Environmental Character Area Profile for the Minerals Local Plan: 21. River Teme corridor

1. Introduction

1.1. Minerals development usually takes place on previously undeveloped land and can therefore result in permanent change to the natural environment and green spaces in Worcestershire. The impacts of both the working and the restoration of mineral sites need to be considered in detail in the development of the Worcestershire Minerals Local Plan (the MLP).

1.2. The Council will take a 'green infrastructure' (GI) approach to considering these impacts. The GI approach is a different way of thinking about the green spaces in Worcestershire. It moves beyond solely considering the environmental benefits of green spaces and integrates the consideration of economic, health and social benefits in the planning and management of green spaces. Rather than considering each green space in isolation it looks at the ways in which individual sites and corridors of green space collectively form the distinctive character of Worcestershire that attracts both visitors and business to the County.

1.3. The components of GI include biodiversity, landscape, historic environment, access and recreation and water (also know as blue infrastructure). The GI approach requires thinking about the environment as an integrated system of stepping stones or nodes in a wider network[1].

Green infrastructure and mineral workings and restoration

1.4. There is significant potential for mineral workings to destroy existing networks of green infrastructure if the nature and character of these networks is not taken into account. However there is also significant potential to contribute positively to green infrastructure through the restoration of mineral workings.

1.5. The GI approach extends beyond thinking about designated sites of biodiversity or historic interest. This means that the impact of a mineral working on the wider environment and the integrated system of stepping stones or nodes in a wider network[2] will need to be considered.

Environmental Character Areas[3] and the Minerals Local Plan

1.6. The Worcestershire Green Infrastructure Partnership has undertaken an analysis of the landscape character, biodiversity and the historic environment of Worcestershire to identify 30 distinct GI Environmental Character Areas (ECAs). Details about how these were developed is set out in *Planning for a Multifunctional Green Infrastructure Framework in*

[1] Green Infrastructure Guidance – Natural England.
[2] Green Infrastructure Guidance – Natural England.
[3] Worcestershire County Council (July 2012) *Planning for a Multifunctional Green Infrastructure Framework in Worcestershire: Green Infrastructure Framework 2*

Worcestershire: Green Infrastructure Framework 2 (2012) available at www.worcestershire.gov.uk/GI

1.7. These underlie the distinctive character of Worcestershire and it is the Council's intention that the unique characteristics of each area will drive the restoration strategy for the Minerals Local Plan.

1.8. This is one of 30 profile documents which set out the characteristics and priorities for the each ECA. It sets out the mineral resources in the ECA and the GI priorities identified by the Worcestershire GI Partnership. These priorities are structured around biodiversity, historic environment, landscape character, water environment (also known as blue infrastructure) access and recreation and transport. The document is also supplemented by other locally relevant information as appropriate.

1.9. This information will be used to develop the spatial strategy and restoration priorities for each ECA.

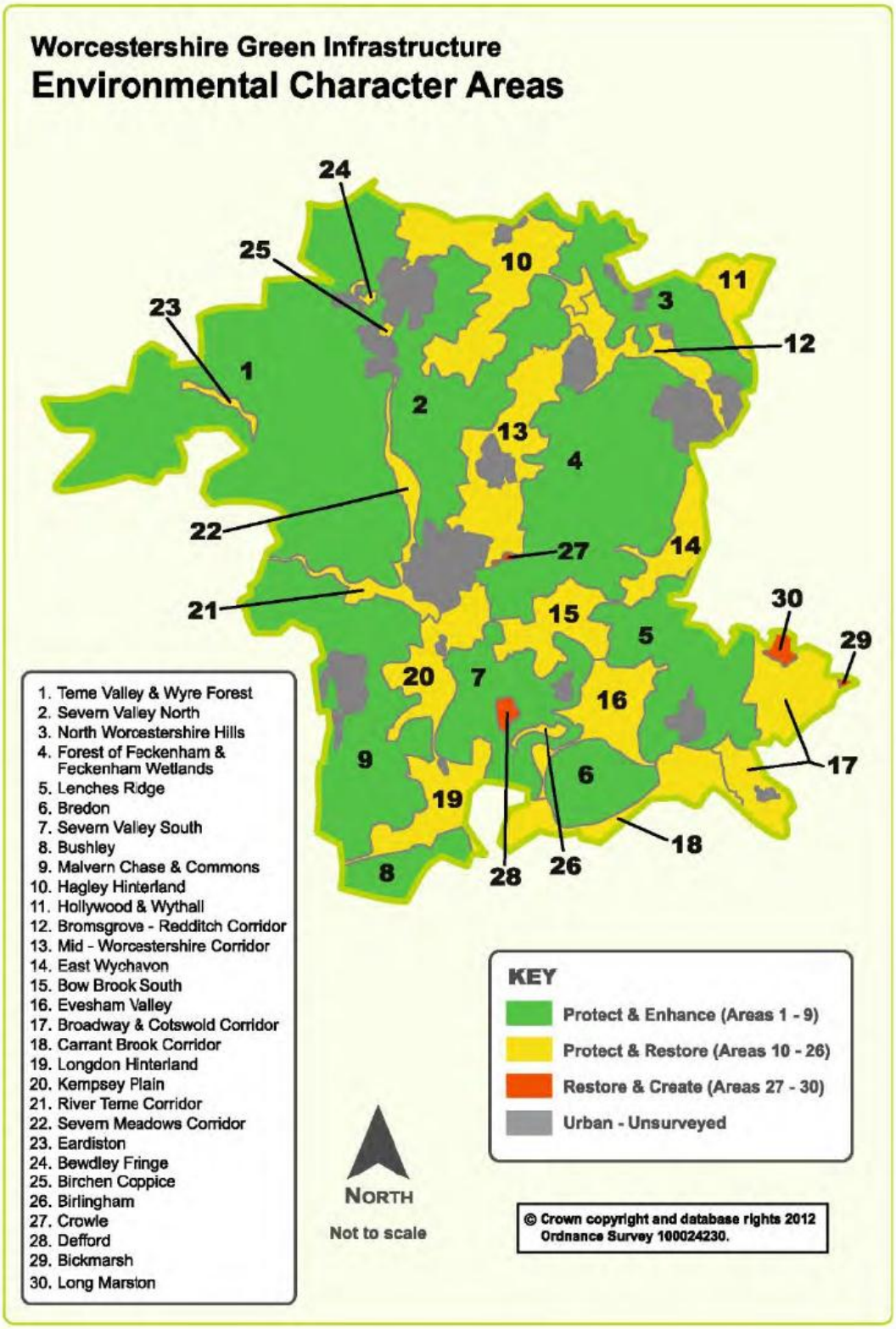
1.10. Profiles for each of the following ECAs are available on our website www.worcestershire.gov.uk/mineralsbackground:

1.11. The Environmental Character Areas are:

1. Teme Valley & Wyre Forest
2. Severn Valley North
3. North Worcestershire Hills
4. Forest of Feckenham & Feckenham Wetlands
5. Lenches Ridge
6. Bredon
7. Severn Valley South
8. Bushley
9. Malvern Chase and Commons
10. Hagley Hinterland
11. Hollywood & Wythall
12. Bromsgrove – Redditch Corridor
13. Mid-Worcestershire Corridor
14. East Wychavon
15. Bow Brook South
16. Evesham Valley
17. Broadway & Cotswold Corridor
18. Carrant Brook Corridor
19. Longdon Hinterland
20. Kempsey Plain
21. River Teme Corridor
22. Severn Meadows Corridor
23. Eardiston
24. Bewdley Fringe
25. Birchen Coppice
26. Birlingham
27. Crowle
28. Defford
29. Bickmarsh
30. Long Marston

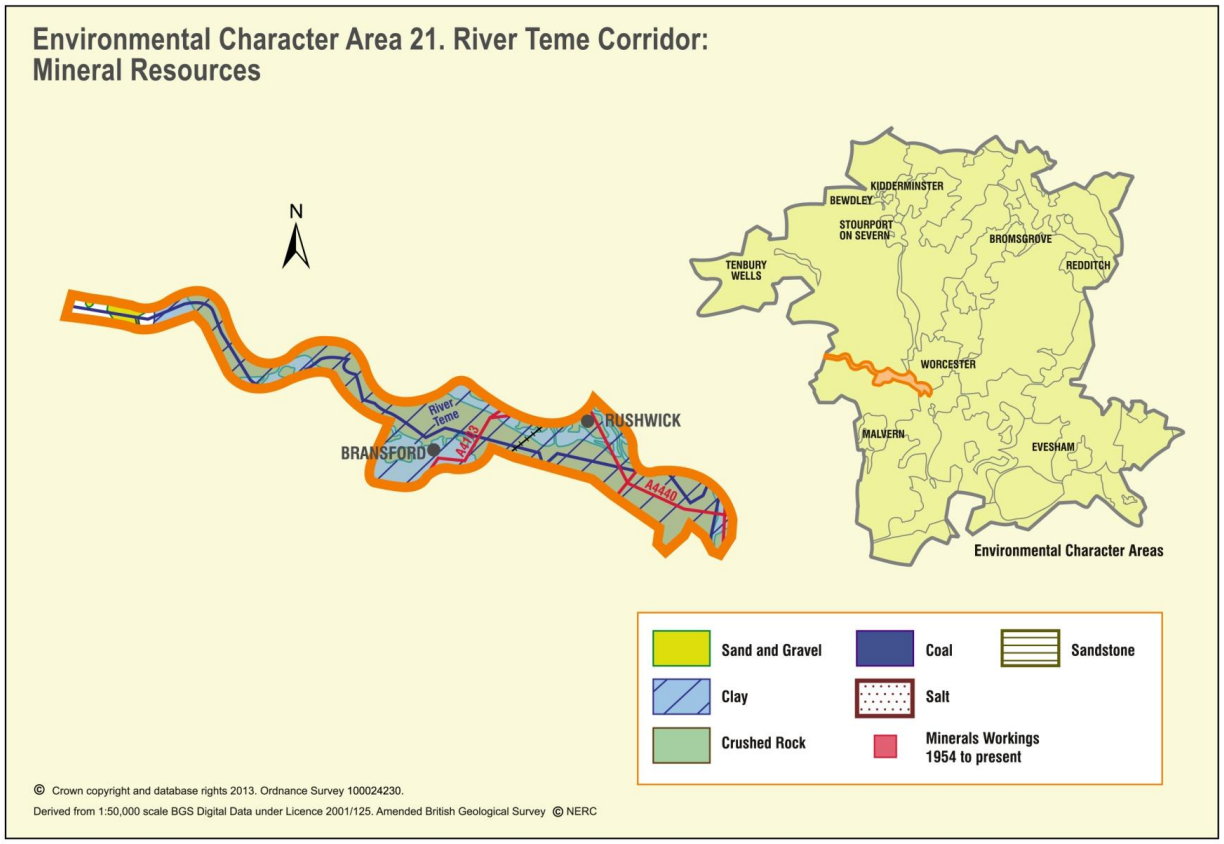
These are illustrated on Figure 1. Environmental Character Areas.

