Newcastle under Lyme Borough Biodiversity Opportunity Mapping

March 2014

Staffordshire Wildlife Trust
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This Project was commissioned by Natural England for the purposes of landscape scale conservation efforts within Staffordshire

Partners in this mapping exercise included:

Executive Summary

Biodiversity Opportunity maps are developed to show where priority habitats could be enhanced, restored or created in a particular area, county or region as a basis from which to develop policies and targets.

The landscape-scale approach to nature conservation and the importance of having coherent and resilient ecological networks, identified via biodiversity mapping, were highlighted as key recommendations of the Making Space for Nature report.[7]

The Biodiversity Opportunity Map encompasses the entirety of Newcastle under Lyme Borough, covering an area of approximately 21,030 hectares in total. Due to the large size of the area, the borough was considered in terms of its ecological character. During the mapping process, elevation, topography, landscape, geology and natural processes such as river systems were considered.

The knowledge of local ecologists and representatives from local organisations, in partnership with the Borough Council, was sought, and was key in identifying and fine-tuning the Biodiversity Opportunity zones.

Eight biodiversity opportunity zones were identified within the Borough of Newcastle under Lyme:

- **River Valley Mosaic**
- **Grassland**
- **Meres & Mosses**
- **Woodland (including Sprinks, Drumbles and Wet Woodland)**
- **Brownfield (Open Mosaic Habitats on Previously Developed Land)**
- **Urban Mosaic**
- **Inner Urban Core**
- **Town Centre**

The biodiversity opportunity map for the Borough of Newcastle under Lyme will form an essential component of a planning officer's checklist in establishing how a planning proposal can contribute appropriate maintenance, enhancement or restoration for local biodiversity. In addition, the map can inform the targeting of agri-environment schemes, the compilation of Neighbourhood Development Plans, development of landscape-scale initiatives and acting as part of a local plan evidence base.

1 Introduction

Biodiversity Opportunity maps are developed to show where priority habitats could be enhanced, restored or created in a particular area, county or region as a basis from which to develop policies and targets. They provide local authorities and partners with vital information in order to support a robust, climate-proof, long-term landscape-scale vision for the benefit of the natural environment, society and the economy.

Any partnerships that produce biodiversity opportunity maps must base such work on sound, ecological principles and utilise currently available material. Information available to inform biodiversity opportunity mapping will often be incomplete; limitations of the data should be understood, but not prevent biodiversity opportunity mapping taking place.[3, 10]

This work was undertaken in partnership with representatives from a number of different organisations including Staffordshire Wildlife Trust (SWT), Natural England (NE), Staffordshire County Council (SCC), Newcastle under Lyme Borough Council (NULBC), and the Environment Agency (EA).

The mapping and report compilation was carried out between Nov 2013 and Feb 2014.

2 Methodology

Firstly, focus was aimed at the key issues partners had or wanted to develop to ensure the biodiversity opportunity map was adequately informed. This involved collating and mapping information about areas that could be enhanced and areas that need protection.

The mapping was based on a landscape characterisation framework to package biodiversity information, and site-based information to indicate the degree of functional connectivity between sites. This strategic approach used a combination of landscape characterisation information to set broad environmental objectives.[3]

The work relied on widely available information sources that included Natural England's National Character Areas (NCAs) and habitat inventories such as the Ancient Woodland Inventory (AWI), Ecosystem Action Plan areas (EAPs), information from Staffordshire Ecological Record (SER) including the protected and BAP species inventory (Species of Principal Importance), UK BAP priority habitat data (Habitats of Principal Importance), various habitat mapping project data, Local Nature Reserves (LNRs), Local Geological/Geomorphological Sites (LoGS), Staffordshire Local Sites Partnership Local Wildlife Site (LWS) surveys, SCC historic water meadows maps, historic field pattern maps and Ecological Characterisation of Staffordshire, NE/Forestry Commission Agri-environment and Woodland Grant Schemes as well as local ecologists and experts.

This biodiversity opportunity mapping exercise also utilised detailed habitat information gathered from the Stoke and Urban Newcastle Living Landscape surveys which were conducted in 2013.

A full list of the datasets used as part of the evidence base for the mapping process is listed below:

Staffordshire Local Sites Partnership *Local Wildlife Site Surveys* (1996-2013)
Staffordshire Ecological Record *UKBAP Priority Habitat Data (Habitats of Pincipal Importance)*
Staffordshire Ecological Record *Protected and UK/SBAP Species Inventory Species of Principal Importance)*
Natural England *Habitat Inventories*
Natural England *Agri-environment Schemes* (1991-2012)
Forestry Commission *Woodland & English Woodland Grant Schemes* (1991-2012)
Staffordshire Biodiversity Action Plan, Third Edition (2010)
Staffordshire County Council *Historic Water Meadows Map*
Staffordshire County Council *Historic Field Pattern Maps*
Staffordshire County Council *Ecological Characterisation of Staffordshire*
Staffordshire Meres and Mosses surveys

2.1 Biodiversity Opportunity Mapping Outcome

Using the resources described, a single, strategic map (***Fig 1***) was produced to show the primary habitat characteristics and opportunities for the area. The map illustrates the objectives for biodiversity conservation and it is, in addition, easier to understand, and more interesting, than lists of figures or text. This kind of strategic mapping goes further than simply defining what is already there, but also indicates what *could* be there, and what should be there if certain targets and objectives are to be met.[11]

It was decided that a framework, based on the EAP areas, would be the best way to express this information. Therefore eight biodiversity opportunity zones were identified within the borough of Newcastle (***Fig 1***):

- **River Valley Mosaic**
- **Grassland**
- **Meres & Mosses**
- **Woodland (including Sprinks Drumbles and Wet Woodland)**
- **Brownfield (Open Mosaic on Previously Developed Land)**
- **Urban Mosaic**
- **Inner Urban Core**
- **Town Centre**

This methodology makes a direct and pragmatic contribution to setting ecologically robust frameworks for the delivery of Local Plans, Green Infrastructure Planning and climate change adaptation.[3]

The biodiversity opportunity map for the Borough of Newcastle under Lyme will form an essential component of a planning officer's checklist in establishing how a planning proposal can contribute appropriate maintenance, enhancement or restoration for local biodiversity. In addition, the map can inform the targeting of agri-environment schemes, the compilation of Neighbourhood Development Plans, and the development of landscape-scale initiatives.

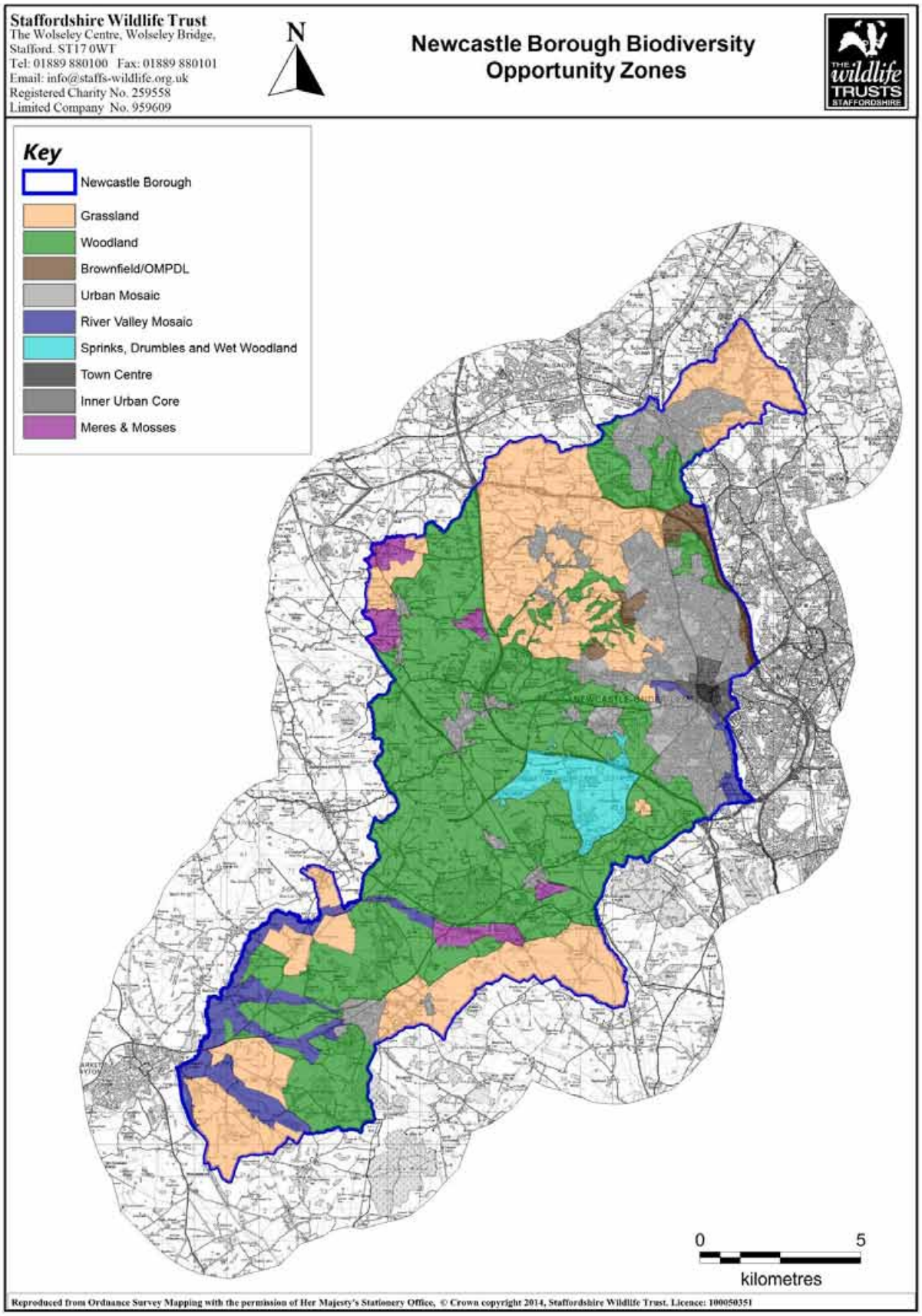


Figure 1: Biodiversity Opportunity Map for Newcastle under Lyme Borough produced from data gathered through survey as well as the ecological knowledge of organisations and individuals.

2.2 Landscape-scale and the Big Picture

The landscape-scale approach to nature conservation and the importance of having coherent and resilient ecological networks, identified via biodiversity mapping, were highlighted as key recommendations of the Making Space for Nature report.[7]

Ecological networks have become widely recognised as an effective response to conserve wildlife in environments that have become fragmented by human activities. An ecological network comprises a suite of high quality sites which collectively contain the diversity and area of habitat that are needed to support species and which have ecological connections between them that enable species, or at least their genes, to move.[7]

Some of the recommendations concerning the planning for biodiversity from Making Space for Nature were adopted in the National Planning Policy Framework (NPPF).[4]

NPPF highlights the importance of landscape-scale conservation. Bullet point 117 (page 27) of the NPPF, makes reference to planning for biodiversity at a landscape-scale across local authority boundaries and connecting international/national/locally designated sites of biodiversity importance, and areas identified by local partnerships for habitat creation or restoration.[4]

The current biodiversity opportunity mapping encompasses the entirety of Newcastle borough, an area totalling approximately 21,030 hectares. Due to the large size of the area, the borough was considered in terms of the geographical distribution of habitats and their accompanying species. During the mapping process, elevation, topography, landscape, geology and natural processes such as river systems were considered. All of these factors influence the distribution of wildlife and natural features. The National Character Areas (NCA's) and Ecosystem Action Plan areas (EAP's) areas were essential resources for this strategic landscape-scale approach as they provide a method that is used to classify, describe and understand the evolution and physical and cultural characteristics of a landscape.[3] NCA coverage for East Cheshire, Shropshire and Staffordshire as well as Newcastle under Lyme Borough is shown in ***Fig. 2***.

Two NCA's are currently present within Newcastle under Lyme Borough (***Fig. 3***), the Shropshire, Cheshire and Staffordshire Plain covers the majority of the Borough in the south and west and the Potteries and Churnet Valley covering the urban areas of Newcastle and Kidsgrove to the east and north.

The Biodiversity Opportunity Map produced for Newcastle under Lyme Borough took into account the primary biodiversity opportunity areas in neighbouring local authorities within Staffordshire. (***Fig. 4***)

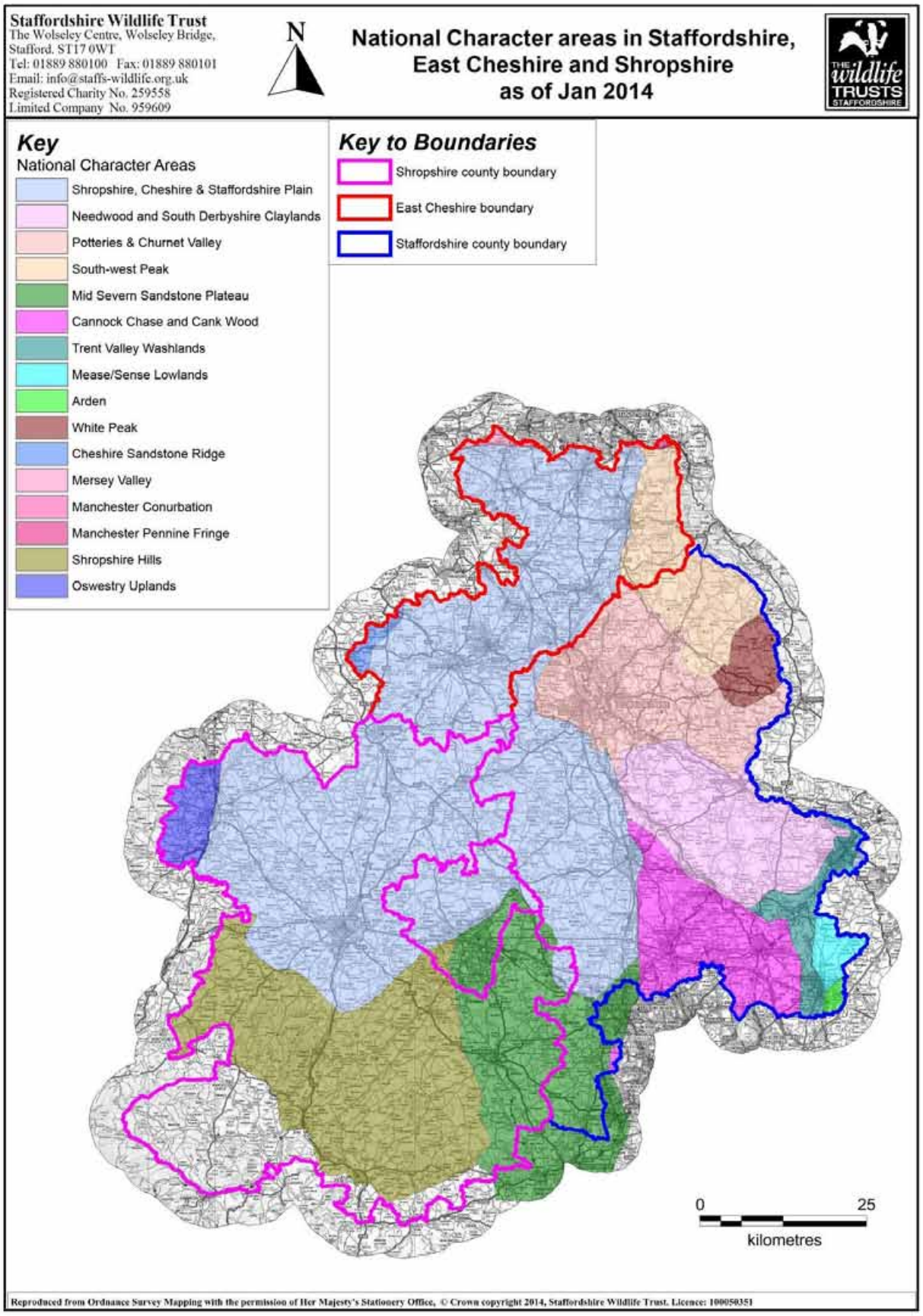


Figure 2: Natural England's National Character Areas within the counties of Staffordshire, Shropshire and the eastern half of Cheshire as of January 2014

