

Appendix B Baseline context

B.1 Introduction

This document outlines the environment, social and economic baseline context of the Severn Valley Water Management Strategy (SVWMS). The baseline focuses primarily on the extent of the Upper Severn Catchment for the purposes of the scoping report, however areas out with the scheme boundaries are noted where they are of particular relevance, such as downstream in the Severn catchment.

As the Upper Severn Catchment is located within both England and Wales, relevant datasets from each country have been reviewed. Where possible directly comparable datasets have been used, for example census data to understand demographics. Where this has not been possible, such as for some environmental designations, the most relevant datasets from each country have been used.

B.2 Population and human health (communities)

B.2.1 Population

The SVWMS covers an area that spans England and Wales and is primarily located within the local authority areas of Powys County Council and Shropshire Council. The Upper Severn Catchment also extends north across the border of these local authorities into Wrexham County Borough Council and Gwynedd Council.

There are approximately 245,000¹ people living within the Upper Severn Catchment, and over 5 million people living and working in the wider Severn River Basin District². There has been an increase in the population of the Upper Severn Catchment area of 4.3% since 2011³. The population density is low compared to the majority of reporting areas countrywide, at approximately 50 persons/km². Powys has the lowest population density of all counties in England and Wales, at 26 persons per km² in 2012⁴. Population forecast for the whole of the Shropshire and Powys local authority areas (including areas beyond the boundaries of the Upper Severn Catchment) estimate that by 2033 the population will have grown by

¹Office for National Statistics (2021) Census 2021. [Online]. Available at: https://www.nomisweb.co.uk/sources/census_2021_bulk

² Environment Agency (2022) Severn River Basin Management Plan summary and cross border catchments (England and Wales). [Online]. Available at: <https://www.gov.uk/government/publications/severn-river-basin-management-plan-summary-and-cross-border-catchments-england-and-wales/severn-river-basin-management-plan-summary-and-cross-border-catchments-england-and-wales>

³ Office for National Statistics (2011) Census 2011. [Online]. Available at: <https://www.nomisweb.co.uk/census/2011/bulk>

⁴ Powys County Council (2018) Adopted Powys Local Development Plan 2011-2026. [Online]. Available at: <https://en.powys.gov.uk/article/4898/Adopted-LDP-2011---2026>

a further 31,600, an increase of 6.8%, and by 2043 the population will have grown by 52,570, an increase of 11.4%^{5,6}.

The Upper Severn Catchment is predominantly rural in character with one major urban centre at Shrewsbury, and a number of towns including Oswestry, Newtown and Welshpool. The wider Severn River Basin District is similarly predominantly rural in nature but also includes larger urban areas such as Bristol, Coventry, Cardiff, Newport, Worcester, Gloucester and Hereford. There are a series of towns located along the River Severn itself, including Bridgnorth, Bewdley, Stourport-on-Severn, Upton upon Severn and Tewkesbury. These urban locations are naturally where there is better access to transport infrastructure as well as social services such as schools, healthcare provision and leisure facilities.

B.2.2 Demographics

The current age structure of the Upper Severn Catchment is shown in Figure B.1 below. The Upper Severn Catchment area has an older population than the national average, with approximately 47% of the population aged 50 or over, in comparison to 38% of the population on average across England and Wales¹. Future population projects, as shown on Figure B.2, indicate an increase of 21% in the proportion of the population of Shropshire and Powys aged 50 or older by 2043^{5,6}. This is similar to the trend anticipated across the UK, within an aging population⁷, however by the early to mid-2040s, Shropshire and Powys are anticipated to have a greater proportion of the population aged over 85 (6.0%) than the UK average (4.3%). Unlike future trends in the UK, Shropshire and Powys are not anticipated to see a decrease in the number of children⁷ and instead are anticipated to see a 4.1% increase in the number of children.

⁵ Office for National Statistics (2020) Population projections – local authorities: SNPP Z1. [Online]. Available at: <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/datasets/localauthoritiesinenglandz1>

⁶ Welsh Government (2021) Population projections by local authority and year. [Online]. Available at: <https://statswales.gov.wales/Catalogue/Population-and-Migration/Population/Projections/Local-Authority/2018-based/populationprojections-by-localauthority-year>

⁷ Office for National Statistics (2022) National population projections: 2020-based interim. [Online]. Available at: <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/bulletins/nationalpopulationprojections/2020basedinterim>

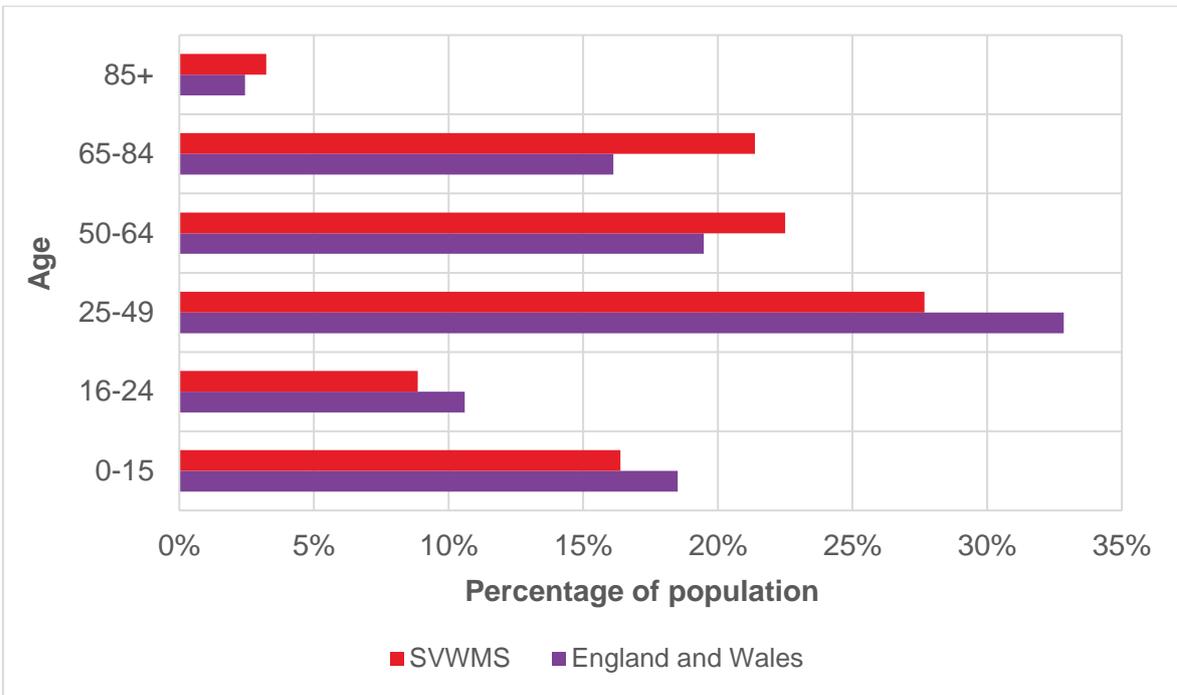


Figure B.1 Age profile of the Upper Severn Catchment and England and Wales

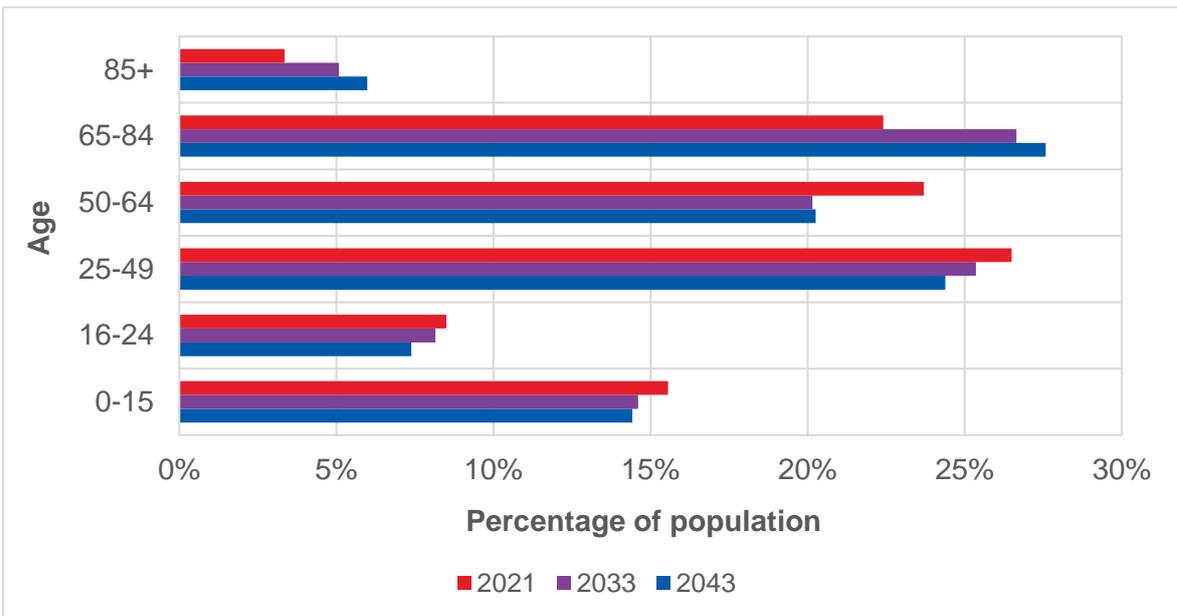


Figure B.2 Projected future age profile of Shropshire and Powys

The population of the Upper Severn Catchment is less ethnically diverse than the averages for England and Wales⁸. As shown on Figure B.3, over 96% of the Upper Severn Catchment area is white, in comparison to an 81.7% average across England and Wales. The next most common ethnic group in the Upper Severn

⁸ Office for National Statistics (2022) Ethnic group, England and Wales: Census 2021. [Online]. Available at: <https://www.ons.gov.uk/peoplepopulationandcommunity/culturalidentity/ethnicity/bulletins/ethnicgroupenglandandwales/census2021>

Catchment is Asian (1.4%), followed by mixed or multiple ethnic groups (1.1%). Less than 1% of the population in the Upper Severn Catchment area identify as Black, Black British, Black Welsh, Caribbean or African or from another ethnic group.

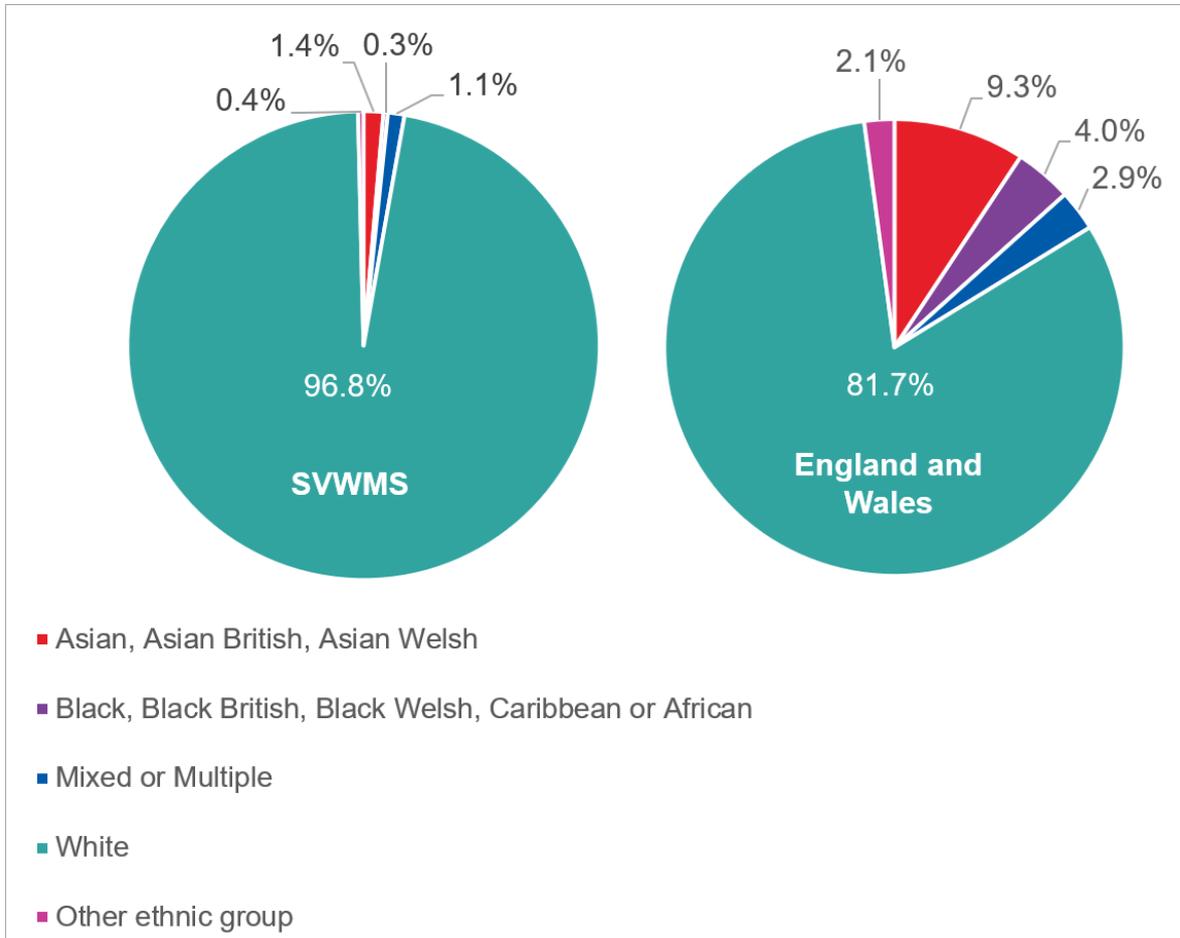


Figure B.3 Ethnicity of the Upper Severn Catchment area and England and Wales

B.2.3 Deprivation

Figure B.4 shows the data from the Index of Multiple Deprivation 2019^{9,10}. The components of deprivation considered within the overall deprivation index include factors such as income, employment, education, health, crime, barriers to housing & services and living environment. The Upper Severn Catchment has mixed levels of deprivation. There is one community within Shrewsbury that is located within the 10% most deprived in England and a further four communities in Oswestry and Shrewsbury that are within the 20% most deprived in England. Newtown and Welshpool contain three communities designated as within the 20% most deprived in Wales. There are also 10 communities located around Shrewsbury that are within the 10% least deprived in England, and a further 10 communities in the north of the Upper Severn Catchment located within the 20% least deprived. There

⁹ Office for National Statistics (2019) English indices of deprivation 2019. [Online]. Available at: <https://www.gov.uk/government/statistics/english-indices-of-deprivation-2019>

¹⁰ Office for National Statistics (2019) Welsh Index of Multiple Deprivation (full Index update with ranks): 2019. [Online]. Available at: <https://www.gov.wales/welsh-index-multiple-deprivation-full-index-update-ranks-2019> This is the latest available data.

are also five communities in the Upper Severn Catchment that are within the top 20% least deprived in Wales, these are predominantly located in the southern extent of the Upper Severn Catchment around Llanidloes and in the central part of the Upper Severn Catchment to the south west of Welshpool.

Indices of Multiple Deprivation

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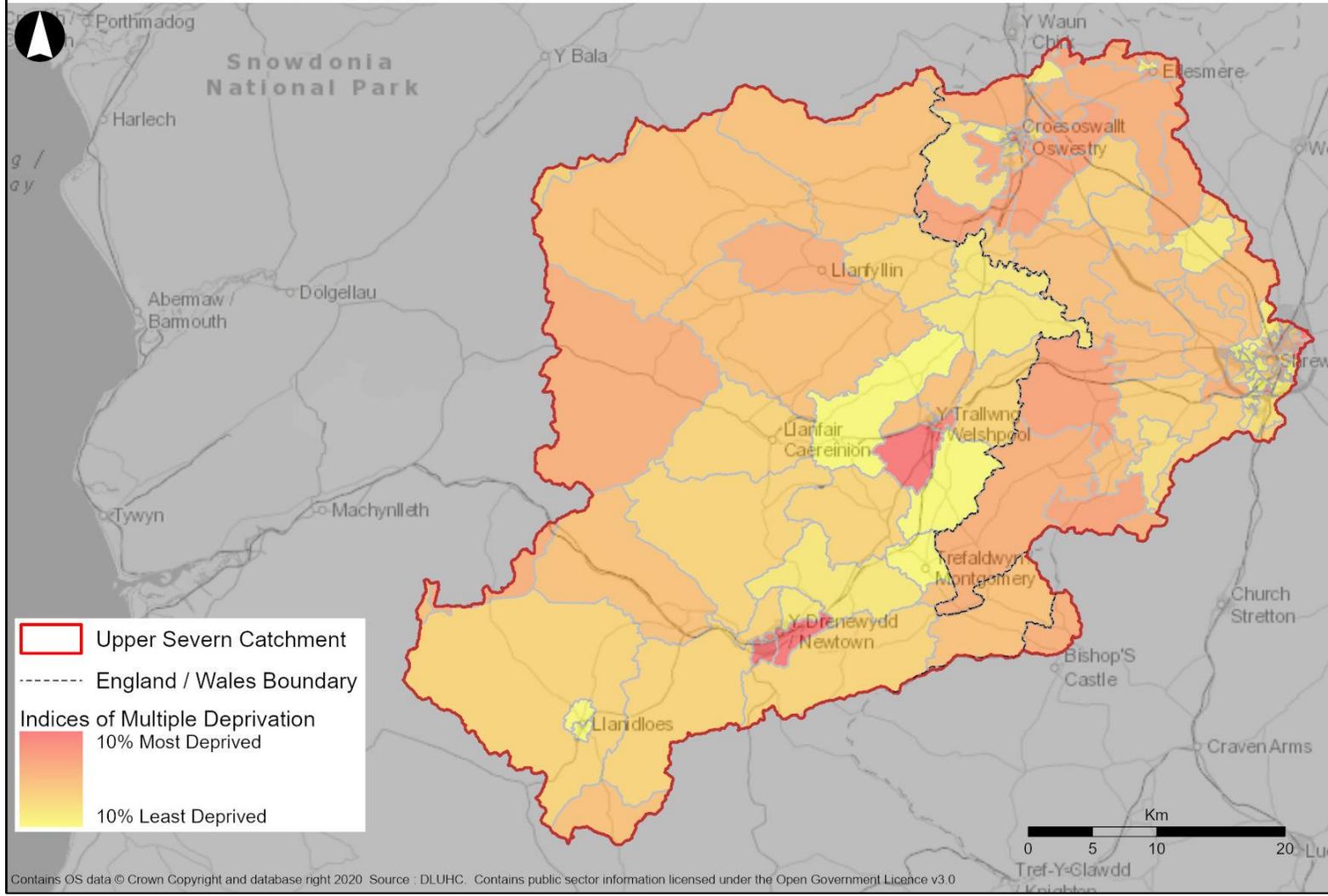


Figure B.4 IMD scores across the Upper Severn Catchment

B.2.4 Health

The average life expectancy for males and females in Shropshire is 79.3 years and 83.5 years, respectively¹¹. This is similar to the England averages for men and women¹². However, this varies across Shropshire, with life expectancy being 5.4 years lower for men and 2.1 years lower for women in the most deprived areas of Shropshire than in the least deprived areas. This represents health inequality across the Upper Severn Catchment. Male and female life expectancy in Shropshire has declined by 1.6 years and 0.6 years, respectively, since a peak in 2014¹¹. Residents of Powys have a similar life expectancy to those in Shropshire, 80.0 years and 83.7 years for men and women, respectively¹³. This is 1.5 years more than the Welsh average for men, and more than one year more than the Welsh average for women. Life expectancy improvements for men and women in Powys has been seen to have stalled in recent years¹³.

Within the Upper Severn Catchment, 18.6% of the population has some form of disability, with a further 7.2% having a long term physical or mental health condition¹. This is similar to, but slightly higher than, the averages for England and Wales. The population of the SVWMS describe themselves as being in better general health in comparison to the England and Wales average. The proportion of people within the Upper Severn Catchment describing their health as 'very good' or 'good' is 81.2%, which is greater than the England and Wales average by 6.6%. Similarly, the proportion of people describing their health as 'bad' or 'very bad' is lower than the England and Wales average by 3.3%¹.

Both Shropshire and Powys have a high proportion of adults that are overweight or obese, 68% and 60%, respectively¹⁴. Rates of overweight or obese adults are expected to continue to rise within Powys. Both local authority areas however have a higher than average proportion of adults who are physically active¹⁴. Other key health issues within Shropshire include diabetes and dementia diagnosis¹⁴. In general Powys compares favourably with Wales overall in terms of key population health indicators such as life expectancy and healthy life expectancy, however addressing inequality in health across the authority area is a key concern.

Over 2,600 residential properties sit within Flood Zone 2 and Flood Zone 3 and are at risk of flooding. Climate change is expected to further exacerbate impacts to current at-risk properties and put even greater numbers of properties at risk. This will impact on the wellbeing of local populations where there is a risk of physical

¹¹ Shropshire Council, Joint Strategic Needs Assessment. [Online]. Available at: <https://www.shropshire.gov.uk/public-health/joint-strategic-needs-assessment-jsna/>

¹² Office for National Statistics (2021) National life tables – life expectancy in the UK: 2018 to 2020. [Online]. Available at: <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/lifeexpectancies/bulletins/nationallifetablesunitedkingdom/2018to2020>

¹³ Powys Regional Partnership Board (2022) Draft Population Needs Assessment. [Online]. Available at: <https://pthb.nhs.wales/about-us/key-documents/needs-assessments/population-needs-assessment-2022/>

¹⁴ Office for Health Improvement & Disparities (2023) Local Authority Health Profiles. [Online]. Available at: <https://fingertips.phe.org.uk/health-profiles#page/1/gid/1938132701/pat/15/par/E92000001/ati/502/are/E06000051/yr/1/cid/4/tbm/1>

danger from flood events as well as associated mental health impacts such as anxiety.

B.2.5 Sense of community

Social connectedness is an important factor for maintaining people's health with community belonging being a tangible aspect of social connectedness¹⁵. Gauging the sense of community is done through qualitative assessment using questionnaires. The latest available data for Powys is relatively old using National Survey for Wales 2013-14 results, but this identified that approximately 65% of people in Powys have a strong sense of community. There are no similar data for Shropshire.

B.2.6 Access to green space

Figure B.5 below shows the location of blue and green infrastructure assets across Shropshire. This shows that the majority of the assets outside of the more urban areas are woodland, nature reserves and publicly accessible land (CRoW)¹⁶.

Figure B.6 below outlines green spaces in Shropshire that are accessible to the public¹⁶ and where these are located in relation to key walking and cycling infrastructure. Accessible green spaces include play spaces, playing fields, parks, millennium greens and country parks. There is a range of accessible green space located within the larger urban areas of Shrewsbury and Oswestry. Out with the larger urban areas, accessible green spaces are more dispersed and not as well connected to national trails and cycle routes. There is demand from residents in Shropshire for more accessible natural greenspace throughout the Upper Severn Catchment area; this includes within the larger urban areas of Shrewsbury and Oswestry, but also within smaller towns and villages¹⁷.

Powys similarly has a range of green spaces available to residents throughout the authority area. Over 80% of people in Powys' settlements live within 300 metres of informal open space which includes public parks and gardens, natural and semi-natural greenspace, amenity greenspace, and cemeteries and churchyards. In Newtown and Welshpool this figure is closer to 90% of the population with each settlement having well over the recommended 0.2ha of open space per 1000 population. However almost 40% of settlements in Powys don't have anywhere for active informal recreation¹⁸.

¹⁵ Michalski CA, Diemert LM, Helliwell JF, Goel V, Rosella LC. Relationship between sense of community belonging and self-rated health across life stages. *SSM Popul Health*. 2020 Oct 12;12:100676.

¹⁶ Natural England (2021) Green and Blue Infrastructure. [Online]. Available at: <https://designatedsites.naturalengland.org.uk/GreenInfrastructure/Map.aspx>

¹⁷ Shropshire Council (2021) Accessible Natural Greenspace map. [Online]. Available at: <https://shropshire.maps.arcgis.com/apps/PublicGallery/index.html?appid=adf20c247d5149ea95f482335e002f6c>

¹⁸ Powys County Council (2015) Open Space Assessment. [Online]. Available at: <https://en.powys.gov.uk/article/5429/Supporting-Documents>

B.2.7 Historic and likely future trends

Historically, the counties of Shropshire and Powys have experienced lower population growth than the UK average^{3,19}. In the coming decades, however, an increase in growth rates is expected in the counties^{5,6}. The large proportion of over 50s living in the Upper Severn Catchment¹ is expected to continue into the future, along with an increasing proportion of children⁷.

Although life expectancy has stalled in Shropshire in recent years, the life expectancy for both counties remains marginally above the England and Wales average. In the Upper Severn Catchment area more generally, life expectancy is expected to rise more-or-less in line with the national trend (approximately 6 years longer by the 2070s)²⁰.

On the other hand, detrimental impacts on health and wellbeing resulting from flood events are expected to rise in the future as the number of properties at risk increases. The UK Climate Change Risk Assessment 2022 assesses the risk to people, communities and buildings from river and surface flooding resulting from climate change as very high. Similarly, the future risk on health and wellbeing from high temperatures is also assessed as very high⁶⁶.

Overall, good health and wellbeing outcomes are expected to be delivered through programmes and objectives such as the Wellbeing of Future Generations Act (2015) in Wales. Indirectly improvements to the natural environment, for example through cleaner air and water, which will be delivered through the Clean Air Strategy 2019, the 25 Year Environment Plan in England and the National Plan in Wales amongst other policies, is expected to result in positive impacts on communities. The Welsh Government are anticipating a general improvement in physical, mental and social health and well-being in the future²¹.

B.2.8 Opportunities

The SVWMS has the potential to support current and future populations, both within the Upper Severn Catchment area and those communities located downstream. Through helping to reduce flood risk, the SVWMS can support local populations by increasing the land available to provide new housing, community facilities and infrastructure to support the growing population. It can also support mental and physical wellbeing through reducing stress, anxiety and physical danger associated with flood events.

In addition to reducing flood risk, the SVWMS can provide a range of wider benefits to support the wellbeing of local population, such as providing accessible

¹⁹ Office For National Statistics (2022) Population estimates for the UK, England, Wales, Scotland and Northern Ireland: mid-2021. Available at. [Online]. Available at: <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/annualmidyearpopulationestimates/mid2021>

²⁰ Office for National Statistics (2022) Mortality in England and Wales: past and projected trends in average lifespan. [Online]. Available at: [https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/lifeexpectancies/articles/mortalityinenglandandwales/pastandprojectedtrendsinaveragelifespan#:~:text=1.,\(COVID%2D19\)%20pandemic.](https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/lifeexpectancies/articles/mortalityinenglandandwales/pastandprojectedtrendsinaveragelifespan#:~:text=1.,(COVID%2D19)%20pandemic.)

²¹ Welsh Government (2021) Integrated Sustainability Appraisal of the National Development Framework. [Online]. Available at: <https://www.gov.wales/sites/default/files/publications/2021-02/future-wales-integrated-sustainability-appraisal.pdf>

green and blue spaces and enhancing the surrounding natural environment and access to nature. Through strategically locating interventions, the SVWMS can also help reduce inequality seen across the study area, directing measures to help those who are most at risk and vulnerable. This may include implementing measures to improve nature and the environment where pollution and local environmental conditions are poor.

Blue Green Infrastructure Assets

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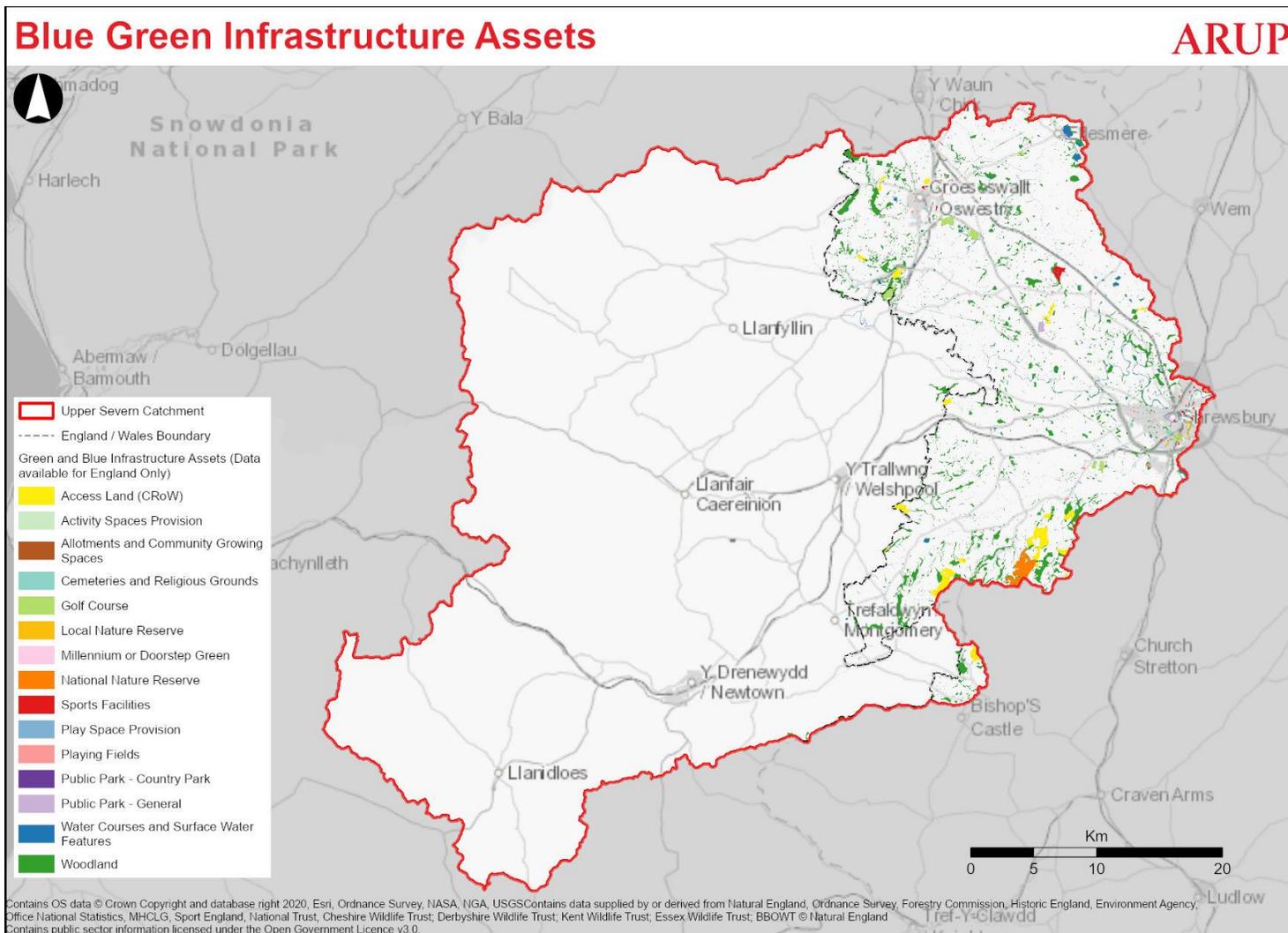


Figure B.5 Blue and green infrastructure located within England

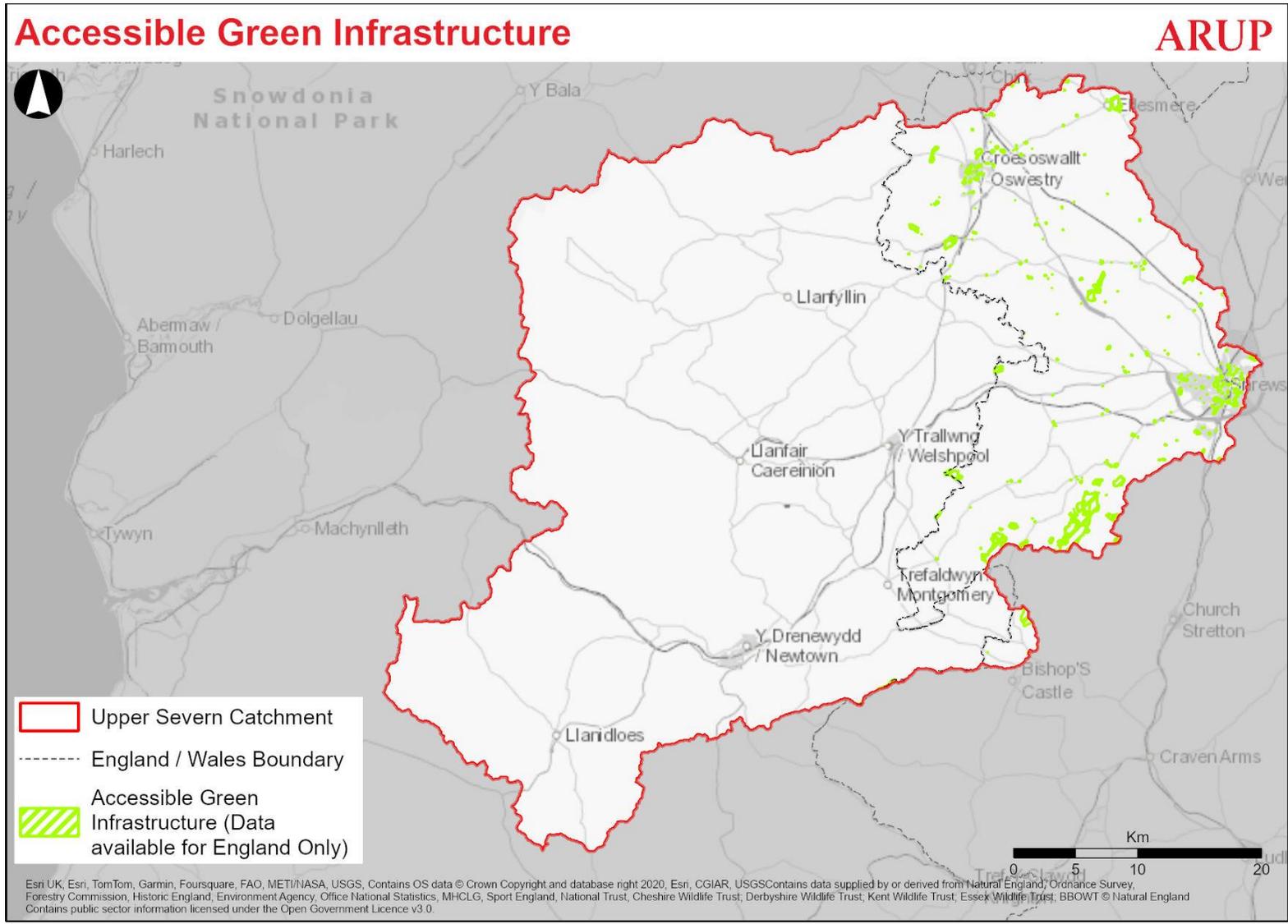


Figure B.6 Accessible green infrastructure

B.3 Biodiversity

B.3.1 Priority habitats

Within the Upper Severn Catchment, there are areas of significant natural heritage with internationally important wetlands, blanket bogs, ancient woodlands and meadows that support unique biodiversity.

Priority habitats cover a wide range of semi-natural habitat types and were identified as being the most threatened, requiring conservation action. In England there are 56 habitats listed under Section 41²² of the Natural Environment and Rural Communities Act 2006. In Wales there are 55 habitats listed under Section 7²³ of the Environment (Wales) Act 2006.

The Upper Severn Catchment contains a diverse selection of priority habitats as identified in Figure B.7 and Figure B.8. There are approximately 17,000 ha of priority habitat within the Upper Severn Catchment. There is also approximately 83km of watercourse that is classed as priority river habitat.

