Derbyshire Natural Capital Strategy - Appendices 1-5

Contents

Appendix 1 - UK Habitat Classification (UKHab) habitat definitions

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
c	Cropland	Regularly or recently cultivated agricultural, horticultural and domestic habitats.			Includes ploughed land, intensive orchards.	
c1	Arable and horticulture	Arable cropland (including perennial, woody crops, and intensively managed, commercial orchards), commercial horticultural land (such as nurseries, commercial vegetable plots and commercial flower growing areas), freshly-ploughed land, annual leys, rotational set-aside and fallow.			Cereal field margins and field boundaries. Sown grasslands less than one year old.	Domestic gardens and allotments.
c1b	Temporary grass and clover leys	Temporary grass or legumes in rotation with grain or tilled crops, usually as a soil conservation measure.				
c1c	Cereal crops	Crops in the cereal group of domesticated grasses: wheat, barley, oats, maize.				
c1d	Non-cereal crops	Crops other than those defined in c1c.				

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
f	Wetland	Any habitat that is waterlogged (water table at surface with standing water for between 50% and 70% of the year)				Wet woodland/Carr (see w1d). Wet habitats where the water table is always within 40cm of the surface and soil containing free water for most of the year (see g or h). Seasonally wet habitats, inundated for part of the year but becoming mesic in the summer.
f1	Bog	Rain fed (ombrotrophic) inundated or waterlogged habitats where peat has formed in the past.			Peat bogs that have been cut/harvested.	Soligenous or topogenous wetlands which are defined under Fen, Marsh and Swamp (see f2); these include drained agricultural peatlands such as the Fens and Somerset Levels.

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
f1a	Blanket bog	Blanket bogs are characterised by the presence of a peat deposit (>0.5m deep), formed from Sphagnum and other peat forming species, which is draped across large expanses of the landscape like a blanket. All but the steepest slopes are permanently waterlogged.	Blanket bogs are rain fed (ombrotrophic) and broadly convex, meaning that surface flow-lines diverge downslope from the crown of the bog unit.		Intermediate habitats around the margins of blanket bog where the major part of the bog morphology is determined by the underlying mineral terrain.	Blanket bog may be part of a habitat mosaic which includes upland fens, flushes and swamps (see f2c), which are are fed by groundwater (minerotrophic). Intermediate habitats around the margins where the raised dome(s) of the system predominates (see f1b).
f1a5	Blanket bog (H7130)	As f1a where peat forming species are still dominant or abundant, notably Sphagnum papillosum, Sphagnum magellanicum, Sphagnum tenellum and Sphagnum capillifolium, Hare's-tail Cottongrass Eriophorum vaginatum (dominant or scattered) and ericoid species less abundant than in f1a.		Annex 1: H7310 Blanket Bog.		

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
f1a6	Degraded blanket bog	As f1a, but where peat forming Sphagnum species have largely disappeared due to drainage of the bog (which may be obvious due to the presence of drainage channels (grips)), to be replaced typically by grasses, such as Purple Moor-grass Molinia caerulea and sometimes to the dominance of Heather Calluna vulgaris.			Includes blanket bog where peat has been largely removed by erosion, fire or peat cutting within a larger unit of blanket bog which still retains a substantial depth of peat. Such patches are classed as part of the blanket bog and in the absence of further damage can be expected to infill with peat again over time. It is not therefore appropriate to map or manage such	

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
					areas as Upland heathland.	
f2	Fen marsh and swamp	Inundated or waterlogged lowland habitats differing from bogs in that water is supplied by ground water or slow-moving rainwater and this flows through them (they are soligenous) and peat does not form.	Often associated with valleys or hollows and include a wide range of vegetation types from tall broad-leaved wetland herb formations, vegetation dominated by small sedge fens, tall wetland sedge/herb/grass fens; fen meadows and rush dominated vegetation; acid poor-fens and reedbeds to bryophyte springs and flushes.			

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
f2a	Lowland fens	Fens are wetlands which receive water and nutrients from the soil, rock and ground water as well as from rainfall. Fens are also often associated with accumulation of undecomposed waterlogged plant litter in the form of peat but not all fens form peat as vegetative matter may be decomposed.	Fens are characterised by their hydrological regime, base-richness and nutrient status (fertility). Topogenous fens are those where water movements in the peat or soil are generally vertical. They include basin fens, fens of lake margins, some forms of flood-plain fen, and the lagg fens of raised bogs. Soligenous fens, on the other hand, develop where there is distinct water movement through the system, so such movements are predominantly lateral rather than vertical, and include valley mires, springs and flushes.			

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
			Rich fens are associated with water derived from baserich rocks such as chalk and other limestones and as such are generally confined to the lowlands. Many sites of rich fen are small and scattered often now occurring as "islands" of semi natural vegetation amongst a sea of agricultural land.			

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
f2a8	Transition mires and quaking bogs; lowland (H7140)	The term 'transition mire' relates to vegetation that in floristic composition and general ecological characteristics is transitional between acid bog and Alkaline fens, in which the surface conditions range from markedly acidic to slightly base-rich. The vegetation normally has intimate mixtures of species considered to be acidophile and others thought of as calciphile or basophile as a result of base-rich water influence upon acidic nutrient poor bogs.	In some cases the mire occupies a physically transitional location between bog and fen vegetation, as for example on the marginal lagg of raised bog or associated with certain valley and basin mires. In other cases these intermediate properties may reflect the actual process of succession, as peat accumulates in groundwater-fed fen or open water to produce rainwater-fed bog isolated from groundwater influence. Many of these systems are very wet and unstable underfoot and can therefore	Annex 1: H7140 Transition mires and quaking bogs [lowland]		

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
			also be described as 'quaking bogs'. Transition mires and quaking bogs can occur in a variety of situations, related to different geomorphological processes: in flood plain mires, valley bogs, basin mires and the lagg zone of raised bogs, and as regeneration surfaces within mires that have been cut-over for peat or areas of mineral soil influence within Blanket bogs (e.g. ladder fens in Scotland only).			

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
f2b	Purple moor grass and rush pastures	The vegetation has a distinct character and consists of various species-rich types of fen meadow and rush pasture. Rush or/and Purple Moor-grass Molinia caerulea dominated vegetation usually on peaty-gley soils with Sharp-flowered Rush Juncus acutiflorus or Soft Rush Juncus effusus abundant to dominant.	Purple moor-grass and rush pastures occur on both poorly drained, usually acidic soils in lowland areas of high rainfall in western Europe as well as on more base-rich soils . In the UK, they are found in south-west England, particularly in Devon, southern Wales, south-west Scotland, perhaps extending as far north as northern Argyll, and in Northern Ireland, especially Fermanagh. Nationally, these agriculturally unimproved pastures are associated with saturated valley-sides and spring	In the west of Britain, Purple moor-grass and rush pastures have been termed Rhôs pasture. 'Rhôs' is a Welsh word meaning 'a wet, often heathy grazing pasture', often referred to as 'moors'. This term has been used widely for such grasslands in Wales but is a term also applied to this habitat in		

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
			lines, on poorly draining acid soils with a mixture of wet heath, rush pasture, mire and scrub, typically with low grazing intensity although they may also occur on roadsides.	south west England. Grasslands of northern Devon and north east Cornwall, especially across the Culm Measures are also referred to as 'culm grasslands'.		
f2c	Upland flushes, fens and swamps	Inundated or waterlogged upland habitats differing from bogs in that water is supplied by ground water or slow-moving rainwater and this flows through them (they are soligenous) and peat does not form.	Often associated with valleys or hollows and include a wide range of vegetation types from tall broad-leaved wetland herb formations, vegetation dominated by small sedge fens, tall wetland			

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
			sedge/herb/grass fens; fen meadows and rush dominated vegetation; acid poor-fens and reedbeds to bryophyte springs and flushes.			
f2e	Reedbeds	Wetlands dominated by stands of the Common Reed Phragmites australis, with the water table at or above ground level for most of the year.	Reedbeds tend to incorporate areas of open water and ditches, and small areas of wet grassland and carr woodland may be associated with them.		Reedbeds with a saline influence including saline tolerant species e.g. Atriplex spp (use secondary code 138).	Similar habitats dominated by species such as Schoenoplectus, Typha and Phalaris fall into a category of 'other swamps' f2f.
g	Grassland	Vegetation, not on waterlogged soils, with more than 75% cover of herbaceous species (grasses, sedges, rushes, herbs, forbs) with halophytic species absent or occasional.			Includes pastures and (semi-)natural grasslands not on waterlogged soils. Includes vegetation dominated by Bracken.	Excludes crops (see c), reedbeds (see f2e), calaminarian grasslands (see s1c), vegetation dominated by a combination of Molinia and Juncus species on waterlogged soils.

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
g1	Acid grassland	Vegetation dominated by grasses and herbs on a range of limedeficient soils which have been derived from acidic bedrock or from superficial deposits such as sands and gravels. Such soils usually have a low base status, with a pH of less than 5.5.	Includes a range of types from open communities of very dry sandy soils in the lowlands, which may contain many annual species, through closed pastures on red brown earths, to damp acidic grasslands typically found on gleys and shallow peats.	Calcifugous swards.	Montane types. Vegetation with Bracken Pteridium aquilinum, except where the grassland type is clearly not acidic (see the appropriate grassland type and secondary code 12 "scattered bracken").	Acid grassland types on shingle habitats.
g1a	Lowland dry acid grassland	Lowland 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.	Includes both enclosed and unenclosed acid grassland throughout the UK lowlands (normally below c. 300m). It covers all acid grassland managed in functional enclosures. It often occurs as an		Swards on road verges. Dry calcareous grasslands of the Breckland, north to the North Norfolk coast where Vulpia ciliata ssp. ambigua is	Swards in old and non-functional enclosures in the upland fringes, which are managed as free-range rough grazing in association with unenclosed tracts of upland (see g1b).

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
			integral part of lowland heath landscapes, in parklands and locally on coastal cliffs.		a key component.	
g1c	Bracken	Land with Bracken Pteridium aquilinum at >95% canopy cover at the height of the growing season.				Scattered patches of bracken or bracken patches
g2	Calcareous grassland	Vegetation dominated by grasses and herbs on shallow, welldrained soils which are rich in bases (principally calcium carbonate) formed by the weathering of chalk and other types of limestone or base-rich rock.	Although the base status of such soils is usually high, with a pH of above 6, it may also be more moderate and calcareous grassland communities can occur on soils with a pH as low as 5.	Calcicolous grasslands. Chalk grasslands. Limestone grasslands.		
g2a	Lowland calcareous grassland	Calcareous grasslands communities below the upper limits of agricultural enclosure.	Largely restricted to the warmer and drier climates of the southern and eastern areas of the United Kingdom.		Calcareous grassland on roadside verges. Calcareous grassland	Calcareous grassland in the unenclosed uplands (see g2b). Calcareous grassland on the Pennines (see g2b).

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
					around Morecambe Bay in Cumbria.	
g2b	Upland calcareous grassland	Upland calcareous grasslands occur on lime-rich soils situated above the upper limit of agricultural enclosure, both in the submontane and montane zones.	Mostly occur above 250-300 m altitude, but the habitat is also found within unenclosed moorland at lower elevations, and descends to sea level in north-west Scotland. Upland calcareous grasslands typically occur as components of habitat mosaics (including both calcicoles and acidophiles).			
g3	Neutral grassland	Vegetation dominated by grasses and herbs on a range of neutral soils usually with a pH of between 4.5 and 6.5.	It includes enclosed dry hay meadows and pastures, together with a range of grasslands which are	Mesotrophic grasslands.		

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
			periodically inundated with water or permanently moist.			
g3a	Lowland meadows	Lowland neutral meadows and pastures consist of a rich mixture of native grasses and broad-leaved herbs. They occur throughout lowland UK, often on shallow slopes or level ground with relatively deep soils that is neither strongly acidic nor lime-rich.	Most forms of neutral grassland across the enclosed lowland landscapes of the UK that have not been substantially modified. 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.			Maritime grassland communities confined to coastal habitats (See s2a, 26), Anthoxanthum odoratum - Geranium sylvaticum grasslands (see g3b) and Molinia - Juncus pastures on waterlogged soils (see f2b).
g3a5	Lowland hay meadows (H6510)	Species-rich hay meadows on moderately fertile soils of river and tributary floodplains.	Seasonal flooding maintains an input of nutrients.	Annex 1: H6510 Lowland hay		

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
				meadows [Alopecurus pratensis, Sanguisorba officinalis]		
g3c	Other neutral grassland	Neutral grassland that does not meet the definition of either g3a or g3b. Perennial Rye-grass Lolium perenne is likely to be present at	Extremely widespread in the UK lowlands.		Special note: many surveyors may wish to add detail to this category. Please consider using the relevant secondary codes: management (e.g. "78 - abandoned" or "80 - unmanaged" gives much information on the nature of the sward); environmental qualifiers (e.g. "117 - dry", "118 - mesic", "120 - wet", "123 -	Species poor swards previously described as "semi-improved neutral grassland" (see g4).

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
					neutral grassland with calcicoles") and species features (e.g. "160 - sward type mosaic", "161 - tall or tussocky sward").	
g4	Modified grassland	Vegetation dominated by a few fast-growing grasses on fertile, neutral soils. It is frequently characterised by an abundance of Rye-grass Lolium spp. and White Clover Trifolium repens.				
h	Heathland and shrub	Vegetation with more than 25% cover of dwarf shrub species			Hedgerows of any height.	Lines of trees (see w1g6), scattered scrub (see 10), young trees (see 56, 57).
h1	Dwarf shrub heath	Vegetation that has a greater than 25% cover of plant species from the heath family (ericoids) or Dwarf Gorse Ulex minor.	Dwarf shrub heath generally occurs on well-drained, nutrientpoor, acid soils. Heaths do occur on more basic soils but these are more limited in		Both dry and wet heath types. Dwarf shrub dominated vegetation in	Dwarf shrub dominated vegetation in which species characteristic of peat-forming vegetation such as cotton-grass Eriophorum spp. and

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
			extent and can be recognised by the presence of herbs characteristic of calcareous grassland. Occurs in both the lowlands and the uplands.		the montane zone.	peat-building sphagna are abundant, and [not "or" this is important] that occurs on deep peat (> 0.5 m) (see f1).
h1a	Lowland Heathland	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, Crowberry Empetrum nigrum and grass species such as Bristle Bent Agrostis curtisii and Sheep's Fescue Festuca ovina.	It is generally found below 300 metres in altitude in the UK, but in more northerly latitudes the altitudinal limit is often lower. Lowland heathland can develop on drift soils and weathered flint beds over calcareous soils (limestone or chalk heath). Lowland heathland is a dynamic habitat which undergoes significant changes in different successional stages,		Small scale mosaic of patches dominated by dwarf shrubs and patches dominated by acid grassland (use 13 in combination with h1a or g1).	Grass dominated areas with less than 25% dwarf shrub cover (see g1).

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
			from bare ground (e.g. after burning or tree clearing) and grassy stages, to mature, dense heath.			
h1b	Upland Heathland	Heathland vegetation occurs widely on mineral soils and thin peats (				Dwarf shrub dominant vegetation on deep peat (see f1a). Heathland below the limit of agricultural enclosure (see h1a).
h2	Hedgerows	A boundary line of shrubs, provided that at one time the shrubs were stock proof and more or less continuous.			Includes: an earth bank or wall only where such a feature occurs in association with the hedgerow. Any bank, wall, ditch, tree or herbaceaous	

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
					vegetation <20m.	
h3	Dense scrub	Patches of shrubs less than 5 metres tall with continuous (>90%) cover.			Patches with occasional trees more than 5 metres tall (see 11). Tree species less than 5m tall. Coastal scrub. Scattered Seabuckthorn Hippophae rhamnoides scrub on dunes (see h3c5).	Patches with shrub cover
h3f	Hawthorn scrub	Dense scrub with dominant Hawthorn Crataegus monogyna.				
r	Rivers and lakes	Inland surface waters (freshwater ecosystems).				

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
r1	Standing open water and canals	Natural systems such as lakes, meres and pools, as well as manmade waters such as reservoirs, canals, ponds and gravel pits.	Standing waters are usually classified according to their nutrient status and this can change naturally over time or as a result of pollution. There are three main types of standing waters, namely: oligotrophic (nutrient-poor), eutrophic (nutrient-rich), and mesotrophic (intermediate). These lake types exist along an environmental gradient and intermediate types occur. Other types of standing water include dystrophic (highly acidic, peatstained water), marl lakes, brackish-water lakes, turloughs and other		Includes the open water zone (which may contain submerged, free-floating or floating-leaved vegetation) and water fringe vegetation. Ditches with open water for at least the majority of the year.	Coastal saline lagoons (see t2g5). Marginal emergent vegetation that is greater than 5 m wide. Mappable adjacent wetland or wet woodland habitat.

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
			temporary water bodies.			
r1c	Oligotrophic and dystrophic lakes	Oligotrophic and dystrophic lakes are water bodies mainly more than 2 ha in size which are characterised by their low nutrient levels and low productivity.	Their catchments usually occur on hard, acid rocks, most often in the uplands. This habitat type encompasses a wide range of size and depth, and includes the largest and deepest water bodies in the UK. Oligotrophic lakes usually have very clear water, whilst some examples with dystrophic characteristics have			

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
			peat-stained waters. Good examples may support some of the least disturbed aquatic assemblages in the UK.			
r1e	Canals	An artificial watercourse for inland navigation or irrigation.				Excludes towpaths and other land between the canalside and the nearest field boundary.
r2	Rivers and streams	Rivers and streams from bank top to bank top, or, where there are no distinctive banks or banks are never overtopped, it includes the extent of the mean annual flood.			Includes: the open channel (which may contain submerged, freefloating or floating-leaved vegetation) water fringe vegetation and exposed	Adjacent wetland habitats.

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
					sediments and shingle banks.	
s	Sparsely vegetated land	Unvegetated, disturbed (regularly or drastically periodically) or sparsely vegetated habitats (permanently or periodically naturally unvegetated areas) inhabited by stress tolerating vegetation.			Includes inland rock, supralittoral rock (sea-cliffs) supralittoral sediment (mud, sand and shingle) and coastal habitats (including dunes).	
s1	Inland rock	Natural and artificial exposed rock surfaces which are mappable, such as inland cliffs, caves, and screes and limestone pavements, as well as various forms of excavations and waste tips such as quarries and quarry waste.			Plant communities that colonise the cracks and fissures of rock faces. Certain types of tall herb and fern vegetation, which as a result of grazing are much reduced	

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
					in extent and confined to areas inaccessible to grazing, such as cliff faces and ledges.	
s1a	Inland rock outcrop and scree habitats	This habitat covers a wide range of rock types, varying from acidic to highly calcareous.	The habitat occurs throughout the uplands, and is particularly characteristic of high altitudes, but is also found at low altitudes notably in northern Scotland.		Includes mountain summit boulder fields.	Coastal cliff and ledge habitats (see s2a).

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
s1b	Limestone pavement	Outcrops of rock, typically horizontal or gently inclined, although a few are steeply inclined. The surface has been dissolved by water over millions of years into 'paving blocks', known as clints, with a complex reticulate pattern of crevices, known as grikes, between them. Record as s1b5 Limestone pavements (H8240)	Limestone pavements are a scarce and non-renewable resource. They were exposed by the scouring action of ice sheets during the ice age which ended some 10,000 years ago. Since then water action has widened the cracks in the pavements to form a complex pattern of crevices known as grikes between which are massive blocks of worn limestone called clints. Limestone pavements are of both geological and biological importance. The vegetation is rich in vascular plants, bryophytes and lichens and varies			

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
			according to geographical location, altitude, rock type and the presence or absence of grazing animals. Limestone pavement vegetation may also contain unusual combinations of plants, with woodland and wood-edge species well-represented in the sheltered grikes. The clints support plants of rocky habitats or are often unvegetated. In the absence of grazing scrub may develop. In oceanic areas scrub over limestone pavement is important for epiphytes.			

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
s1c	Calaminarian grasslands	Calaminarian grasslands include a range of semi-natural and anthropogenic sparsely vegetated habitats on substrates characterised by high levels of heavy metals such as lead, chromium and copper, or other unusual minerals.	Associated with outcrops of serpentine and river gravels rich in heavy metals, as well as with artificial mine workings and spoil heaps. Seral succession is slowed or arrested by the toxicity of the substrate.			
u	Urban	Constructed, industrial and other artificial habitats			Constructed, industrial and other artificial habitats in rural areas.	Grasslands, woodlands, heathlands, wetlands, rivers, lakes, sparsely vegetated land in urban areas.
u1	Built-up areas and gardens	Urban and rural settlements, farm buildings, caravan parks and other man-made built structures such as industrial estates, retail parks, waste and derelict ground, urban parkland and urban transport infrastructure.			Allotments and most gardens	Mappable patches of other ecosystems that fall within an uirban area.

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
u1a	Open Mosaic Habitats on Previously Developed Land	Each of the following five criteria must be met. (1) Open mosaic habitat at least 0.25 ha in size. (2) Known history of disturbance or evidence that soil has been removed or severely modified by previous use(s). Extraneous materials/substrates such as industrial spoil may have been added. (3) Site contains some vegetation. This will comprise early successional communities consisting mainly of stress-tolerant species (e.g. indicative of low nutrient status or drought). Early successional communities are composed of (a) annuals, or (b) mosses/liverworts, or (c) lichens, or (d) ruderals, or (e) inundation species, or (f) open grassland, or (g) flower-rich grassland, or (h) heathland. (4) Contains unvegetated, loose bare substrate and pools may be present. (5) The site shows spatial variation, forming a mosaic of one or more of early successional communities (a)–(h) above				

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
		(criterion 3) plus bare substrate, within 0.25 ha.				
u1c	Artificial unvegetated, unsealed surface	Land cleared for development, infrastructure construction or other purpose, currently unvegetated, but the soil surface is not sealed with impervious materials.				

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
w	Woodland and forest	Land with more than 25% cover of trees more than 5m in height.			Recently felled woodland (but not clear felled forestry plantations unless re-planted). Coppice. Coppice-with-standards. Lines of trees (but not hedgerows). Wet woodland. Bog woodland.	Hedgerows (see h2). Scrub (see h3 or 10). Clear felled forestry plantations (see w2), unless replanted.
w1	Broadleaved mixed and yew woodland	Vegetation dominated by trees that are more than 5 m high when mature, which form a distinct, although sometimes open canopy with a canopy cover of greater than 25%. It includes stands of both native and non-native broadleaved tree species and Yew Taxus baccata, where the percentage cover of these trees in the stand exceeds 20% of the total cover of the trees present.			Ancient or recent woodland and either semi-natural or planted. Recently felled broadleaved, mixed and yew woodland where there is a clear indication that it will return to	Hedgerows (see h2). Scrub (see h3 or 10). Woodlands that are dominated by conifer trees with less than 20% of the total cover provided by broadleaved or yew trees (see w2).

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
					woodland. Carr (woody vegetation on fens and bog margins).	
w1a	Upland oakwood	Record as w1a5 Western acidic oak woodland (H91A0)	It is found throughout the north and west of the UK with major concentrations in Argyll and Lochaber, Cumbria, Gwynedd, Somerset, Devon and Cornwall.			
w1b	Upland mixed ashwoods	Woods on base-rich soils in the north and west, in most of which Ash Fraxinus excelsior is a major species, although locally Oak Quercus spp., Birch Betula spp., Elm Ulmus spp., Small-leaved Lime Tilia cordata and even Hazel Corylus avellana may be the most abundant species.	Upland in the name reflects the abundance of this type of woodland on base-rich soils in upland Britain rather than to the altitude at which individual sites occur. Some			Ash woodlands on limestone pavements (see s1b).

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
			are only just above sea level.			
w1d	Wet woodland	Wet woodland occurs on poorly drained or seasonally wet soils, usually with Alder Alnus glutinosa, Birch Betula spp. and Willows Salix spp. as the predominant tree species, but sometimes including Ash Fraxinus excelsior, Oak Quercus spp., Scots Pine Pinus sylvestris and Beech Fagus sylvatica on the drier riparian areas.	It is found on floodplains, as successional habitat on fens, mires and bogs, along streams and hill-side flushes, in peaty hollows, along lake edges and fen marsh margins. These woodlands, sometimes known as carr, occur on a range of soil types including nutrient-rich mineral and acid, nutrient-poor organic ones. The boundaries with dryland woodland may be sharp or gradual and may			

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
			change with time through succession, depending on the hydrological conditions and the treatment of the wood and its surrounding land. Therefore wet woods frequently occur in mosaic with other woodland key habitat types (e.g. with upland mixed ash or oakwoods) and with open key habitats such as fens.			
w1f	Lowland mixed deciduous woodland	Lowland mixed deciduous woodland includes woodland growing on the full range of soil conditions, from very acidic to base-rich; occurs largely within enclosed landscapes, usually on sites with well-defined boundaries, at relatively low altitudes,	Includes most established semi-natural woodland in southern and eastern England, and in parts of lowland Wales and Scotland.Many are ancient woods and they include classic			

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
		although altitude is not a defining feature.	examples of ancient woodland in East Anglia and the East Midlands.			
w1g6	Line of trees	A line of trees at least 20 metres in length with open habitat on each side.			Grown out hedgerows, avenues, narrow windbreaks, willows and alders along watercourses.	Overgrown hedgerows still capable of being laid into a stockproof hedge.
w1h	Other woodland; mixed	A mixture of broadleaved and coniferous trees in which neither make up more than 80% of the tree cover. Mixed woodland that does not meet the definition of any other woodland types.	Likely to include woodland that is self-sown and/or recently established in either urban or rural situations.			

Primary Habitats	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
w2	Coniferous woodland	Vegetation dominated by trees that are more than 5 m high when mature, which form a distinct, although sometimes open canopy which has a cover of greater than 20%, with stands of both native and non-native coniferous trees species (with the exception of Yew Taxus baccata) where the percentage cover of these trees in the stand exceeds 80% of the total cover of the trees present.	Scots pine Pinussylvestrisis the only pine tree that is native to the UK, and forms native woodland only in Scotland. Semi-natural woods of Scots pine are normally called native pinewoods. The majority of coniferous woodlands in the UK are plantations of species that are either not native to the UK or to the sites on which they occur.		Recently felled coniferous woodland where there is a clear indication that it will return to woodland.	Woodlands that are made up of broadleaved, yew and conifer trees with less than 80% of the total cover provided by conifer trees.


Environment
SYSTEMS
evidence and insight

eftec
economics for
the environment

SLR

DERBYSHIRE
County Council

Secondary Codes	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
10	Scattered scrub	Non-woodland habitats that include patches of scattered scrub, each below 0.04ha., with an overall cover of				
11	Scattered trees	Non-woodland habitats that include trees growing at low density, with canopy cover <20%.				
12	Scattered bracken	Habitats with Bracken, Pteridium aquilinum, at < 95% canopy cover at the height of the growing season.				
13	Scattered dwarf shrubs	Small scale mosaic of patches dominated by dwarf shrubs and patches dominated by acid grassland, with each type failing to meet separate mappable size.				
16	Tall herb	Stands of tall perennial or biennial dicotyledons, such as Rosebay Willowherb Chamerion angustifolium, Common Nettle Urtica dioica, Hogweed Heracleum sphondylium and Japanese Knotweed Reynoutria japonica.			Includes non-wooded stands of species such as Lemon-scented fern Oreopteris limbosperma, Lady-fern Athyrium filix-femina, Dryopteris species or Great	Excludes upland species-rich ledges (see s1a9).

Secondary Codes	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
					Wood-rush Luzula sylvatica.	
17	Ruderal/ ephemeral	Short patchy plant associations typical of unmanaged areas in arable landscape, derelict urban sites, quarries and railway ballast.				
18	Calcareous - acidic mosaic	A small-scale mosaic of vegetation types with predominance of calcicole and calcifugous species.				

Secondary Codes	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
19	Ponds (Priority Habitat)	Permanent and seasonal standing water bodies up to 2 ha in extent which meet one or more of the following criteria: (1) Habitats of international importance: Ponds that meet criteria under Annex I of the Habitats Directive. (2) Species of high conservation importance: Ponds supporting Red Data Book species, UK BAP species, species fully protected under the Wildlife and Countryside Act Schedule 5 and 8, Habitats Directive Annex II species, a Nationally Scarce wetland plant species, or three Nationally Scarce aquatic invertebrate species. (3) Exceptional assemblages of key biotic groups: Ponds supporting exceptional populations or numbers of key species. Based on (i) criteria specified in guidelines for the selection of biological SSSIs (currently amphibians and dragonflies only), and (ii) exceptionally rich sites for plants or invertebrates (i.e. supporting >30 wetland plant species or >50 aquatic macroinvertebrate species) (4) Ponds of high ecological quality: Ponds classified in the top PSYM category ("high") for ecological quality (i.e.				

Secondary Codes	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
		having a PSYM score >75%). [PSYM (the Predictive SYstem for Multimetrics) is a method for assessing the biological quality of still waters in England and Wales; plant species and-or invertebrate families are surveyed using a standard method; the PSYM model makes predictions for the site based on environmental data and using a minimally impaired pond dataset; comparison of the prediction and observed data gives a % score for ponds quality]. (5) Other important ponds: Individual ponds or groups of ponds with a limited geographic distribution recognised as important because of their age, rarity of type or landscape context e.g. pingos, dune slack ponds, machair ponds.				

Secondary Codes	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
20	Wood-pasture and parkland	Wood-pasture and parkland are mosaic habitats valued for their trees, especially veteran and ancient trees, and the plants and animals that they support. Wood-pasture and parkland habitats display at least some of the following characteristics (see context for additional qualifying characteristics): (1) Open grown trees, some of which are ancient or veteran and may be hollow and support significant amounts of dead and decaying timber. If managed, the ancient or veteran trees have generally been pollarded, although wood-pastures may incorporate other forms of tree management. The trees often exhibit a browse line at the maximum height that browsing animals can reach. (2) Scrub as individual plants or clumps, in some instances providing tree protection or opportunities for tree regeneration. (3)Evidence of past land use for extensive agriculture and transhumance systems (where livestock are moved between lowland in winter and upland or mountain grazing in the summer). Abandoned wood-pastures	Some sites have origins in medieval hunting forests (which may not have been completely treed) and emparkments, wooded commons, or pastures with trees in them. Many of these sites were later developed as landscaped parks creating a rich legacy of layers of designed landscapes and archaeological features also of historic importance. A range of native species usually			

Secondary Codes	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
		in the uplands are remnants of a lost land-use system which is still extant in many parts of continental Europe. These wood-pastures contain open grown veteran trees (often pollards) which may in some instances now be within a matrix of secondary woodland or scrub that has developed by regeneration and/or planting in the absence of grazing animals. (4) Wood-pasture or parkland that has been converted to other land uses such as arable fields, forestry and amenity land, but where surviving veteran trees are of nature conservation interest. Some of the characteristic wood-pasture and parkland species may be surviving this change in state in the short term while the veteran trees remain alive. Sites may contain ancient pollards (e.g. Hatfield Forest) and other less usual tree forms, which result from trees being managed for timber, fodder and other products in the presence of grazing animals.	predominates amongst the oldest trees but there may be nonnative trees which have been planted or regenerated naturally. Others are designed landscapes not originating from medieval parkland, but with veteran trees, including 19th century or later parklands with their origins in earlier agricultural landscapes.			

