodate the proposed development and there is no need to review them. If necessary Southern Water can apply to the Environment Agency for new or amended environmental permits to accommodate new development. Any upgrades to the treatment works will be undertaken and funded by Southern Water, however local network infrastructure improvements required as a result of new development would need to be provided by the developer. Southern Water will bid for investment funding for sites allocated in an adopted Local Plan via the Ofwat Periodic Review process.