

**Appendix A**  
**Environmental Baseline**

---

## 1.1 Introduction

The data collected to characterise the baseline environment of Telford and Wrekin Borough has been derived from numerous secondary sources, which are referenced as footnotes in this report. No new investigations or surveys have been undertaken.

In some instances, it has been noted that different secondary sources present conflicting information and it has not been possible to verify which sources are the most accurate. Where this has been identified, the limitations have been noted.

It should be noted that there is an abundance of environmental information available. However, the information presented in this Appendix has been chosen on the basis that it may be influenced or affected by the Local Flood Risk Management Strategy (LFRMS). Steps have been taken to avoid including information which is of no clear relevance to the LFRMS. It may be necessary to collect further data against which to assess the potential environmental effects of the LFRMS with regard to monitoring requirements.

## 1.2 Population

### 1.2.1 Population

The topic of population is considered first in the baseline information, since the over-arching purpose of the LFRMS is to reduce flood risk to people and property. The LFRMS also seeks to increase public awareness of flooding and promote individual and community level flood resilience.

A number of properties in the Telford and Wrekin Area are in areas at risk of flooding and were affected by flooding during the Summer 2007 floods. Some of the properties were affected by flooding from fluvial sources (streams, rivers) but many properties were affected from surface water flooding from sewers and drains<sup>i</sup>. The frequency of flooding varies throughout the borough, with Coalbrookdale and Ironbridge being some of the most frequently affected communities.

A future increase in precipitation, due to climate change, is likely to cause further increases in flood risk to communities, although the nature and extent of this increase remains uncertain.

Between 2001 and 2011 the population of the West Midlands region increased by around 330,000, equivalent to a 6.2 per cent (%) increase). However, this was below the corresponding increase for England (7.4%) over the same period. By mid-2011 the West Midlands region was recorded to support a total population of c.5.6 million, equivalent to 11 per cent (%) of the population of England. It is projected that the region will reach 6 million residents by 2021, of which 19.3% could be aged 65 and over, 0.6% higher than the same figure for England. Between 2001 and 2011 Telford and Wrekin's population increased by 5.3 per cent (%), rising to around 167,000 by mid 2011<sup>ii</sup>. The West Midlands has one of the youngest populations, with 19% of the population 16 or under, and is the most ethnically diverse region in the UK outside of London<sup>iii</sup>.

With the development of Telford New Town, Telford has been a regional and national population growth point, and during the 1990's the Borough was the fastest growing Borough in the region<sup>iv</sup>, and was one of the fastest growing areas in England. The borough is also composed of several small towns that existed before the designation of the New Town, including Dawley, Donnington, Madeley, Wellington and Oakengates. At present the borough's population is estimated to be around 170,300 and is forecast to grow to c.196, 300 by 2026<sup>v</sup>.

Approximately 84% of the population is estimated to live within Telford, whilst Newport and the rural area are reasonably evenly split with approximately 7% living in Newport and 9% living in the rural areas<sup>vi</sup>. There are currently around 70,000 houses within the borough, with a new housing supply of almost 800 homes during 2011/12. New housing is being provided across the borough, with key strategic developments at Lawley Village, Lightmoor Village and Telford Millennium Community at East Ketley. This has resulted in one of the best rates of growth in the West Midlands. Further planning permission has been approved for over 8,000 new homes in the borough which have yet to be completed.<sup>vii</sup>

Telford and Wrekin was identified a housing target to provide 26,500 new homes between 2006 and 2026 (in the revoked RSS), with a five year target equating to 1,722 dwellings annually over the period 2013-2018, the majority of which are to be provided in and around Telford, and the remaining amount identified for Newport and Rural Areas<sup>viii</sup>. This has implications for many other environmental receptors<sup>x</sup>. Population growth is likely to result in increased demand on existing infrastructure and services, such as sewerage networks and local water supplies.

The requirement for additional housing can result in new development, which results in loss of land, visual intrusion, potentially increased flood risk (if development does not incorporate sustainable drainage principles) or development unsympathetic to the surrounding landscape or built heritage. In turn this can increase pressure on biodiversity, ecosystems and recreational facilities. However, new development could also bring opportunities, for example the retro-fitting of Sustainable Drainage Systems (SuDS) to adjacent existing development.

Careful planning and management of flood risk and water management related infrastructure will be required, considering the pressure that population growth and increased tourism will place on the environment.

## 1.2.2 Human Health

The major hospital located within the catchment area is the Princess Royal Hospital at Apley. Other health care services within the borough include nursing homes, specialist healthcare centres, dentists and health centres. These are numerous and well dispersed throughout the southern half of the authority area. There are far fewer such facilities within the northern half of the borough.

Health and wellbeing in the borough has improved significantly over the last twenty years, with the majority of residents (80.2%) reporting good health within the 2011 Census. However the area remains below the national average in many areas, including life expectancy and obesity. Clear health inequalities have been identified between the least and most deprived areas of the borough (a difference of seven years for men and four and a half years for females). Early death rates from cancer, heart disease and strokes remain higher than the national average.

In 2007 the area was ranked the 112<sup>th</sup> most deprived local authority area in England, from a total of 354. Today the local authority area falls within the top 40% most deprived nationally<sup>x</sup>. In 2010, 14 out of 108 Super Output Areas (SOAs) in Telford and Wrekin were ranked amongst the 10% most deprived nationally. A further 12 SOAs in Telford and Wrekin were ranked amongst the 20% most deprived nationally. This equates to almost a quarter of the borough's total population living within the 20 % most deprived areas of the country<sup>xi</sup>. Areas of Priorslee, Shawbirch, Apley Castle, Newport North, Ercall and Newport West are identified as within the least deprived 10%; conversely areas of Woodside, Malinslee, Cuckoo Oak, Brookside, Hadley & Leegomery, Dawley Magna, College and Donnington are within the 10% most deprived<sup>xii</sup>.

Figure A1 illustrates the varying levels of deprivation across Telford and Wrekin.

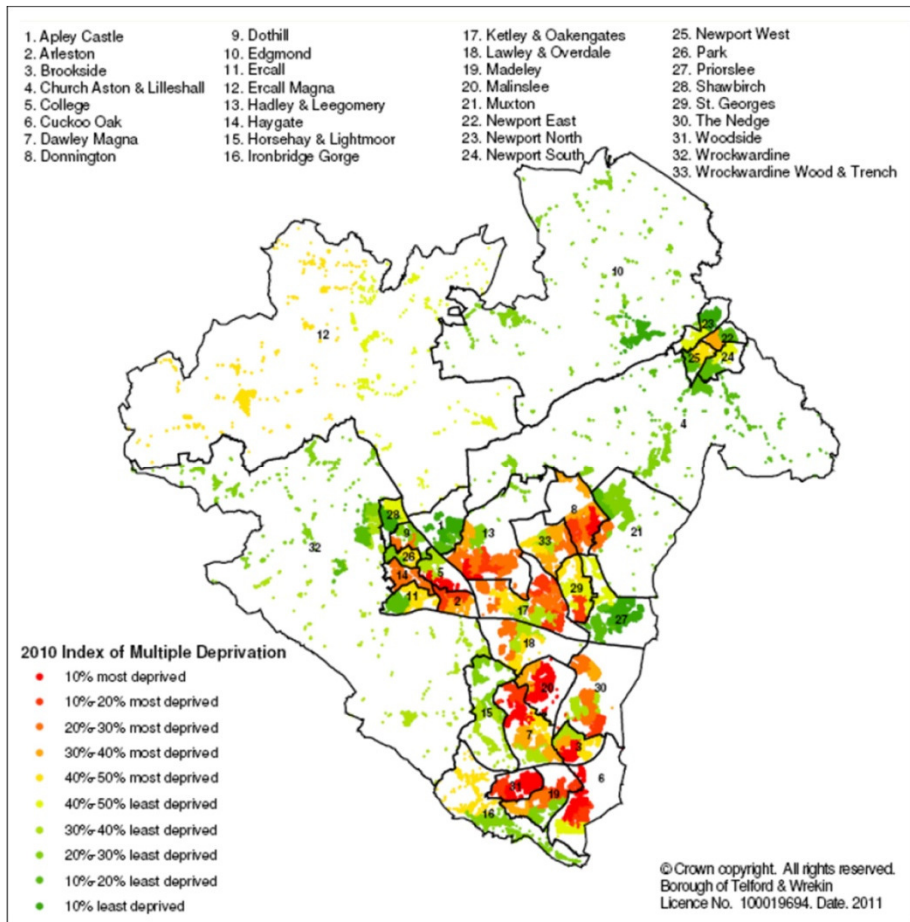


Figure A1: Telford & Wrekin Indices of Deprivation<sup>xiii</sup>

Evidence indicates that 16.4% of people in the borough experience difficulty in accessing health facilities<sup>xiv</sup>.

A growing population will potentially increase the number of people at risk from flooding especially when concentrated in high-risk flood areas. As such, it is important that access to healthcare and other emergency services are maintained during flood events.

### 1.2.3 Recreation

There are a wide variety of recreational resources in the borough, including parks and gardens, footpaths and cycle-ways, leisure facilities and recreation grounds. Telford & Wrekin has a Public Rights of Way network that contains over 900 individual routes, totaling over 360 kilometres of path. There are a number of sports pitches and sites across the borough<sup>xv</sup>.