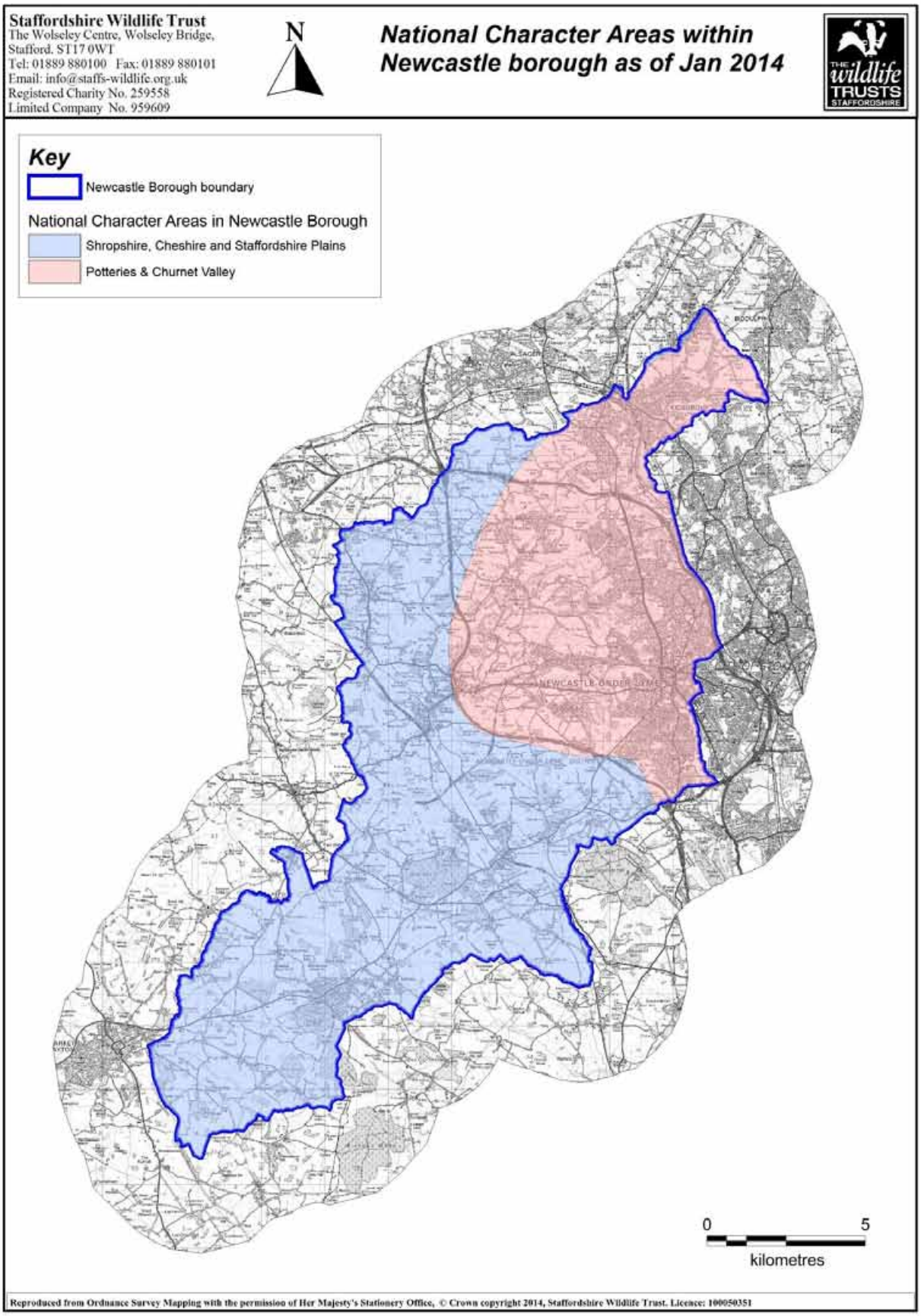


Figure 3: Natural England's National Character Area coverage within the Newcastle under Lyme Borough

2.3 Staffordshire and UK Biodiversity Action Plan

The third edition Staffordshire Biodiversity Action Plan (SBAP) aims to prioritise conservation management at a landscape level and contribute to local, regional and national conservation targets by replacing Habitat and Species Action Plans with 14 Ecosystem Action Plans (EAPs) and one Rivers Action Plan in the county.[13] (***Fig 5***)

Four EAP' areas are present within Newcastle Borough (***Fig 6***); The Wooded Quarter comprises the majority of the Borough at 15,000 ha. The Meres and Mosses EAP area is small and isolated, encompassed by the Wooded Quarter. Urban covers the majority of the conurbation of Newcastle and Kidsgrove with Species-rich Farmland only accounting for a small proportion of the borough in the north.

Part of the Meres and Mosses of the Marches Nature Improvement Area (NIA) occurs within Staffordshire (***Fig 7***), incorporating two important Meres and Mosses sites as well as bordering a third within the county. The majority of this NIA is predominantly located in Cheshire and Shropshire and includes many nationally important sites.

The Joint Nature Conservation Committee (JNCC) identified a set of priority habitats and species as being nationally threatened and requiring conservation[6]. There are currently 65 habitat types on the UKBAP priority list, of which, a number occur in Newcastle Borough. The Natural Environment and Rural Communities (NERC) act of 2006 highlighted 56 Habitats and 943 Species of Principal Importance which require action as designated through the UK Biodiversity Action Plan and continue to be considered as conservation priorities after the post-2010 Biodiversity Framework[8]. Opportunity mapping was informed based on available habitat information highlighting where these habitats do or are likely to exist. (**Appendix 1**)

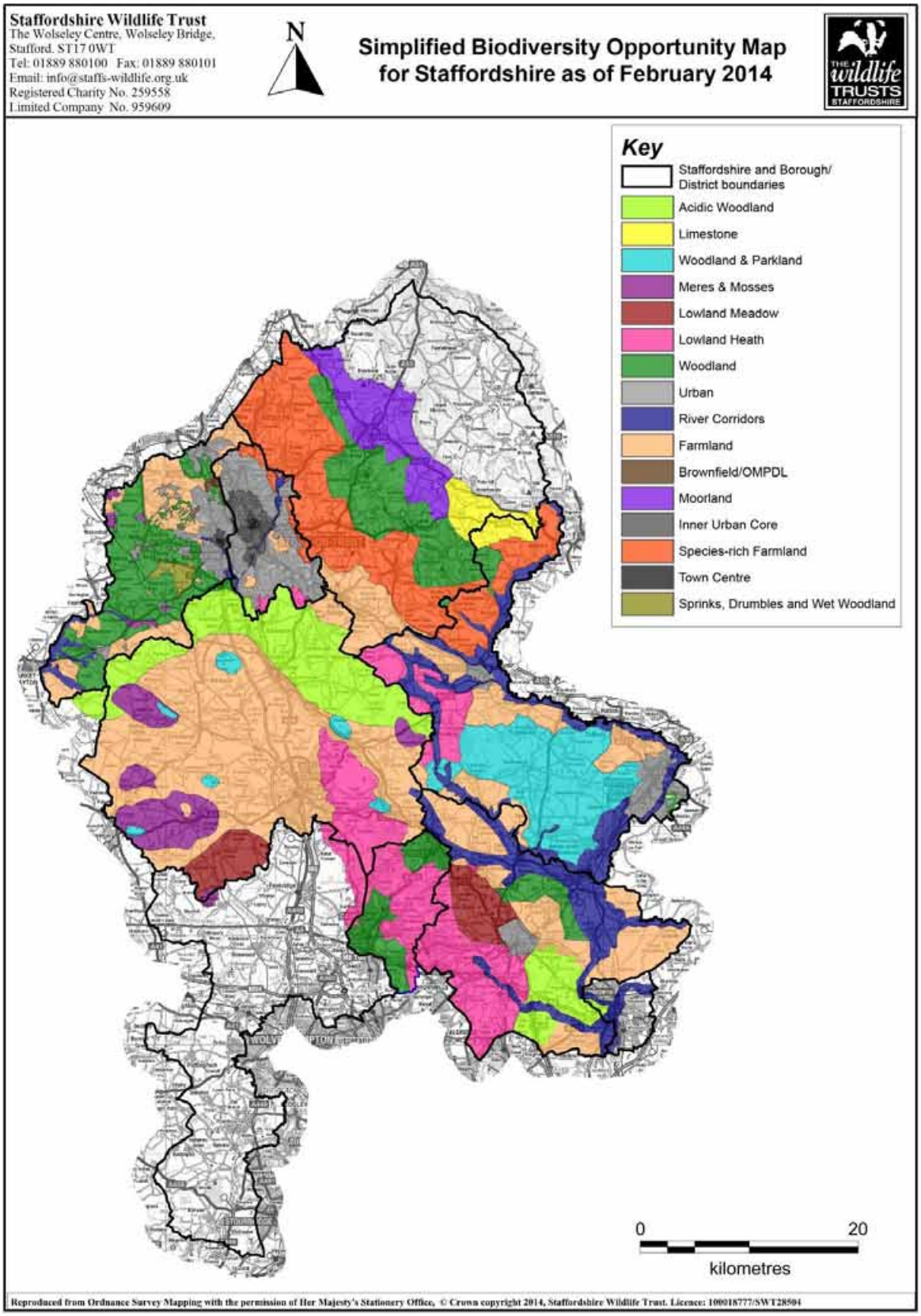


Figure 4: Biodiversity Opportunity Zones in Staffordshire (January 2014)

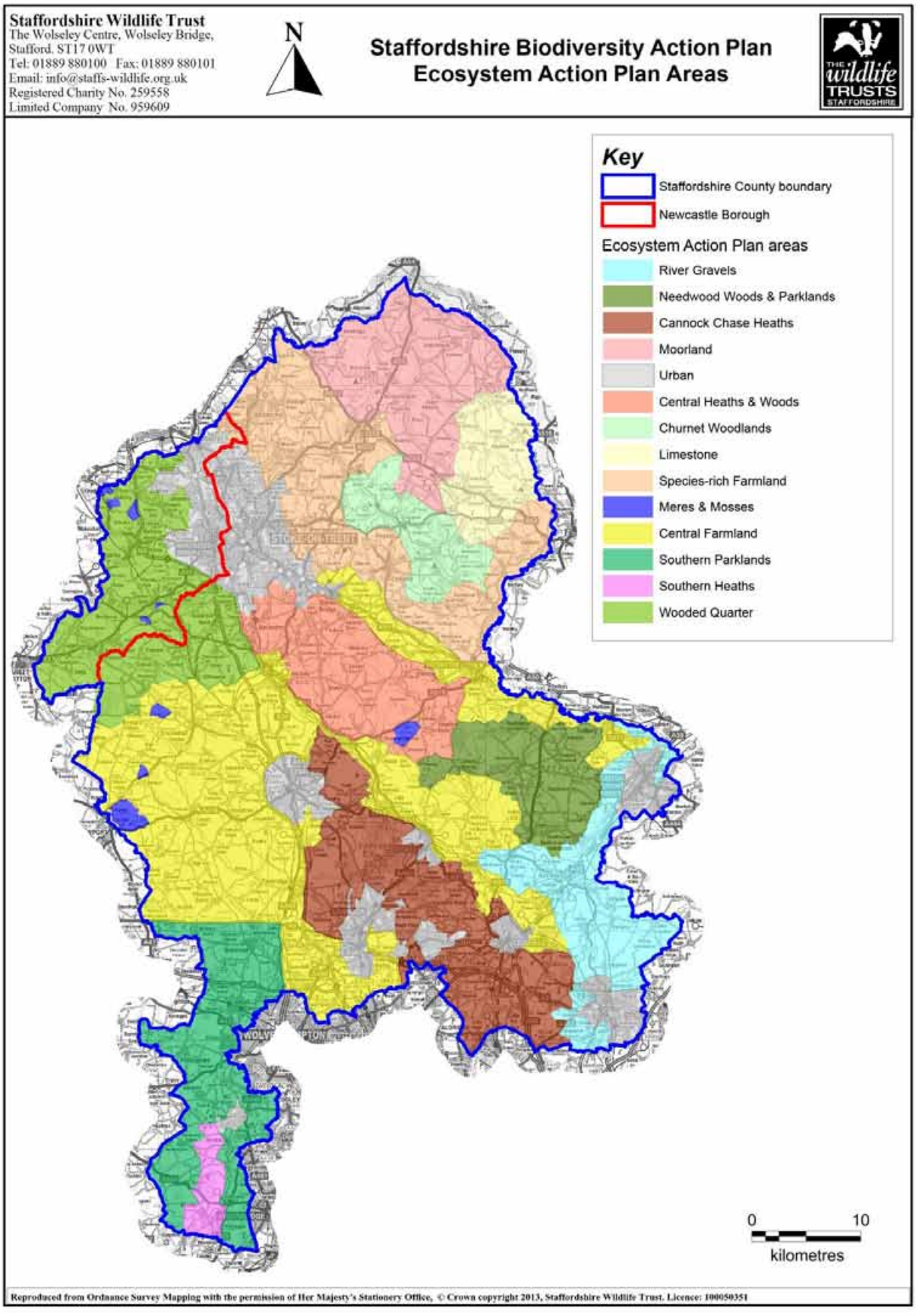


Figure 5: Staffordshire Biodiversity Action Plan (SBAP) Ecosystem Action Plan (EAP) areas for Staffordshire County with Newcastle under Lyme Borough highlighted in red