Secondary Codes	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
21	Traditional orchards	Habitat structure rather than vegetation type, topography or soils, is the defining feature of the habitat. Traditional orchards are structurally and ecologically similar to wood-pasture and parkland, with open- grown trees set in herbaceous vegetation, but are generally distinguished from these priority habitat complexes by the following characteristics: the species composition of the trees, these being primarily in the family Rosaceae; the usually denser arrangement of the trees; the small scale of individual habitat patches; the wider dispersion and greater frequency of occurrence of habitat patches in the countryside.			Traditional orchards include plantings for nuts, principally hazel nuts, but also walnuts.	
25	Coastal and floodplain grazing marsh	Grazing marsh is defined as periodically inundated pasture, or meadow with ditches which maintain the water levels, containing standing brackish or fresh water.			Sites may contain seasonal water-filled hollows and permanent ponds with emergent swamp communities.	Extensive areas of tall fen species like reeds.

Secondary Codes	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
33	Ancient woodland site	England and Wales definition: land that is currently wooded and has been continually wooded, at least since 1600AD. Scotland definition: land that is currently wooded and has been continually wooded, at least since 1750AD. Northern Ireland definition: "long-established woodland" - land that has been continuously wooded since the first comprehensive maps of Ireland were produced in 1830-44.	Ancient woodland sites can include a) fragments of woodland in inaccessible areas (cliff, gorges etc), b) ancient high forest (mainly pine and birch in Scotland), c) relicts of wood pasture (unenclosed woodland in former medieval forests, old deer parks and wooded commons), d) ancient coppice woods.		The tree and shrub layer is composed of species native to the site derived from natural regeneration or coppice regrowth from individuals which were themselves derived from natural regeneration (Ancient semi-natural woodland - use codes 33 and 37). If an ancient woodland site has been replanted then use codes 33 and 36 - Plantation on Ancient Woodland Site, or "PAWS").	Land that was an ancient woodland site in the recent past but has now been converted to a non-woodland land-use.

Secondary Codes	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
36	Obviously planted trees which are predominantly even-aged, of uniform density and similar forms, normally occurring in rows.				Includes wooded ornamental gardens and arboretum collections.	
37	Semi-natural woodland	Composed of trees which are usually uneven-aged, of mixed density and forms, and which occur in natural groupings.				
38	Secondary woodland	Woodlands that have regrown on abandoned or neglected ground that had previously been used for agriculture, grazing or development of towns, villages, industry and roads.				Excludes plantations.
39	Freshwater - man-made	Freshwater bodies that have been dug by humans.			Includes artificial ponds, fishing lakes, water-filled sand and gravel pits, ornamental lakes, fen drains and ditches	Excludes: reservoirs (see 1040) and canals (see r1e).

Secondary Codes	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
					(especially in Coastal Floodplain and Grazing Marsh).	
51	Coppice	Crops of marketable broadleaved species that have at least 2 stems per stool and are either being worked or are capable of being worked on rotation. With the exception of hazel coppice more than half the stems should be capable of producing 1 m timber lengths of good form.				
53	Felled	Woodland areas that have been felled or stands where the stocking has been reduced to less than 20% and where it is expected that these areas will be replanted.				
56	Young trees - planted	Areas where planting is clearly visible, but the trees cannot yet be allocated between Conifer and Broadleaved due to their immaturity. These areas can be on either land new to woodland or where a felled crop has been replaced.				
57	Young trees - self-set	Tree seedlings or saplings of natural regeneration origin.				

Secondary Codes	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
58	Grazed	Managed by farm livestock, including exotic species.				Excludes habitat exclusively grazed by wild animals.
66	Frequently mown	Frequent mechanised cutting of grass as in garden lawns, golfcourse fairways and urban parks managed as short grassland.				
67	Dry stone wall	A wall consisting of stones without mortar or cement.				
73	Bare ground	Any type of bare soil or other unvegetated substrate. Link only with vegetated primary habitats that surround or are adjacent to much of the bare ground patch.				Excludes bare ground defined by their unvegetated state e.g. Intertidal mud.
105	Quarry - hard rock	A large, deep pit, from which stone has been extracted.				Excludes sand, gravel and marl pits.
106	Quarry - sand and gravel	Open mining for materials occurring as small grain sizes, such as sand and gravel.				

Secondary Codes	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
114	Solar panel array	An arrangement of ground-mounted or floating solar photovoltaic panels designed for renewable electricity generation.				Solar panels mounted on the roofs of buildings.
117	Dry	Water table < 100 cm of the surface, water available only during some periods				
119	Seasonally wet	Water table variable at the surface and waterlogged for the winter months or spring flooding season, becoming wet or mesic during the summer period.				
120	Wet	Water table within 40 cm of the surface and soil containing free water for most of the year.				
121	Waterlogged	Soils or vegetation saturated with water.				
127	Peat	Land with any depth of surface peat, bare or vegetated.				
129	Flush	Lines of water flow not forming streams – wetland vegetation indicators present.				
134	Base-rich substrate	Soil, water, tree bark or rock with high levels of calcium or magnesium ions.				

Secondary Codes	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
135	Acidic substrate	Soil, water, tree bark or rock with high levels of hydrogen ions.				
146	Exposed riverine sediments	Mounds of sediment which have recently been deposited in any channel of flowing water and then subsequently exposed by reduced water levels, including shoals, bars, berms, spits, sandbanks and shingle banks.				
160	Sward type mosaic	A grassland site with a mosaic of sward types such as short grazed/mown, tall flower-rich, tussocky.				
161	Tall or tussocky sward	Tall swards, with or without occasional tussocks, providing nectar, pollen, foodplants, seeds, dead seed heads and prey items for invertebrates and certain bird species.				
189	Scattered grass	A non-grassland habitat with a low cover of grasses.				
200	Parks and gardens	Areas of land designed, constructed, managed and maintained for casual leisure and recreation. Normally enclosed.				

Secondary Codes	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
300	Natural and semi-natural open space	Areas of undeveloped or previously developed land with residual natural habitats or which have been planted or colonised by vegetation and wildlife.				
431	Road island/verge	Land alongside roads and in the middle of roundabouts. Will usually be managed by the Local Authority or Highways Authority.				
510	Sports pitches	Flat areas of grassland or specially designed surfaces used for a range of outdoor sports, i.e. football, rugby and hockey and, in the summer, for cricket. They often have changing rooms and pavilions.			Includes athletics tracks.	Excludes sports pitches on educational land (see 710, 711, 712).
540	Golf course	Land enclosed and used for golf.			Includes golf ranges. Includes all land, including semi-natural habitats, within the golf course boundary.	
611	Children's Play Space; natural	A site set aside mainly for children containing the usual paraphernalia of swings, slides and roundabouts but on a soft surface such as grass or sand.				

Secondary Codes	Full title	Definition	Landscape and ecological context	Synonyms	Inclusions	Exclusions
810	Cemetery	Land outside the confines of a church or place of worship used as a place of burial.			Includes land associated with crematoriums, burial grounds and memorial sites.	
910	Allotments	Land used for the cultivation of fruit and vegetables with numerous plots rented to local people.			Includes Community Gardens and City Farms.	
1011	Pasture or meadow	Land used for grazing or managed as a meadow.				
1040	Reservoirs	An artificial water body created by a dam for water supply or irrigation purposes.			Includes drawdown zones.	Excludes the dam. Excludes fishing lakes, industrial lagoons, gravel pits, quarry pools.
1160	Introduced shrub	Non-native tall phanerophytes, mid phanerophytes or low phanerophytes planted in a garden or park setting e.g. winter jasmine.				

Appendix 2: Input datasets and conflation order used to produce the Habitat Asset Register

Conflation order	Dataset	Provider
1 (top)	Stonewalls (automated and manual refinement from EO-based classification)	Environment Systems
2	Hedgerows (automated and manual refinement from EO-based classification)	Environment Systems
3	Stakeholder feedback - site-specific manual updates	Environment Systems
4	Chesterfield greenspace data	Chesterfield Borough Council
5	Merged dataset containing stakeholder feedback relating to wood pasture, arable/amenity grassland, and bare ground	Environment Systems
6	Multi Surface Fill - OS MasterMap selection	Ordnance Survey
7	Ponds	Derbyshire Wildlife Trust
8	Lakes in Lowland Derbyshire	Derbyshire Wildlife Trust
9	Boundary features derived from Lidar, Sentinel-1, NDVI analysis (Sentinel-2), OS MasterMap boundary data	Environment Systems / Ordnance Survey
10	Allotments	Derby City Council
11	Local Wildlife Sites	Derbyshire Wildlife Trust
12	Purple moor grass and rush pasture	Derbyshire Wildlife Trust
13	Reedbeds	Derbyshire Wildlife Trust
14	Ancient Woodland 2018	Derbyshire Wildlife Trust
15	Ancient Woodland England	Natural England
16	Fen, Mire, & Bog	Natural England
17	Lowland fen	Derbyshire Wildlife Trust
18	Lowland Heathland	Derbyshire Wildlife Trust
19	Open Mosaic Habitat	Derbyshire Wildlife Trust
20	Open Mosaic Habitat	Natural England
21	Traditional Orchards	Natural England
22	Traditional Orchards	Derbyshire Wildlife Trust
23	National Trust Phase1 data	National Trust
24	Wood Pasture and Parkland Priority Habitat data	Natural England
25	National Forest Inventory	Forest Research
26	Historical Wood Pasture and Parkland	Derbyshire Wildlife Trust
27	Semi natural grassland sites	Derbyshire Wildlife Trust
28	Peak District National Park Priority Habitat Data	Peak District National Park Authority
29	Priority Habitat Inventory (PHI) North	Natural England

30	Non Priority Habitats	Peak District National Park Authority
31	Amenity Green Space	Derby City Council
32	Natural and Semi Natural Green Space	Derby City Council
33	New Parks 2021	Derby City Council
34	The Crop Map of England (CROME) merged with OS MasterMap derived arable areas	Rural Payments Agency / Ordnance Survey
35 (bottom)	EO-derived habitat classification (Sentinel-2 imagery)	Environment Systems

Appendix 3: UKHab classes mapped in the Habitat Asset Register

CLASS NAME	HARCLASS	L2_CODE	LD_CODE	SEC_CODE	UKHAB_L2	UKHAB_LD	UKHABSEC
1	u1	u	u1	431	Urban	Built-up areas and gardens	Road island/verge
12	c	c	c	No secondary code assigned	Cropland	Cropland	No secondary code assigned
13	c1	c	c1	No secondary code assigned	Cropland	Arable and horticulture	No secondary code assigned
15	c1c	c	c1c	No secondary code assigned	Cropland	Cereal crops	No secondary code assigned
16	c1d	c	c1d	No secondary code assigned	Cropland	Non-cereal crops	No secondary code assigned
17	f	f	f	No secondary code assigned	Wetland	Wetland	No secondary code assigned
19	f - 127	f	f	127	Wetland	Wetland	Peat
20	f1	f	f1	No secondary code assigned	Wetland	Bog	No secondary code assigned
21	f1 - 73, 127	f	f1	73, 127	Wetland	Bog	Bare ground, Peat
22	f1 - 117	f	f1	117	Wetland	Bog	Dry
24	f1 - 120	f	f1	120	Wetland	Bog	Wet
26	f1a	f	f1a	No secondary code assigned	Wetland	Blanket bog	No secondary code assigned
27	f1a - 117	f	f1a	117	Wetland	Blanket bog	Dry
28	f1a - 120	f	f1a	120	Wetland	Blanket bog	Wet
29	f1a5	f	f1a5	No secondary code assigned	Wetland	Blanket bog (H7130)	No secondary code assigned
30	f2	f	f2	No secondary code assigned	Wetland	Fen marsh and swamp	No secondary code assigned
31	f2 - 129	f	f2	129	Wetland	Fen marsh and swamp	Flush
32	f2 - 129, 134	f	f2	129, 134	Wetland	Fen marsh and swamp	Flush, Base-rich substrate
35	f2a - 16	f	f2a	16	Wetland	Lowland fens	Tall herb

36	f2a8	f	f2a8	No secondary code assigned	Wetland	Transition mires and quaking bogs; lowland (H7140)	No secondary code assigned
37	f2b	f	f2b	No secondary code assigned	Wetland	Purple moor grass and rush pastures	No secondary code assigned
38	f2c	f	f2c	No secondary code assigned	Wetland	Upland flushes, fens and swamps	No secondary code assigned
40	f2e	f	f2e	No secondary code assigned	Wetland	Reedbeds	No secondary code assigned
41	g	g	g	No secondary code assigned	Grassland	Grassland	No secondary code assigned
43	g - 119, 120, 121	g	g	119, 120, 121	Grassland	Grassland	Seasonally wet, Wet, Waterlogged
44	g - 16	g	g	16	Grassland	Grassland	Tall herb
45	g - 17	g	g	17	Grassland	Grassland	Ruderal/ ephemeral
46	g - 18, 160	g	g	18, 160	Grassland	Grassland	Calcareous - acidic mosaic, Sward type mosaic
47	g - 21	g	g	21	Grassland	Grassland	Traditional orchards
48	g - 25	g	g	25	Grassland	Grassland	Coastal and floodplain grazing marsh
49	g1	g	g1	No secondary code assigned	Grassland	Acid grassland	No secondary code assigned
51	g1 - 12	g	g1	12	Grassland	Acid grassland	Scattered bracken
52	g1 - 13	g	g1	13	Grassland	Acid grassland	Scattered dwarf shrubs
53	g1 - 161	g	g1	161	Grassland	Acid grassland	Tall or tussocky sward
54	g1 - 18, 160	g	g1	18, 160	Grassland	Acid grassland	Calcareous - acidic mosaic, Sward type mosaic
55	g1 - 58	g	g1	58	Grassland	Acid grassland	Grazed
57	g1a	g	g1a	No secondary code assigned	Grassland	Lowland dry acid grassland	No secondary code assigned
58	g1a - 13	g	g1a	13	Grassland	Lowland dry acid grassland	Scattered dwarf shrubs
60	g1c	g	g1c	No secondary code assigned	Grassland	Bracken	No secondary code assigned
61	g2	g	g2	No secondary code assigned	Grassland	Calcareous grassland	No secondary code assigned

64	g2a	g	g2a	No secondary code assigned	Grassland	Lowland calcareous grassland	No secondary code assigned
65	g2b	g	g2b	No secondary code assigned	Grassland	Upland calcareous grassland	No secondary code assigned
66	g3	g	g3	No secondary code assigned	Grassland	Neutral grassland	No secondary code assigned
68	g3 - 1011	g	g3	1011	Grassland	Neutral grassland	Pasture or meadow
69	g3 - 120	g	g3	120	Grassland	Neutral grassland	Wet
70	g3 - 161	g	g3	161	Grassland	Neutral grassland	Tall or tussocky sward
71	g3a	g	g3a	No secondary code assigned	Grassland	Lowland meadows	No secondary code assigned
72	g3c	g	g3c	No secondary code assigned	Grassland	Other neutral grassland	No secondary code assigned
73	g4	g	g4	No secondary code assigned	Grassland	Modified grassland	No secondary code assigned
75	g4 - 66, 1160	g	g4	66, 1160	Grassland	Modified grassland	Frequently mown, Introduced shrub
77	h1	h	h1	No secondary code assigned	Heathland and shrub	Dwarf shrub heath	No secondary code assigned
78	h1 - 120	h	h1	120	Heathland and shrub	Dwarf shrub heath	Wet
79	h1 - 189	h	h1	189	Heathland and shrub	Dwarf shrub heath	Scattered grass
80	h1a	h	h1a	No secondary code assigned	Heathland and shrub	Lowland heathland	No secondary code assigned
81	h1b	h	h1b	No secondary code assigned	Heathland and shrub	Upland heathland	No secondary code assigned
83	h1b - 120, 134	h	h1b	120, 134	Heathland and shrub	Upland Heathland	Wet, Base-rich substrate
84	h1b - 134	h	h1b	134	Heathland and shrub	Upland heathland	Base-rich substrate
85	h1b - 135	h	h1b	135	Heathland and shrub	Upland heathland	Acidic substrate
86	h1b - 189	h	h1b	189	Heathland and shrub	Upland heathland	Scattered grass
87	h2	h	h2	No secondary code assigned	Heathland and shrub	Hedgerows	No secondary code assigned
88	h3	h	h3	No secondary code assigned	Heathland and shrub	Dense scrub	No secondary code assigned

89	h3f	h	h3f	No secondary code assigned	Heathland and shrub	Hawthorn scrub	No secondary code assigned
90	r	r	r	No secondary code assigned	Rivers and lakes	Rivers and lakes	No secondary code assigned
91	r1	r	r1	No secondary code assigned	Rivers and lakes	Standing open water and canals	No secondary code assigned
92	r1 - 1040	r	r1	1040	Rivers and lakes	Standing open water and canals	Reservoirs
93	r1 - 39	r	r1	39	Rivers and lakes	Standing open water and canals	Freshwater - man-made
94	r1c	r	r1c	No secondary code assigned	Rivers and lakes	Oligotrophic and dystrophic lakes	No secondary code assigned
95	r1e	r	r1e	No secondary code assigned	Rivers and lakes	Canals	No secondary code assigned
96	r2	r	r2	No secondary code assigned	Rivers and lakes	Rivers and streams	No secondary code assigned
97	s	s	s	No secondary code assigned	Sparsely vegetated land	Sparsely vegetated land	No secondary code assigned
98	s1	s	s1	No secondary code assigned	Sparsely vegetated land	Inland rock	No secondary code assigned
99	s1b	s	s1b	No secondary code assigned	Sparsely vegetated land	Limestone pavement	No secondary code assigned
100	s1c	s	s1c	No secondary code assigned	Sparsely vegetated land	Calaminarian grasslands	No secondary code assigned
101	u	u	u	No secondary code assigned	Urban	Urban	No secondary code assigned
104	u1 - 1160	u	u1	1160	Urban	Built-up areas and gardens	Introduced shrub
105	u1 - 910	u	u1	910	Urban	Built-up areas and gardens	Allotments
106	u1a	u	u1a	No secondary code assigned	Urban	Open Mosaic Habitats on Previously Developed Land	No secondary code assigned
107	w	w	w	No secondary code assigned	Woodland and forest	Woodland and forest	No secondary code assigned
108	w - 10	w	w	10	Woodland and forest	Woodland and forest	Scattered scrub
109	w - 11	w	w	11	Woodland and forest	Woodland and forest	Scattered trees
111	w - 33	w	w	33	Woodland and forest	Woodland and forest	Ancient woodland site
112	w - 33, 36	w	w	33, 36	Woodland and forest	Woodland and forest	Ancient woodland site, Plantation

113	w - 33, 37	w	w	33, 37	Woodland and forest	Woodland and forest	Ancient woodland site, Semi-natural woodland
114	w - 33, 37, 120	w	w	33, 37, 120	Woodland and forest	Woodland and forest	Ancient woodland site, Semi-natural woodland, Wet
115	w - 36	w	w	36	Woodland and forest	Woodland and forest	Plantation
117	w - 51	w	w	51	Woodland and forest	Woodland and forest	Coppice
118	w - 53	w	w	53	Woodland and forest	Woodland and forest	Felled
119	w - 56	w	w	56	Woodland and forest	Woodland and forest	Young trees - planted
120	w - 56, 57	w	w	56, 57	Woodland and forest	Woodland and forest	Young trees - planted, Young trees - self-set
121	w1	w	w1	No secondary code assigned	Woodland and forest	Broadleaved mixed and yew woodland	No secondary code assigned
123	w1 - 33	w	w1	33	Woodland and forest	Broadleaved mixed and yew woodland	Ancient woodland site
124	w1 - 33, 36	w	w1	33, 36	Woodland and forest	Broadleaved mixed and yew woodland	Ancient woodland site, Plantation
125	w1 - 33, 37	w	w1	33, 37	Woodland and forest	Broadleaved mixed and yew woodland	Ancient woodland site, Semi-natural woodland
126	w1 - 36	w	w1	36	Woodland and forest	Broadleaved mixed and yew woodland	Plantation
127	w1 - 37	w	w1	37	Woodland and forest	Broadleaved mixed and yew woodland	Semi-natural woodland
128	w1 - 38	w	w1	38	Woodland and forest	Broadleaved mixed and yew woodland	Secondary woodland
129	w1 - 53	w	w1	53	Woodland and forest	Broadleaved mixed and yew woodland	Felled
130	w1 - 56	w	w1	56	Woodland and forest	Broadleaved mixed and yew woodland	Young trees - planted
131	w1 - 56, 57	w	w1	56, 57	Woodland and forest	Broadleaved mixed and yew woodland	Young trees - planted, Young trees - self-set
133	w1a	w	w1a	No secondary code assigned	Woodland and forest	(Upland oakwood)	No secondary code assigned
136	w1a - 36	w	w1a	36	Woodland and forest	(Upland oakwood)	Plantation
137	w1a - 37	w	w1a	37	Woodland and forest	(Upland oakwood)	Semi-natural woodland
138	w1b	w	w1b	No secondary code assigned	Woodland and forest	Upland mixed ashwoods	No secondary code assigned

141	w1b - 36	w	w1b	36	Woodland and forest	Upland mixed ashwoods	Plantation
142	w1b - 37	w	w1b	37	Woodland and forest	Upland mixed ashwoods	Semi-natural woodland
143	w1d	w	w1d	No secondary code assigned	Woodland and forest	Wet woodland	No secondary code assigned
144	w1d - 37	w	w1d	37	Woodland and forest	Wet woodland	Semi-natural woodland
145	w1d - 38	w	w1d	38	Woodland and forest	Wet woodland	Secondary woodland
146	w1f	w	w1f	No secondary code assigned	Woodland and forest	Lowland mixed deciduous woodland	No secondary code assigned
147	w1f - 33, 37	w	w1f	33, 37	Woodland and forest	Lowland mixed deciduous woodland	Ancient woodland site, Semi-natural woodland
148	w1f - 37	w	w1f	37	Woodland and forest	Lowland mixed deciduous woodland	Semi-natural woodland
149	w1h - 36	w	w1h	36	Woodland and forest	Other woodland; mixed	Plantation
150	w2	w	w2	No secondary code assigned	Woodland and forest	Coniferous woodland	No secondary code assigned
151	w2 - 33, 36	w	w2	33, 36	Woodland and forest	Coniferous woodland	Ancient woodland site, Plantation
152	w2 - 36	w	w2	36	Woodland and forest	Coniferous woodland	Plantation
154	w2 - 53	w	w2	53	Woodland and forest	Coniferous woodland	Felled
155	s1a	s	s1a	No secondary code assigned	Sparsely vegetated land	Inland rock outcrop and scree habitats	No secondary code assigned
156	s - 105	s	s	105	Sparsely vegetated land	Sparsely vegetated land	Quarry - hard rock
157	h - 10	h	h	10	Heathland and shrub	Heathland and shrub	Scattered scrub
158	c1b - 1	c	c1b	1	Cropland	Temporary grass and clover leys	Intensively managed
159	c1b - 2	c	c1b	2	Cropland	Temporary grass and clover leys	Less intensively managed
161	f1a6	f	f1a6	No secondary code assigned	Wetland	Degraded blanket bog	No secondary code assigned
162	w1g6	w	w1g6	No secondary code assigned	Woodland and forest	Single line of trees	No secondary code assigned
163	s1a	s	s1a	No secondary code assigned	Inland rock outcrop and scree habitats		No secondary code assigned
165	u - 540	u	u	540	Urban	Urban	Golf course
167	s - 73	s	s	73	Sparsely vegetated land	Sparsely vegetated land	Bare ground

168	g - 73	g	g	73	Grassland	Grassland	Bare ground
169	u - 73	u	u	73	Urban	Urban	Bare ground
170	g - 20	g	g	20	Grassland	Grassland	Wood-pasture and parkland
171	g - 114	g	g	114	Grassland	Grassland	Solar farm
172	s - 105, 106	s	s	105, 106	Sparsely vegetated land	Sparsely vegetated land	Quarry - hard rock, Quarry - sand and gravel
173	w - 56	w	w	56	Woodland and forest	Woodland and forest	Planted woodland
174	f - 146	f	f	146	Wetland	Wetland	Exposed riverine sediments
175	g - 10	g	g	10	Grassland	Grassland	Scattered Scrub
177	r - 19	r	r	19	Rivers and lakes	Rivers and lakes	Ponds
178	g3a5	g	g3a5	No secondary code assigned	Grassland	Lowland hay meadows (H6510)	No secondary code assigned
179	u1c	u	u1c	No secondary code assigned	Urban	Artificial unvegetated, unsealed surface	No secondary code assigned
180	g - 810	g	g	810	Grassland	Grassland	Cemeteries
181	g - 610	g	g	611	Grassland	Grassland	Grassland/Childrens play areas
182	u - 200	u	u	200	Urban	Urban	Parks and gardens
183	u - 300	u	u	300	Urban	Urban	Natural and semi-natural open space
184	u - 510	u	u	510	Urban	Urban	Sport pitches
189	g - 67	g	g	67	Grassland	Grassland	Dry stone wall
193	u - 105	u	u	105	Urban	Urban	Quarry - hard rock
195	g3 -10	g	g3	10	Grassland	Neutral grassland	Scattered Scrub

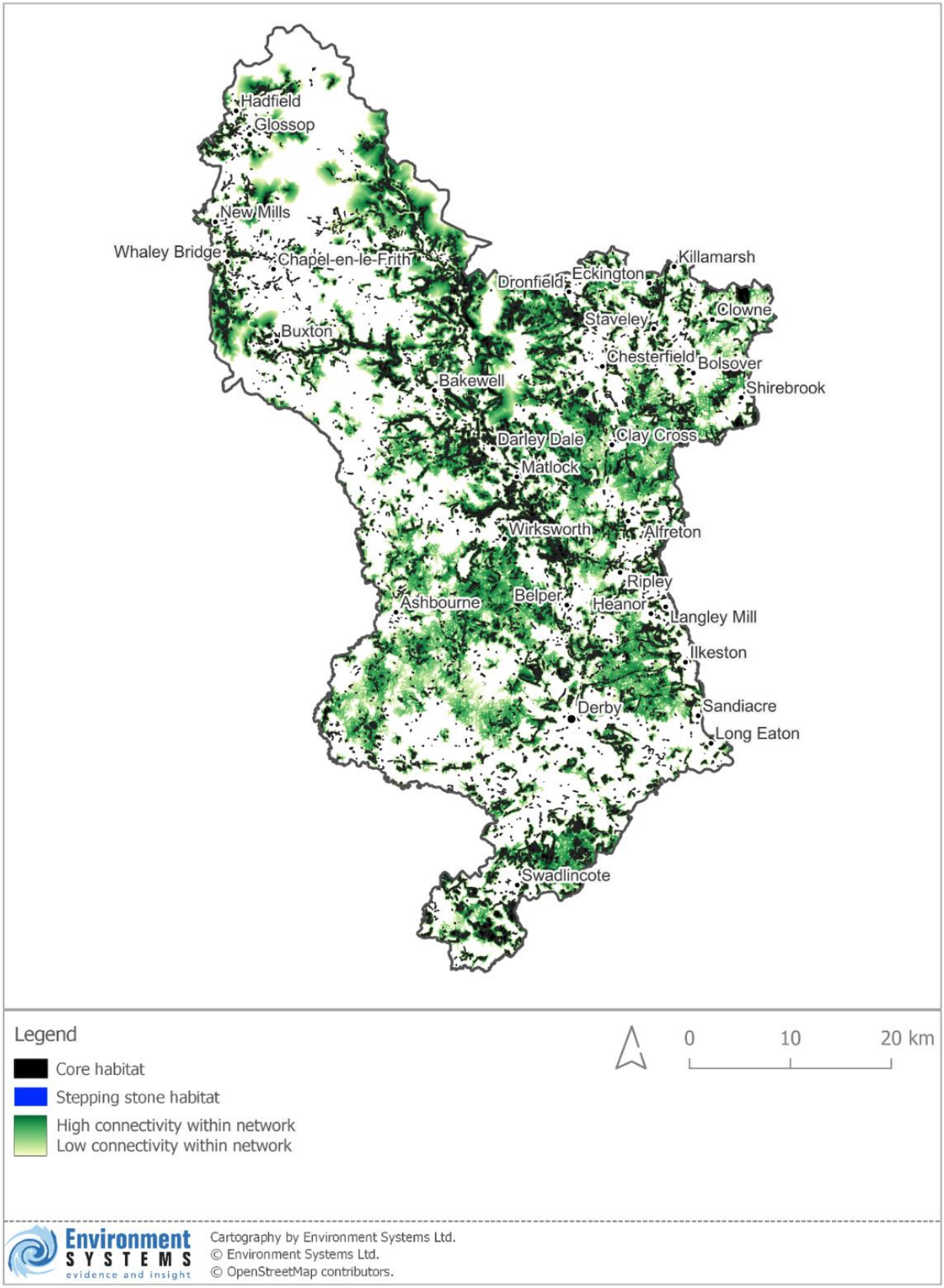
Appendix 4: Input datasets used in production of the ecosystem service stock, risk and opportunity maps