The Framework for Sport in England (Sport England 2004, vision to 2020) envisages a 1% increase year on year in participants in sport, to a target of 70% of the population active by 2020. This has huge implications for the provision of the necessary facilities to enable this to happen. This is supported by The Regional Plan for Sport 2004-2008 (Sport England), with a reduced target of 45% active in sport by 2020.<sup>xvi</sup>

The Playing Pitch Strategy 2012 for Telford and Wrekin analyses current and future demand for grass and artificial pitches for five key sports including football, rugby union, rugby league, cricket and hockey. Plans going forward include a recommendation to work with schools to ensure community use agreements are

developed to enable communities to make use of school pitches including those being built or planned in the borough as part of the Building Schools for the Future programme.<sup>xvii</sup>

The Telford & Wrekin Green Infrastructure Framework defines green infrastructure as the term used to describe every public and private green space and natural feature including water in the borough. It includes private gardens, parks, playing fields, road verges, woods, landscaped areas in industrial parks, farmland ponds, lakes, streams and rivers. The figure below illustrates the distribution of the different types of green infrastructure across the borough.

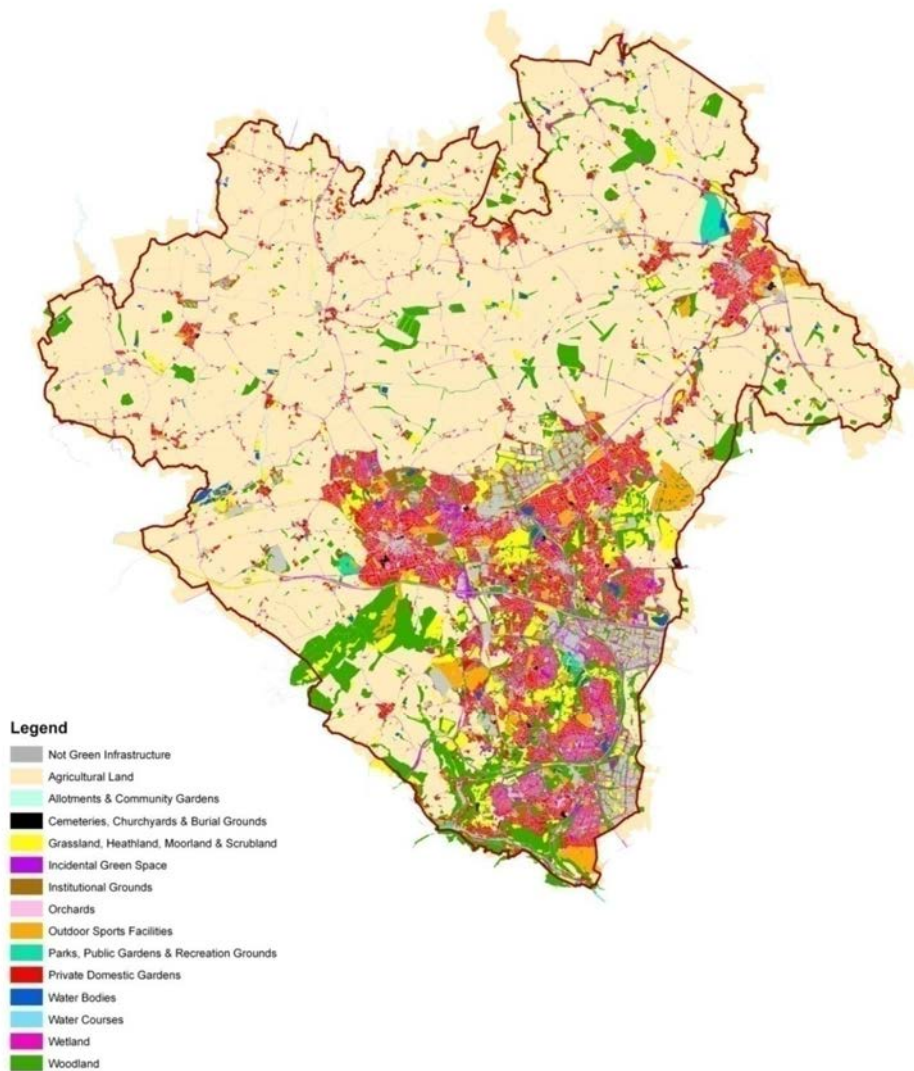


Figure A2: Green Infrastructure Composite Typology Map<sup>xviii</sup>

The Evidence & Analysis document prepared by Telford and Wrekin Council, demonstrates that over 90% of the borough is 'green infrastructure'. Green infrastructure is vital to the area's image and identity, its economic prosperity and its social health and well being as well as the borough's sustainability and resilience to climate change.

## 1.2.4 Influence of the LFRMS on Population and Human Health

There are various ways in which the population and their health may be affected by flooding, as outlined by Lancaster *et al.* (2004)<sup>xix</sup>:

- Drowning, injuries and falls resulting from direct exposure to deep and/or flowing flood waters, lack of adequate warning and fast flowing water carrying debris;
- Respiratory disease, shock hypothermia and cardiac arrest may occur as a result of flooding;
- Contact with polluted waters and damp conditions can lead to wound infections, dermatitis, conjunctivitis, gastrointestinal illness, ear/nose/throat infections and the possibility of serious waterborne diseases;
- Contamination to water supply from combined sewer overflows and disruption to services such as electricity, gas, public lighting and water; and
- Physical and emotional stress due to loss of property, evacuation and disturbances as a result of injury.

The direct physical risk of flooding to the population of the borough is shown in the LFRMS, which outlines the number of properties that are estimated to be at risk from fluvial, pluvial and ground water flooding.

Actions taken to manage flood risk may have impacts on both individuals and communities and may increase the possibility of waterborne infection as a result of damage to water supply/sewerage systems. LFRMS measures taken to manage flood risk may have impacts on both individuals and communities and can help to reduce risk to human health from the impacts listed above.

The perceived level of flood risk and fear of flooding that communities experience may also affect levels of stress and impact on their quality of life.

The LFRMS will need to consider whether any LFRMS measures on the ground will be able to reduce geographical barriers to services rather than increase them, for example through scheme design and access arrangements associated with new schemes.

Population growth in the borough will lead to increased demand for development land and increased need for flood risk management. It will also increase demand for water resources and will place additional pressure on the sewerage systems.

The requirement for additional housing can result in new development which could potentially result in an increase in impermeable surfaces, with implications for flood risk. However, new development could also bring opportunities, for example, the retro-fitting of SuDS adjacent to or on existing development or installing SuDS on new developments.

The increased pressure on the Telford and Wrekin's water resources and infrastructure are likely to come from two principal sources, as follows:

- **Population growth:** For example, new growth in Telford, and as a result of an ageing population and falling household size;
- **Seasonal tourism:** Influxes, which will increase as a result of general population growth.

Careful planning and management of flood risk and water management related infrastructure will need to be in the LFRMS, Surface Water Management Plans (SWMPs) and Strategic Flood Risk Assessments (SFRAs), considering the pressure that population growth and increased tourism will place on the environment.

Maintaining or improving access to homes, places of employment and critical infrastructure should be considered by the LFRMS. Areas used for recreation and access to them will also need to be considered in any plans to improve the standard or provision of green infrastructure. Telford and Wrekin Council could also consider potential funding opportunities to improve some rights of way in conjunction with LFRMS schemes.

### **1.2.5 Likely Evolution of the Baseline without the LFRMS**

From a review of the baseline information it appears likely that the direct and indirect risks to population and human health are likely to increase if no further action was taken to reduce flood risk from LFRMS sources.

These risks include the physical risks of flooding, contact with polluted water or damp conditions and physical and emotional stress due to loss of property, evacuation and disturbances as a result of injury. These risks are likely to be especially high in the hotspots of flood risk identified in the LFRMS. The risks to human health due to flooding from main rivers are also likely to increase. According to the UK Climate Change Risk Assessment (CCRA)<sup>xx</sup>, the number of people exposed to a significant likelihood of flooding in the UK (taking population growth into account) will be between 1.3 million and 3.6 million by the 2050s, rising to between 1.7 million and 5 million by the 2080s (an increase of between 400,000 and 2.7 million by the 2050s and between 800,000 and 4.1 million by the 2080s compared to the current figure of 900,000).

The CCRA for the 'health' sector<sup>xxi</sup> also shows the principal impacts of climate change on human health expected to come from changing temperatures, ground-level ozone levels and sunlight.

## **1.3 Material Assets**

The term "material assets" is not defined in the SEA Directive. For the purposes of the SEA, the term is used in relation to buildings and infrastructure in the borough that could potentially be affected by flooding. However, the LFRMS should also consider whether any of its policy themes or other elements could potentially increase demand for mineral resources or lead to an increase in waste production, for example, during scheme construction at a later stage.

The UK Climate Change Risk Assessment shows that flooding as a result of climate change is likely to pose an increasing threat to critical infrastructure. This includes increased risk to transport networks, water supplies and sewerage treatment, energy supplies, hospital and schools.

There is a high degree of confidence in the 'significant likelihood of flooding' risk posed to roads and a medium level of confidence in relation to power stations, hospitals and schools.<sup>xxii</sup>

### **1.3.1 Transport Infrastructure**

Telford and Wrekin is bordered by North Shropshire, Shrewsbury and Atcham to the west, Bridgenorth to the south and by Stafford in the east. The M54 motorway runs directly through the town (east to west), linking up Telford with the M6 motorway in the east and the UK's wider motorway network. Telford Central Railway Station, located near Telford town centre, is on the Wolverhampton to Shrewsbury Line, with frequent trains to and from Birmingham, where there are regular connections to London.