²² Gov.UK (2022). Habitats and species of principal importance in England [Online]. Available at: <https://www.gov.uk/government/publications/habitats-and-species-of-principal-importance-in-england>

²³ Wales Biodiversity Partnership (2023). Environment (Wales) Act 2016 Section 7 Priority habitats. [Online]. Available at: <https://www.biodiversitywales.org.uk/environment-wales-act>

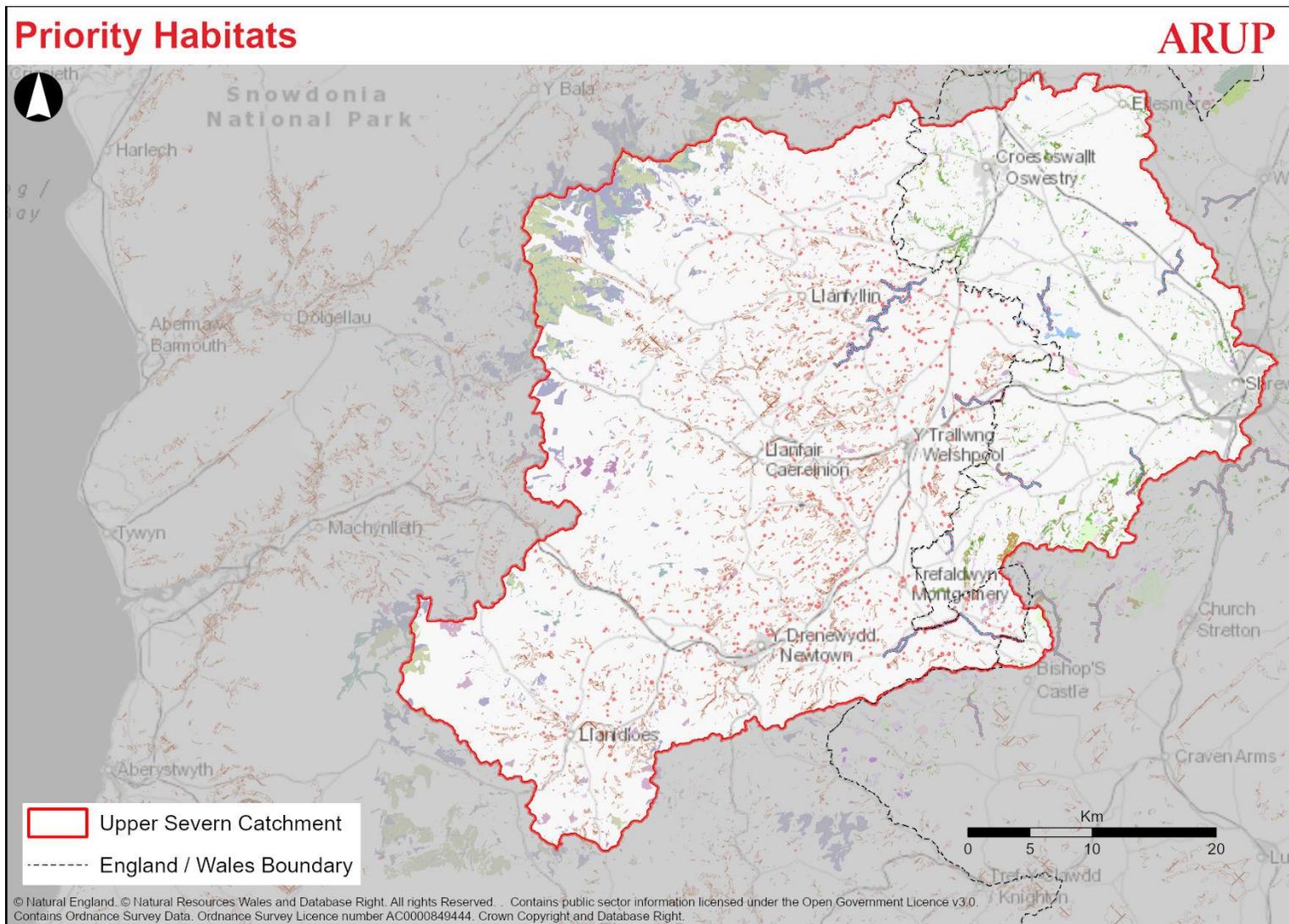


Figure B.7 Priority habitat

In the north-western and south-western section of the Upper Severn Catchment, there are extensive areas of blanket bog or lowland raised bogs. These account for the largest area of priority habitats in the Upper Severn Catchment, accounting for approximately 4,545 ha (27% of the priority habitat cover). The largest concentration of fens (lowland fens and reedbeds; and upland flushes, fens and swamps) accounting for approximately 1,304 ha (8% of the priority habitats cover) is present in this western area. There is a low concentration of lowland fens scattered across the eastern part of the Upper Severn Catchment.

Upland heathland is the second most common priority habitat and accounts for approximately 4,240 ha (25% of the priority habitats cover) present in the Upper Severn Catchment. The majority is concentrated across the western section of the Upper Severn Catchment, running north to south, with a few parcels in the southeast.

There is approximately 22,404ha of woodland mapped within the Upper Severn Catchment comprising 12,707ha of broadleaved woodland and 9,697ha of coniferous woodland. Priority habitat deciduous woodland accounts for approximately 2,650 ha (16% of the priority habitats cover). Deciduous woodland is predominantly concentrated across the north-eastern and eastern section of the Upper Severn Catchment, with a few parcels scattered on the west. Small areas of wet woodland are found in the south of the Upper Severn Catchment and mid-west in Wales.

Ancient woodland is defined as woodland that has existed since 1600 (in England and Wales) and has therefore had time to develop complex communities of plants and animals. There is approximately 9,064 ha of ancient woodland scattered throughout the Upper Severn Catchment, comprising ancient semi-natural woodland, plantation on ancient woodland sites and restored ancient woodland sites. There are 155 ancient woodland parcels in England and 5,057 in Wales. Within the Upper Severn Catchment, there are approximately 3,725 mapped significant trees of which 281 are ancient, 1,723 are veteran and 1,687 are notable. Ancient trees²⁴ are defined as being in the third or final stage of their life; old relative to others of the same species; and/or interesting biologically, aesthetically or culturally due to age. Veteran trees are usually in their second or mature stage of life and have developed some of the features found on ancient trees but are not old enough to be ancient²⁵. Notable trees²⁶ are defined as mature trees which may stand out in the local environment because they are large in comparison with older trees around them but do not have any obvious veteran characteristics.

Lowland dry acid grassland (5% of the priority habitats cover) is scattered across the Welsh uplands, which accounts for approximately 1554 ha. A few parcels in the eastern section of the Upper Severn Catchment across the English border account for approximately 158 ha. Good quality semi-improved grassland

²⁴ Woodland Trust (2023). Ancient trees. [Online]. Available at: <https://ati.woodlandtrust.org.uk/what-we-record-and-why/what-we-record/ancient-trees/>

²⁵ Woodland Trust (2023) Veteran trees. [Online]. Available at: <https://ati.woodlandtrust.org.uk/what-we-record-and-why/what-we-record/veteran-trees/>

²⁶ Woodland Trust (2023) Notable trees. [Online]. Available at: <https://ati.woodlandtrust.org.uk/what-we-record-and-why/what-we-record/notable-trees/>

accounts for the largest area of priority grassland habitat in England with approximately 684 ha (4% of the priority habitats cover) in the eastern section of the Upper Severn Catchment.

Floodplain grazing marsh is found in river valleys, and approximately 186 ha (1% of the priority habitat cover) is concentrated along the Severn Valley within the Upper Severn Catchment, including the River Severn (Afon Hafren) adjacent to the border between England and Wales.

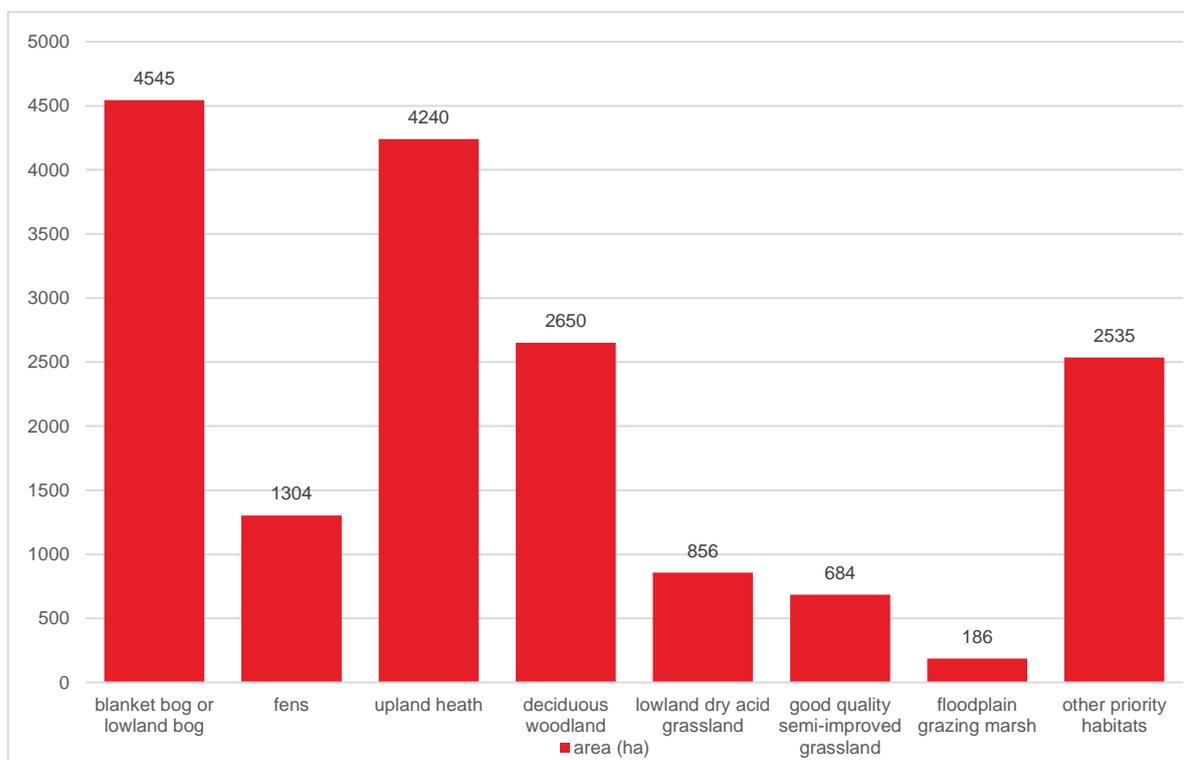


Figure B.8 Priority habitats within the Upper Severn Catchment area

B.3.2 Designated sites

The best quality examples of priority habitats within the Upper Severn Catchment and the species they support, are qualifying features for numerous statutory designated sites for nature conservation. These include internationally important Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar sites, and nationally important Sites of Special Scientific Interest (SSSI). Collectively these cover 53,179 ha of land within the Upper Severn Catchment (see Figure B.9).

The 10 internationally important designated sites are described as follows:

- The largest extent of internationally valuable designated habitats occurs in the Berwyn upland area in the north-west of the Upper Severn Catchment. This extensive area of heather moorland is designated as a SAC for its habitats including dry heath, blanket bog and calcareous and neutral grasslands. Within this area is also an SPA designated for internationally significant numbers of birds (hen harrier (*Circus cyaneus*), merlin (*Falco columbarius*), peregrine (*Falco peregrinus*) and red kite (*Milvus milvus*)) and as a separate SAC designated for lesser horseshoe bat (*Rhinolophus hipposideros*) populations.

- One other area of internationally important upland habitat occurs in the Stiperstones in the east of the Upper Severn Catchment, designated as a SAC for dry heath and upland oak woodland.
- The two Ramsar sites within the Upper Severn Catchment are in the north-east, comprising components of the Midland Meres & Mosses (Phase 1 and Phase 2). The Meres and Mosses are a series of lowland open water (meres) and peatland sites (mosses), which developed in natural depressions left by the retreating ice sheets at the end of the last Ice Age. These sites support a number of rare species of plants and invertebrates associated with wetlands.
- Orientated roughly north to south through the centre of the Upper Severn Catchment is the Montgomery Canal SAC running for approximately 36km. The majority of this largely unused waterway has open water supporting a rich assemblage of floating-leaved, emergent and submerged plants, including the largest population of floating water-plantain in lowland Britain. Approximately 3km to the west of the canal, near the centre of the Upper Severn Catchment, is the small Granllyn SAC designated for supporting an internationally important population of great crested newt.
- In the south-west of the Upper Severn Catchment are two further internationally important sites. Coedydd Llawr-y-glyn SAC is an example old sessile oak woodland with acidic ground flora, comprising a group of woodland blocks set around a series of connected valleys. A small area of Elenydd Mallaen SPA overlaps with the Upper Severn Catchment, with the majority of this large moorland site occurring to the south of the Upper Severn Catchment.

While this ecology baseline focuses upon the Upper Severn Catchment, there are many more designated sites that occur within the River Severn Basin District catchment boundary. Interventions within the Upper Severn Catchment have potential to beneficially or adversely impact designated wildlife sites as far as the Severn Estuary (SAC, SPA and Ramsar site). The potential for such impacts would depend on the nature of the intervention and how any habitats that are directly impacted are functionally or hydrologically linked to those within the more distant designated sites.

All of the internationally important sites described above are also designated as SSSIs for the nationally important habitats and species they support, which may be different features to those listed for the international designation. In total there are 109 nationally designated sites across the Upper Severn Catchment, comprising 106 SSSIs and three National Nature Reserve (NNR) sites.

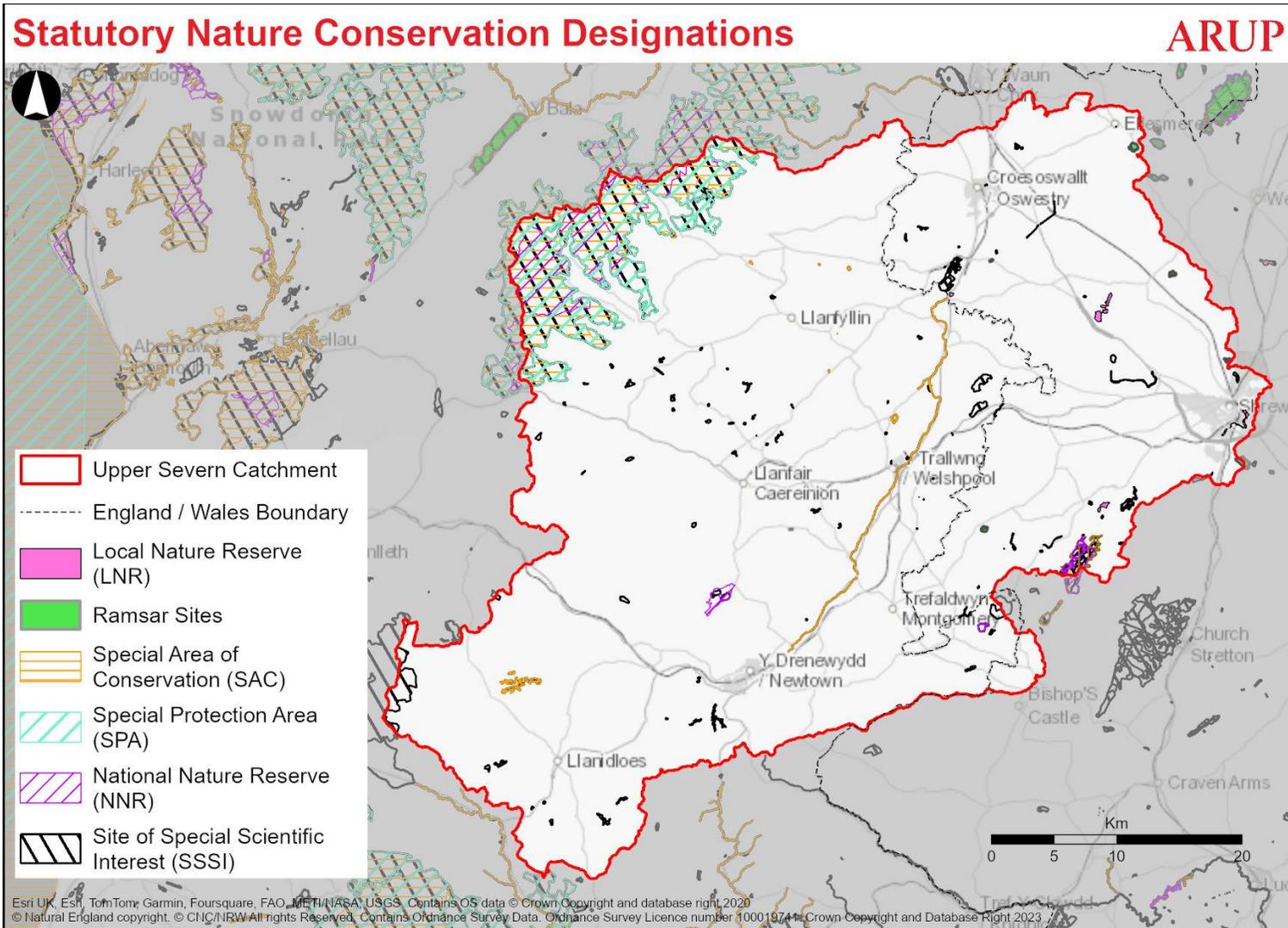


Figure B.9 Special Protection Areas, Special Areas of Conservation Ramsar sites, Site of Special Scientific Interest, National Nature Reserves and Local Nature Reserves within the Upper Severn Catchment

It is anticipated that selected aquatic and terrestrial habitats within the Upper Severn Catchment would qualify as Critical Habitat, triggered by a number of species using the International Union for Conservation of Nature (IUCN) Red List of Threatened Species²⁷. The International Finance Corporation (IFC) defines Critical Habitat in their highly influential Performance Standard 6 (PS6) as areas of high biodiversity value with five core criteria and thresholds used to identify areas of critical habitats. Screening based on existing data for a selection of mammals, fish, plants and fungi within the Upper Severn Catchment indicates that species within these groups are potentially present that would trigger Critical Habitat criteria, including globally critically endangered species. These comprise European eel (a critically endangered migratory fish species) Eurasian beaver (released into two sites in the Upper Severn Catchment in 2021) and Stirton's whitebeam (a critically endangered tree species).

A report²⁸ by The Department for Environment, Food and Rural Affairs (Defra) acknowledges that biodiversity has been in decline with '*a significant proportion of the best wildlife habitats inside and outside protected sites remains in an unfavourable condition; many species groups are in long-term falls; invasive species continue to increase in prevalence across the UK; and action is needed on funding for biodiversity and ecosystems in the UK*'. The report highlighted that for terrestrial and freshwater ecosystems, land use changes and modification of the environment (i.e. unsustainable agriculture, logging, transportation, development, energy production and mining) have had the greatest overall negative impact on nature since 1970. Only 38.2% of the area covered by habitats designated as SSSI in England is in favourable condition in 2022²⁹; and 20% in Wales³⁰ in 2020.

The majority of the Upper Severn Catchment is within Wales, where at a national level the rate of change in nature is increasing, with pressures on wildlife from agricultural management, urbanisation, pollution, hydrological change, woodland management and invasive non-native species³¹. These factors combined with climate change are driving widespread changes in the abundance, distribution and ecology of Wales's wildlife.

B.3.3 Natural capital

Natural capital can be defined as the world's stocks of living and non-living natural assets such as forests, fisheries, rivers, biodiversity, land and minerals which

²⁷ International Union for Conservation of Nature (2023) Red List. [Online]. Available at: <https://www.iucnredlist.org/>

²⁸ UK Parliament (2023) Biodiversity in the UK: bloom or bust? First Report of Session 2021-22 . [Online]. Available at: <https://publications.parliament.uk/pa/cm5802/cmselect/cmenvaud/136/136-report.html>

²⁹ Gov.UK (2023). Extent and condition of protected areas. [Online]. Available at: <https://www.gov.uk/government/statistics/england-biodiversity-indicators/1-extent-and-condition-of-protected-areas>

³⁰ Natural Resources Wales (2023). Protected sites baseline assessment 2020. [Online]. Available at: <https://naturalresources.wales/evidence-and-data/research-and-reports/protected-sites-baseline-assessment-2020/?lang=en>

³¹ RSPB (2019) State of Nature: A Summary for Wales. [Online]. Available at: https://www.rspb.org.uk/globalassets/images/campaigning-and-positions/let-nature-sing/birdsong-takeover/pdf/sonr/rspb_state-of-nature_summary_wales.pdf

provide a range of services to society³². Stocks of natural capital provide flows of services (i.e. ecosystem services) and benefits over time. In terms of land use, the Upper Severn Catchment includes large areas of enclosed farmland, woodlands and semi-natural grassland. These land uses contribute heavily in terms of provision of ecosystem services in the Upper Severn Catchment, particularly those relating to agriculture, recreation, climate regulation, water quality and air quality.

B.3.4 Historic and likely future trends

The total area of land and sea protected through national or international protected areas, or landscape designations has increased by almost 50%, from 27.6MHa in 2017 to 40.6MHa in 2022, although this increase is almost exclusively marine sites³³. Further plans to restore 750,000ha of terrestrial and freshwater protected sites are set out in the 25 Year Environment Plan which sets the ambition for improving the UK's air and water quality and protecting threatened species. The plan also intends to create or restore 500,000ha of unprotected sites which is anticipated to provide extensive benefits.

In England, the Environment Act 2021 mandated a BNG requirement for new development that requires the delivery of at least 10% biodiversity net gain. From January 2024 (except small sites and those that are except) all granted planning permissions will result in habitats are left in a better state for wildlife than before the development.

As of October 2023 Planning Policy Wales (version 12) has been updated to include a requirement for a net benefit for biodiversity. In practice this means development must provide a net benefit for biodiversity and improve, or enable the improvement, of the resilience of ecosystems through implementation of the DECCA framework³⁴. It is recognised that many of the retained priority habitats and designated nature conservation sites, are too small and isolated to be resilient to the environmental changes they are facing. Under the Environment (Wales) Act, Natural Resources Wales and other bodies are required to seek to maintain and enhance biodiversity and the resilience of ecosystems³⁵. A framework approach has been developed which uses four interlinked ecosystem attributes to assess ecosystem resilience: diversity, extent, condition and connectivity. Known as the DECCA framework it is the intention that it can be applied to environmental process at different scales, habitats and land uses, to drive the sustainable

³² HM Treasury (2022) The Green Book, Central Government Guidance on Appraisal and Evaluation. [Online]. Available at: <https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government>

³³ JNCC (no date) C1. Protected areas. [Online]. Available at: [https://jncc.gov.uk/our-work/ukbi-c1-protected-areas/#:~:text=Downloads-,Key%20results,March%202022%20\(Figure%20C1i\)](https://jncc.gov.uk/our-work/ukbi-c1-protected-areas/#:~:text=Downloads-,Key%20results,March%202022%20(Figure%20C1i))

³⁴ Natural Resources Wales (2023). Annex to Heads of Planning Letter Dated 11 October 2023: Addressing the Nature Emergency through the planning system: Updated National Planning Policy for Chapter 6 of Planning Policy Wales. Available at: [Annex to Heads of Planning Letter Dated 11 October 2023: Addressing the Nature Emergency through the Planning System: Updated National Planning Policy for Chapter 6 of Planning Policy Wales \(gov.wales\)](#)

³⁵ Natural Resources Wales (2022). Ecosystem resilience field guide. Available at: [Natural Resources Wales / Ecosystem resilience field guide](#)

management of natural resources in Wales³⁶. Planning authorities must take account of and promote the resilience of ecosystem, following the DECCA framework approach.

In 2020, the plan for a National Forest in Wales was announced which will create new areas of woodland and protect and enhance ancient woodland. In England, the Trees Action Plan pledges to treble tree planting rates in England with an aspiration of 12% woodland cover by 2060.

Despite this, the State of Nature 2019 reports a significant decline in average species abundance since 1970, with a 6% decrease occurring in the last decade alone. Only 38.2% of the area designated as SSSIs in England were in a favourable condition in 2022³⁷; and 20% in Wales³⁸ in 2020. Rapid changes in abundance are underway and average species distribution has fallen³⁹ due to pressures such as poor land management, land use change, pollution, hydrological change and invasive non-native species^{28,40}.

Climate change is already driving widespread changes in the abundance, distribution and ecology of wildlife. In future, sensitive ecosystems are expected to come under increasing pressure as a result of extreme events and disturbance such as floods, wildfires and droughts. The projected impacts of these trends include potential adverse impacts to both terrestrial and aquatic biodiversity resulting from extreme weather events, water scarcity, increased water temperatures and phenological shifts. These alterations to biodiversity are also anticipated to have an impact on existing landscape characteristics, likely to be exacerbated by both natural and managed alterations to soil, hydrology and geomorphology⁴¹. The risk to freshwater species and habitats from a changing climate has been assessed as high to very high, whilst the risk to terrestrial species and habitats is unknown⁶⁶.

Future trends in Wales relating to opportunities for the conservation and enhancement of biodiversity and for the sustainable management and use of

³⁶ Natural Resources Wales (2020). Ecosystem Resilience in a Nutshell 1: What is ecosystem resilience? Available at: [Ecosystem Resilience in a Nutshell 1: what is ecosystem resilience? \(cyfoethnaturiol.cymru\)](https://cyfoethnaturiol.cymru)

³⁷ Gov.UK (2023) Extent and condition of protected areas. [Online]. Available at: <https://www.gov.uk/government/statistics/england-biodiversity-indicators/1-extent-and-condition-of-protected-areas>

³⁸ Natural Resources Wales (2023) Protected sites baseline assessment 2020. [Online]. Available at: <https://naturalresources.wales/evidence-and-data/research-and-reports/protected-sites-baseline-assessment-2020/?lang=en>

³⁹ National Biodiversity Network (2019) State of Nature 2019. [Online]. Available at: <https://nbn.org.uk/wp-content/uploads/2019/09/State-of-Nature-2019-UK-summary.pdf>

⁴⁰ NRW (2020) Protected sites baseline assessment, 2020. [Online]. Available at: <https://naturalresources.wales/evidence-and-data/research-and-reports/protected-sites-baseline-assessment-2020/?lang=en>

⁴¹ UK Climate Risk (2023) Evidence for the third UK Climate Change Risk Assessment (CCRA3) Summary for Wales. [Online]. Available at: <https://www.ukclimaterisk.org/independent-assessment-ccra3/national-summaries/>

natural resources are declining²¹. Finally, it is widely recognised that the targets committed to through the Convention on Biological Diversity will not be met.

B.3.5 Opportunities

The SVWMS represents a major opportunity to contribute towards targeted nature recovery by aligning natural flood management interventions with the emergence of national habitat networks in England and Wales. In accordance with guidance from the Wildlife Trusts on development of such networks⁴², local mapping should identify where healthy wildlife habitat is already, where it should be in the future and how it will be established, protected restored, and joined together to achieve recovery. There is an opportunity for SVWMS to use the mapping of nature recovery networks to plan where to take action for nature, including where to target investments and where best to deliver Nature-based Solutions (NbS). This approach would also align with the Natural Resources Wales Resilient Ecological Networks DECCA framework⁴³, with opportunities to improve the diversity, extent, condition and connectivity of ecosystems through catchment scale deployment of NbS.

One potential source of investment for SVWMS interventions that contribute to nature recovery is Biodiversity Net Gain⁴⁴ (BNG). This will be a mandatory requirement for developments in England that require consent under the Town and Country Planning Act 1990. This requirement is likely to apply directly to components of the SVWMS project. BNG also presents an opportunity for SVWMS to deliver habitat restoration measures that generate a surplus of biodiversity units, which could be funded by developers of other projects that have a shortfall in achievement of on-site BNG. Similarly with the requirement for planning applications in Wales to demonstrate a net benefit for biodiversity there may be opportunities within this DECCA framework context for SVWMS to work with developers to produce habitat restoration measures that help a development achieve a net benefit for biodiversity.

There is opportunity to use a natural capital approach to help inform the development of the SVWMS. This approach can be used to help better understand the impact of the strategy on ecosystem services and target interventions to increase the natural capital value of the Upper Severn Catchment.

B.4 Land use and landscape

B.4.1 Landscape character areas

The Upper Severn Catchment has an array of diverse landscapes, which are predominantly rural, rich in natural beauty and with a strong human influence from inhabited and agricultural land that has shaped the landscape character over time.

⁴² The Wildlife Trusts (2020) Nature Recovery Network Handbook. [Online]. Available at: https://www.wildlifetrusts.org/sites/default/files/2020-10/Nature_Recovery_Network_Handbook_LO_SINGLES.pdf

⁴³ Natural Resources Wales (2023) Address the nature emergency through the planning system. Available at: [Addressing the Nature Emergency through the Planning System: Update to Chapter 6 of Planning Policy Wales \(gov.wales\)](https://www.gov.wales/government/consultations/addressing-the-nature-emergency-through-the-planning-system)

⁴⁴ Gov.UK (2023) Understanding biodiversity net gain. [Online]. Available at: <https://www.gov.uk/guidance/understanding-biodiversity-net-gain>

Landscape Character Areas are defined by Natural England (NE) and Natural Resources Wales (NRW). NE has revised all the National Character Areas (NCAs) as part of its responsibilities in delivering the Natural Environment White paper, Biodiversity 2020 and the European Landscape Convention. NRW uses LANDMAP to record, classify and describe Welsh landscapes. They are often used for decision making and planning as well as monitoring change across the landscape. There are eight defined National Landscape Character Areas in the Upper Severn Catchment. Five are wholly in Wales and two wholly in England. The Shropshire Hills Character Area spans the border. Due to having only a small extent within the Upper Severn Catchment, for the purposes of this study, both Snowdonia and The Clun and North West Herefordshire Hills have been incorporated into the adjacent Berwyn and Shropshire Hills Character Areas, respectively.

The landscape character areas are shown on Figure B.10 below. The landscape character area descriptions are as follows:

- Cambrian Mountains: extensive upland plateau, deep valleys.
- Berwyn & Snowdonia: rolling uplands, river valleys and waterfalls.
- Montgomeryshire hills and vales: hills and valleys, mix of uplands and lowland.
- Oswestry uplands: steeply sloping, flat topped limestone hills.
- Radnorshire hills: rolling open moors & steep sided valleys.
- Severn Valley: river valley, flood plain.
- Shropshire, Cheshire and Staffordshire Plain: undulating plain, ridges and valleys.
- Shropshire Hills & Clun and North West Herefordshire Hills: ridges, scarps and valleys.

The topography in the Upper Severn Catchment rises from east to west and reaches its highest points towards Snowdonia National Park. The areas around the main towns, Oswestry, Welshpool and Shrewsbury, define the extents of the large floodplain of the River Severn, which is fed by a series of west-east running vales.

B.4.2 Land Use

Land uses across the Upper Severn Catchment are illustrated in

Figure B.11 below. Land use in the Upper Severn Catchment is dominated by agriculture with pasture and sheep farming covering approximately a third of the Upper Severn Catchment, predominantly on hillsides. Dairy farming dominates the valleys and confluence area where soils are of a better quality. Welsh Government own areas of woodland that are management by Natural Resource Wales⁴⁵. Within

⁴⁵ Natural Resources Wales (2023) NRW Forest Ownership. Available [Online] at: https://datamap.gov.wales/layers/inspire-nrw:NRW_FORESTRY_OWNERSHIP_GB#download-metadata-section

the Upper Severn Catchment, there are 113 areas of woodlands that are owned by Welsh Government, totalling over 80km².

Peatland coverage and areas of deep peat reserves within the catchment are shown on Figure B.12 below. Peatland is present throughout the Upper Severn Catchment, with particularly high concentrations within the north west and north east of the catchment around Lake Vyrnwy and east of Oswestry. These locations also include deep peat (including modified deep peat) which are an important carbon store.

Approximately 10% of agricultural land within the Upper Severn Catchment is at risk of flooding, with around 24,705ha considered at medium risk. Agriculture and associated businesses form a key part of the local economy, however there is growing concern from farmers and landowners whose livelihoods are impacted by ever more frequent and prolonged flooding of their land.