Dataset	Provider/Owner
Housing Allocations and Employment Land Allocations	Bolsover District Council
Housing Allocations	Chesterfield Borough Council
Natmap Vector (soil type)	Cranfield NSRI
Natmap Carbon	Cranfield NSRI
SP1104 rerun – climate change ALC scenarios	Cranfield NSRI
Renewable Energy Planning Database: quarterly extract	Department for Business, Energy & Industrial Strategy
5m resolution DEM	Derby City Council
Access points to paths	Derby City Council
Derby City parks	Derby City Council
Green spaces – parks	Derby City Council
Heritage at Risk	Derby City Council
Landscape Character 2013	Derby City Council
National Forest boundary	Derby City Council
Opportunity areas for large wind renewable energy	Derby City Council
Opportunity areas for small wind renewable energy	Derby City Council
Opportunity areas for ground-mounted solar renewable energy	Derby City Council
Paths	Derby City Council
Strategic Sites	Derby City Council
Visual intactness (October 2010 evaluation)	Derby City Council
Local Wildlife Sites	Derbyshire Wildlife Trust
Species data: bat roosts; GCN; notable invertebrate ponds; otter; water vole; while-clawed crayfish.	Derbyshire Wildlife Trust
Floodzone 2	Environment Agency
Floodzone 3	Environment Agency
Channel network (derived from 5m DEM using SCIMAP)	Environment Systems
Habitat Asset Register	Environment Systems
Slope: 5m resolution DEM	Environment Systems
Proposed Housing Allocations	Erewash Borough Council
Housing Allocations	High Peak Borough Council
Listed buildings	Historic England
Registered parks and gardens	Historic England
Scheduled monuments	Historic England
World Heritage Sites	Historic England
Agricultural Land Classification	Natural England
AONBs	Natural England
Country parks	Natural England
CRoW land	Natural England
LNRs	Natural England

NNRs	Natural England
Nature Recovery Networks for England	Natural England
Peak District National Park boundary	Natural England
Ramsar sites	Natural England
SACs	Natural England
SPAs	Natural England
SSSIs	Natural England
National Trust estates	National Trust
Master Map	Ordnance Survey
Vectormap	Ordnance Survey
Canals	Water Framework Directive
Selected rivers: Derwent, Dove, Trent	Water Framework Directive

Appendix 5: Methodology used in the production of individual SENCE and climate change maps

Woodland network



Connectivity was modelled using a cost-distance approach. All classes within the HAR were classified as either core type habitats (where species associated with the network type are natively found) or other habitat type. Larger blocks of core habitats are more resilient and

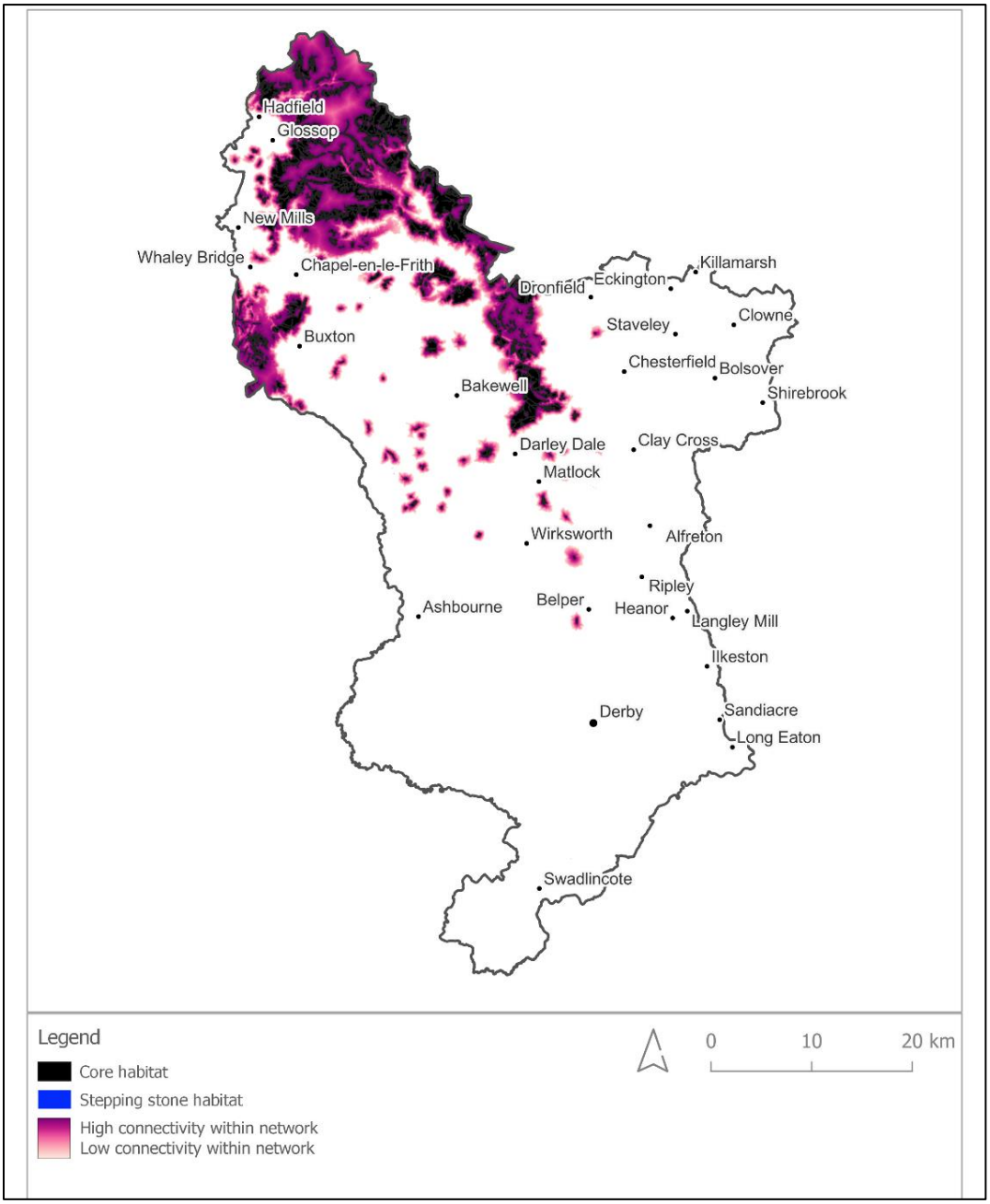
therefore retained as the 'core' class, whilst smaller areas were reclassified as 'stepping stones', i.e. areas that a species might use transiently while passing through, but would not choose to nest there. All habitats (core, stepping stone and 'other') were additionally assessed for movement cost; a value expressing how difficult it is for a species associated with the network to move through this non-core habitat. Core type habitats have an associated movement cost of 0 – the species are at home in these patches. The cost increases the harder a habitat is to transverse, with intensive agricultural land-use, waterbodies, or urban areas normally having the highest cost values. For this habitat type 'core' habitats were considered as areas of minimum 2ha size, while stepping stone habitats were of the same habitat type, but found in smaller patch sizes. A cut-off value was identified to determine the final extent of the network, in consultation with Derbyshire County Council, Peak District National Park Authority and Derbyshire Wildlife Trust. The table below identifies the HAR habitat types considered 'core' or 'stepping stone' for this habitat network.

UKHAB_L2	UKHAB_LD	UKHABSEC
Woodland and forest	(Upland oakwood)	No secondary code assigned
Woodland and forest	(Upland oakwood)	Plantation
Woodland and forest	(Upland oakwood)	Semi-natural woodland
Woodland and forest	Broadleaved mixed and yew woodland	Ancient woodland site
Woodland and forest	Broadleaved mixed and yew woodland	Ancient woodland site, Plantation
Woodland and forest	Broadleaved mixed and yew woodland	Ancient woodland site, Semi-natural woodland
Woodland and forest	Broadleaved mixed and yew woodland	No secondary code assigned
Woodland and forest	Broadleaved mixed and yew woodland	Plantation
Woodland and forest	Broadleaved mixed and yew woodland	Secondary woodland
Woodland and forest	Broadleaved mixed and yew woodland	Semi-natural woodland
Woodland and forest	Lowland mixed deciduous woodland	Ancient woodland site, Semi-natural woodland
Woodland and forest	Lowland mixed deciduous woodland	No secondary code assigned
Woodland and forest	Lowland mixed deciduous woodland	Semi-natural woodland
Woodland and forest	Other woodland; mixed	Plantation

Woodland and forest	Upland mixed ashwoods	No secondary code assigned
Woodland and forest	Upland mixed ashwoods	Plantation
Woodland and forest	Upland mixed ashwoods	Semi-natural woodland
Woodland and forest	Wet woodland	No secondary code assigned
Woodland and forest	Wet woodland	Secondary woodland
Woodland and forest	Wet woodland	Semi-natural woodland
Woodland and forest	Woodland and forest	Ancient woodland site
Woodland and forest	Woodland and forest	Ancient woodland site, Plantation
Woodland and forest	Woodland and forest	Ancient woodland site, Semi-natural woodland
Woodland and forest	Woodland and forest	Ancient woodland site, Semi-natural woodland, Wet
Woodland and forest	Woodland and forest	Coppice
Woodland and forest	Woodland and forest	No secondary code assigned
Woodland and forest	Woodland and forest	Plantation
Woodland and forest	Woodland and forest	Planted woodland

Associated data file	**Value/Class name**
Ecological_Network_Woodland_SS_Core.gpkg	CLASS – Core: hex colour: #000000 CLASS – Stepping stone: hex colour: #ff7f00
Ecological_Network_Woodland.gpkg	Range: 0 – High: dark green 3000 – Low: light green

Heathland network



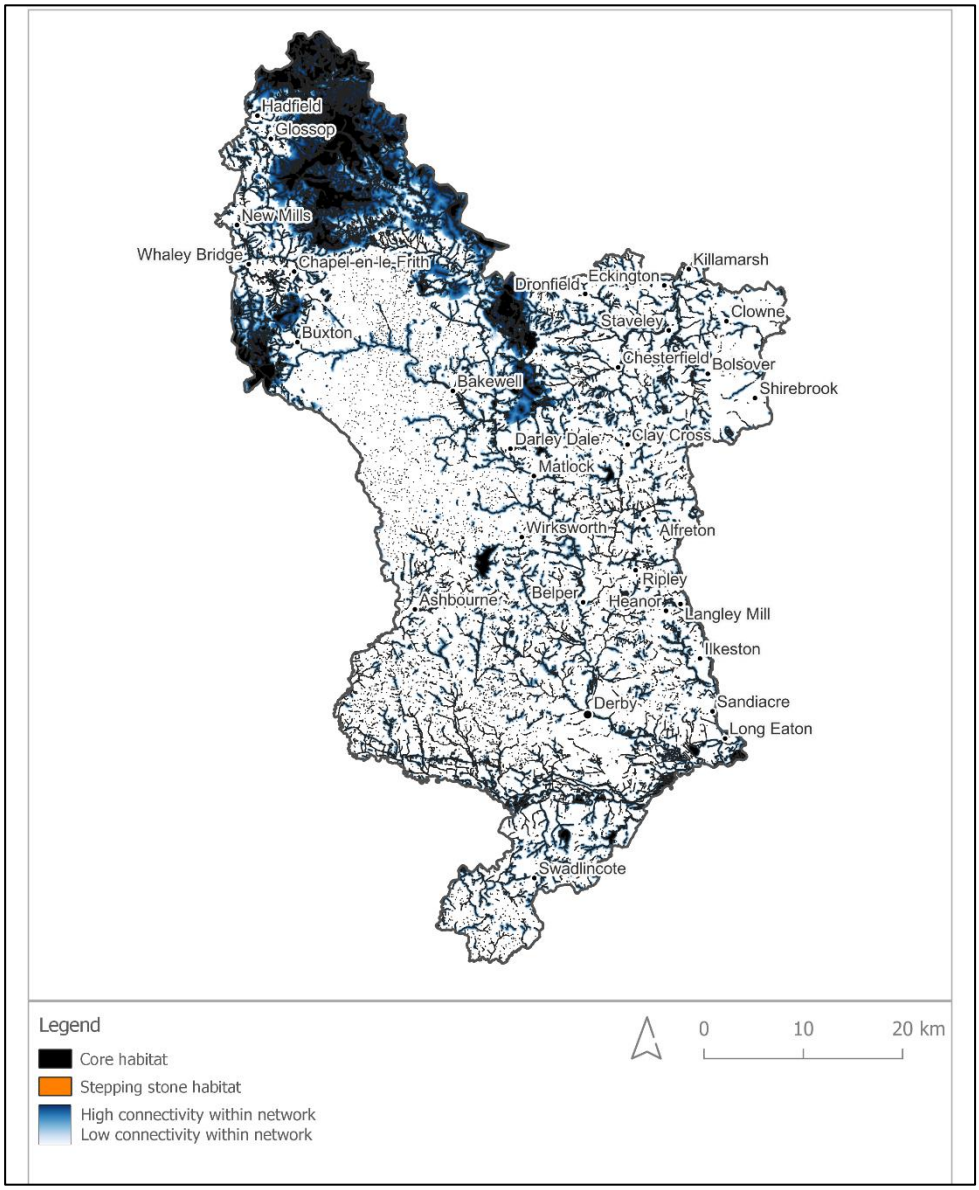
Connectivity was modelled using a cost-distance approach. All classes within the HAR were classified as either core type habitats (where species associated with the network type are natively found) or other habitat type. Larger blocks of core habitats are more resilient and therefore retained as the 'core' class, whilst smaller areas were reclassified as 'stepping stones', i.e. areas that a species might use transiently while passing through, but would not choose to nest there. All habitats (core, stepping stone and 'other') were additionally assessed for movement cost; a value expressing how difficult it is for a species associated with the network to move through this non-core habitat. Core type habitats have an associated movement cost of 0 – the species are at home in these patches. The cost increases the harder a habitat is to transverse, with intensive agricultural land-use, waterbodies, or urban areas

normally having the highest cost values. For this habitat type 'core' habitats were considered as areas of minimum 0.25ha size, while stepping stone habitats were of the same habitat type, but found in smaller patch sizes. A cut-off value was identified to determine the final extent of the network, in consultation with Derbyshire County Council, Peak District National Park Authority and Derbyshire Wildlife Trust. The table below identifies the HAR habitat types considered 'core' or 'stepping stone' for this habitat network.

UKHAB_L2	UKHAB_LD	UKHABSEC
Heathland and shrub	Dwarf shrub heath	No secondary code assigned
Heathland and shrub	Dwarf shrub heath	Scattered grass
Heathland and shrub	Dwarf shrub heath	Wet
Heathland and shrub	Lowland heathland	No secondary code assigned
Heathland and shrub	Upland heathland	Acidic substrate
Heathland and shrub	Upland heathland	Base-rich substrate
Heathland and shrub	Upland heathland	No secondary code assigned
Heathland and shrub	Upland heathland	Scattered grass
Heathland and shrub	Upland Heathland	Wet, Base-rich substrate

Associated data file	Value/Class name
Ecological_Network_Heathland_SS_Core.gpkg	CLASS – Core: hex colour: #000000 CLASS – Stepping stone: hex colour: #032cfc
Ecological_Network_Heathland.gpkg	Range: 0 – High: dark pink 8200 – Low: light pink

Wetland network



Connectivity was modelled using a cost-distance approach. All classes within the HAR were classified as either core type habitats (where species associated with the network type are natively found) or other habitat type. Larger blocks of core habitats are more resilient and therefore retained as the 'core' class, whilst smaller areas were reclassified as 'stepping stones', i.e. areas that a species might use transiently while passing through, but would not choose to nest there. All habitats (core, stepping stone and 'other') were additionally assessed for movement cost; a value expressing how difficult it is for a species associated with the network to move through this non-core habitat. Core type habitats have an associated movement cost of 0 – the species are at home in these patches. The cost increases the harder a habitat is to transverse, with intensive agricultural land-use, waterbodies, or urban areas normally having the highest cost values. For this habitat type 'core' habitats were considered as areas of minimum 0.2ha size, while stepping stone habitats were of the same habitat type, but found in smaller patch sizes. A cut-off value was identified to determine the final extent of the network, in consultation with Derbyshire County Council, Peak District National Park

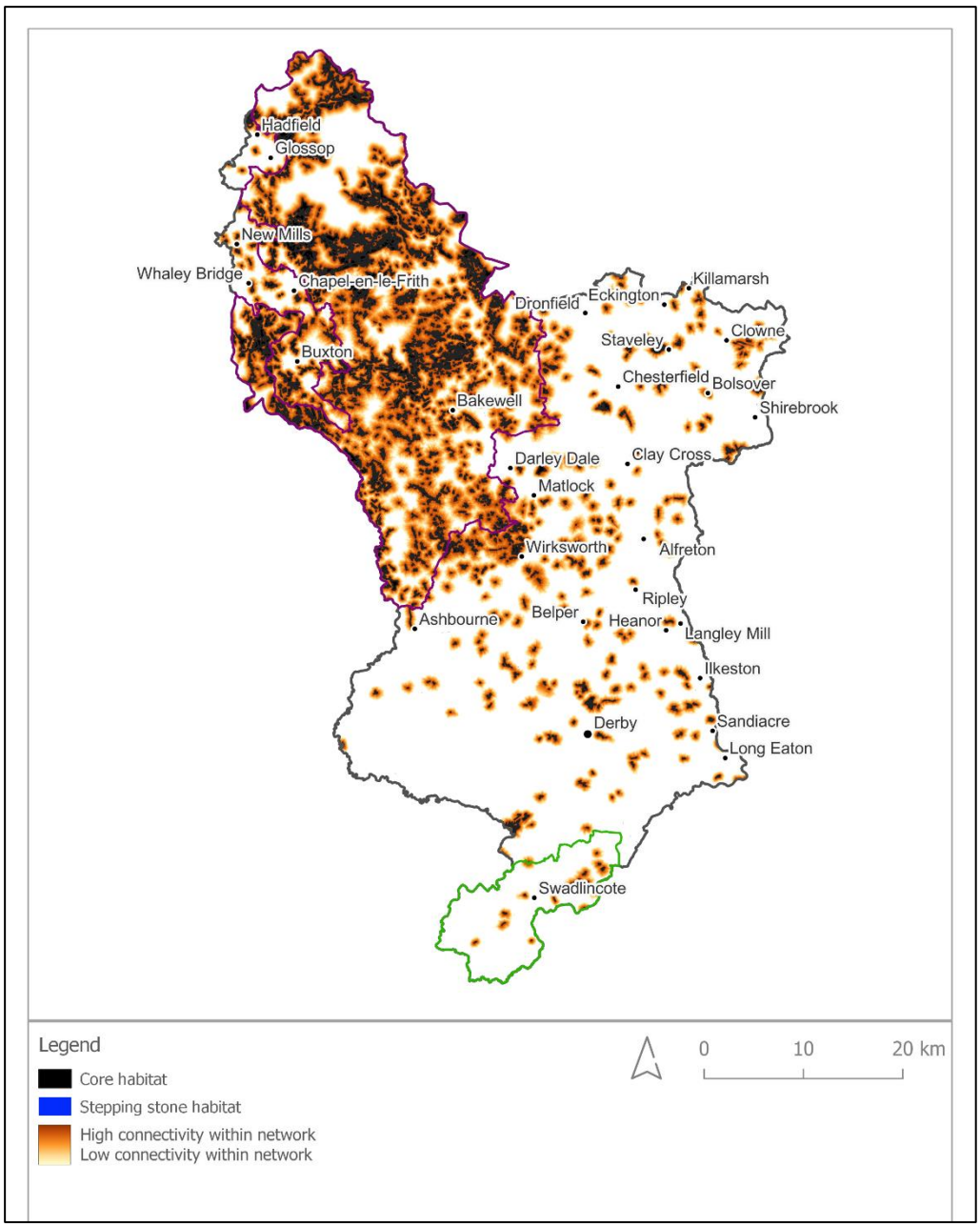
Authority and Derbyshire Wildlife Trust. The table below identifies the HAR habitat types considered 'core' or 'stepping stone' for this habitat network.

UKHAB_L2	UKHAB_LD	UKHABSEC
Rivers and lakes	Canals	No secondary code assigned
Rivers and lakes	Oligotrophic and dystrophic lakes	No secondary code assigned
Rivers and lakes	Rivers and lakes	No secondary code assigned
Rivers and lakes	Rivers and lakes	Ponds
Rivers and lakes	Rivers and streams	No secondary code assigned
Rivers and lakes	Standing open water and canals	Freshwater - man-made
Rivers and lakes	Standing open water and canals	No secondary code assigned
Wetland	Blanket bog	No secondary code assigned
Wetland	Blanket bog	Wet
Wetland	Blanket bog (H7130)	No secondary code assigned
Wetland	Bog	Bare ground, Peat
Wetland	Bog	Dry
Wetland	Bog	No secondary code assigned
Wetland	Bog	Wet
Wetland	Degraded blanket bog	No secondary code assigned
Wetland	Fen marsh and swamp	Flush
Wetland	Fen marsh and swamp	Flush, Base-rich substrate
Wetland	Fen marsh and swamp	No secondary code assigned
Wetland	Lowland fens	Tall herb
Wetland	Purple moor grass and rush pastures	No secondary code assigned
Wetland	Reedbeds	No secondary code assigned
Wetland	Transition mires and quaking bogs; lowland (H7140)	No secondary code assigned
Wetland	Upland flushes, fens and swamps	No secondary code assigned
Wetland	Wetland	No secondary code assigned
Wetland	Wetland	Peat
Woodland and forest	Wet woodland	No secondary code assigned
Woodland and forest	Wet woodland	Secondary woodland

Woodland and forest	Wet woodland	Semi-natural woodland

Associated data files	Value/Class name
Ecological_Network_Wetland_SS_Core.gpkg	CLASS – Core: hex colour: #000000 CLASS – Stepping stone: hex colour: #ff7f00
Ecological_Network_Wetland.gpkg	Range: 0 – High: dark blue 3000 – Low: light blue

Grassland network



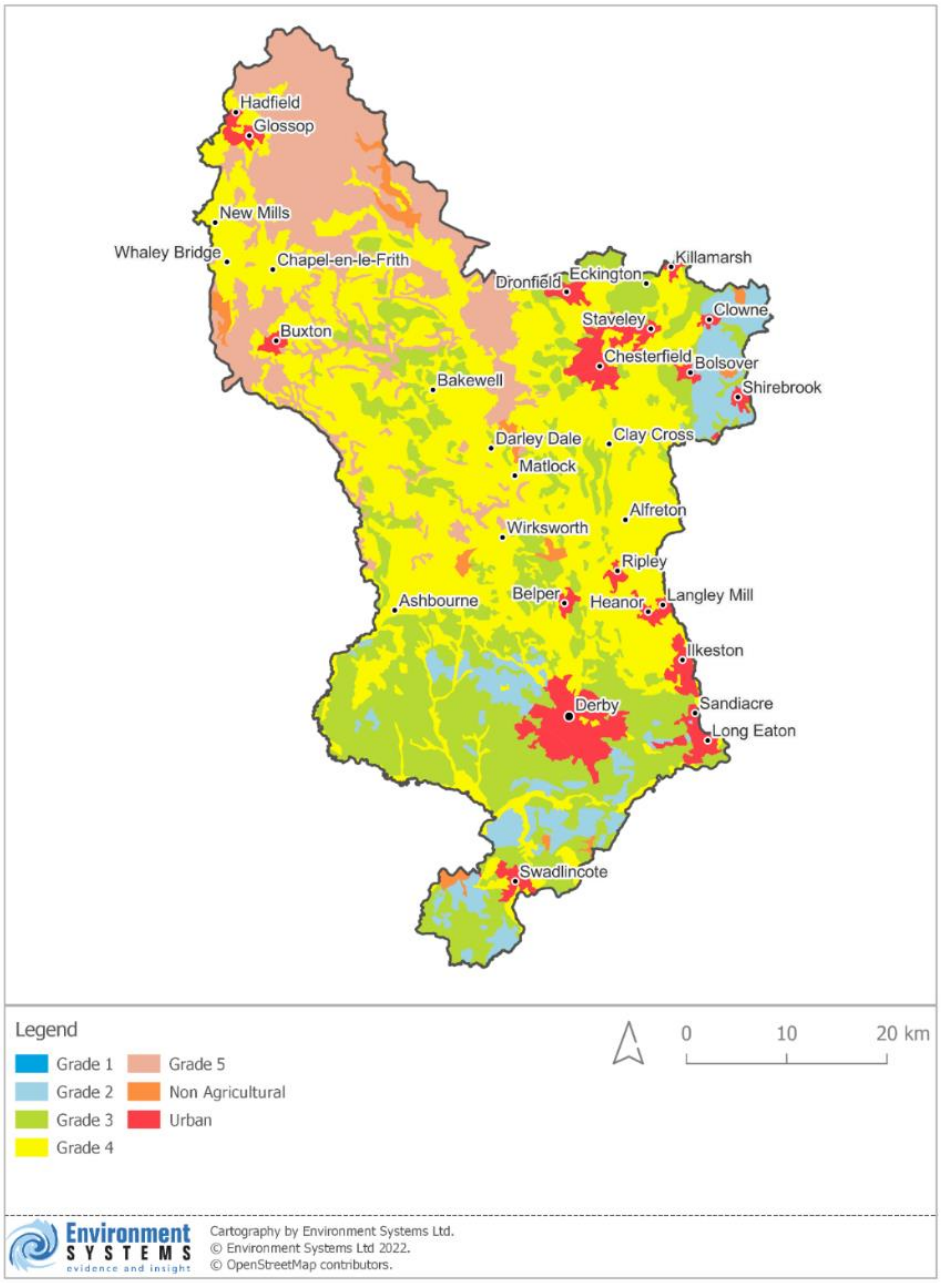
Connectivity was modelled using a cost-distance approach. All classes within the HAR were classified as either core type habitats (where species associated with the network type are natively found) or other habitat type. Larger blocks of core habitats are more resilient and therefore retained as the 'core' class, whilst smaller areas were reclassified as 'stepping stones', i.e. areas that a species might use transiently while passing through, but would not choose to nest there. All habitats (core, stepping stone and 'other') were additionally assessed for movement cost; a value expressing how difficult it is for a species associated with the network to move through this non-core habitat. Core type habitats have an associated movement cost of 0 – the species are at home in these patches. The cost increases the harder a habitat is to transverse, with intensive agricultural land-use, waterbodies, or urban areas normally having the highest cost values. For this habitat type 'core' habitats were considered as areas of minimum 0.25ha size, while stepping stone habitats were of the same habitat type, but found in smaller patch sizes. A cut-off value was identified to determine the final extent of the network, in consultation with Derbyshire County Council, Peak District National Park Authority and Derbyshire Wildlife Trust. The table below identifies the HAR habitat types considered 'core' or 'stepping stone' for this habitat network. Additionally, Derbyshire Wildlife Trust data mapping Open Mosaic Habitats were incorporated into the grassland network as core or stepping stone habitats, depending on the habitat patch size.

UKHAB_L2	UKHAB_LD	UKHABSEC
Grassland	Acid grassland	Calcareous - acidic mosaic, Sward type mosaic
Grassland	Acid grassland	Grazed
Grassland	Acid grassland	No secondary code assigned
Grassland	Acid grassland	Scattered bracken
Grassland	Acid grassland	Scattered dwarf shrubs
Grassland	Acid grassland	Tall or tussocky sward
Grassland	Calcareous grassland	No secondary code assigned
Grassland	Grassland	Calcareous - acidic mosaic, Sward type mosaic
Grassland	Lowland calcareous grassland	No secondary code assigned
Grassland	Lowland dry acid grassland	No secondary code assigned
Grassland	Lowland dry acid grassland	Scattered dwarf shrubs
Grassland	Lowland hay meadows (H6510)	No secondary code assigned
Grassland	Lowland meadows	No secondary code assigned
Grassland	Neutral grassland	No secondary code assigned
Grassland	Neutral grassland	Scattered scrub
Grassland	Neutral grassland	Tall or tussocky sward
Grassland	Neutral grassland	Wet

Grassland	Upland calcareous grassland	No secondary code assigned
Wetland	Purple moor grass and rush pastures	No secondary code assigned

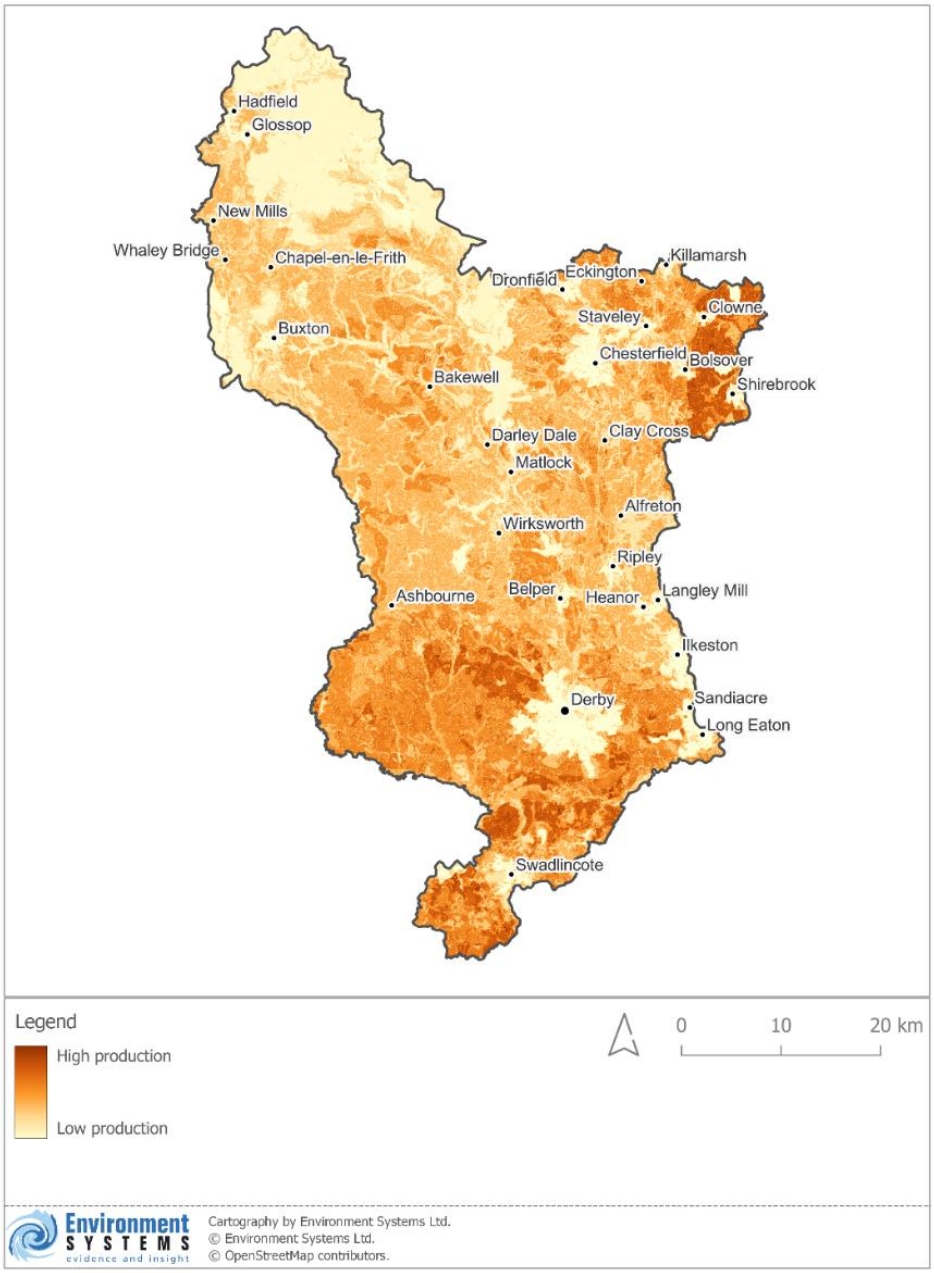
Associated data files	**Value/Class name**
Ecological_Network_Grassland_SS_Core.gpkg	CLASS – Core: hex colour: #000000 CLASS – Stepping stone: hex colour: #032cfc
Ecological_Network_Grassland.gpkg	Range: 0 – High Connectivity: hex: #993404 8200 – Low Connectivity: hex: #ffffd4

Agricultural Land Classification



This map shows the current agricultural capability of the land according to the Agricultural Land Classification, where Grade 1 is the best and most versatile land for agriculture, where there are few limitations to cultivation and good yields can be expected, and Grade 5 is the least productive land where there are greater challenges to cultivation. The ALC considers factors such as soil depth, stoniness, wetness, drought susceptibility, steepness of slope, and climate.