In 2009 the Telford International Rail freight Park (TIRP) opened just off the Hortonwood Roundabout near Donnington. Telford has a significant and growing distribution sector and is recognised as a developing regional logistics centre within the West Midlands<sup>xxiii</sup>.

### **1.3.2 Other key infrastructure**

The LFRMS will also need to consider flood risk to sewerage infrastructure, pumping stations, electricity and communications infrastructure health, emergency services, educational facilities, leisure facilities and residential properties.

### **1.3.3 Influence of the LFRMS on Material Assets**

The LFRMS will seek to manage flood risk to transport infrastructure and other critical infrastructure and material assets within the borough. However, the implementation of LFRMS measures has the potential to cause temporary disruption to critical transport infrastructure, for example through the construction of schemes and associated impacts on the local environment and road network.

Telford and Wrekin Council will need to work closely with the Highways Agency and its own Highways team in order to fully understand the principal flood risk issues that relate to transport infrastructure. The construction of new roads, improvement to existing roads or increased urbanisation in general, could all potentially lead to an increase in the rate and volume of surface run-off from impermeable surfaces. The location of critical infrastructure may influence the range of available LFRMS management options and measures. The location of LFRMS related infrastructure, if any new build is required, will also need to consider access to and use of critical infrastructure.

### **1.3.4 Likely Evolution of the Baseline without the LFRMS**

The risk of flooding to key infrastructure, land assets and properties is likely to continue to increase without the LFRMS. This could potentially increase risks to receptors that fall under other SEA topics, for example an increased risk of pollution to soil and water resources caused by the inundation of contaminated land.

## **1.4 Climate change adaptation**

### **1.4.1 Overview**

The UK Climate Impacts Programme (UKCIP) has carried out modelling that shows detailed climate probability for each 25km<sup>2</sup> of land in the UK. The latest projections anticipate that the Borough and the UK are likely to experience:

- Warmer/wetter winters;
- Hotter/drier summers;
- Higher average annual temperatures; and
- More weather extremes (heavy rain and flash flooding events).

UK Local Climate Impacts Profiles (LCIPs) for various local authorities are available on the UKCIP website.<sup>xxiv</sup> In the Telford and Wrekin borough, increased precipitation will increase the risk of surface water flooding, which may be exacerbated by blockages in culverts, gutters and drains (sometimes due to inadequate maintenance).



Flooding is a regular occurrence in the Severn Gorge and the Severn catchment in particular has a long and well-documented history of flooding with records dating back to the 13th Century<sup>xxv</sup>.

Telford and Wrekin's LCIP<sup>xxvi</sup> shows the following key findings for the borough to date:

- 62 reported weather events were recorded in Telford and Wrekin in the last decade. Flooding was the most frequent event reported (including high profile flood events on the Severn in 1998, 2000, 2002, 2003, 2004 and 2007). There has been a clear rise in the number of flash flood events in recent years;
- Heat waves – July 2006 was the warmest month in the UK since records began. A Level 3 heat wave warning was issued to the West (18th and 19th July) as daytime temperatures exceeded 30°C, with 15°C at night;
- Gales – The storms which hit the country in January 2007 caused widespread damage, estimated to be in the millions of pounds, and directly resulting in ten deaths;
- Flash Flooding – almost a month's worth of rain (46mm) fell in 24 hours on 19th June 2007. Sustained rainfall throughout the following month coupled with a wetter than average May caused widespread flash flooding; and
- Snow – Severe blizzard-like conditions were experienced during February 2007. During February 2009 widespread problems were caused by several snowfalls within a two week period. Flood warnings were also issued after the events in anticipation of the melting snow causing the local tributaries to the River Severn to break their banks.

The T&W Local Climate Impact Profile (LCIP) is due to be updated. If the results of the update are ready in time, they will be included in the Environmental Report.

In addition to the information contained in the LCIP, the borough has also experienced more recent flooding. 2012 was classified as the second wettest year on record in the UK, with the prolonged period of heavy rain resulting in many flooding incidents. The Coalbrookdale and Ironbridge communities were particularly affected but many other areas were also flooded.

In rural communities, potential disruption to transport and access to services is particularly important. The majority of the West Midlands population lives in high density urban areas particularly in the Birmingham, Black Country, Coventry and Stoke conurbations. National and international research suggests that deprived communities and individuals with existing health problems are more vulnerable individuals to the effects of climate change.<sup>xxvii</sup>

## 1.4.2 Influence of the LFRMS on Climate Change Adaptation

Climate change could potentially impact on most SEA topic areas in a variety of different ways. Figure A3 shows some of these potential interactions.

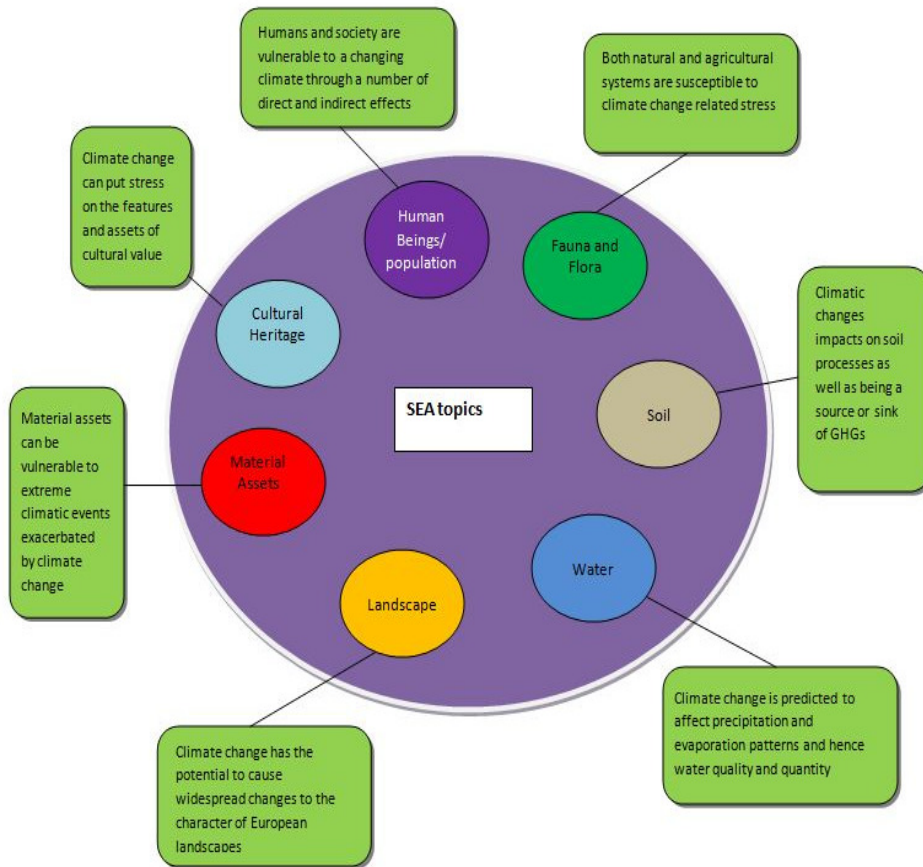


Figure A3: Interactions between climate change and other LFRMS SEA topics

The LFRMS should assist Telford and Wrekin in becoming better adapted to the impacts of climate change, particularly in relation to flood risk. However, there may also be opportunities, through LFRMS measures, to improve the resilience of biodiversity to climate change, for example by creating or improving flood storage areas for wildlife potential.

The LFRMS could also potentially facilitate the migration of habitats and species, especially in areas where some habitats and species are under pressure from development or other impacts. For example, new flood storage areas could effectively expand the amount of a specific vulnerable habitat. Tree planting at the location of LFRMS measures could also contribute to cooling and shading.

Opportunities to link up green infrastructure and improve its resilience to climate change impacts should also be explored.

### 1.4.3 Likely Evolution of the Baseline Environment without the LFRMS

As described in section 1.7.1, the borough, in common with the majority of the UK, is likely to experience hotter and drier summers, warmer and wetter winters and more weather extremes. Telford and Wrekin Council and other organisations will work together, for example, through the West Midlands Climate Change Adaptation Partnership, to help the region become more resilient and better adapted to climate change.

## 1.5 Soils and Geology

Shropshire has a diverse geology with a wide range of mineral resources and rocks, representing most of the major divisions of geological time. Upper Carboniferous rocks occur in a discontinuous belt from north-west to south-east across Shropshire. They contain coal bearing strata giving rise to a number of small coalfields. The most well known of these are the Coalbrookdale Coalfield (Telford & Wrekin) and the adjacent Broseley Coalfield, both of which have a recent history of opencast coal and clay mining.

Underground mining occurred in all of the county's coalfields during the 20th century. The Wrekin is a prominent hill near the town of Telford. The Wrekin is home to some of the oldest rocks in Shropshire (677 million years old).

The sedimentary rock types are varied around the area, but lava from various volcanic eruptions formed this landmark, however, The Wrekin itself is not a volcano, and never was. Intrusions of igneous rock have been quarried in the past at nearby Ercall Quarry.