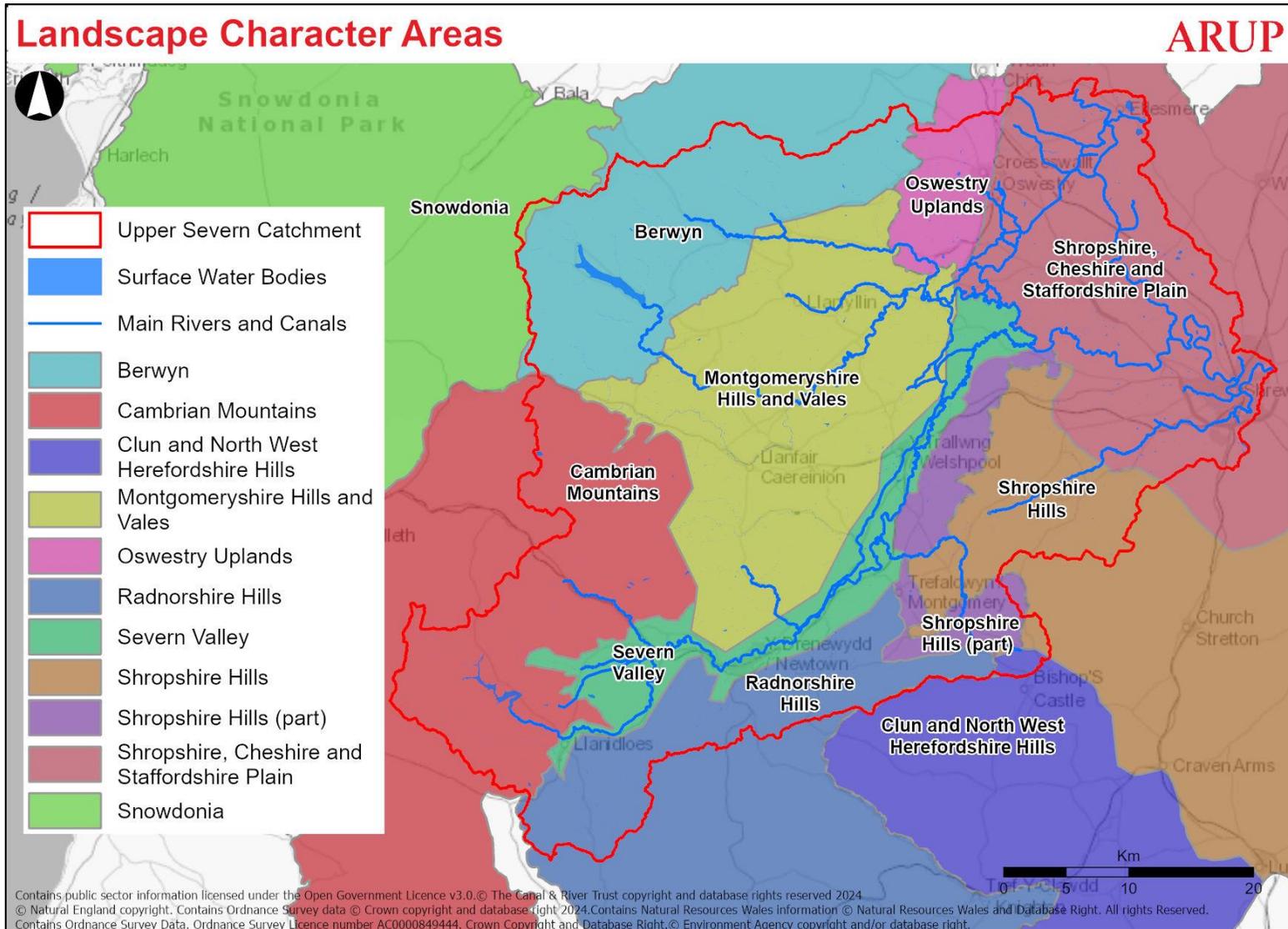


Figure B.10 Landscape Character Areas

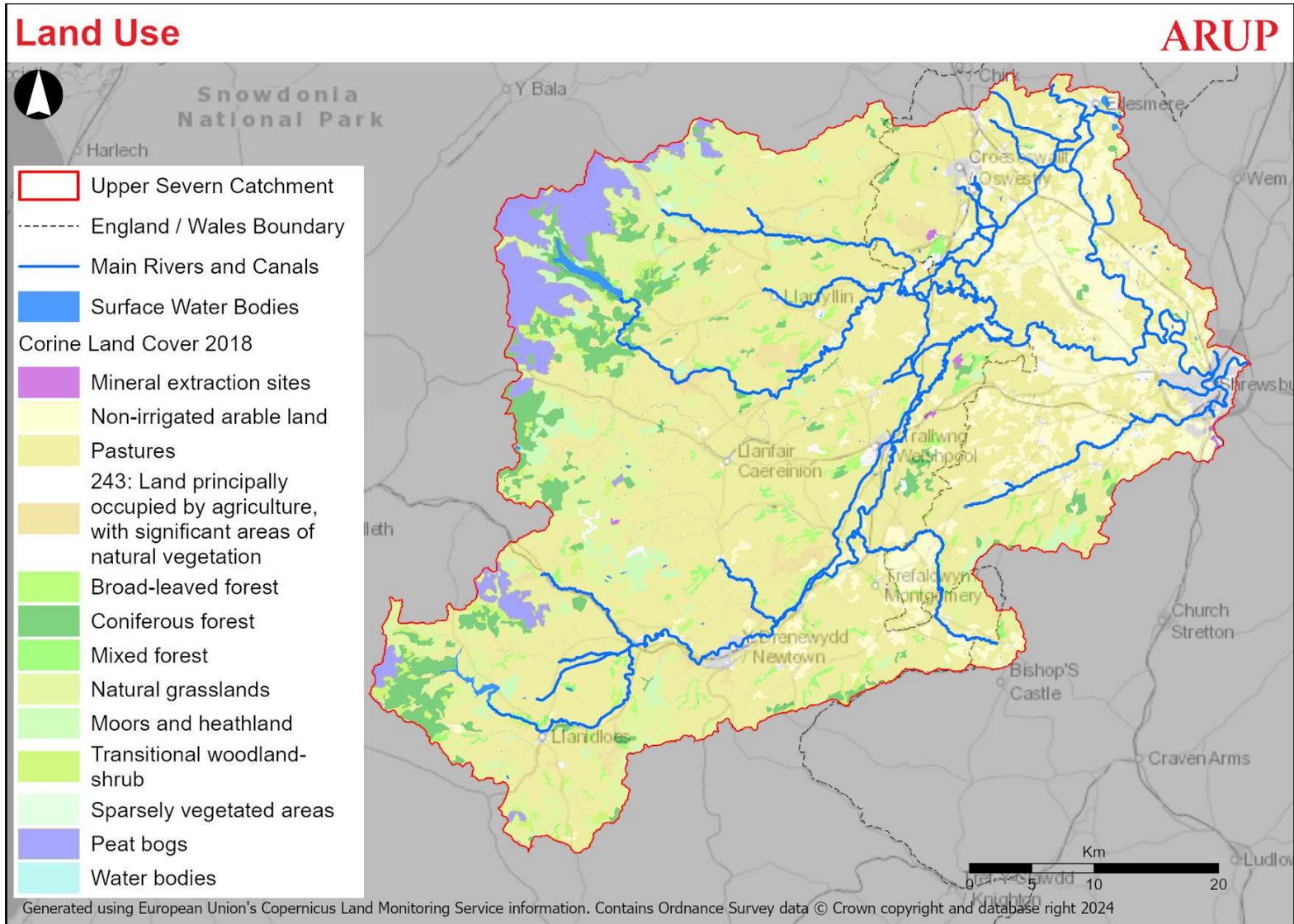


Figure B.11 Land Use

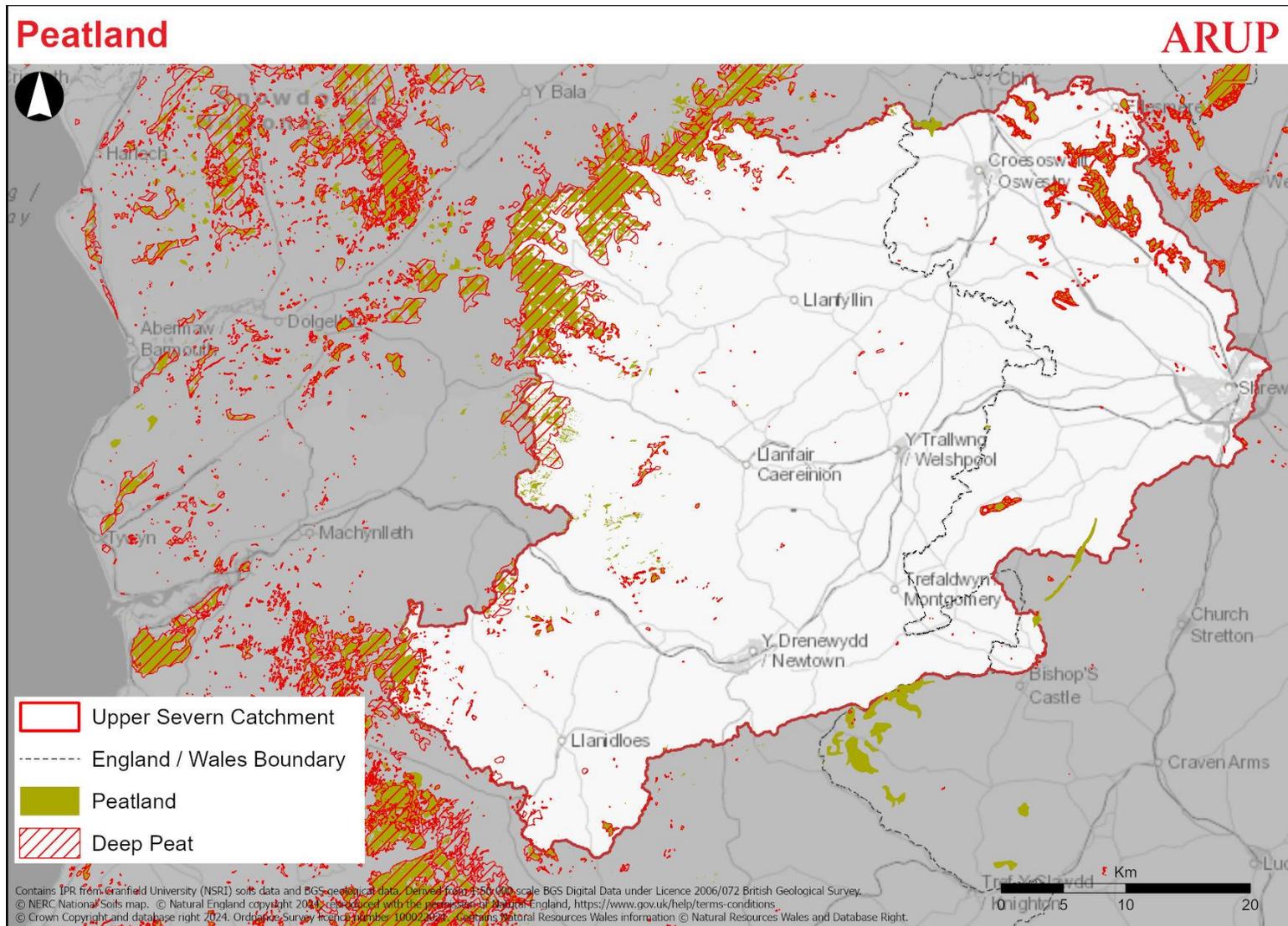


Figure B.12 Areas of Peatland and Deep Peat Reserves

B.4.3 Designated sites and attractions

A wide range of environmental designations are within the study area as shown on Figure B.13. The Upper Severn Catchment shares its northwest border with Snowdonia National Park. England's landscape is made up of around 10% as National Parks and 15% as AONBs, the UK Government makes promise that these designations continue to be conserved and enhanced. Adjacent to the park boundary is the Berwyn area which is designated as a Site of Specific Scientific Interest (SSSI), Special Protection Area (SPA), Special Area of Conservation (SAC) and National Nature Reserve (NNR) (see Figure B.9).

The southeastern boundary of the Upper Severn Catchment intersects with a small portion of the Shropshire Hills Area of Outstanding Natural Beauty (AONB). The Shropshire Hills are renowned for its rolling hills, picturesque valleys, and rich biodiversity. It plays a crucial role in preserving the region's natural and cultural heritage. These designations are diverse and cover citations for geomorphology, terrestrial and aquatic flora and fauna, water quality and more.

B.4.4 Tourist destinations and attractions

The Upper Severn Catchment borders two main tourist destinations, Shropshire Hills AONB and Snowdonia National Park. There are several Registered Historic Landscapes and Registered Parks and Gardens, most of them in Wales. There are also several important CADW sites in the Upper Severn Catchment area, as well as a National Trust and English Heritage site. A number of play areas, parks, gardens and sports fields are scattered across the Upper Severn Catchment; however, higher concentrations can be found around more densely populated areas such as Shrewsbury, Oswestry, Welshpool and Newtown.

The Upper Severn Catchment includes a swathe of historic landscapes ranging from the historically contested Marches (border areas of England and Wales), areas of post-medieval industry and historic towns to narrow valleys rich in evidence of prehistoric activity. It contains two Registered Landscapes of Outstanding Interest – the Vale of Montgomery and the Tanat Valley - as well as two Registered Landscapes of Special Interest - Caersws Basin and Clywedog Valley.

B.4.5 Agricultural land classification

Agricultural Land Classification is a system used in England and Wales to grade the quality of land for agricultural use. It is used to inform planning decisions affecting greenfield sites. The system classifies land into five grades, from Grade 1 (excellent quality agricultural land) to Grade 5 (very poor-quality agricultural land). In Upper Severn Catchment, the highest quality agricultural land is present in the river valleys and near the main towns where the topography is flatter as shown on Figure B.14. Only 5.4% of land within the Upper Severn Catchment is considered to be very good or excellent quality agricultural land, with the majority to classified as good/moderate or worse.

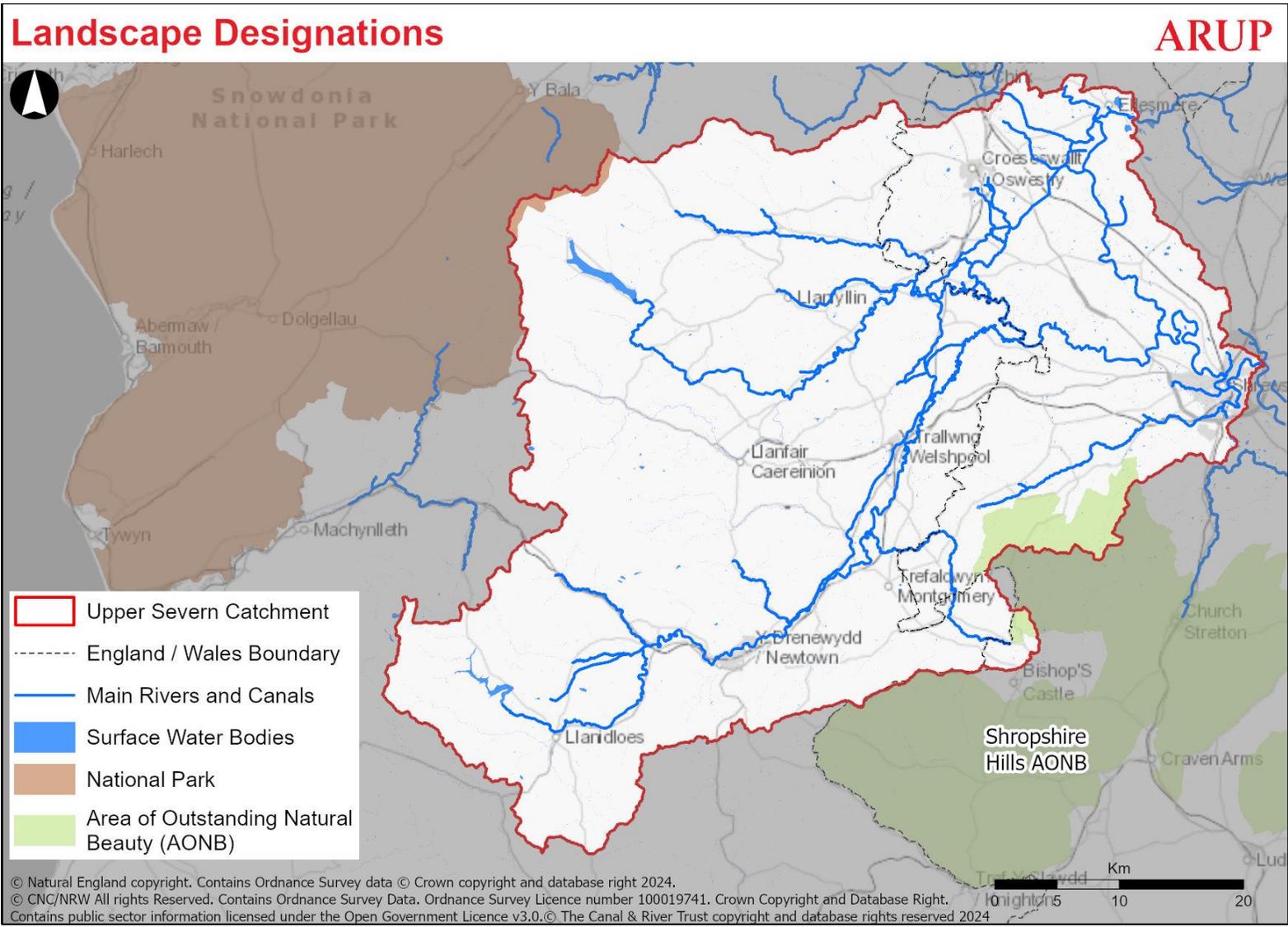


Figure B.13 Designated sites

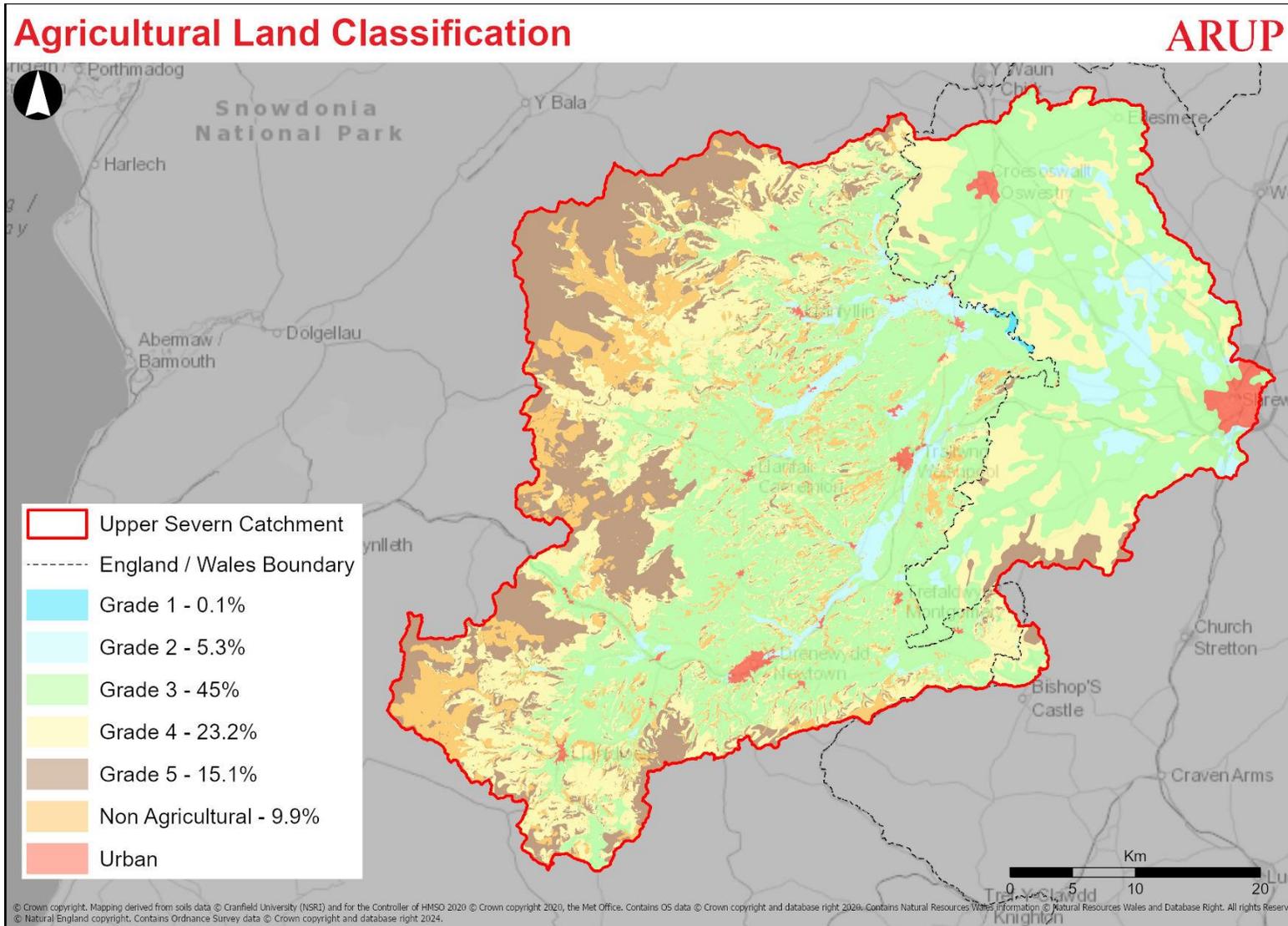


Figure B.14 Agricultural Land Classification

B.4.6 Historic and likely future trends

As introduced in section B.4.3, the UK Government has committed to the ongoing conservation and enhancement of National Parks and AONBs and has recognised the need for a greater number of larger and more connected protect sites⁴⁷. The government has pledged to increase the area of protected land in the UK from 25% to 30% by 2030. Additionally, improved public access to protected landscapes will be delivered through the levelling up agenda and the Mid Wales Area Statement. It is anticipated that better management and strengthened enforcement powers to protect designated areas will benefit biodiversity, provide flood risk benefits and support rural communities and economies⁴⁶.

In the Landscapes Review published by Defra in 2019, it is acknowledged that National Parks are currently unable to meet their statutory purpose of conserving and enhancing the natural beauty, wildlife and cultural heritage of their site. It is understood that the number of SSSIs in English National Parks and AONBs that are in favourable or unfavourable recovering condition declined between 2012 and 2019⁴⁷. In Wales, the government has acknowledged the challenges facing ecosystems and has challenged designated landscapes to do more to identify, safeguard and realise the benefits from the public goods they protect⁴⁸.

However, there is increasing pressure on non-designated rural and agricultural land from developers, with future population growth necessitating more housing and urban development infrastructure. Opportunities for the protection and enhancement of the local distinctiveness of landscapes and townscapes is declining²¹.

B.4.7 Opportunities

Any intervention within the catchment will need to be cognisant of landscape character to minimise any detrimental impact. Sympathetic and community-led design can offer the opportunity to further enhance the landscape and character of different areas, and change the way communities interact with them.

B.5 Cultural heritage

The Upper Severn Catchment covers an area with a range of historic landscapes including parts of the historically contested marches (border areas of England and Wales), areas of post-medieval industry, historic towns and narrow valleys rich in evidence of prehistoric activity. Within this landscape there are a large number of nationally significant heritage assets, including listed buildings, scheduled

⁴⁶ Defra (2022) Landscapes review (National Parks and AONBs): government response. [Online]. Available at: <https://www.gov.uk/government/publications/landscapes-review-national-parks-and-aonbs-government-response/landscapes-review-national-parks-and-aonbs-government-response#:~:text=The%20work%20that%20we%20are,country%20for%20their%20natural%20beauty>.

⁴⁷ Defra (2019) Landscapes review: National Parks and AONBs. [Online]. Available at: <https://www.gov.uk/government/publications/designated-landscapes-national-parks-and-aonbs-2018-review>

⁴⁸ Welsh Government (2018) Valued and Resilient: The Welsh Government's Priorities for Areas of Outstanding Natural Beauty and National Parks. [Online]. Available at: <https://www.gov.wales/sites/default/files/publications/2021-02/areas-outstanding-natural-beauty-national-parks-2018-report%20.pdf>

monuments, historic parks and gardens, conservation areas and registered landscapes of outstanding and special historic interest. Additionally, there are many non-designated archaeological sites, historic battlefields, buildings and landscape character areas as well as the potential for previously unrecorded archaeological remains. The Upper Severn Catchment has variable densities of different types of designated asset, with urban areas having the majority of listed buildings, but with the other designations more broadly spread across the area.

B.5.1 Scheduled ancient monuments

There are 419 scheduled monuments recorded within the Upper Severn Catchment (Figure B.15). These assets including a large number of scheduled sections of Offa's Dyke, an 82-mile earthwork bank and ditch which was built along the Wales/England border by the Mercian king Offa in around 780AD. In addition to Offa's Dyke, there is also a section of the 40-mile-long Wat's Dyke, another linear earthwork defence thought to predate Offa's defensive line. Other scheduled monuments include prehistoric burial monuments, Iron Age and Roman defensive structures, medieval castles, fortifications and abbeys, and ruined industrial sites.

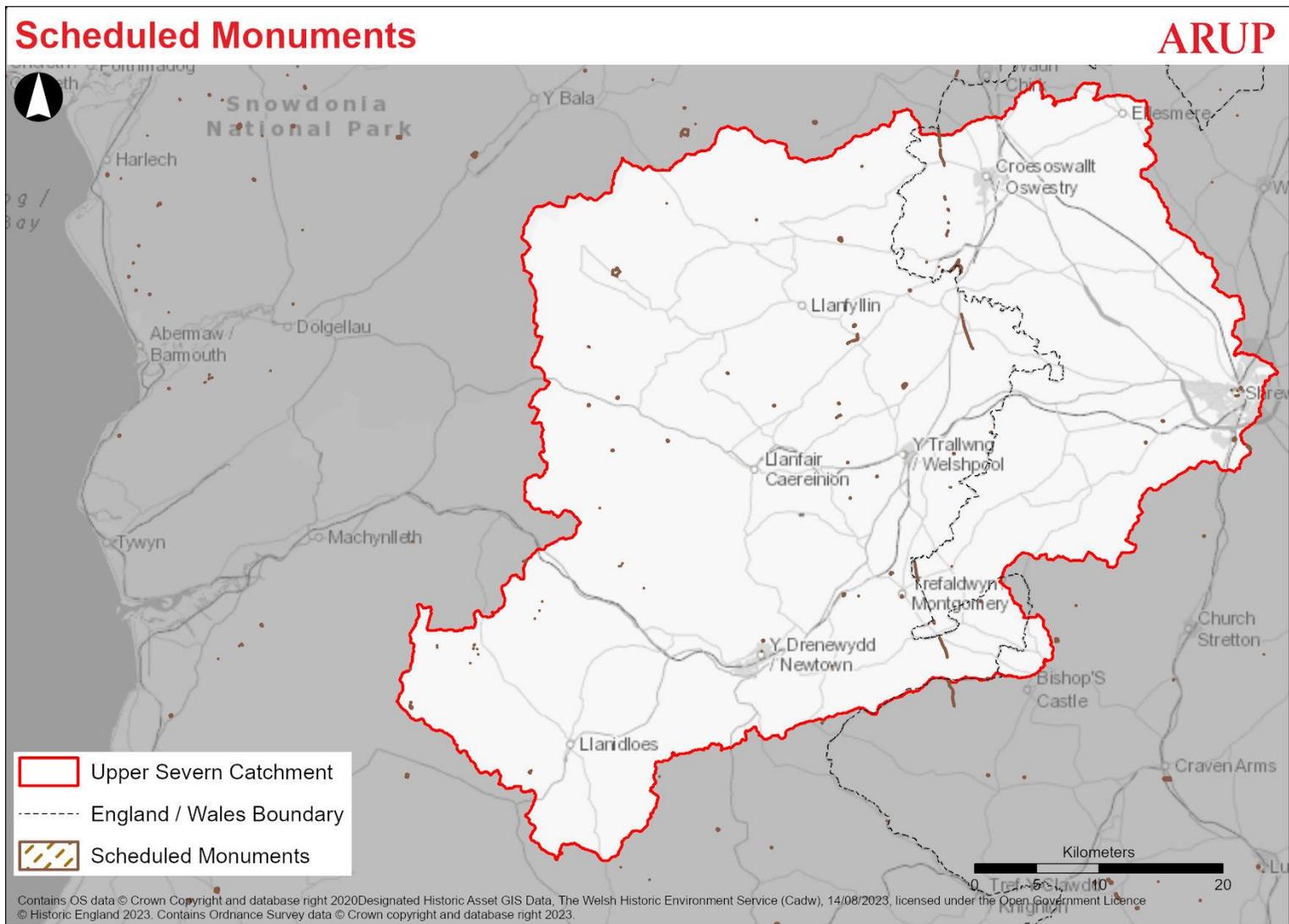


Figure B.15 Scheduled Monuments

B.5.2 Listed buildings and conservation areas

There are 4366 listed buildings within the study area (Figure B.16). Within this, 57 are Grade I and 268 are Grade II*. The higher grade listed buildings include typically elite, public or religious buildings, such as churches, castles, country houses and market halls, but also include examples of vernacular architecture such as barns and large scale industrial and engineering structures, such as dams, bridges and mills. Notably, the latter category includes the Ditherington Flax mill near Shrewsbury, the oldest iron framed building in the world. While the highest grade of listed buildings tends to be reserved for structures of considerable age and/or status, Grade II listed buildings often include many of the more typical aspects of the built environment, including bridges, dams, vernacular buildings and milestones.

In addition to listed buildings there are also 62 conservation areas, which protect both listed and non-designated built heritage alongside their surrounding townscape and, where appropriate, their wider landscape. Change within conservation areas and their setting (urban or rural) is managed through the planning process and is guided through the individual characteristics of each area and their capacity to absorb different types of change without a loss to the heritage value of the historic townscapes/landscapes they are designated to protect.

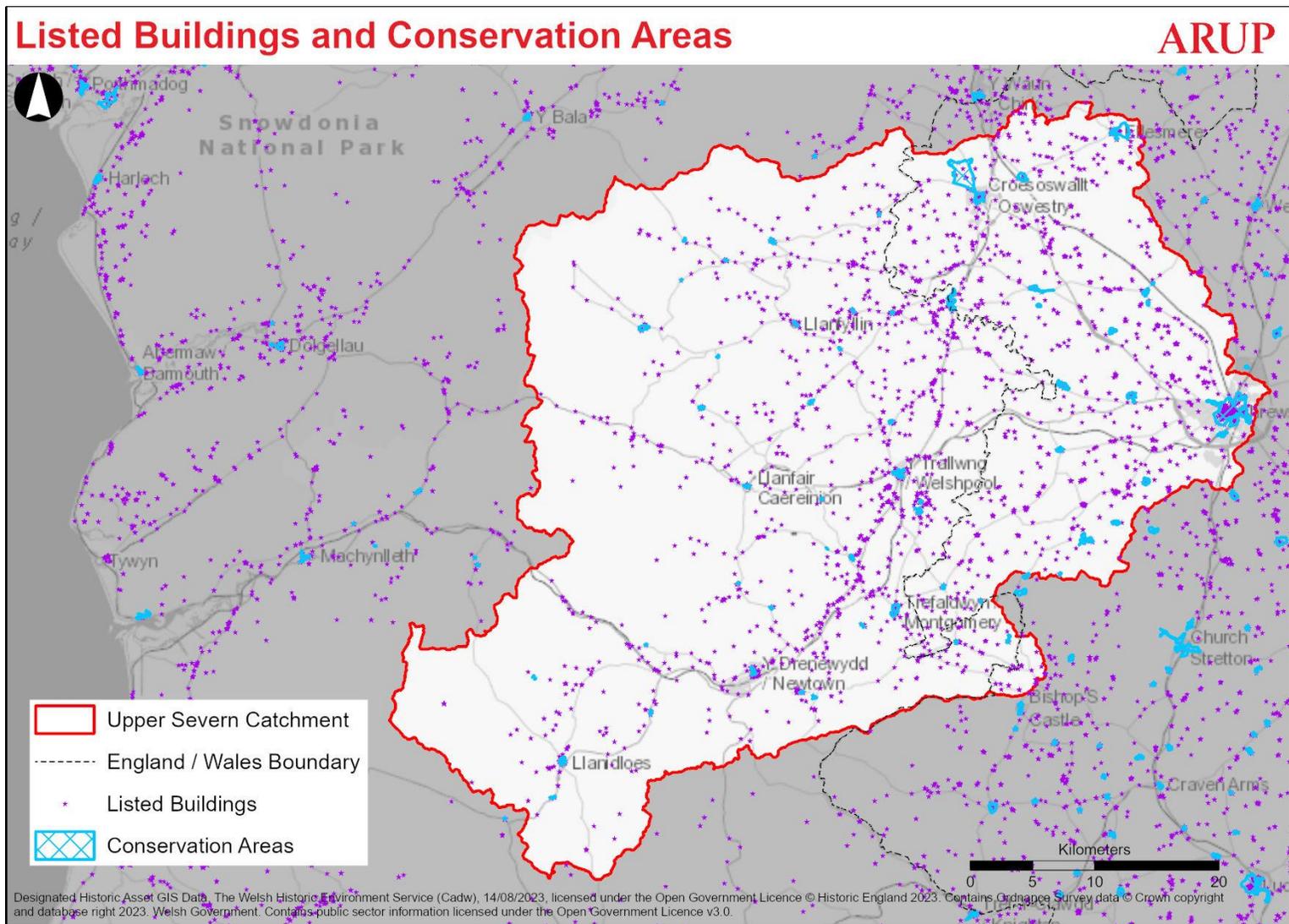


Figure B.16 Listed Buildings and Conservation Areas

B.5.3 Historic parks and gardens and historic landscapes

Both England and Wales have registers of historic parks and gardens (Figure B.17), although in England this is a non-statutory designation. In both countries these are protected from harmful change through the planning process. There are 20 historic parks and gardens (Wales) in the Upper Severn Catchment, including four designated Grade I (Powys Castle, Greygynog, Leighton Hall and Vaynor Park) and four Grade II*. These are typically the designed parkland and gardens associated with post-medieval country houses, with the exception of the churchyard of St Aelhairan's, which surrounds a medieval church. There are five registered parks and gardens (England) within the Upper Severn Catchment, all of which are Grade II.

In addition to historic parks and gardens, which typically protect relatively small parts of historic landscapes, such as a formal estate, Wales also has a register of landscapes of outstanding or special historic interest, which reflect areas where the traces of human activity are still legible within the current landscape character. This is a non-statutory advisory register, important for determining strategy and planning decisions for major changes to the landscape, typically only required for schemes requiring Environmental Impact Assessment (EIA) but can also be required where Welsh Ministers deem it appropriate. Within the Upper Severn Catchment there are four registered historic landscapes. There are two of outstanding historic interest – the Vale of Montgomery and the Tanat Valley. These are large stretches of land within the Upper Severn Catchment area; the Vale of Montgomery is 11,384 hectares and the Tanat Valley is 10,255 hectares. The Vale of Montgomery is a marches landscape, covering a natural basin at the confluence of the Rivers Severn and Camlad. The historical territorial disputes within the Vale can be read in the landscape through the remains of fortifications and boundaries, including a section of Offa's Dyke. There is also an important crossing point on the Severn at Rhyd Whyman and a distinctive pattern of field boundaries featuring hedgerow trees. The Tanat Valley, in contrast, is a narrow, steep-sided valley, distinctive for its extensive traces of Bronze Age monuments (visible only as crop marks), medieval and post-medieval agriculture, with historic lead, phosphate, slate and granite mining and quarrying found in the upper reaches of the valley. There are two registered landscapes of special historic interest within the Upper Severn Catchment area – Caersws Basin and Clewedog Valley.

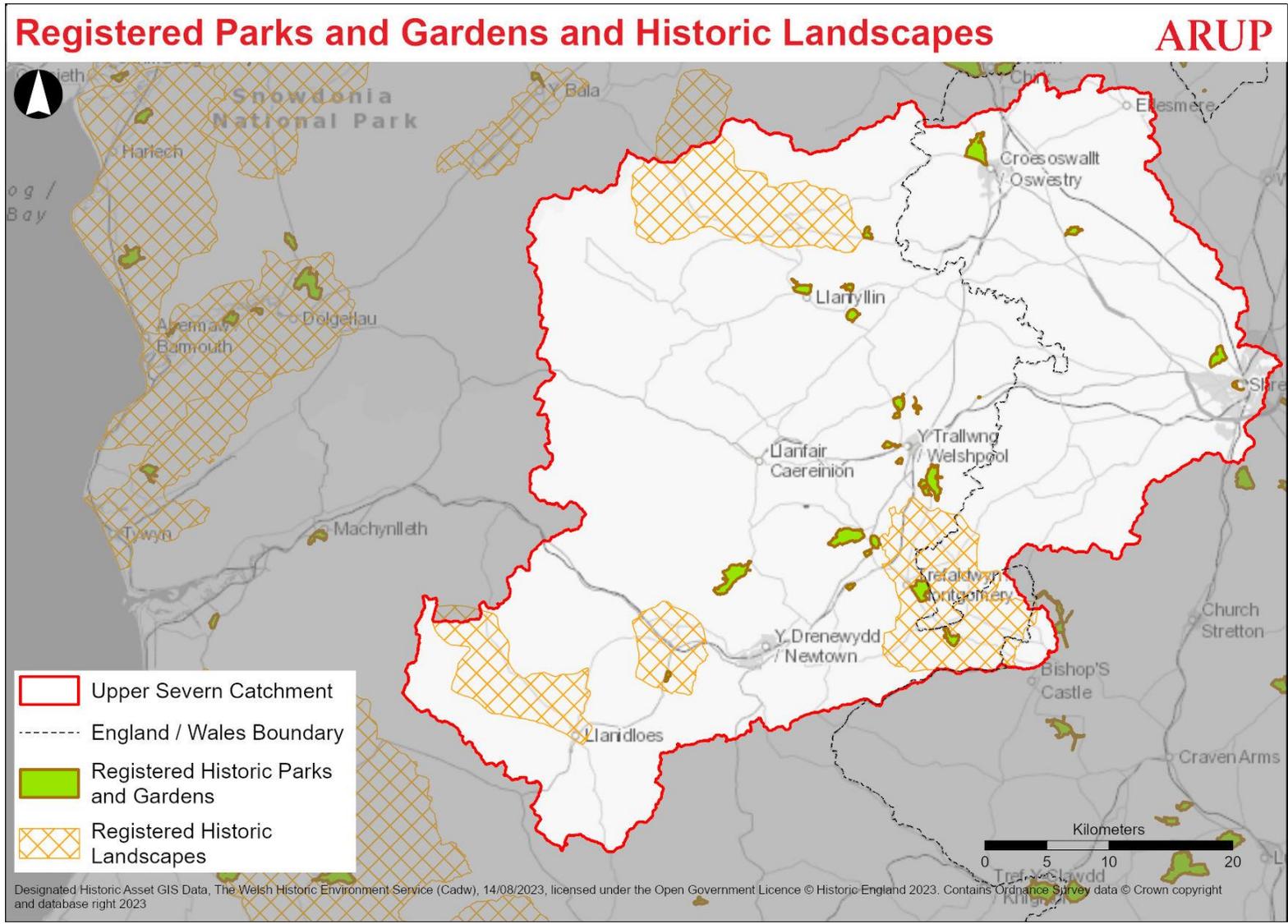


Figure B.17 Registered Parks and Gardens and Historic Landscapes

B.5.4 Non-designated heritage assets

Across the Upper Severn Catchment there are many thousands of non-designated heritage assets, as well as extensive potential for previously unrecorded archaeological remains. Different types of landscape within the Upper Severn Catchment can be characterised in the following way in relation to non-designated heritage assets:

- **Agricultural Areas:** There is extensive cropmark evidence for below ground archaeological remains across the cultivated fields of the river valleys within the Upper Severn Catchment, likely dating from the later prehistoric periods onwards. Good agricultural land was as important in the past as it is today and archaeological remains of settlement, fortification and ceremonial activity may be present across arable and pasture land within the Upper Severn Catchment area.
- **Upland areas:** Upland areas are often rich in archaeological remains, which can include fortified sites and the traces of extractive industries. There is also often evidence of settlement, from prehistory to the more recent traces of medieval and post-medieval transhumance, the seasonal pasturing of livestock in summer meadows. These remains reflect changes in the climate, historically, which made upland areas more sustainable for farming than they are today.
- **Urban areas:** Many towns and villages have origins in the medieval period and the layout of streets and surrounding fields will often be of historic interest. Depending on the extent of later development, urban areas may have archaeological remains of earlier settlement and there may be an array of non-designated built heritage assets, alongside designated assets.
- **Woodland:** Historically, woodlands have been important resources and wood banks and other structures, such as duck decoys, may be found within and around long-established and ancient forests. More recent plantations may cover and preserve earlier traces of agriculture and settlement.
- **River corridors:** River corridors will often contain traces of historic crossing points, bridges, weirs and early industrial sites/water management features associated with the utilisation of hydropower, such as mill complexes. River terrace gravels were often formed at the end of the last glacial period in the UK and can contain in situ or redeposited palaeolithic remains.
- **Peat deposits, and other perennially wet, below ground conditions,** provide the anaerobic environment necessary for the preservation of organic remains, which can be of particular significance due to their rarity. Blanket peats typically began to form during the Bronze Age in the UK, meaning that they can also cover earlier prehistoric remains, which can be well preserved beneath the peat. Peat deposits may be of paleoenvironmental significance as the pollen and other ecofacts preserved within it can be used to reconstruct details of the environment in the past.

The historic environment resource represents a diverse range of features, ranging from individual buildings or monuments to extensive landscapes which retain legible traces of historic land use. In an area the size of the Upper Severn Catchment there are many factors which could impact the historic environment's future baseline. Broadly, however, the most significant factors that are likely to

impact the future baseline of the historic environment are the impacts of development and climate change. Climate change is likely to lead to harm through the dewatering of formerly waterlogged soils, increased erosion, the effects of wildfires, high winds causing damage to buildings and designed landscapes, the loss of historic trees to disease and drought, and flooding.