Figure 1. Environmental Character Areas



2. Characteristics and priorities of the River Teme corridor ECA 21

Figure 2. Character 21 River Teme Corridor: Mineral Resources



Mineral Resources

Aggregates

2.1. Details about the aggregate resources in this ECA are given in the background report "Analysis of Mineral Resources in Worcestershire" available on www.worcestershire.gov.uk/mineralsbackground. The following is therefore only a simple summary.

Sand and gravel

2.2. ECA 21 may have some sand and gravel resources but the geology of the area is not easy to interpret. There are river terrace deposits along the course of the River Teme, with a particularly steep bluff north of Bransford Bridge. Extensive spreads of gravel occur in the Teme valley around Cotheridge Court with at least 2.5m of gravel being reported east of Cotheridge and sub-alluvial deposits may exist. There is only one borehole however and it is difficult to speculate on the depth of material and overburden on this basis. There does not appear to be evidence of significant sand and gravel working in the past.

Hard rock

2.3. No suitable materials appear to be present.

Industrial minerals

Clay

2.4. Suitable materials appear to be present but there is no evidence of significant working.

Silica sand

2.5. No suitable materials appear to be present.

Brine

2.6. There is no evidence of brine working in this area or that Halite deposits might exist at depth.

Future Growth

2.7. The key driver for mineral extraction is to provide the raw materials required for the economy to function properly and for homes and infrastructure to be built. Minerals are unevenly distributed. Some of the minerals that we need are not found in Worcestershire and will need to be imported from outside the County. Many minerals are expensive to transport, particularly aggregates as they are a relatively low value and bulky material, and they are likely to be used close to their source, meaning that some local mineral extraction will be needed to support local growth in housing and the associated infrastructure that is required, or to provide raw materials for local industry. On average, about 80 per cent of mineral products are used within 30 miles of the quarry.

2.8. This ECA is a largely rural area primarily within Malvern Hills District but clipping the boundary with Worcester City. Malvern Hills District anticipates the development of 2,592 homes and 29.76 ha of employment land, whilst Worcester City anticipates the development of 6,525 homes, 74 ha of employment land and 10,000 sq m of retail space in the next 14-18 years[4].

2.9. The ECA incorporates the Category 2 village of Rushwick which is proposed for some development in the South Worcestershire Development Plan proposed submission document[5].

[4] Information gathered by Worcestershire County Council in early 2013. This gives a good indication of the likely levels of development which can be expected, but for the latest figures please refer to the relevant City, District or Borough Council.

[5] Category 1, 2 and 3 villages are fourth in the five tier settlement hierarchy set out in the South Worcestershire Development Plan proposed submission document. Their role is predominately aimed at meeting locally identified housing and employment needs. They are therefore suited to accommodate market and affordable housing needs alongside limited employment for local needs. The scale of allocated development is significantly less than that for the urban areas and is aimed at helping to address housing needs and support local services.

2.10. These and other areas beyond the boundary of the ECA could create demand for minerals in this Environmental Character Area. Particularly Worcester City to the east of the ECA, which is anticipated to experience significant development over the life of the Minerals Local Plan and the main town of Malvern[6] to the south west.

Green Infrastructure priorities[7]

2.11. All Environmental Character Areas (ECA's) have been placed into one of three categories based on their overall score for Green Infrastructure. These are:

1. Protect and enhance
2. Protect and restore
3. Restore and create

2.12. The category is based on an assessment of the ECAs landscape character, biodiversity and the historic environment characteristics. These characteristics were each attributed a score, with biodiversity being given a greater weighting than landscape and the historic environment, each of which were given equal but lower weightings.

