

Environmental Character Area Profile for the Minerals Local Plan: 20. Kempsey Plain

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 known as blue infrastructure). The GI approach requires thinking about the environment as an integrated system of stepping stones or nodes in a wider network¹.

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 network² will need to be considered.

Environmental Character Areas³ 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.

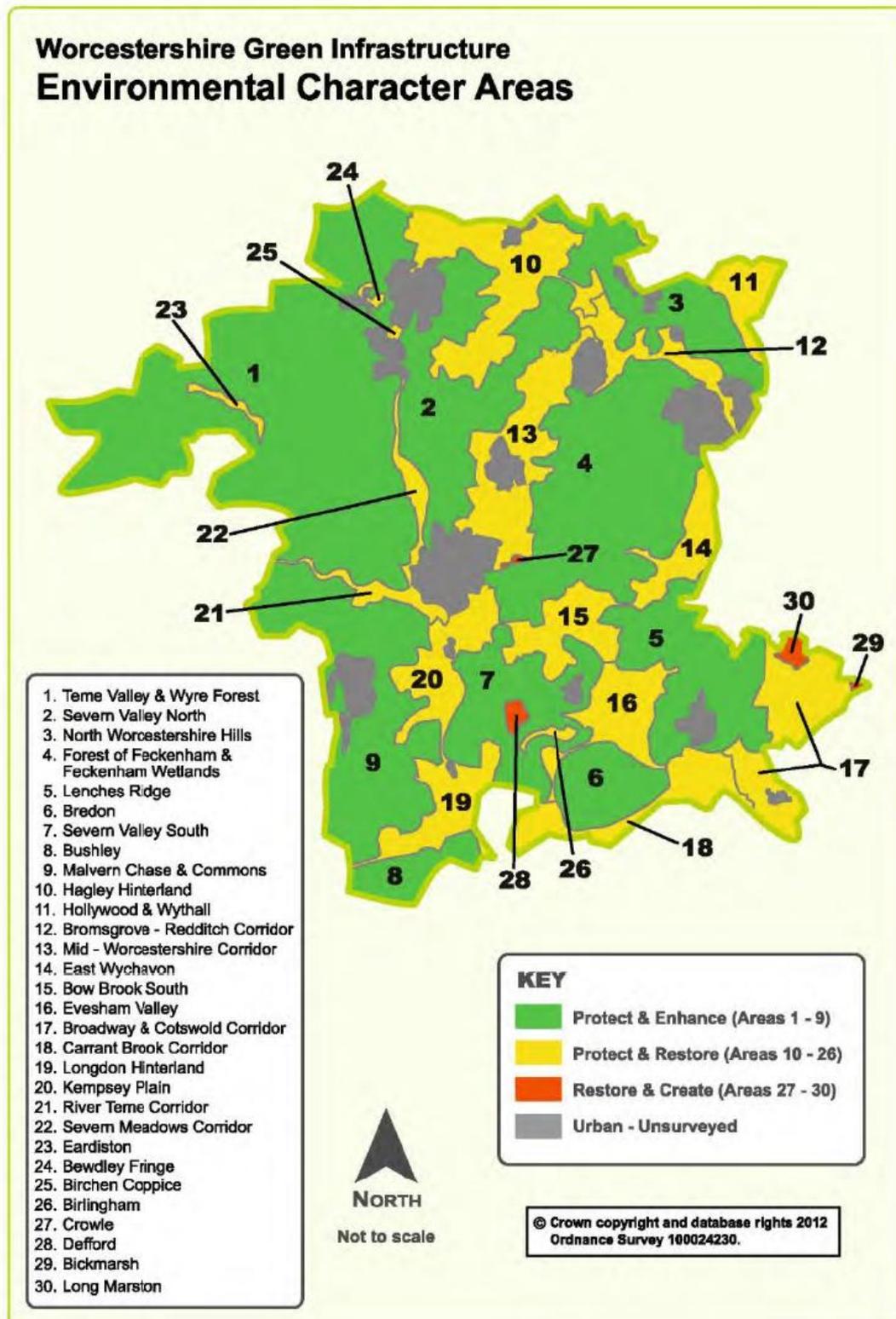
³ Worcestershire County Council (July 2012) *Planning for a Multifunctional Green Infrastructure Framework in Worcestershire: Green Infrastructure Framework 2*

