SECTION 10: FUTURE PRESSURES AND CHANGES

10.1: Climate change

The next few decades are likely to see a wide range of natural and anthropogenic pressures brought to bear on the River Wandle. An ongoing challenge to be factored into future iterations of this Catchment Plan lies in predicting their effects and devising ways to mitigate them.

Rivers in general are considered to be highly sensitive to the effects of climate change, since they rely on the larger water cycle for their flow, and are unable to regulate their own temperature. Chalkstreams like the Wandle are often cited as being better buffered than rain-fed rivers, both in terms of flow and temperature, because the majority of their flows derive from deep chalk aquifers rather than direct runoff of precipitation. However, recent research reveals that this buffering effect may not be as great as originally believed (Durance and Ormerod, 2007; 2009).

Within the London area, climate change is already high on the political agenda. The Mayor's London Plan outlines London's response to climate change, highlighting that the key impacts on London will be overheating, flooding and drought.

Under a medium emissions scenario (UKCP09), average summer temperatures in London are likely to increase by 1.6°C in the 2020s, by 2.7°C in the 2050s and by 3.9°C in the 2080s. However, maximum daytime temperatures could increase by up to 10°C, and the urban heat island effect will continue to affect the river even in hours of darkness: London is already an average 9°C warmer than its surrounding green belt on a summer night. Long term water temperature trends may also threaten the viability of fish populations in some areas of the Wandle unless shade is increased by encouraging aquatic weed and riparian tree planting schemes.

Summer rain is forecast to decrease by 7% in the 2020s, by 19% in the 2050s and by 23% in the 2080s whilst winter rainfall is set to increase by 6% in the 2020s, 14% in the 2050s and by 19% in the 2080s (under the same medium emissions scenario). Reduced summer rainfall and less water in the river mean that the impacts of higher in-stream temperatures are likely to be intensified. Water quality may be reduced, with less dilutory capacity and increased concentrations of pollutants. Increased winter rainfall could result in more flooding (both pluvial and fluvial), risks to urban drainage, disruption to transport and damage to infrastructure.

Climate change is also likely to increase the frequency and intensity of extreme weather events, including both droughts and storms, with impacts on the Wandle and its species including heat stress and wash-out in high water. At the same time, ecosystem services offered by the river may become increasingly valuable to people living within the river's catchment: for instance as its blue-green spaces offer areas of cool refuge for recreation in times of drought and heat.

10.2: Demand for water

According to recent EA figures, London already has less water per capita than Sudan or Syria (EA, 2013).

Population growth and climate change predictions suggest that this demand is only likely to increase: a view confirmed by Sutton & East Surrey Water's latest plans which forecast overall demand to increase by around 1% from 2015 to 2020. Importantly, this is likely to be as a result of population growth rather than increased per capita consumption, which is actually predicted to decrease from 157 to 152 litres per person per day over this period (pers comm. Alison Murphy, Sutton & East Surrey Water, 2014).

Government policies encouraging redevelopment of brownfield sites, including former industrial and residential areas throughout the Wandle catchment, is already resulting in residential intensification and increased water use.

With no investment in constructing significant new reservoirs in the London area over the last 40 years, the vast majority of London's domestic water consumption is still abstracted from aquifers, and those supplying the Wandle headwaters are particularly vulnerable. Towards the centre of London, in the northern part of the river's catchment, domestic water supply is sourced from the Thames and Lea, with water being transferred between areas of London. However, in the southern part of the Wandle catchment, water is provided by abstraction from the chalk aquifer. Any increase in abstraction in the Wandle's headwater and winterbourne areas will put even more pressure on the river's headwaters. In turn, this will place increasingly unsustainable reliance on Sutton & East Surrey Water's augmentation system to keep the Carshalton water body flowing, exacerbating risks associated with recirculating water originating from different locations, and contributing to climate change due to the energy requirements of the system.

As part of its statutory remit, the EA has a duty to conserve, redistribute and augment water resources, and to secure their proper use – including managing supply and demand in light of economic and environmental considerations. To this end, the EA has asked water companies to produce water resource plans. These should be robust and follow a twin track approach to managing future water resources, based on active measures to manage the demand for water and achieve tough leakage targets to avert or delay the need to develop new water resource schemes. The resulting plans involve a range of measures to achieve sustainable management of water resources, including:

- Encouraging more efficient use of water by the public, including changes in public attitude to water usage
- Encouraging use of water meters and tariffs that distinguish between essential and non-essential use of water
- Encouraging water conservation in old buildings through retrofitting schemes supported by grants
- Encouraging water conservation in new buildings by influencing developers and the planning process
- Promoting development and sale of low-water usage domestic appliances
- Requiring leakage to be reduced before investment in new resources is considered

To reduce water loss through leaking mains pipes, which peaked in 2002 – 2003 at 738,000 m3 per day, Thames Water have replaced 2,250km of Victorian water mains pipes. Since 2006, leakage has been reduced by around a quarter (Thames Water, 2013).