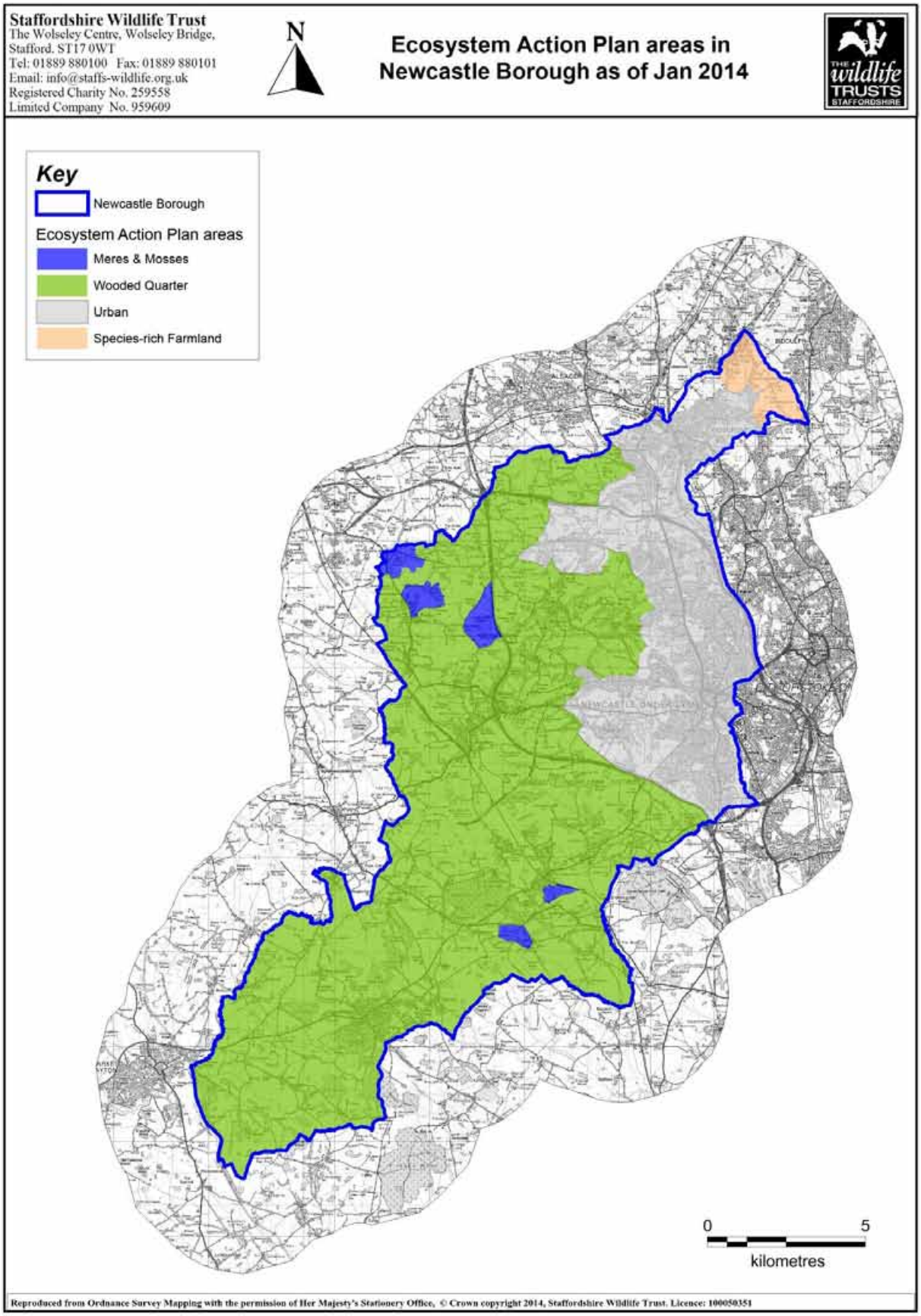


Figure 6: Ecosystem Action Plan areas within Newcastle under Lyme Borough

2.4 Information from the Local Record Centre

Staffordshire Ecological Record (SER), the local ecological record centre for the county, was used as a critical source of information which is of particular value because of its local knowledge base. The record centre holds information on internationally, nationally and locally designated sites such as AWI sites, LWSs, LNRs, LoGS, International and UK Statutory sites, protected and UK BAP and SBAP priority species and habitats (Species and Habitats of Principal Importance) as well as more general information of importance for biodiversity conservation.

2.5 Local Ecologists and Naturalists

The knowledge of local ecologists and representatives from local organisations was sought, in partnership with the Borough Council, and was key in identifying and fine tuning the Biodiversity Opportunity zones.

Evaluation at larger scales provides a strategic context for local action while local validation and refinement helps to deal with any uncertainties.[3]

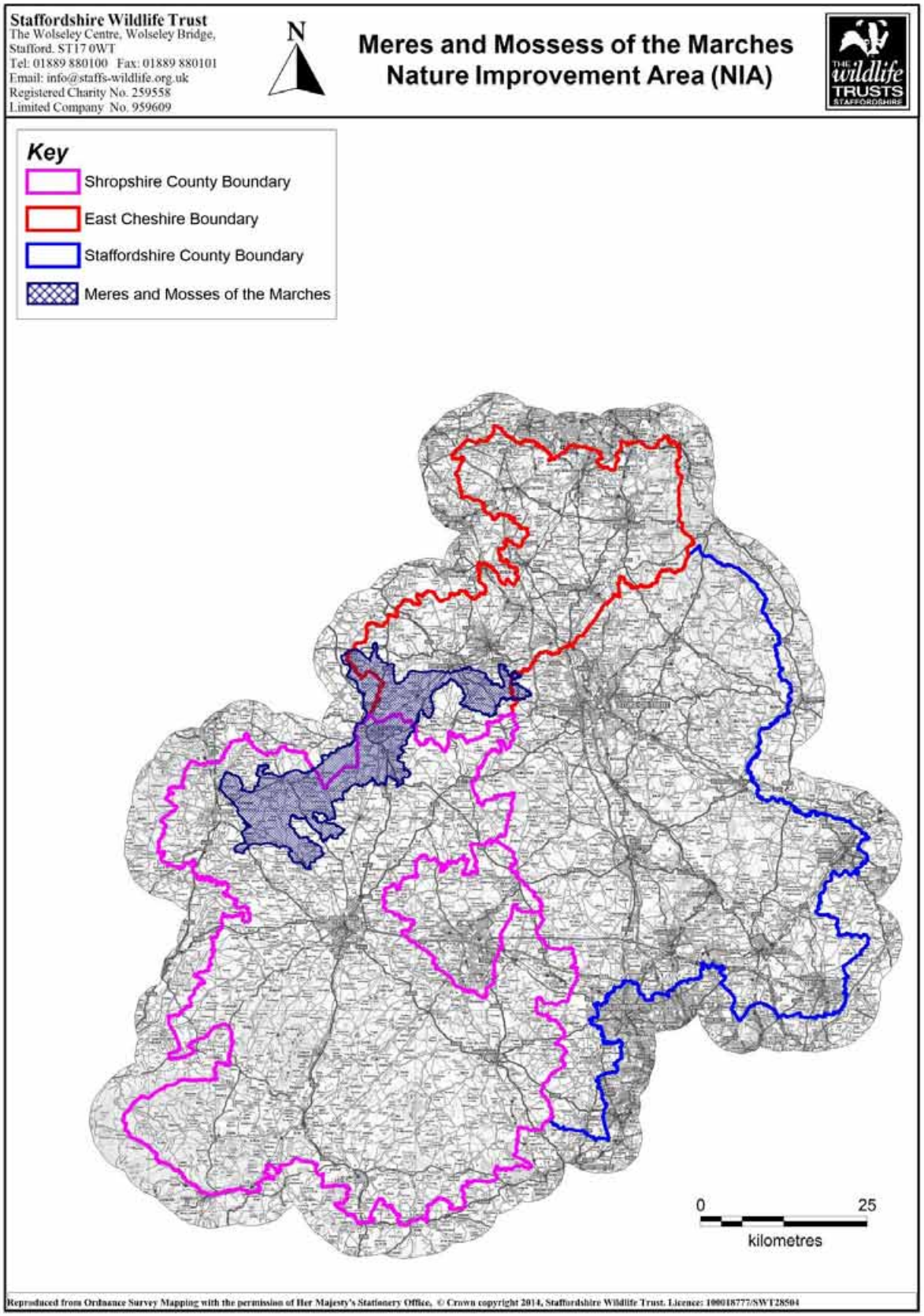


Figure 7: Meres and Mosses of the Marches Nature Improvement Area (NIA) within Staffordshire, Shropshire and east Cheshire

2.6 Implementation of the Biodiversity Opportunity Zones

From the planning perspective, the biodiversity opportunity zones for Newcastle under Lyme Borough are designed to inform and guide the prioritisation and location of habitat maintenance, restoration and creation across the Borough.

Any prospective planning application should be viewed in conjunction with the biodiversity opportunity zones, as well as the Staffordshire Biodiversity Action Plan. Further guidance on appropriate levels of mitigation can also be sought from Staffordshire Wildlife Trust.

In addition, the implementation of the biodiversity opportunity mapping zones will assist with the identification and designation of additional sites to the suite of Local Wildlife/Geological/Geomorphological Sites in the Borough.

2.7 Geological factors influencing Biodiversity opportunities

When conducting the mapping exercise it was discussed that a Coal Measures and Claylands opportunity zone could possibly be identified to package habitats influenced by the extraction of Clay and Carboniferous deposits in the past. The geological sub-divisions of Carboniferous strata, namely the Coal Measures and Barren Measures were combined into one group for ease of classification, and do generally differ from deposits of Triassic Sandstones further south in the Borough.

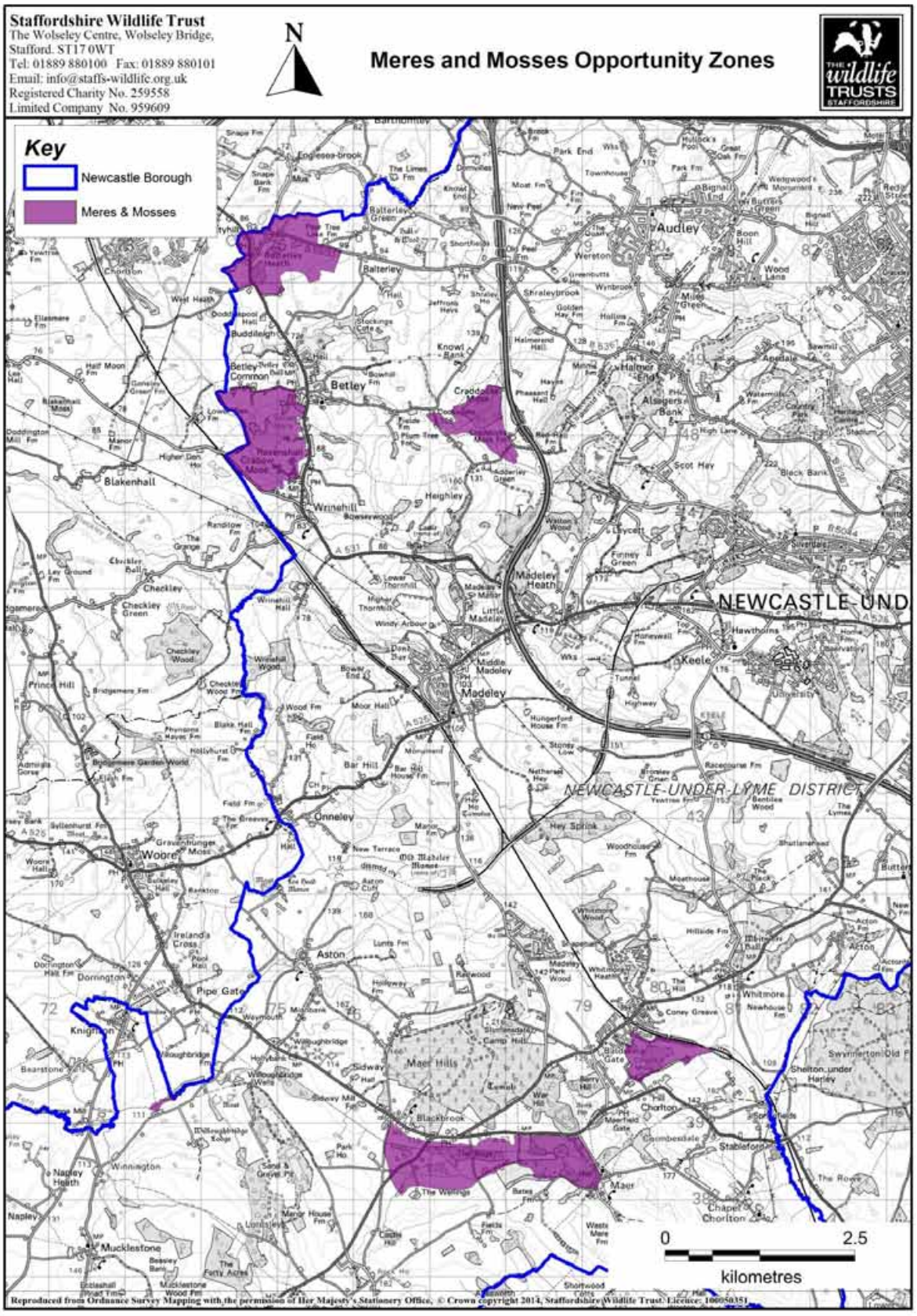
The underlying geology of the northern half of Staffordshire primarily consists of Carboniferous rock in the form of Limestone, Millstone Grits, Coal Measures and Barren Measures, partially covered with a veneer of Late Glacial sediments. The geology of Stoke-on-Trent and Newcastle under Lyme Borough was an important economic driver in the past; the expansion and collapse of the coal and ironstone mining industry in the 18th and 19th century along with the extraction of clay deposits for the pottery industry from the Coal Measures and the Barren Measures has given rise to the landforms that are observed over much of Newcastle under Lyme today, and have greatly influenced the biological and ecological diversity of the Borough.

The extent of the Coal Measures in North Staffordshire extends from Mow Cop down to Silverdale (**Appendix 2**). The rural/urban fringe contained the greatest intensity of mining practices in the past particularly areas around Chatterley, Apedale, Silverdale, and Alsagers Bank. These areas now exhibit a mixed habitat structure, likely as a culmination of the past practices and their aftermath management, the mixture of substrates present within the Coal Measures and any heavy metals and other ground contaminants contained within spoils.

The Coalfields and Claylands area of the Borough is not easily defined as an opportunity area due to the fact that there is no single unifying habitat that it best supports and is not a habitat in itself. The fact that this geological feature has greatly influenced the ecology and biology of the Borough in a host of different ways is of significant importance from a biodiversity and geodiversity standpoint. The areas of the borough which the Carboniferous Coal Measures cover contain a great diversity of habitats existing on different substrates, or both bedrock and glacial sediments, much of which have been altered by human practices in the past. It is the habitats present which are of primary concern from a biodiversity standpoint, but recognising the role in which the County's geodiversity has played in their formation is important in understanding their future management and habitat creation suitability.

3 Newcastle-Under-Lyme Borough Biodiversity Opportunity Mapping Habitat Zones.

3.1 Meres & Mosses Opportunity Zone



3.1.1 Brief Outline of Zone

The Meres and Mosses are part of a wider Midland Meres and Mosses complex across Shropshire, Cheshire and Staffordshire, as well as being included in the Nature Improvement Area (NIA) 'Meres and Mosses of the Marches'. Of sites within the borough Black Firs & Cranberry Bog and Betley Mere are included under the European designated Midland Meres and Mosses Ramsar sites. Both of these sites are designated as SSSIs along with a further site, Maer Pool which is outside the Midlands Meres and Mosses Ramsar sites. Other sites included within the Meres and Mosses opportunity areas are Chorlton Moss, The Bogs and Craddocks Moss, all of which are designated Local Wildlife Sites.