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

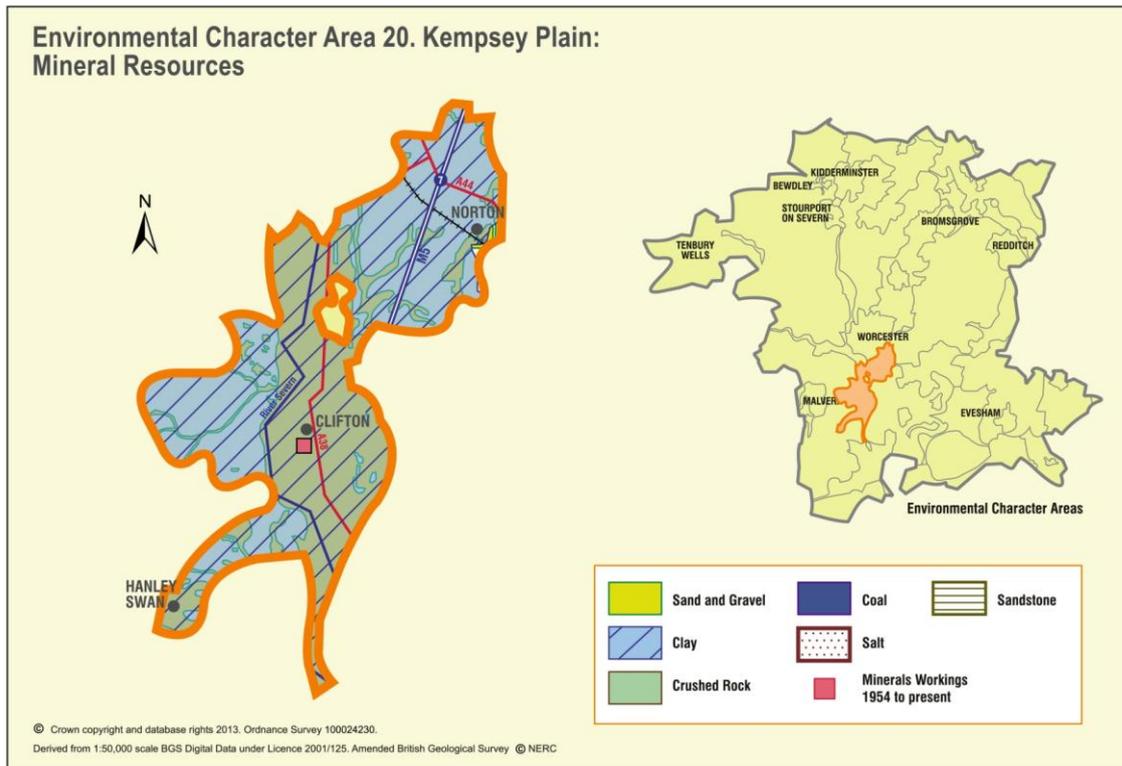
These are illustrated on Figure 1. Environmental Character Areas.

Figure 1. Environmental Character Areas



2. Characteristics and priorities of the Kempsey Plain ECA

Figure 2. Environmental Character Area 20. Kempsey Plain: 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. There are substantial (over 900H) potential sand and gravel resources in ECA 20, mostly 2nd and 3rd terraces, although 4th, 5th and 6th terraces also exist. Borehole data is however fairly poor but shows a wide range of depths of sand and gravel; estimates of the volume available can only be hypothetical but could vary between 17mt and 41 mt. The county's largest currently operational gravel pit is currently being worked at Clifton.

Hard rock

2.3. There is no evidence that suitable strata exist.

Industrial minerals

Clay

- 2.4. There are Mercia mudstone deposits under much of this ECA and which were worked for brick making at Norton until the late 1960`s. There is also evidence of 2 former brick pits, one on each side of the river, north east of Cliffe Farm.

Silica sand

- 2.5. There is no evidence that suitable strata exist.

Brine

There is no evidence of brine working in this area or that Halite deposits might exist at depth. The memoir for Tewkesbury reports that it was not found in a borehole (1930) near Upton upon Severn.