Not far from The Wrekin is the famous Ironbridge Gorge, named after the bridge that stands over the River Severn near Madeley. The River Severn runs across the county from west to east. Around Ironbridge and Bridgnorth it runs through a deep gorge which has been cut through the rock. The geological events that took place here thousands of years ago helped make the Industrial Revolution possible, as the Gorge itself was carved out by an ice sheet, together with its melt water, towards the end of the last ice age, some 15,000 years ago, and the ice sheet cut down into layers of coal, limestone and iron ore.<sup>xxviii</sup>

Soils within Telford and Wrekin vary according to the geological characteristics of specific areas of the Borough. Within the Mid Severn Sandstone Plateau, to the west, around the Severn Valley, the light sandy soils and rolling landform give way to heavier soils and more irregular topography. Here the land is of mixed arable and pasture use. To the east of the Severn, soils are dry and sandy.

In the Shropshire Staffordshire Plain NCA, widespread fertile and productive clay soils are generally characteristic; however in places the soils are thin, sandy and gravelly. In addition, peat covers 3% of the area.

In the Shropshire Hills NCA, the sandstone plateau around the hills gives rise to red, silty, loam soils over silty clays. For the most part these are fertile and well-drained, supporting arable land and pasture as well as woodland, but waterlogged areas support wet heathland and bog. The hill tops have thin, stony soils supporting only rough moorland.

## 1.6 Landscape

### 1.6.1 Landscape Character

The European Landscape Convention (ELC) adopts a broad definition of landscape:

*“landscape means an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors”.*

The ELC concept of landscape applies to all landscapes everywhere and in any condition – land, inland water, inter-tidal, marine, natural, rural, urban and peri-urban, outstanding, ordinary and degraded.

Telford & Wrekin has a rich and varied topography, with many landscape features that reflect history of the Borough. The borough contains the undulating landscapes of Telford New Town, the upland landscapes of the Wrekin and Ercall Hills and the low lying wet landscapes of the Weald Moors.

The Borough contains three National Character Areas (NCAs), which are defined by Natural England as “bio-geographic sub-divisions of England characterised by unique associations of wildlife and natural features”. The NCAs are as follows:

#### **NCA 66: Mid Severn Sandstone Plateau**

Located in the central catchment of the Severn and the lower Stour rivers, this NCA is a national watershed between the north-easterly flowing River Trent and the south-westerly flowing River Severn. It possesses a highly diverse nature conservation value and hosts a great variety of geological features from a wide range of periods. The landscape is dominated by rolling arable cultivation, with weak hedgerows marking the field boundaries. To the west of the area, field patterns contrast with the open rolling arable fields, with a more mixed field pattern and stronger pattern of hedgerows. There are large urban fringes, including Telford. Patches of heathland are scattered across the area, and steep-sided dingles are common. Urban areas also support a variety of semi-natural habitats including valley mires, remnant ancient woodland, meadows and field ponds.

#### **NCA 65: Shropshire Hills**

This NCA is of international importance for its geological interest, and supports an interesting transition of species between southern lowland and northern upland types, with several at the edge of their natural range. The area has a dominant pattern of south-west to north-east ridges, scarps and intervening valleys, with rounded hills often crowned with heathland and woodland on steeper slopes. Scattered farms occur within the dales and sheltered valleys. The area maintains several important areas of unimproved grassland with gradations of upland dry acid grassland to neutral grassland on the lower slopes. The area is abundant in semi-natural ancient woodland and a variety of riparian and aquatic habitats add to the diversity of the area.

#### **NCA 61: Shropshire, Cheshire and Staffordshire Plains**

This NCA is characterised by extensive undulating plains interrupted by sandstone ridges. The area covers the northern part of the Borough. Farming is dominated by dairy, with some mixed farming to the north and southeast. Field boundaries are predominantly hedgerows, with scattered standards and are generally well managed. Woodlands are generally restricted to the steeper slopes of the sandstone ridges. The small peat and open water wetlands are of international conservation importance.

Flood risk management options should be in keeping with the existing landscape character and visual amenity, whether protected or not and there may be opportunities to enhance the existing landscape and/or townscape.

Future restriction on development within areas at risk from flooding such as the river flood plain may help protect the landscape character and views within and from these important landscapes; however Telford and Wrekin Council will need to ensure that any development displaced from these areas does not cause a landscape impact equally or more severe elsewhere.

### **1.6.2 Landscape Designations and Other Notable Landscape Features**

There are a number of landscapes within the borough that have been designated for protection, including an Area of Outstanding Natural Beauty (AONB) and seven Conservation Areas designated for their historic buildings, as discussed in Sections 1.7 and 1.8 of this Appendix. Landscape features are the result of natural and manmade activity and processes.

The eastern extent of the Shropshire Hills AONB extends into the borough, approximately 3-5km west of Telford. The Shropshire Hills AONB was designated in 1958 for its varied geology, diverse wildlife and rich history. The area contains several broad landscapes areas including two Environmentally Sensitive Areas (Clun and the Shropshire Hills). In addition to the AONB, over a third of the borough is designated as part of the council's 'Green Network', which is an important environmental, wildlife and recreational resource. In 2001 the Green Network covered an area of c.2780ha<sup>xxxix</sup>. Landscape designations and the Green Network are shown on the maps provided in Appendix B.

Green Belt also exists beyond the local authority boundary. Although Green Belt is a planning rather than landscape designation it ultimately affects the levels and nature of development, which in turn influences the landscape.<sup>xxx</sup>

The Strine Levels Area of Special Landscape Character (a non-statutory designation) lies to the north of Telford. This is an area of lower land in the Strine valley which is largely undeveloped and mostly comprises active floodplain which is for the most part used for informal open space and grazing.

There are 27 different landscape types recognised within Shropshire, some of which including the Lowland Moss types have only a limited distribution and others such as the Estate Farmlands and the Principal Settled Farmlands occur more widely in the country. The various landscape types of the Telford and Wrekin borough are depicted in the below figure.



Figure A4: Landscape Typology

### 1.6.3 Land Use

The Borough has a total land area of approximately 29,000 hectares, almost three quarters of which (approximately 21,000 hectares) is rural open countryside. The remaining 27% is associated with the urban areas of the borough, primarily located in the south east of the borough.<sup>xxxi</sup> Figure A5 shows the distribution of agricultural land across the borough.

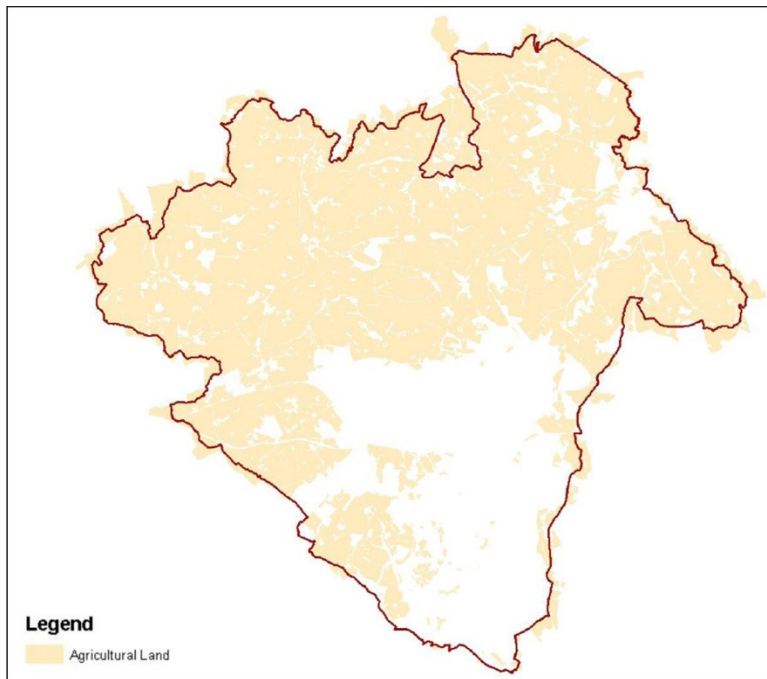


Figure A5: Distribution of Agricultural Land in Telford and Wrekin<sup>xxxii</sup>

As outlined within the Sustainability West Midlands Report (2012), “agriculture is historically, and continues to be, one of the most important sectors in the West Midlands, not only in land use terms, but also through its contribution to society and the environment. Seventy percent of the land in the region is used for agriculture, with approximately half used for arable farming and horticulture, and half used for grazing of livestock”.

Flooding is one of the major risks to agricultural land. In 2007, over 10,923 hectares of agricultural and farm land in the West Midlands (Severn and Avon affected) was flooded causing £15.5 million in damage and costing on average £96,596 per farm. This was an exceptional event, but climate change predictions suggest that extreme events such as this are likely to occur more frequently<sup>xxxiii</sup>.

#### 1.6.4 Influence of the LFRMS on Landscape

Local authorities are working with Natural England, who lead on the implementation of the European Landscape Convention in England. Local authorities can also incorporate landscape objectives into their plans and programmes; for example in Telford and Wrekin’s Core Strategy Policy 11 (Open Space), 12 (Natural Environment), 14 (Cultural, Historic and Built Environment) and 15 (Urban design).

The LFRMS will need to ensure that and LFRMS measures complement this Policy and take into account database records, such as the HLC (see Section 1.7.3) in terms of maintaining or enhancing landscape character.

The LFRMS measures may include new (or modified) flood risk management structures, land use change, changes in flood risk/frequency or changes in water levels that have the potential to adversely or positively affect existing landscape features or settings, and to create new features, for example flood storage areas.

The LFRMS measures may change the frequency and extent of flooding, leading to consequent changes in the suitability of land for certain uses, for example by affecting its versatility, productivity, soil quality and mineral resources. For instance, construction activities or increasing the seasonal period during which soil is waterlogged could lead to impacts such as these.