National domestic water metering trials carried out in the 1990s suggested that on average a home with a meter will use 10 – 15% less water than a home without, with up to 30% reduction at peak summer times. These findings have been reinforced by studies undertaken by Southern Water (which currently has 40% of customers on meters, and plans to increase this to 92% by 2015) and South West Water (WWF, 2011).

Extreme weather events, such as catastrophic drought, may cause the Wandle to become subject to emergency water resource measures. In a state of national emergency, the usual processes and plans are dispensed with: in very prolonged drought, the emergency Cobra committee can decide where water comes from, with provision for the public considered more important than wildlife or the health of a river, and it is likely that any remaining water in the Wandle would be directly abstracted to supply the needs of people in the Wandle valley.

Even without this level of national crisis, however, local demand for water may put the Wandle under considerable stress. Informal local abstractions for car washing, watering gardens and

other uses are already known to occur, and Wandle Trust staff observed multiple drums of water being filled and removed from the river during the 2012 drought and hosepipe ban.

Further reading:

Environment Agency (2013) *London Abstraction Licensing Strategy*

WWF (2011) *Fairness on Tap: Making the Case for Water Metering*

10.3: Population increase

South east England, and London in particular, has seen a large population increase in recent years and this is set to continue. There are targets to build more housing and associated infrastructure and the Wandle valley has been identified as an economic growth area in the Mayor's London Plan. As the Wandle Valley Regional Park becomes established, more people will be encouraged to visit the Wandle in their leisure time, and may result in more permanent residents moving into the area.

Increasing local population will put pressure on the Wandle in several ways:

- More demand for water (see Section 10.2)
- More demand for development which is likely to result in infilling and general conversion of permeable surfaces to impermeable roofs, concrete and tarmac. Without implementation of large-scale SUDS, negative consequences will include reduced infiltration to replenish ground water supplies, increased flood risk as additional surface water enters the river, and reduced river water quality as this surface water carries urban runoff particulates and other pollutants into the river.
- More pressure on Beddington STW, with more treated effluent entering the river during normal operation. Increased influent to the works also implies decreased time-capacity for filling the existing storm tanks (currently 3-4 hours' capacity), hence more frequent discharges of untreated sewage into the Wandle.

10.4: Socio-demographic risks and pressures

As the population of the Wandle catchment increases, the demographics of that population may also change, putting the river under new cultural and other pressures.

Different cultures may have different or conflicting views of the value and purpose of landscape features such as the Wandle, and they may use water and the river differently. For instance:

- High water consumption: increasing economic affluence is likely to mean more usage of domestic appliances such as power showers, which may already have contributed to an upward shift in London's water use. On average, Londoners already use more water (161 litres per person per day) than the national average (150 litres per person per day) (GLA, 2014).
- Heavier use of the Wandle Trail and the surrounding Wandle Valley Regional Park for leisure purposes. Higher footfall may disturb wildlife by reducing refugia and quieter

areas. Management regime(s) for the Trail itself may also impact the river, and additional safety lighting may affect some species (see Section 5.8.9).

- Use of the river for religious purposes: most Wandle community river cleanups involve removing at least one coconut and assorted Hindu and other religious artefacts from the river, into which they have been thrown in the course of ceremonial observances.

- Damage to fish and fisheries: recovery, abundance and diversity of fish populations in the Wandle may be impacted by subsistence anglers from cultures which do not share the 'catch and release' sporting traditions commonly practised by UK anglers.

- Foraging and public health: research from North America's Columbia River suggests that subsistence fishing in post-industrial rivers may have implications for public health, with levels of carcinogenic PCBs bioaccumulated in resident fish at levels 27,000% above limits recommended by the EPA (Columbia Riverkeeper blog, accessed Jan 2014). During 2013, Wandle Trust staff observed watercress being harvested, possibly by restaurant owners, in areas of the Carshalton water body known to contain contaminated sediments and less than 100m downstream of positively identified sewer misconnections. Such urban foraging may raise the risk of heavy metals as well as *E. Coli* and other pathogens being consumed by members of the public.

10.5: Ecological shifts caused by climate change

Climate change also implies shifts in species and ecological communities in and around the Wandle.

As discussed in Section 10.1, even chalk streams are likely to be highly sensitive to the effects of climate change. Warmer average air and water temperatures are predicted to put pressure on native fish and invertebrates: in 2009 the EA calculated that invertebrate numbers in upland streams will fall by 20% for every 1°C rise in water temperature.

By contrast, many invasive non-native species may find a warming climate positively beneficial in terms of extended breeding, growing and dispersal seasons. Warmer temperatures may also help new non-native species to emerge as damaging and invasive threats, with effects cascading unpredictably through the Wandle catchment's ecosystem. Some of these future invasive species may already be present in the catchment's seed bank, awaiting suitable conditions to emerge and proliferate.