Image 1: Black Firs and Cranberry Bog. ©SWT

Meres are water bodies in hollows formed during the retreat of the last glaciers. They are often associated with a variety of wetland habitat types which illustrate natural progressions from open water through swamp and fen habitats, to wet willow or alder woodland, which in turn are associated with a large diversity of insects. Mosses are bog communities also developed in glacial hollows, which similarly provide a habitat for an extensive range of rare and highly specialised plants and animals. Mosses develop

where a build-up of peat produces very acidic conditions. A number of 'moss' types have developed either over extensive areas as a shallow dome or in smaller basins. Their relationship with the meres can be seen where a floating raft of mosses covers a remnant lens of water. Such 'schwingmoors' are rare internationally, Newcastle-under-Lyme Borough possessing 1 of 2 in Staffordshire in Cranberry Bog. The Borough contains more Meres and Mosses sites than any other district/borough in the county and these are of significant importance at local, county, national and international scales.

These important sites occur as isolated parcels within the Borough, and due to their geographic spread the surrounding environments are variable. However, most are associated with a wetland complex beyond the lowland raised bog and eutrophic standing waters and are an integral part of a larger catchment area.

3.1.2 Staffordshire Biodiversity Action Plan (SBAP) Priority Habitat Types Within Zone

(Further information on SBAP priority habitat types and species can be found on the SBAP website (http://www.sbap.org.uk).

Native Woodland, Wet Woodland, Lowland Acid Grassland, Lowland Heathland, Lowland Wet Grassland, Un-improved Neutral Grassland, Mosses, Ponds, Lakes and Canals, Reedbeds, Rivers and Streams.

3.1.3 SBAP Priority Species

Otter, Water Vole, Barn Owl, Snipe, Lapwing, Grass Snake, Great Crested Newt, Pipistrelle Bat, Yellowhammer.

3.1.4 Issues and Objectives for Zone

The primary objective for this habitat type within the borough is the maintenance, restoration and expansion of wetland complexes, with particular emphasis on the mosses resources.

Further objectives for this habitat type within the borough are to increase connectivity of semi-natural habitats in order to create larger habitat complexes using priority habitats where-ever possible, as well as aiming to encourage and promote appropriate management of the immediate catchment areas of wetlands to increase site sustainability, resilience to environmental change and improve biological water quality. Catchments of particular concern are those along the River Tern, Black Firs & Cranberry Bog and Maer Pool.

Each site will have some specific management requirements to maintain or restore the priority habitat quality; there are some unifying core issues that can be addressed. Tackling these on a landscape scale is critical to the robustness and long term future of Meres & Mosses within Newcastle under Lyme Borough and surrounding districts, boroughs and counties, particularly in view of the threat from climate change and the changing dynamic of urbanisation and usage of agricultural land.

Issues

- Fragmentation of semi-natural habitats through further loss due to land use change and the intensification of agriculture.
- Hydrological changes, particularly a lower water table as a result of artificial drainage or abstraction which has occurred in the past.
- Siltation of some meres from increased cultivation along inflow streams and erosion along banks of watercourses.
- Increase in diffuse pollution due to agricultural intensification
- Need for updated management plans and agreements with land owners and users
- Isolation of sites leading to impoverishment of communities and stagnation of the genetic variation within populations of plants and animals
- Afforestation leading to the direct loss of habitat and the drying out of adjacent land due to increased water uptake.
- Invasive species
- Education and interpretation of sites, their habitats, species and the natural processes which they demonstrate

Broad Opportunities

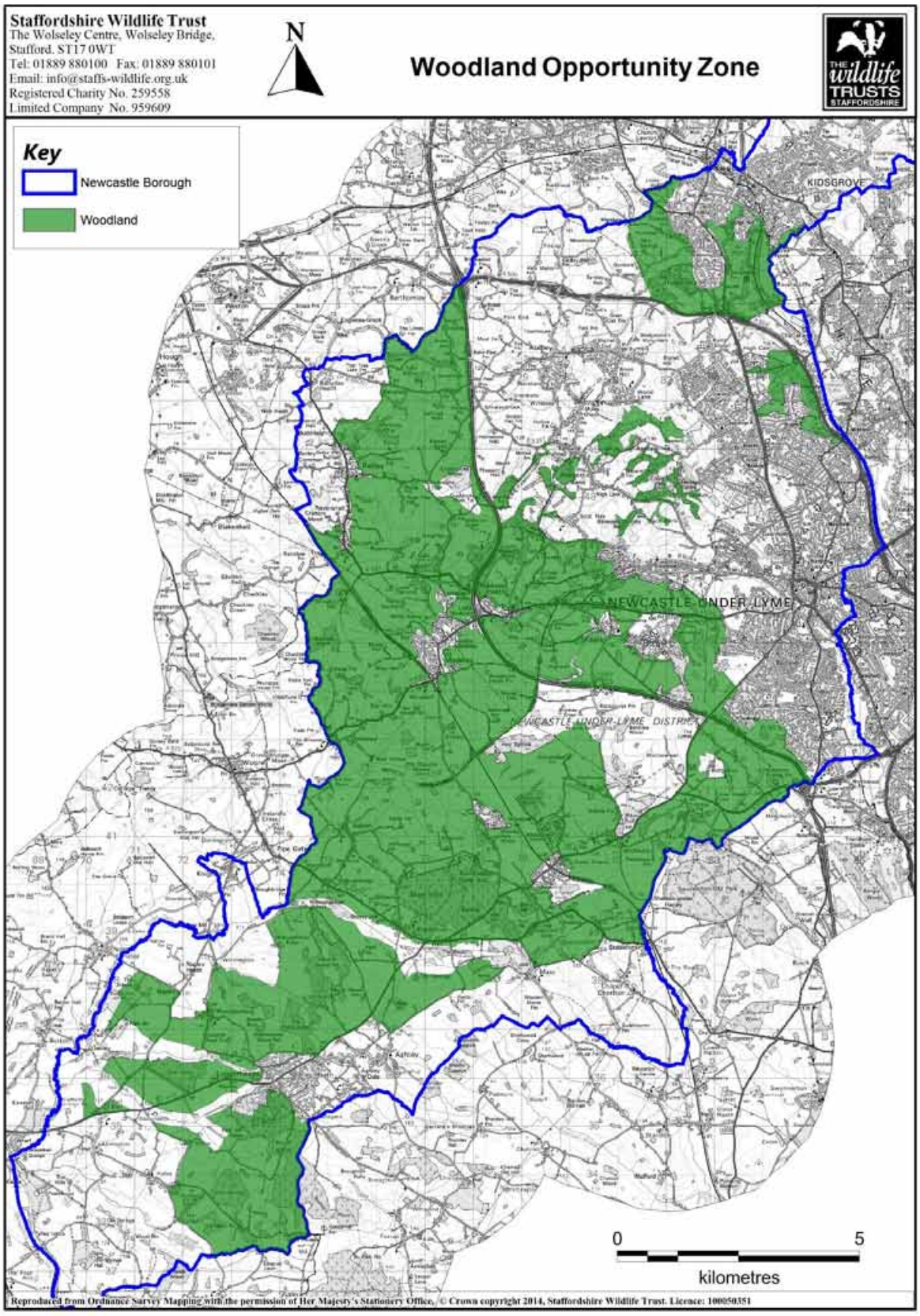
- Encourage uptake of agri-environment schemes, as there will continue to be opportunities for landowners to increase, connect and manage new and existing habitats through this mechanism.
- Secure appropriate management to ensure there is resilience to environmental change and safeguarding the future health of sensitive sites.
- Working at a sub catchment scale with surrounding landowners to tackle water quantity and quality issues
- Creation or expansion of buffer zones around all sites to minimise the direct impact of pollution, enrichment and encroachment from site edges
- The use of Sustainable Drainage Systems (SuDS) to both create new and mantain existing areas of habitat and achieve favourable conditions for several sites.
- Expand priority BAP habitats, develop an ecological network, assist with climate change adaptation and in turn meet UK and local targets
- Limit and translocate the discharge of combined sewer outflows where they will affect sensitive sites, as well as targeting an increase in usage of natural measures such as reed bed filtration where it does not affect other habitats of value.
- The Local Wildlife Sites Partnership is critical to deliver semi-natural habitat protection with a local designation to safeguard and increase the quality of existing sites of county importance.
- Sympathetic planting and management of woodland so as not to cause any more damage to existing biodiversity interest within Meres & Mosses – particular importance as most sites are surrounded by the wooded quarter opportunity area.

Targeted Opportunities

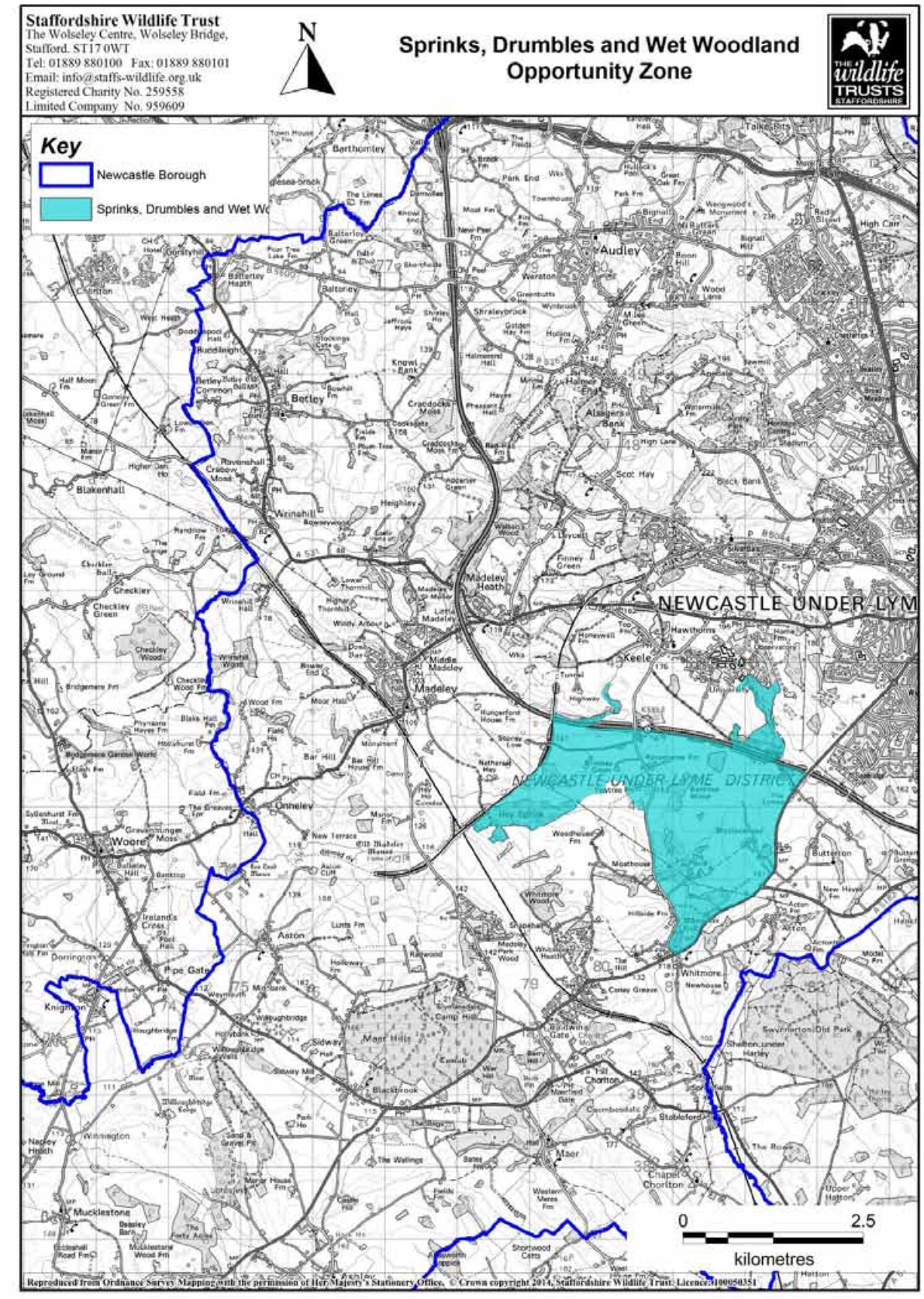
- Improve condition of Maer pool and improve water quality along the length of the River Tern and its catchment and control discharges into watercourses.
- Improve water quality of Betley Mere through restoration, as well as securing further beneficial management through communication with landowners and other relevant bodies.
- Rectify issues surrounding chronic poor water quality in both the Tern and areas around Jamage/Talke where watercourses flow through several diverse sites.

- Restoration and Improvement of existing biodiversity interest at Chorlton and moss to ensure more favourable conditions and improve resilience to environmental change.
- Sympathetic management of Craddocks moss along with monitoring schemes to gauge the success of said management in terms of biology and hydrology.
- Implementation of sustainable rural drainage systems particularly in areas with poorer water quality to attempt to improve aquatic diversity as well as provide benefits through ecosystem services.
- Connect pond networks such as the Lordsley pond network, and the swathe of small in-field ponds to the south of Madeley to connect and buffer existing biodiversity interests and create a more resilient habitat system.

3.2 Woodland (inc. Sprinks Drumbles and Wet Woodland) Opportunity Zone



Sprinks, Drumbles and Wet Woodland Sub-compartment



3.2.1 Brief Outline of Zone

The woodland opportunity area covers the majority of the Borough and extends to its extreme western and southern extents. The Woodland opportunity zone occupies the northern section of the Shropshire, Cheshire and Staffordshire Plain National Character Area, with a small proportion within the Potteries and Churnet Valley NCA (***Fig 2&3***).

Image 2: Bluebells in woodland near Keele. ©SWT

The woodland opportunity area sits within a distinctive region of sandstone hills; at its core is an area of strongly rising landform, culminating in the Maer and Hanchurch hills, with their extensive conifer plantations and remnant heathland character. There are large Forest Enterprise woodlands, at Burnt Wood and similar privately owned commercial woodlands on the Maer Hills. The Maer Hills plantation possibly occupies former heathlands; Burnt Wood contains areas of both semi-natural ancient woodland which attains SSSI status and areas of ancient replanted woodland. The maturities of woodland throughout the borough are very mixed with many young planted woodlands or woodlands in early successional stages or toward the north. The decline of industry in Stoke and Urban Newcastle has left many interspersed parcels of trapped remnant semi-natural woodlands. In the more rural areas of the borough woodlands are still

relatively fragmented however there are more frequent larger blocks of both planted and semi-natural stands.

Image 3: Wet and dry woodland ground flora in early spring in a woodland just south of Keele ©SWT

The Woodland and Grassland Zones interweave in the areas surrounding Silverdale and Apedale creating an area of significant ecological and structural diversity with significant proportions of both semi-improved neutral grassland and semi-natural broadleaved woodland present.

The Sprinks, Drumbles and Wet Woodland Opportunity Zone is a specific sub-compartment of the larger Woodland Opportunity Zone due to the high density of this habitat type in this area. They are usually relic semi-natural ancient woodlands where water is an integral part of their ecology. This part of the Woodland Opportunity Zone is located to the south of Newcastle Town Centre and still occurs within the wooded quarter EAP and the Shropshire, Cheshire and Staffordshire Plains NCA. Sprinks and Drumbles are found throughout the whole county and generally consist of a canopy of mixed deciduous trees with a single, or several streams flowing through the main body

of the woodland and associated wet ancient woodland ground flora. These woodlands are typically located in valleys, sometimes containing a mixed species canopy. Streams flowing through the valley bottom and sometimes include features such as small waterfalls or weirs as well as small pools and ponds, and there is generally ground flora species associated with wet woodlands. Where the valley is steep, the upper and lower slopes of the valley may differ in species composition with species tolerant of wetter conditions thriving in the lower slopes and species less tolerant in the higher areas.