Agricultural production: current provision (stock)



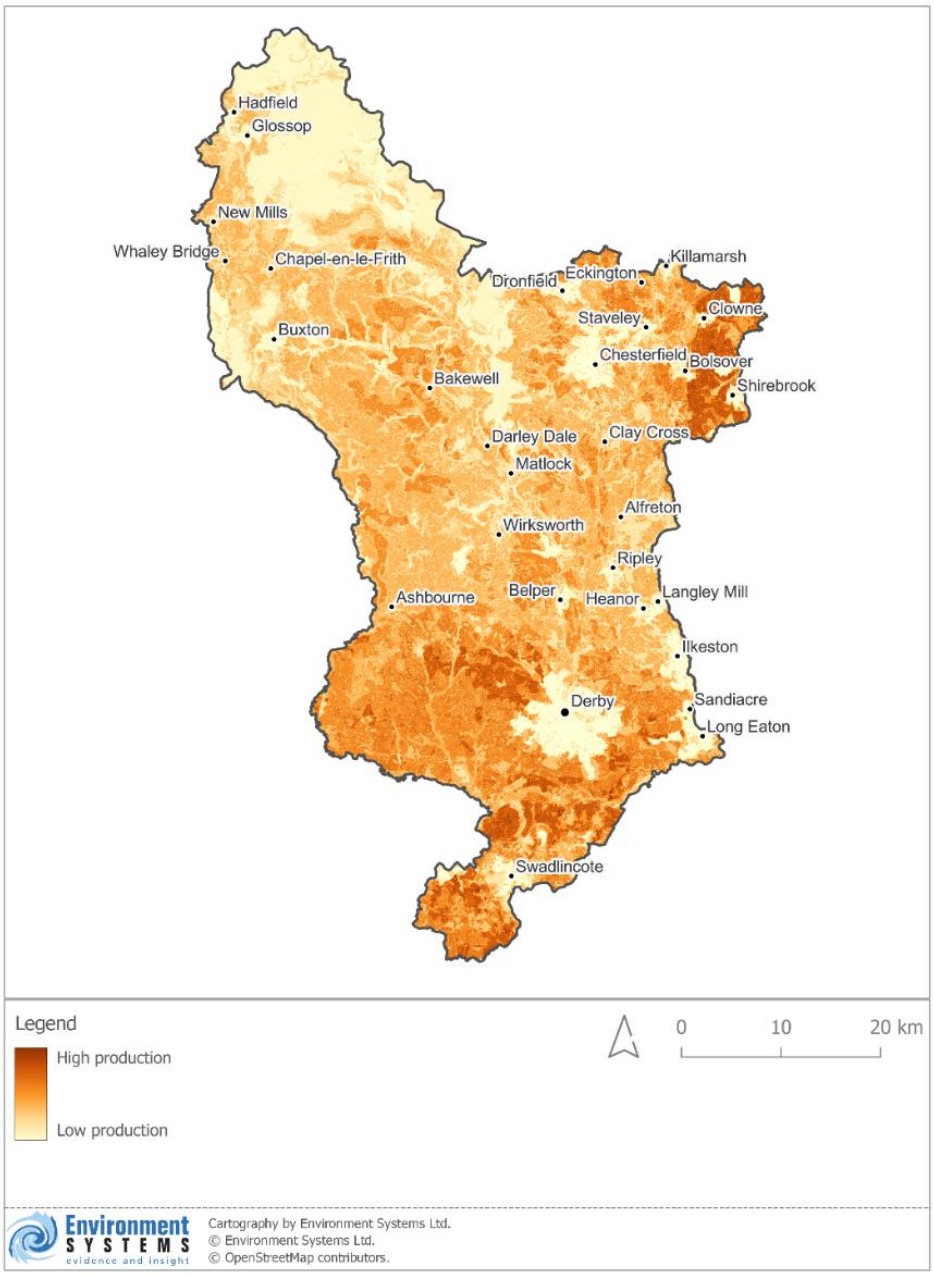
This map shows the relative level of agricultural provision based on habitat, soil type and slope.

Data input	Reason for usage	Indicative scoring
Habitat Asset Register	This was used as the base dataset; relative agricultural productivity was assessed for each habitat type	Cereal crops: high productivity Coastal and floodplain grazing marsh: moderate productivity Blanket bog: low productivity
Selection of agricultural polygons from the HAR,	The CROME data models the extent of specific crops, providing a greater level of detail as to	Soya, potato: high

attributed with the dominant CROME crop class	relative productivity; this dataset was used to amend the HAR productivity scores.	Winter oilseed: moderate Perennial Crops and Isolated Trees: low
Agricultural Land Classification	This dataset classifies the relative quality of the soil, topography and climate for agriculture; higher yields (greater agricultural productivity) are achieved from the better quality land	Grade 2 land: high productivity Grade 3 land: moderate productivity Grade 5 land: low productivity
Slope (derivative of 5m DEM)	Steep slopes are harder to work; the 5m resolution DEM allows much more detailed consideration of this factor than could be achieved by using the ALC data alone	Slopes of 7-11 degrees: reduce productivity by 10% Slopes of 11 - 18 degrees: reduce productivity by 25% Slopes greater than 40 degrees: reduce productivity by 40%

Associated data file	**Value/Class name**
Agricultural_Production_Current_Provision.gpkg	Range: 160 – High production: hex: #993404 0 – Low Production: hex: #ffffd4

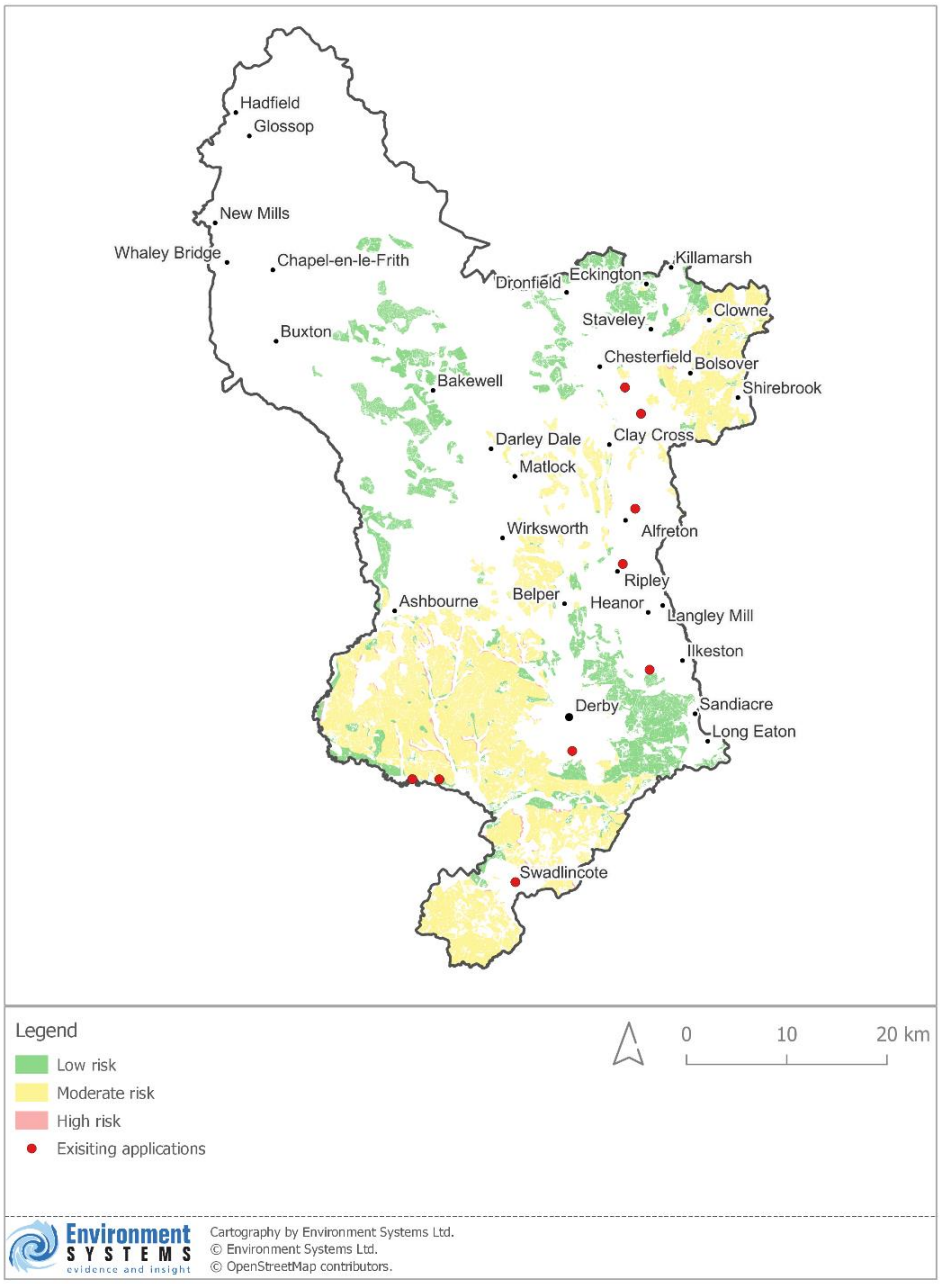
Risks to agricultural production: potential conflicts with woodland objectives



This map shows areas of opportunity for planting woodland (as shown in the map of woodland opportunities for biodiversity) that are located on the best quality agricultural land (ALC Grade 2 and Grade 3 land), located on agricultural areas extracted from the HAR.

Associated data file	Value/Class name
Agricultural_Production_Woodland_Risk.gpkg	1 - Within network: hex colour: #33a02c 10 - Outside network: hex colour: #ff7f00

Risks to agricultural production: ground-mounted solar PV



This map shows the modelled locations of ground-mounted solar PV opportunities as derived by georeferencing and manual digitisation of data presented in the Derbyshire Spatial Energy Study (Scene Connect 2022), and intersecting this with Grade 2 and 3 agricultural land (as derived from ALC data and the Derbyshire habitat map) so that only these higher land quality areas are shown. The Spatial Energy Study considered landscape character as an underpinning constraint. Nationally and internationally-designated protected sites were removed from the area, as it was deemed that these sites would not be at risk of development for renewables. Risk categories were assigned according to the level of constraint attributed to the area within the Study, as shown in the table below.

Level of constraint (Derbyshire Spatial Energy Study)	**Map risk class**
More constrained	Low risk
Constrained	Moderate risk
Less constrained	High risk

The map has been overlain by current and proposed medium, large and very large solar energy applications (>1MW) listed in the Renewable Energy Planning Database for July 2022 (Department for Business, Energy & Industrial Strategy, 2022).

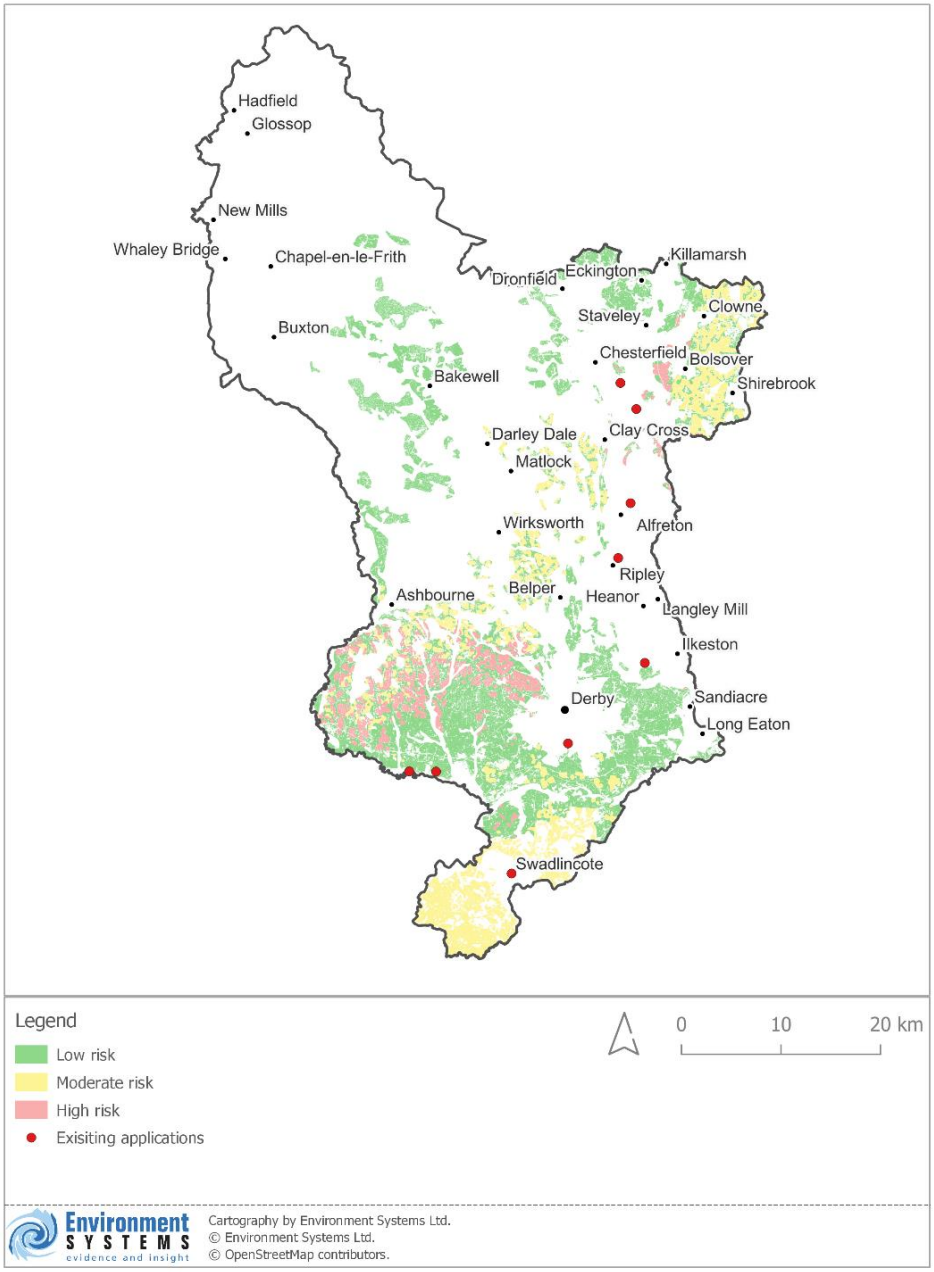
Associated data file	**Value/Class name**
Agricultural_Production_Solar_Sites.gpkg	Whole dataset: Existing applications hex colour: #e31a1c
Agricultural_Production_Solar_Energy_Risk.gpkg	Type: More Constrained - Low risk: hex colour: #8ed88a Type: Constrained - Moderate risk: hex colour: #fdf595 Type: Less Constrained - High risk: hex colour: #f9aead

References:

Department for Business, Energy & Industrial Strategy, 2022. Renewable Energy Planning Database for July 2022. https://www.gov.uk/government/publications/renewable-energy-planning-database-monthly-extract [Accessed 2022-08-15]

Scene Connect (2022) Derbyshire Spatial Energy Study. Evidence base for policy makers. Derbyshire County Council

Risks to agricultural production: small wind



This map shows the modelled locations of small-scale (15-50m) wind development opportunities (>1MW) as derived by georeferencing and manual digitisation of data presented in the Derbyshire Spatial Energy Study (Scene Connect 2022), and intersecting this with Grade 2 and 3 agricultural land so that only these higher land quality areas are shown. The Spatial Energy Study considered agricultural land grade, National Park and National Forest areas as underpinning constraints. Nationally and internationally-designated protected sites were removed from the area, as it was deemed that these sites would not be at risk of development for renewables. Risk categories were assigned according to the level of constraint attributed to the area within the Study, as shown in the table below.

Level of constraint (Derbyshire Spatial Energy Study)	**Map risk class**
More constrained	Low risk
Constrained	Moderate risk
Less constrained	High risk

The map has been overlain by current and proposed solar energy applications (>1MW) listed in the Renewable Energy Planning Database for July 2022 (Department for Business, Energy & Industrial Strategy, 2022).

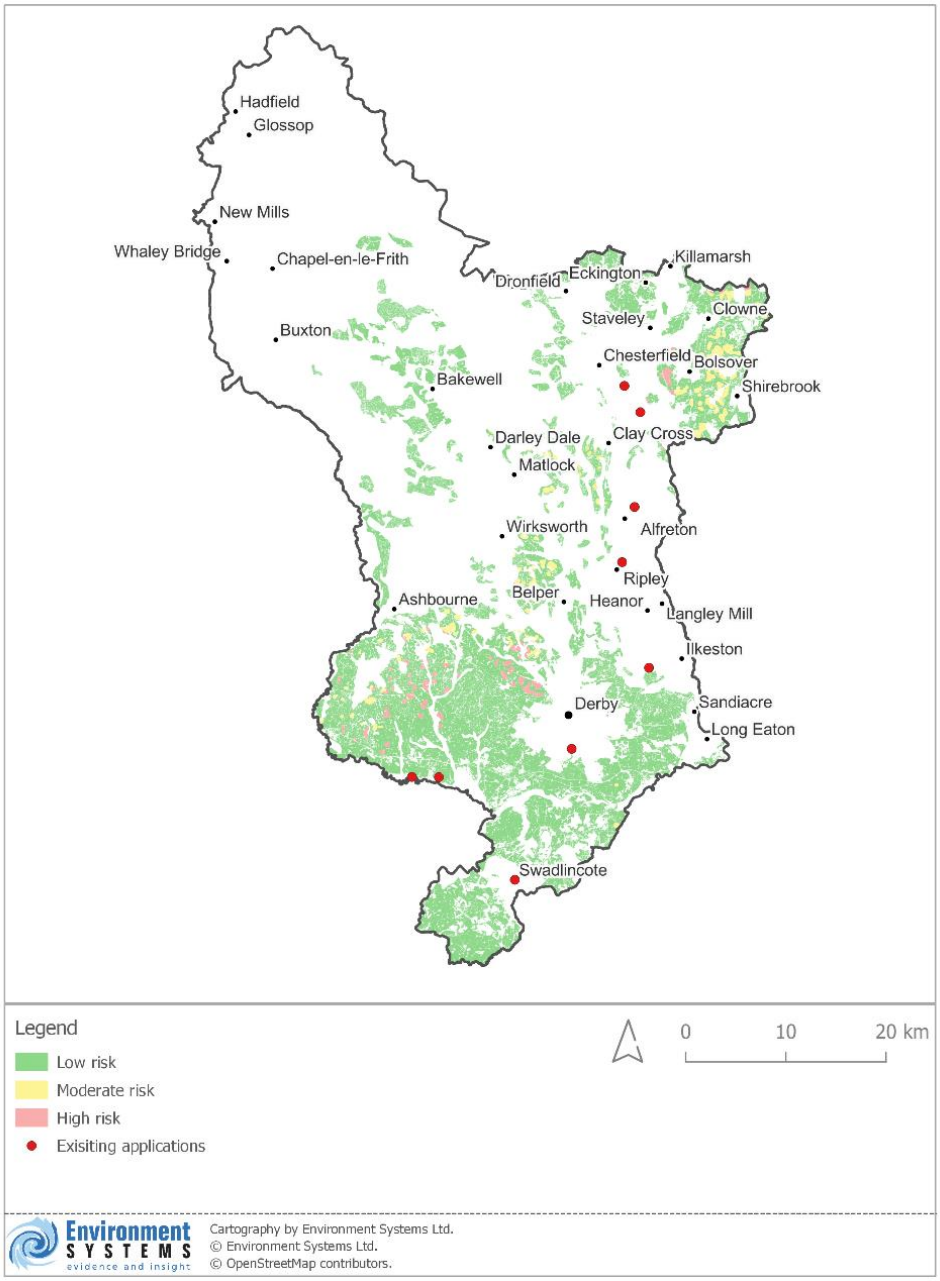
Associated data file	**Value/Class name**
Agricultural_Production_Small_Wind_Risk.gpkg	Type: More Constrained - Low risk: hex colour: #8ed88a
	Type: Constrained - Moderate risk: hex colour: #fdf595

References:

Department for Business, Energy & Industrial Strategy, 2022. Renewable Energy Planning Database for July 2022. https://www.gov.uk/government/publications/renewable-energy-planning-database-monthly-extract [Accessed 2022-08-15]

Scene Connect (2022) Derbyshire Spatial Energy Study. Evidence base for policy makers. Derbyshire County Council

Risks to agricultural production: large wind



This map shows the modelled locations of large-scale (>50m) wind development opportunities (>1MW) as derived by georeferencing and manual digitisation of data presented in the Derbyshire Spatial Energy Study (Scene Connect 2022), and intersecting this with Grade 2 and 3 agricultural land so that only these higher land quality areas are shown. The Spatial Energy Study considered landscape character as an underpinning constraint. Nationally and internationally-designated protected sites were removed from the area, as it was deemed that these sites would not be at risk of development for renewables. Risk categories were assigned according to the level of constraint attributed to the area within the Study, as shown in the table below.

Level of constraint (Derbyshire Spatial Energy Study)	**Map risk class**
More constrained	Low risk
Constrained	Moderate risk
Less constrained	High risk

The map has been overlain by current and proposed wind energy applications (>1MW) listed in the Renewable Energy Planning Database for July 2022 (Department for Business, Energy & Industrial Strategy, 2022).

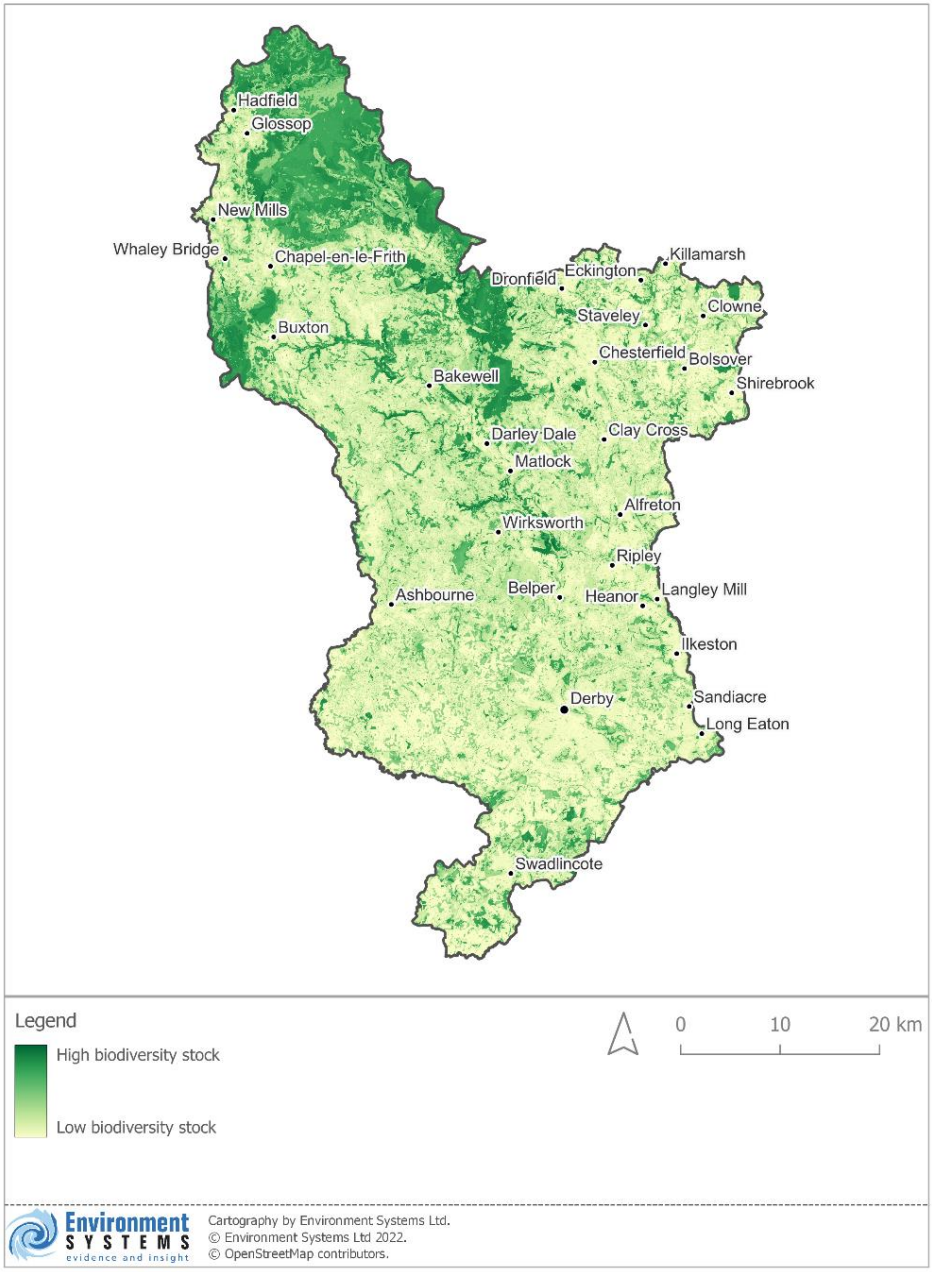
Associated data files	**Value/Class name**
Agricultural_Production_Large_Wind_Risk.gpkg	Type: More Constrained - Low risk: hex colour: #8ed88a Type: Constrained - Moderate risk: hex colour: #fdf595 Type: Less Constrained - High risk: hex colour: #f9aead

References:

Department for Business, Energy & Industrial Strategy, 2022. Renewable Energy Planning Database for July 2022. https://www.gov.uk/government/publications/renewable-energy-planning-database-monthly-extract [Accessed 2022-08-15]

Scene Connect (2022) Derbyshire Spatial Energy Study. Evidence base for policy makers. Derbyshire County Council

Biodiversity: current provision (stock)



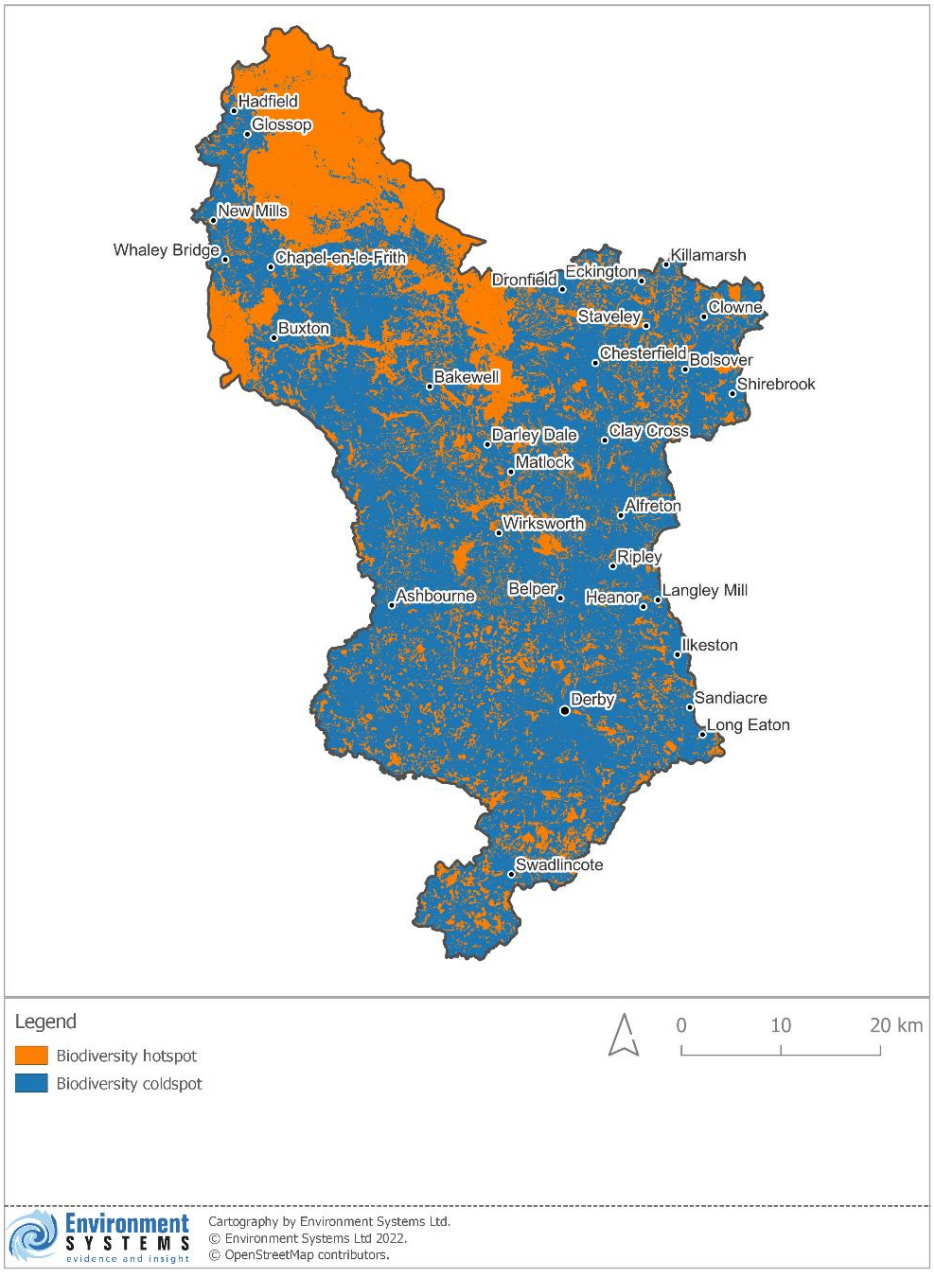
This map shows the current relative levels of biodiversity across Derbyshire, on a scale of low to high.