2.13. The strategic GI approach for the River Teme corridor ECA is to *protect and restore.* The overarching principle identified by the GI partnership is to protect and restore multi-functional river valley corridor and floodplain.

Biodiversity and landscape

2.14. The boundaries of this ECA closely follow the River Teme as it flows from the Herefordshire and Worcestershire border near Knightwick, east to join the Severn at Powick. The River Teme itself is designated as a Site of Special Scientific Interest (SSSI it is one of the best sandstone and mudstone rivers in Britain, supporting a diverse range of plants, fish, insects and mammals. Species of interest found in the River Teme SSSI include salmon, twaite shad, otter, native crayfish, lampreys, bullhead and pearl mussels.

2.15. Natural England is working with CCW, the Environment Agency and the Severn Rivers Trust to develop a river restoration plan for the River Teme The plan aims to return the river to a more natural condition and ecological health by restoring the river`s more natural form and function over the next 50 years to create:

- A dynamic and diverse river bed which is suitable for fish and invertebrates.
- Variable channel features with a variety of river depths and flow speeds.

[6] Main towns are second in the five tier settlement hierarchy set out in the South Worcestershire Development Plan proposed submission document. They provide a comprehensive range of local services and employment opportunities. The towns will continue to be the focus of balanced growth in Malvern Hills and Wychavon, with urban extensions and smaller infill allocations along with necessary associated infrastructure.

[7] Worcestershire County Council (July 2012) *Planning for a Multifunctional Green Infrastructure Framework in Worcestershire: Green Infrastructure Framework 2*

- Varied bankside plant structure, including areas of shading and occasional open stretches of floodplain meadow.
- Diverse plant, invertebrate and breeding bird communities that are able to use the river corridor with minimal disturbance.
- Lowered levels of river engineering allowing natural movement of the channel within a riparian corridor.

Increased connection with the floodplain where wet grassland and meadows, fen, carr and wooded areas may develop.

2.16. This ECA falls wholly or partially within the Malvern Chase with Laugherne Valley Biodiversity Delivery Area, one of the priority opportunity areas determined by the Worcestershire Biodiversity Partnership for the delivery of county Biodiversity Action Plan targets. Information about the Biodiversity Delivery Areas is available from www.worcestershire.gov.uk/biodiversity.

2.17. The landscape is characterised by the open, low lying, seasonally flooded Riverside Meadows with their lines of riverside trees and lack of settlement. Woodland is not a feature here. Along the eastern stretches, set back on slightly higher ground are areas classified as Principal Timbered Farmlands where the small scale, wooded landscape with densely scattered hedgerow trees has a much more intimate character. Traditional orchards, species rich meadows and small, ancient woodlands are all typical of this Landscape Type.

GI Priorities:

2.18. The biodiversity priorities identified for the River Teme corridor ECA are[8]:

- Newly created GI features should aim to augment the existing resource concentrating on the main priorities for protection and creation including wetland and floodplain habitats in the river corridors.
- Create and enhance existing neutral grassland habitats and traditional field boundaries to aid connectivity and landscape permeability.

2.19. The landscape priorities identified for the River Teme corridor ECA are[9]:

- Composed predominantly of the unsettled Riverside Meadows Landscape Type where opportunities should be sought to retain pastoral land use and management regimens that support natural river and flood plain function.
- Protect and enhance the hedgerow field boundaries in a planned enclosure pattern of medium-to-large fields. Seek opportunities to address density and age structure in linear tree belts along hedgerows, ditches and watercourses.
- The surrounding landscapes are composed of the smaller-scale Principal Timbered Farmlands with a contrasting organic enclosure pattern – protect and enhance this where possible, also

[8] Worcestershire County Council (July 2012) *Planning for a Multifunctional Green Infrastructure Framework in Worcestershire: Green Infrastructure Framework 2*
[9] Worcestershire County Council (July 2012) *Planning for a Multifunctional Green Infrastructure Framework in Worcestershire: Green Infrastructure Framework 2*

safeguarding and/or managing/re-planting hedgerow oaks to address density and age structure.

Geodiversity

2.20. There are no geological SSSIs or local geological sites in this ECA.

Historic Environment

2.21. Unlike the Severn and Avon river corridors, the Teme is much less well understood. This is due to the lack of historical mineral extraction and the fact that the sand and gravel terraces are sealed beneath alluvial deposits for almost all its length. It is likely however that beneath the alluvium, remains of prehistoric and possibly Romano British settlement and land division occur. The broader meanders of the river are likely to have left a series of palaeochannel's sealed beneath these later alluvial deposits.

2.22. Historic landscape character is defined by multi-period, piecemeal enclosure on the valley slopes contrasting with large 18th and 19th century riverside meadows that overlay large areas of post-medieval water meadow systems.