Image 4: Wild Garlic in a Newcastle woodland. ©SWT

3.2.2 SBAP Priority Habitats Within Zone

Lowland Wood Pasture and Parkland, Native Woodland, Wet Woodland, Ancient/ Diverse Hedgerows, Lowland Acid Grassland, Lowland Heathland, Lowland Wet Grassland, Ponds, Lakes and Canals, Reedbeds, Rivers and Streams.

3.2.3 SBAP Priority Species

Pipistrelle Bat, Noctule Bat, Otter, Hazel Dormouse, Water Vole, Skylark, Woodlark, Ring Ouzel, Barn Owl, Great Crested Newt and Grass Snake.

3.2.4 Issues and Objectives for Zone

The primary habitat objectives within the opportunity area are the maintenance, restoration and expansion of Wood-Pasture, Parkland and Native Woodland. Lowland heathland/acid grassland complexes are also important in the area as are wetland associated Ponds and Pond networks, Coastal Floodplain Grazing Marsh and Lowland Meadows.

The other objective in the area is to increase connectivity of semi-natural habitats to create larger habitat complexes using priority habitats wherever possible. New hedgerows, field margins and woodland extension will be key to achieving this objective.

There are a diverse range of challenges for woodland opportunities within the borough from its proximity to a large conurbation, the intensification of agriculture and the need to revert land to potentially less productive or less popular habitats in order to maintain sensitive and threatened priority habitats. It is crucial that wetland areas, including drainage systems are managed at least on a sub-catchment scale to protect and buffer any effects on Meres & Mosses sites. It will also be critical to manage the reversion of coniferous plantations to their former habitats to provide adaptation measures to climate change as well as increase the coverage and connectivity of priority habitat within the borough.

Issues include:

- Habitat loss through urban encroachment and infrastructure development
- Loss and fragmentation of semi-natural habitats due to urban development or from the intensification of agriculture, in particular lowland heathlands, lowland meadows and floodplain grazing marsh
- Improved drainage which, along with infill, encroachment and mismanagement, has resulted in the loss of field ponds, bogs, and mosses.

- Increase in diffuse pollution due to agricultural activity
- Threats to quantity and quality of woodlands through diseases such as *Phytophthora* and *Chalara fraxinea* (Ash Dieback) potentially amplified by issues with biosecurity.
- Encroachment of non-native and invasive species such as Rhododendron and Japanese Knotweed into semi-natural ancient woodlands reducing biological diversity.
- Woodlands have been felled locally and replaced with conifers or new conifer plantations have been planted with the subsequent loss of semi-natural habitats, especially lowland heathland.
- Disposal by national organisations of land containing high quality semi-natural habitat, such as Nature Reserves and SSSIs.
- Deterioration of hedges through over-cutting or neglect and a decrease in the number of hedgerows and hedgerow trees as field size increases
- Variable concentrations of priority habitats throughout the area with large tracts of impermeable agricultural and urban landscapes which are potentially significant barriers to the creation of semi-natural networks
- Difficulty in identifying the extent of priority features critical for connectivity at this scale due to the amount of time necessary to carry out survey.
- Woodlands with significant biological diversity close to large urban populations can be negatively affected by fly tipping/fire damage.
- Major roads potentially acting as a barrier for biodiversity connectivity.

Opportunities include:

- Where no other solution is viable and development has a negative impact on semi-natural habitats there needs to be opportunities to ensure mitigation goes beyond the minimum and makes a real and positive contribution to the creation of new sites and networks.
- Biodiversity, connectivity and climate change adaptation measures could be secured through green infrastructure implementation and development mitigation.
- Development of new landscape scale ownership and delivery partners to retain management control over high quality biodiverse landscapes.

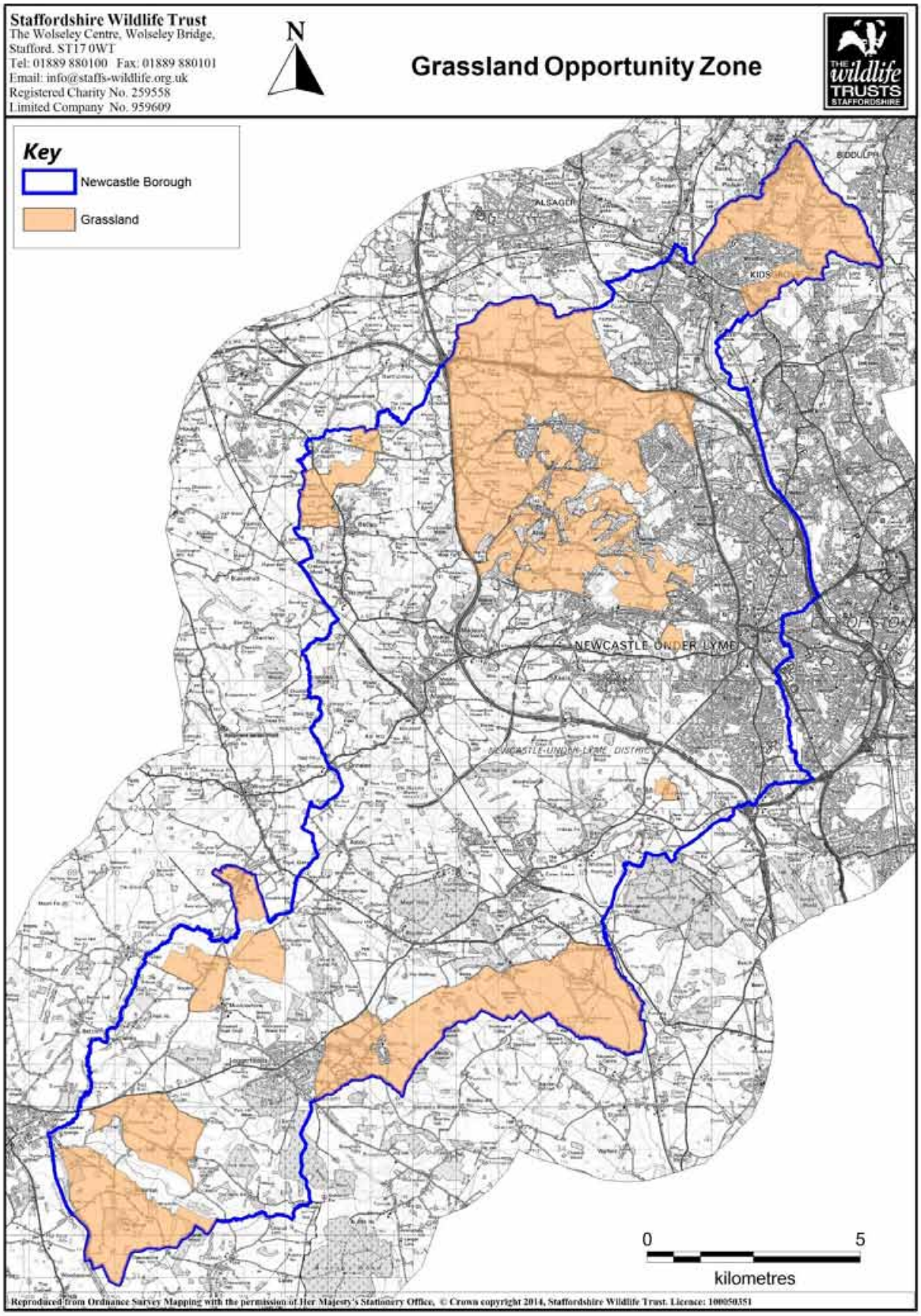
- Thinning of conifer plantations on Planted Ancient Woodland (PAWs) sites to revert back to broadleaved woodland.
- Landscape scale removal of conifer plantations on heathland inventory sites and expansion of the heathland resource on a scale that ensures it is robust enough to withstand eradication through climate change (minimum 30ha blocks with links to other sites).
- Clearance of diseased trees to increase structural and biological diversity of woodlands as well as continued monitoring to track the spread of diseases.
- Develop an ecological network to assist with climate change adaptation and in turn meet UK and local targets
- Where planting of woodland takes place ensure it is of benefit to surrounding habitats and ensure that species used are native and appropriate in a landscape context.
- Improve habitat connectivity for key species as well as the provision of good quality habitats to ensure the longevity of species presence in the area.
- The Local Wildlife Sites Partnership is critical to identify and deliver semi-natural habitat protection with a local designation to safeguard and increase the quality of existing sites of county importance.

Specific opportunities

- Protection of the woodland, grassland and open mosaic habitats surrounding Apedale to conserve structural diversity and maintain current levels of biodiversity.
- Using developments both in urban and rural locations to promote the creation of orchards and parkland sites and implement traditional management as well as targeting woodlands as an educational resource.
- Work with minerals operators to secure priority habitat creation through restoration and to ensure long term management for biodiversity.
- Sympathetic management of habitat corridors in and around Loggerheads to maintain and enhance habitat connectivity specifically for Dormice.
- Thinning of conifer plantations in areas such as Maer hills and Burnt Wood to increase the quantity and quality of semi-natural broadleaved woodlands.
- Decrease cover of Rhododendron in Burnt Wood in order to improve plant disease control, and contribute to an increase in biological diversity.

- Focus on features of particular connectivity importance such as dismantled railways in Audley and Alsagers Bank which provide good opportunities for habitat creation and connectivity.

3.3 Grassland Opportunity Zone



3.3.1 Brief Area Description

Farmland covers a significant proportion of Newcastle under Lyme Borough with the dominant use appearing to be pasture with grasslands cut for silage and hay and areas of arable land on more productive ground. In terms of Ecological Characterisation, there is a distinct change throughout the Borough, with grassland areas in the north and surrounding the conurbation of Newcastle predominantly exhibiting an irregular field size existing on a wide range of soil types, many of which are in post-industrial areas. There is a mixed sward diversity with improved pasture intermixed with meadows of reasonable diversity. Small areas of dry heath and acidic grassland are present around Mow Cop and in some brownfield sites around Kidsgrove.

Image 5: Large fields of improved grassland near Butterton© SWT

The central and southern areas of grassland within the Borough have a more regular large field pattern and consist predominantly of pasture with limited diversity. Many relatively large dairy units are present in this area; the fields are generally bordered by hedges, however for the most part these are species poor and heavily managed; some boundaries are replaced with post and wire fencing. Hedgerow trees seem to be an ecological feature associated with the central and southern areas of the borough with significant numbers being present in hedges along road verges. There are some small

patches of less improved grassland throughout however, but these are isolated which will potentially have an impact upon their condition.

Woodland cover within this zone can be small broadleaved or conifer plantations with linear woodland along stream corridors and ridge tops. Urban and industrial expansion and collapse appears to have left relic parcels of woodland around many of the areas surrounding Newcastle; particularly Apedale and Alsagers Bank, and some replanting of broadleaved woodland has occurred as well as significant amounts of scrub growth in areas where management has been neglected. Several sites around Silverdale, Apedale and Bateswood are now active conservation areas with high biodiversity value possessing grassland communities of various diversities and under differing management regimes as well as both planted and semi-natural woodland at differing successional stages.

Image 6: Southern Marsh Orchid in species-rich grassland near Halmer End ©SWT

The southernmost areas of grassland within the Borough vary from large intensive mixed units, to collections of smallholdings. Small watercourses seem to be present in much of the landscape, with the catchment of the River Tern and other associated

watercourses such as the Coal Brook and the Meece Brook along with numerous drainage ditches and small infield ponds and pools.

There are small remnant patches of un-improved grassland just south of Newcastle itself which are largely surrounded by improved agricultural land of relatively low biodiversity interest. Areas such as this are the only fragments of land still present following agricultural improvement and urban/industrial expansion within Newcastle and are very good examples of traditionally managed species-rich grassland.

Image 7: Species-rich grassland along the Lyme Brook. ©SWT

3.3.2 SBAP Priority Habitats

Lowland Wood-pasture and Parkland, Native Woodland, Wet Woodland, Ancient/Diverse Hedgerows, Arable Field Margins, Lowland Acid Grassland, Lowland Heathland, Lowland Wet Grassland, Unimproved Neutral Grassland, Ponds Lakes and Canals, Reedbeds, Rivers and Streams.

3.3.3 SBAP Priority Species

Brown Hare, Noctule Bat, Otter, Pipistrelle Bat, Water Vole, Barn Owl, Farmland Seed-eating Birds, Grey Partridge, Lapwing, Skylark, Snipe, Grass Snake, Great Crested Newt, Ground Nesting Solitary Bees and Wasps.

3.3.4 Issues and Objectives for Zone

The primary habitat objectives are the maintenance, restoration and expansion of species-rich grasslands, particularly Lowland Meadows and also Lowland Heathland where applicable.

The secondary objectives in the for this opportunity zone are to address the long term management practices associated with retaining grassland of a high biological diversity through methods such as agri-environment schemes and seek benefits through ecosystem services to attempt to change perspectives toward farming for the environment. Landscape scale improvements for biodiversity should be targeted toward reducing political restrictions associated with the conservation of large areas of land.

The conservation and creation of field boundaries along with grassland of high ecological value is of high environmental concern. The opportunity zone harbours a range of issues that can present both challenges or opportunities and these are largely based around changes in agricultural practices or land use.

Issues include

- Fragmentation of semi-natural habitats and further loss due to land use change and the intensification of agriculture.
- Increase in stock control fencing and the decline of well-maintained hedges of significant ecological value.
- Traditionally farmed land is less productive and provides a lower income to intensively farmed land.
- Increase in diffuse pollution due to agricultural activity.
- Management techniques and methods involved with the management of traditional grasslands may not be cost or time effective when carried out in conjunction with more intensive practices.

- Quarries can have a negative impact on priority habitats and species in a number of ways including destruction of semi-natural habitats, increasing fragmentation of sites, increase in infrastructure requirements such as roads.
- Proximity to a major conurbation and planned expansion of rural towns increases development pressure.
- Fly tipping and issues with the disposal of waste, degrading areas of high quality habitat in close proximity to the urban areas of Newcastle under Lyme.
- Potential loss of structural and biological diversity through intensification of agricultural practices such as the improvement of pastures into cutting regimes and the removal of hedgerows and hedgerow trees etc.
- Mis-management or lack of appropriate management potentially leading to loss of structural and biological diversity.