Data input	Reason for usage	Indicative scoring
Habitat Asset Register	Base dataset used to assess the biodiversity of individual habitat patches	• Native woodland: high biodiversity value • Intensively managed grassland: low biodiversity value

Ancient Woodland Inventory and DWT Ancient Woodland data	Overlay with HAR to ensure maximum biodiversity value for the habitat type was applied	• Habitat is ancient woodland: assign maximum woodland biodiversity value
DWT open mosaic habitats	Overlay with HAR to ensure maximum biodiversity value for the habitat type was applied	• Habitat is open mosaic habitat: apply minimum value threshold, to ensure OMH areas are assigned a high biodiversity value.
Rasterised DWT species data: bat roosts; GCN; notable invertebrate ponds; otter; water vole; while-clawed crayfish.	Overlay with HAR to increase the biodiversity value of the pixel	• Notable species present; increase biodiversity value of the pixel
Grassland, Heathland, Wetland and Woodland ecological networks	Overlay each individual network with the HAR to increase the biodiversity value of the areas within the ecological networks. Areas that are part of multiple networks will have the largest increase in value.	• Habitat is core habitat: largest increase in biodiversity value • Habitat is stepping stone habitat: moderate increase in biodiversity value • Habitat is part of the wider network (not core or stepping stone): slight increase in biodiversity value • Habitat is not part of the ecological network: no increase in biodiversity value

Associated data file	**Value/Class name**
Biodiversity_Stock.gpkg	Range: 0 – Low biodiversity stock: hex: #ffffcc 190 – High biodiversity stock: hex: #006837

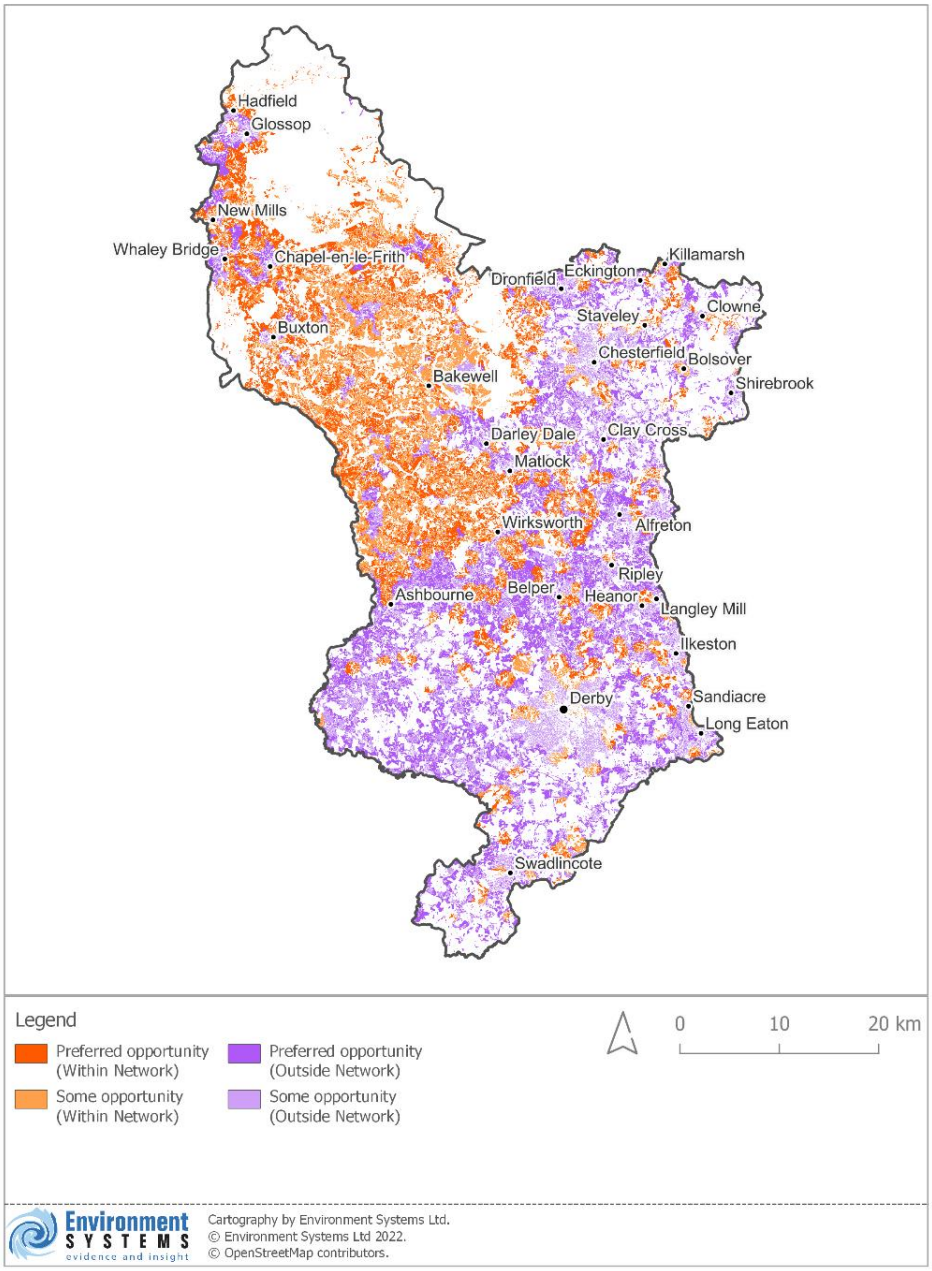
Biodiversity hotspots / coldspots



This map has been created from the biodiversity current provision (stock) map; it highlights the areas of highest biodiversity as 'hotspots' and areas of lower biodiversity as 'coldspots'.

Filename	Value/Class name
Biodiversity_Hotspots.gpkg	1 – Biodiversity Hotspot: hex: #ff7f00 2 – Biodiversity Coldspot: hex: #1f78b4

Opportunities for establishing species-rich grassland



This map shows areas of opportunity for creating grassland habitat, based on the Habitat Asset Register. The opportunities are classified as 'preferred' opportunities if the existing habitat could be readily converted to a high biodiversity value grassland, and 'some opportunity' if the existing habitat would be more difficult, or take longer to convert to species rich grassland. The opportunities are also classified according to whether they lie within the grassland ecological network, or outside the network. HAR habitat classes identified as opportunities for establishing this habitat type are shown in the table below.

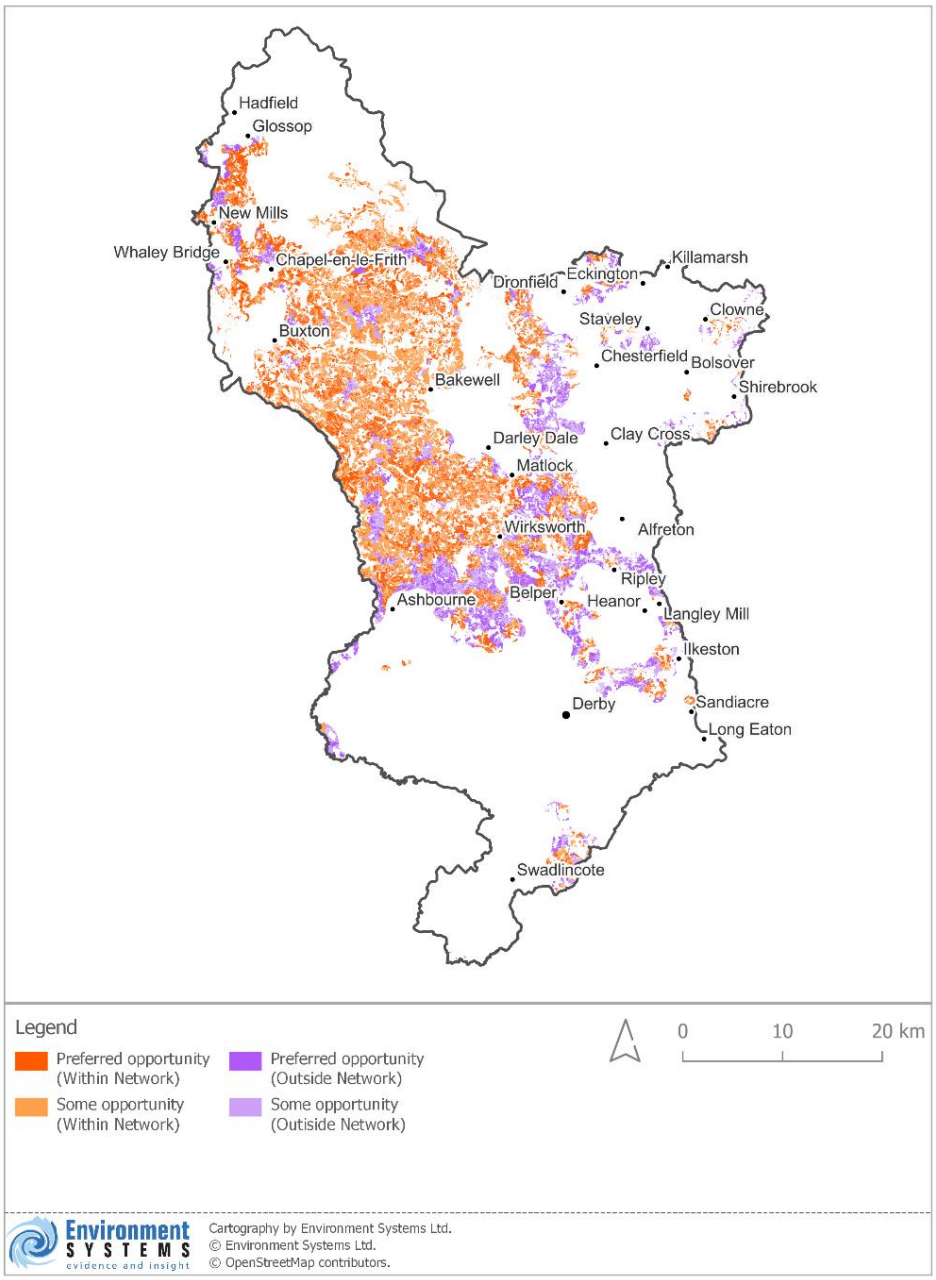
UKHAB_L2	UKHAB_LD	UKHABSEC	Opportunity type

Grassland	Bracken	No secondary code assigned	Preferred opportunity
Grassland	Grassland	Bare ground	Preferred opportunity
Grassland	Grassland	Coastal and floodplain grazing marsh	Preferred opportunity
Grassland	Grassland	No secondary code assigned	Preferred opportunity
Grassland	Grassland	Ruderal/ ephemeral	Preferred opportunity
Grassland	Grassland	Seasonally wet, Wet, Waterlogged	Preferred opportunity
Grassland	Grassland	Tall herb	Preferred opportunity
Grassland	Neutral grassland	Pasture or meadow	Preferred opportunity
Grassland	Other neutral grassland	No secondary code assigned	Preferred opportunity
Grassland	Temporary grass and clover leys	Less intensively managed	Preferred opportunity
Sparsely vegetated land	Sparsely vegetated land	Bare ground	Preferred opportunity
Sparsely vegetated land	Sparsely vegetated land	No secondary code assigned	Preferred opportunity
Urban	Artificial unvegetated, unsealed surface	No secondary code assigned	Preferred opportunity
Urban	Urban	Bare ground	Preferred opportunity
Urban	Urban	Natural and semi-natural open space	Preferred opportunity
Grassland	Grassland	Cemeteries	Some opportunity
Grassland	Grassland	Wood-pasture and parkland	Some opportunity
Grassland	Modified grassland	Frequently mown, Introduced shrub	Some opportunity
Grassland	Modified grassland	No secondary code assigned	Some opportunity
Grassland	Temporary grass and clover leys	Intensively managed	Some opportunity
Heathland and shrub	Dense scrub	No secondary code assigned	Some opportunity
Urban	Built-up areas and gardens	Road island/verge	Some opportunity
Urban	Urban	Parks and gardens	Some opportunity

Associated data file	**Value/Class name**

Biodiversity_Grassland_Opportunities.gpkg	2 - Preferred opportunity (Outside Network): hex colour: #b059f7 11 - Preferred opportunity (Within Network): hex colour: #ff5a00 210 - Some opportunity (Within Network): hex colour: #ffa04c 400 - Some opportunity (Outside Network): hex colour: #cfa0f8

Grassland opportunities located within Natural England grassland NRNs



This map was created by intersecting the opportunities for establishing species-rich grassland that lie within the ecological network, with processed Natural England Nature Recovery Network (NRN) data.

The following processing was undertaken to the NRN data prior to intersecting with the biodiversity opportunities:

NRN data for the following habitats were merged to make a single NRN dataset for grasslands, clipped to the Derbyshire boundary:

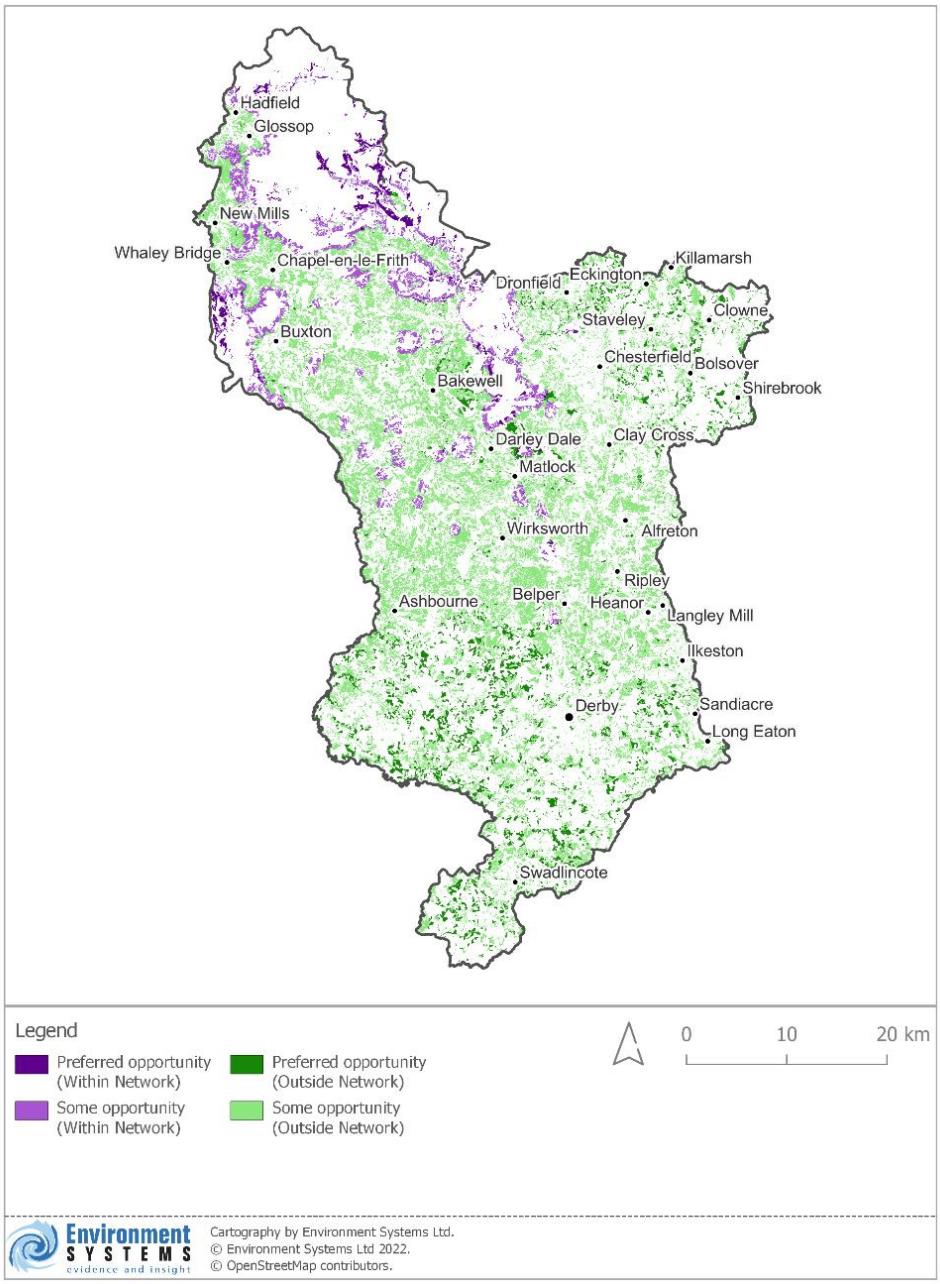
- Lowland Calcareous Grassland
- Lowland Dry Acid Grassland
- Lowland Meadows
- Upland Calcareous Grassland
- Upland Hay Meadows

Within the merged NRN data any areas that contained areas of Primary Habitat or Associated Habitat (of any grassland habitat type) were removed, so that the remaining areas to be intersected with the biodiversity opportunity data consisted of areas that were part of the wider NRN network, comprising the following classes:

- Restorable Habitat
- Fragmentation Action Zone
- Network Enhancement Zone 1
- Network Enhancement Zone 2
- Network Expansion Zone

Associated data file	Value/Class name
Biodiversity_Grassland_Opportunities_in_NRN.gpkg	DN: 2 - Preferred opportunity: hex colour: #b059f8 DN: 11 - Preferred opportunity: hex colour: #ff5a00 DN: 210 - Some opportunity: hex colour: #ffa04c DN: 400 - Some opportunity: hex colour: #cfa0f8

Opportunities for establishing heathland



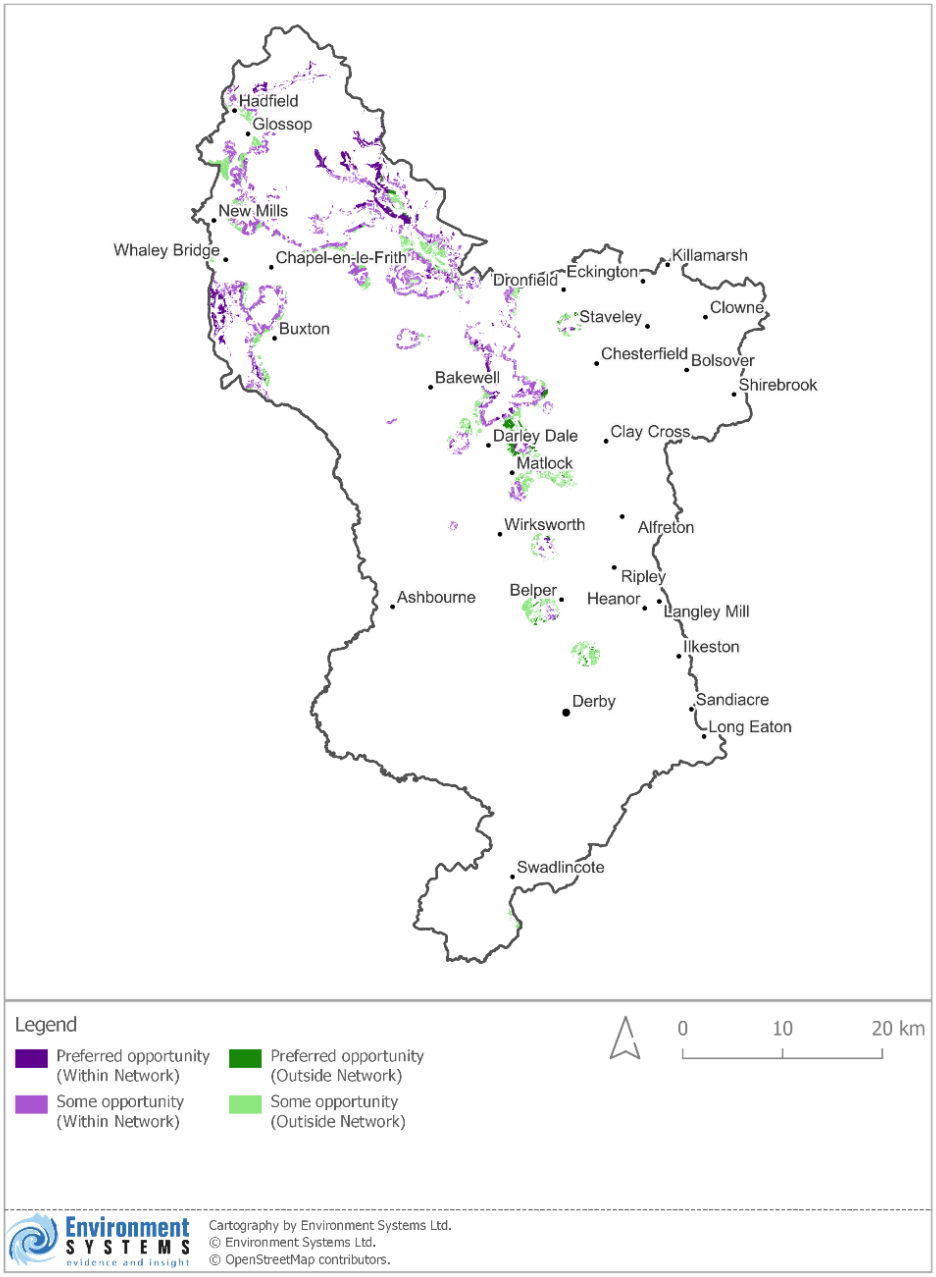
This map shows areas of opportunity for creating heathland habitat, based on the Habitat Asset Register. The opportunities are classified as 'preferred' opportunities if the existing habitat could be readily converted to heathland, and 'some opportunity' if the existing habitat would be more difficult, or take longer to convert to heathland. The opportunities are also classified according to whether they lie within the heathland ecological network, or outside the network. Areas outside the network are likely to be extremely difficult to establish new heathland due to a deficiency in soil mycorrhiza; locations on coniferous woodland may be an exception to this. HAR habitat classes identified as opportunities for establishing this habitat type are shown in the table below.

UKHAB_L2	UKHAB_LD	UKHABSEC	Opportunity type
Grassland	Bracken	No secondary code assigned	Preferred opportunity
Grassland	Neutral grassland	Pasture or meadow	Preferred opportunity
Grassland	Other neutral grassland	No secondary code assigned	Preferred opportunity
Heathland and shrub	Dense scrub	No secondary code assigned	Preferred opportunity
Heathland and shrub	Heathland and shrub	Scattered scrub	Preferred opportunity
Woodland and forest	Broadleaved mixed and yew woodland	Felled	Preferred opportunity
Woodland and forest	Broadleaved mixed and yew woodland	Young trees - planted	Preferred opportunity
Woodland and forest	Broadleaved mixed and yew woodland	Young trees - planted, Young trees - self-set	Preferred opportunity
Woodland and forest	Coniferous woodland	Ancient woodland site, Plantation	Preferred opportunity
Woodland and forest	Coniferous woodland	Felled	Preferred opportunity
Woodland and forest	Coniferous woodland	No secondary code assigned	Preferred opportunity
Woodland and forest	Coniferous woodland	Plantation	Preferred opportunity
Woodland and forest	Woodland and forest	Felled	Preferred opportunity
Woodland and forest	Woodland and forest	Scattered scrub	Preferred opportunity
Woodland and forest	Woodland and forest	Scattered trees	Preferred opportunity
Woodland and forest	Woodland and forest	Young trees - planted	Preferred opportunity
Woodland and forest	Woodland and forest	Young trees - planted, Young trees - self-set	Preferred opportunity
Grassland	Grassland	No secondary code assigned	Some opportunity
Grassland	Grassland	Ruderal/ ephemeral	Some opportunity
Grassland	Grassland	Seasonally wet, Wet, Waterlogged	Some opportunity
Grassland	Grassland	Tall herb	Some opportunity

Grassland	Modified grassland	No secondary code assigned	Some opportunity
Grassland	Temporary grass and clover leys	Less intensively managed	Some opportunity
Sparsely vegetated land	Sparsely vegetated land	Bare ground	Some opportunity
Sparsely vegetated land	Sparsely vegetated land	No secondary code assigned	Some opportunity

Associated data file	**Value/Class name**
Biodiversity_Heathland_Opportunities.gpkg	2 - Preferred opportunity (Outside Network): hex colour: #178808 11 - Preferred opportunity (Within Network): hex colour: #5f008e 210 - Some opportunity (Within Network): hex colour: #a855d2 400 - Some opportunity (Outside Network): hex colour: #8ce77e

Heathland opportunities located within Natural England heathland NRNs



This map was created by intersecting the opportunities for establishing heathland that lie within the ecological network, with processed Natural England Nature Recovery Network (NRN) data.

The following processing was undertaken to the NRN data prior to intersecting with the biodiversity opportunities:

NRN data for the following habitats were merged to make a single NRN dataset for heathlands, clipped to the Derbyshire boundary:

- Lowland Heathland

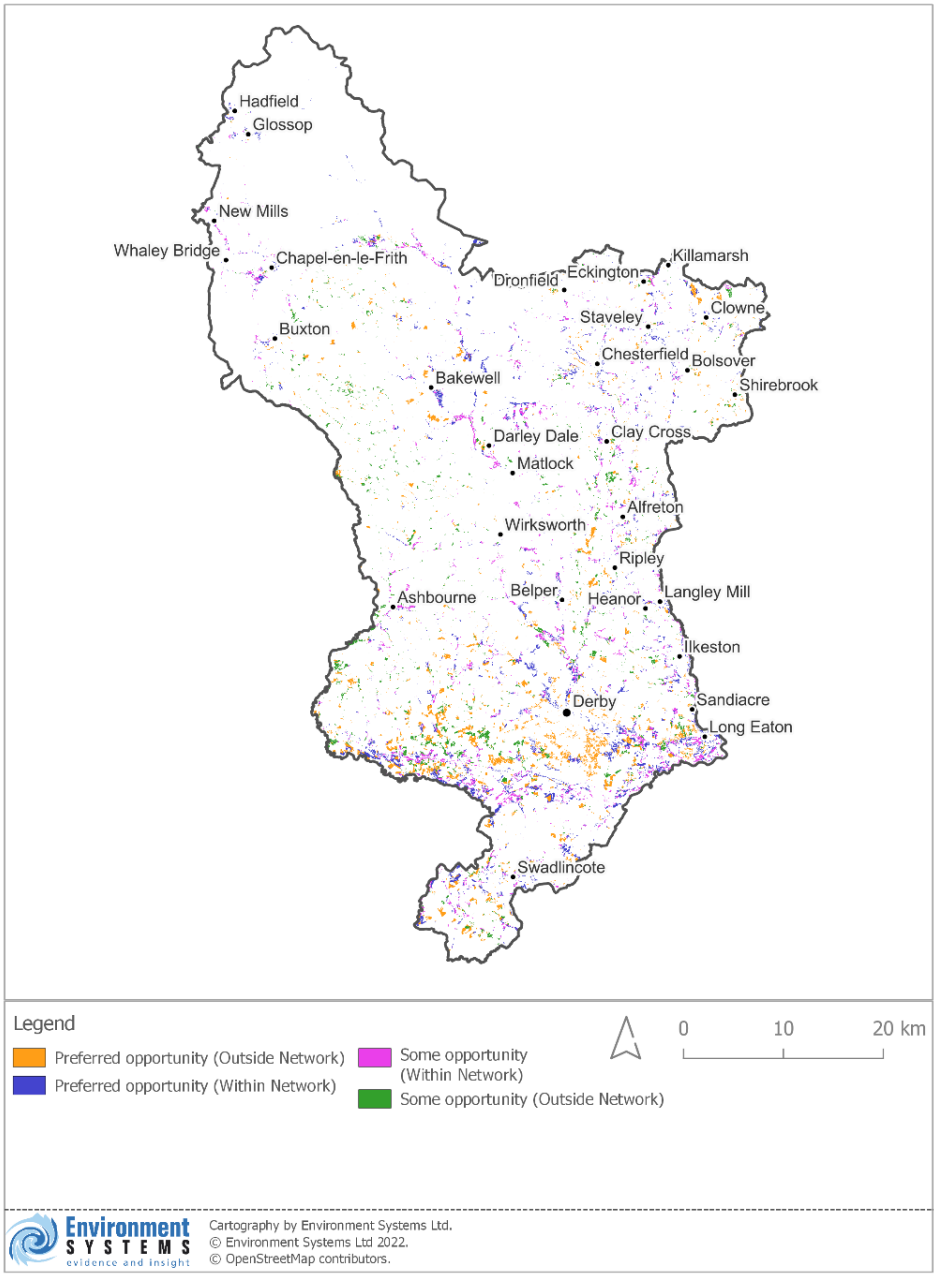
- Upland Heathland

Within the merged NRN data any areas that contained areas of Primary Habitat or Associated Habitat (of any heathland habitat type) were removed, so that the remaining areas to be intersected with the biodiversity opportunity data consisted of areas that were part of the wider NRN network, comprising the following classes:

- Restorable Habitat
- Fragmentation Action Zone
- Network Enhancement Zone 1
- Network Enhancement Zone 2
- Network Expansion Zone

Associated data file	Value/Class name
Biodiversity_Heathland_Opportunities_NRN.gpkg	DN: 2 - Preferred opportunity: hex colour: #178808 DN: 11 - Preferred opportunity: hex colour: #5f008e DN: 210 - Some opportunity: hex colour: #a855d2 DN: 400 - Some opportunity: hex colour: #8ce77e

Opportunities for establishing wetland

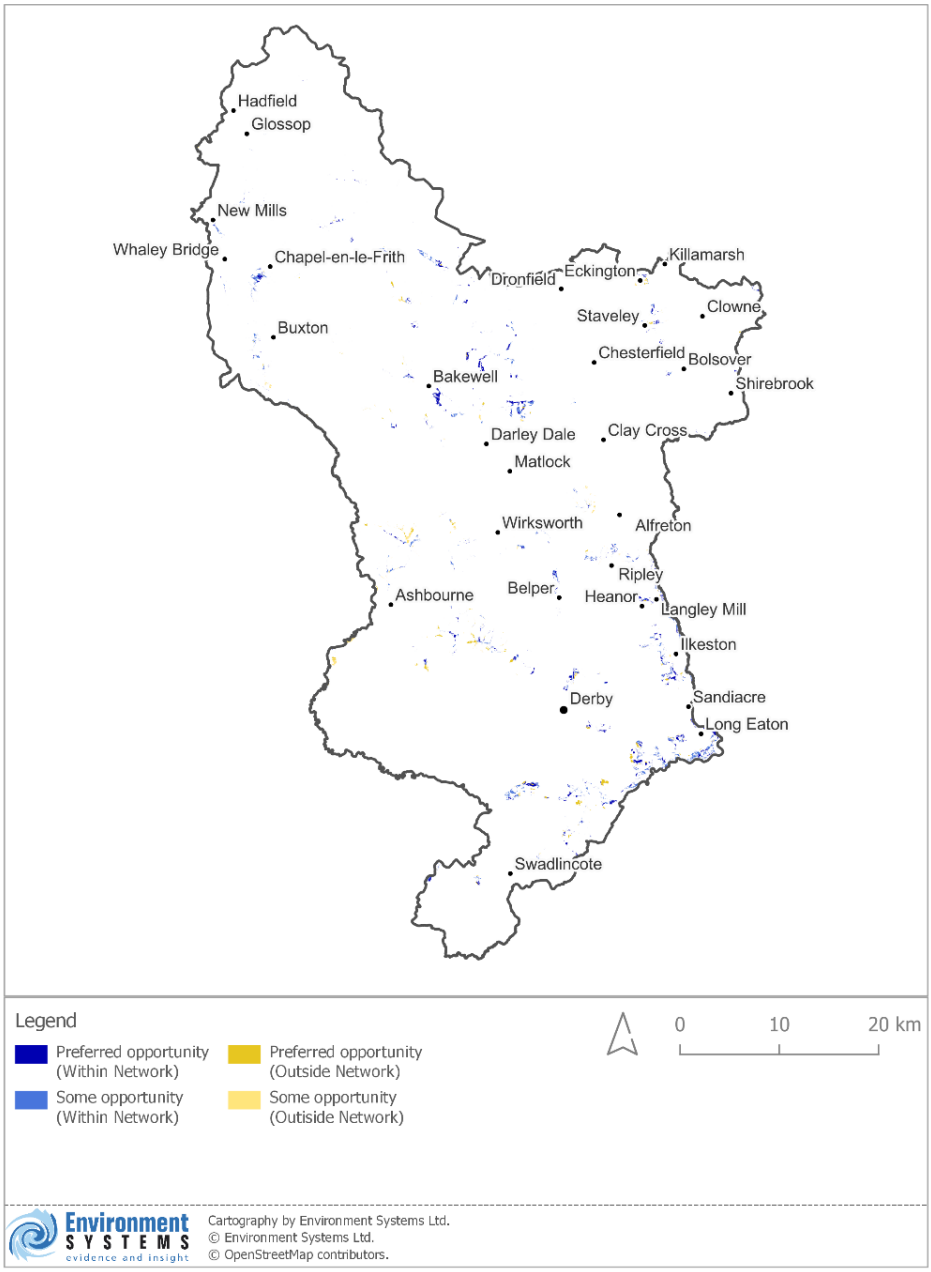


This map shows areas of opportunity for creating wetland habitat, based on the Habitat Asset Register, areas of close proximity to the drainage channel network (derived from the 5m DEM), areas of shallow slopes/flat ground (less than 3° slope), and geology (limestone areas as defined by the Landscape Character Types, and Natmap soil data were classed as a constraint; no wetland opportunities were classified in these areas). The opportunities are classified as 'preferred' opportunities if the existing habitat could be readily converted to a wetland, and 'some opportunity' if the existing habitat would be more difficult, or take longer to convert to a wetland. The opportunities are also classified according to whether they lie within the wetland ecological network, or outside the network. HAR habitat classes identified as opportunities for establishing this habitat type are shown in the table below.