GI Priorities:

2.23. The historic environment priorities identified for the River Teme corridor ECA are[10]:

- Protect and enhance field boundaries and hedgerows associated with historic hay meadows on the Teme floodplain.
- Protect historic water features and buffer key sites, such as moats, fishponds and mills.
- Protect below ground deposits of high palaeoenvironmental potential associated with alluvial soils in the Teme corridor.
- Protect and buffer earthworks representing abandoned medieval settlement and land division.

Blue Infrastructure

2.24. ECA 21 is dominated by, and is in effect the historic flood plain of, the lower part of the River Teme in Worcestershire, down to and including its junction with the Severn. An important tributary, the Leigh Brook joins the Teme in this area, as do at least 9 minor, un-named watercourses.

2.25. Tenbury, significantly to the north of this ECA, is severely affected by flooding. The causes appear to be principally from the River Teme itself, the Kyre Brook and surface water flooding from sewers, overland flow and blocked culverts but any impediment to flows in this ECA could have implications for upstream drainage and would need careful assessment.

2.26. In Malvern Hills generally flood risk is seen as a significant factor for strategic planning. The Malvern Hills LPA considers that the Severn and the area west of Worcester are not defended against flooding to a satisfactory standard. The main cause of flooding in the rural areas of Malvern Hills district is from local watercourses and surface water sewers.

[10] Worcestershire County Council (July 2012) *Planning for a Multifunctional Green Infrastructure Framework in Worcestershire: Green Infrastructure Framework 2*

In particular, flash flooding from rainstorms and in rapid response catchments are of concern, and as many of the watercourses at risk are less than 3km2 in area there are no flood risk maps covering these areas.

2.27. For the city of Worcester the main causes of flooding include flooding from the River Severn and River Teme. Worcester City LPA considers that the rivers Severn and Teme are not defended against flooding to a satisfactory standard.

2.28. Groundwater flooding is not considered an issue in Malvern Hills district.

2.29. The River Severn Catchment Flood Management Plan makes this a Policy 3 area, where it will "Continue with existing or alternative actions to manage risk at the current level."

Water quality

2.30. The whole of the River Teme has been designated an SSSI as a representative of near natural and biologically rich river type associated with mudstones and sandstones. The CAMS also state that the Teme and Severn Confluence Wetland Restoration Zone is present in the catchment of Careys Brook and plans are in place to convert the fields to the east of Powick STW to wet grassland

2.31. The current ecological quality for the majority of rivers within Worcester is moderate, indicating that they have been moderately disturbed by anthropological activity and are at present below the recommended „good" status or „good potential" under the WFD. The only river in Worcester to achieve good ecological status is the River Teme. The River Severn and Careys Brook have poor quality due to unacceptable levels of phosphorus.

2.32. The River Severn, downstream of the River Teme and Hatfield Brook (south of this ECA) pass in terms of Chemical Quality whereas the River Teme fails due to Tributyltin Compounds. Release of Tributyltin Compounds is primarily from their use in wood preservatives and in marine antifouling paints on for example ships.

2.33. In Malvern Hills district the River Severn and Careys Brook all have a moderate ecological status/potential; all the watercourses have unacceptable levels of phosphorus to achieve a good ecological status under the WFD.

2.34. Changes to current discharge consents may be necessary at Powick STW for BOD, Ammonium and Phosphorus.

2.35. The current quantitative status of groundwater is generally good within the area. However, the map indicates that there is pressure on groundwater resources at Worcester.The current chemical status of groundwater in the South Worcestershire area is generally good.

Water Supply

2.36. No water available.

GI Priorities:

2.37. The blue infrastructure priorities identified for the River Teme corridor ECA are[11]:

- Reduce dependence on raised flood defences, as this is not sustainable in the long term, by taking opportunities to restore sustainable natural storage of floodwater on undeveloped floodplains.
- Seek opportunities to improve watercourses where it would benefit fisheries (especially salmon). Reduce dependence on raised flood defences, as this is unsustainable in the long term, by taking opportunities to restore sustainable natural storage of floodwater on undeveloped floodplains.
- Make more space for rivers through urban areas via 'blue corridors' (i.e. Restoring access for floodwater onto key strips of floodplain. This requires redevelopment to be limited to flood-compatible land-uses e.g. parkland).
- Some designated 'aquatic conservation' sites are in unfavourable condition (for example Teme SSSI). Activities that affect these sites must be changed to improve their condition.
- Ensure that the run-off from all proposed development is minimised. SUDS must be encouraged and targeted within planning approvals.
- Encourage the retro-fitting of SUDS where surface water flooding is already a problem.
- Support ecological improvements. Examples of this include Severn & Avon Wetlands Project; Natural England's three fluvial SSSIs.
- Tackle issues of diffuse pollution in the catchment through the provision of advice to farmers under the England Catchment Sensitive Farming Delivery Initiative.