Future Growth

- 2.6. 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.
- 2.7. This ECA is a largely rural area primarily within Malvern Hills District but spanning the boundaries with Wychavon District and Worcester City. Malvern Hills District anticipates the development of 2,592 homes and 29.76 ha of employment land, whilst Wychavon anticipates 5,807 homes, 18.5 ha of employment land and a new neighbourhood centre and 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 years⁴.
- 2.8. The ECA incorporates the Worcester urban expansion areas of Broomhall Community and Norton Barracks Community and Kilbury Drive⁵, it surrounds the Category 1 village of Kempsey and incorporates the Category 1 village of Hanley Swan which are proposed for some

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 Worcester city is the first in the five tier settlement hierarchy set out in the South Worcestershire Development Plan proposed submission document. It is the administrative centre of the county and provides the greatest range of services. It is the main employment destination for Malvern Hills and Wychavon. The city is a sub-regional focus for strategic employment, housing and retail development.

development in the South Worcestershire Development Plan proposed submission document⁶.

- 2.9. 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 north of the ECA, which is anticipated to experience significant development over the life of the Minerals Local Plan and the main town of Malvern⁷ to the west.

Green Infrastructure priorities⁸

- 2.10. 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

- 2.11. 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.

- 2.12. The strategic GI approach for the Kempsey Plain ECA is to *protect and restore*. The overarching principle identified by the GI partnership is to protect and restore neutral grassland habitats and traditional field boundaries.

Landscape and biodiversity

- 2.13. The character of the Kempsey Plain Environmental Character Area is dominated by the central north/south corridor of the River Severn and its concomitant Landscape Types of Riverside Meadows and Settled Farmlands on River Terraces. The heavy and often waterlogged soils of the Riverside Meadows also include a number of gravel ridges which are now surrounded by a mixture of grazed flood meadows and the arable fields of the lighter, more freely draining River Terraces. In association

⁶ 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.

⁷ 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.

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

with the River Severn, the Severn and Avon Vales Biodiversity Delivery Area also bisects the ECA.

- 2.14. To the west of the river dominated central area, and extending past the county boundary into Herefordshire, the landscape has been classified as Principal Timbered Farmlands by the Worcestershire Landscape Character Assessment. Within it can be found Madresfield Court parkland, one of the larger designed parklands in the county. The Principal Timbered Farmlands are small scale, agricultural landscapes of irregularly shaped woodlands, winding lanes and frequent wayside dwellings and farmsteads which have been cleared piecemeal from the local woodlands and subsequently enclosed by hedgerows. Their most notable characteristic is the densely scattered hedgerow trees, usually oaks which frame filtered views.
- 2.15. The north east of the ECA is dominated by the Principal Settled Farmlands of the Clerkenleap/Norton area. Here the tree cover is sparse, being most notable along streams and as groups associated with settlements: woodland is not a feature.
- 2.16. In biodiversity terms this ECA is a diverse area comprising mixtures of arable land and relictual grasslands connected through linear features such as hedgerows, verges and common land. Semi-natural habitats are highly variable in quality: often forming dense networks of standing water, BAP grasslands and broadleaved woodland. Biodiversity value here is considered quite high where semi-natural habitats remain unimproved, especially on steep slopes and valleys. The area is important for its remaining network of these semi-natural habitats of which Ashmoor Common SSSI, Frieze Wood, Madresfield Brook, Dripshill Wood and Kempsey Lower Ham Local Wildlife Sites are good examples.

GI Priorities:

- 2.18 The landscape and biodiversity priorities identified for the Kempsey Plain ECA are⁹:
 - Enhance and protect the hedgerow field boundaries respecting the characteristic enclosure pattern of each Landscape Type – planned in the Riverside Meadows, sub-regular in the Settled Farmlands on River Terraces, moving to irregular and organic in the Settled and Timbered Farmlands, respectively.
 - Opportunities should be sought for protecting and enhancing characteristic tree cover to address density and age structure as appropriate. Tree cover is typically provided by linear belts along hedgerows, ditches and watercourses in the Meadows, or trees associated with settlement or watercourses in the River Terrace Farmlands; watercourse and hedgerow trees in the Settled and Timbered Farmlands.
 - Opportunities should be sought to retain pastoral land use and management regimens in the Riverside Meadows that support natural river and flood plain function.

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

- 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.