UKHAB_L2	UKHAB_LD	UKHABSEC	Opportunity type
Grassland	Grassland	Coastal and floodplain grazing marsh	Preferred opportunity
Grassland	Grassland	No secondary code assigned	Preferred opportunity
Grassland	Grassland	Seasonally wet, Wet, Waterlogged	Preferred opportunity
Grassland	Modified grassland	Frequently mown, Introduced shrub	Preferred opportunity
Grassland	Modified grassland	No secondary code assigned	Preferred opportunity
Grassland	Neutral grassland	Pasture or meadow	Preferred opportunity
Grassland	Other neutral grassland	No secondary code assigned	Preferred opportunity
Sparsely vegetated land	Sparsely vegetated land	No secondary code assigned	Preferred opportunity
Wetland	Blanket bog	Dry	Preferred opportunity
Grassland	Grassland	Ruderal/ ephemeral	Some opportunity
Grassland	Grassland	Tall herb	Some opportunity
Grassland	Temporary grass and clover leys	Less intensively managed	Some opportunity

Associated data file	Value/Class name
Biodiversity_Wetland_Opportunities.gpkg	2 - Preferred opportunity (Outside Network): hex colour: #e7c621 11 - Preferred opportunity (Within Network): hex colour: #0000b1 210 - Some opportunity (Within Network): hex colour: #4875dc 400 - Some opportunity (Outside Network): hex colour: #ffe57c

Wetland opportunities located within Natural England wetland NRNs



This map was created by intersecting the opportunities for establishing wetland that lie within the ecological network, with processed Natural England Nature Recovery Network (NRN) data.

The following processing was undertaken to the NRN data prior to intersecting with the biodiversity opportunities:

NRN data for the following habitats were merged to make a single NRN dataset for wetlands, clipped to the Derbyshire boundary:

- Blanket Bog

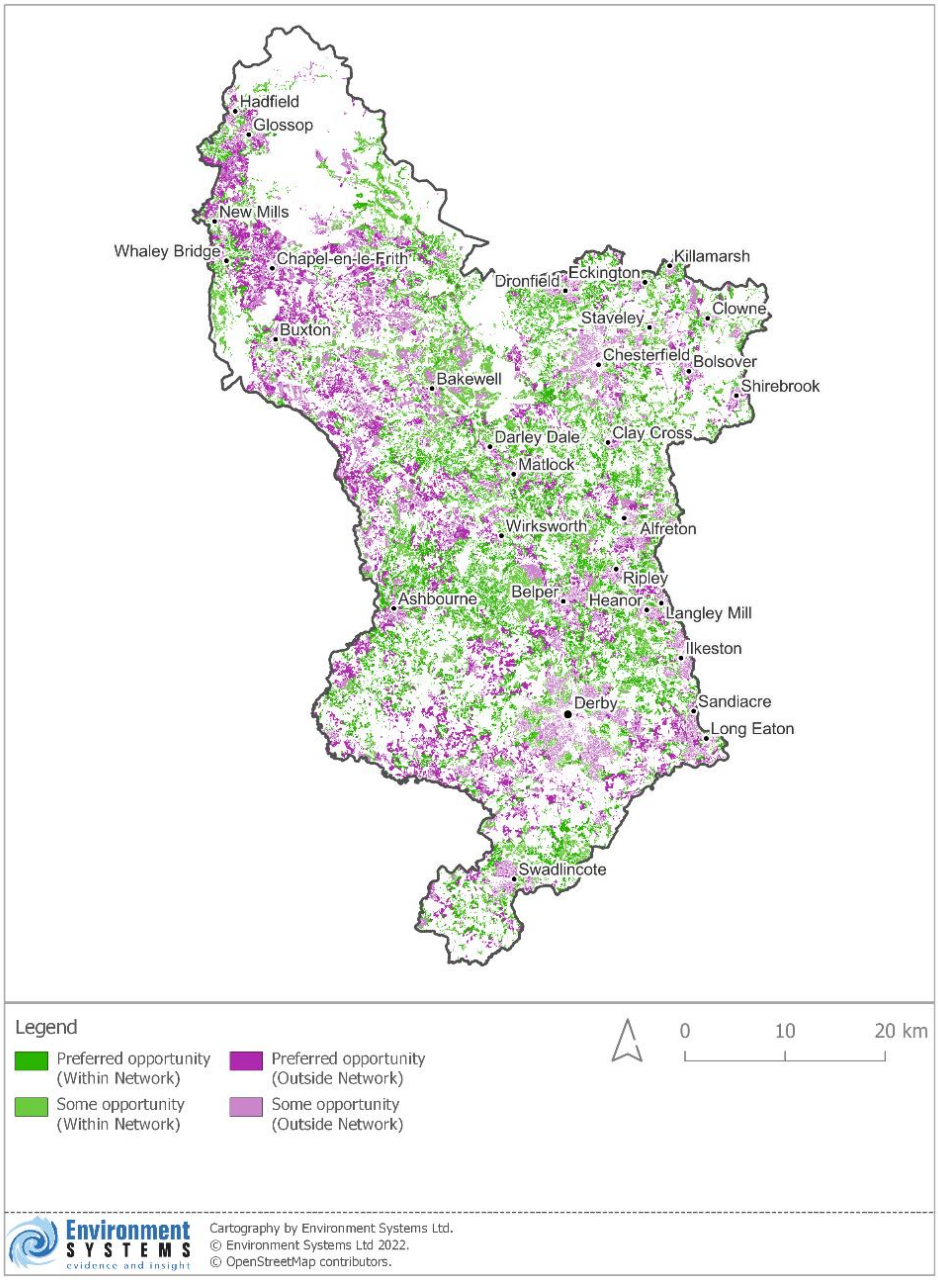
- Lakes
- Lowland Fen
- Lowland Raised Bog
- Purple Moor-Grass Rush Pasture
- Reedbeds
- Rivers
- Upland Fens, Flushes, Swamps

Within the merged NRN data any areas that contained areas of Primary Habitat or Associated Habitat (of any wetland habitat type) were removed, so that the remaining areas to be intersected with the biodiversity opportunity data consisted of areas that were part of the wider NRN network, comprising the following classes:

- Restorable Habitat
- Fragmentation Action Zone
- Network Enhancement Zone 1
- Network Enhancement Zone 2
- Network Expansion Zone

Associated data file	**Value/Class name**
Biodiversity_Wetland_Opportunities_NRN.gpkg	DN: 2 - Preferred opportunity: hex colour: #e7c621 DN: 11 - Preferred opportunity: hex colour: #0000b1 DN: 210 - Some opportunity: hex colour: #4875dc DN: 400 - Some opportunity: hex colour: #ffe57c

Opportunities for establishing woodland



This map shows areas of opportunity for creating woodland habitat, based on the Habitat Asset Register. The opportunities are classified as 'preferred' opportunities if the existing habitat could be readily converted to woodland, and 'some opportunity' if the existing habitat would be more difficult, or take longer to convert to woodland. The opportunities are also classified according to whether they lie within the woodland ecological network, or outside the network. HAR habitat classes identified as opportunities for establishing this habitat type are shown in the table below.

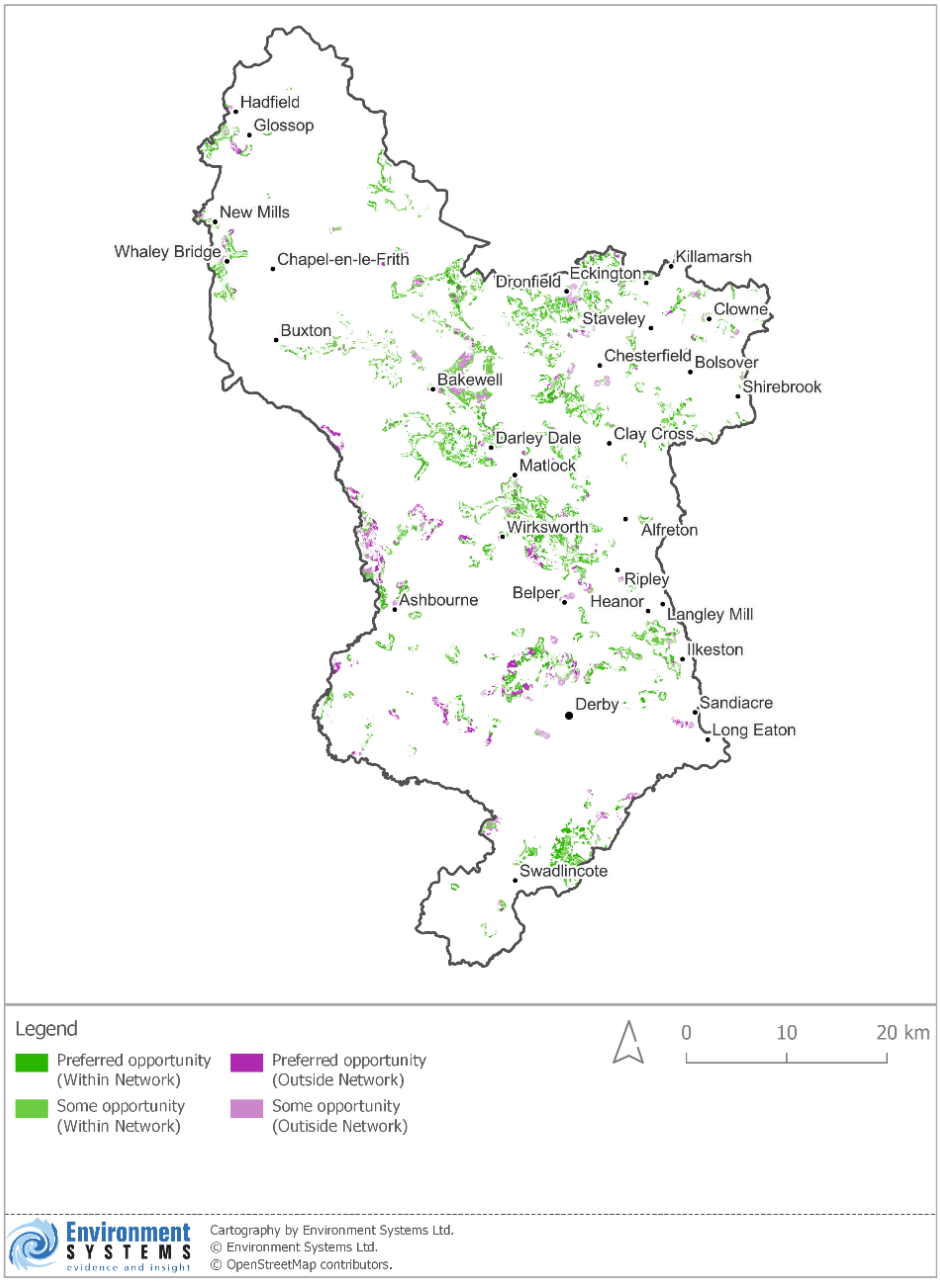
UKHAB_L2	UKHAB_LD	UKHABSEC	Opportunity type

Grassland	Bracken	No secondary code assigned	Preferred opportunity
Grassland	Grassland	Bare ground	Preferred opportunity
Grassland	Grassland	Ruderal/ ephemeral	Preferred opportunity
Grassland	Grassland	Scattered Scrub	Preferred opportunity
Grassland	Grassland	Seasonally wet, Wet, Waterlogged	Preferred opportunity
Grassland	Grassland	Tall herb	Preferred opportunity
Grassland	Neutral grassland	Pasture or meadow	Preferred opportunity
Grassland	Other neutral grassland	No secondary code assigned	Preferred opportunity
Grassland	Temporary grass and clover leys	Less intensively managed	Preferred opportunity
Heathland and shrub	Dense scrub	No secondary code assigned	Preferred opportunity
Heathland and shrub	Hawthorn scrub	No secondary code assigned	Preferred opportunity
Sparsely vegetated land	Sparsely vegetated land	Bare ground	Preferred opportunity
Woodland and forest	Broadleaved mixed and yew woodland	Felled	Preferred opportunity
Woodland and forest	Broadleaved mixed and yew woodland	Young trees - planted	Preferred opportunity
Woodland and forest	Broadleaved mixed and yew woodland	Young trees - planted, Young trees - self-set	Preferred opportunity
Woodland and forest	Coniferous woodland	Ancient woodland site, Plantation	Preferred opportunity
Woodland and forest	Coniferous woodland	Felled	Preferred opportunity
Woodland and forest	Woodland and forest	Felled	Preferred opportunity
Woodland and forest	Woodland and forest	Scattered scrub	Preferred opportunity
Woodland and forest	Woodland and forest	Scattered trees	Preferred opportunity
Woodland and forest	Woodland and forest	Young trees - planted	Preferred opportunity
Woodland and forest	Woodland and forest	Young trees - planted, Young trees - self-set	Preferred opportunity

Grassland	Grassland	Coastal and floodplain grazing marsh	Some opportunity
Grassland	Grassland	No secondary code assigned	Some opportunity
Grassland	Modified grassland	Frequently mown, Introduced shrub	Some opportunity
Grassland	Modified grassland	No secondary code assigned	Some opportunity
Sparsely vegetated land	Sparsely vegetated land	No secondary code assigned	Some opportunity
Urban	Urban	Natural and semi-natural open space	Some opportunity
Woodland and forest	Coniferous woodland	No secondary code assigned	Some opportunity
Woodland and forest	Coniferous woodland	Plantation	Some opportunity

Associated data file	**Value/Class name**
Biodiversity_Woodland_Opportunities.gpkg	2 - Preferred opportunity (Outside Network): hex colour: #b02ab0 11 - Preferred opportunity (Within Network): hex colour: #2ab500 210 - Some opportunity (Within Network): hex colour: #6ccb40 400 - Some opportunity (Outside Network): hex colour: #cc86cc

Woodland opportunities located within Natural England wetland NRNs



This map was created by intersecting the opportunities for establishing woodland that lie within the ecological network, with processed Natural England Nature Recovery Network (NRN) data.

The following processing was undertaken to the NRN data prior to intersecting with the biodiversity opportunities:

NRN data for the following habitats were merged to make a single NRN dataset for woodlands, clipped to the Derbyshire boundary:

- Ancient Semi Natural Woodland

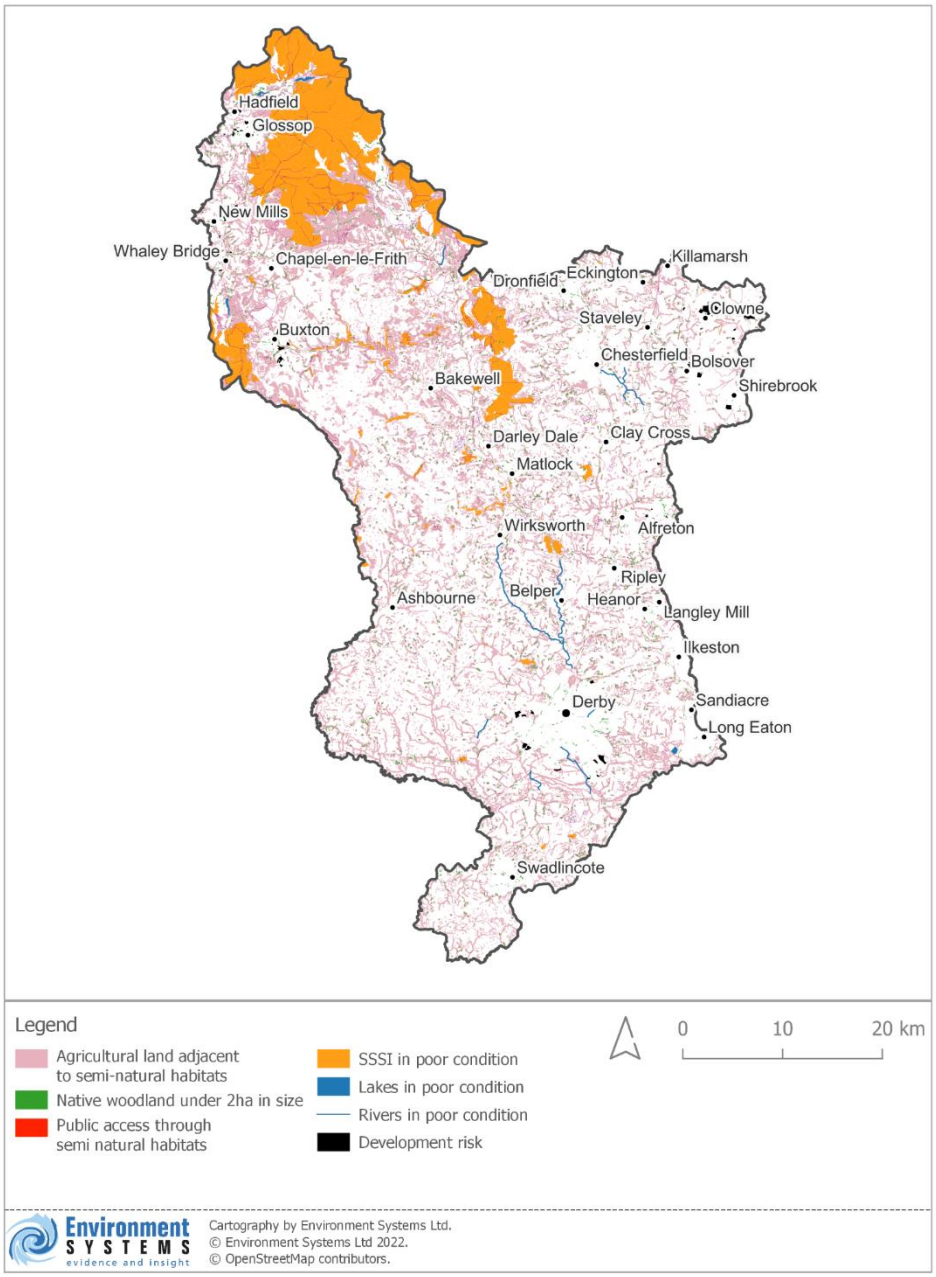
- Traditional Orchards
- Wood Pasture and Parkland

Within the merged NRN data any areas that contained areas of Primary Habitat or Associated Habitat (of any woodland habitat type) were removed, so that the remaining areas to be intersected with the biodiversity opportunity data consisted of areas that were part of the wider NRN network, comprising the following classes:

- Restorable Habitat
- Fragmentation Action Zone
- Network Enhancement Zone 1
- Network Enhancement Zone 2
- Network Expansion Zone

Associated data file	**Value/Class name**
Biodiversity_Woodland_Opportunities_in_NRN.gpkg	DN: 2 - Preferred opportunity: hex colour: #b02ab0 DN: 11 - Preferred opportunity: hex colour: #2ab500 DN: 210 - Some opportunity: hex colour: #6ccb40 DN: 400 - Some opportunity: hex colour: #cc86cc

Biodiversity risks



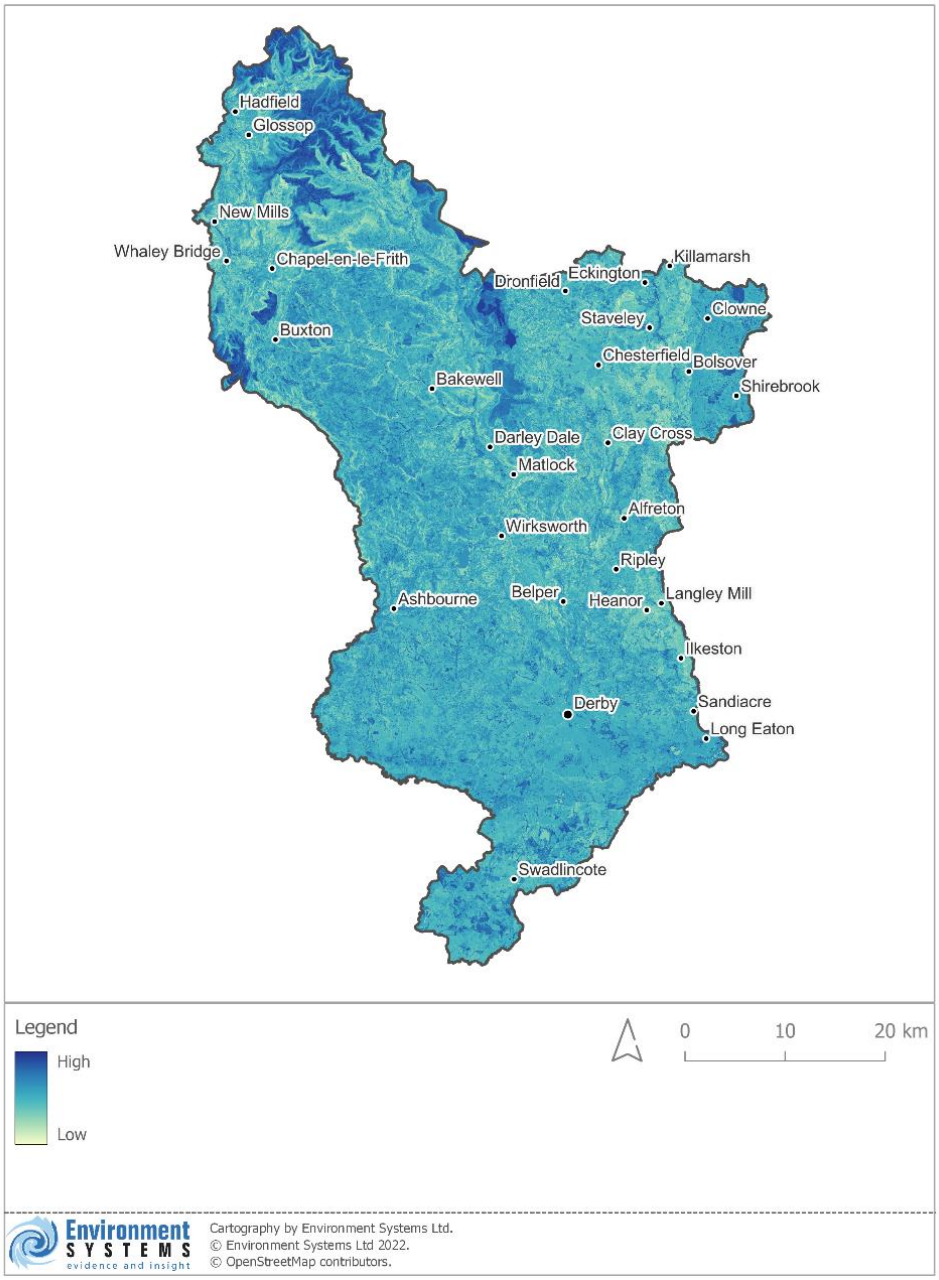
This map shows five different types of risk, as outlined in the table below.

Risk type	Definition of risk area
SSSI risk areas	SSSIs with the following condition assessments: • Not assessed • Unfavourable declining • Unfavourable recovering • Unfavourable no change • Part destroyed

	• Destroyed
Native woodland under 2ha in size	• Woodland ecological network 'stepping stone' areas
Waterbodies in poor condition	WFD condition assessment for rivers and lakes: • Poor • Fail • Moderate or less
Areas of public access through semi-natural habitat	Places where paths (buffered by 10m) cross areas of semi-natural habitat (identified from the HAR and ecological network core and stepping stone areas).
Agricultural land adjacent to semi-natural habitats	Agricultural areas (selected from the HAR) within 50m of a semi-improved habitat (identified from the HAR and ecological network core and stepping stone areas).
Development risk	Areas allocated for housing and employment development within Local Development Plans for the following areas: • Bolsover • Chesterfield • Derby City • High Peak

Associated data file	**Value/Class name**
Biodiversity_Risks_Rivers.gpkg	Whole dataset: hex: #1f78b4
Biodiversity_Risks_Public_Access.gpkg	Whole dataset: hex: #ff2301
Biodiversity_Risks_Lakes.gpkg	Whole dataset: hex: #1f78b4
Biodiversity_Risks_Native_Woodland.gpkg	Whole dataset: hex: #33a02c
Biodiversity_Risks_SSSI.gpkg	Whole dataset: hex: #ff9e17
Biodiversity_Risks_Agri_Semi_Natural.gpkg	Whole dataset: hex: #e8b1be

Natural Flood Management: current provision (stock)



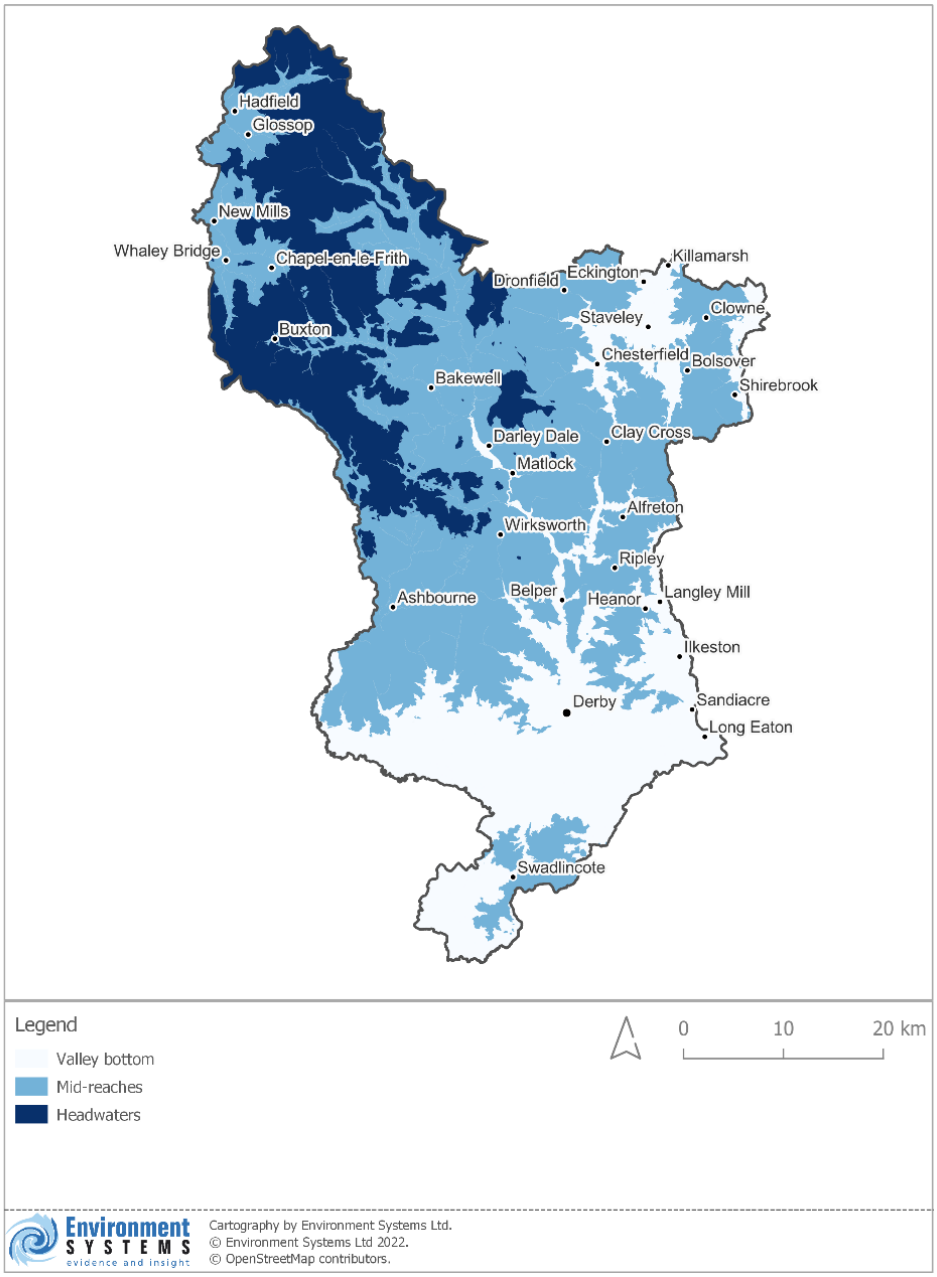
This map shows the existing NFM provision in Derbyshire. Darker areas show areas of higher provision, lighter areas show lower NFM provision.