B.5.5 Historic and likely future trends

As outlined in section B.5.4, future trends may include increasing harm to the historic environment resulting from development and climate change. The level of risk posed by climate change on cultural heritage is currently unknown⁶⁶. In spite of this, the general future trend in Wales relating to the protection, conservation and enhancement of the historic environment, historic assets and their settings are improving²¹.

B.5.6 Opportunities

There are a number of potential benefits for the historic environment that the strategy could bring about – most significantly the reduction of potential harm from flooding or flood alleviation schemes. Towns such as Shrewsbury, along the River Severn, have seen regular flooding historically which is likely to increase in severity and regularity as a result of climate change. Both flooding itself and measures to alleviate flooding have the potential to harm heritage assets. Interventions designed to alleviate the effects of climate change may, themselves, have adverse effects on the historic environment – particularly with larger engineered structures such as flood walls and reservoirs. There are also opportunities to protect buried archaeological remains through peatland restoration and changing soil management schemes. Tree planting, and other landscape-level interventions, could also be designed to enhance the setting of heritage assets or restore lost areas of historic woodland. The strategy should seek to develop principles to encourage the preservation and enhancement of the historic environment, avoiding works which would alter the character or physical survival of heritage assets.

B.6 Ground conditions (soils and geology)

Given the size of the Upper Severn Catchment, this report gives a high-level summary of the geology and hydrogeology only. More detailed and in-depth studies will be required at individual locations identified when more site specific details are available for catchment interventions.

B.6.1 Geological Summary

The Upper Severn Catchment is vast in geological terms, with hundreds of geological units shown on the 1:50,000 scale maps. For practical reasons, only simplified 1:625,000 geology maps⁴⁹ have been consulted, which is considered sufficient detail for this report.

⁴⁹ British Geological Survey (no date) GeoIndex Onshore Viewer. [Online]. Available at: <https://www.bgs.ac.uk/map-viewers/geoindex-onshore/>

Superficial Deposits

Across the study area, land at higher elevations has little coverage of superficial deposits, whereas the land at lower elevations has high coverage (see Figure B.18).

Most of the superficial deposits are of Quaternary Age due to glacial and, less frequently, fluvial processes. The depths of these deposits are generally estimated to be between 2m and 8m, with up to 40m thickness in the nearby Shropshire area. A notable example is the Severn Trench, west of Shrewsbury, which is an infilled glacial channel extending to -53mAOD at points, with up to approximately 120m of drift⁵⁰.

The superficial deposits found within the study area are listed below. The units are generally ordered from youngest to oldest. This should be read in conjunction with Figure B.18.

- **Peat** is mapped in a small number of locations, half of which are in upland areas in the west of the study area, and each of which cover less than 1km² in area. Some larger areas of peat, up to 8km², are mapped in the east of the study area, northwest of Shrewsbury.
- **Alluvium** ('clay silt and sand' on Figure B.19) is found in the flat valley floors adjacent to the rivers within the study area. These deposits generally comprise unconsolidated clays, silts, sands and gravels.
- **River terrace deposits** ('sands and gravels' on Figure B.19) are found adjacent to alluvium in river valleys at some of the locations in the east of the study area discussed above. These deposits consist of sands and gravels, with local lenses of silt, clay or peat⁴⁹.
- **Glacial sand and gravel** is absent in the west of the study area, but there is extensive coverage around the confluence of the Vyrnwy and the Severn, and to the north and east of confluence. This unit is comprised mainly of coarse-grained sands and gravels, with a smaller proportion of finer-grained deposits such as clay interbedded locally⁴⁹.
- **Till** ('diamicton' on Figure B.19) covers most of the study area, though very little is observed above 450m on the areas of higher ground. Till is an unsorted and unstratified glacial drift, a heterogenous mixture of clay, sand and gravel and boulders of varying size and shape.

Bedrock Geology

The bedrock geology is presented in Figure B.19, and can be simplified into two distinct geological areas. Sedimentary formations deposited in the Ordovician and Silurian periods (485.4 Ma (million years ago) – 419.2 Ma) stretch from the southwest of the Upper Severn Catchment across the English-Welsh border. Whereas younger formations are present only in the northeast, from Oswestry to

⁵⁰ British Geological Survey and Environment Agency (2005) Baseline Report Series: 20. The Permo-Triassic Sandstone Aquifer of Shropshire. [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/290920/scho0207blyr-e-e.pdf

Shrewsbury. Some formations were deposited in the Carboniferous period, but most date from the Permian and Triassic Periods (298.5 Ma – 201.3 Ma).

Ordovician and Silurian formations – Central, west, and southeast

The sedimentary formations, which cover most of the study area, are early Palaeozoic mudstones, siltstones and sandstones. These deposits are more than 5km thick⁵¹, with some small areas of igneous intrusion occurring in the east. Generally, the youngest rocks are located in the southwest of the study area (Figure B.19).

Triassic, Permian and Carboniferous formations – North east

Permo-Triassic sandstones and conglomerates are the predominate outcrop in this area. These dip shallowly northeast to form the southern edge of a large basinal/synclinal structure that extends as far north as Manchester, with early Jurassic rocks at its core (outside of the study area).

The Triassic lithology is mostly mudstones with halite layers, which make up the Mercia Mudstone Group (MMG), overlying sandstones of the Sherwood Sandstone Group (SSG). Below these units is a suite of Carboniferous lithologies. These rocks are youngest in the northeast and generally outcrop at lower, flatter topographies. There is an unconformity between the oldest Carboniferous and youngest Silurian rocks in this area.

Igneous material

There is a sparse outcropping of Palaeozoic-aged, into Ordovician aged igneous deposits, in the north and east of the Upper Severn Catchment (see Figure B.19). Intrusive material is variably mafic and felsic, extrusive material is a series of tuffs. There are a small number of dykes, of very variable age and with no apparent consistent orientation.

⁵¹ British Geological Survey (2016) Geology of the Llanidloes area: Introduction. [Online]. Available at: [https://earthwise.bgs.ac.uk/index.php/Geology_of_the_Llanidloes_area:_Introduction#:~:text=The%20district%20is%20underlain%20by,Welsh%20Basin%20\(Figure%20P930911\)](https://earthwise.bgs.ac.uk/index.php/Geology_of_the_Llanidloes_area:_Introduction#:~:text=The%20district%20is%20underlain%20by,Welsh%20Basin%20(Figure%20P930911))

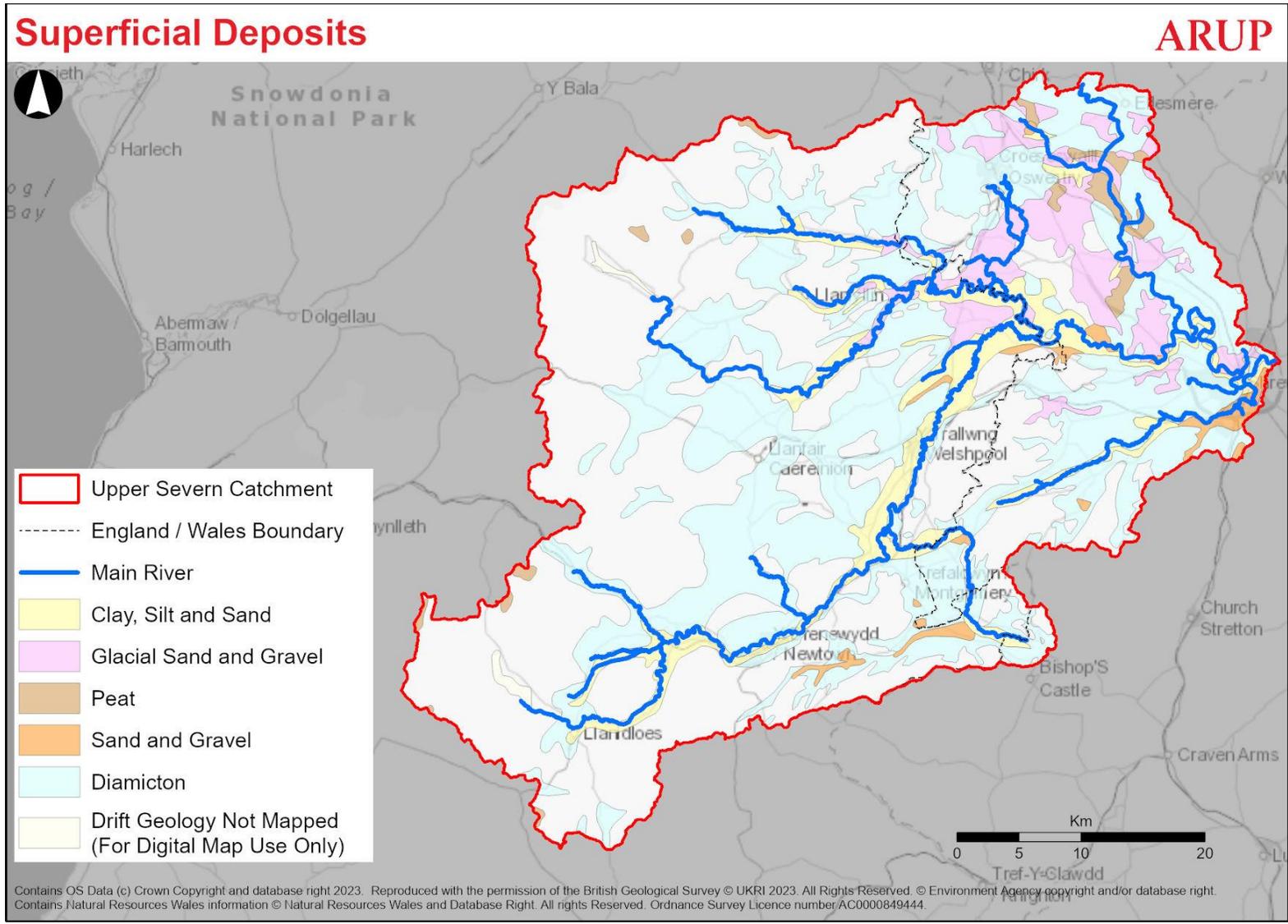


Figure B.18 Superficial deposits

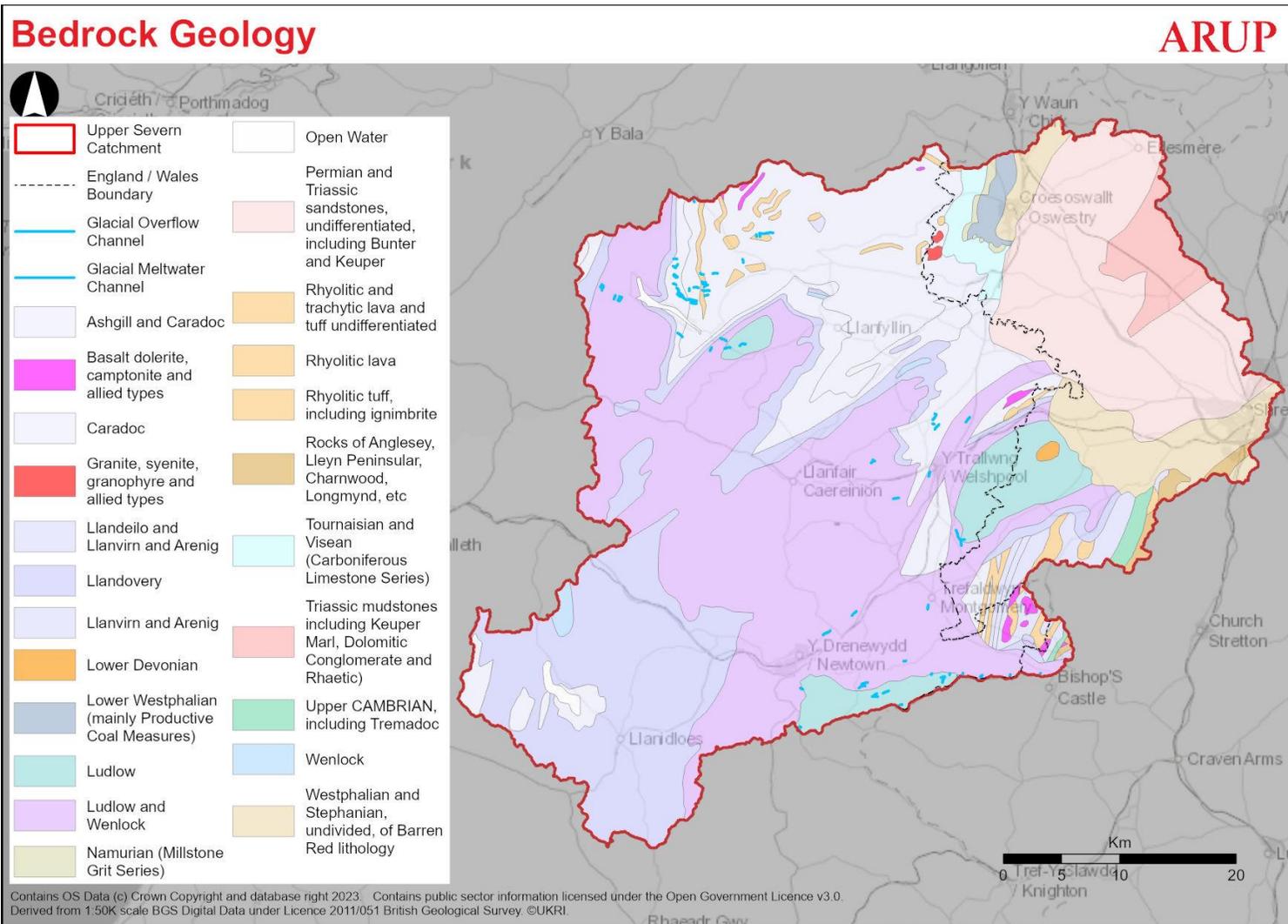


Figure B.19 Bedrock geology

Mining

Within the Upper Severn Catchment, there are three main regions where coal mining has been reported (Figure B.20): to the very north, near Chirk/Y Waun; to southwest of Oswestry; and a larger region extending from between Welshpool/Y Trallwng and Shrewsbury to immediately south/southeast of Shrewsbury. There is also a significant number of abandoned mines throughout the study area; concentrated to the northeast of Llanidloes, and across the northeast portion of the study area.

The area also has a significant non-coal mining heritage, from copper in the Bronze Age to lead, silver and zinc up to the 1930s⁵². There are seven active non-coal quarries/mines in the study area. There is also a sparse array of Mineral Permitted Working Areas and Mineral Sites in the study area with the largest 5-10k NE of Welshpool/Y Trallwng, as well as one to the west, and another to the northwest, of the study area.

⁵² Schofield (2009) What's in the Welsh Basin?: insights into the evolution of Central Wales and the Welsh Borderlands during the Lower Palaeozoic. [Online]. Available at: [http://www.shropshiregeology.org.uk/sgspublications/Proceedings/2009%20No 14%20001-017%20Schofield%20Central%20Wales.pdf](http://www.shropshiregeology.org.uk/sgspublications/Proceedings/2009%20No%2014%20001-017%20Schofield%20Central%20Wales.pdf)

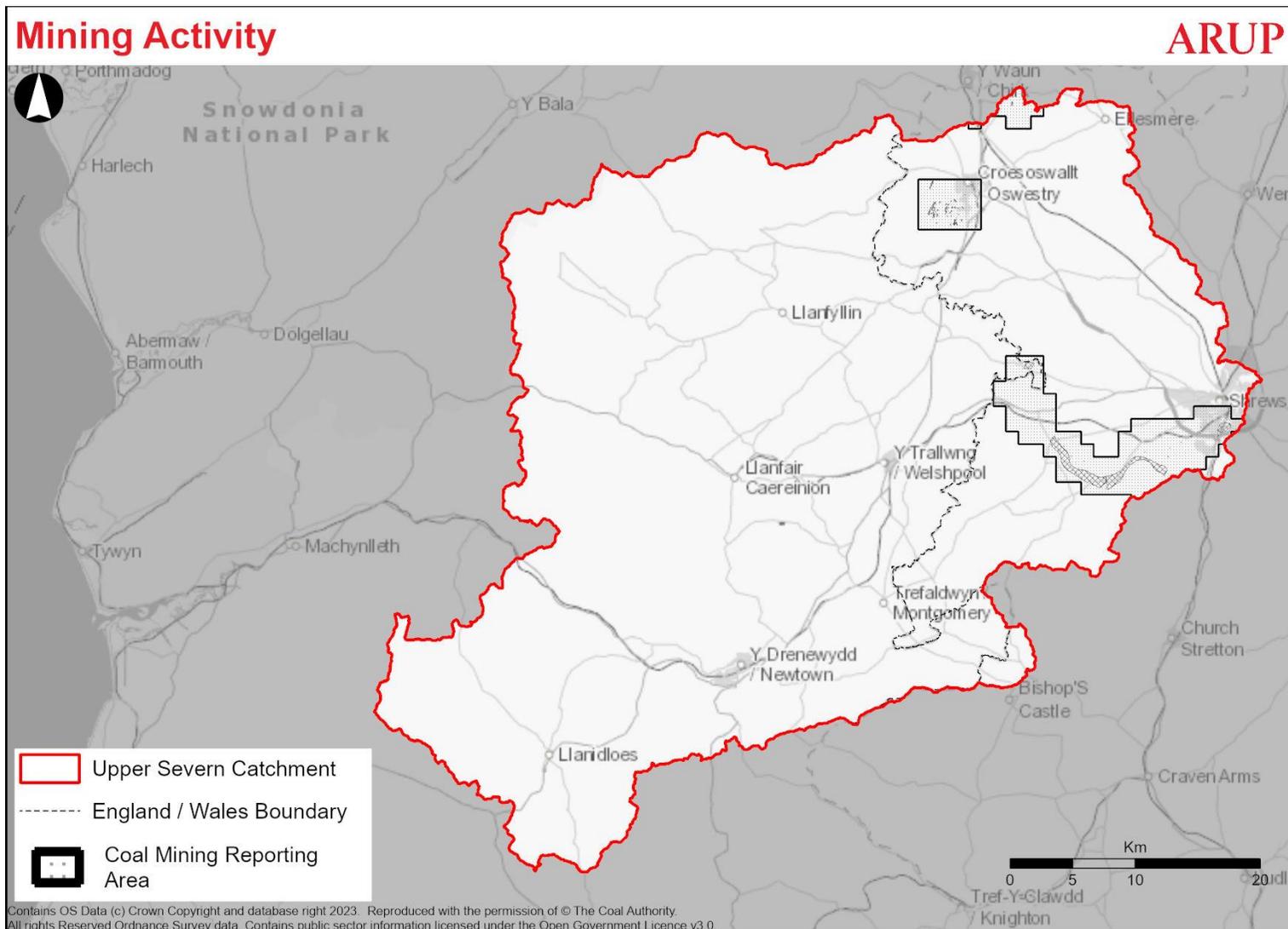


Figure B.20 Mining activity

B.6.2 Hydrogeology

For the current baseline, only an outline of the hydrogeological designations and water resources are covered given the scale of the Upper Severn Catchment.

Aquifer Classification

The EA and NRW use the same classification system to define aquifers in England and Wales respectively; this is based on their ability to transmit water and support water abstractions, surface flow and wetland ecosystems, and is defined, largely, by the rock's characteristics, on both a macro and micro scale.

These classes and their definitions are as follows:

- **Principal Aquifer** - highly permeable rock that provides water supply and/ river base flow.
- **Secondary A Aquifer** - permeable layers capable of supporting water supplies at a local rather than strategic scale. In some cases, they form important sources of baseflow to rivers.
- **Secondary B Aquifer** - predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.
- **Secondary (undifferentiated) Aquifer** - assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.
- **Unproductive Strata**

Bedrock Aquifers

The bedrock aquifer classification is provided in Figure B.21. There are 11 principal aquifers across England and Wales, three of which are present, albeit to very limited extents, within the Upper Severn Catchment. These are Triassic and Permian Sandstones and Carboniferous Limestones.

Within the study area, the predominant aquifer classification, spatially, is 'Secondary B'. This classification covers all lithologies but for these exceptions:

- Permo-Triassic Sandstones and Limestones (Principal),
- Llandovery sandstones and conglomerates, Warwickshire Group and Millstone Grit (Secondary A),
- Wenlock sandstones and conglomerates (Secondary undifferentiated Aquifer), and
- Halite layers within the Permo-Triassic rocks (Unproductive Strata).

Superficial Aquifers

The superficial aquifer classifications in the study area are shown in Figure B.22. Typically, the Alluvium, Peat, Glacial Sands and Gravels and River Terrace Deposits are classified as Secondary A Aquifers, whereas the Till is generally Secondary (undifferentiated).

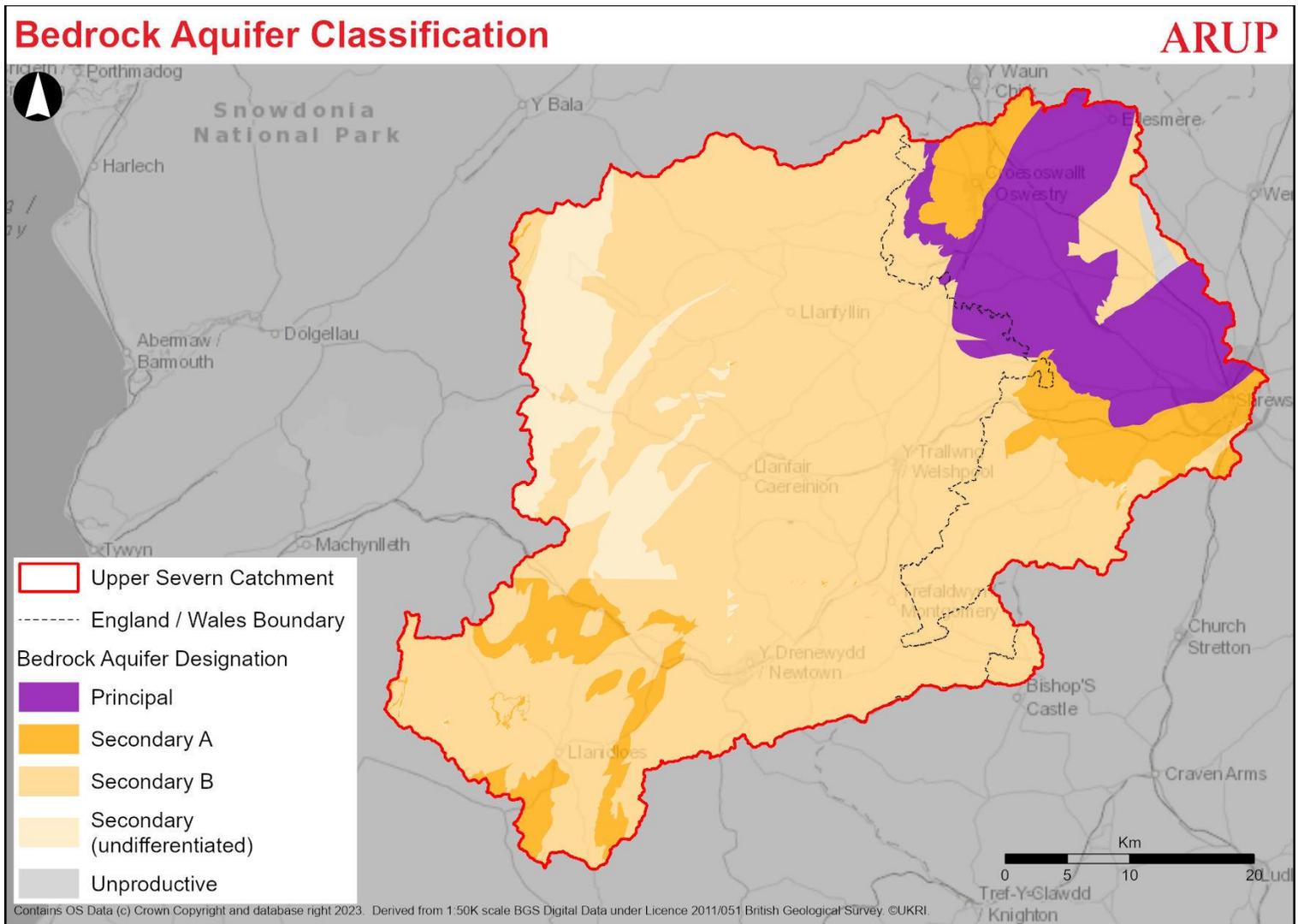


Figure B.21 Bedrock aquifer classification

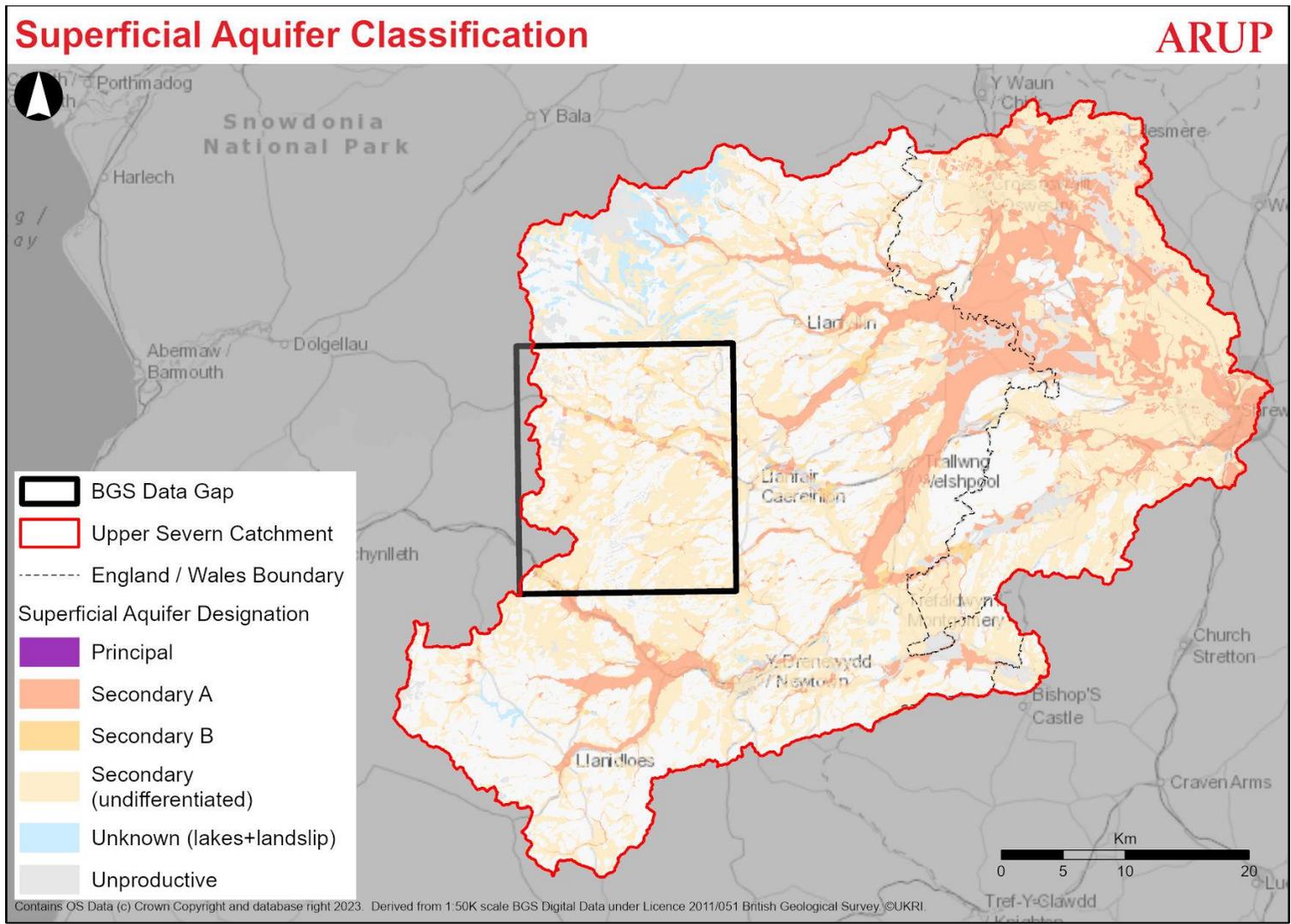


Figure B.22 Superficial aquifer classification

Groundwater Abstraction

At this stage of the project, data on private groundwater abstractions (<20m³/d) have not been requested from the Local Authorities.

There are 157 licenced abstractions (those above 20m³/d) in the study area (Figure B.23). These are predominantly located to the northeast of the study area.

The Shropshire Groundwater Scheme involves 50 groundwater abstraction boreholes hydrogeologically linked to the River Severn to allow for flexibility and greater resilience in the water supply during dry periods. Specifically, the objective is to utilise the scheme during peak dry periods, to augment the inflow to the river from Llyn Clywedog and Lake Vyrnwy. The scheme is split into 8 phases, at the completion of the final phase there should be up to 300MI/d of groundwater available⁵³ with 64 abstraction and 91 observation boreholes.

Currently, Phases 1 to 5 of the scheme have been implemented, which adds 160-175MI/d to the overall groundwater availability. The scheme, and the borehole array, are just north of Shrewsbury in a sigmoidal/S-shape, extending about 50km E-W.

Designations

The following environmental designations are relevant to the hydrogeology of the Upper Severn Catchment:

- Seven groundwater bodies (covered in Section B.7)
- Eight Source Protection Zones (SPZ) (Figure B.24)
- Two Drinking Water Safeguard Zones (DWSgZ) in England and none in Wales (Figure B.24)
- Six Nitrate Vulnerable Zones (NVZ) in England (Figure B.24), of which two are groundwater and the rest surface water. None in Wales at present, though there is an intention to change the entire country to an NVZ, with a review currently underway.

⁵³ Voyce (2009) Groundwater Management: the Shropshire Groundwater Scheme. [Online]. Available at: <http://www.groundwateruk.org/Shropshire-Groundwater-Scheme.aspx>

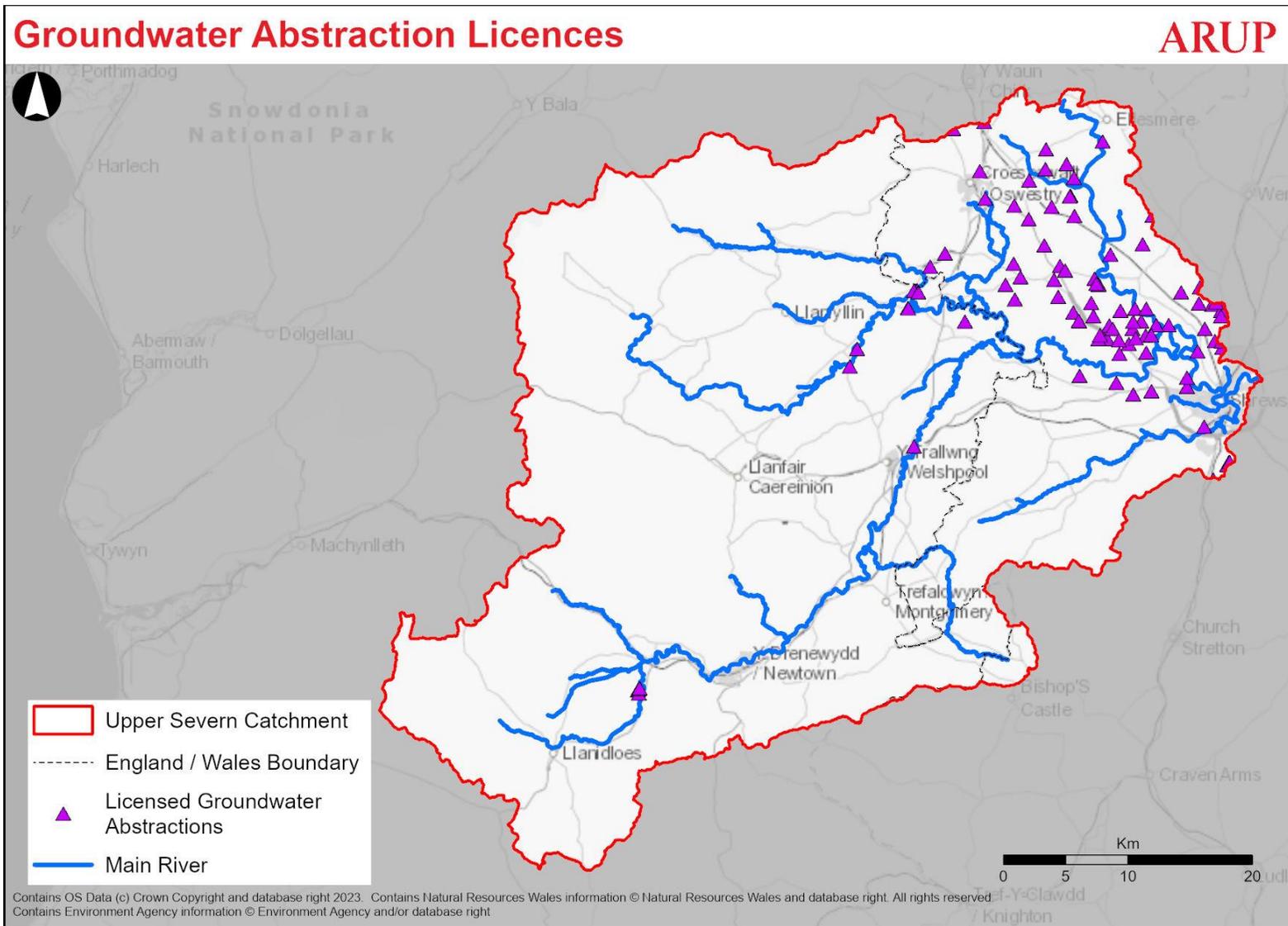


Figure B.23 Licensed groundwater abstractions

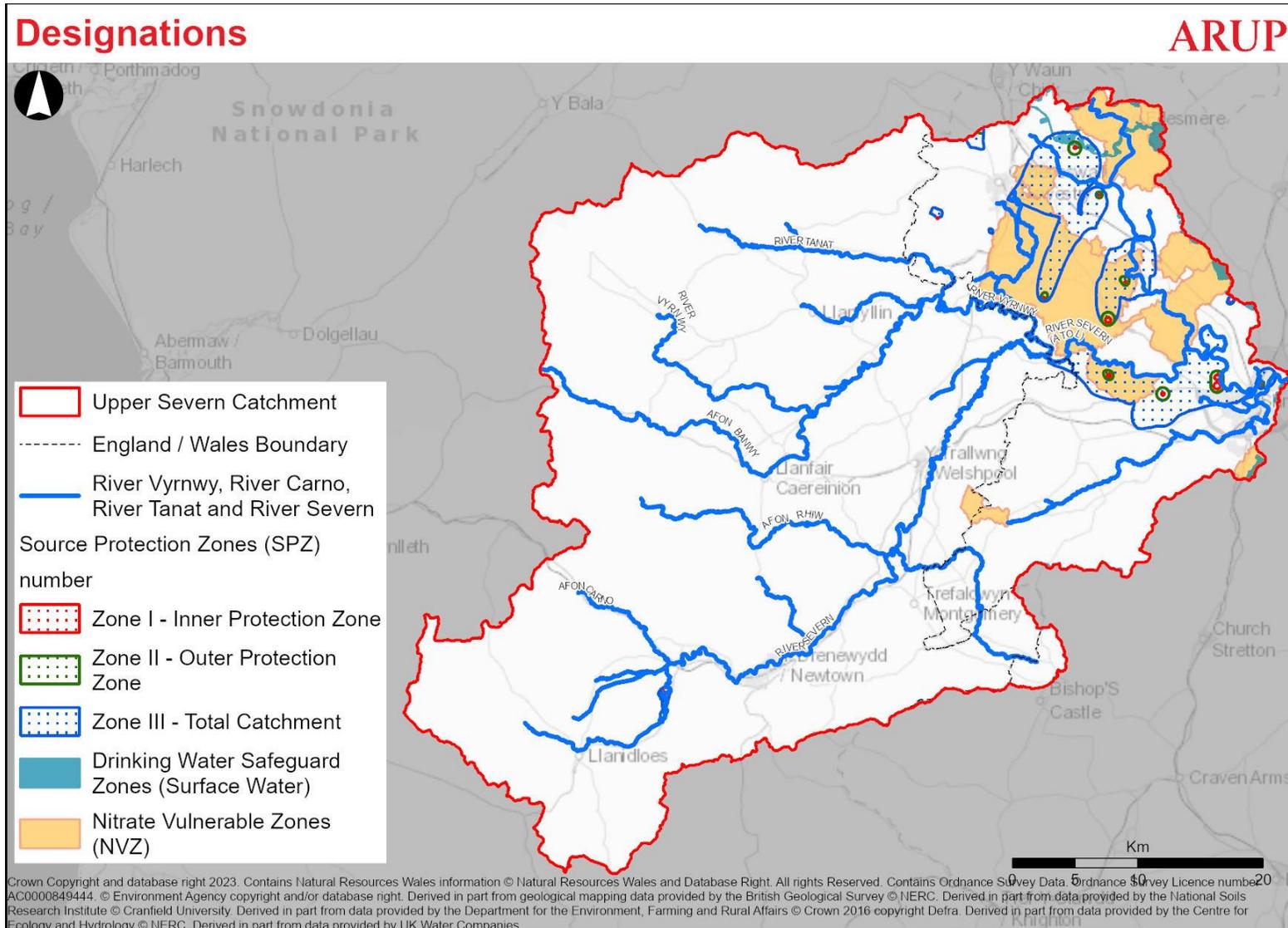


Figure B.24 Water resources designations

Groundwater Flooding

Figure B.25 presents the risk of groundwater flooding in the study area which is taken from the BGS⁵⁴. This indicated that the study area is at a moderate risk to groundwater flooding. The majority of the area is at <25%, but there are significant areas of ≥75%. One such area is where the A470 meets the A489, west of Newtown/Y Drenewydd, another follows the A483 northeast through Welshpool/Y Trailwng. Finally, there is a large high risk area about 7.5km south of Oswestry/Creoswalt. These areas of high susceptibility correlate with areas of Secondary A superficial aquifers.