Geodiversity

- 2.17. There is one geological SSSI in this ECA, Ashmoor common. This is also a Local Geological Site.
- 2.18. Ashmoor Common lies in the flood plain of the River Severn, a few miles south of Worcester City. The site is an important one for studies of river landforms and of the history and evolution of the River Severn.
- 2.19. This site is important for interpreting aspects of the palaeohydrology of the River Severn. It includes a type example of an underfit palaeochannel representing an earlier course of the Severn above the level of the present floodplain. It is also important in providing detailed information on floodplain sedimentary environments and an absolute chronology for floodplain development. Deposits in the palaeochannel include reworked terrace sediments with channel sands on top. A radiocarbon date from organic deposits indicates that the channel was abandoned around 6,000 years ago.

Historic Environment

- 2.20. This forms part of the principal area of known prehistoric and Romano British settlement sites and landscapes in the County. The gravel terraces of the River Severn from Worcester southwards have revealed extensive remains of settlement and funerary sites. The broader meanders of the river have also left a series of palaeochannel's sealed beneath later alluvial deposits. These have been shown by excavation to be a focus of activity during the Neolithic period onwards. Later palaeochannel's are likely to be the focus of mills and water management features. Where clays dominate over the lighter sands and gravels there is greater survival of medieval and post medieval landscape features and settlement and agricultural earthworks.
- 2.21. Historic landscape character is dominated by larger dispersed and estate farmsteads set in post-medieval field systems along the river terraces. Small areas of unenclosed common are significant and rare remnants of historically much more substantial areas of unenclosed lowland heath.

GI Priorities:

- 2.22. The historic environment priorities identified for the Kempsey Plain ECA are¹⁰:
- Explore opportunities to protect below ground archaeology associated with extensive prehistoric and Romano-British settlement and ritual sites throughout the area and medieval archaeology adjacent to Kempsey.
 - Protect sensitive below ground palaeoenvironmental deposits contained in palaeochannels adjacent to the Severn.

Blue Infrastructure

Flooding

- 2.23. The geology can have an effect on the runoff, and the flooding, within a catchment as a result of the permeability of the strata. The geology within South Worcestershire is variable. According to the River Severn Catchment Flood Management Plan (CFMP), the lower reaches of the River Severn flow over Non Aquifer Triassic Mercia Mudstone Group strata and Jurassic Lower Lias Clays. The drift gravels at this point allow groundwater to flow from the drift deposits to the river and vice versa.
- 2.24. This ECA is to the south of Worcester. Flood risk is a significant factor in strategic planning in the city and any mineral related development in ECA 20 must take account of this. In particular Worcester City LPA considers that the Rivers Severn and Teme are not defended against flooding to a satisfactory standard. There is a specific Teme and Severn Confluence Wetland Restoration scheme and plans are in place to convert the fields to the east of Powick STW to wet grassland.
- 2.25. The Environment Agency has identified that there is a problem of fluvial flooding from the Hatfield Brook downstream of Worcester in Kempsey. The Environment Agency has installed a flood alleviation scheme for the village but they still require surface water flows from new developments to be attenuated to greenfield runoff rates. Any surface water drainage solution should take fully into account the flooding issues downstream at Kempsey.
- 2.26. Upton upon Severn is particularly prone to serious flooding from the river Severn, surface water flooding from sewers and overland flow. During an extreme flood extent the town can become cut off as a result of the River Severn flooding. This is caused by a flood flow route to the west of the town.
- 2.27. Apart from these places the main cause of flooding within the Malvern Hills District part of the ECA is from local watercourses and surface water sewers; short duration intense storms causing flash or rapid response flooding in smaller watercourses are also a problem. In particular, rapid response catchments are of concern, and as many of the watercourses at

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

risk are less than 3km² in area there are no flood risk maps covering these areas. Where proposed allocation sites are located in such catchments further assessments may be needed to determine the level of risk.

- 2.28. For the villages in south Worcestershire the main causes of flooding are the smaller watercourses and surface water flooding from sewers and overland flow.
- 2.29. Groundwater flooding is not considered to be a major issue in the South Worcestershire Joint Core Strategy area.
- 2.30. The River Severn Catchment Flood Management Plan makes this a Policy 2 area where they will "reduce existing flood management actions (accepting that flood risk will increase over time).