Data input	Reason for usage	Indicative scoring
Slope: 5m resolution DEM	Steepness of slope has a strong effect on how quickly water is shed, and where it is stored	• Flat ground and gentle slopes (up to 3º): highest NFM • Moderate slopes (multiple categories): moderate NFM

		• Steep slopes (> 18º): No NFM benefit (water-shedding)
Natmap soil type (Cranfield data)	Soil texture, organic matter content and depth have a strong impact on water retention	• Peat soils, deep loamy and sandy soils: high NFM • Shallow soils, heavy clays: low NFM
Habitat Asset Register	Vegetation cover and rooting depth affect water interception, surface runoff, and infiltration.	• Woodland: high NFM • Tall or shrubby grassland: moderate NFM • Short grassland, bare ground: low NFM

Associated data file	**Value/Class name**
NFM_Current_Provision.gpkg	Range: 5 – Low: hex: #ffffcc 285 – High: hex: #253494

Hydrological catchment zones



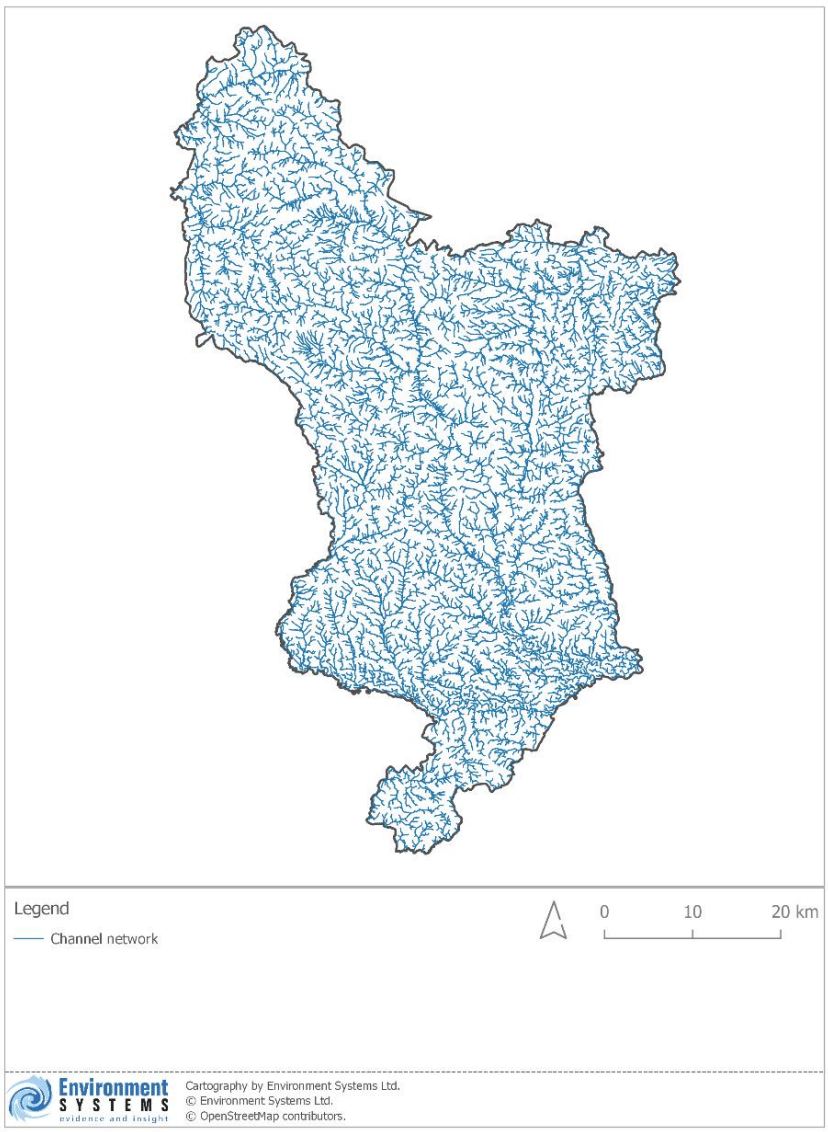
The catchment zones map shows the partition of the Derbyshire area into headwater, mind-reach, and valley bottom zones.

Data input	Reason for usage	Indicative scoring
5m resolution DEM	Elevation is one of the deciding factors for position within the catchment	• < 100m: valley bottom • 100 - 300m: Mid-reaches • > 300m: headwaters
Environment Agency Floodzone 3	Areas subjected to flooding are likely to be valley bottom	Area falls within Floodzone 3: floodplain catchment zone

Associated data file	Value/Class name
Hydrological_Catchment_Zones.gpkg	Catchment_: Candidate for valley bottom – Valley bottom: hex colour: #f7fbff Catchment_: Mid-reaches – Mid-reaches: hex: #73b2d8 Catchment_: Head Waters – Headwaters: hex: #08306b

Channel network

This map shows the fine-scale natural hydrological drainage channels, extracted through SCIMAP analysis of the 5m DEM

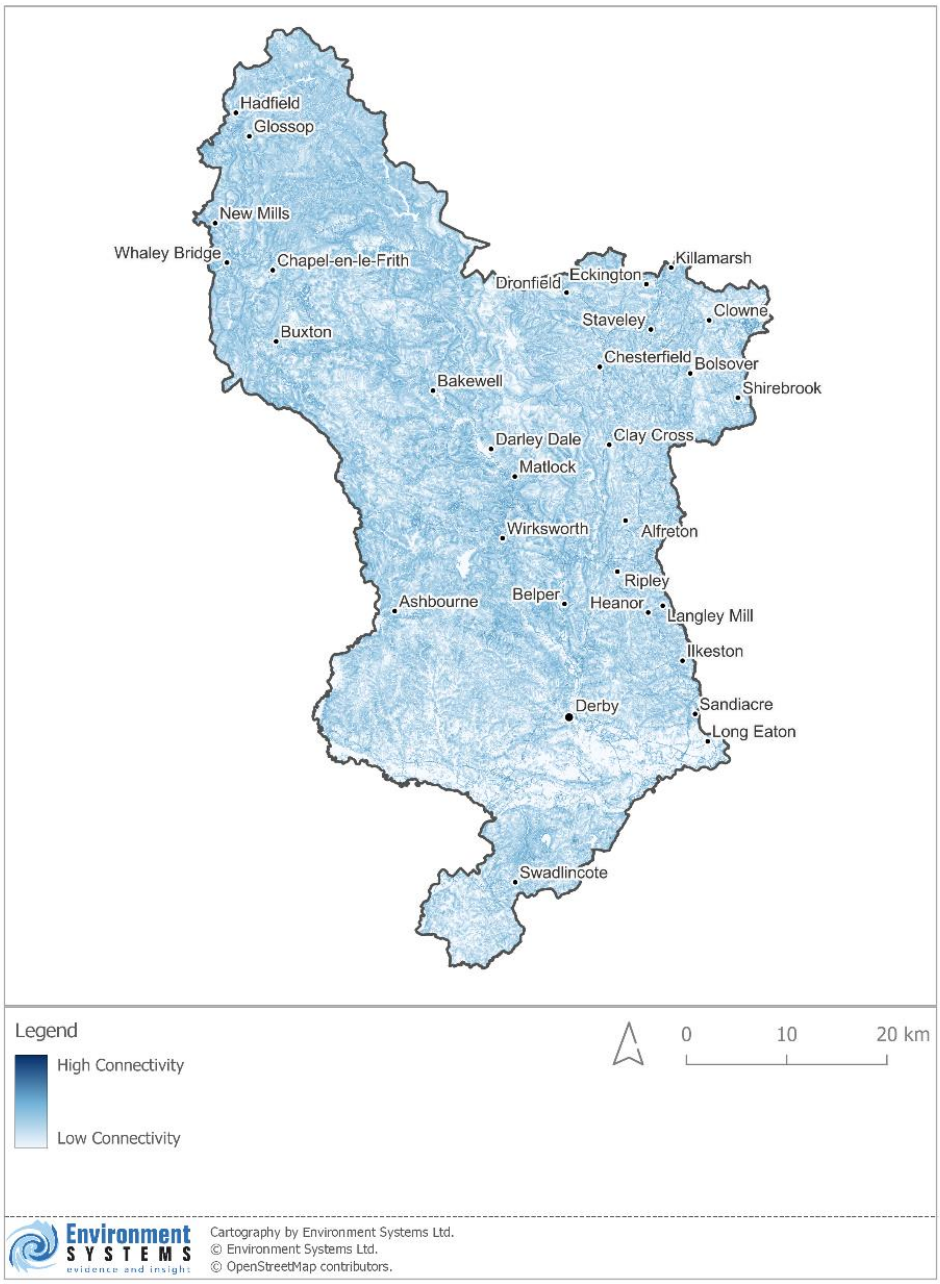


References:

SCIMAP: Diffuse Pollution and Flood Water Source Mapping. https://scimap.org.uk/ [accessed 2022-09-16]

Associated data file	Value/Class name
SCIMAP_Channel_Network.gpkg	Whole dataset: Channel Network hex colour: #1f78b4

Hydrological connectivity



This map shows how strongly areas are connected to the channel network; how important each location is for funnelling water towards the rivers and streams. Areas with high

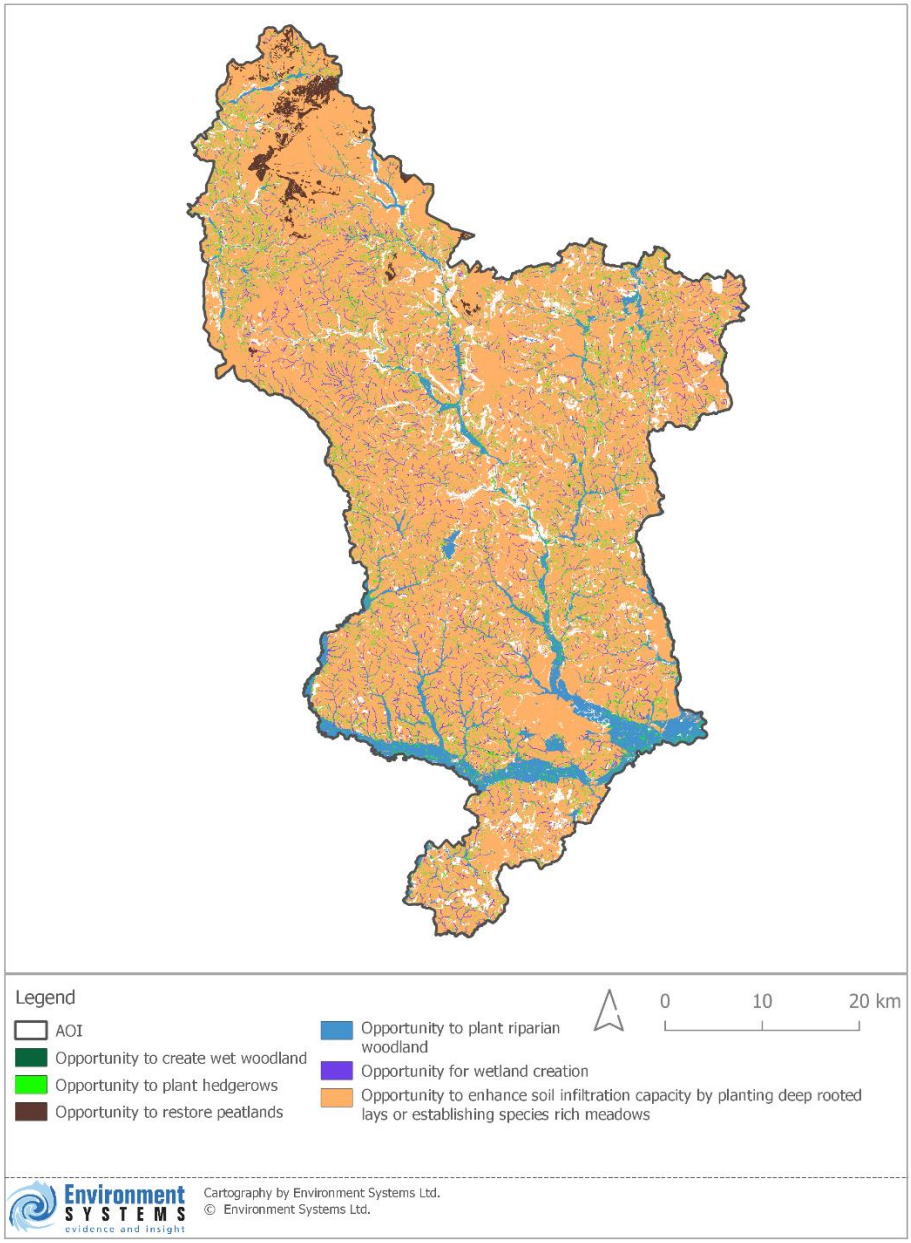
connectivity funnel more water. This dataset was generated by analysis of the Digital Elevation model with SCIMAP.

Associated data file	Figure heading	Value/Class name
NFM_Risk_Hydrological_Connectivity.gpkg	Figure 35: Hydrological connectivity	Range: 0 – High Connectivity: hex: #08306b 1 – Low Connectivity: hex: #f7fbff

References:

SCIMAP: Diffuse Pollution and Flood Water Source Mapping. https://scimap.org.uk/ [accessed 2022-09-16]

Natural Flood Management: all NFM opportunities



This map considered opportunities to change the habitat type or condition, or soil condition, to improve surface water regulation by increasing rainfall interception, surface roughness, or soil water-retention capacity (e.g. through increasing rooting depth or organic matter content, or alleviating compaction).

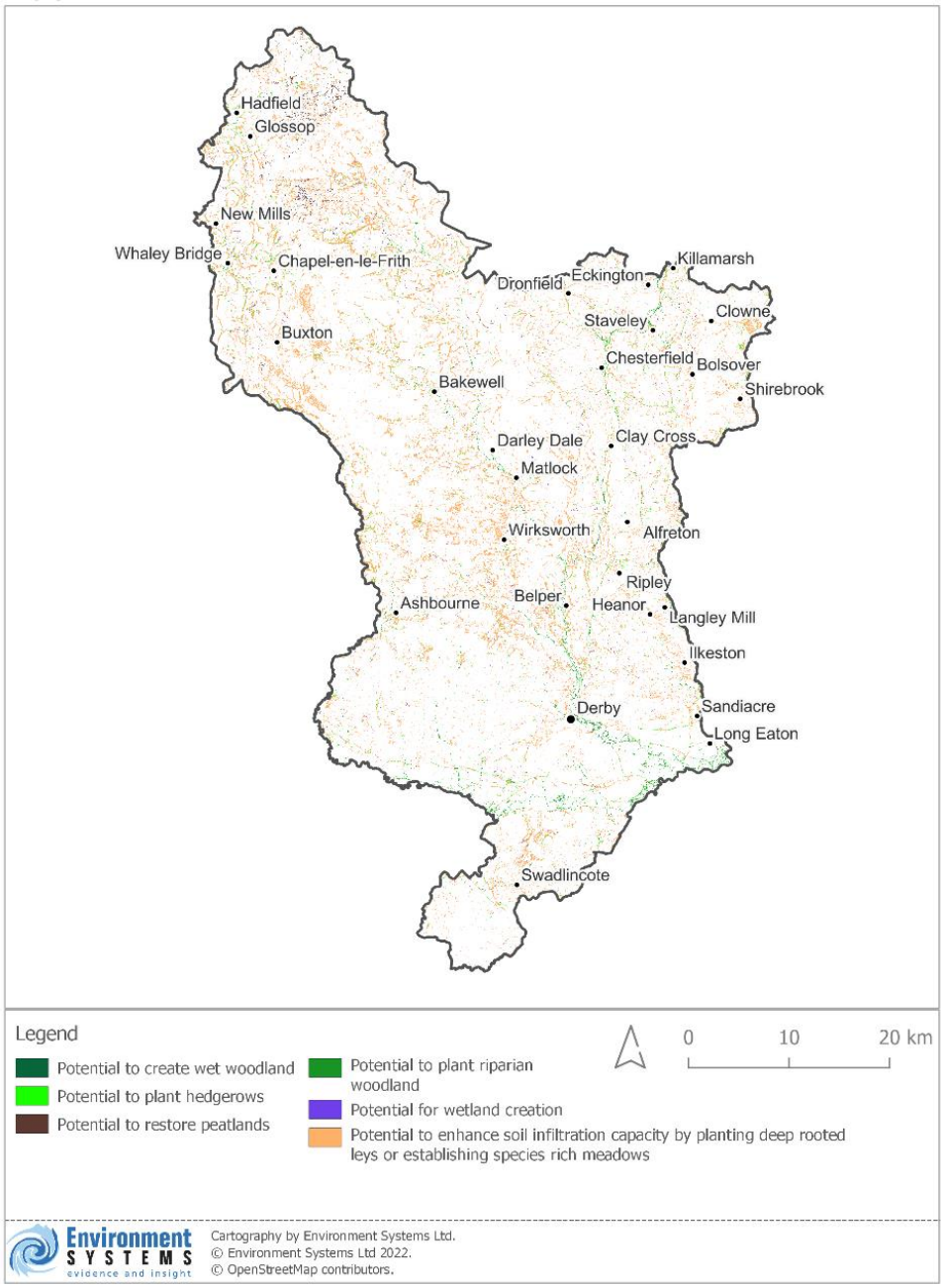
Data input	Reason for usage
Habitat Asset Register	Grassland and cropland selection to identify areas to enhance habitats by planting deep rooted lays. Degraded bogs are opportunities for peatland restoration.

	Rivers and streams without adjoining woodland cover are opportunities for riparian woodland creation. Existing hedgerows and stonewalls used as a basis to identify agricultural fields currently lacking hedgerows (or stonewalls), where hedgerows could be created
Landscape Character 2013	Used to identify areas where hedgerow creation would not be appropriate (areas currently characterised by the presence of stone walls), and ensure that hedgerow creation was not recommended in these areas.
Channel network (derived from 5m DEM using SCIMAP)	Used to identify riparian woodland opportunities
Environment Agency Floodzone 2	Floodplain areas used to identify areas suitable for wet woodland and wetland creation
Natmap soil type (Cranfield data)	Groundwater-affected soil types within the floodplain are opportunities for wetland creation
Woodland opportunities (output from Biodiversity theme mapping)	Used to identify areas suitable for wet woodland creation

Associated data file	Figure heading	Value/Class name
Natural_Flood_Management_Opportunities.gpkg	Figure 36: Natural Flood Management: all NFM opportunities	1- Potential to create wet woodland: hex colour: #ef64dd 2 - Potential to plant hedgerows: hex colour: #1aff00 3 - Potential to restore peatlands: hex colour: #5e3931 4 - Potential to plant riparian woodland: hex colour: #1a9426 5 - Potential for wetland creation: hex colour: #703fea 6 - Potential to enhance soil infiltration capacity by planting deep rooted lays or establishing species

		rich meadows: hex colour: #ffb168

Natural Flood Management: targeted opportunities



This map was made from the full map of NFM opportunities. It is a selection of areas that occur in the places that have a high hydrological conductivity, meaning the most significant locations for funnelling water towards the rivers and streams. Areas of high hydrological connectivity were identified by analysis of the Digital Elevation model with SCIMAP.

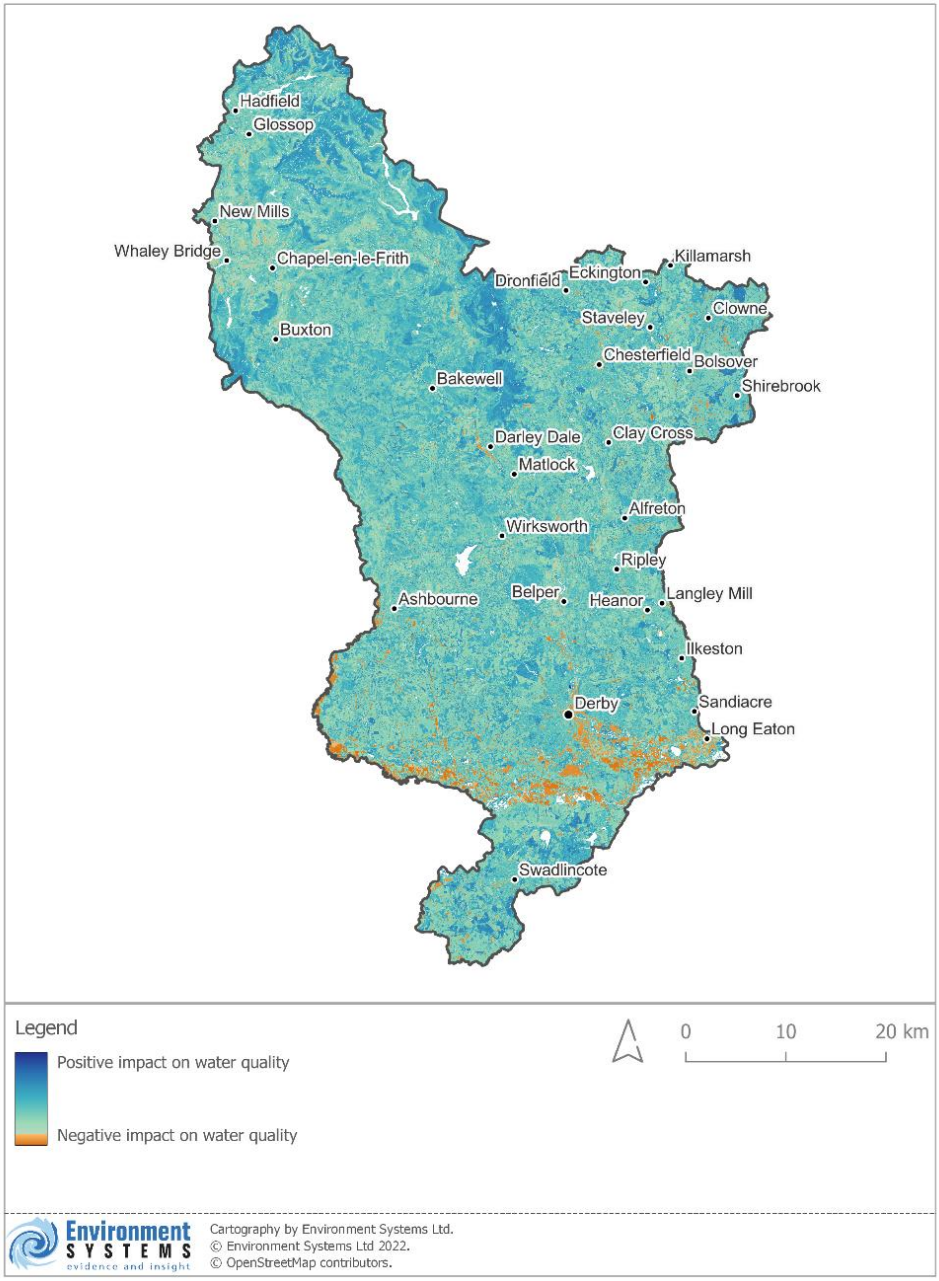
Associated data files	Value/Class name

NFM_Targeted_Opportunities.gpkg	1 - Potential to create wet woodland: hex colour: #09663c 2 - Potential to plant hedgerows: hex colour: #1aff00 3 - Potential to restore peatlands: hex colour: #5e3931 4 - Potential to plant riparian woodland: hex colour: #1a9426 5 - Potential for wetland creation: hex colour: #703fea 6 - Potential to enhance soil infiltration capacity by planting deep rooted lays or establishing species rich meadows: hex colour: #ffb168

References:

SCIMAP: Diffuse Pollution and Flood Water Source Mapping. https://scimap.org.uk/ [accessed 2022-09-16]

Water quality regulation: current provision (stock)



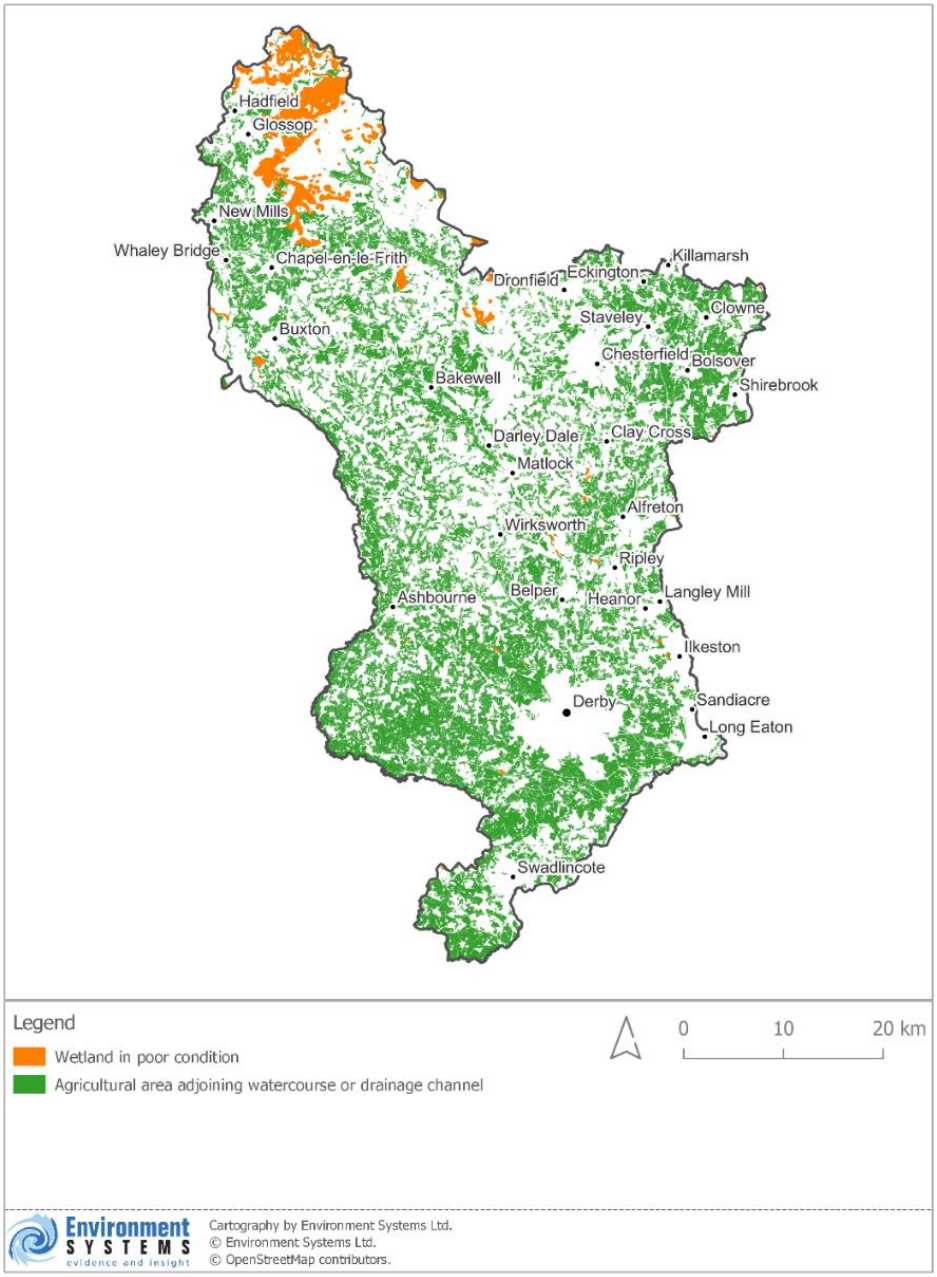
This map was created by combining datasets relating to slope, soil type and land use/land management, each assessed for their contribution to water quality regulation.