Access, informal recreation and tourism

2.38. This ECA is in the Malvern Hills District, which has 4,212ha of accessible natural greenspace. This is 7.3% of the total area of the District. There is a good spread of different sizes of accessible natural greenspaces assets across the District and the presence of the Malvern Hills AONB along the western edge of the District means that access to larger assets is good with 84% of households in the Malvern Hills being within 10km of 500ha+ sites and 66% of households being within 5km of 100ha+ sites.

2.39. The District has three sub-regional GI assets:

- The Malvern Hills
- Shrawley Wood
- Kempsey Common

Malvern Hills district also enjoys a dense rights of way network, linking a network of small sites and commons which fall outside of the regional assets but combined together offer significant recreational opportunity.

2.40. There are no sub-regional recreation assets in the River Teme corridor ECA, however the River Teme itself forms a significant GI asset.

[11] Worcestershire County Council (July 2012) *Planning for a Multifunctional Green Infrastructure Framework in Worcestershire: Green Infrastructure Framework 2*

2.41. Tourist attractions in this ECA include The Fold at Bransford, and Leigh Court Tithe Barn.

GI Priorities:

2.42. The access and recreation priorities identified for the River Teme corridor ECA are[12]:

- Consider the proximity to and ability to integrate with the rights of way network, recreational way-marked routes and the cycle network;
- Accommodate associated facilities necessary for the use and enjoyment of the site in a manner that is appropriate and able to integrate with the landscape character, wildlife and cultural interests.
- Act as a greenway from town into the countryside and utilise existing canal, former railway lines, river corridors and wherever possible link with public transport routes.
- Adopt minimum quality standards, (commensurate with its location and scale) that sites and routes should be expected to achieve will be those from the Green Flag Award Programme, and the Country Parks Accreditation Scheme, as appropriate.

Transport

Road

2.43. The A44 from Worcester in the east to Bromyard and Leominster in the west runs through the western tip of the ECA. The A4103 crosses the ECA to connect Worcester with Hereford, and the A449 crosses the ECA to connect Worcester with Malvern.

2.44. These three roads are each connected by the A4440 link road around the south west of Worcester in the eastern end of the ECA. The A449 and the A4440 link road suffer with peak time congestion. Other roads in this Environmental Character Area are more minor.

2.45. The Worcestershire Advisory Lorry Route Map does not show any low bridges which would restrict the movement of vehicles over 16'3" (4.95m) on the lorry route network. Local roads may have further restrictions and will need further assessment if they are to be used for accessing mineral resources.

Rail

2.46. The railway line connecting Worcester with Malvern and Hereford crosses the ECA near Rushwick.

Water

2.47. This ECA follows the course of the River Teme from Knightwick to its confluence with the River Severn at Worcester. There is no evidence available that the river is navigable.

[12] Worcestershire County Council (July 2012) *Planning for a Multifunctional Green Infrastructure Framework in Worcestershire: Green Infrastructure Framework 2*

GI Priorities:

2.48. The GI transport priorities identified for the River Teme corridor ECA are[13]:

- Opportunities should be sought to protect, enhance and create green infrastructure that promotes sustainable movement by walking and cycling, reducing the need to travel by car by providing pleasant environments that promote sustainable transport as a means to minimise the impact of transport on the natural environment and mitigate the impacts of climate change.

LTP Priorities:

2.49. The LTP 3 transport priorities identified for the River Teme Corridor ECA are:

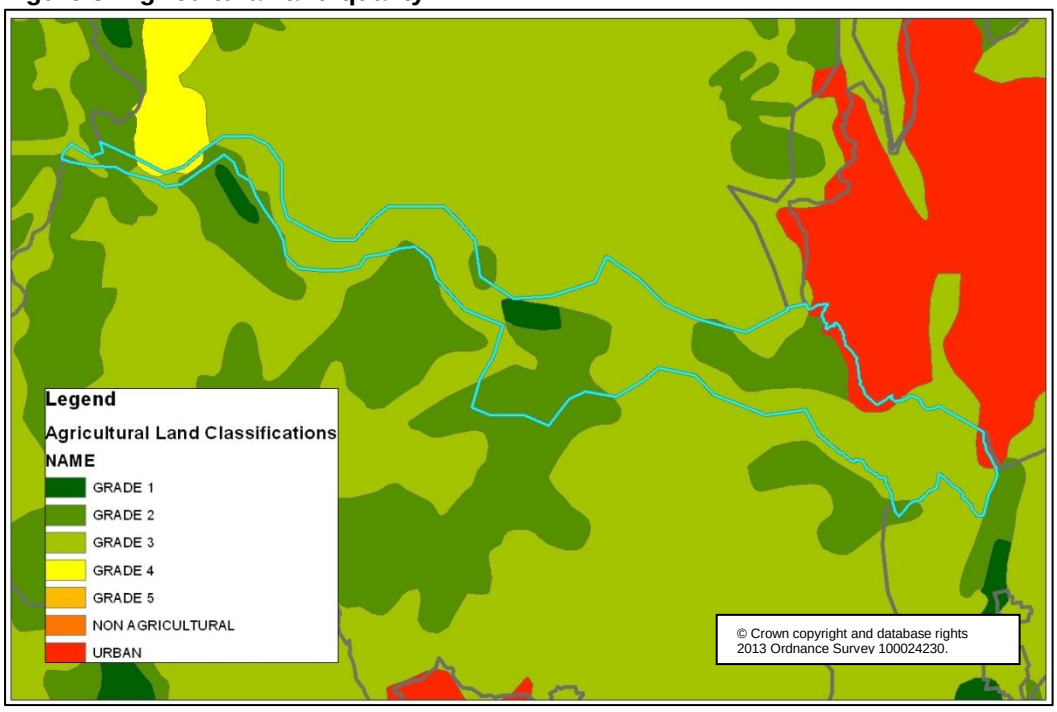
- **A449/A4440 Malvern-Worcester (M5 J7) interurban corridor maintenance and improvement scheme** - a programme of improvements to transport infrastructure on this route, which is likely to be progressed in the medium term and will include junction enhancements, street furniture decluttering, replacement and enhancement as well as the provision of an off-road walking and cycling route along the A449 between Worcester and Malvern.
- **Worcester - southern link road improvements scheme** - this scheme would involve the dualling of the Worcester Southern Link Road, from Powick Hams to M5 Junction 7, involving the development of a new bridge adjacent the existing Carrington Bridge and the replacement of the railway bridge over the Southern Link Road. Significant costs and risks mean that this is a long term aspiration.
- **Worcester - rail capacity improvement scheme** – this scheme would involve upgrading rail signalling and junctions in Worcester and would include the removal of single track operations, enhancing capacity and improving reliability of rail services across South Worcestershire. Dependent on the rail industry to progress this in the long term.