B.6.3 Historic and likely future trends

The State of Natural Resources Report (SoNaRR) for Wales 2020 explains that the condition of woodland soil has generally been improving since the 1970s whereas the condition of agricultural soils have been stable or declining⁵⁵. It is anticipated that soils will continue to be impacted by human activity such as intensive agriculture, historic industrial pollution, actions that increase vulnerability to erosion, compaction and loss of organic matter. In the future, there is a high risk that soils will be further degraded as a result of changing climatic conditions, including seasonal aridity and wetness⁶⁶.

The 25 Year Environment Plan sets out the ambition for all of England's soils to be managed sustainably by 2030. There is no equivalent soils plan for Wales. The England Peat Action Plan and National Peatland Action Programme in Wales sets the vision for the management, protection and restoration of peatland.

The Shropshire Groundwater Scheme is still under development, and so the total deployable yield is set to increase. Historically, the scheme has been called upon in 1984, 1989, 1995, 1996 and 2005 to use groundwater to support river flows⁵³. If the trend of drier summers continues as predicted, it is likely that the Shropshire Groundwater Scheme is utilised more frequently.

B.6.4 Opportunities

At present the constraints and opportunities mapping has utilised the aquifer designations and source protection zones to identify areas where certain interventions are appropriate or ruled out.

The aquifer classifications at ground surface (either superficial or bedrock where superficial deposits are absent) have been used to determine whether a particular site is favourable for a specific intervention.

Generally, Unproductive Strata are considered advantageous for interventions which would benefit from water ponding on the surface, such as wet agriculture, wetland creation etc. Equally, for online storage solutions, Unproductive Strata

⁵⁴ British Geological Survey (no date) Groundwater flooding dataset. [Online]. Available at: <https://www.bgs.ac.uk/datasets/groundwater-flooding/>

⁵⁵ Natural Resources Wales (2020) The Second State of Natural Resources Report (SoNaRR2020) Assessment of the achievement of sustainable management of natural resources: Land use and soils. [Online]. Available at: <https://naturalresources.wales/media/693310/sonarr2020-theme-land-use-and-soils.pdf>

present an opportunity to reduce costs with less engineering required to ensure that a reservoir would hold water.

However, where infiltration to ground would improve the success of an intervention (e.g. grip blocking, gully stuffing, runoff attenuation features etc) then an aquifer classification of Principal or Secondary A Aquifer is considered advantageous. This is because it presents an opportunity to promote groundwater recharge.

Interventions which would intercept recharge or take water from groundwater storage, such as wet woodland or tree planting, or online storage have been flagged as not appropriate in Source Protection Zone 1, in order to protect the associated groundwater abstraction. This is the only hard constraint identified for groundwater.

The groundwater WFD elements are considered separately under Appendix D: WFD Waterbodies.

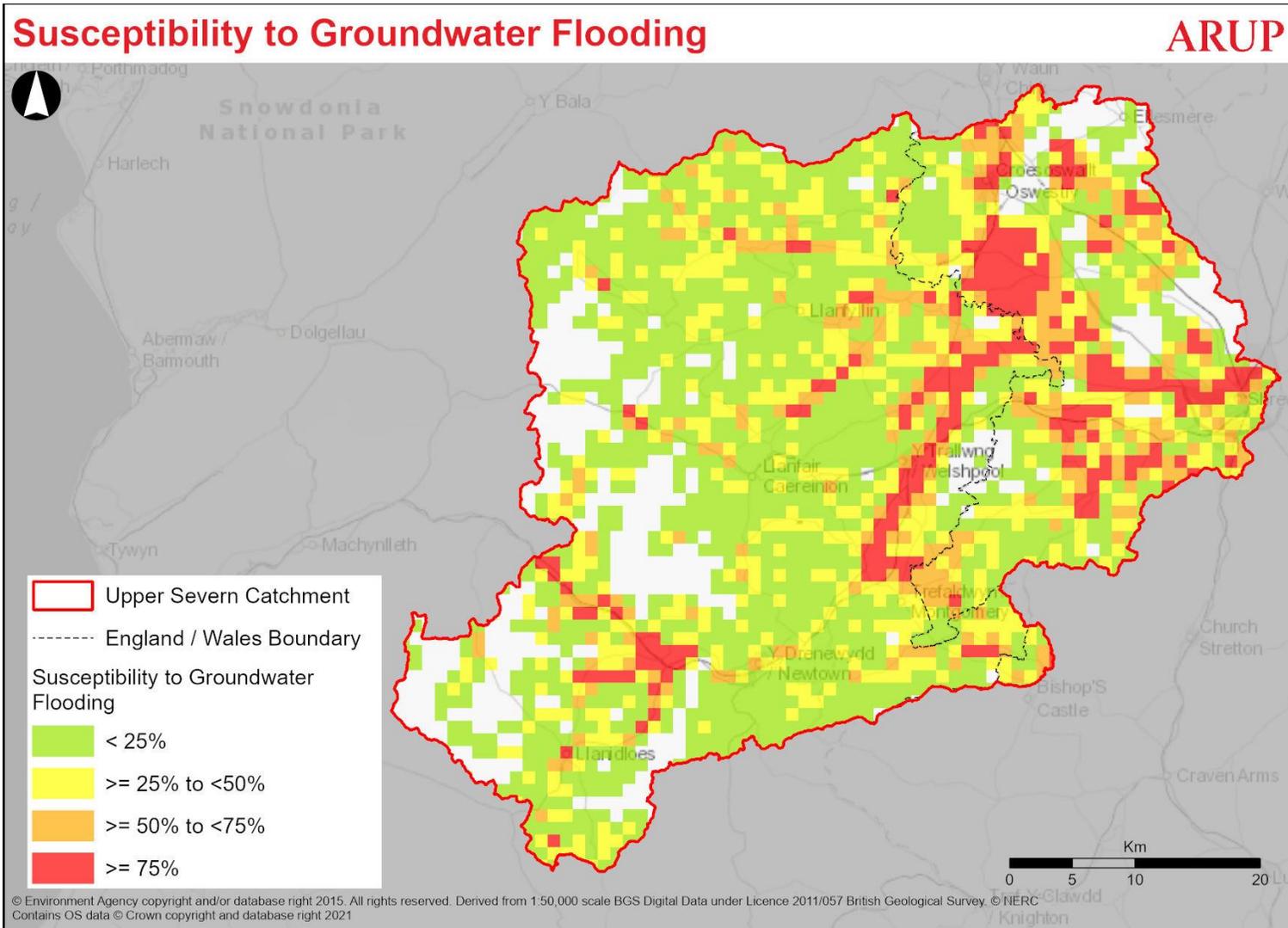


Figure B.25 Susceptibility to groundwater flooding

B.7 Water environment

B.7.1 Waterbodies and flooding

The water environment plays a significant role in the Upper Severn Catchment area which focusses on the Upper Severn Catchment. The area encompasses a diverse range of landscapes and physical habitats in which the water environment is central, from the Cambrian Mountains and the source of the River Severn (located at Pumlumon) to the south-west, the Berwyn mountains in the north-west, and lower-lying floodplain areas along the central Severn Valley and to the north-east, upstream of the town of the town of Shrewsbury.

The Upper Severn Catchment is located within the Severn River Basin District (RBD) which is split into 10 Water Framework Directive (WFD) surface water 'management catchments'. These catchments range from high energy upland streams to slower rivers in the lowlands and include sandstone and limestone aquifers used for public water supply in the Midlands, England. Around 80% of the land within the RBD is used for agriculture and forestry, which shapes much of the landscape. The sector includes beef and sheep farming, large-scale dairy farms, coniferous forestry plantations and some arable and specialist horticulture.

The Upper Severn Catchment roughly aligns with the 'Severn Uplands' WFD Management Catchment (as defined within the Severn River Basin Management Plan (RBMP)⁵⁶) which covers an area of approximately 2,500 km² across England and Wales, with approximately 85% of the area falling within Wales. There are 102 surface water bodies (shown in Figure B.26) and seven groundwater bodies located within the study area (shown in Figure B.27). These water bodies are also summarised in Appendix D: WFD Waterbodies.

⁵⁶ Environment Agency (2022) Severn River Basin District River Basin Management Plan: Updated 2022. [Online]. Available at: <https://www.gov.uk/guidance/severn-river-basin-district-river-basin-management-plan-updated-2022>

Surface Water Bodies

ARUP

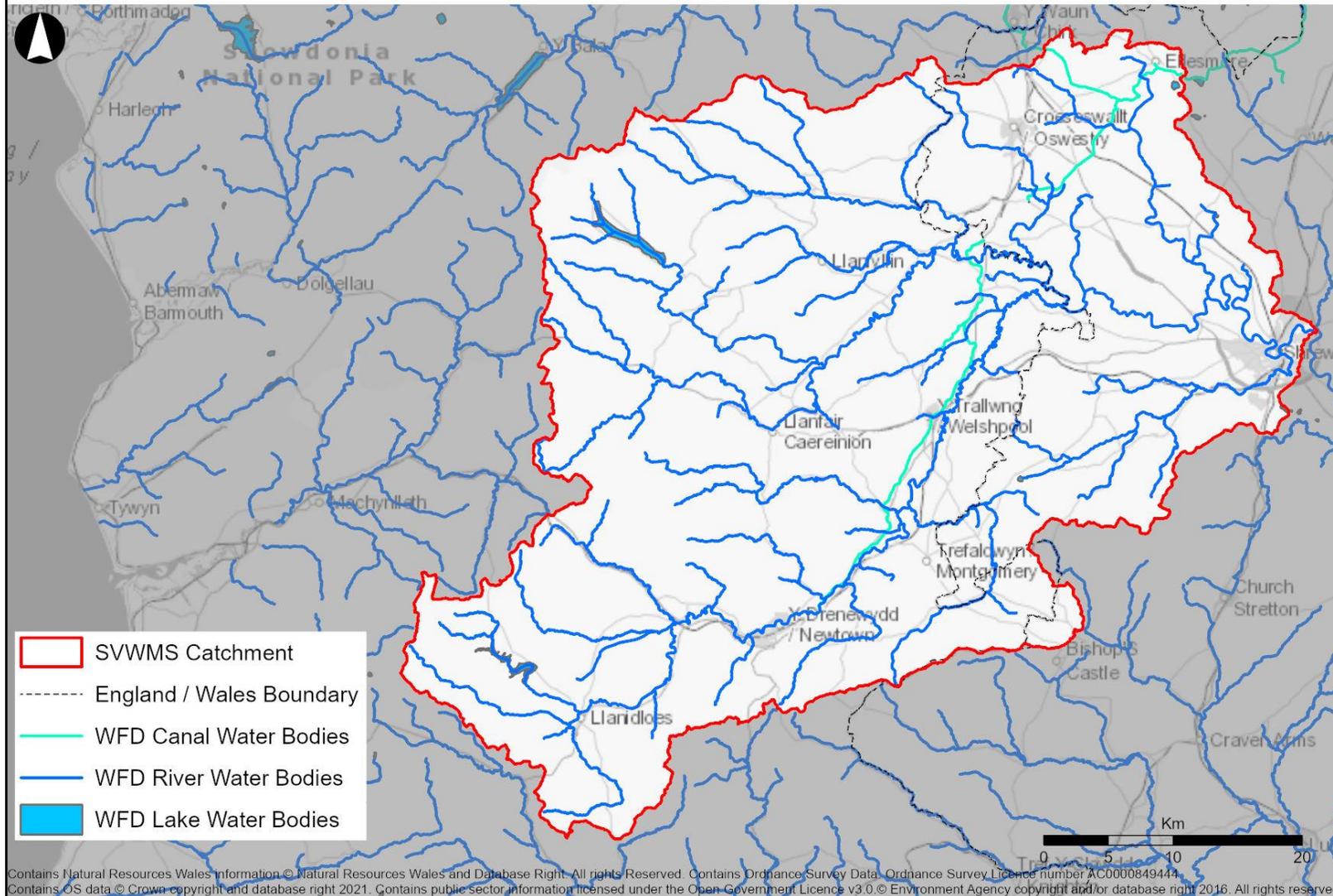


Figure B.26 Surface water bodies within the Upper Severn Catchment area

Groundwater Bodies

ARUP

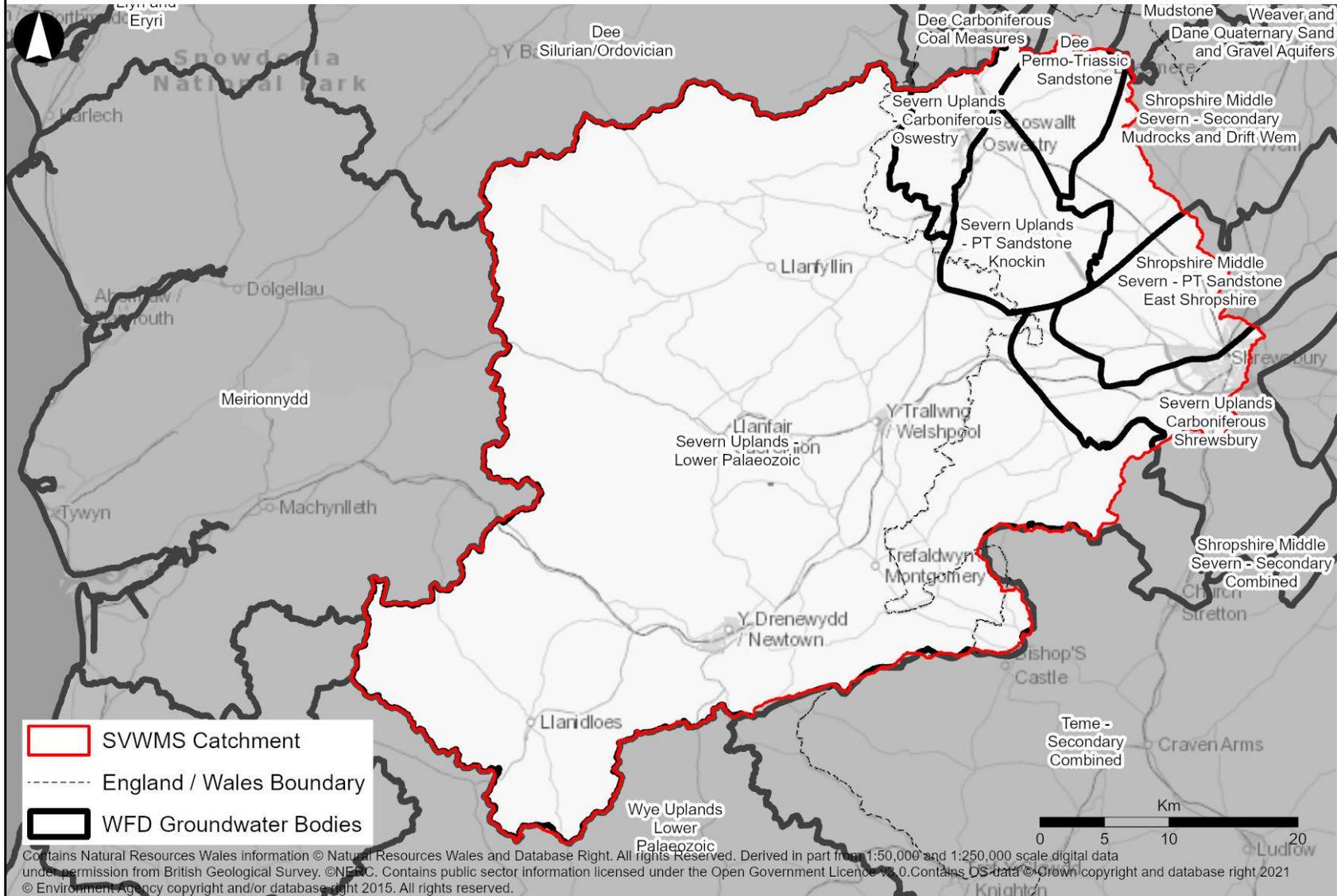


Figure B.27 Groundwater bodies within the Upper Severn Catchment area

There are a number of different water-related stakeholders present within the Upper Severn Catchment and the needs for each will need to be considered. For example, there are two water utility companies, Severn Trent Water and United Utilities, operating within the Upper Severn Catchment area. Water supply needs will therefore need to be considered. There are also a number of active wildlife, river and woodland trusts, such as Severn Rivers Trust and Coed Cymru, who will require consideration in term of impacts but also may open up opportunities in terms of potential ideas and landowner relationships. The Upper Severn Catchment area also falls within the jurisdiction of local authorities such as Powys Council who are likely to be interested in the SVWMS from a flood risk perspective and also may be able to provide information on opportunities within the Upper Severn Catchment that the project may be able to capitalise on.

Under the WFD, surface water bodies are categorised by three types; water bodies not designated as heavily modified, heavily modified water bodies (HMWB) and artificial water bodies (AWB). HMWBs are those which have been significantly physically modified to support various social or economic uses. AWBs, such as canals, are those which have been created for a specific purpose, such as navigation or water supply/transfer. Of the 91 river water bodies present within the study area, the majority (82; 90%) are not designated as HMWBs. The four canal water bodies are classified as AWBs and of the seven lake water bodies five (71%) are designated as HMWBs.

Under the WFD, each water body has a default objective to reach good Overall Status by a set date (currently, no later than 2027). In specific circumstances, exemptions to this objective may be justified on the grounds of technical infeasibility, disproportionate cost, or natural conditions. A summary of the overall status for surface water bodies within the Upper Severn Catchment area is shown in Table B.1.

Table B.1 Summary of overall status of water bodies within the Upper Severn Catchment area (2019 status data)

| Overall status | River water bodies | Lake water bodies | Artificial water bodies (canals) | Groundwater bodies |
|----------------|--------------------|-------------------|----------------------------------|--------------------|
| High | 0 (0%) | 0 (0%) | 0 (0%) | - |
| Good | 27 (30%) | 1 (14%) | 2 (50%) | 2 (29%) |
| Moderate | 45 (49%) | 5 (71%) | 2 (50%) | - |
| Poor | 17 (19%) | 1 (14%) | 0 (0%) | 5 (71%) |
| Bad | 2 (2%) | 0 (0%) | 0 (0%) | - |

When a water body is not achieving good status, action is required to improve the status to good. 'Reasons for not achieving good' (RNAGs) are identified, and each RNAG is recorded using a defined set of pressures and reasons for failure. In total, 76 surface water bodies (including rivers, lakes, and canals) have at least one RNAG identified, with a total of 297 individual RNAG currently identified across the study area, shown in Table B.2

Table B.2 Summary of the RNAGs for surface water bodies within the Upper Severn Catchment area

| Category and SWMI | RNAG Count | Percentage |
|---------------------------------------|------------|------------|
| Agriculture and rural land management | 140 | 47% |
| Mining and quarrying | 39 | 13% |
| Water Industry | 34 | 11% |
| Unknown (pending investigation) | 29 | 10% |
| Other category | 55 | 19% |

The most common category associated with these is agriculture and rural land management, with mining and quarrying, and the water industry also identified as key sectors. Diffuse source pollution is the key Surface Water Management Issue (SWMI) identified in association with agriculture and rural land management related RNAGs (89% of the RNAGs in this category). This is further sub-divided against the arable and livestock agricultural business sectors, which account for 23% and 47% of agricultural diffuse source pollution, respectively. The Severn RBMP also identifies that the priority river management issues to tackle within the Severn Uplands WFD management catchment are agricultural and rural land management, point source pollution and physical modification of watercourses.

At each RBMP cycle, a range of measures are identified to address pressures on water bodies that are not achieving good status. Any development or activity must take all practicable steps to not deteriorate the current status or future status objectives of a waterbody or prevent the implementation of these measures.

Flood risk combines the probability and the potential consequences of flooding⁵⁷ from all sources (rivers, rainfall affecting ground surface and rising groundwater, sewers and drainage systems, reservoirs, canals, lakes and other artificial sources). As a result of climate change, the UK is likely to experience more frequent heavy rainfall which will likely lead to an increase in the number and severity of flood events. Within the Upper Severn Catchment, there are a number of areas that fall within Flood Zone 3 (high probability of flooding)⁵⁸ (see Figure B.28), particularly on the main River Severn and River Vyrnwy and around the confluence of both rivers. It has been calculated that 5% of the total land area within the Upper Severn Catchment area is located within Flood Zone 3. Over 2,600 residential properties are known to be at risk of flooding within the Upper Severn Catchment particularly around urban centres along the River Vyrnwy and River Severn from Llanymynech to Shrewsbury.

⁵⁷ Department for Levelling up, Housing and Communities and Ministry of Housing, Communities & Local Government (2022) Flood risk and coastal change guidance. [Online]. Available at: <https://www.gov.uk/guidance/flood-risk-and-coastal-change#table1>

⁵⁸ Land having a 1% or greater annual probability of river flooding; or land having a 0.5% or greater annual probability of sea.²

Furthermore, in recent years measures have also had to be implemented to manage the effects of dry weather and water shortages. The River Severn and its tributaries are a vital source of public water supply for nearly 8 million people and over 100,000 businesses⁵⁹.

⁵⁹ Environment Agency (2021) Plan to improve flood and drought resilience in Severn Valley. [Online]. Available at: <https://www.gov.uk/government/news/plan-to-improve-flood-and-drought-resilience-in-severn-valley>

Fluvial Flood Risk

ARUP

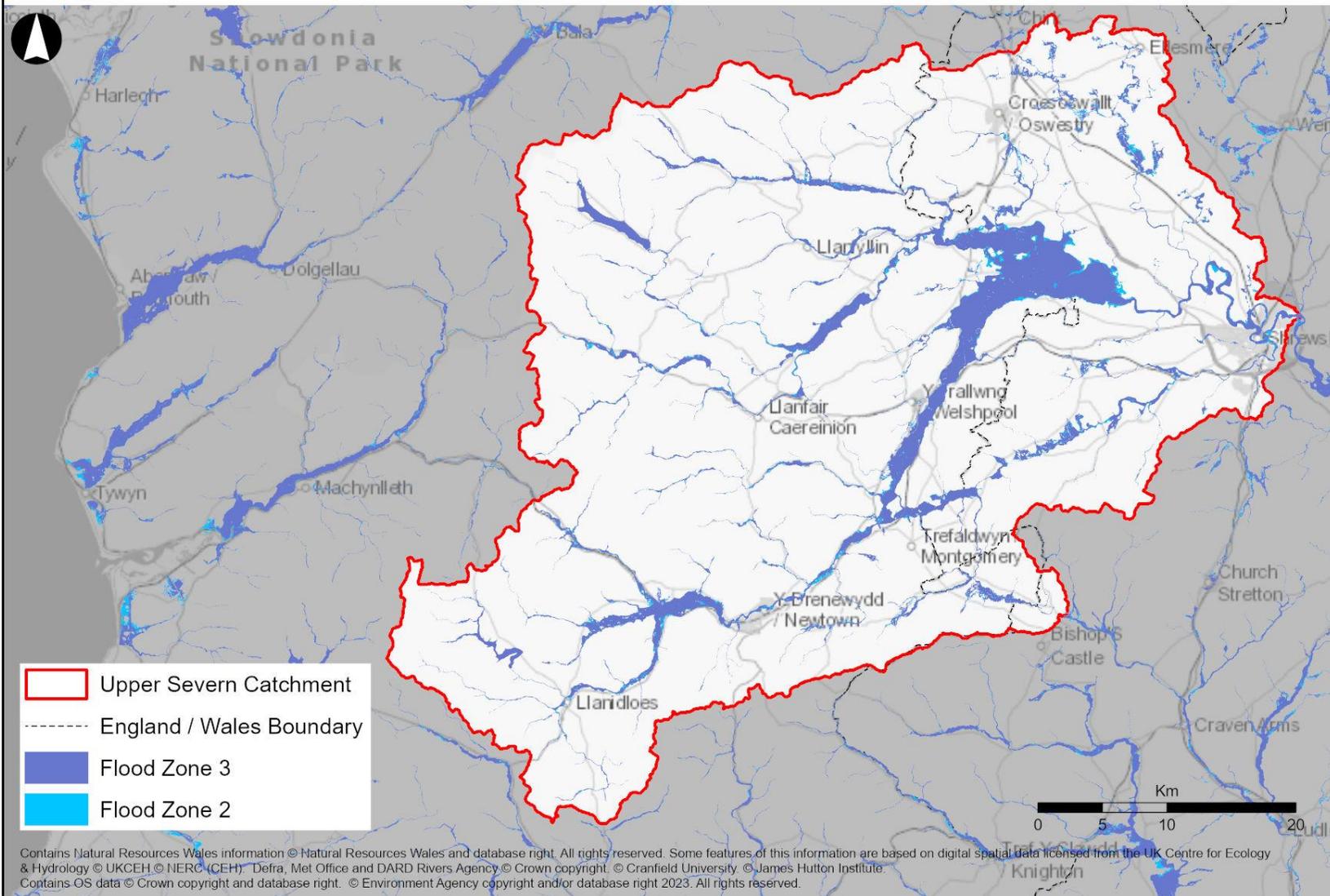


Figure B.28 Areas within the Upper Severn Catchment area within Flood Zone 2 and 3.

B.7.2 The Water Environment (Water Framework Directive) Regulations water bodies

The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (as retained and as amended) set out a framework for the protection of surface waters, transitional waters (e.g. estuaries), coastal waters and groundwater – the water bodies within the Upper Severn Catchment area are set out in Appendix D. The environmental objectives of the Regulations principally relate to the improvement of water bodies through the development and implementation of plans to recover failing water bodies to a good condition, or better.

In total there are 109 WFD water bodies present within the Upper Severn Catchment area comprising of:

- 91 river water bodies;
- seven lake water bodies;
- four artificial (canal) water bodies; and
- seven groundwater bodies.

Information on each water body, including its status and objectives, can be found on NRW's Water Watch Wales⁶⁰ and the EA's Catchment Data Explorer⁶¹.

B.7.3 Historic and likely future trends

Overall, water quality in English and Welsh rivers, estuaries and coastal waters has improved over the last few decades. More stringent regulation and investment by water companies has resulted in wastewater treatment works discharging 67% less phosphorus and 79% less ammonia into English rivers than in 1995. Also, the number of serious water pollution incidents caused by water companies has reduced from over 500 in the early 1990s to 62 in 2021. However, recently this improvement in water quality has slowed, and in some cases plateaued. In England, the proportion of rivers meeting the criteria for good ecological status (14%) has remained consistent for some time⁶².

In the Upper Severn Catchment area, main pressures on surface water bodies are related to agriculture and rural land management, mining and quarrying and the water industry. Groundwater and surface water pollution from historic mining is progressively being addressed as sites are remediated, however this is likely to remain an issue in the Upper Severn Catchment area for some time.

The recent Environment Act 2021 granted stronger powers to regulators so polluters can be held to account. Additionally, the Environmental Improvement Plan 2023 sets out the ambition to upgrade 160 wastewater treatment works by 2027 to tackle nutrient pollution.

⁶⁰ Natural Resources Wales (2022) Water Watch Wales. [Online]. Available at: <https://waterwatchwales.naturalresourceswales.gov.uk/en/>

⁶¹ Environment Agency (2022) Catchment Data Explorer. [Online]. Available at: <https://environment.data.gov.uk/catchment-planning/>

⁶² Environment Agency and Sir James Bevan (2023) Reflections on water: the good, the bad and the future. [Online]. Available at: <https://www.gov.uk/government/speeches/reflections-on-water-the-good-the-bad-and-the-future>

In Wales, the area of land designated as Nitrate Vulnerable Zones is proposed to increase due to nutrient pollution from agricultural practices⁶³.

In recent years, dry weather and drought have become more common in England and Wales. This can place significant pressure on ecosystems, water supplies and the agricultural sector. Future trends are likely to include prolonged and more severe droughts and an increased demand for water due to population growth, industry and agriculture. This is predicted to result in a shortfall of approximately 4,000 million litres of water per day by 2050 in England⁶⁴.

To address this the government has set targets to reduce leakage and per capita consumption, which water companies have made “significant steps” towards⁶⁵. However, the current draft water resource management plans would deliver water reductions short of the 20% target set out in the Environment Act 2021. Although there are currently no Strategic Resource Options proposed in the SVWMS, nationally we should expect to see multiple major water infrastructure schemes to secure water supplies.

The UK is also likely to experience more frequent heavy rainfall events, which will result in an increased number and severity of flood events. Currently over 2,600 residential properties are at risk of flooding in the Upper Severn Catchment area, and this is expected to increase. Annual damages expected to increase by 25% by 2050 and 40% by 2080 under a 2°C by 2100 warming scenario⁶⁶.

Future trends in Wales relating to the reduction and management of flood risk, along with the protection and enhancement of the quality and quantity of water features and resources is declining²¹.

B.7.4 Opportunities

One of the objectives of the SVWMS is to reduce flood risk to communities so the strategy will actively be seeking to implement solutions that reduce flooding including land use change and restoration, natural flood management, and formal storage and engineered solutions. Whilst this baseline review has focussed on the water bodies within the Upper Severn Catchment area there are also likely to be impacts to the water environment downstream due to retaining water for longer and slowing the flow in the upper Severn catchment. A key objective of the strategy is also to combat against the effects of drought

⁶³ Natural Resources Wales (2022) The State of Natural Resources Report (SoNaRR): Assessment of the Sustainable Management of Natural Resources. [Online]. Available at: <https://naturalresources.wales/media/684348/chapter-3-state-and-trends-final-for-publication.pdf>

⁶⁴ Environment Agency (2023) A summary of England’s draft regional and water resources management plans. [Online]. Available at: <https://www.gov.uk/government/publications/a-review-of-englands-draft-regional-and-water-resources-management-plans/a-summary-of-englands-draft-regional-and-water-resources-management-plans>

⁶⁵ Environment Agency (2023) Securing England’s water resources: right now, and for the future. [Online]. Available at: <https://environmentagency.blog.gov.uk/2023/06/22/securing-englands-water-resources-right-now-and-for-the-future/>

⁶⁶ HM Government (2022) UK Climate Change Risk Assessment 2022. [Online]. Available at: <https://assets.publishing.service.gov.uk/media/61e54d8f8fa8f505985ef3c7/climate-change-risk-assessment-2022.pdf>

by delivering solutions that work to conserve water supplies in dry weather that will have benefits for the communities in the Upper Severn Catchment and wider Severn catchment.

Where possible the strategy aims to identify and deliver NbS that are compatible with the principle of Working with Natural Processes (WwNP) to maximise wider environmental benefits and outcomes. This will also compliment one of the objectives of the strategy to protect, create and enhance habitats, biodiversity and natural and social capital in the Upper Severn Catchment. The interventions should also seek to maximise the improvement of WFD status for relevant water bodies as well as reducing flood risk and increasing resilience to drought.

B.8 Climatic factors

In 2015 the 21st UN Climate Change Conference was held in Paris. At this conference the Paris Agreement was agreed and adopted by 196 countries, including the UK. The Paris Agreement is a legally binding international treaty on climate change. Its overarching goal is to hold the increase in the global average temperature to well below 2°C above pre-industrial levels” and pursue efforts “to limit the temperature increase to 1.5°C above pre-industrial levels. In response to this, the UK Government, and devolved Welsh Government, committed to a legally binding target of 80% reduction in carbon emissions relative to the levels in 1990, to be achieved by 2050. In June 2019, secondary legislation was passed that extended that target to “at least 100%”.

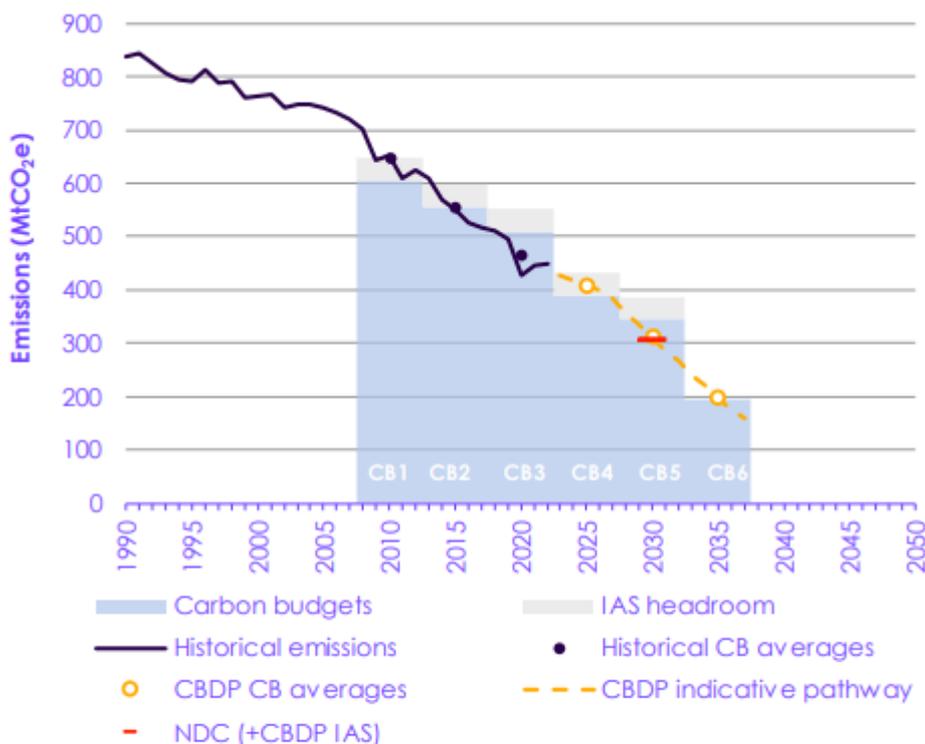
The Welsh Government accepted these targets however following the advice of the Committee on Climate Change (CCC) in 2019 and 2020, Wales subsequently increased the ambition of its 2050 target to be Net Zero emissions, i.e. instead of producing no more than the 1990 level, they committed to producing net zero emissions. Wales has also committed to achieving net zero collectively across the public sector by 2030. The Net Zero Strategy: Build Back Greener defines net zero as reducing emissions to as close to zero as possible, with the small amount of remaining emissions absorbed through natural carbon sinks like forests, and new technologies like carbon capture⁶⁷.

The EA has committed to reaching net zero by 2030, by reducing emissions by 45% by 2030 and offsetting the remainder. Planning for net zero is one of the priorities in the EA’s current business plan, EA2025. In response to the declaration of the climate emergency the vision articulated in EA2025 is to “protect and enhance the environment as a whole and contribute to sustainable development”.

B.8.1 Carbon

UK GHG emissions have been steadily falling in the UK over the past three decades and in 2022 were 46% below 1990 levels. The UK has set out its carbon reduction obligations within Carbon Budgets that run over five-year periods. The UK met its first two carbon budgets and is likely to have met its third, which ran from 2018 to 2022. Using the provisional estimate for 2022 emissions, total emissions over the Third Carbon Budget period were 2,327 MtCO₂e. The historic UK GHG emissions data and projected carbon emissions, in context of current carbon budgets, are shown below in Figure B.29.