### 1.6.5 Likely Evolution of the Baseline Environment without the LFRMS

Landscape evolution is intrinsically linked to planning policy and development control and the application of these controls over development which could have significant impact. Assuming that these mechanisms are enforced in the borough, the landscape baseline is unlikely to change significantly.

## 1.7 The Historic Environment

### 1.7.1 Overview

This section covers buried archaeological remains, scheduled monuments, listed buildings and bridges, historic parks and gardens, the historic landscape including hedgerows and other land boundaries, buildings of historical significance, towns and villages, and industrial features.

### 1.7.2 Designated Heritage Assets

Table A1 details the various heritage features present in Telford & Wrekin. All heritage assets will require attention when developing and implementing the LFRMS to ensure that they are protected not only against flood events but also from any flood risk measures put in place to prevent or control flooding.

Designated Assets	Total in Telford & Wrekin
<b>Listed Buildings (all)</b>	790
Grade I	12
Grade II*	51
Grade II	727
<b>Scheduled Monuments</b>	37
<b>Registered Parks and Gardens</b>	3 (includes: Orleton Hall, Lilleshall Hall and Chetwynd Park – All Grade II)
<b>Conservation Areas</b>	7
<b>World Heritage Site</b>	1 (Ironbridge Gorge)
<b>Registered Battlefields</b>	0

Table A1: Heritage Sites in Telford & Wrekin

Where there is an existing flood risk to heritage assets, this risk may need managing in order to reduce the threat to either the assets themselves or their setting. This particularly applies to features already indicated as being at risk by English Heritage.

The 2013 Heritage at Risk register records one Registered Park and Garden as ‘at risk’ in Telford and Wrekin: Lilleshall Hall, Sherifffhales / Chetwynd Aston and Woodcote / Lilleshall and Donnington (grade II). It is identified as generally in satisfactory condition but with significant localised problems, and highly vulnerable.<sup>xxxiv</sup>

Two buildings are identified as ‘at risk’:

- Charlton Castle, Wrockwardine, a Scheduled Monument in ‘very bad’ condition;
- Church of St Mary the Virgin, Jackfield, a Listed Place of Worship (grade II), in ‘poor’ condition.



Together with 8 further Archaeological entries (Scheduled Monuments):

- Enclosed Iron Age farmstead immediately adjacent to The Croft, Pave Lane, Chetwynd Aston and Woodcote (Scheduled Monument);
- Roman camp on Red Hill, Lilleshall and Donnington (Scheduled Monument);
- St Leonard's Priory immediately adjacent to the Church of St Mary and St Leonard, Wombridge, Oakengates (Scheduled Monument);
- Canal aqueduct over River Tern, Rodington (extensive significant problems) (Scheduled Monument, Listed Building Grade I);
- Uxacona Roman site (also with Shropshire Unitary Authority), Shifnal / St. Georges and Priorslee / Lilleshall and Donnington (Scheduled Monument);
- Site revealed by aerial photography north of Castle Farm, St. Georges and Priorslee (Scheduled Monument);
- Churchyard of St James's Church, Stirchley and Brookside (Scheduled Monument, Listed Building Grade I);
- Moated site and a fishpond 160 metres and 280 metres south of The Farm, Charlton, Wrockwardine (Scheduled Monument).

As detailed in Table A1 and shown in the Cultural Heritage map of Appendix B, the borough is rich in designated archaeological and cultural heritage sites. The Cultural Heritage map in Appendix B shows the Scheduled Monuments, Registered Parks and Gardens and World Heritage Sites present within the borough. Shropshire's online Historic Environment Record (HER) also shows Conservation Areas, Historic Parks and Gardens, Listed Buildings, Scheduled Monuments and Registered Battlefields within or close to Telford and Wrekin, as well as the Ironbridge Gorge World Heritage Site.

Ironbridge Gorge World Heritage Site is the only World Heritage Site in the West Midlands. Key management issues for this unique historic site include:

- The need to preserve the unique character of the Gorge;
- Management of visitors and their access to the World Heritage Site;
- Land stability;
- The management of the river and its banks.

### **1.7.3 Undesignated Heritages Assets**

The Heritage Environment Record for Shropshire identifies some 900 non-statutory heritage data records for Telford and Wrekin.

An issue central to many development schemes is the potential for disturbance to hitherto unknown archaeology. There is the potential for flood risk management options to impact on unknown archaeological sites, as well as to known ones. It is likely that in many instances, future schemes will have to consider the cultural heritage resource in terms of assessment in order to determine archaeological

potential. Schemes requiring planning permission might have to implement archaeological investigation to assist planning determination and robust mitigation strategies.

Archaeological resources in the study area may remain undiscovered or lie underwater in rivers and wetland areas. River corridors are often archaeologically rich and are likely to result in discoveries, should works be carried out within the river corridor.

The cultural heritage resource also includes historic landscapes, which include historic water management systems in catchment areas, including features such as water meadows, leats, historic flood embankments and dykes. Flood schemes have the potential to erase historic landscape signatures which can erode or change historic landscape character. Historic landscapes therefore need to be part of the cultural heritage resource considered in assessments. Most counties in England have been subject to Historic Landscape Characterisation (HLC) studies. These have used historic map regressions and Historic Environment Record data to characterise the historic landscape outside towns and cities. The HLC records are GIS-based, and indicate the extent of the survival of historic and ancient landscapes, as well as providing a 'time-depth' profile of any given area. HLC is used as a planning tool as well as for historic environment assessment and research.

#### **1.7.4 Palaeo-environmental remains**

The cultural heritage resource also includes palaeoenvironmental remains, which are the relict organic remains of former water courses and flooding events which survive in the buried environment, often within alluvial layers of deposition. These organic remains contain material from which can be derived a wide variety of environmental data, such as pollen and macrofossils, which shed light on the physical environment of periods in the past. LFRMS schemes have the obvious potential to disturb such remains, much like buried archaeological sites.

#### **1.7.5 Influence of the LFRMS on the Historic Environment**

The issues that arise that the LFRMS might need to address can be divided into four areas.

- **The impact of flooding on heritage assets.**

Flooding damage to structures, such as buildings, bridges, culverts, historic settlements, to archaeological sites and to palaeo-environmental survival. Flood damage to the setting of the assets.

- **The role of historic structures within water and flood management**

The degree to which flooding and its control might be impacted (positively or negatively) by the management of historic structures. For example maintenance of existing systems, utilisation of water meadows as flood capacity.

- **The impact of historic structures on water management**

The degree to which the historic environment might inform or constrain the options available, such as bridge maintenance or adaptation, Conservation Areas, and Listed or Scheduled structures associated with watercourses.

- **Impact of flood prevention and mitigation on the historic environment.**

There are potential physical impacts from flood risk management structures and their operation on historic buildings, archaeological sites and palaeo-environmental remains. In this regard, consideration must be taken for the potential of changes in the hydrological regime leading to episodic 'drying out' of

archaeological and palaeo-environmental assets. Wetland sites have a high potential for containing preserved organic remains.

The LFRMS also needs to consider the potential impact of flood structures on the setting of buildings, towns and monuments; for example, the impact of a flood barrier adjacent to an iconic building or the influence that a Conservation Area has on the location and design of a structure.

The LFRMS may be able to reflect historic landscape character as an influence on scheme design, for example utilising orientation and patterns of existing drainage, or reflecting local landscape character traits.

The LFRMS may also be able to utilise aspects of the historic environment in relation to flood control, in particular identifying areas of the landscape that have historically been used to accept flood water.

The LFRMS will need to maintain or improve the condition or setting of cultural heritage as well as access routes to these resources.

The LFRMS should consider the potential for unrecorded archaeological sites of interest when considering floor risk management options.

### **1.7.6 Likely Evolution of the Baseline Environment without the LFRMS**

Cultural heritage is likely to face a continuation of the same threats it currently faces. These include direct impacts, such as loss or damage of important features, as well as indirect impacts, such as change of water table levels which may affect the preservation of archaeological and built heritage in situ. Threats include inadequate management of features, landscapes or nearby resources, neglect and inappropriate development within or near historic features or landscapes.

Air pollution, physical or chemical erosion and pressure from tourists can also pose threats to cultural heritage. However, the positive effects of cultural heritage management and restoration are also likely to continue in the absence of the LFRMS.

## **1.8 Biodiversity**

### **1.8.1 Overview**

The biodiversity of Telford and Wrekin varies according to land use and the underlying geology. The landscape immediately around Telford and to the South is dominated by heathland and associated grassland. Post-industrial sites are important for biodiversity; the topography and soil conditions that remain following mining or excavations have been important in creating conditions favourable to natural colonisation by valuable communities of flora and fauna.<sup>xxxv</sup>

The 'Wrekin' area of the Borough is part of a wider landscape comprising a series of hundreds of wetlands associated with peatland and water filled glacial hollows. Locally they are known as meres and mosses and are of international conservation significance. A diverse range of wetlands habitats occur at these sites including lowland raised bog; fen, wet woodland; reedbed; and eutrophic or mesotrophic standing waters. Significant areas of grazing marsh habitat are found in the floodplain of the Severn. The area also contains important arable habitats. These support nationally important assemblages of arable birds.<sup>xxxvi</sup>

The Shropshire Hills, to the South West of Telford, are characterised by upland heathland and lowland mixed deciduous woodland. The area is very rich in upland fens, flushes and swamps, but this habitat has been very poorly surveyed to date. The assemblage of plant and animal communities in the Shropshire Hills show

transitions between southern lowland and northern upland communities, with several species being present at the edge of their natural range.<sup>xxxvii</sup>

Shropshire Council and Telford & Wrekin Council received funding between January and June 2012 to build capacity for a Local Nature Partnership (LNP) to cover both administrative areas, in partnership with a range of organisations.