Water Quality

- 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, downstream of the River Teme and Hatfield Brook passes in terms of Chemical Quality but still contains unacceptable levels of phosphorous, whereas the River Teme fails due to Tributyltin Compounds.
- 2.32. Changes to current discharge consents may be necessary at Powick STW for BOD, Ammonium and Phosphorus.
- 2.33. Apart from a very small section south of Spetchley the whole of this ECA is recorded as a water body with both water company point source pollution and agricultural/rural diffuse pollution pressure.

Water supply

- 2.34. Catchment Abstraction Management Strategies produced by the Environment Agency show that the surface water and groundwater in the South Worcestershire Development Plan area is either being over-abstracted or there is no water available for further abstractions.

GI Priorities:

- 2.35. The blue infrastructure priorities identified for the Kempsey Plain ECA are¹¹:
 - 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.

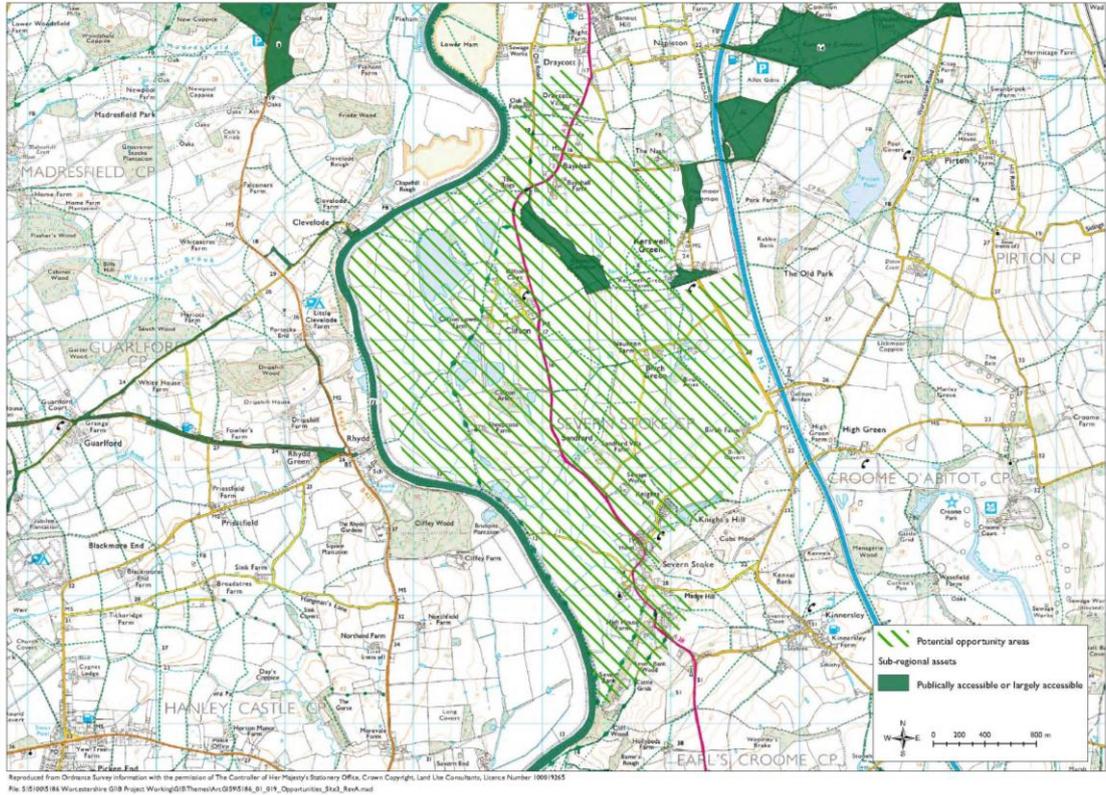
¹¹ Worcestershire County Council (July 2012) *Planning for a Multifunctional Green Infrastructure Framework in Worcestershire: Green Infrastructure Framework 2*

- Seek opportunities to improve watercourses where it would benefit fisheries.

Access, informal recreation and tourism

- 2.36. This ECA is predominantly 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.
- 2.37. 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.
- 2.38. Kempsey Common is in the Kempsey Plain ECA and the River Severn runs through the ECA, forming a significant GI asset. The Severn Way also runs through this ECA.
- 2.39. The GI Framework Document 3 also identifies an "area of search" for a strategic recreation asset in the ECA. The area of search, known as Clifton Water Park, identifies that the old gravel pits around Sandford, by the edge of the River Severn just south of Kempsey provide a significant opportunity to create an alternative destination for visitors to the Malvern Hills (potentially reducing the number of car journeys to the Malvern Hills) and an additional new resource to serve the significant new developments that are planned for the south of Worcester and the north of Great Malvern. The water park would need to provide visitor facilities including provision for a number of different activities as well as enhancing biodiversity in order to create a visitor experience that is distinctive and attractive enough to take pressure away from the Malvern Hills.
- 2.40. This potential opportunity area is shown in Figure 3.