⁶⁷ HM Government (2021) Net Zero strategy: Build Back Greener. [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf



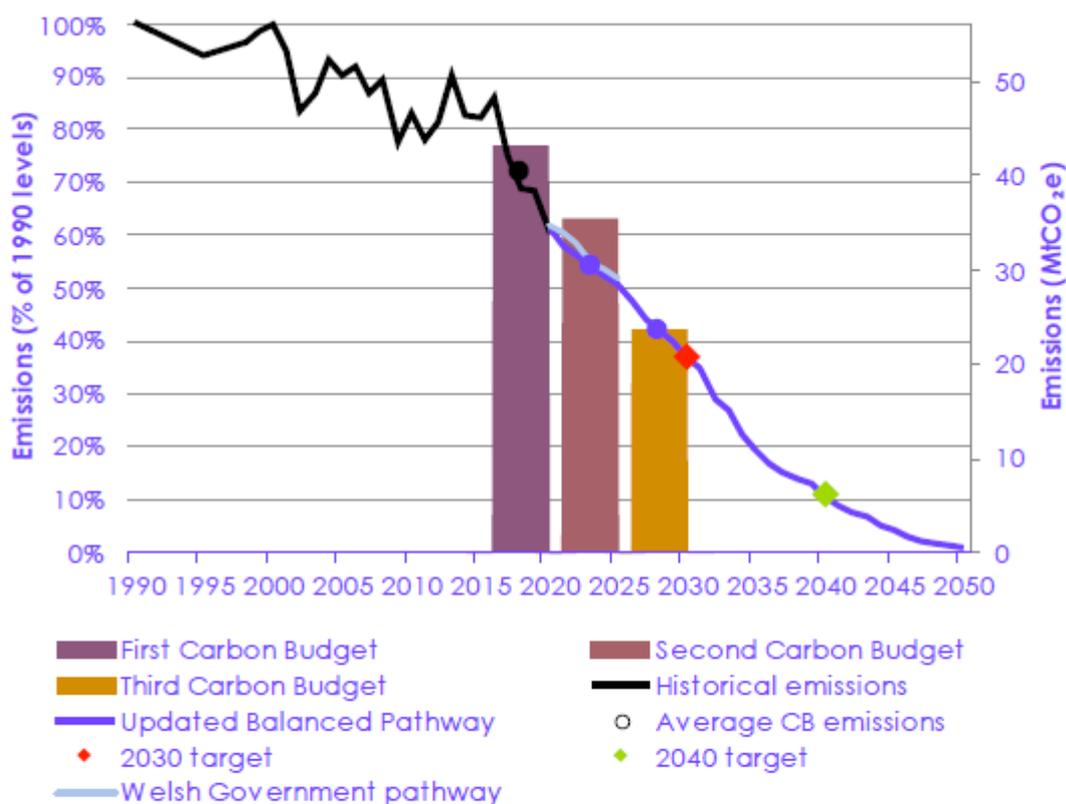
Source: DESNZ (2023) Carbon Budget Delivery Plan; BEIS (2021) Net Zero Strategy; CCC (2020) The Sixth Carbon Budget.

Notes: (1) Emissions from international aviation and shipping (IAS) are included in historical emissions and the Carbon Budget Delivery Plan (CBDP) pathway and added to the NDC to allow for a direct comparison. (2) The CBDP projections include only the quantified plans. Unquantified plans may lead to further emissions reductions. (3) The annual pathway is an indication of emissions reduction. The UK does not have annual targets but the five-year carbon budgets and 2030 NDC must be achieved. (4) We have adjusted the Government's published CBDP pathway for land use to account for methodological changes between the 1990-2019 and 1990-2020 inventories.

Figure B.29 Historic and future GHG emissions data and projections for the UK

The Welsh Government's carbon budgets fall within the UK's however, using their devolved powers, have set their own Carbon Budgets. Wales met both its 2020 interim target and its First Carbon Budget, with emissions falling to an average of 28% compared to 1990 levels over the period 2016-2020⁶⁸. The progress of these reductions is shown in Figure B.30 below.

⁶⁸ Climate Change Committee (2023) Progress Report: Reducing emissions in Wales. [Online]. Available at: <https://www.theccc.org.uk/publication/2023-progress-report-reducing-emissions-in-wales/#:~:text=Welsh%20greenhouse%20gas%20emissions%20decreased,Decarbonisation%20indicators>



Source: National Atmospheric Emissions Inventory (2022) Greenhouse Gas Inventories for England, Scotland, Wales & Northern Ireland: 1990-2020; CCC (2020) The Sixth Carbon Budget; CCC analysis; Welsh Government.
 Notes: The updated Balanced Pathway includes the following changes: rescaling residential buildings emissions to match 2019 emissions and correcting for greenhouse gas inventory methodology updates up to the 1990-2020 inventory. The global warming potentials are those without carbon feedback from the IPCC's Fifth Assessment Report.

Figure B.30 Wales recorded emissions, targets and projections between 1990 and 2050

B.8.2 Future Climate

The United Kingdom Climate Projections 18 (UKCP18) uses climate science to provide updated observations and climate change projections out to 2100 in the UK and globally⁶⁹. The UKCP18 projections are broken into four Representative Concentration Pathways (RCPs) and represent progressively worse warming scenarios. RCP2.6 represents a pathway where greenhouse gas emissions are strongly reduced, resulting in a best estimate global average temperature rise of 1.6°C by 2100 compared to the preindustrial period. RCP8.5 is a pathway where greenhouse gas emissions continue to grow unmitigated, leading to a best estimate global average temperature rise of 4.3°C by 2100. RCP4.5 and RCP6.0 are two medium stabilisation pathways, with varying levels of mitigation.

All of the UKCP18 climate projections for the UK show trends of increased chance of warmer, wetter winters and hotter, drier summers along with an increase in the frequency and intensity of extremes.

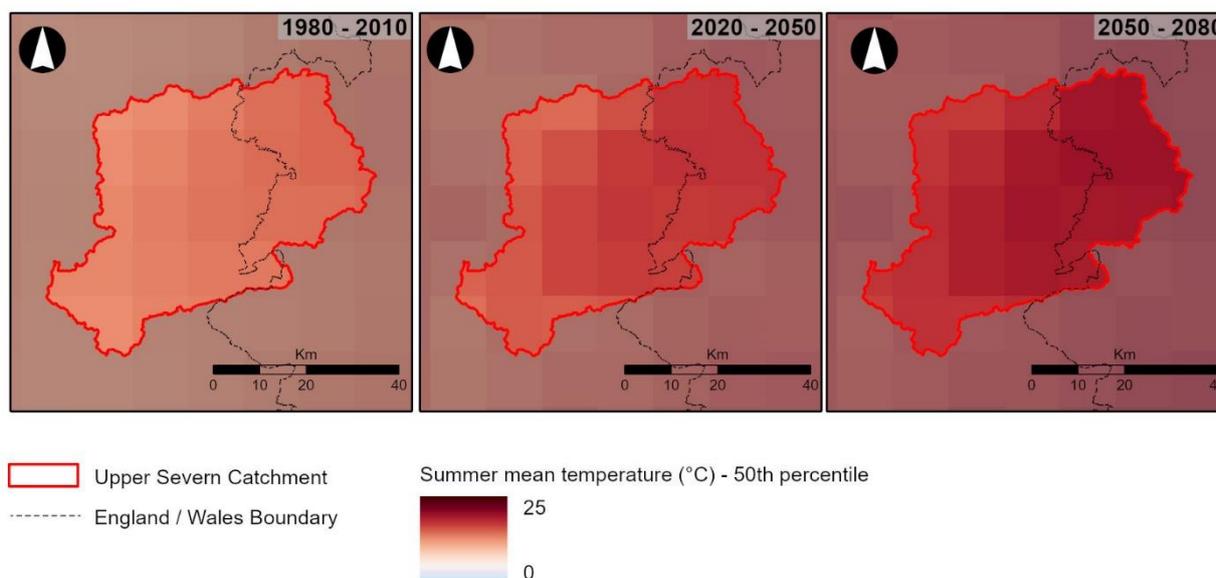
⁶⁹ Met Office (no date) UKCP18 UK climate projections. [Online]. Available at: <https://www.metoffice.gov.uk/research/approach/collaboration/ukcp>

The summer of 2018 was the equal-warmest summer for the UK along with 2006, 2003 and 1976, at the time of the UKCP18 Headline Findings report. Climate change has already increased the chance of seeing a summer as hot as 2018 to between 12-25%. With future warming, hot summers by mid-century could become even more common, with chances increasing further to around 50-60%⁷⁰. Temperature records have continued to be set in the UK although have yet to be published in the latest UKCP18 headline reports given the lag in climate data reporting. In 2022, several locations across the United Kingdom exceeded temperatures of more than 40 degrees Celsius which broke the record set in 2018.

In UKCP18, the probabilistic projections provide local low, central and high changes across the UK, corresponding to 10%, 50% and 90% probability levels. These can be broken down to the specific regions within the UK. Figure B.31 - Figure B.38 below show the projected mean annual temperatures and projected mean annual precipitation for Upper Severn Catchment during the 2020-2039 and 2080-2099 timescales for the UKCP18 8.5 scenario⁷¹. These figures show the annual means which means the extremes, during summer and winter, are likely to be much more drastic.

Temperature - Summer

ARUP



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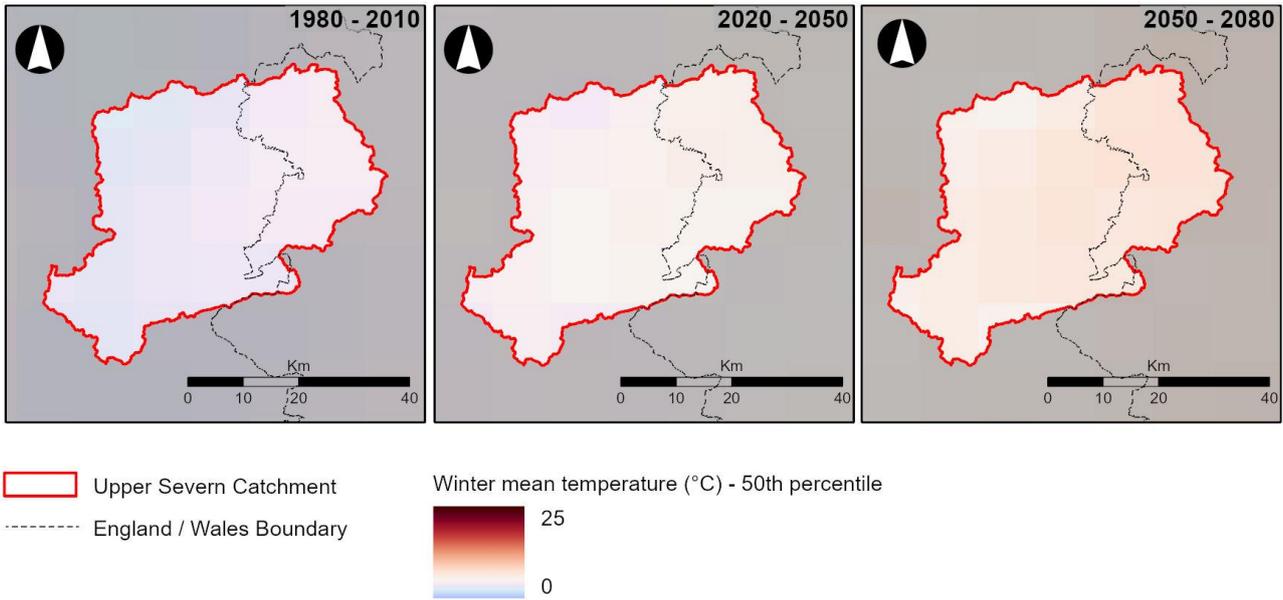
Figure B.31 Mean summer temperature in the Upper Severn Catchment area

⁷⁰ Met Office (2022) UK Climate Projections: Headline Findings. [Online]. Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18_headline_findings_v4_aug22.pdf

⁷¹ Met Office (2022) Climate change projections over land. [Online]. Available at: <https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/summaries/climate-change-projections-over-land>

Temperature - Winter

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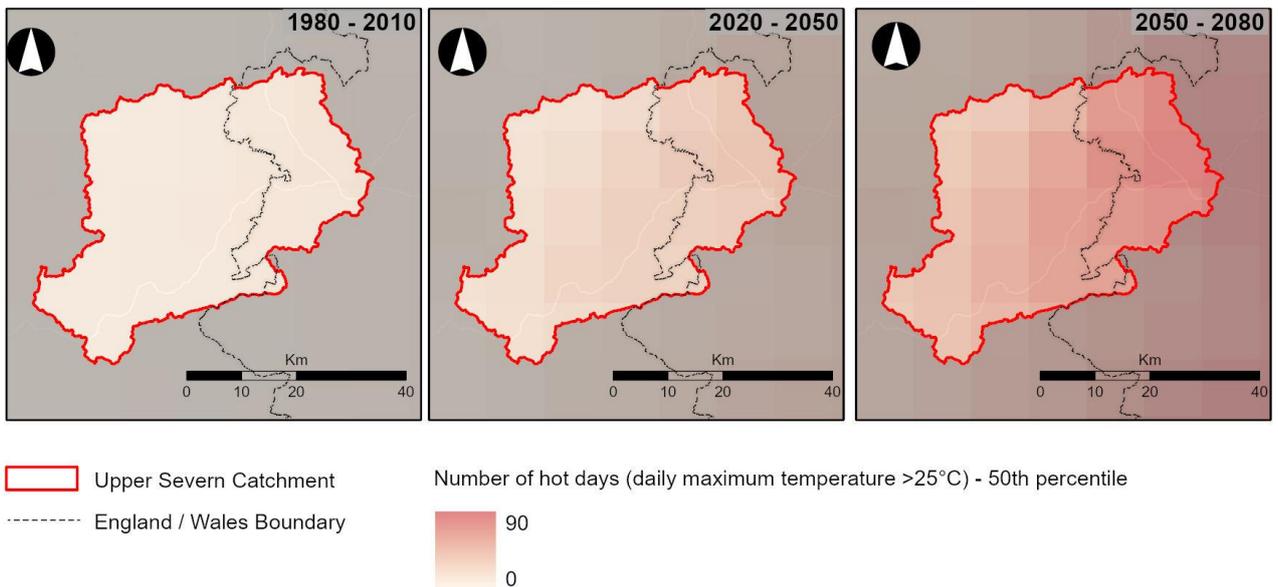


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Figure B.32 Mean winter temperature in the Upper Severn Catchment area

Temperature - Hot Days

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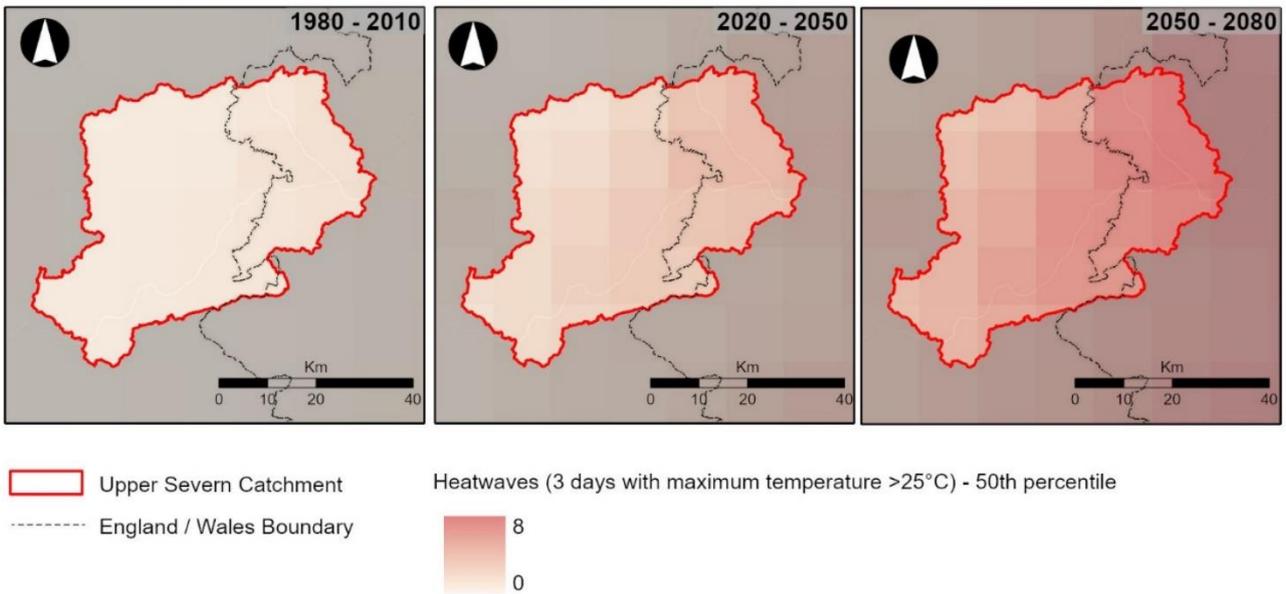


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Figure B.33 Mean number of hot days annually in the Upper Severn Catchment area

Temperature - Heatwaves

ARUP

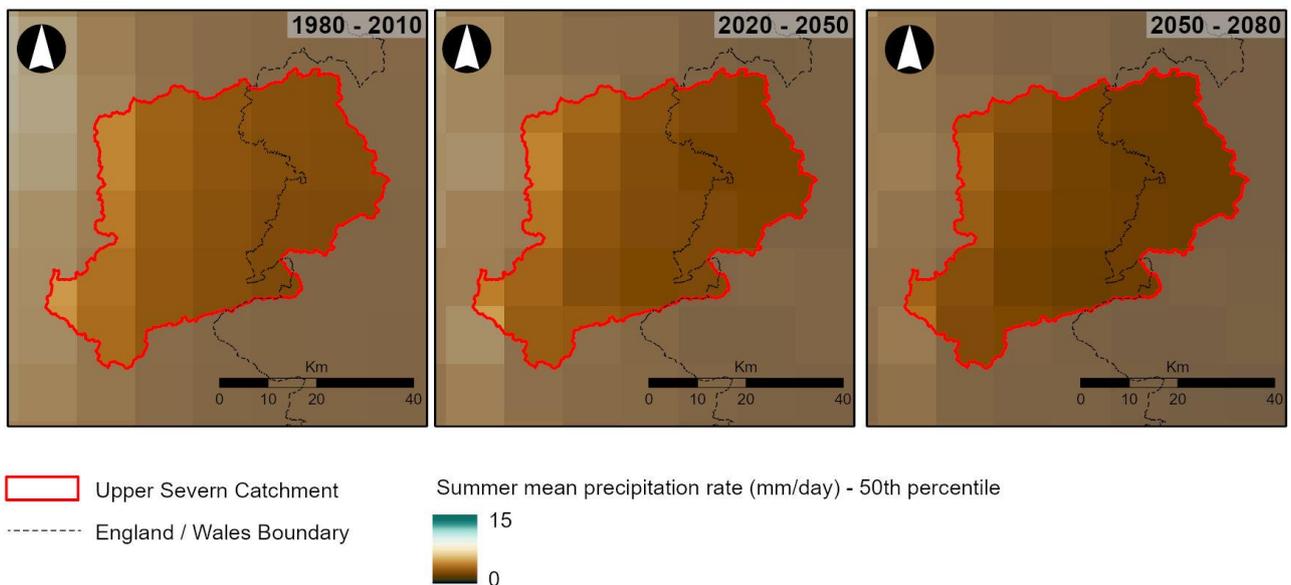


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Figure B.34 Mean number of heatwaves annually in the Upper Severn Catchment area

Precipitation - Summer

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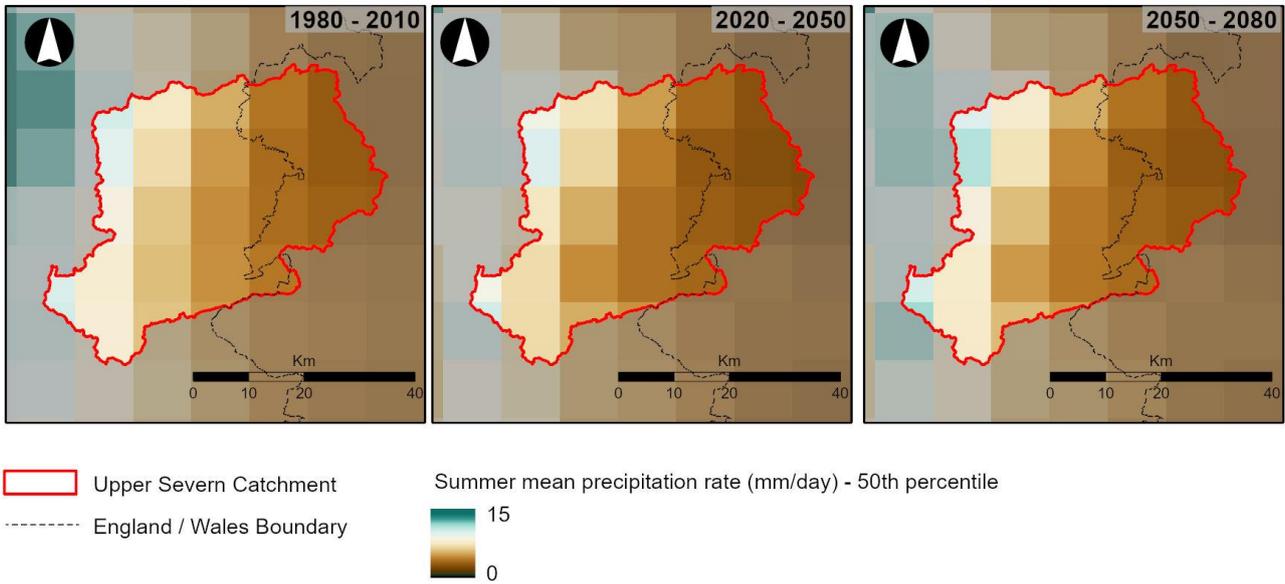


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Figure B.35 Mean summer precipitation rate in the Upper Severn Catchment

Precipitation - Winter

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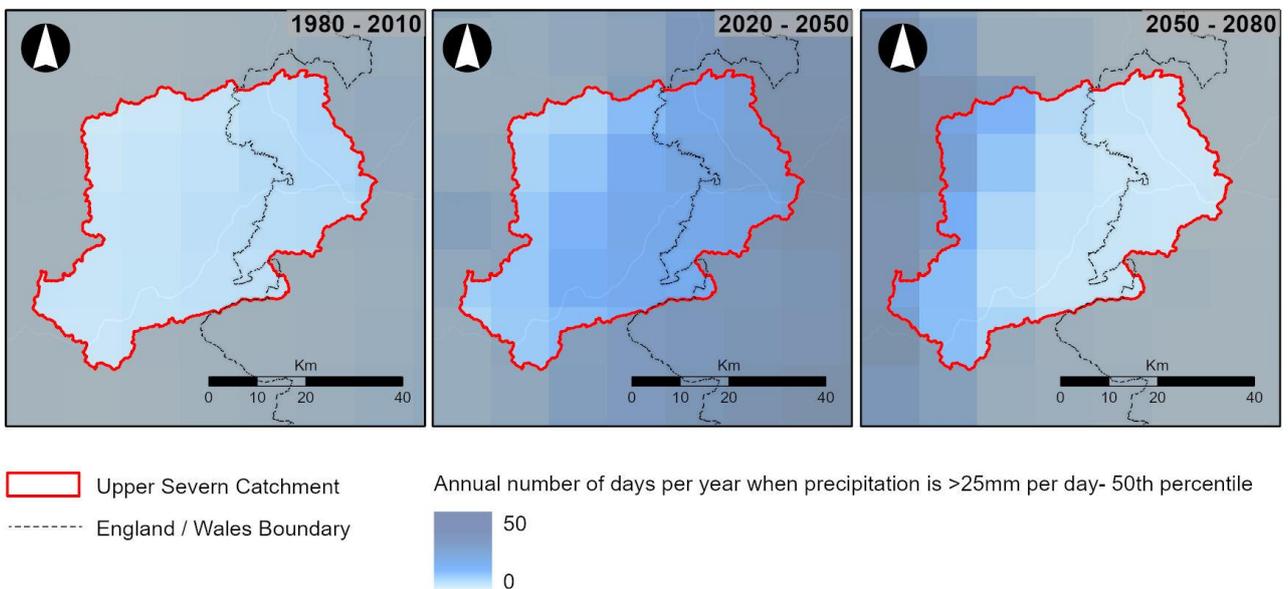


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Figure B.36 Mean winter precipitation rate in the Upper Severn Catchment

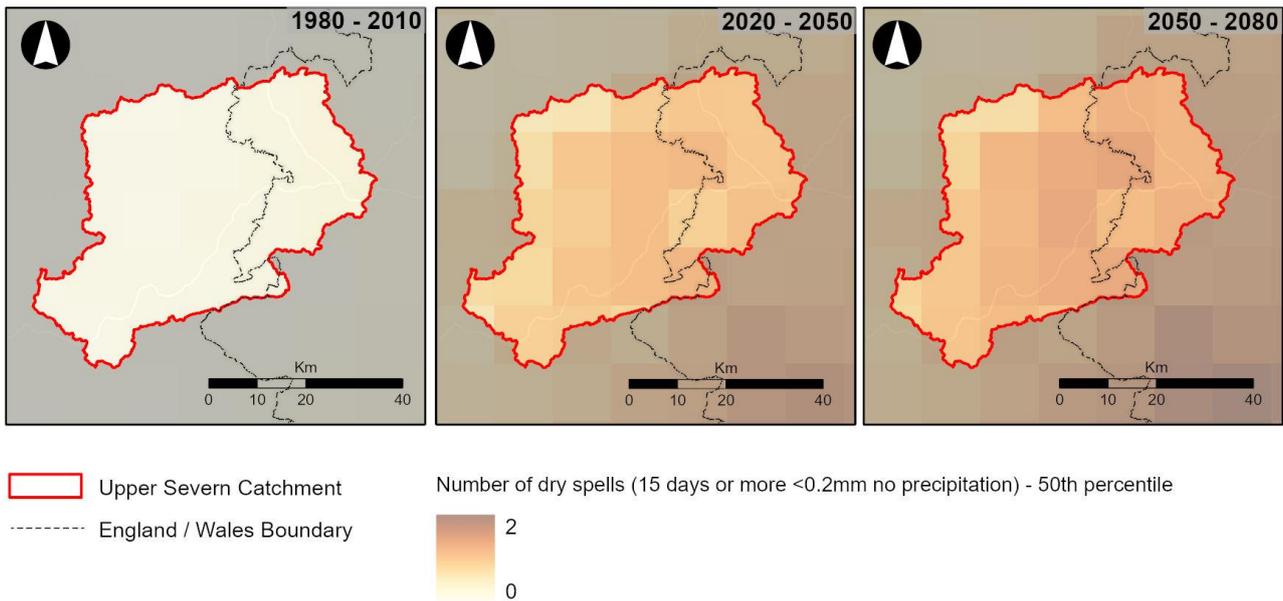
Precipitation - Heavy Rain

ARUP



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Figure B.37 Mean number of heavy rain days in the Upper Severn Catchment



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Figure B.38 Mean number of dry spells in the Upper Severn Catchment

B.8.3 Historic and likely future trends

The Paris Agreement commits countries to pursuing efforts to limiting global temperatures to 1.5°C above pre-industrial levels. Subsequently, the UK Government has committed reduce carbon emissions at least 100% relative to levels in 1990 and the Welsh Government has committed to be Net Zero emissions by 2050. As a result, UK GHG emissions have fallen over the past three decades.

Numerous plans, policies and objectives such as the Climate change: Third national adaptation programme (2023 to 2028) and Net Zero Wales Carbon Budget 2 (2021 to 2025) set out key actions focused on climate change adaptation and mitigation. The Net Zero Strategy, for example, sets the UK Government’s ambition to use land more effectively to tackle climate change and decarbonise power systems by 2035 (Net Zero Strategy: Build Back Greener). In 2020, the UK Government pledged to end the sale of new petrol and diesel cars by 2030.

Opportunities to reduce greenhouse gas emissions and encourage energy efficiency and sustainable design is improving²¹, although the global dependency on fossil fuels is likely to remain for some time.

Climate projections for the UK show trends of increased change of warmer, wetter winters and hotter, drier summers along with an increase in the frequency and intensity of extreme weather and sea level rise. This is expected to be reflected in the Upper Severn Catchment area (see Figure B.31 to Figure B.38).

B.8.4 Opportunities

This focus on reducing GHG emissions has its difficulties in infrastructure development. There is however much more scope for potential low carbon options on wider, more

holistic schemes such as the SVWMS. Given that this study is catchment wide it gives the opportunity to improve flood resilience using low carbon solutions that have much greater positive impacts than the traditional hard engineering solutions. These can take the form of wetland habitat creation or enhancements, upstream flood storage areas or naturalising rivers and watercourses. All of these solutions could improve flood resilience while supporting biodiversity net gain, improving water quality, creating green spaces for local communities and rewilding landscapes. These improvements can be delivered with a fraction of the GHG emissions that would normally be associated with concrete use and construction.

B.9 Air quality

Exposure to air pollution represents one of the most significant environmental threats to health in the UK, with thousands of deaths a year being attributed to long-term exposure. The Office for Health Improvement and Disparities (OHID) identify strong evidence that air pollution causes the development of coronary heart disease, stroke, respiratory disease and lung cancer, and exacerbates asthma⁷².

Progress has been made in improving air quality with reduction in levels of some pollutants over the past 50 years, such as total annual emissions of fine particulate matter (PM_{2.5}) and nitrogen oxides (NO_x). However, more recent health evidence suggests that smaller particles are associated with a wider range of health effects. Particulate matter (PM₁₀ and PM_{2.5}) and nitrogen dioxide (NO₂) remain of particular concern for human health⁷². In addition, ultrafine particles which are less than 100 nanometres across, are subject to increasing focus to understand their role in pollution and health effects⁷³.

The UK Government's Clean Air Strategy⁷⁴ sets out actions to meet targets for several pollutants, including cutting public exposure to particulate matter pollution. The Clean Air Strategy also seeks to tackle the environmental impacts of air pollution.

B.9.1 Air Quality Standards

Air Quality Standards 2010 (amended in 2016)

The Air Quality Standards Regulations 2010 (amended in 2016)⁷⁵ defines the policy framework for 12 air pollutants known to have harmful effects on human health or the natural environment. The Secretary of State for the Environment has the duty of ensuring compliance with the air quality limit values (pollutant concentrations not to be exceeded by a certain date).

⁷² Office for Health Improvement and Disparities (2022). Air pollution: applying All Our Health. [Online]. Available at: <https://www.gov.uk/government/publications/air-pollution-applying-all-our-health/air-pollution-applying-all-our-health>

⁷³ UK Air (2018) Ultrafine Particles (UFP) in the UK. [Online]. Available at: https://uk-air.defra.gov.uk/assets/documents/reports/cat09/1807261113_180703_UFP_Report_FINAL_for_publication.pdf

⁷⁴ UK Government (2019) Clean Air Strategy. [Online]. Available at: <https://www.gov.uk/government/publications/clean-air-strategy-2019>

⁷⁵ The Air Quality Standards (Amendment) Regulations 2016, SI 2016/1184

Some pollutants have standards expressed as annual average concentrations due to the chronic way in which they affect health or the natural environment, i.e. effects occur after a prolonged period of exposure to elevated concentrations. Some pollutants have standards expressed as 24-hour, 1-hour or 15-minute average concentrations due to the acute way in which they affect health or the natural environment, i.e. after a relatively short period of exposure. Several pollutants have standards expressed in terms of both long and short-term concentrations. Air quality limit values and objectives are standards for clean air. Therefore, in this baseline, the term ‘air quality standard’ has been used to refer to the national limit values.

Table B.3 sets out the national air quality standards and targets for NO₂, PM₁₀ and PM_{2.5}, which are the pollutants of relevance to the Upper Severn Catchment.

Table B.3 Air quality standards and targets

| Pollutant | Averaging period | Air quality standard |
|--|------------------|---|
| Nitrogen Dioxide (NO ₂) | Annual mean | 40µg/m ³ |
| | 1-hour mean | 200µg/m ³ ^a |
| Particulate Matter (PM ₁₀) | Annual mean | 40µg/m ³ |
| | 24-hour mean | 50µg/m ³ ^b |
| Fine Particulate Matter (PM _{2.5}) | Annual mean | 20µg/m ³ |
| | | 12µg/m ³ to be achieved by 2028* |
| | | 10µg/m ³ to be achieved by 2040* |
| Notes: | | |
| ^a not to be exceeded more than 18 times a year (99.8 th percentile) | | |
| ^b not to be exceeded more than 35 times a year (90.4 th percentile) | | |
| * The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 updated in 2023, to state that the “the annual mean level of PM _{2.5} in ambient air must be equal to or less than 10 µg/m ³ (“the target level”)” by 31st December 204076. The Environmental Improvement Plan (2023) sets an interim target of 12 µg/m ³ , to be achieved by 31 January 2028. | | |

B.9.2 Local air quality management

The Environment Act 2021⁷⁷ requires local authorities to review and assess air quality with respect to the air quality standards for the pollutants under the Local Air Quality Management (LAQM) framework, as set out in the Environment Act 1995⁷⁸. Local authorities are required to carry out an assessment and produce an Annual Status Report

⁷⁶ Department for Levelling Up, Housing & Communities (2023) Chief Planners Newsletter. [Online]. Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1140170/03_Chief_Planners_Newsletter_March_2023.pdf

⁷⁷ UK Government (2021) Environment Act 2021. [Online]. Available at:

<https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted>

⁷⁸ Environment Act 1995, Chapter 25, Part IV Air Quality

(ASR) of their area every year. Where objectives are not predicted to be met, local authorities must declare the area as Air Quality Management Area (AQMA). In addition, local authorities are required to produce an Air Quality Action Plan (AQAP) that includes measures to improve air quality in the AQMA.

Across the SVWMS there is one AQMA, declared by Shropshire Council (AQMA No.3)⁷⁹. AQMA No.3 (Shropshire Council) is located in Shrewsbury town centre and was declared in 2003 due to exceedances of the annual mean NO₂ objective. The highest NO₂ level to be recorded at a residential receptor within this AQMA was 52µg/m³, well above the air quality standard of 40µg/m³⁸⁰. This was the lowest ever recorded result at this location, therefore the AQMA is still required. The location of the AQMA is shown in Figure B.39.

There are no AQMAs declared in Powys. As Powys is largely a rural county, air quality is generally good⁸¹.