## 1.8.2 Designated Sites

There are several nature conservation sites near the Borough boundary with internationally recognised designations; however no internationally designated sites are within the Borough boundary. These sites are all designated under the Ramsar Wetlands Convention;

Ramsar sites;

- Midlands Meres and Mosses Phase 1;
- Midlands Meres and Mosses Phase 2; and
- Rostherne Mere

The Meres & Mosses form a geographically discrete series of lowland open water and peatland sites in the North-West Midlands. These have developed in natural depressions in the glacial drift left by receding ice sheets which formerly covered the Cheshire/Shropshire Plain. The wide range of resulting habitats support nationally important flora and fauna, including an assemblage of rare wetland invertebrates. The Midlands Meres and Mosses Phase 2 Ramsar Site lies closer to the Telford and Wrekin Borough boundary, approximately 2km North East of Newport. This site supports a number of rare species of plants, bryophytes and invertebrates associated with wetlands. There are 16 species of British Red Data Book insect listed for this site including the following endangered species: the moth *Glyphipteryx lathamella*, the caddisfly *Hagenella clathrata* and the sawfly *Trichiosoma vitellinae*. The site is also designated as a National Nature Reserve (NNR).

There are 8 Sites of Special Scientific Interest (SSSIs) within the Telford and Wrekin Borough Area and 10 in the vicinity (within 12.5 km of the centre of the borough (near SJ 650,150). These sites are as follows:

- Allscott Settling Ponds
- Aqualate Mere (outside Borough)
- Attingham Park (outside Borough)
- Buildwas River Section (outside Borough)
- Buildwas Sand Quarry (outside Borough)
- Chermes Dingle (outside Borough)
- Farley Dingle (outside Borough)
- Hodnet Heath (outside Borough)
- Lincoln Hill
- New Hadley Brickpit
- Newport Canal
- Lydebrook Dingle (outside Borough)
- Muxton Marsh (outside Borough)
- Sheinton Brook (outside Borough)

- Tick Wood And Benthall Edge
- The Wrekin & The Ercall

There are currently five Local Nature Reserves (LNRs), which cover 190 hectares<sup>xxxviii</sup>, in Telford and Wrekin<sup>xxxix</sup>.

- Granville Country Park
- Limekiln Wood
- Lodge Field
- Telford Town Park
- The Ercall and Lawrence's Hill

Telford Town Park LNR covers 160 hectares and attracts over 1 million visitors each year.<sup>xi</sup>

Telford and Wrekin also has numerous locally designated nature conservation sites. These are chosen by the wildlife sites review group, attended by Telford & Wrekin Council but led by the Shropshire Wildlife Trust. There are 40 wildlife sites in Telford and Wrekin, including Dothill Park, Ladywood and Priorslee Lake<sup>xli</sup>.

Ramsar Sites, SSSIs, LNRs and NNRs are shown on the maps provided in Appendix B. However, the 40 wildlife sites are not represented due to absence of GIS data for these areas.

### 1.8.3 Biodiversity Enhancement

There are two 'Priority Areas for Action' identified in Shropshire's Biodiversity Action Plan that fall within the Borough of Telford and Wrekin, although no further details of these areas is provided on the Shropshire Biodiversity Partnership website.<sup>xlii</sup> Further details of biodiversity enhancement opportunities are provided in Chapter 7 of the Environmental Report.

## 1.9 Water

### 1.9.1 Overview

The LFRMS needs to ensure that, by improving drainage and reducing flood risk in the district, there are no adverse impacts on water quality or the hydrological regime of aquatic habitats. It also needs to ensure that drinking water quality, groundwater and human health are protected.

Information on flood risk from pluvial and fluvial flooding is presented in the LFRMS and is taken from the PFRA and the CFMP respectively. Flood risk is also described in sections 1.2 and 1.4 of this Appendix in relation to people and to climate change, respectively. The following sections therefore focus on water quality and availability.

The quality status of water bodies in terms of the Water Framework Directive is dependent upon various underlying factors, as shown in Figure A6:

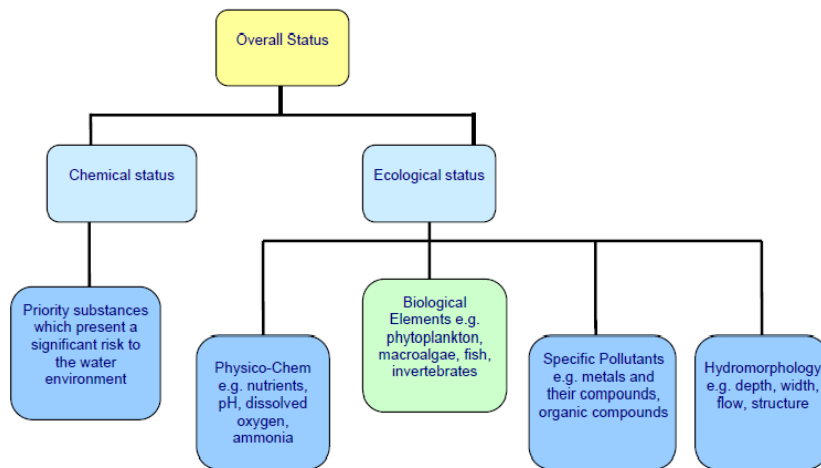


Figure A6: The components of overall status of surface water bodies <sup>xliii</sup>

With this in mind, the SEA needs to provide an objective that assesses whether the LFRMS is likely to have any impact on the chemical or ecological status of water bodies.

There are various impact sources that could affect ecological status. The most relevant to the LFRMS are shown in Table A2;

Reason for failure	Key elements impacted
Point source water industry sewerage works	Ammonia, phosphate, dissolved oxygen
Physical modification urbanisation	Fish, invertebrates
Diffused source mixed urban run-off	Dissolved oxygen, invertebrates, phosphate, benzo (ghi) perelyene and indeno (123-cd) pyrene
Diffuse source agricultural	Ammonia (phys-chem), dissolved inorganic nitrogen, dissolved oxygen, fish, invertebrates, macrophytes, phosphate, phytobenthos, phytoplankton, total phosphorus
Physical modification barriers to fish migration	Fish
Physical modification land drainage	Dissolved oxygen, fish
Physical modification flood protection	Fish, invertebrates
Physical modification water storage and supply	Fish

Table A2: Main reasons for surface water bodies not achieving good ecological status or potential. Adapted from Environment Agency, 2009; *Severn River Basin Management Plan*.

The LFRMS will need to consider whether any modifications to ordinary water courses, or the way in which surface or groundwater is managed, will lead to any adverse impacts on the receptors listed in Table 5, in terms of water quality impacts on biodiversity. The quality of water in rivers, streams, and rhynes in the district (strategic level) could potentially be directly affected by:

- Redirected ordinary water courses or drainage water containing pollutants reaching new receptors; and
- New surface water conveyance over contaminated land, enabling pollutants to enter water courses.

## 1.9.2 Baseline conditions

### 1.9.2.1 Flood risk from main rivers (non-LFRMS sources)

The Environment Agency is the non-departmental public body set up to protect the environment from threats including flooding from designated main rivers. They are responsible for operating, maintaining and replacing flood risk management assets including flood defences, barriers and gates, pumping stations and flood flow control sluices.

The flood map on the “What’s in Your Backyard” section of the Environment Agency’s pages on the Defra web site indicate areas at risk of flooding from main rivers in the Borough. Areas at risk of fluvial flooding are described in Chapter 5 of the LFRMS.

### 1.9.2.2 Groundwater quality

One of the most problematical and widespread groundwater contaminants is nitrates. Nitrates are regularly found in groundwater in some areas at concentrations exceeding the drinking water limit as established in the European Commission’s Directive on Drinking Water (80/778/EEC).<sup>xliv</sup>

Agriculture is thought to be the primary source of nitrate presence in groundwater, although other sources of nitrate include waste, particularly through old landfills, septic tanks and leaking sewers.