Figure 3. Clifton Water Park - Potential opportunity area



GI Priorities:

2.41. The access and recreation priorities identified for the Kempsey Plain ECA are¹²:

- 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

2.42. The M5 runs north-south through the north western corner of the ECA and Junction 7 for Worcester south is within the ECA. The A38 runs north-south through the centre of the ECA, connecting Worcester to the north

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

with Upton upon Severn and Tewkesbury to the south. These roads are both on the eastern side of the River Severn and there are no A-roads in the ECA on the western side of the river.

- 2.43. The A4440 link road to the south and east of Worcester is just within the northern boundary of the ECA and suffers with peak time congestions. Other roads in this Environmental Character Area are more minor.
- 2.44. 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

- 2.45. The Cotswold Line crosses through the northern east corner of this ECA, connecting Worcester and Evesham. The intersection of the Cotswold Line with the Birmingham-Bristol line near Norton is just outside the ECA to the west.

Water

- 2.46. The River Severn flows through the ECA, joining Worcester upstream in the north to Upton upon Severn and Tewkesbury downstream in the south. It is an operational river navigation, capable of carrying commercial traffic and is navigable up to Stourport on Severn.

GI Priorities:

- 2.47. The GI transport priorities identified for the Kempsey Plain ECA are¹³:
- 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:

- 2.48. The LTP 3 transport priorities identified for the Kempsey Plain ECA are:
- **Worcester - A4440 Whittington junction minor enhancement scheme** – this scheme to improve capacity of Whittington Junction on the Worcester Southern Link Road and deal with current congestion and journey reliability problems was completed in 2012.
 - **Worcester junction enhancements on the southern link road** – this scheme includes enhancements to the Ketch and Norton junctions and their approaches on the Worcester Southern Link Road. The scheme, which is likely to be progressed in the short term, would increase the capacity of the Southern Link Road and deal with current congestion and journey reliability problems.
 - **Worcester Ketch park and ride site** - development of a Park and Ride site close to the Ketch junction of the Worcester Southern

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

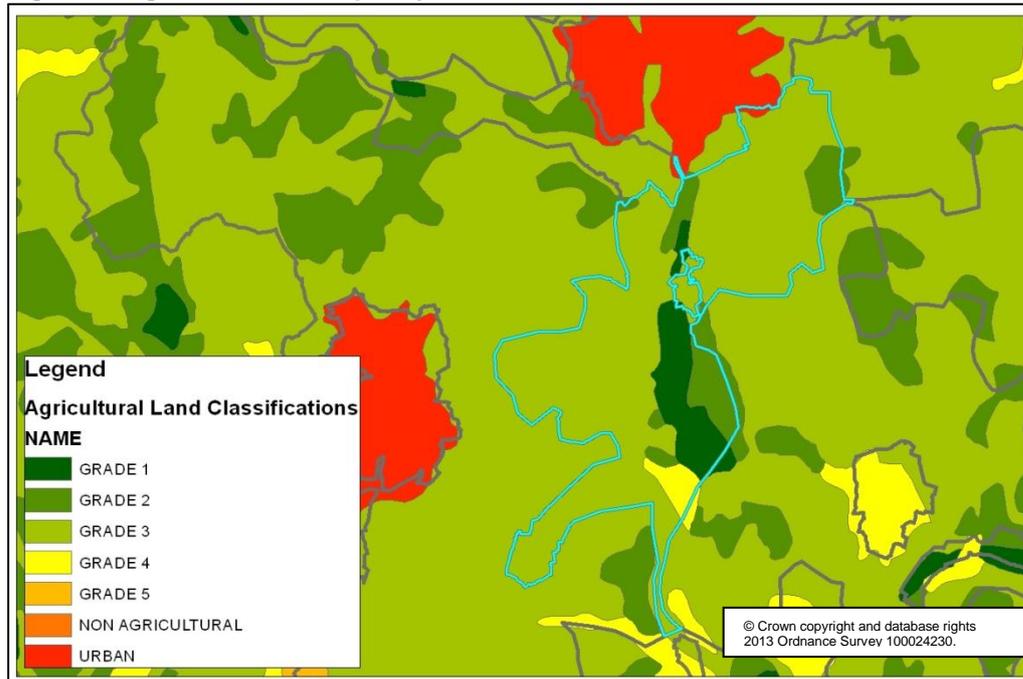
Link Road, likely to be progressed in the short term, to provide alternative access to Worcester for residents of the rural areas to the south of Worcester City, as well as to ensure that Bath Road does not become congested as a result of increased local development.