⁷⁹ UK Air (2021) Air Quality Management Areas (AQMAs). [Online]. Available at: <https://uk-air.defra.gov.uk/aqma/list>

⁸⁰ Shropshire Council (2022) Air Quality Annual Status Report. [Online]. Available at: https://www.shropshire.gov.uk/media/24588/sc_asr_2022_v10-final.pdf

⁸¹ Powys County Council (2022). Air Quality Annual Status Report. [Online]. Available at: <https://en.powys.gov.uk/article/7201/Air-Quality>

Air Quality Management Areas

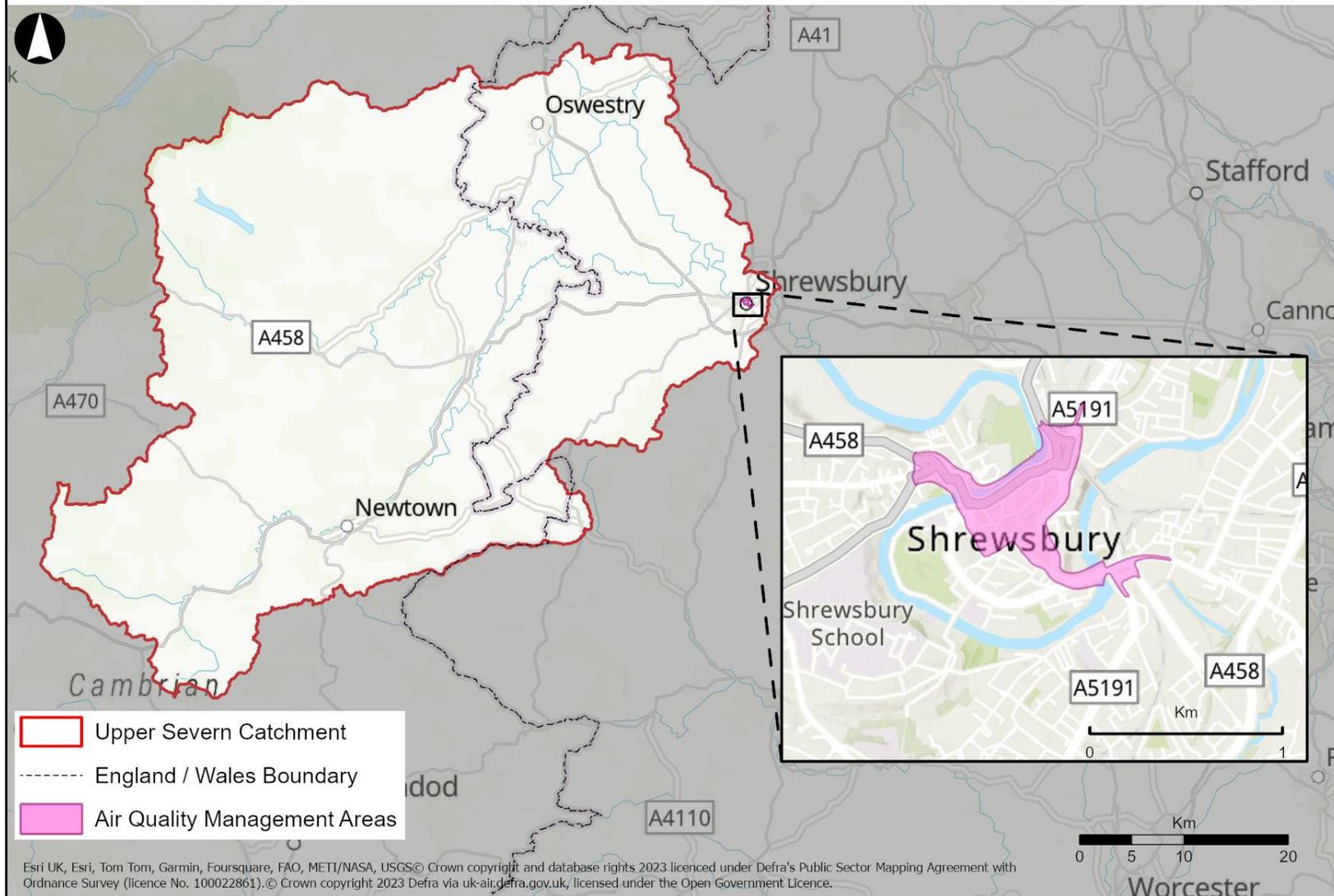


Figure B.39 Air Quality Management Areas in the Upper Severn Catchment

Within urban centres, focus remains on efforts to reduce local road traffic emissions. This includes initiatives such as Shrewsbury's 'Making Movement Better'⁸² project, pledging to encourage sustainable growth in Shrewsbury by reducing traffic and promoting public transport, pedestrian routes and cycling. Measures implemented to reduce through-traffic through the town centre include:

- Giving priority to pedestrians over cars in the town centre;
- Public realm improvements that benefit pedestrians in the town centre; and
- A new strategic cycle route along Town Walls.

B.9.3 Sources of air pollution

Air quality within the Upper Severn Catchment will be influenced by various sources, such as industrial sources (and their regulated and localised impacts), domestic activities (such as heating), traffic and natural sources. The largest contribution of emissions within the Upper Severn Catchment area to air will be vehicle emissions from the surrounding main roads. Major roads within the Upper Severn Catchment area include the A458, A5 and A483. Air quality is generally anticipated to improve in future years across the UK due to policy implementation and electrification of fleet.

Potential operational impacts

Residential development close to major roads already affects the health of those living nearby. The location of future development within the SVWMS can be informed by these existing sensitive routes and other areas where major roads are close to residential areas (for example, the A458 in Welshpool). One of the challenges associated with future development is to balance the requirement for good access to transport infrastructure, while avoiding, creating, or increasing pollution to areas of high pollution. As there is generally good air quality within the Upper Severn Catchment, it is not expected there would be any air quality impacts due to operation associated with the SVWMS.

Potential construction impacts

Impacts on air quality could arise from the construction works associated with the SVWMS caused by the movement of heavy goods vehicles (HGV) and construction activities including construction, earthworks and associated trackout. However, it is anticipated that with effective mitigation there would be significant adverse air quality effects.

Air quality impacts on ecological receptors

Nitrogen is a nutrient that is damaging to ecological habitats, originating from ammonia and nitrogen oxides which are commonly emitted by vehicles. Deposition of these pollutants on natural ecosystems causes nutrient enrichment and changes in vegetation

⁸² Shropshire Council (2019) Making Movement Better. [Online]. Available at: <https://shrewsburybigtownplan.org/projects/making-movement-better/>

and soils⁸³. It is not anticipated that works related to the SVWMS would lead to any significant air quality impacts on ecological receptors.

B.9.4 Historic and likely future trends

Generally, air quality has improved in the last 50 years due to improved regulation, investment in cleaner processes in industry and the use of cleaner fuels. More recently however, PM₁₀ concentrations have stabilised⁸⁴. Poor air quality, particularly PM₁₀, PM_{2.5} and NO₂, remains one of the UK's biggest public health challenges, as well as being detrimental to the natural environment. It is possible that climate change will result in poorer air quality through increased emissions from wildfires, stagnated air accumulating in cities and worsening indoor air quality resulting from increased air conditioning use⁸⁵.

The Clean Air Strategy sets targets for five damaging air pollutants, which if met should halve the effects of air pollution on health by 2030⁸⁶ as well as having considerable benefits on the environment.

Future trends in Wales relating to opportunities for encouraging and improving air quality are improving²¹. This trend is likely to be mirrored in England, with additional local powers granted in the Clean Air Strategy to support the creation of Clean Air Zones and using incentives to reduce ammonia emissions from farming. Pollution from transport emissions is expected to decrease as petrol and diesel vehicles become replaced by electric vehicles. Furthermore, with the current and planned future promotion of active travel and sustainable travel, it is likely that air quality in the Upper Severn Catchment area, particularly in Shrewsbury, will improve.

B.10 Infrastructure and transport

B.10.1 Transport

As the county town of Shropshire, Shrewsbury is well connected to the north and south of England, as well as Wales, as shown in Figure B.40. Outside of the major settlements in the Upper Severn Catchment, there is a vast network of country lanes⁸⁷. However, the sparsely populated rural communities and rugged landscape makes travel, particularly

⁸³ UK Air (2018) Impacts of Vegetation on Urban Air Pollution. [Online]. Available at: https://uk-air.defra.gov.uk/assets/documents/reports/cat09/1807251306_180509_Effects_of_vegetation_on_urban_air_pollution_v12_final.pdf

⁸⁴ UK Air (2019) Air quality statistics in the UK 1987 to 2018. [Online]. Available at: <https://uk-air.defra.gov.uk/news?view=252>

⁸⁵ Department of Health and Social Care (2022) Chief Medical Officer's annual report 2022: air pollution. [Online]. Available at: <https://www.gov.uk/government/publications/chief-medical-officers-annual-report-2022-air-pollution>

⁸⁶ Defra (2023) 25 Year Environment Plan. [Online]. Available at: <https://www.gov.uk/government/publications/25-year-environment-plan/25-year-environment-plan-our-targets-at-a-glance>

⁸⁷ Shropshire Council (2011) Shropshire Local Transport Plan: Provisional LTP Strategy 2011-2026. [Online]. Available at: <https://www.shropshire.gov.uk/media/4132/provisional-ltp-strategy.pdf>

from north to south Powys, challenging⁸⁸. For many, utilising public transport and engaging in active travel is not an option due to inadequate infrastructure and services and this has significant implications for the long-term economic and social sustainability of rural services^{89,90}.

⁸⁸ Powys County Council (2022) Powys Housing Support Programme Strategy 2022-2026. [Online]. Available at: <https://en.powys.gov.uk/article/2646/Housing-Strategies>

⁸⁹ Powys County Council (2023) The Powys Well-being Plan. [Online]. Available at: <https://en.powys.gov.uk/article/5789/The-Powys-Well-being-Plan>

⁹⁰ Shropshire Council (2010) Shropshire Core Strategy. Background Technical Report on: The Sustainability Appraisal Process. [Online]. Available at: <https://www.shropshire.gov.uk/media/8533/core-strategy-sustainability-appraisal.pdf>.

Transport

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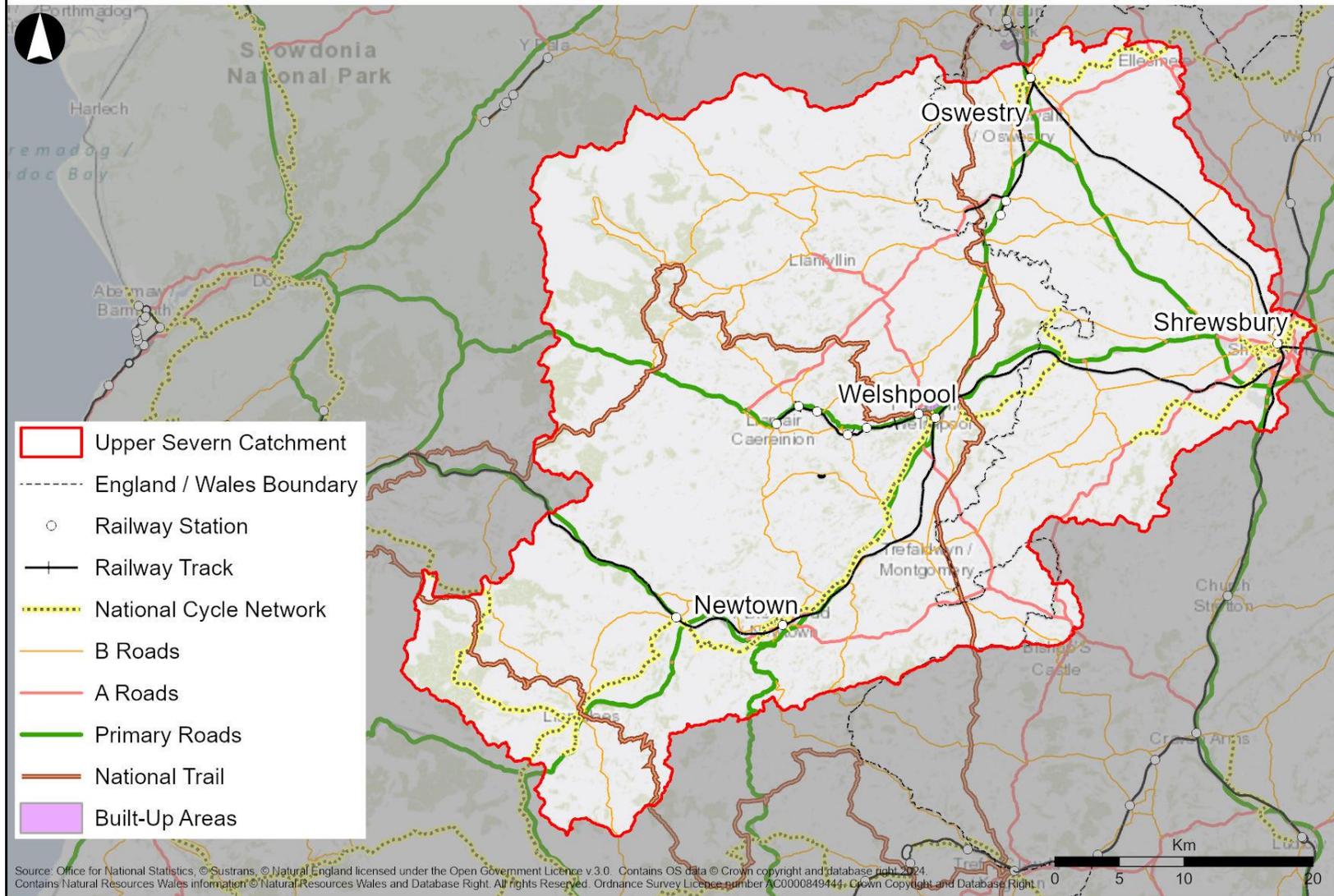


Figure B.40 Key transport links

Poor access to public transport in much of the Upper Severn Catchment has resulted in higher than average levels of car ownership⁹⁰. More than 86% of households own one or more car or van per household, compared to an England and Wales average of 75%⁹¹. Car travel is the preferred mode of transport in the West Midlands, with people taking nearly a quarter more car or van journeys than the England average⁹⁷. However, in Mid Wales, the use of car or van journeys to work is slightly below the Welsh average⁹².

Median commuting time in the Upper Severn Catchment is comparable to the UK average (16.52 minutes in the Upper Severn Catchment, compared to 16.24 minutes nationally)⁹³. Although over four in five Shropshire households are located within 2km of a primary school, almost a third of primary school pupils do not attend their catchment school resulting in significant use of car travel for school journeys⁸⁷. For example, school children in the West Midlands are, on average, travelling twice as far to school as the average child in England and are half as likely to walk⁹⁴.

Distances and time taken to travel to services in Shropshire and Powys are higher than the national average, as shown in Figure B.41 and Figure B.42, particularly when public transport is used.

⁹¹ Office for National Statistics (2021) Number of cars or vans. [Online]. Available at: <https://www.ons.gov.uk/census/maps/choropleth/housing/number-of-cars-or-vans/number-of-cars-5a/no-cars-or-vans-in-household?lad=W06000023>

⁹² Welsh Government (2023) National Survey for Wales: results viewer. [Online]. Available at: <https://www.gov.wales/national-survey-wales-results-viewer>

⁹³ Office for National Statistics (2019) Commuting time by Travel to Work Areas. [Online]. Available at: <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/adhocs/10601commutingtimebytraveltoworkareas>

⁹⁴ Department for Transport (2022) Mode of travel - NTS9908: Trips to and from school by main mode, region and Rural-Urban Classification, England: 2002 to 2003 onwards. [Online]. Available at: <https://www.gov.uk/government/statistical-data-sets/nts03-modal-comparisons#mode-by-region>

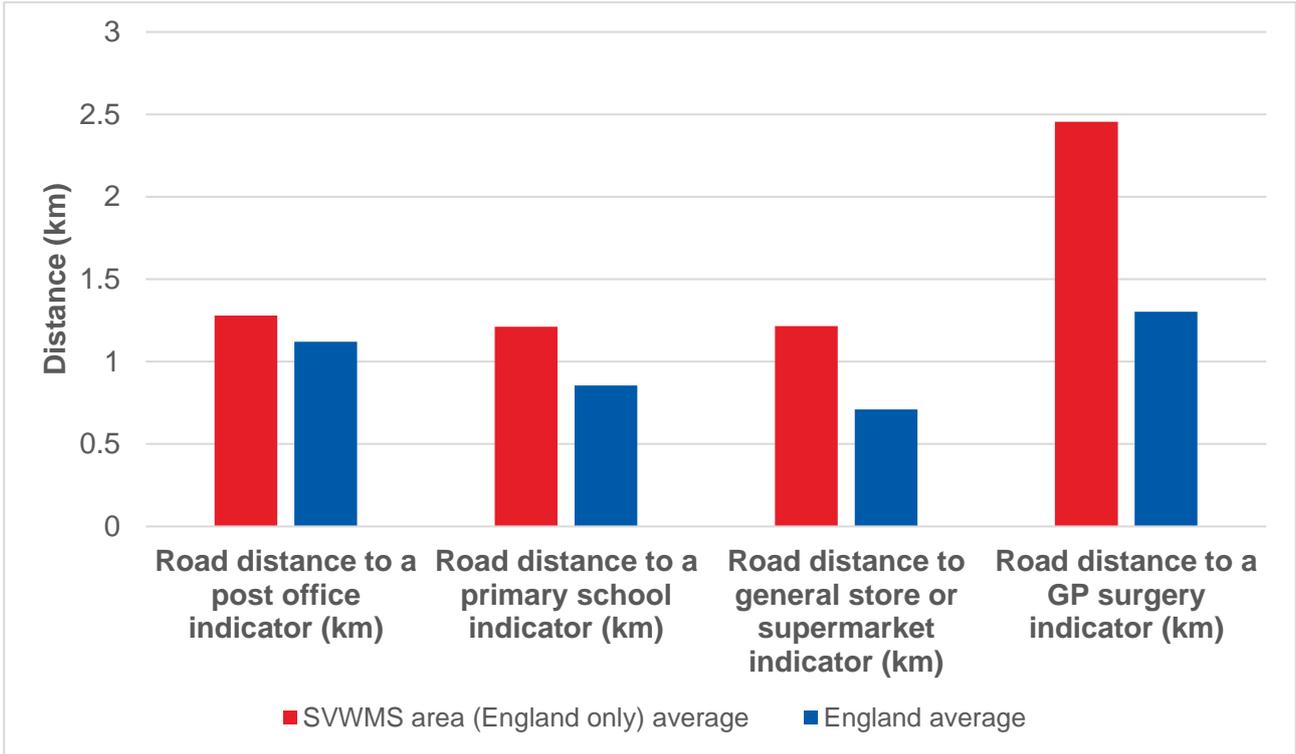


Figure B.41 Distance to key services in Shropshire

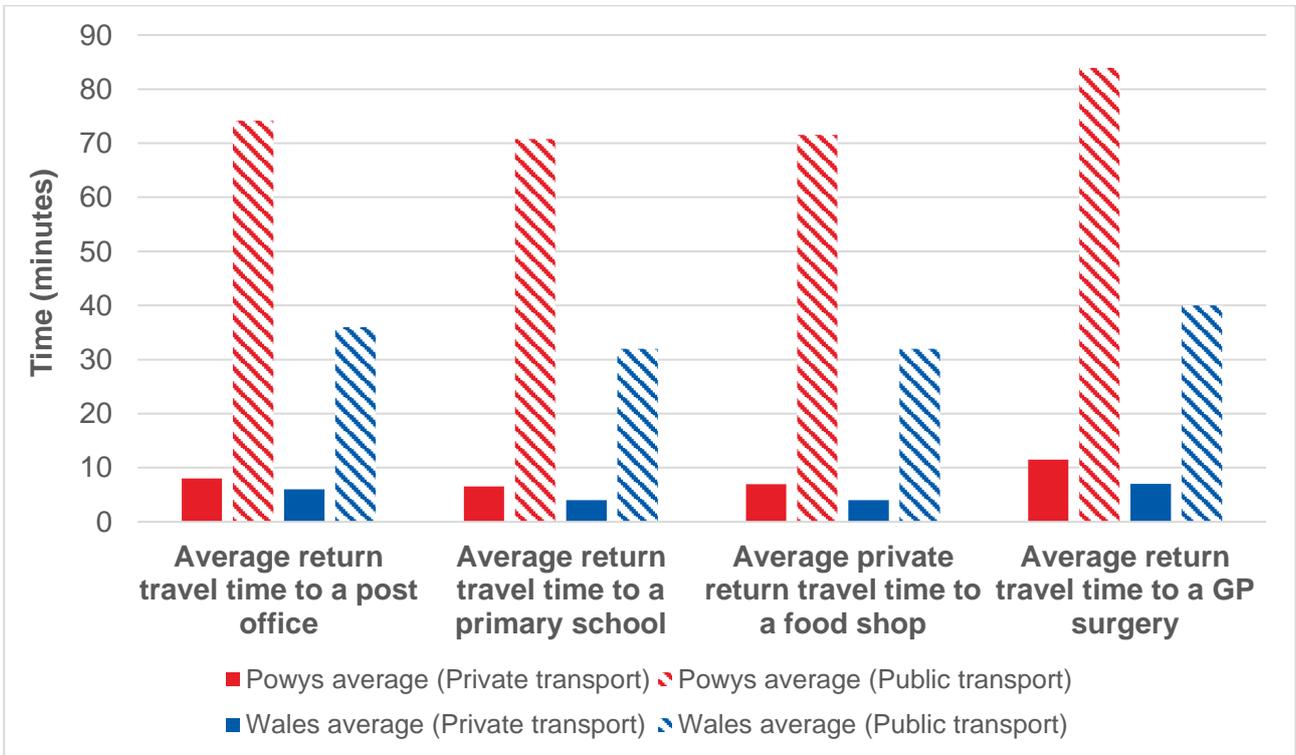


Figure B.42 Time taken to travel to key services in Powys

Road users in Shrewsbury have reported concerns of the condition of some local roads and the availability and cost of car parking⁸⁷. Congestion is not considered to be a

significant problem in Shropshire or Powys, except for a few areas, mostly in and around Shrewsbury⁸⁷ and increased stop-start traffic in Newtown⁹⁵.

Shrewsbury acts as a rail hub, with lines from Aberystwyth, Cardiff, Chester, Crewe, Swansea and Wolverhampton converging at Shrewsbury Station⁸⁷. Three key rail operators; London Midland, Arriva Trains Wales and Virgin Trains run frequent links to Birmingham, Manchester, London, Cardiff, Liverpool, Sheffield, Leicester and beyond⁹⁶. Two mainline railway lines dissect the Upper Severn Catchment; the WSJ2 line which passes through Shrewsbury and Gobowen (serving Oswestry) between Hereford and Chester and the SBA1 line from Shrewsbury westwards towards Aberystwyth⁸⁷. The number of trips taken on local buses and surface rail in Shropshire are comparable with the rest of England excluding London (within +/- 3.8%)⁹⁷.

However, in the sparsely populated rural areas, providing a comprehensive bus service is difficult. Longer distance local bus services are expensive to operate resulting in most local bus services relying on financial support from the Council. Therefore, frequent public transport services are largely limited to key strategic roads and rail routes within the Upper Severn Catchment. A lack of buses to business parks and for those working shifts are a key concern for businesses, and they call for better access to rail, faster rail speeds and increased reliability⁸⁷.

In the National Survey for Wales 2022-23, 42% of Mid-Wales respondents said they were somewhat satisfied with buses services and 37% were satisfied with train services. The main reasons given for not using buses or trains more were “car more convenient / easier” (38%), “Not frequency enough / runs at wrong times for me” (35%) and “Too far to bus stop / train station” (28%)⁹².

The Upper Severn Catchment is well served by Public Rights of Way. The Offa's Dyke Path National Trail passes through the area, entering near Mainstone and traversing approximately 57km before exiting the Upper Severn Catchment near Llawnt. The Glyndwrs Way National Trail, which starts in Knighton and ends Welshpool, also crosses the Upper Severn Catchment. There are five National Cycle Network (NCN) routes within the area; NCN Route 0 (Shrewsbury), Route 8, Route 44, Route 81 and Route 455. The Shropshire Core Strategy reports that the provision of countryside access in the Shropshire Plains area is low compared to those willing to use rights of way⁹⁰. However, the average number of trips taken by walking and cycling in the region is approximately 20% and 47% lower than the England average⁹⁷.

⁹⁵ Powys County Council (2022) Air Quality Progress Report 2022. [Online]. Available at: <https://en.powys.gov.uk/article/7201/Air-Quality>

⁹⁶ Chronotrains (No date) Chronotrains. [Online]. Available at: <https://www.chronotrains.com/en/station/7001957-Shrewsbury/8>

⁹⁷ Department for Transport (2022) Mode of travel - NTS9903: Average number of trips (trip rates) by main mode, region and Rural-Urban Classification, England: 2002 to 2003 onwards. [Online]. Available at: <https://www.gov.uk/government/statistical-data-sets/nts03-modal-comparisons#mode-by-region>

There is one airport in the Upper Severn Catchment: Welshpool Mid Wales Airport offering flying lessons, pleasure flights and hangarage⁹⁸. Outside of the Upper Severn Catchment, Manchester, Liverpool and Birmingham airports can be reached in as little as one hour.

Shropshire has set out a range of planned improvements in The Shropshire Plan, the Future Oswestry Plan and the Strategic Infrastructure and Investment Plan. These include the Local Cycling and Walking Infrastructure Plan which aims to increase walking, cycling, more sustainable transport, air quality improvements and reduce congestion across the county⁹⁹. The 'Making Movement Better' framework is focused on prioritising pedestrian access in Shrewsbury, improving pedestrian and cycle networks and reducing town centre traffic¹⁰⁰. Furthermore, some roads and junctions already running above capacity are set to be improved in Shrewsbury, largely roundabouts on the A5, as well as highway improvements associated with allocated sites. Improvements to the local and strategic road network are planned near Ellesmere and Oswestry to facilitate planned development¹⁰⁰.

Powys Council is currently undertaking two Active Travel schemes. The Welshpool Severn Road Active Travel scheme aims to improve walking and cycling provision and access to the train station¹⁰¹. The Mid Wales Joint Local Transport Plan was jointly prepared with Powys, Ceredigion and Gwynedd in 2015. The plan sets out a number of interventions aiming to improve strategic connections, accessibility to employment and services, encourage walking and cycling and integrate public transport networks¹⁰².

B.10.2 Infrastructure

The Shropshire Draft Housing Strategy (2020-2025)¹⁰³ recognises the high cost of housing in the county and sets out the requirement for around 30,800 houses to be delivered between 2016 and 2038¹⁰⁴. The Council has identified 46 housing sites, predominantly located in Shrewsbury (58.9ha), Oswestry (19.7ha), Whittington (7.6ha) and Baschurch (7.79ha).

⁹⁸ Welshpool Airport (No date) Mid-Wales Airport. [Online]. Available at: <https://www.welshpoolairport.co.uk/>

⁹⁹ Shropshire Council (2022) The Shropshire Plan: 2022 – 2025 – Strategic Plan. [Online]. Available at: <https://www.shropshire.gov.uk/media/25345/shropshire-plan-may-2022.pdf>

¹⁰⁰ Shropshire Council (2022) Shropshire's Strategic Infrastructure and Investment Plan 2022. [Online]. Available at: <https://www.shropshire.gov.uk/media/22805/gc4t-shropshire-strategic-infrastructure-and-investment-plan-2022.pdf>

¹⁰¹ Powys Council (No date) Welshpool Severn Road Active Travel scheme. [Online]. Available at: <https://en.powys.gov.uk/article/11654/Ongoing-Active-Travel-Schemes-and-Developments>

¹⁰² Mid Wales Transportation (2015) Mid Wales Local Transport Plan 2015. [Online]. Available at: <https://www.growingmid.wales/traccpublications>

¹⁰³ Shropshire Council (2020) Shropshire Council Draft Housing Strategy 2020-2025. [Online]. Available at: <https://www.shropshire.gov.uk/media/15532/draft-housing-strategy-jul20.pdf>

¹⁰⁴ Shropshire Council (2022) Regulation 19: Pre-Submission Draft of the Shropshire Local Plan 2016 to 2038. [Online]. Available at: <https://www.shropshire.gov.uk/media/21100/sd002-draft-shropshire-local-plan.pdf>

The Powys Preferred Strategy proposes the provision of 7,700 dwellings, focused through the central growth corridor of Powys¹⁰⁵. Thirteen residential allocation sites are in the towns of Newtown and Llanllwchaiarn (9.99ha), Welshpool (7.44ha), Llanfyllin (6.53ha), Llanfair Caereinion (3.44ha) and Llanidloes (2.66ha), with a further 29 sites (44.5ha) proposed in villages. Figure B.43 outlines the location of development sites across the Upper Severn Catchment.

¹⁰⁵ Shropshire Council (2012) LDP Preferred Strategy March 2012. [Online]. Available at: <https://en.powys.gov.uk/article/5146/Preferred-Strategy>

Local Development

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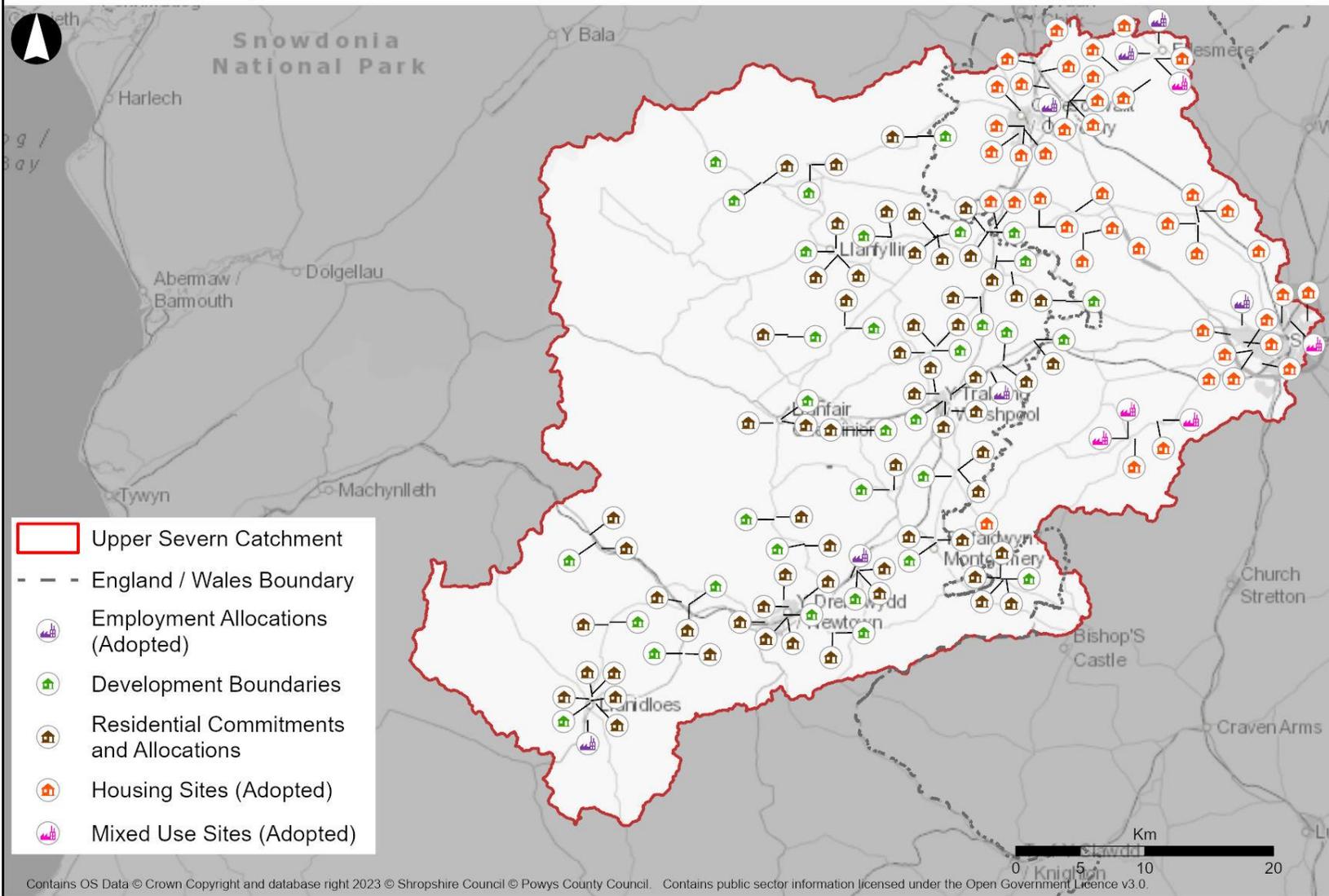


Figure B.43 Local development

Figure B.44 below shows number of permanent dwellings built between 2009-2010 and 2021-2022. Although the annual number of completions has declined in Shropshire since 2016-2017, the completion rate for 2021-2022 remains almost double the national average for a local authority area. Completion rates for all other local authorities in, or adjacent to, the Upper Severn Catchment area are approximately 47-71% lower than the UK average¹⁰⁶.

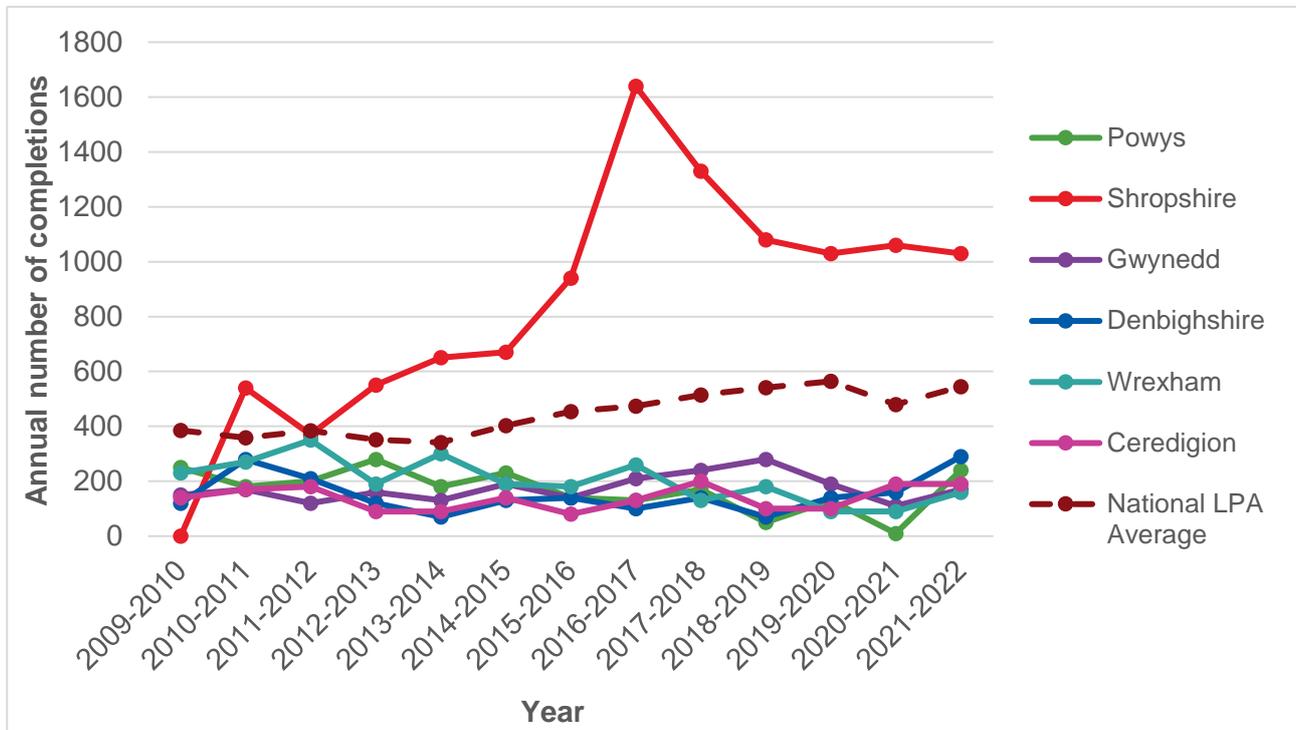


Figure B.44 House building completions by local authority area

The Economic Growth Strategy for Shropshire prioritises investment in strategic locations and growth zones including along the strategic corridors of the A5 West corridor, focused on Oswestry, and central Shropshire, focused on Shrewsbury. A total of around 300ha of proposed employment land is identified in the draft Shropshire Local Plan, with approximately 68ha located within the Upper Severn Catchment. These include sites at Shrewsbury and Ellesmere, and significant developments in Oswestry. The Oswestry Innovation Park, for example, is being promoted as a new commercial development and the Oswestry Sustainable Urban Extension will provide up to 900 new houses, along with open spaces and community facilities¹⁰⁷.

¹⁰⁶ Office for National Statistics (2022) House building, UK: permanent dwellings started and completed by local authority. [Online]. Available at: <https://www.ons.gov.uk/peoplepopulationandcommunity/housing/datasets/housebuildingukpermanentdwellingsstartedandcompletedbylocalauthority>

¹⁰⁷ Shropshire Council (2022) Future Oswestry Plan. [Online]. Available at: <https://www.shropshire.gov.uk/media/24868/future-oswestry-plan-final-draft-report.pdf>

The Powys Local Development Plan 2011-2026 provides 45ha of employment land (equivalent to 3.3ha per annum), of which over half is located within the Upper Severn Catchment¹⁰⁵.

Community and educational facilities and services

There are three art galleries, 13 libraries, five museums, 131 places of worship and 10 sports and leisure centres in the Upper Severn Catchment area. In both the Powys LDP and the Shropshire Local Plan, the provision of community facilities is supported and their importance to the social and physical well-being of communities is recognised.

Also in the Upper Severn Catchment are 97 primary schools, 19 secondary schools, 8 special needs education schools, six further education schools and one university. Land provision for a new school site has been secured at Bowbrook in Shropshire (4ha). The new primary school will accommodate up to 420 pupils and an adjacent New Special School will accommodate 120 pupils¹⁰⁰.

Utilities

Two electricity distribution network operators supply power to properties in the Upper Severn Catchment: Scottish Power Energy Networks and Western Power Distribution¹⁰⁰. Approximately 25km of overhead lines traverse the northeast of the Upper Severn Catchment¹⁰⁸. A number of large-scale power supply infrastructure projects are identified within the Shropshire Strategic Infrastructure and Investment Plan. This include a 132kv reinforcement of North Shropshire (near Oswestry) and eight projects in and around Shrewsbury. Renewable energy projects in Shropshire are to be confirmed following review of the Shropshire Action Plan and Project Pipeline¹⁰⁰. In the Welsh Upper Severn Catchment, twelve sites, totalling almost 6,000ha, are being assessed for their suitability as solar PV sites with a capacity of 5-50MW each⁴.