### 1.9.2.3 Source Protection Zones

The Environment Agency defines Source Protection Zones (SPZs) for groundwater sources such as wells, boreholes and springs used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution in the area. The closer the activity, the greater the risk of pollution. Figure A7 shows the location of SPZs in Telford and Wrekin:

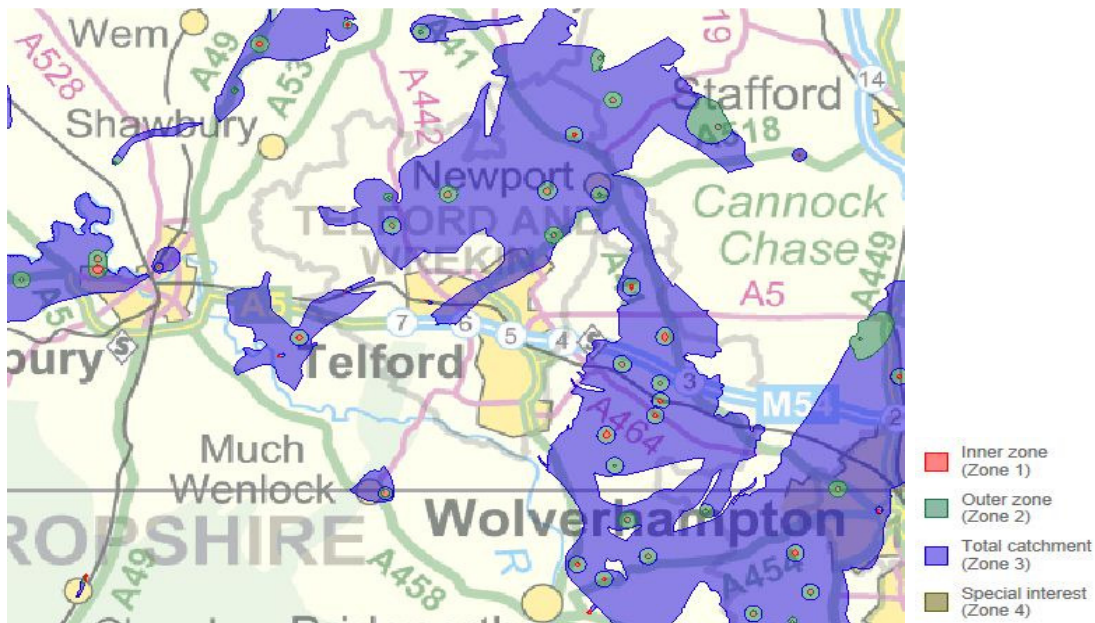


Figure A7: Source Protection Zones in Telford and Wrekin<sup>xliv</sup>

The following information on SPZs is taken from the Environment Agency Policy and Practice for the Protection of Groundwater<sup>xlvi</sup>:

- SPZ1 (Inner protection zone) – Defined as the 50 day travel time from any point below the water table to the source. This zone has a minimum radius of 50 metres;
- SPZ2 (Outer protection zone) – Defined by a 400 day travel time from a point below the water table. This zone has a minimum radius of 250 or 500m around the source, depending on the size of the abstraction; and
- SPZ3 (Source catchment protection zone) – Defined as the area around a source within which all groundwater recharge is presumed to be discharged at the source. In confined aquifers, the source catchment may be displaced some distance from the source. For heavily exploited aquifer, the final Source Catchment Protection Zone can be defined as the whole aquifer recharge area where the ratio of groundwater abstraction to aquifer recharge (average recharge multiplied by outcrop area) is >0.75. There is still the need to define individual source protection areas to assist operators in catchment management.<sup>xlvii</sup>

In the future, SPZs may also form the basis of Safeguard Zones under the Water Framework Directive.

The majority of the Borough to the North of Telford is categorised by the Environment Agency as a Surface Water Safeguard Zone. These non-statutory Safeguard Zones are areas where activities can impact adversely on the quality of water abstracted in a Drinking Water Protected Area (DrWPA). Action to address pollution is targeted in these zones so that extra treatment of raw water can be avoided. Safeguard Zones are a joint initiative between the Environment Agency and water companies. The zones are one of the main tools for delivering the DrWPA objectives of the Water Framework Directive.<sup>xlviii</sup>

In addition to the risk of surface and groundwater contamination from pollution spillages there is also potential for pollutants to be mobilised if contaminated land is flooded. Detailed information on contaminated land and post-industrial sites in the Borough is not included here. However, landfill sites within Telford and Wrekin are shown in the maps of Appendix B. Any LFRMS measures proposed in the vicinity of these landfill sites should consider the current and future flood risk associated with these areas and how it could be reduced.

#### 1.9.2.4 Catchment Sensitive Farming

Catchment Sensitive Farming (CSF) gives advice on dealing with diffuse pollution from agriculture and the impact on water courses.

CSF is a voluntary initiative, whereas Nitrate Vulnerable Zones (NVZs) are a statutory obligation. CSF focuses on best practice on manure and pesticide usage, promoting good soil structure, protecting watercourses from run-off and best practice on stock management.

There are two CSF target areas close to the Telford and Wrekin border. One area falls predominantly in Staffordshire, between Telford and Stafford. The other CSF target area is Aqualate Mere, immediately north east of Newport. The LFRMS would need to consider any potential effects of FRM measures on catchment sensitive areas, in terms of pollution risk, for example, FRM measures that relate to the sewerage network.

<sup>xlix</sup>

The majority of Telford and Wrekin is either designated as a Surface Water NVZ or Groundwater NVZ, as shown in Figure A8





Figure A8: Nitrate Vulnerable Zones (NVZ) in Telford and Wrekin<sup>1</sup>

### 1.9.2.5 Rivers and river water quality

The Telford South Catchment contains the River Severn and the Coal Brook which are classified as Main River by the Environment Agency. The Telford North Catchment contains no main rivers, whereas the Rural East contains 3 main rivers (River Meese, Upper Strine and Lower Strine) and the Rural West has two, the River Roden and River Turn.

Four water courses within the Borough have been assessed by the Environment Agency to have ‘poor’ ecological Status, whereas six water courses have ‘moderate’ ecological status<sup>li</sup>. Ecological status applies to surface water bodies and is based on the following quality elements: biological quality, general chemical and physico-chemical quality, water quality with respect to specific pollutants (synthetic and non synthetic), and hydromorphological quality.<sup>lii</sup>

The Environment Agency records pollution released into the environment by industrial sites under the EC Integrated Pollution Prevention and Control Directive (IPPC). Numerous industrial pollution incidents have been recorded in the borough. The majority of these have been described by the Environment Agency as ‘significant’ but there are also seven recorded major incidents in the Borough. A cluster of these surround Ironbridge.<sup>liii</sup> Industrial pollution incidents in the Borough have largely been categorised as ‘waste’, ‘chemical’ and ‘mineral.’<sup>liiv</sup> These incidents have occurred where there has been an emergency, mis-management, accident or plant failure which has caused pollutants to be released.

### 1.9.2.6 Water availability in Telford and Wrekin

The North of the Borough largely falls within the Shropshire Middle Severn catchment in terms of catchment abstraction.

In the River Tern Catchment of the Borough there are four points where the Environment Agency measure surface water flows (AP3, River Tern at Ternhill, AP 5 River Meese at Tibberton, AP6 River Roden at Rodington and AP7 River Tern at Walcot). For these assessment points there is restricted water available for licensing new surface water licences on the Rivers Tern, Meese, Roden, Strine, and associated tributaries, this means:

- There is no water available for unconstrained abstraction i.e. abstraction with no 'Hands-off flow' (HOF) restriction (see glossary in main report).
- Water is only available during periods of medium to high flows subject to a HOF condition.<sup>iv</sup>

For assessment point 4 Coley Brook at Coley Mill there is restricted water available for licensing.

For new surface water licences on the Coley Brook and associated tributaries, this means:

- There is no water available for unconstrained abstraction i.e. abstraction with no HOF restriction.
- Water is only available during periods of high flows subject to a HOF condition

Severn Trent's Water Resources Management Plan (WRMP) shows that the Borough falls within the Shelton Water Resource Zone (WRZ). This WRZ spans the England-Wales border extending from Gwynedd towards Wolverhampton. It is predominantly groundwater fed, with one small river source in Shrewsbury. The WRMP states the need to providing alternative supplies to customers in and around Telford and Bromsgrove, where the current sources of supply are considered likely to be environmentally unsustainable. Their proposed alternative source of supply is the expansion of output from their Uckington source near Telford, up to full licensed quantity together with pipeline upgrades to transfer additional water from the west part of the Shelton zone to the east.<sup>vi</sup>

### 1.9.3 Influence of the LFRMS on Water Resources

The LFRMS will need to consider whether any LFRMS measures will lead to adverse impacts on the water bodies within Telford and Wrekin and whether the LFRMS can contribute to delivering some of the mitigation measures set out within the River Basin Management Plans (RBMP's) Programme of Measures e.g. through improvement to fish passage.

Water resources within the LFRMS area are likely to be under increasing pressure from a growing population and increased demand for wastewater treatment and drinking water over the duration of the strategy. Consequently, strategic measures proposed by the LFRMS will need to consider these issues. The LFRMS should also have regard to NVZs and ground water SPZs.

### 1.9.4 Likely Evolution of the Baseline Environment without the LFRMS

The UK CCRA for the water sector<sup>vii</sup> shows that climate change is likely to cause the following impacts on water nationally:

- **River flows.** By the 2080s, reductions in summer river flows may be significant across the UK, with the largest decreases in southern and eastern England;
- **Water supply.** By the 2080s almost the whole UK population may be living in areas affected by a supply-demand deficit unless significant action is taken. Maintaining supplies may become particularly challenging in south- east England and the Midlands, unless further action is taken both to reduce the demand for water and to increase supplies. By the 2050s, there may be a significant decrease in the number of rivers where sustainable water abstraction is possible and this situation may grow more severe by the 2080s:

- **Water quality.** This depends to a large extent on water volume and is therefore influenced by river flows. For example, pollutants are less likely to be diluted by lower summer flows. Higher water temperatures may also contribute to changes in water quality; and
- **Assets and Infrastructure.** Many UK sewers are part of combined systems that carry both sewerage and surface water runoff. When their carrying capacity is exceeded by heavy rainfall, or they become blocked, they overflow or 'spill'. Although heavily influenced by socio-economic factors (e.g. population change), significant increases in spill frequency may result from climate change due to changes in rainfall patterns (e.g. more heavy winter downpours).

There are also likely to be continuing pressures on the water environment as demand for water increases alongside population increase. However, the Environment Agency is aiming to improve water quality to ensure water bodies meet Good Ecological Status in line with the WFD, for example through catchment and river basin management planning. Catchment sensitive farming and the wider implementation of SuDS should also continue to improve water quality.