Agriculture/Forestry

2.50. The agricultural land use in this ECA is dominated by pastoral and mixed farming. Agricultural land quality varies across the area, with the majority of the ECA classified as high quality grade 1-3 land, although there is a small area of grade 4 land in the western end of the ECA and some urban land in the west where the ECA meets Worcester City, as shown inFigure 3. This ECA is part of the Environment Agency's Catchment Sensitive farming Priority Catchment for the River Teme.

[13] Worcestershire County Council (July 2012) *Planning for a Multifunctional Green Infrastructure Framework in Worcestershire: Green Infrastructure Framework 2*

Figure 3. Agricultural land quality



2.51. The forestry commission's woodland opportunity maps show that some areas along the boundaries of this ECA are listed as priority 1 for woodland creation which could benefit landscape character, biodiversity, cultural heritage and/or public access (Figure 4). They also show that small areas in the west and north of this ECA are ancient woodland landscapes but are not prioritised for woodland restoration (Figure 5).

Figure 4. Woodland creation for landscape, biodiversity, heritage and public access

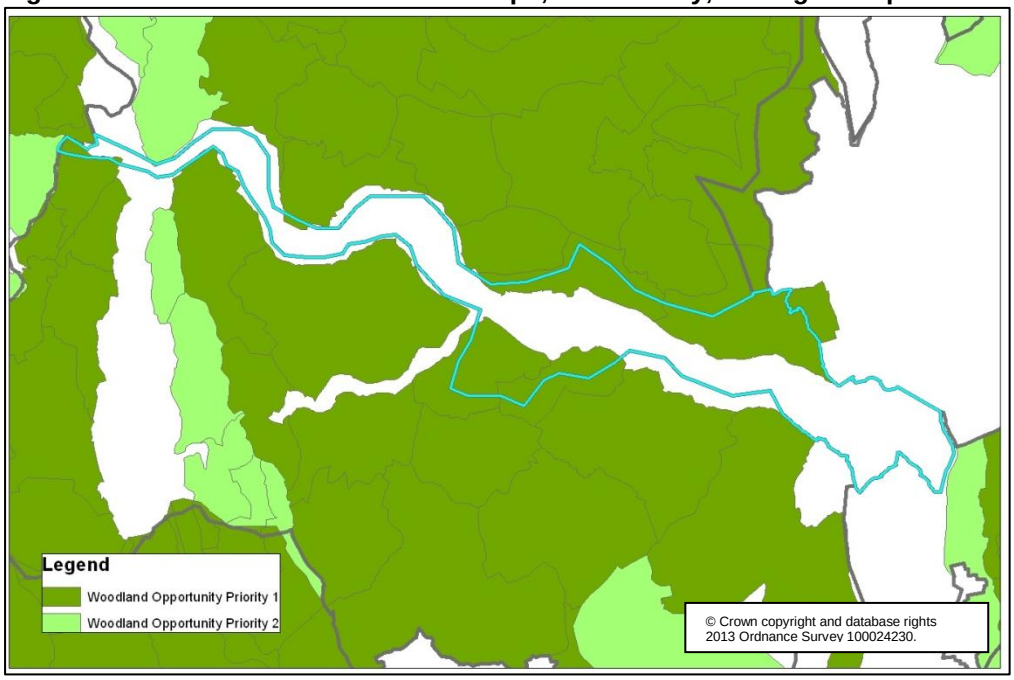
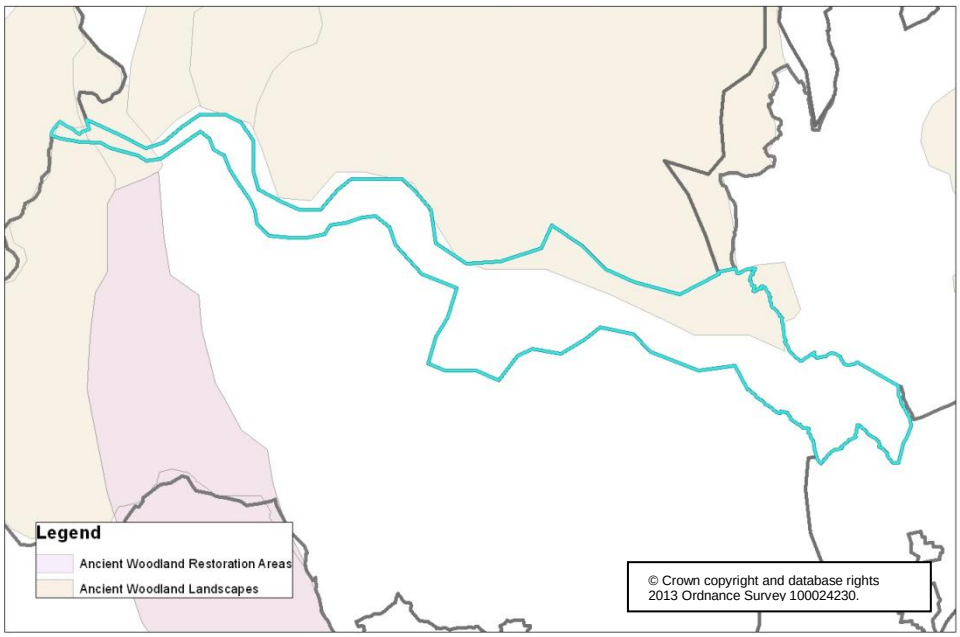