- **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.
- **Worcester to Evesham rail line dualling scheme** - A proposed scheme to reinstate dual track between Worcester and Evesham, to further increase capacity on the Cotswold Line route. Dependent on the rail industry to progress this in the long term.

Agriculture/Forestry

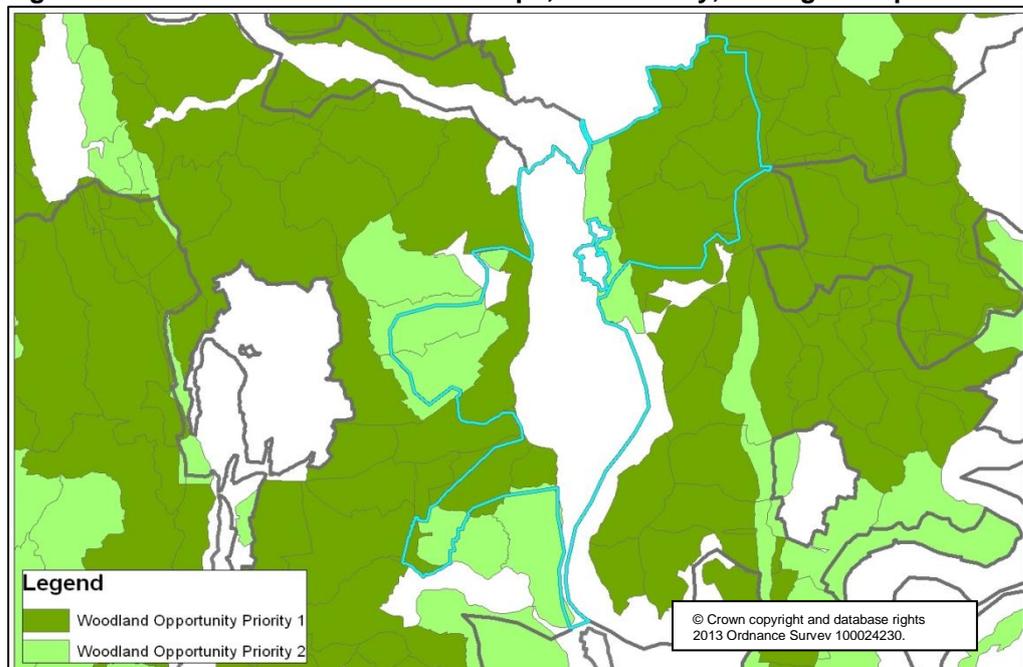
2.49. The agricultural land use in this ECA is dominated by pastoral and mixed farming with some cash cropping. Agricultural land quality varies across the area, with the majority of the ECA classified as grade 3 land but some areas of higher quality grade 1 and 2 land, as well as an area of lower quality grade 4 land near Severn Stoke, as shown in Figure 4.

Figure 4. Agricultural land quality



2.50. The forestry commission's woodland opportunity maps show that the eastern and western sides of this ECA are listed as priority 1 or 2 for woodland creation which could benefit landscape character, biodiversity, cultural heritage and/or public access (Figure 5). However, they also show that none of this ECA is an ancient woodland landscape and therefore woodland restoration across this part of the ECA would not benefit the ancient woodland landscape.

Figure 5. Woodland creation for landscape, biodiversity, heritage and public access



Climate Change

2.51. 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

2.52. 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.

2.53. 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.

2.54. The soil types in small areas on the edges of this ECA are inherently at risk of subsidence and heave. It is possible that changes in weather patterns as a result of climate change may worsen these tendencies.

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.
- 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:
- Enhancements across both health and economic related GI issues.