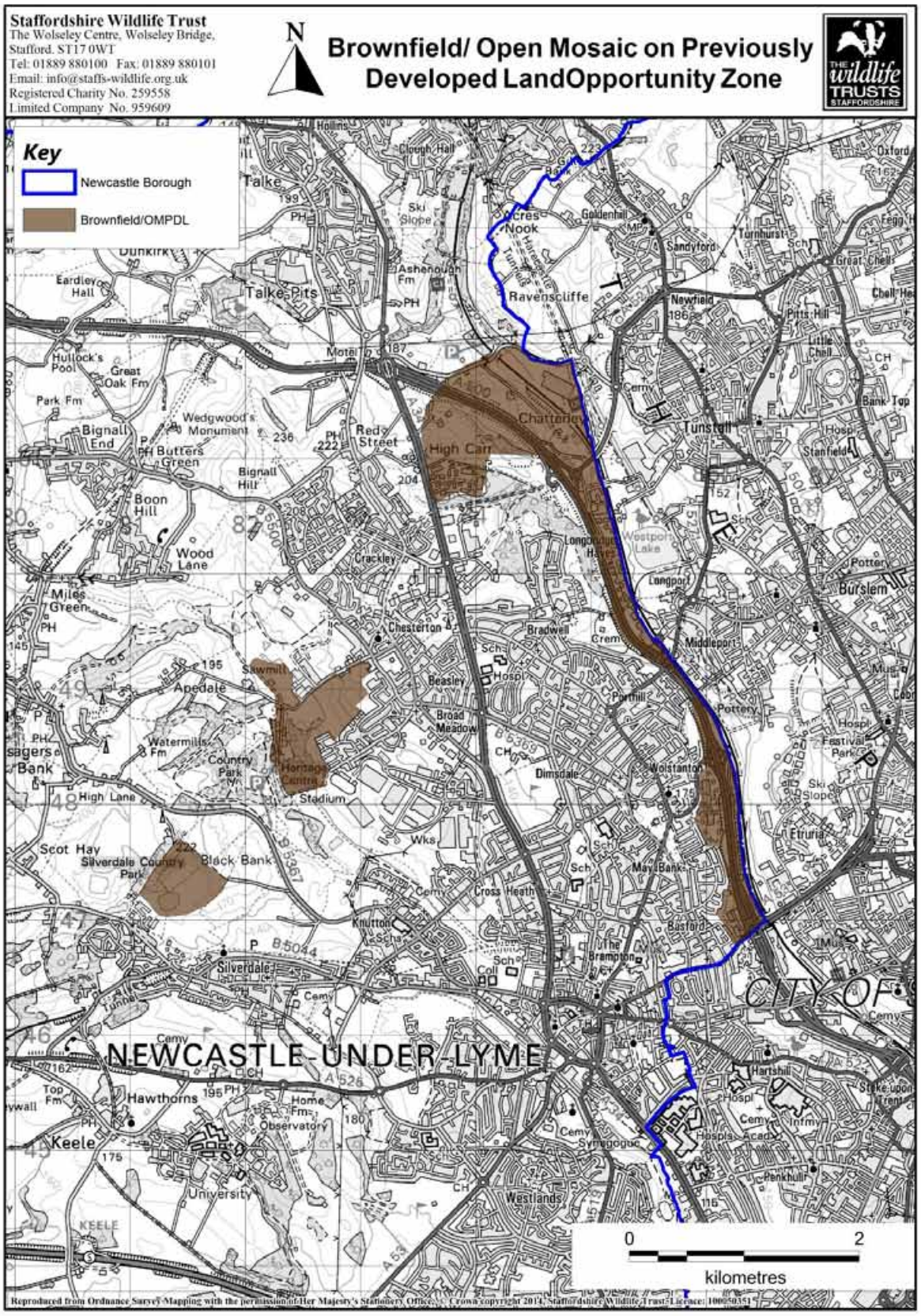
Broad objectives include

- Encourage uptake of agri-environment schemes as there will continue to be opportunities for landowners to increase, connect and manage new and existing habitats through this mechanism.
- Increasing demand for less intensive, locally sourced produce. Local farmers could be further supported and schemes expanded
- Working with the minerals industry to accomplish the best possible habitat gains through restoration plans as well as targeting areas where quarrying is likely to do the least ecological damage.
- Future mineral extraction that impacts on semi-natural habitats could ensure mitigation goes beyond the minimum and makes a real and positive contribution to the creation of new sites and networks
- The Local Wildlife Sites Partnership is critical to deliver semi-natural habitat protection with a local designation to safeguard and increase the quality of existing sites of county importance.
- Biodiversity, connectivity and climate change adaptation measures could be secured through green infrastructure implementation and development mitigation

Targeted Objectives include

- Increase area of species-rich grassland around Apedale and Bateswood where there are already good quality woodlands and grassland to provide both greater habitat connectivity and a greater resilience to environmental change.
- Creation of pockets of Open Mosaic Habitat within the grasslands around Apedale and Chesterton contributing towards a diverse habitat network and increased species diversity, alongside provision of supplementary priority habitats.
- Maintain appropriate management for small areas of wood pasture in the south of the borough.
- Restoration of grasslands in areas with intensive agricultural practices such as Chapel Chorlton, Maer, Knighton and areas around Audley.
- Encourage sympathetic management and reduced use of inorganic fertilisers and pesticides, particularly in areas around the Tern, Meece, Lyme and Lea catchments as well as areas surrounding Meres and Mosses to safeguard current biodiversity interest.
- Utilising current biodiversity sources at Bateswood and Apedale as a platform for the expansion of semi-natural habitats and promoting structural diversity.
- Identify and designate opportunities for hedgerow connectivity between woodlands in the areas to the west of the M6 motorway corridor, particularly where there are already diverse hedgerows present.
- Maintain existing corridor of woodland and neutral grassland mosaic connecting areas of western Newcastle town to wider rural areas.
- Improve habitat connectivity to small isolated areas of un-improved grassland to the south of Newcastle town in order to improve their ability to cope with environmental change.
- Use of grasslands of high biological value as a source site for any future grassland improvement projects.

3.4 Brownfield (Open Mosaic Habitats on Previously Developed Land) Opportunity Zone



3.4.1 Brief Area Description

Open Mosaic Habitats within Newcastle under Lyme Borough occur relatively ubiquitously throughout urban areas and are generally small sites around the fringes of industrial developments, or occur in interim periods of sites which are currently being developed. The heavy industry which took place in the past coupled with the incremental and unplanned expansion of the urban areas of Newcastle and Stoke has left remnant parcels of brownfield land trapped within urban areas which in some cases are now areas of significant biological interest or at least possess a potential to become sites of significant ecological value.

Image 8: Open Mosaic land exhibiting a mixed habitat structure ©SWT

Brownfield habitats and more specifically Open Mosaic Habitats on Previously Developed Land (OMHPDL) habitats are present throughout the borough as a whole and are generally only short lived as they contain many pioneer and early successional communities made up of ephemeral species; however a range of habitat types and different successional stages on these sites is often desirable. OMHPDL is a current SBAP priority habitat and Habitat of Principal Importance.

There are several significant areas of brownfield and open mosaic habitat particularly to the north of Newcastle stretching in a corridor down the route of the A500. There are also numerous small portions of brownfield around Silverdale and Apedale which are remnant undeveloped areas from the past coal mining industry.

3.4.2 SBAP Priority Habitats within Zone

Lowland Acid Grassland, Lowland Heathland, Lowland Wet Grassland, Ponds, Lakes and Canals, Rivers and Streams

3.4.3 SBAP Priority Species within Zone

Brown Hare, Pipistrelle Bat, Farmland Seed-eating Birds, Skylark, Grass Snake, Great Crested Newt, Ground Nesting Solitary Bees and Wasps.

3.4.4 Issues and Objectives for Zone

The primary objectives within Open Mosaic Habitat sites is to ensure there is no net loss of good quality habitat area whilst still meeting development targets for the provision of infrastructure and urban renewal; as well as retaining a range of successional stages within a suite of brownfield sites.

Secondary objectives include securing the sympathetic management of Open Mosaic Habitat areas with particularly high ecological value in order to retain some biodiversity potentially for use as source of biodiversity in the future. Ensure any future developments recognise the biological importance of Open Mosaic Habitats and include mitigation or space within development to provide good quality compensatory habitat.

There are a diverse range of challenges surrounding brownfield land within the Borough, in particular the prioritisation of brownfield land over greenbelt/greenfield land for development despite biological interests. Factors such as urban regeneration and the lack of aesthetic appeal for brownfield areas also lead to the direct loss of brownfield habitat.

Image 9: Brownfield habitat near Kidsgrove on spoil heaps with significant structural diversity and a mixture of species. ©SWT

Issues Include

- The demand for new housing and industrial developments which tend to be targeted toward the use of brownfield areas over Greenfield/greenbelt land despite relative ecological or biological value of each site.
- Aesthetics of brownfield and OMHPDL habitat is generally undesirable especially when coupled with its general proximity to urban conurbations; it is therefore usually a primary target for renewal.
- Public access, vandalism and fly tipping are a problem on many of these types of sites as they are largely unmanaged and seen as waste ground. Many sites also contain materials which are potentially harmful to the public or the sites themselves are unsafe.
- There are few OMHPDL sites which have statutory or non-statutory designations making the targeting and justification of conservation more problematic.

- Eutrophication of sites through the encroachment of nutrients from surrounding land uses or the deposition of nutrients from other sources leading to the growth of rank species which out-compete more stress tolerant species.

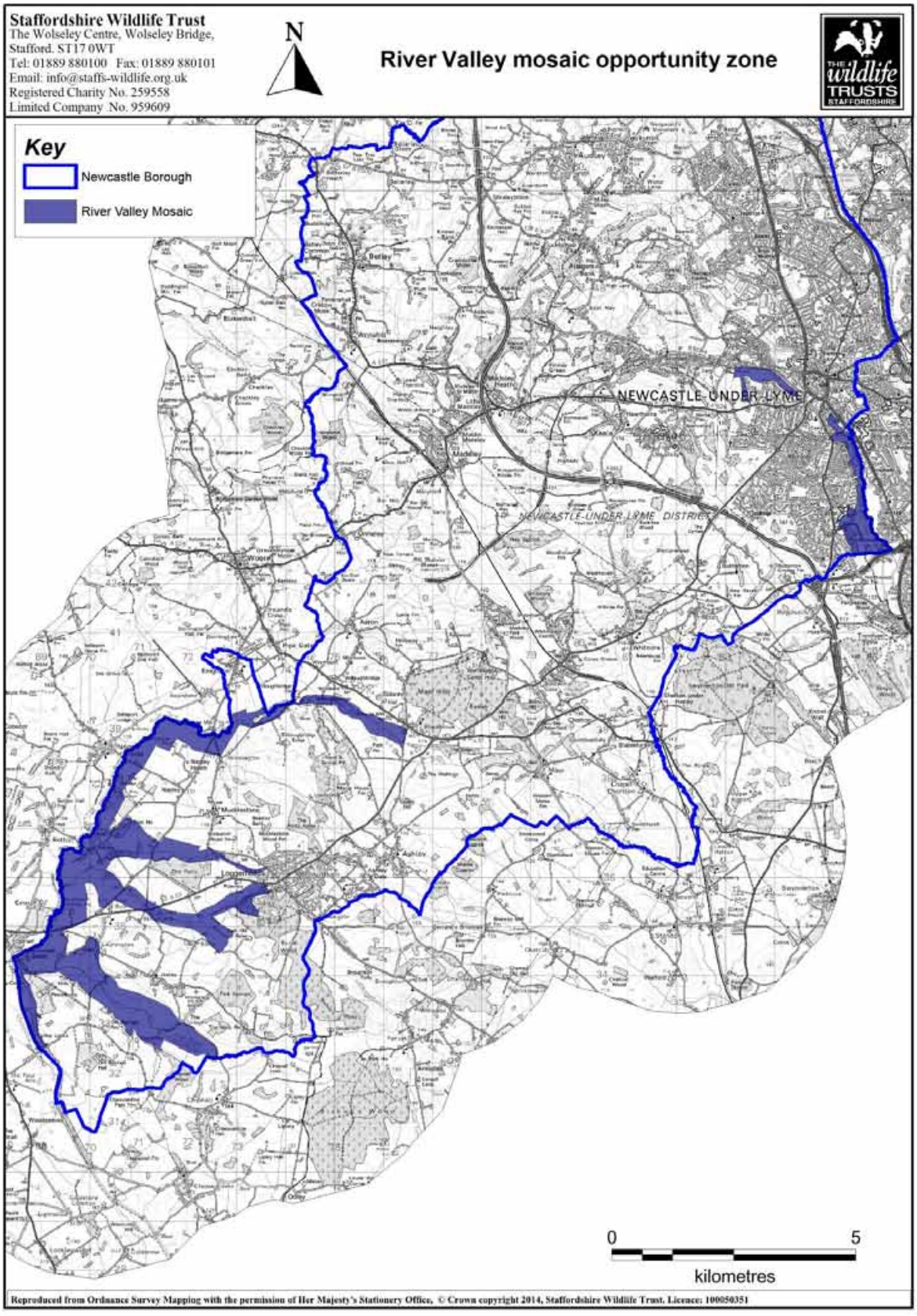
Objectives Include

- Address issues in public perception/development structure to focus on site based development rather than development in or outside the greenbelt in order to conserve areas of greatest conservation concern.
- Ensure mitigation goes beyond the minimum and provides tangible measures to provide adequate habitat through development.
- Increase connectivity between sites to buffer the effects of any negative impacts, as well as aid in the recovery should any biodiversity loss occur.
- Secure ownership and management of key areas where possible to continue to provide a high quality source of biodiversity so that future sites may benefit.
- Site monitoring to gain a better understanding of levels of biodiversity associated with these sites within the county.

Targeted Objectives Include

- Management of key sites such as Chatterley valley, areas of Apedale and Silverdale to suspend succession and provide a perennial refuge for biodiversity.
- Providing effective mitigation for sites where there are active planning applications and ensure that this goes beyond the minimum required.
- Maintain and enhance habitat quality and connectivity for the significant meta-populations of Great Crested Newts at Chatterley Valley and Apedale/Silverdale.
- Ensure that Silverdale dis-used quarry remains under sympathetic management to retain open mosaic structure and secure its future as a resource for biodiversity.

3.5 River Valley Mosaic Opportunity Zone



3.5.1 Brief Area Description

Newcastle under Lyme Borough has a watershed with catchment areas feeding three major rivers; the Humber, Severn and Mersey. Water falling in the north of the borough feeds the Weaver catchment and eventually feeds into the Mersey. The central and eastern sections of the borough feed the Lyme, Meece and Trent which eventually flows into the Humber. The southern proportion of the borough feeds into the Coal brook and River Tern eventually ending up in the River Severn. It is a fairly unique feature for a relatively small borough that water can potentially contribute to bio-accumulative affects in three major rivers terminating in different locations around the UK.

The Lyme Brook rises in Apedale and flows southeast through the major urban core of Newcastle before meeting the River Trent just North of Trentham. The Lyme Brook is heavily modified throughout nearly its entire course, and in a lot of areas has been culverted and straightened. Lower down its course the brook possesses a more natural profile where annual flooding of surrounding fields potentially takes place. Pollution is a significant issue around the urban watercourses in Newcastle where the proximity to urban and industrial areas is leading to problems with chronic poor water quality and impacting aquatic biodiversity.

Image 10: The Lyme Brook with bankside vegetation and swamp habitat near Poolfields, Newcastle ©SWT

The River Tern rises at Maer Pool SSSI and has been straightened along the initial 3 or 4 Kilometres of its course for the drainage of agricultural land. The river then follows its natural course and forms part of the borough and county boundary with Shropshire and Cheshire. The habitat types present throughout the length of the river are very mixed, much of the initial section of river sits on significant deposits of peat suggesting that bog and moss habitats were present prior to agricultural improvement; woodlands and agricultural land are the two predominant habitat types. Along its course through the Borough the Tern is joined by several other watercourses, most notably the Coal Brook which appears to have numerous small pools and wet habitats along its length.