Figure 5. Ancient woodland landscape and restoration



Climate Change

2.52. Some effects of climate change will be similar across the whole county and many of the issues which can be addressed are likely to be common to all ECAs, such as:

- Improving air quality
- Providing flood risk management solutions
- Preventing water and soils pollution as a result of climate change related extreme weather conditions
- Promoting energy efficient and low carbon solutions
- Contributing to renewable energy production

Opportunities and issues

2.53. Green Infrastructure features such as buffering of watercourses provide a way of minimising fluvial flooding. Planned landscaping incorporating flood defences could provide both and short term benefits and sustainable drainage schemes (SUDS) are a mechanism for managing both fluvial and pluvial flood risk.

2.54. Agricultural and horticultural businesses could face damaging water shortages in the coming decades as a result of climate change. In many parts of Worcestershire, water resources are under severe pressure. The majority of catchments in which horticultural production is concentrated have been defined by the Environment Agency as being either over-licensed and/or over-abstracted. Well executed water storage facilities could not only provide water supply for the business in the dry periods but a wide range of green infrastructure benefits such as biodiversity or landscape and opportunities for increased physical activity and exposure to nature.

Socio-economic considerations

2.55. The analysis of the socio-economic situation in Worcestershire in this strategy considers the economy and health & well-being at a high level. It is not intended to draw a full picture of the economy or health and well-being in the county, instead it focuses only on the indicators which are of most relevance to green infrastructure:

- **Economy**: unemployment, household income and deprivation levels.
- **Health and well-being**: health deprivation, heart diseases, obesity, mental health problems and respiratory conditions.
- **Access to sites for informal recreation**: considers links between informal recreation opportunities and mental and physical well-being.

2.56. There is thought to be a link between green infrastructure and some aspects of health. The issues of obesity, respiratory conditions, mental health, heart disease and health deprivation have been considered in this context.

2.57. 26% (120,000) of the Worcestershire's adult population is obese and another 40% is overweight. The adult obesity levels in Worcestershire are higher than the national average. The level of childhood obesity is around the national average, at 10% of five year olds and 18% of eleven year olds. In terms of land cover, most of the Worcestershire area has some problems with obesity. This ECA is however one of the better performing areas in the county in this regard.

2.58. Obesity and respiratory problems in this county generally follow the same geographical pattern. Mental health problems, by contrast, tend to be found in the and around major settlements. Although mortality rates from cardiovascular diseases are significantly lower than the national rate, patterns of heart diseases are more dispersed than the other health indicators assessed and poor performance is found across the county. Contrary to other health indicators, heart diseases are least prevalent in some of the urban areas.

2.59. The overarching principles identified by the GI partnership regarding socio-economic matters for this ECA are:

- Opportunities to reduce the incidence of health problems related to heart disease.