Two water companies, Severn Trent Water and Dŵr Cymru Welsh Water, predominantly supply water in the SVMWS area. The Severn Trent Water Resource Management Plan (WRMP) forecasts a significant deficit in long term water supply, compared with demand. The Strategic Resource Options identified in the draft WRMP for 2024; the Grand Union Canal transfer, the Severn to Thames Transfer and the Upper Derwent Valley Reservoir Expansion are not located in the Upper Severn Catchment¹⁰⁹. The revised draft WRMP24 for Dŵr Cymru Welsh Water does not identify a deficit for the water resource zones in or around the Upper Severn Catchment¹¹⁰.

In Shropshire, wastewater treatment works (WwTW) in Baschurch and Pant Plas are expected to exceed their discharge consents during the proposed Plan period as no upgrade schemes are currently planned. Severn Trent Water will be required to address

¹⁰⁸ National Grid (No date) Network Route Maps. [Online]. Available at: <https://www.nationalgrid.com/electricity-transmission/network-and-infrastructure/network-route-maps>

¹⁰⁹ Severn Trent Water (2022) Draft Water Resource Management Plan 2024. [Online]. Available at: <https://www.severntrent.com/about-us/our-plans/water-resources-management-plan/>

¹¹⁰ Dŵr Cymru Welsh Water (2022) Revised Draft Water Resources Management Plan 2024. [Online]. Available at: <https://www.dwrcymru.com/en/our-services/water/water-resources/draft-water-resources-management-plan-2024>

these issues¹⁰⁰. The Powys LDP states that some public sewers and sewage treatment works are not operating at capacity which is acting as a constraint to development⁴.

Flood defences

Almost 400km of flood defences, predominately along the River Severn and Rea Brook, protect properties in the SVMWS catchment area from flooding. Over 85% of these assets are located in England and are mostly high ground assets (81.2%). One FCERM Programme 2021-22 programme is located within the Upper Severn Catchment. The Plasnewydd Flood Alleviation Scheme is at Outline Business Case phase and is expected to benefit 13 properties¹¹¹.

The Flood Risk Management Plan for Mid Wales¹¹² identifies that there are six communities located within this the Welsh part of the Upper Severn Catchment that are identified as being most at risk of flooding. These are Caersws, Crewgreen, Guilsfield, Llandrinio, Llanfyllin and Meifod. A series of measures are identified in the Flood Risk Management Plan to help manage flood risk including undertaking updates to hydraulic models for these locations, undertaking initial assessments and feasibility studies and improvements to flood warning services.

The Shropshire Strategic Infrastructure and Investment Plan identifies locations where flood defence projects are in development, but where greater alignment with work undertaken by the River Severn Partnership to unlock finance and enable delivery. These include: Coleham, Coton Manor and Coton Hill, all in Shrewsbury. All three projects in Shrewsbury face challenges such as flooding from multiple sources, the requirement for a holistic approach and issues with historic settings. Additionally, flood risk management infrastructure is proposed in Ellesmere, Gobowen and Whittington to protect 70, 60 and 24 properties, respectively, from surface flooding. There is also surface water flooding in the Morda Valley, with multiple schemes identified in the Oswestry Place Plan area¹⁰⁰.

No important buildings in the Upper Severn Catchment, such as schools, emergency service stations and hospitals, are located within flood zones 2 or 3.

Health infrastructure

There are eight hospitals, two hospices and 12 medical care accommodation facilities in the SVMWS catchment area. Of the hospitals, four are located in Shrewsbury, and one each in Llanidloes, Newtown, Gobowen and Welshpool. Powys has no general hospital so excess to healthcare facilities outside of the county is essential.

As a result of future development proposed in the draft Shropshire Local Plan, the following projects may be required; Baschurch replacement medical centre and Mytton Oak Road medical centre. The Clinical Commissioning Group is also progressing projects for new or improved GP facilities in Shrewsbury¹⁰⁰.

¹¹¹ Welsh Government (No date) Flood & Coastal Erosion Risk Management Programme 2021-22. [Online]. Available at: https://datamap.gov.wales/maps/new?layer=geonode:ferm_programme_21_22#/

¹¹² Natural Resource Wales (2023) Natural Resource Wales Flood Risk Management Plan: Mid Wales Place. Available [Online] at: <https://naturalresources.wales/media/3hwgt4vp/frmp-cycle-2-place-section-mid.pdf>

Data and digital

The “Connecting Shropshire” broadband programme has seen significant investment in improving broadband infrastructure in the county¹¹³. Between 2013 and 2023, the programme resulted in an increase in superfast broadband (>30mbps) coverage from 24% to 98% of premises in the Shropshire Council area¹¹⁴. Shropshire Council aims to provide all premises with access to superfast broadband by 2025⁹⁹ and will continue to work with the UK Government on ‘Project Gigabit’ to deliver gigabit broadband (1,000mbps) to areas that are commercially unviable for broadband infrastructure suppliers without public funding¹¹⁴.

Currently, 79% of households in Powys have access to superfast broadband¹¹⁵. The LDP encourages utility companies to undertake improvements and developments to overhead lines, pipelines and telecommunications necessary to improving broadband coverage⁴.

B.10.3 Historic and likely future trends

Since 1970, average distance travelled per person by private transport has increased by approximately 104% and by approximately 86% by rail. Conversely, average distance travelled by buses and coaches has decreased by 55% over the same period and bicycle distances remained more or less consistent¹¹⁶. The dominant mode of transport in the Upper Severn Catchment area remains private car, largely due to a lack of public transport outside of larger towns.

Through the levelling up agenda, the government has promised improved rural transport¹¹⁷. The Environment Improvement Plan 2023 also sets out a vision for half of all journeys in towns and cities to be cycled or walked by 2030. A number of local transport schemes are underway to improve travel in the Upper Severn Catchment area. These include active travel schemes and plans to prioritise pedestrian areas which has the potential to reduce the number of cars on the road. However, given the rural nature of the catchment and the national long-term trend of increasing car ownership it is likely that travel by car will remain the most commonly used mode of transport. More generally, the trend in connectivity between communities and access to goods and services is declining in Wales²¹.

¹¹³ Invest in Shropshire (No date) Digital Infrastructure. [Online]. Available at: <https://www.investinshropshire.co.uk/why-shropshire/digital-infrastructure/>

¹¹⁴ Shropshire Council (No date) Connecting Shropshire: About the programme. [Online]. Available at: <https://next.shropshire.gov.uk/communities-and-safety/connecting-shropshire/about/>

¹¹⁵ Welsh Government (2019) Indicator Data by Lower Layer Super Output Areas - Access To Services Domain. [Online]. Available at: <https://statswales.gov.wales/Catalogue/Community-Safety-and-Social-Inclusion/Welsh-Index-of-Multiple-Deprivation/WIMD-Indicator-data-2019/indicatordata-by-lowerlayersuperoutputarea-accesstoservicesdomain>

¹¹⁶ Department for Transport (2023) Modal comparisons (TSGB01). [Online]. Available at: <https://www.gov.uk/government/statistical-data-sets/tsqb01-modal-comparisons>

¹¹⁷ Defra (2022) Landscapes review (National Parks and AONBs): government response. [Online]. Available at: <https://www.gov.uk/government/publications/landscapes-review-national-parks-and-aonbs-government-response/landscapes-review-national-parks-and-aonbs-government-response#:~:text=The%20work%20that%20we%20are,country%20for%20their%20natural%20beauty>

Shropshire and Powys both face challenges related to affordable housing and meeting ambitious housing buildings targets for the short to medium term. With the number of affordable housing completions having recently decreased in Shropshire and the increasing trend of single person households, it appears likely that housing affordability issues will continue¹¹⁸. Housing affordability has followed a downward trend in Shropshire over the past 10 years, and the provision of good quality, safe and affordable housing is declining in Wales²¹.

The UK Climate Change Risk Assessment 2022 assesses the risk of climate change to infrastructure and transport networks and public water supplies as medium to very high⁶⁶.

B.11 Resources and waste

B.11.1 Minerals

Shropshire Council and Powys County Council are the Mineral Planning Authorities that are responsible for resources within the English and Welsh areas of the Upper Severn Catchment, respectively. As Mineral Planning Authorities the councils must ensure that sufficient supplies of these minerals are maintained to industry, whilst also ensuring that the environment is protected. There are 30 mineral sites located within the English part of the Upper Severn Catchment, the majority of which are related to sand and gravel or roadstone extraction. Some of the larger mineral sites are located near the border around Porth Y Waen and immediately south of Shrewsbury. Within the Welsh part of the Upper Severn Catchment, there are a further seven permitted mineral working areas primarily consisting of sandstone and igneous minerals¹¹⁹. These are located around Criggon and Middleton to the east, Pencraig and Llangynog in the north and Rhyd in the west. The location of the mineral sites within the Upper Severn Catchment are shown on Figure B.45.

¹¹⁸ Shropshire Council (2014) Shropshire Sites Allocation and Management of Development (SAMDev) Plan: Sustainability Appraisal Report. [Online]. Available at: <https://www.shropshire.gov.uk/media/1023/sustainability-appraisal-report.pdf>

¹¹⁹ South Wales Regional Aggregates Working Party (2023) Annual Report for 2020. [Online]. Available at: <http://www.swrawp-wales.org.uk/Html/SWRAWP%20Annual%20Report%202020%20Final.pdf>

Minerals

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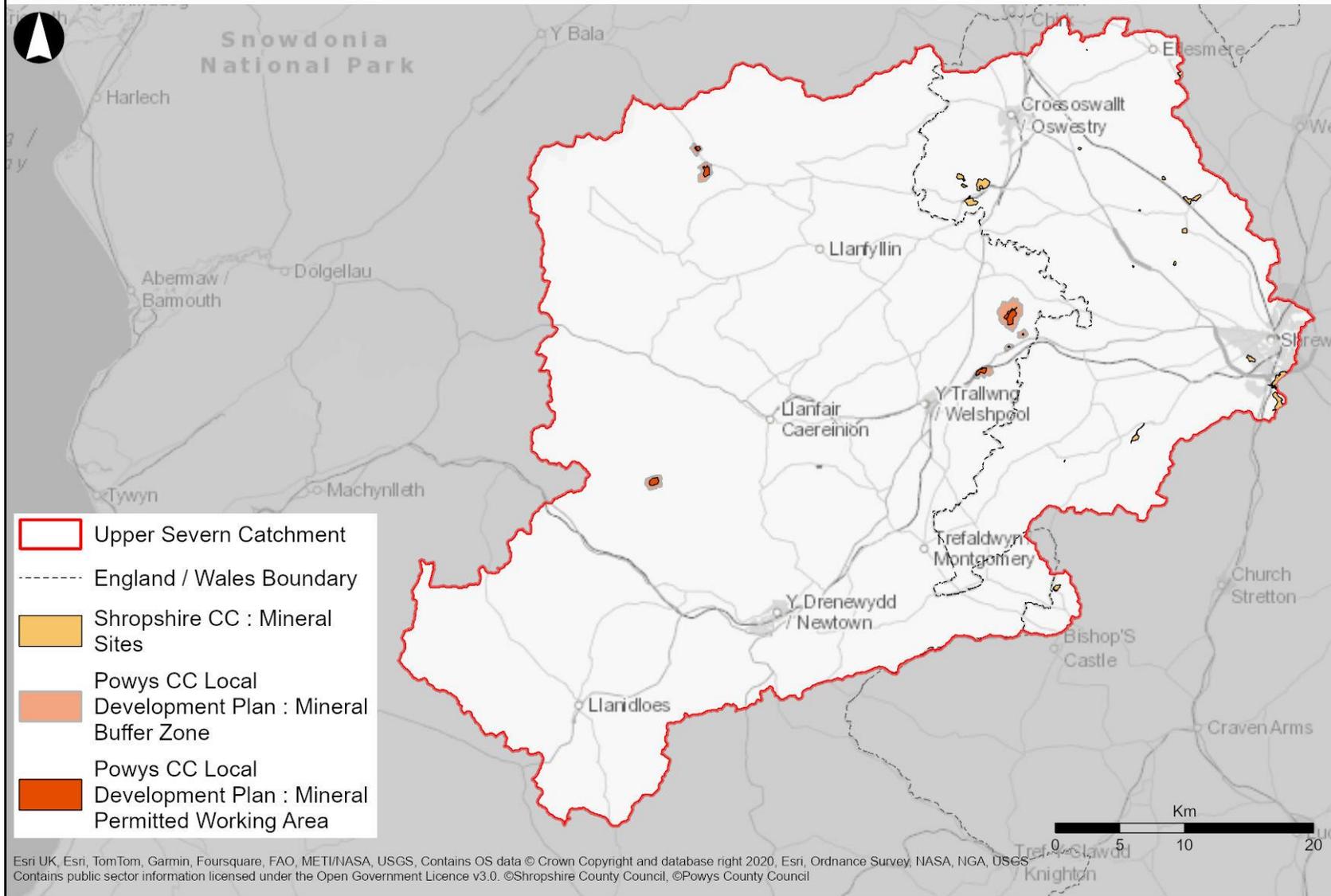


Figure B.45 Locations of mineral sites

Each year around four million tonnes of aggregate is sold by mineral areas in Shropshire, Telford & Wrekin.¹²⁰ The majority of sales in this area relate to crush rock, with the Shropshire, Telford & Wrekin area being the largest seller of crushed rock across the mineral planning authorities within the West Midlands. In Powys (including the Brecon Beacons) approximately 3 million tonnes of primary aggregates are sold annually, all of which is crushed rock. Sales in Powys and Shropshire have increased since 2018. In Powys sales of aggregates were up 30,000 tonnes in 2020 compared to 2019¹¹⁹ and in Shropshire, Telford and Wrekin sales were up 1.1 million tonnes since 2020.

B.11.2 Waste

There are 64 licenced waste sites across the Upper Severn Catchment area that are authorised to treat, keep or dispose of waste and are all located within the Welsh part of the Upper Severn Catchment¹²¹. Of these sites, 60 are currently operational. There are also 129 historic waste sites located across the Upper Severn Catchment, with the majority located within England^{122,123}. There are nine closed or abandoned mine waste facilities located across the Upper Severn Catchment area, split across Shropshire and Powys. All of these are metalliferous facilities that have been closed due to water pollution¹²⁴.

Every year Shropshire Council and Powys Council collect 80,000 tonnes and 65,000 tonnes of waste, respectively^{125,126}. Energy is recovered from residual, non-recyclable waste at the Energy Recovery Facility in Battlefield, Shrewsbury, located just to the east of the Upper Severn Catchment area. Energy generated by the facility is sufficient to power 10,000 homes via the National Grid and the resulting ash is recycled to use as an aggregate in the construction industry. Recycling rates in Powys and Shropshire area

¹²⁰ West Midlands Aggregates Working Party (2022) Annual Monitoring Report 2021[Including data from 2019 and 2020]. [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1142512/2019_2020_-_WMAWP_Report_Jul_2022_.pdf

¹²¹ Natural Resource Wales (2023) Environmental Permitting Regulations – Waste Sites. [Online]. Available at: https://datamap.gov.wales/layers/geonode:nrw_waste_permits

¹²² Environment Agency (2023) Historic Landfill Sites. [Online]. Available at: <https://www.data.gov.uk/dataset/17edf94f-6de3-4034-b66b-004ebd0dd010/historic-landfill-sites>

¹²³ Natural Resource Wales (2017) Historic Landfill Sites. [Online]. Available at: https://datamap.gov.wales/layers/inspire-nrw:NRW_Historic_Landfill_Sites

¹²⁴ Natural Resource Wales (2017) Inventory of Closed Mining Waste Facilities. [Online]. Available at: https://datamap.gov.wales/layers/inspire-nrw:NRW_MINING_WASTE_CLOSED_SITES

¹²⁵ Shropshire Council (2020) The Wonderful World of Waste! [Online]. Available at: <https://www.shropshire.gov.uk/media/16652/wonderful-world-of-waste-blog-021220.pdf>

¹²⁶ Welsh Government (2023) Annual waste generated (tonnes) by source. [Online]. Available at: <https://statswales.gov.wales/Catalogue/Environment-and-Countryside/Waste-Management/Local-Authority-Municipal-Waste/annualwastegenerated-by-source-year>

above national averages at 66.8%¹²⁷ and 52%¹²⁸. National averages for Wales and England are 65.2% and 44.1%¹²⁹, respectively. Welsh government have a target to 70% of recycle, reuse or compost 70% of waste by 2025 and a 'zero waste' 100% recycling target for 2050¹³⁰. England has a target of recycling 55% of waste by 2025, increasing to 65% by 2035.

B.11.3 Historic and likely future trends

The use of landfills as a disposal method is expected to decrease over time to meet targets such as the Welsh Government's ambition to recycle, reuse or compost 70% of waste by 2025 and the UK Governments ambition of zero avoidable waste by 2050.

In recent years, sales of minerals in Shropshire and Powys have increased. The Shropshire Local Aggregates Assessment 2016-2017 predicts declining productive capacity in the short-medium term.

B.11.4 Opportunities

The SVWMS will involve the construction of different types of interventions. There is opportunity to use local materials during construction to help reduce the need to import materials from elsewhere and support the local economy. The SVWMS should also aim to implement a circular economy approach, including reducing waste and emissions through reusing assets. The SVWMS has the potential to help improve water quality within the Upper Severn Catchment. This could include locating interventions that can filter and remove pollutants where historic and active landfill and mineral sites are located to reduce contaminants entering waterbodies. Measures could also benefit minerals and waste sites through reduce flood risk associated with fluvial and surface water flooding. Historic mineral workings located in flood risk areas could also be restored and used to help increase flood water storage and enhance the natural environment¹³¹.

¹²⁷ Welsh Government (2023) Annual reuse/recycling/composting rates by local authority. [Online]. Available at: <https://statswales.gov.wales/Catalogue/Environment-and-Countryside/Waste-Management/Local-Authority-Municipal-Waste/annualreuserecyclingcompostingrates-by-localauthority-year>

¹²⁸ Shropshire, What happens to my recycling? [Online]. Available at: <https://www.shropshire.gov.uk/recycling-and-rubbish/what-happens-to-my-recycling/#:~:text=In%202021%2D22%20Shropshire%20Council,your%20continued%20commitment%20to%20recycling>

¹²⁹ Department for Environment Food & Rural Affairs (2023) National statistics Local authority collected waste management - annual results 2021/22. [Online]. Available at: <https://www.gov.uk/government/statistics/local-authority-collected-waste-management-annual-results-202122/local-authority-collected-waste-management-annual-results-202122#:~:text=England%20Waste%20from%20Households%3A%202021,44.0%20per%20cent%20in%202020>

¹³⁰ Welsh Government (2021) Beyond recycling. [Online]. Available at: <https://www.gov.wales/beyond-recycling>

¹³¹ Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (2020) Flood risk and coastal change. [Online] Available at: <https://www.gov.uk/guidance/flood-risk-and-coastal-change>

B.12 Economy

B.12.1 Employment

Within the Upper Severn Catchment area, approximately 57.8% of the adult population are economically active, this is similar to, but slightly less than the England and Wales average of 58.3%. Of those that are economically inactive, the majority (67.2%) are retired. The proportion of residents retired in the area is more than 10% greater than the England and Wales average and the proportion of students within the area is 5% less than average¹.

Unemployment rates across the Upper Severn Catchment area are relatively low at 3.7%, this is over 1% less than the England and Wales average. Areas with the lowest employment rates within the Upper Severn Catchment are found within or near to the larger urban areas of Shrewsbury, Newtown and Welshpool. The proportion of people claiming job seekers allowance or out of work universal credit benefits within the Upper Severn Catchment is relatively low at 2.3%, compared to 3.7% for England and Wales¹³². In Powys, the Newtown locality accounts the highest proportion of claimants, followed by the Llandrindod and Rhayader locality, and the Welshpool and Montgomery locality¹³³.

Employment is largely concentrated in Shrewsbury (for Shropshire) and Newtown (for Powys). As illustrated on Figure B.46 below, the main employment industries in the Upper Severn Catchment area are health and social work, wholesale and retail, education, construction and manufacturing. The Upper Severn Catchment area also has a much greater proportion of people employed in agriculture, forestry and fishing (5.4%) than the England and Wales average (0.9%)¹. In comparison to the England and Wales proportion, the Upper Severn Catchment area has a greater proportion of the population working in skilled trade occupations and fewer people working in professional occupations and associated professional and technical occupations¹. There is an under-representation of private sector services such as finance and insurance and professional, scientific and technical activities. The mix of sectors contributes to comparatively low workplace wages and to low levels of productivity (Gross Value Added (GVA) generation). Earnings in Shropshire and Powys are also lower than average. In Powys earnings are at a rate of £13.84 an hour compared to an average of £16.37 for Great Britain^{134,135}.

The Upper Severn Catchment area has a higher-than-average proportion of the population that are self-employed (12%). Of the enterprises located in Shropshire and Powys, the majority (over 90%) are micro enterprises (<10 employees) and the area has fewer small to large scale enterprises than the national and regional averages^{134,135}.

¹³² Office for National Statistics (2023) CC01 Regional labour market: Claimant Count by unitary and local authority (experimental). [Online]. Available at: <https://www.ons.gov.uk/employmentandlabourmarket/peoplenotinwork/unemployment/datasets/claimantcountbyunitaryandlocalauthorityexperimental>

¹³³ Powys Public Service Board (2022) Well-being Assessment. [Online]. Available at: <https://en.powys.gov.uk/article/5794/Full-Well-being-assessment-analysis>

¹³⁴ Office for National Statistics (2023) Labour Market Profile – Shropshire. [Online]. Available at: <https://www.nomisweb.co.uk/reports/lmp/la/1946157170/report.aspx?town=Shropshire#tabempunemp>

¹³⁵ Office for National Statistics (2023) Labour Market Profile – Powys. [Online]. Available at: <https://www.nomisweb.co.uk/reports/lmp/la/1946157389/report.aspx#tabempunemp>

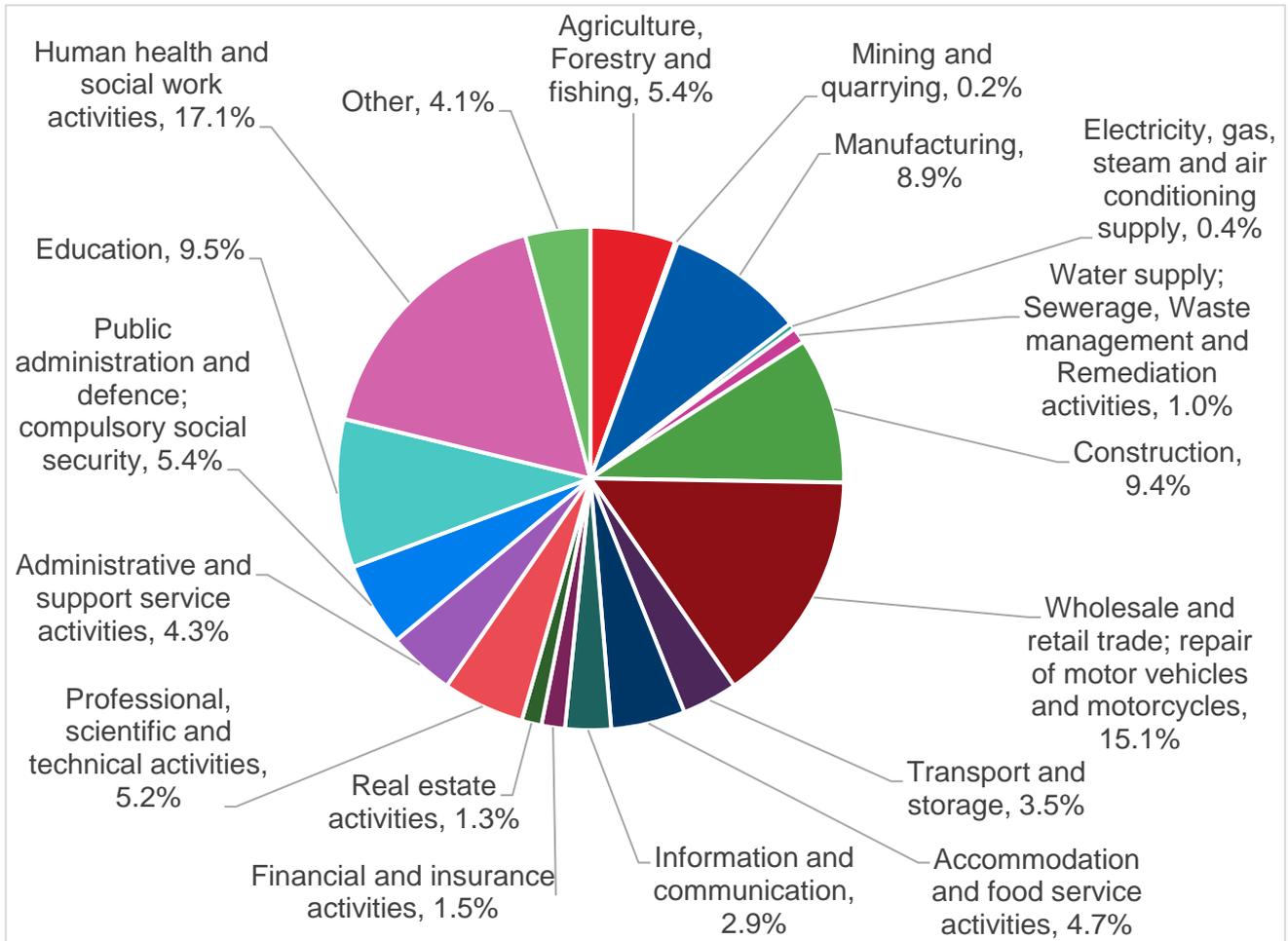


Figure B.46 Upper Severn Catchment area employment by industry

B.12.2 Education

The population of the Upper Severn Catchment area hold educational qualifications to a similar level as the England and Wales average and have a lower proportion of residents that hold no qualifications (16.8%) than average (18.2%). At least 50% of the population hold two or more A levels (or the equivalent)¹, however a lower than average proportion hold qualifications to degree level (or equivalent). The Upper Severn Catchment area also has a higher proportion of apprentices (6.2%) than average (9.6%) which may be reflective of the higher proportion of people in the Upper Severn Catchment employed in skilled trade occupations.

B.12.3 Gross value added

GVA per head over the past 10 years is shown on Figure B.47 below. In Shropshire GVA has increased by 24.9% since 2012 and in 2021, GVA per head was £20,667. This is however less than the West Midlands average (£24,530) and significantly less than UK average (£30,443). Powys has seen an increase in GVA of 20.7% since 2021, however it has the 14th lowest GVA per head of all areas of the UK (£17,296 or 56.8% of UK average in 2021). This is anticipated to be related to residents of Powys working longer hours on average as a result of high proportions of people working in the agricultural sector¹³³. In

2021, Agriculture, forestry, fishing, mining and quarrying contributed 5.4% and 6.9% to the total GVA of Shropshire and Powys, respectively¹³⁶.

By 2027 Shropshire aim to close the GVA and wage gap to national average by at least 50%¹³⁷. During the period 2018-2040 the Mid Wales economy is forecasted to decline 3.45% (reduction of 3,352 jobs), whilst the wider Welsh economy is anticipated to grow by 1.7% during this period¹³⁸. The number of jobs within Shropshire was estimated to be approximately 133,000 in 2020 and the council have plans to increase this by 5,000+ by 2027¹³⁷.

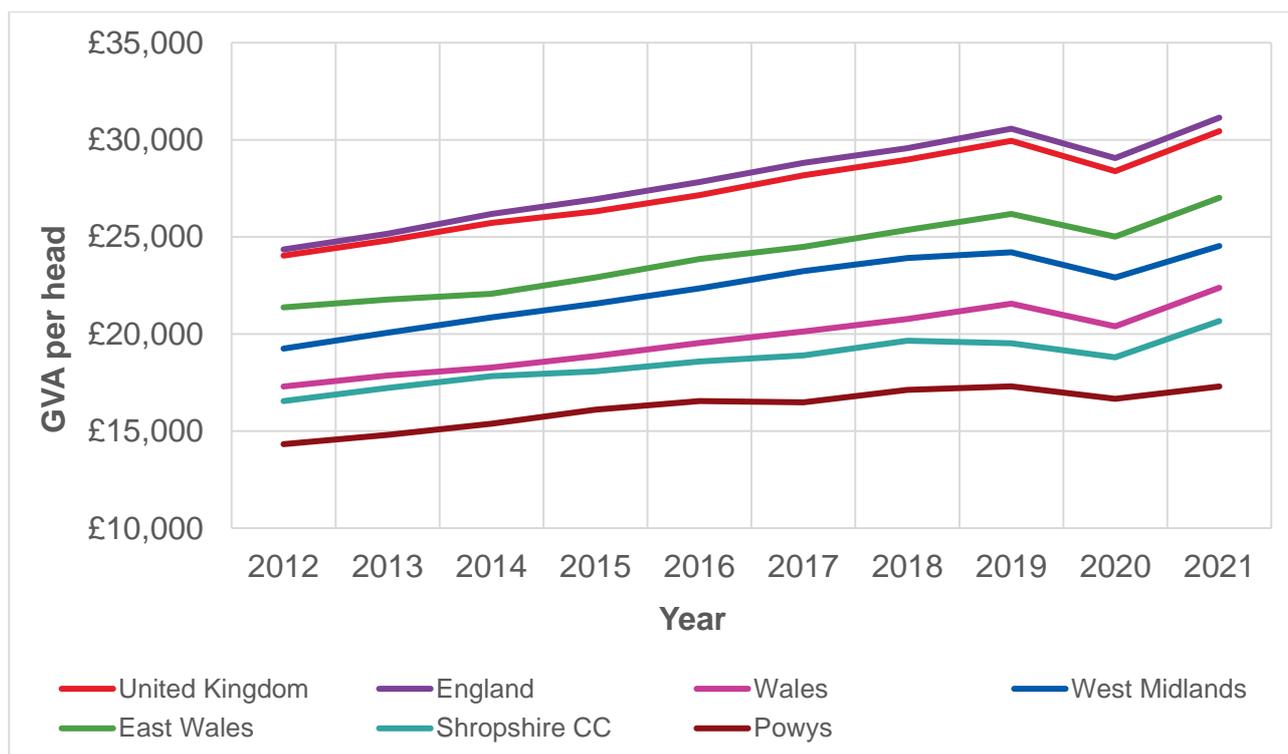


Figure B.47 GVA per head of population

B.12.4 Housing

Median house prices in Powys and Shropshire at the end of 2022 were £240,000 and £260,000, respectively, which is less than the England and Wales average (£280,000) but

¹³⁶ Office for National Statistics (2023) Regional gross value added (balanced) by industry: all ITL regions. [Online]. Available at: <https://www.ons.gov.uk/economy/grossvalueaddedgva/datasets/nominalandrealregionalgrossvalueaddedbalancedbyindustry>

¹³⁷ Economic Taskforce Invest In Shropshire (2022) Shropshire's Economic Growth Strategy 2022 – 2027. [Online]. Available at: <https://www.shropshire.gov.uk/business-support/shropshire-s-economic-growth-strategy-2022-2027/#:~:text=Collectively%20with%20our%20partners%2C%20stakeholders,growth%20and%20prosperity%20of%20Shropshire>

¹³⁸ Ceredigion County Council and Powys County Council (2022) Mid Wales Regional Investment Plan, UK Shared Prosperity Fund 2022-25. [Online]. Available at: <https://en.powys.gov.uk/article/13431/Mid-Wales-Regional-Investment-Plan>

higher than the regional averages for Wales and the West Midlands¹³⁹. Housing affordability estimates are calculated by dividing house prices by annual earnings to create a ratio. The housing affordability ratios for Shropshire and Powys are 8.0 and 7.9, respectively, which is better than the average for England (8.3) but worse than the average for Wales (6.2). In Powys, housing affordability has remained at similar level to 2021 and levels seen 10 years ago. In Shropshire, housing affordability has improved over the past year, but has gotten worse over the past 10 years¹⁴⁰. Less than 20% of households can afford to purchase a property of median value in Shropshire and a combination of high house prices and a low wage economy makes housing unaffordable to a significant proportion of Powys' households^{141,142}.

B.12.5 Tourism

Tourism is a key economic sector in Powys and further tourism development has the potential to support local communities and rural holdings both in economic and social terms¹⁴¹. In 2019, Powys saw 3-million-day visitors and had 960,000 paying visitor nights, with 12.1 million visitors spending £1.012 billion in Powys through the year¹⁴³. It is acknowledged that the COVID-19 pandemic may have reduced these numbers and that some of the major tourist attractions in Powys are located outside the Upper Severn Catchment area, such as the Bannau Brycheiniog (Brecon Beacons) National Park. Shropshire also sees total visitor trip numbers 12.7 million, of which 850,000 are staying trips and 11.8 million are day visits and approximately £400 million a year is spent on goods and services in market towns and rural areas across Shropshire¹⁴⁴.

B.12.6 Flood damage

There is a long history of flooding along the River Severn and communities along its length continue to suffer the impacts of prolonged inundation. Many homes, businesses and critical infrastructure in both England and Wales were once again hit by severe flooding following consecutive Storms; Dudley, Eunice and Franklin in February 2022. The floods that occurred in the winter of 2019/20 resulted in approximately 1600 homes across the River Severn catchment being flooded, causing significant damage and creating a lasting

¹³⁹ Office for National Statistics (2023) Median house prices for administrative geographies: HPSSA dataset 9. [Online]. Available at: <https://www.ons.gov.uk/peoplepopulationandcommunity/housing/datasets/medianhousepriceforationalandsubnationalgeographiesquarterlyrollingyearhpssadataset09>

¹⁴⁰ Office for National Statistics (2023) Housing affordability in England and Wales: 2022. [Online]. Available at: <https://www.ons.gov.uk/peoplepopulationandcommunity/housing/bulletins/housingaffordabilityinenglandandwales/2022>

¹⁴¹ Powys County Council (2018) Powys Local Development Plan 2011-2026, Written Statement. [Online]. Available at: <https://en.powys.gov.uk/article/4898/Adopted-LDP-2011---2026>

¹⁴² Powys County Council (2019) Vision 2025, Our Corporate Improvement Plan 2018-2023. [Online]. Available at: <https://powys.moderngov.co.uk/mgConvert2PDF.aspx?ID=26008>

¹⁴³ Powys Public Service Board (2021) Well-being Assessment. [Online]. Available at: <https://en.powys.gov.uk/article/5794/Full-Well-being-assessment-analysis>

¹⁴⁴ Invest In Shropshire (no date) Visitor Economy. [Online]. Available at: <https://www.investinshropshire.co.uk/relocating-and-investing/sectors/visitor-economy/>

impact on the local economy¹⁴⁵. Within the Upper Severn Catchment area, widespread flooding has been noted in recent years in Shrewsbury, Welshpool and Newtown that has caused significant damage to properties and infrastructure. The estimated economic cost of damages associated with flooding in the Upper Severn Catchment is over £1,137 million¹⁴⁶. Flooding also impacts the agricultural industry upon which many people in the Upper Severn Catchment are employed by, with approximately 10% of agricultural land within the Upper Severn Catchment being at risk of flooding.

B.12.7 Historic and likely future trends

Both Shropshire and Powys have seen a recent increase in GVA, although they remain significantly below the national averages. For those working in the rural economy in the Upper Severn Catchment area, there is the potential for negative impacts on the forestry and agricultural sectors as a result of changing climatic conditions, as well as a very high risk of flooding to business sites⁶⁶. However, opportunities in Wales for an increase in employment and sustainable economic growth are improving²¹ and Shropshire Council plans to “boost productivity, pay, jobs and living standards” by creating jobs, improving digital connectivity and developing a sustainable tourism sector¹³⁸.

B.12.8 Opportunities

The SVWMS has the potential to support the economy of the immediate Upper Severn Catchment and communities downstream through reducing damages and losses associated with flood risk, including to homes, businesses, infrastructure and agriculture. By reducing flood risk, it can support the expansion of development in Powys and Shropshire, increasing land available for provision of new housing and businesses, providing new employment opportunities. The SVWMS can also help the area become more resilient to the current and future impacts of drought, which can also impact the success of industries in the catchment, particularly the agricultural sector. Wider benefits such as improvements to water quality, biodiversity and access to nature can also help increase the attractiveness of the catchment as a destination for visitors.

¹⁴⁵ Environment Agency (2020) Severn Valley Water Management Scheme. [Online] Available at: <https://consult.environment-agency.gov.uk/west-midlands/svwms/>

¹⁴⁶ Arup (2023) Seven Valley Water Management Scheme, Strategic Study: Strategic Study and Economic Case.