Image 11: The River Tern with significant amounts of bankside emergent vegetation ©SWT

The Meece Brook forms the boundary between Newcastle and Stafford Boroughs near Chapel Chorlton, the land along its catchment within Newcastle under Lyme Borough is a mixture of improved farmland and areas of marshy grassland and marginal vegetation. There are several small scrapes which hold water and give rise to pockets of marshy grassland and ephemeral pools throughout its length. The land along the Meece appears relatively diverse and is part of an important habitat network linking the

borough to diverse network of Local Wildlife Sites as well as areas such as Doxey Marshes SSSI and could therefore influence or be influenced by these habitats. This illustrates the importance of river corridors and other linear habitat features as effective corridors for wildlife and their value to sites beyond political borders.

Image12: A pond with significant emergent vegetation along its banks, part of a much wider network of ponds near Loggerheads. ©SWT

3.5.2 SBAP Priority Habitats

Native Woodland, Wet Woodland, Ancient/Diverse Hedgerows, Arable Field Margins, Lowland Acid Grassland, Lowland Heathland, Lowland Wet Grassland, Mosses, Ponds, Lakes and Canals, Reedbeds, Rivers and Streams

3.5.3 SBAP Priority Species

Brown Hare, Pipistrelle Bat, Otter, Water Vole, Barn Owl, Farmland Seed-eating Birds, Grey Partridge, Lapwing, Skylark, Snipe, Great Crested Newt, White Clawed Crayfish

3.5.4 Issues and Objectives

The primary objective for this opportunity area is to improve water quality to benefit aquatic diversity as well as ensuring that water quality remains at sustainable

acceptable levels by the implementation of agri-environment schemes and catchment sensitive farming in areas adjacent to watercourses.

Secondary objectives include developing a sustainable network of high quality habitats along watercourses to buffer any affects from pollution sources elsewhere, as well as utilising the natural habitat corridor for the movement of genetic diversity. The creation of new wetland habitats will both benefit biodiversity and contribute toward the provision of ecosystem services.

Issues surrounding water quality are of serious concern as this could potentially have negative implications for many other habitats with the potential to be transmitted long distances downstream. Riparian habitats are critical in the delivery of many ecosystem services and are likely to become more important in the future as tools for flood alleviation and control, as well as their benefits to biodiversity.

Issues Include

- Chronic poor water quality due to organic and in-organic compounds has greatly affected the biology of many watercourses and is likely to have had an effect on populations of native species.
- Use of agricultural and industrial chemicals in close proximity to watercourses, as well as discharges of pollutants in urban areas.
- Siltation issues due to the intensification and/or mis-management of agricultural land in close proximity to watercourses causing silt build up.
- Alteration of the level of the water table due to the cutting of drainage ditches in order to reduce standing water in fields and improve agricultural productivity.
- Invasive species along watercourses increasingly becoming more of a problem, with many watercourses acting as a vector for their spread.
- Several Local Wildlife Sites (LWSs) are located along watercourses within the borough which could be negatively affected or degraded by any issues surrounding poor water quality.
- Eutrophication of headwater streams and slow flowing waters.
- Dredging and silt removal leading to increased bankside erosion and potential loss of habitat for several species.

Broad Objectives Include

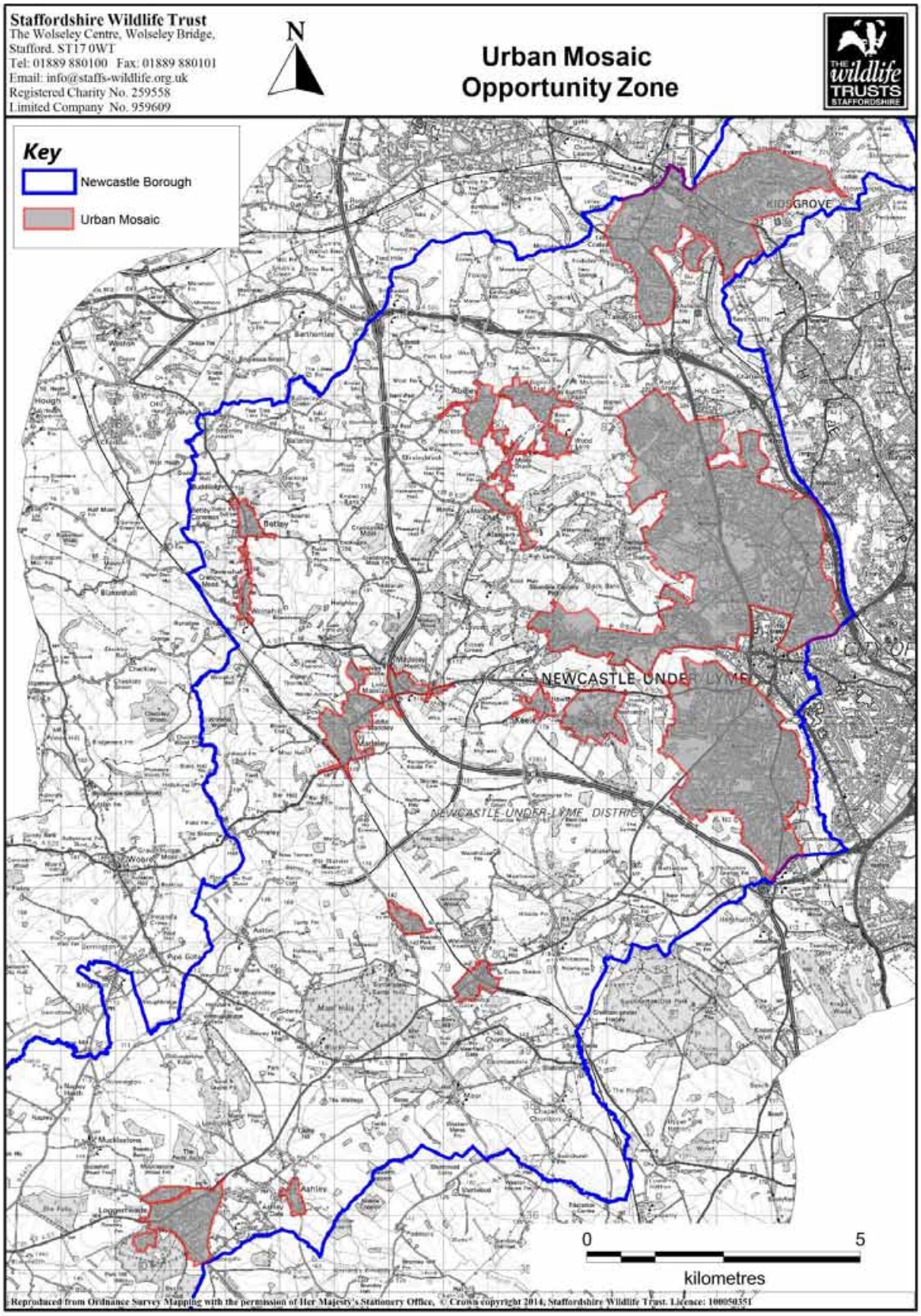
- Encourage uptake of Agri-environment schemes and promotion of catchment sensitive farming to address issues with poor water quality.
- Creation or expansion of buffer zones and open space corridors around all watercourses to minimise the direct impact of pollution, enrichment and encroachment from site edges
- Expand BAP priority habitats and develop an ecological network which is able to withstand increasing pressures from changing land use, climate and hydrology.
- Implementation of the Water Framework Directive (WFD) to improve water quality in areas where there are chronic problems with water quality.
- Reversion of original course of rivers and streams where possible to provide more habitat for a range of species.
- Wetland features such as ponds and reedbeds conserved and where possible expanded, particularly where there are a range of successional habitat stages.
- Natural features such as meanders, riffles and backwaters should be maintained and enhanced.
- Working with the minerals industry to accomplish the best possible habitat gains through restoration plans as well as targeting areas where quarrying is likely to do the least ecological damage.
- Use of SuDS to provide natural drainage solutions, as well as providing additional riparian habitat.

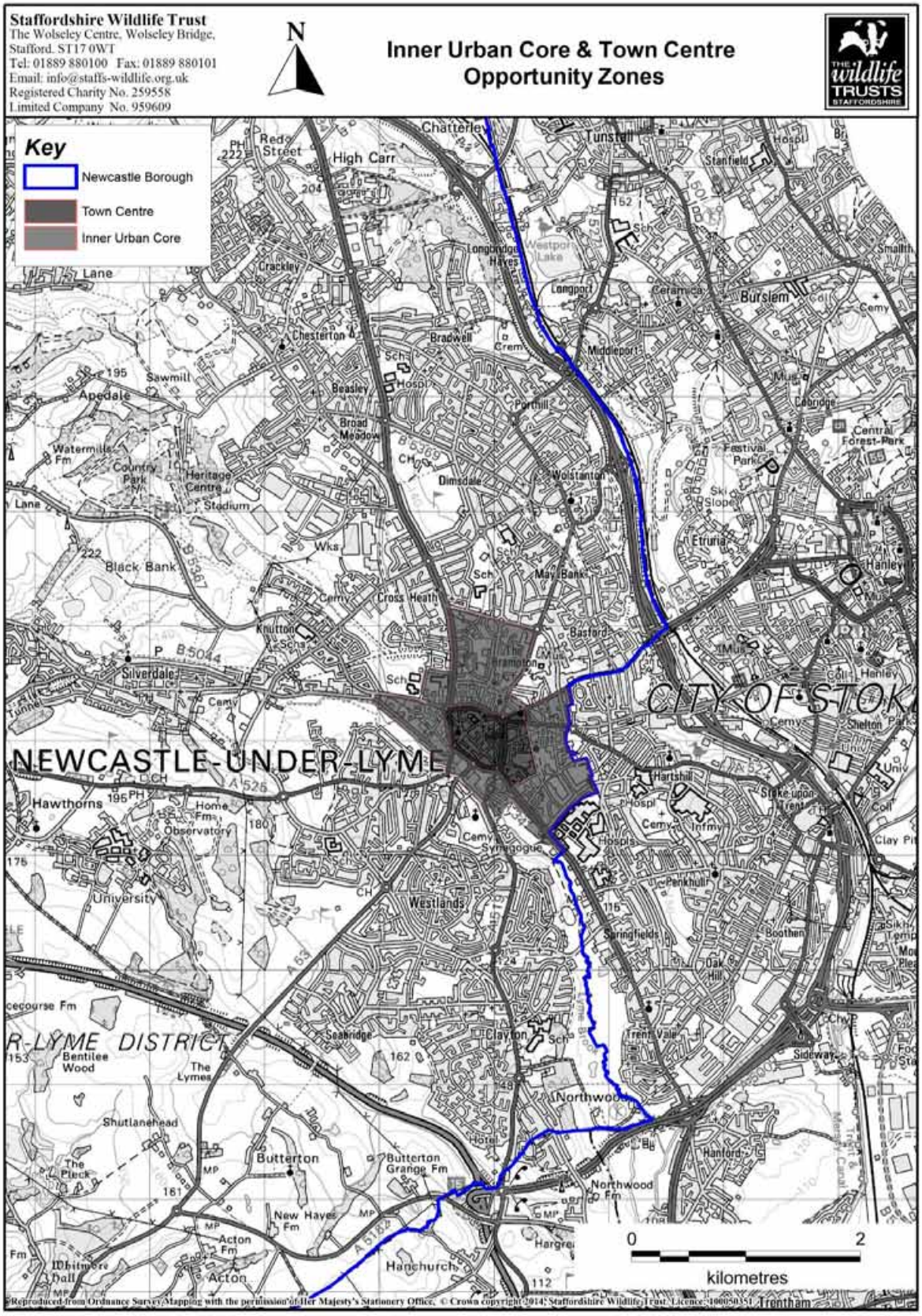
Targeted Opportunities

- Buffer the effects of urban infrastructure on the Lyme Brook and address issues with water quality from headwaters to its confluence with the Trent
- Ensure both statutory and non-statutory sites alongside watercourses are buffered from the effects of poor water quality in order to protect high levels of biodiversity present.
- Protection and enhancement of biodiverse network of sites on the southern Lyme Brook, the location of these sites within an area of urban development is critical for the enhancement and connectivity of other urban sites.

- Development of effective measures to protect Mammals, invertebrates and amphibians specifically along the Coal Brook and River Tern via the use of 'pondscapes' encouraging the dispersal of metapopulations.
- Encourage the use of canals in particular the Shropshire Union Canal and the Trent and Mersey Canal to benefit habitat connectivity via improving bankside vegetation in areas not used for mooring.
- Ensure that effective monitoring of indicator species is carried out to assess the health of both rivers and riparian habitats to target areas where habitats could be improved or created.

3.6 Urban Opportunity Zones





Newcastle under Lyme Borough Biodiversity Opportunity Mapping

3.6.1 Brief Area Description

The greatest urban area within Newcastle under Lyme Borough is the town centre of Newcastle and its surrounding conurbation which consists of both residential and industrial developments with interspersed pockets of post-industrial land, amenity grassland and woodland. There are also several significant urban areas scattered amongst rural areas, with towns such as Betley, Madeley, Kidsgrove, Loggerheads, Keele and Baldwin's Gate all having at least some built up areas.

Image 13: Amenity grassland in Newcastle Town Centre with numerous planted trees. ©SWT

Urban areas are often considered as being less important for biodiversity than rural environments, however urban environments such as open green-spaces and gardens provide unique habitats which are often less frequent or absent from rural environments and support a range of specialised plants and animals. Human populations are continually expanding, resulting in an increase in expanse of urban area and density which has in the past gone unchecked and has likely already led to the loss of many important habitats.

The Town Centre and Inner Urban Core area of Newcastle are both built up and are of a higher density than the Urban Mosaic Zone, the Town Centre zone possesses little in

the way of any significant green space, whereas the Inner Urban Core possesses slightly more, with housing intermixed amongst more commercial areas along with limited amounts of public green space. The Urban mosaic is the least dense of the three urban classifications and has a range of habitats set amongst urban developments, generally consisting of houses with gardens mixed with industrial developments and small areas of trapped agricultural land and smallholdings, as well as more frequent public open green space.

3.6.2 SBAP Priority Habitats

Lowland Wood-pasture and Parkland, Native Woodland, Ancient/Diverse Hedgerows, Lowland Acid Grassland, Ponds, Lakes and Canals, Rivers and Streams

3.6.3 SBAP Priority Species

Pipistrelle Bat, Farmland Seed-eating Birds, Grass Snake, Great Crested Newt, Water Vole

3.6.4 Issues and Objectives

Primary objectives within this opportunity area are the provision of as many semi-natural habitats as possible within the urban environment to strengthen habitat networks and connectivity as well as creating corridors for wildlife and promoting education on the importance of ecological and biological conservation with emphasis toward urban environments.

Secondary objectives include providing more direct links both for the public and wildlife from urban to rural locations via the use of existing infrastructure such as dis-used railway lines as well as providing additional links to further strengthen habitat networks.

Increasing need and pressure for housing and jobs has led to the expansion and increased density of urban areas, the sustainable development of new urban areas is critical in maintaining and improving levels of biodiversity within urban environments. This will not only be important for biodiversity but also for education and recreational purposes.

Available opportunities for biodiversity within the town centre are likely to be small scale occurring amongst existing infrastructure or as part of new developments, there is likely to be slightly more available opportunities within the inner urban core, although still with some constraints. The urban mosaic is likely to provide the greatest opportunity for habitat creation and/or restoration either alongside existing infrastructure or as part of development plans.