# References

- 
- <sup>i</sup> Telford and Wrekin Council (2008) Local Development Framework: Sustainability Appraisal, Revised Scoping Report
- <sup>ii</sup> ONS Regional Profiles Population Tables (March 2013)
- <sup>iii</sup> A Summary of Climate Change Risks for the West Midlands
- <sup>iv</sup> Telford & Wrekin Council LTP3: Environmental Report Incorporating HIA and HRA (2011)
- <sup>v</sup> Telford & Wrekin Council (2013) State of the Borough Report
- <sup>vi</sup> GIF Evidence and Analysis Document
- <sup>vii</sup> Telford & Wrekin Council (2013) State of the Borough Report
- <sup>viii</sup> Telford & Wrekin Council (2013) Five Year Housing Supply Statement at April 2013.
- <sup>ix</sup> Telford & Wrekin Council (2012) Annual Monitoring Report
- <sup>x</sup> Telford & Wrekin Council (2013) State of the Borough Report
- <sup>xi</sup> Telford & Wrekin Council (2011) Telford & Wrekin Indices of Deprivation 2010
- <sup>xii</sup> Telford & Wrekin Council (2013) State of the Borough Report
- <sup>xiii</sup> Telford & Wrekin Council (2011) Telford & Wrekin Indices of Deprivation 2010
- <sup>xiv</sup> The 2005 West Midlands Regional Lifestyle Survey in Central Telford AAP SAR 2010 and LDF
- <sup>xv</sup> Telford & Wrekin Council (2013) GIF Evidence and Analysis Document
- <sup>xvi</sup> Sport England (2004) A Regional Plan for Sport in the West Midlands 2004-2008
- <sup>xvii</sup> Source: [http://www.telford.gov.uk/press/article/1199/new\\_strategy\\_for\\_playing\\_pitches](http://www.telford.gov.uk/press/article/1199/new_strategy_for_playing_pitches)
- <sup>xviii</sup> Telford & Wrekin Council (2013) Green Infrastructure Framework (GIF) Evidence and Analysis Document
- <sup>xix</sup> Lancaster, J.W., Preene, M., Marshall, C.T. 2004. Development and flood risk – guidance for the construction industry. CIRIA London.
- <sup>xx</sup> Defra, 2012. UK Climate Change Risk Assessment: Floods and Coastal Erosion. Available on: <http://www.defra.gov.uk/environment/climate/government/risk-assessment/#keyfindings>, accessed on 10/10/2012.
- <sup>xxi</sup> Defra, 2012. UK Climate Change Risk Assessment: Health. Available on: <http://randd.defra.gov.uk/Document.aspx?Document=CCRASummaryHealth.pdf>, accessed on 10/10/2012.
- <sup>xxii</sup> Defra, 2012. UK Climate Change Risk Assessment: Floods and Coastal Erosion. Available on: <http://www.defra.gov.uk/environment/climate/government/risk-assessment/#keyfindings>, accessed on 10/2/2012.
- <sup>xxiii</sup> Telford & Wrekin Council (2013) State of the Borough Report
- <sup>xxiv</sup> UKCIP (2013) Local Climate Impact Profiles. Source: <http://www.ukcip.org.uk/lclip/lclip-case-studies/>, accessed on 12/12/2013.
- <sup>xxv</sup> Telford & Wrekin Council (May 2012) Flooding. Source: [http://www.telford.gov.uk/info/793/civil\\_emergencies-flooding/165/flooding](http://www.telford.gov.uk/info/793/civil_emergencies-flooding/165/flooding)
- <sup>xxvi</sup> Telford & Wrekin Council (2010) Local Climate Impact Profile: Summary report – Telford & Wrekin Council. Source: [http://www.telford.gov.uk/downloads/file/2107/local\\_climate\\_impact\\_profile\\_lclip-summary\\_report](http://www.telford.gov.uk/downloads/file/2107/local_climate_impact_profile_lclip-summary_report), Accessed on 13/12/2013.
- <sup>xxvii</sup> Sustainability West Midlands (2012) A summary of Climate Change Risks for the West Midlands. Source: [http://www.telford.gov.uk/downloads/file/3742/a\\_summary\\_of\\_climate\\_change\\_risks\\_for\\_the\\_west\\_midlands](http://www.telford.gov.uk/downloads/file/3742/a_summary_of_climate_change_risks_for_the_west_midlands)
- <sup>xxviii</sup> Extract from Halcrow (2007) Telford and Wrekin Council: Strategic Flood Risk Assessment for Local Development Framework, Level 1.
- <sup>xxix</sup> Final Telford and Wrekin Core Strategy SA Scoping Report, 2008.
- <sup>xxx</sup> Source: <http://www.swo.org.uk/EasysiteWeb/getresource.axd?AssetID=51331&type=full&servicetype=Inline>, accessed on 6/6/2012.
- <sup>xxxi</sup> Telford & Wrekin Council (2007) Core Strategy Development Plan Document Adopted December 2007
- <sup>xxxii</sup> Telford and Wrekin (2013) Green Infrastructure Framework (GIF) Evidence and Analysis Document
- <sup>xxxiii</sup> Climate UK/Sustainability West Midlands (2012) A summary of Climate Change Risks for the West Midlands.
- <sup>xxxiv</sup> English Heritage (2013) Heritage at Risk Register 2013: West Midlands
- <sup>xxxv</sup> Natural England, 2012. National Character Area Fact Sheet - NCA 66: Mid Severn Sandstone Plateau: Key Facts & Data.
- <sup>xxxvi</sup> Natural England, 2012. National Character Area Fact Sheet - NCA 61: Shropshire, Cheshire and Staffordshire Plain Key Facts & Data.
- <sup>xxxvii</sup> Natural England, 2012. National Character Area Fact Sheet - NCA 65: Shropshire Hills: Key Facts & Data.
- <sup>xxxviii</sup> Telford and Wrekin Council website: [http://www.telford.gov.uk/info/512/conservation\\_advice/841/natural\\_environment](http://www.telford.gov.uk/info/512/conservation_advice/841/natural_environment), accessed on 28/01/14.

- 
- <sup>xxxix</sup> Telford and Wrekin Council website:  
[http://www.telford.gov.uk/info/512/conservation\\_advice/841/natural\\_environment/5](http://www.telford.gov.uk/info/512/conservation_advice/841/natural_environment/5), accessed on 28/01/14.
- <sup>xl</sup> Telford and Wrekin Council website:  
[http://www.telford.gov.uk/info/512/conservation\\_advice/841/natural\\_environment](http://www.telford.gov.uk/info/512/conservation_advice/841/natural_environment), accessed on 28/01/14.
- <sup>xli</sup> Telford and Wrekin Council website:  
[http://www.telford.gov.uk/info/512/conservation\\_advice/841/natural\\_environment/5](http://www.telford.gov.uk/info/512/conservation_advice/841/natural_environment/5), accessed on 28/01/14.
- <sup>xlii</sup> Shropshire Biodiversity Partnership website:  
<http://www.naturalshropshire.org.uk/Projects/LandscapeScaleProjects/tabid/102/Default.aspx>, accessed on 28/01/14.
- <sup>xliii</sup> Environment Agency (2009) Severn River Basin Management Plan
- <sup>xliv</sup> West of England Waste Core Strategy Sustainability Appraisal.
- <sup>xlv</sup> Environment Agency 'What's in My Backyard Website', available on: <http://maps.environment-agency.gov.uk/wiyby/>, accessed on 24/1/2014.
- <sup>xlvi</sup> Environment Agency, 2008. Groundwater Protection: Policy and Practice (GP3).
- <sup>xlvii</sup> Source: <http://www.environment-agency.gov.uk/homeandleisure/37805.aspx>, accessed 14/5/2013
- <sup>xlviii</sup> Environment Agency 'What's in My Backyard Website', available on: <http://maps.environment-agency.gov.uk/wiyby/>, accessed on 24/1/2014.
- <sup>xlix</sup> Environment Agency 'What's in My Backyard Website', available on: <http://maps.environment-agency.gov.uk/wiyby/>, accessed on 24/1/2014.
- <sup>l</sup> Environment Agency 'What's in My Backyard Website', available on: <http://maps.environment-agency.gov.uk/wiyby/>, accessed on 24/1/2014.
- <sup>li</sup> Environment Agency 'What's in My Backyard Website', available on: <http://maps.environment-agency.gov.uk/wiyby/>, accessed on 24/1/2014.
- <sup>lii</sup> Environment Agency. River Basin Management Plan Glossary.
- <sup>liiii</sup> Environment Agency 'What's in My Backyard Website', available on: <http://maps.environment-agency.gov.uk/wiyby/>, accessed on 24/1/2014.
- <sup>liv</sup> Environment Agency 'What's in My Backyard Website', available on: <http://maps.environment-agency.gov.uk/wiyby/>, accessed on 24/1/2014.
- <sup>lv</sup> Environment Agency, 2013. Shropshire Middle Severn Abstraction Licensing Strategy.
- <sup>lvi</sup> Severn Trent Water, 2013. Revised draft Water Resources Management Plan; our proposals for the next 25 years.
- <sup>lvii</sup> UK CCRA, 2012. Climate Change Risk Assessment for the Water Sector. Available on:  
<http://randd.defra.gov.uk/Document.aspx?Document=CCRASummaryWater.pdf>, accessed on 20/11/2013.