Issues Include

- Habitat loss or degradation through urban expansion as well as increasing urban density.
- Increase in popularity for "low Maintenance" gardens which contain more hard infrastructure and less biodiversity.
- Increasing urban density leading to the loss of green space and lack of creation of new green space.
- Infilling resulting in loss of larger mature gardens and diminished ecological connectivity.
- Increase in ground and air pollution issues relating to increased populations and population densities which could potentially have negative effects on biodiversity value outside of the urban environment.

Broad Objectives include

- Promotion of conservation gardening to provide habitat for multiple species within urban environments, this should also benefit the permeability of habitat connectivity of urban environments by providing refuge for multiple species.
- Relaxing of Mowing Regimes, particularly with cuts later in summer and material taken off site in areas of amenity grassland, this should help to benefit both the diversity of flora as well as provide habitat for other species such as ground nesting birds and small mammals.
- Secure appropriate management for conservation in publicly owned and managed sites and promote education surrounding conservation in urban areas.
- The need to provide open green space for large urban populations which could also be utilised for conservation purposes.

- Creation of tree lined avenues and parkways for connectivity enhancement in order to permeate dense urban spaces.
- Recognition of green natural spaces as a cultural ecosystem service which provides psychological and physiological benefits to large urban populations.

Targeted Objectives Include

- Utilisation of Dis-used railways linking rural and urban areas, in particular those linking Reserves and Local Wildlife Sites into the Town Centre and Inner Urban Core as a network for both public access and biodiversity connectivity.
- Promotion of infrastructural biodiversity gains through development with projects such as green walls/green roofs etc. which should improve the biological permeability of built up environments.
- Implementation of SuDS in new developments to provide mitigatory habitat as well as contribute towards improving water quality.

4 Brief Definitions for Biodiversity Action Plan Priority Habitat Types in Newcastle under Lyme Borough

(Source: Joint Nature Conservancy Council (JNCC), 2011).

- **Arable Field Margins**

Arable Field Margins are herbaceous strips or blocks around arable fields that are managed specifically to provide benefits for wildlife. The arable field must be in a crop rotation which includes an arable crop, even if in certain years the field is in temporary grass, set-aside or fallow. Arable field margins are usually sited on the outer 2-12m margin of the arable field, although when planted as blocks they occasionally extend further into the field centre.

- **Coastal & Floodplain Grazing Marsh**

Coastal & Floodplain Grazing Marsh is defined as periodically inundated pasture, or meadow with ditches which maintain the water levels, containing standing brackish or fresh water. The ditches are especially rich in plants and invertebrates. Almost all areas are grazed and some are cut for hay or silage. Sites may contain seasonal water-filled hollows and permanent ponds with emergent swamp communities.

- **Eutrophic Standing Waters**

Eutrophic Standing Waters are highly productive because plant nutrients are plentiful, either naturally or as a result of artificial enrichment. These water bodies are characterised by having dense, long-term populations of algae in mid-summer, often making the water green.

- **Heathland (Lowland)**

Lowland Heathland is described as a broadly open landscape on impoverished, acidic mineral and shallow peat soil, which is characterised by the presence of plants such as heathers and dwarf gorses. It is generally found below 300 metres in altitude in the UK, but in more northerly latitudes the altitudinal limit is often lower. Upland Heathland is defined as lying above 300 metres but below the alpine or montane zone at approximately 600-750m).

- **Hedgerows**

A Hedgerow is defined as any boundary line of trees or shrubs over 20m long and less than 5m wide, and where any gaps between the trees or shrub species are less that 20m wide

- **Lowland Dry Acid Grassland**

Lowland Dry Acid Grassland typically occurs on nutrient-poor, generally free-draining soils with pH ranging from 4 to 5.5 overlying acid rocks or superficial deposits such as sands and gravels.

- **Lowland Fens**

Lowland Fens are peatlands which receive water and nutrients from the soil, rock and ground water as well as from rainfall.

- **Lowland Meadows**

Lowland Meadows are taken to include most forms of unimproved neutral grassland across the enclosed lowland landscapes of the UK. The habitat type is not restricted to grasslands cut for hay, but also takes into account unimproved neutral pastures where livestock grazing is the main land use. On many farms in different parts of the UK, use of particular fields for grazing pasture and hay cropping changes over time, but the characteristic plant community may persist with subtle changes in floristic composition.

- **Lowland Mixed Deciduous Woodland**

Lowland Mixed Deciduous Woodland includes woodland growing on the full range of soil conditions, from very acidic to base-rich, and takes in most semi-natural woodland in southern and eastern England, and in parts of lowland Wales and Scotland. It thus complements the ranges of upland oak and upland ash types. It occurs largely within enclosed landscapes, usually on sites with well-defined boundaries, at relatively low altitudes, although altitude is not a defining feature.

Often there is evidence of past coppicing, particularly on moderately acid to base-rich soils; on very acid sands the type may be represented by former wood-pastures of oak and birch.

- **Mesotrophic Lakes**

Mesotrophic Lakes (i.e. those in the middle of the trophic range) are relatively infrequent in the UK and largely confined to the margins of upland areas in the north and west. They are characterised by having a narrow range of nutrients.

- **Ponds**

Ponds, for the purpose of UK BAP priority habitat classification, are defined as permanent and seasonal standing water bodies up to 2 ha in extent and support habitats of international importance and/or species of high conservation importance.

- **Purple Moor Grass & Rush pastures**

Purple Moor-grass & Rush Pastures occur on poorly drained, usually acidic soils in lowland areas of high rainfall in western Europe.

Their vegetation, which has a distinct character, consists of various species-rich types of fen meadow and rush pasture. Purple Moor-grass *Molinia caerulea,* and rushes, especially Sharp-flowered Rush *Juncus acutiflorus*, are usually abundant.

- **Reedbeds**

Reedbeds are wetlands dominated by stands of the Common Reed *Phragmites australis*, wherein the water table is at or above ground level for most of the year. They tend to incorporate areas of open water and ditches, and small areas of wet grassland and wet woodland may be associated with them.

- **Rivers**

This habitat type includes a very wide range of types, encompassing all natural and near-natural running waters in the UK (i.e. with features and processes that resemble those in 'natural' systems). These range from torrential mountain streams to meandering lowland rivers.

- **Open Mosaics on Previously Developed Land**

These are generally primary colonisations and, as such, unusual in the British landscape, especially the lowlands. The vegetation can have similarities to early/pioneer communities (particularly grasslands) on more 'natural' substrates but, due to soil conditions, the habitat can often persist (remaining relatively stable) for decades without active management. Stands of vegetation commonly comprise small patches and may vary over relatively small areas, reflecting small-scale variation in substrate and topography.

- **Wet Woodland**

Wet woodland occurs on poorly drained or seasonally wet soils, usually with alder, birch and willows as the predominant tree species, but sometimes including ash, oak, pine and beech on the drier riparian areas. It is found on floodplains, as on fens, mires and bogs, along streams and hill-side flushes, and in peaty hollows. These woodlands occur on a range of soil types including nutrient-rich mineral and acid, nutrient-poor organic ones.

- **Wood-pasture & Parkland**

Wood-pasture & Parkland are mosaic habitats valued for their trees, especially veteran and ancient trees, and the plants and animals that they support. Grazing animals are fundamental to the existence of this habitat. Specialised and varied habitats within Wood-pasture & Parkland provide a home for a wide range of species, many of which occur only in these habitats, particularly insects, lichens and fungi which depend on dead and decaying wood. Individual trees, some of which may be of great size and age, are key elements of the habitat and many sites are also important historic landscapes.

Further information on SBAP priority habitat types and species can be found on the SBAP website (http://www.sbap.org.uk).

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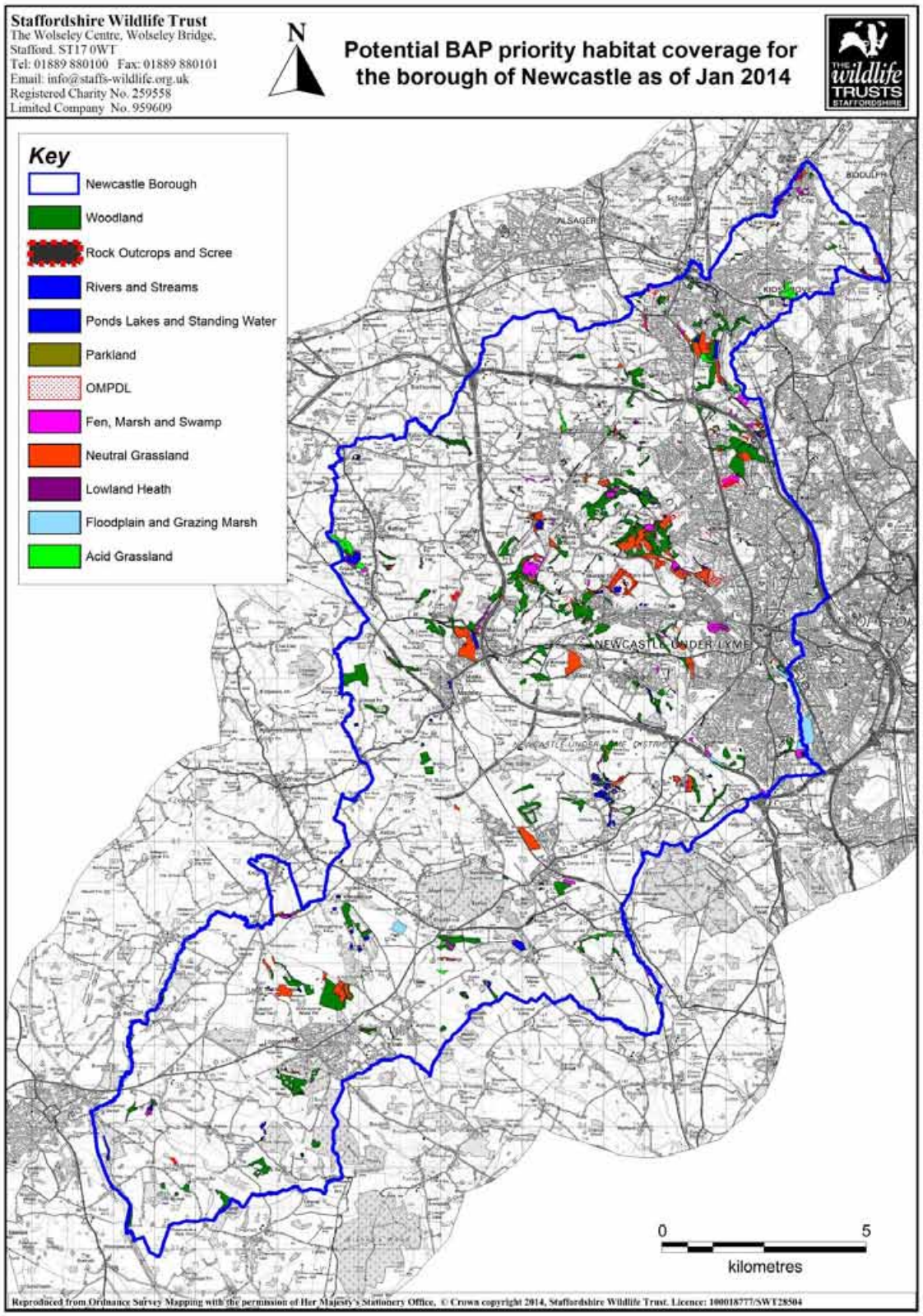
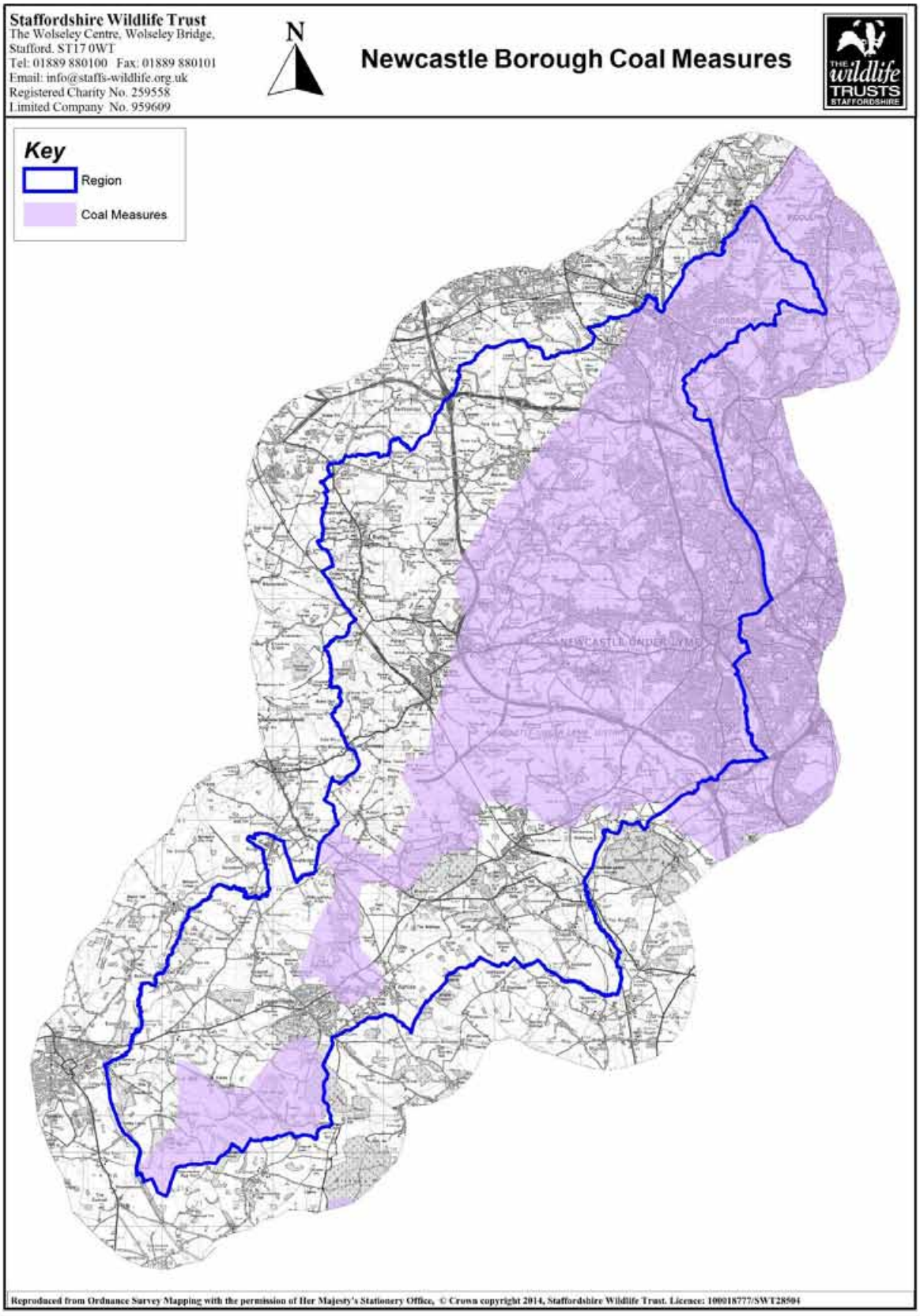
6 Appendix



Appendix 1: Potential BAP priority habitats based on available habitat data from a variety of survey methods. Priority habitats were identified and placed under their representative broad habitat categories for ease of mapping.



Appendix 2: Extent of the geological Coal Measures within the borough of Newcastle