Data input	Reason for usage	Indicative scoring
Slope: 5m resolution DEM	Steepness of slope affects water pooling/shedding and filtration potential	• Flat ground and gentle slopes (up to 3º): high positive effect on water quality regulation • Moderate slopes (multiple categories): moderate positive impact on water quality regulation

		• Steep slopes (> 18º): No water quality regulation benefit
Natmap soil type (Cranfield data)	Soil texture, organic matter content, depth, and underlying geology have a strong impact on water filtration	• Peat soils, soils over limestone: high NFM • Shallow soils over hard rock types: low water quality regulation
Habitat Asset Register	Vegetation cover, rooting and nutrient uptake characteristics affect water filtration and movement of pollutants.	• Wet blanket bog: high positive effect on water quality regulation • Neutral grassland: moderate positive impact on water quality regulation • Arable land: negative impact on water quality regulation

Associated data source	**Value/Class name**
Water_Quality_Existing_Provision.gpkg	Whole dataset 0: hex #b8d9c5 to 315: hex: #253494 -0.1: hex: #fdbf6f to -50: hex: #d76800

Water quality regulation: risk areas



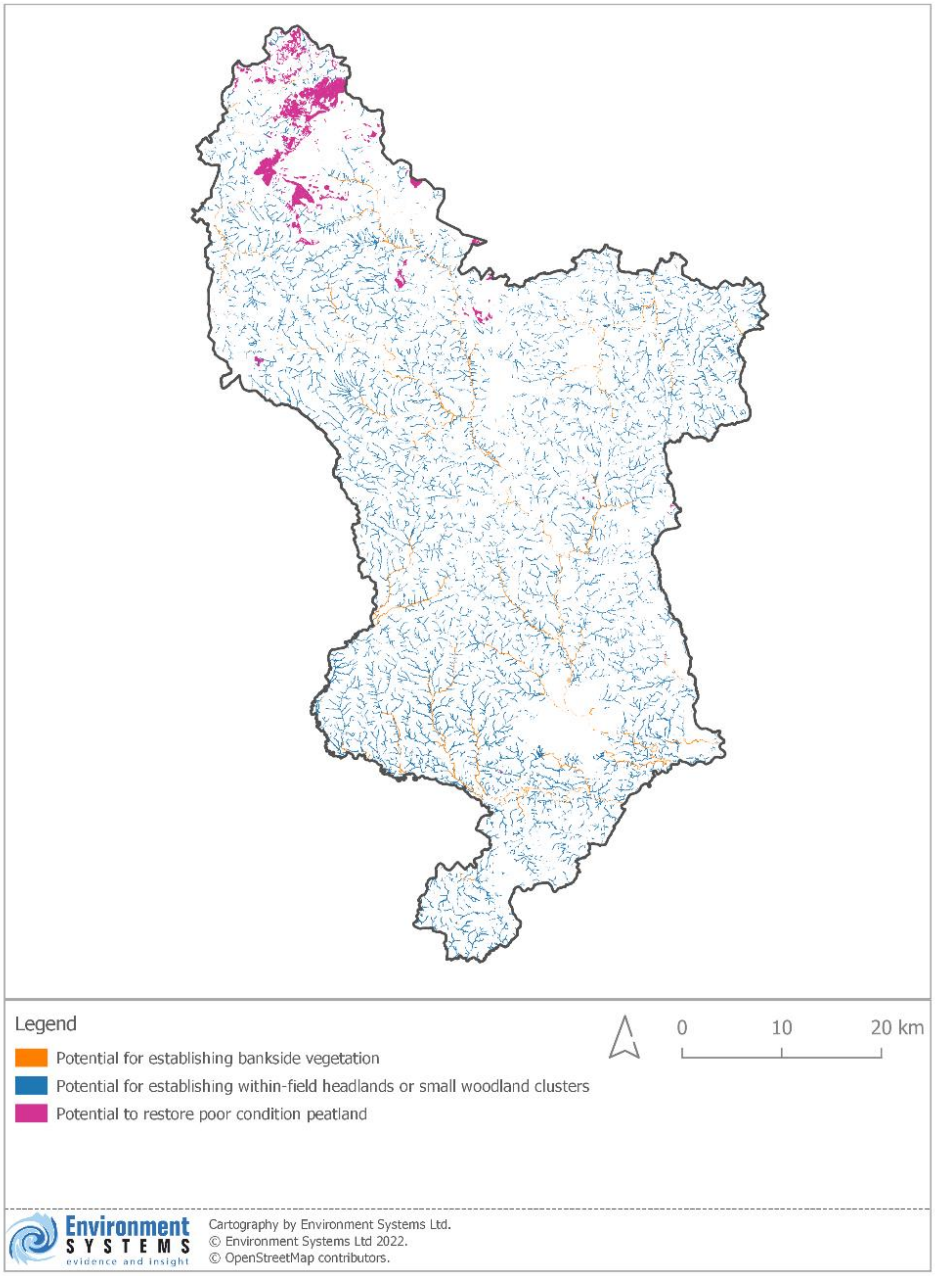
This map identifies the locations of two risk types; degraded peatlands, and agricultural areas adjoining drainage channels.

Risk type	Definition of risk area
Degraded peatlands	Areas of degraded blanket bog and bare peat, selected from the HAR
Agricultural areas adjoining drainage channels	Agricultural areas (selected from the HAR) within 30m of rivers and streams (selected from the HAR) and natural drainage channels (as identified by SCIMAP analysis of 5m DEM)

Associated data files	Value/Class name

Water_Quality_Risk.gpkg	Whole dataset: Agricultural area adjoining watercourse or drainage channel hex colour: #33a02c
Water_Quality_Risk_Opportunities.gpkg	DN: 3 - Wetland in poor condition hex colour: #ff7f00

Water quality regulation: potential enhancement areas



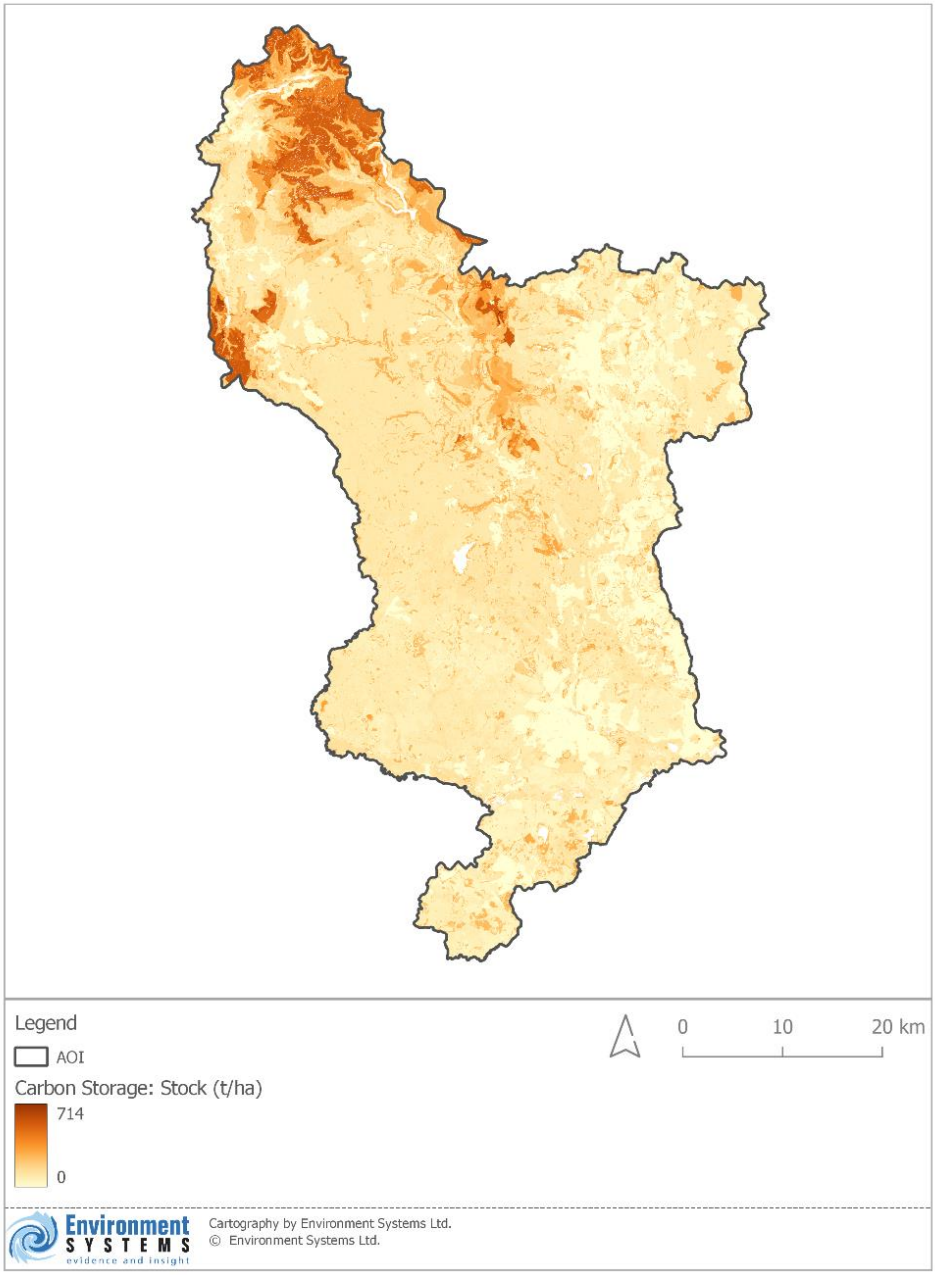
This map shows five different types of opportunity, as outlined in the table below.

Opportunity type	Definition of opportunity area

Opportunity for establishing bankside vegetation	Areas bordering the main rivers and streams (within 30m of the watercourse) that currently lack woodland or shrubby bankside vegetation (as mapped by the HAR)
Opportunity for establishing within-field headlands or small woodland clusters	Agricultural areas (selected from the HAR) within 30m of natural drainage channels (as identified by SCIMAP analysis of 5m DEM)
Opportunity to restore poor condition peatland	Areas of degraded blanket bog and bare peat, selected from the HAR

Filename	**Value/Class name**
Water_Quality_Opportunities.gpkg	1 - Potential for establishing bankside vegetation: hex colour: #ff7f00 2 - Potential for establishing within-field headlands or small woodland clusters: hex colour: #1f78b4 3 - Potential to restore poor condition peatland : hex colour: #d33494

Current carbon storage (stock)



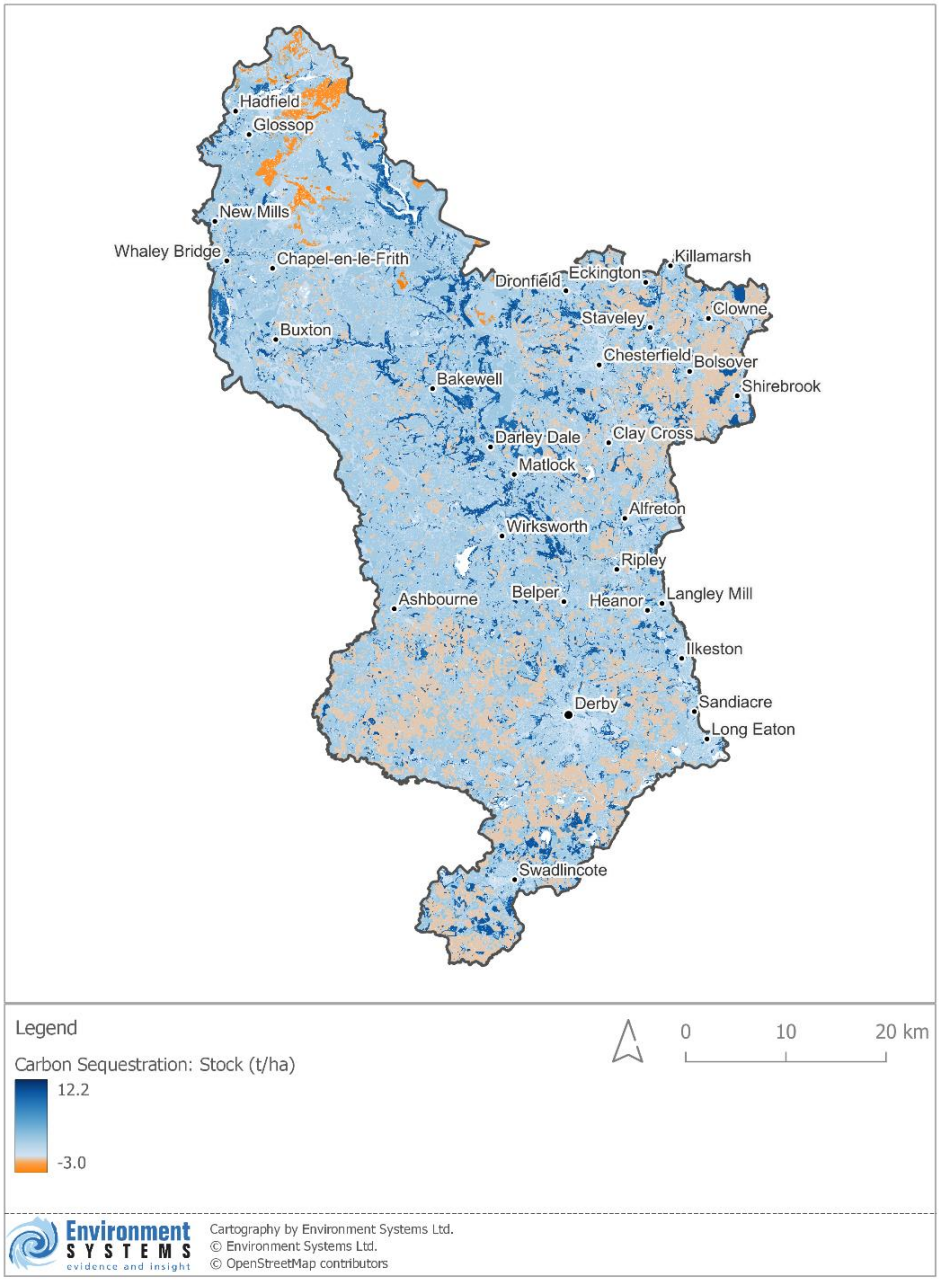
This is a quantitative map; carbon storage values are expressed in $t.ha^{-1}$. Carbon storage values were taken from Natmap Carbon data obtained under license from Cranfield, based on carbon storage in the 0-30cm depth fraction, with the addition of mean carbon storage values for the habitat present, as determined by the HAR. The Natmap Carbon dataset contains both maximum and minimum carbon values for the soil type. The assigned carbon value was assigned from within this range based on the HAR habitat class and steepness of slope in each location, and the influence of floodplains (e.g. good condition bog habitat would be assigned the maximum value in the Natmap Carbon data range, but bare ground on steep slopes would be assigned a value towards the minimum in the stated Natmap Carbon range), informed by the relative carbon values of different habitat types (Alonso *et. al.,* (2012); Gregg *et. al.,* (2021)). Examples of how the carbon values were determined from

the maximum and minimum values within the Natmap Carbon data are shown in the table below.

Habitat / dataset	Process for selecting carbon value using maximum and minimum values from Natmap Carbon
Ancient woodland	Use the maximum value in the Natmap Carbon dataset
Wet neutral grassland	Select the value that lies half way within the range in the Natmap Carbon dataset.
Areas within floodplains (Floodzone 2)	Increase habitat carbon storage value by 10% (or use Natmap Carbon maximum value, whichever is lower)
Moderate slopes (7-11°)	Decrease habitat carbon storage value by 10% (or use Natmap Carbon minimum value, whichever is higher)
Steep slopes (11-18°)	Decrease habitat carbon storage value by 25% (or use Natmap Carbon minimum value, whichever is higher)
Very steep slopes (>18°)	Decrease habitat carbon storage value by 40% (or use Natmap Carbon minimum value, whichever is higher)

Associated data file	Figure heading	Value/Class name
Carbon_storage_stock.gpkg	Figure 41: Current carbon storage (stock)	Range: 0: hex: #ffffd4 248.39: hex: #993404

Current carbon sequestration (stock)



This is a quantitative map; carbon sequestration values are expressed in $t.ha^{-1}$. Carbon sequestration values were taken from the Natural England report Gregg *et al* (2021). This review considered the scientific evidence for carbon sequestration by semi-natural habitats, in relation to their condition and/or management. This new report updates and expands previous work by Alonso et al (2012). Where evidence was lacking a gap analysis was included showing areas where research was needed. Where research projects were underway, new evidence was obtained under a current carbon mapping project being undertaken by Natural England (Medcalf *et al.*, in press), including gathering carbon storage evidence from northern Europe to fill any final knowledge gaps. The sequestration rates applied to each habitat type are shown in the table below.

UKHAB_L2	UKHAB_LD	UKHABSEC	C sequestration (t.ha^{-1})
Urban	Built-up areas and gardens	Road island/verge	0
Cropland	Cropland	No secondary code assigned	-0.5
Cropland	Arable and horticulture	No secondary code assigned	-0.5
Cropland	Cereal crops	No secondary code assigned	-0.5
Cropland	Non-cereal crops	No secondary code assigned	-0.5
Wetland	Wetland	No secondary code assigned	-0.5
Wetland	Wetland	Peat	-3
Wetland	Bog	No secondary code assigned	1.7
Wetland	Bog	Bare ground, Peat	1.7
Wetland	Bog	Dry	-2
Wetland	Bog	Wet	1.7
Wetland	Blanket bog	No secondary code assigned	1.7
Wetland	Blanket bog	Dry	-2
Wetland	Blanket bog	Wet	1.7
Wetland	Blanket bog (H7130)	No secondary code assigned	1.7
Wetland	Fen marsh and swamp	No secondary code assigned	1.8
Wetland	Fen marsh and swamp	Flush	0.4
Wetland	Fen marsh and swamp	Flush, Base-rich substrate	1.8
Wetland	Lowland fens	Tall herb	1.8
Wetland	Transition mires and quaking bogs; lowland (H7140)	No secondary code assigned	1.7
Wetland	Purple moor grass and rush pastures	No secondary code assigned	0.8
Wetland	Upland flushes, fens and swamps	No secondary code assigned	0.4
Wetland	Reedbeds	No secondary code assigned	6.5
Grassland	Grassland	No secondary code assigned	2.9
Grassland	Grassland	Seasonally wet, Wet, Waterlogged	2.5
Grassland	Grassland	Tall herb	2.5
Grassland	Grassland	Ruderal/ ephemeral	2.3
Grassland	Grassland	Calcareous - acidic mosaic, Sward type mosaic	0.8
Grassland	Grassland	Traditional orchards	1.4
Grassland	Grassland	Coastal and floodplain grazing marsh	2.8
Grassland	Acid grassland	No secondary code assigned	0.5
Grassland	Acid grassland	Scattered bracken	2
Grassland	Acid grassland	Scattered dwarf shrubs	2.3
Grassland	Acid grassland	Tall or tussocky sward	2.2

Grassland	Acid grassland	Calcareous - acidic mosaic, Sward type mosaic	2.7
Grassland	Acid grassland	Grazed	2.2
Grassland	Lowland dry acid grassland	No secondary code assigned	0.5
Grassland	Lowland dry acid grassland	Scattered dwarf shrubs	2
Grassland	Bracken	No secondary code assigned	2.3
Grassland	Calcareous grassland	No secondary code assigned	0.8
Grassland	Lowland calcareous grassland	No secondary code assigned	0.8
Grassland	Upland calcareous grassland	No secondary code assigned	0.8
Grassland	Neutral grassland	No secondary code assigned	3.1
Grassland	Neutral grassland	Pasture or meadow	3
Grassland	Neutral grassland	Wet	2.5
Grassland	Neutral grassland	Tall or tussocky sward	3
Grassland	Lowland meadows	No secondary code assigned	3.4
Grassland	Other neutral grassland	No secondary code assigned	2.8
Grassland	Modified grassland	No secondary code assigned	2.5
Grassland	Modified grassland	Frequently mown, Introduced shrub	2.5
Heathland and shrub	Dwarf shrub heath	No secondary code assigned	2.3
Heathland and shrub	Dwarf shrub heath	Wet	2.3
Heathland and shrub	Dwarf shrub heath	Scattered grass	2
Heathland and shrub	Lowland heathland	No secondary code assigned	2.8
Heathland and shrub	Upland heathland	No secondary code assigned	2.8
Heathland and shrub	Upland Heathland	Wet, Base-rich substrate	2.8
Heathland and shrub	Upland heathland	Base-rich substrate	2.8
Heathland and shrub	Upland heathland	Acidic substrate	2.8
Heathland and shrub	Upland heathland	Scattered grass	2.7
Heathland and shrub	Hedgerows	No secondary code assigned	0.5
Heathland and shrub	Dense scrub	No secondary code assigned	9.7
Heathland and shrub	Hawthorn scrub	No secondary code assigned	9.7
Rivers and lakes	Rivers and lakes	No secondary code assigned	Not mapped
Rivers and lakes	Standing open water and canals	No secondary code assigned	Not mapped

Rivers and lakes	Standing open water and canals	Reservoirs	Not mapped
Rivers and lakes	Standing open water and canals	Freshwater - man-made	Not mapped
Rivers and lakes	Oligotrophic and dystrophic lakes	No secondary code assigned	Not mapped
Rivers and lakes	Canals	No secondary code assigned	Not mapped
Rivers and lakes	Rivers and streams	No secondary code assigned	Not mapped
Sparsely vegetated land	Sparsely vegetated land	No secondary code assigned	0
Sparsely vegetated land	Inland rock	No secondary code assigned	0
Sparsely vegetated land	Limestone pavement	No secondary code assigned	0
Sparsely vegetated land	Calaminarian grasslands	No secondary code assigned	0
Urban	Urban	No secondary code assigned	0
Urban	Built-up areas and gardens	No secondary code assigned	0.5
Urban	Built-up areas and gardens	Introduced shrub	0.5
Urban	Built-up areas and gardens	Allotments	0.2
Urban	Open Mosaic Habitats on Previously Developed Land	No secondary code assigned	10
Woodland and forest	Woodland and forest	No secondary code assigned	9.7
Woodland and forest	Woodland and forest	Scattered scrub	5
Woodland and forest	Woodland and forest	Scattered trees	10.4
Woodland and forest	Woodland and forest	Ancient woodland site	10.4
Woodland and forest	Woodland and forest	Ancient woodland site, Plantation	10.4
Woodland and forest	Woodland and forest	Ancient woodland site, Semi-natural woodland	10.4
Woodland and forest	Woodland and forest	Ancient woodland site, Semi-natural woodland, Wet	10
Woodland and forest	Woodland and forest	Plantation	12.2
Woodland and forest	Woodland and forest	Coppice	0
Woodland and forest	Woodland and forest	Felled	7

Woodland and forest	Woodland and forest	Young trees - planted	7
Woodland and forest	Woodland and forest	Young trees - planted, Young trees - self-set	10.4
Woodland and forest	Broadleaved mixed and yew woodland	No secondary code assigned	10.5
Woodland and forest	Broadleaved mixed and yew woodland	Ancient woodland site	10.4
Woodland and forest	Broadleaved mixed and yew woodland	Ancient woodland site, Plantation	10.4
Woodland and forest	Broadleaved mixed and yew woodland	Ancient woodland site, Semi-natural woodland	10.3
Woodland and forest	Broadleaved mixed and yew woodland	Plantation	10.4
Woodland and forest	Broadleaved mixed and yew woodland	Semi-natural woodland	10
Woodland and forest	Broadleaved mixed and yew woodland	Secondary woodland	0
Woodland and forest	Broadleaved mixed and yew woodland	Felled	7
Woodland and forest	Broadleaved mixed and yew woodland	Young trees - planted	6
Woodland and forest	Broadleaved mixed and yew woodland	Young trees - planted, Young trees - self-set	10.4
Woodland and forest	(Upland oakwood)	No secondary code assigned	10.2
Woodland and forest	(Upland oakwood)	Plantation	10.4
Woodland and forest	(Upland oakwood)	Semi-natural woodland	10
Woodland and forest	Upland mixed ashwoods	No secondary code assigned	9.8
Woodland and forest	Upland mixed ashwoods	Plantation	10
Woodland and forest	Upland mixed ashwoods	Semi-natural woodland	8.5
Woodland and forest	Wet woodland	No secondary code assigned	8.5
Woodland and forest	Wet woodland	Semi-natural woodland	8.5
Woodland and forest	Wet woodland	Secondary woodland	10.4
Woodland and forest	Lowland mixed deciduous woodland	No secondary code assigned	10.4
Woodland and forest	Lowland mixed deciduous woodland	Ancient woodland site, Semi-natural woodland	10.4
Woodland and forest	Lowland mixed deciduous woodland	Semi-natural woodland	10
Woodland and forest	Other woodland; mixed	Plantation	9.2

Woodland and forest	Coniferous woodland	No secondary code assigned	9.2
Woodland and forest	Coniferous woodland	Ancient woodland site, Plantation	9.2
Woodland and forest	Coniferous woodland	Plantation	0
Woodland and forest	Coniferous woodland	Felled	0
Sparsely vegetated land	Inland rock outcrop and scree habitats	No secondary code assigned	0.5
Sparsely vegetated land	Sparsely vegetated land	Quarry - hard rock	2.8
Heathland and shrub	Heathland and shrub	Scattered scrub	2.5
Cropland	Temporary grass and clover leys	Intensively managed	2.5
Cropland	Temporary grass and clover leys	Less intensively managed	-3
Wetland	Degraded blanket bog	No secondary code assigned	6
Woodland and forest	Single line of trees	No secondary code assigned	0
Inland rock outcrop and scree habitats		No secondary code assigned	0
Urban	Urban	Golf course	0.5
Sparsely vegetated land	Sparsely vegetated land	Bare ground	2
Grassland	Grassland	Bare ground	0
Urban	Urban	Bare ground	3
Grassland	Grassland	Wood-pasture and parkland	1
Grassland	Grassland	Solar farm	0.5
Sparsely vegetated land	Sparsely vegetated land	Quarry - hard rock, Quarry - sand and gravel	8.4
Woodland and forest	Woodland and forest	Planted woodland	0
Wetland	Wetland	Exposed riverine sediments	2.7
Grassland	Grassland	Scattered Scrub	0
Rivers and lakes	Rivers and lakes	Ponds	2.9
Grassland	Lowland hay meadows (H6510)	No secondary code assigned	0
Urban	Artificial unvegetated, unsealed surface	No secondary code assigned	2.8
Grassland	Grassland	Cemeteries	2.8
Grassland	Grassland	Grassland/Childrens play areas	3

Urban	Urban	Parks and gardens	3
Urban	Urban	Natural and semi-natural open space	0.5
Urban	Urban	Sport pitches	0
Grassland	Grassland	Dry stone wall	0
Urban	Urban	Quarry - hard rock	2.9

Associated data file	**Value/Class name**
Carbon_sequestration_stock.gpkg	Range: -3: hex: #ff7f00 to -1.3111: hex: #ff9f45 0: hex: #d2e3f3 to 12.2: hex: #08306b

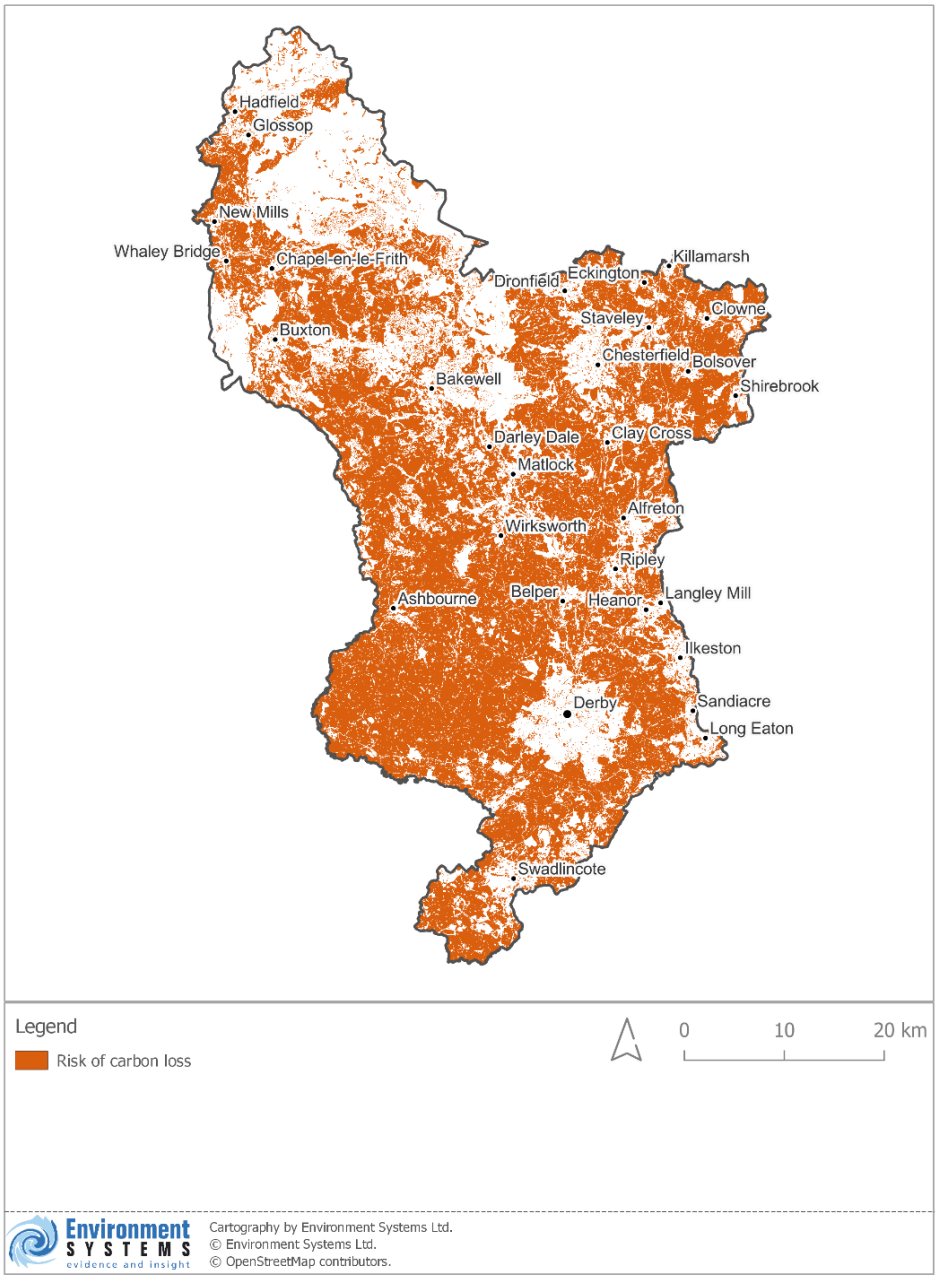
References:

Alonso, I., Weston, K., Gregg, R. and Morecroft, M. 2012. Carbon storage by habitat - Review of the evidence of the impacts of management decisions and condition on carbon stores and sources. Natural England Research Report NERR043. Natural England, York.

Gregg, R., Elias, J. L., Alonso, I., Crosher, I.E. and Muto, P. and Morecroft, M.D. (2021) Carbon storage and sequestration by habitat: a review of the evidence (second edition) Natural England Research Report NERR094. Natural England, York.

Medcalf, K., Williams, J. and Selman, C. (in press) Spatial Prioritisation of Land Management for Carbon Dataset. Draft report for Natural England. Environment Systems Ltd.

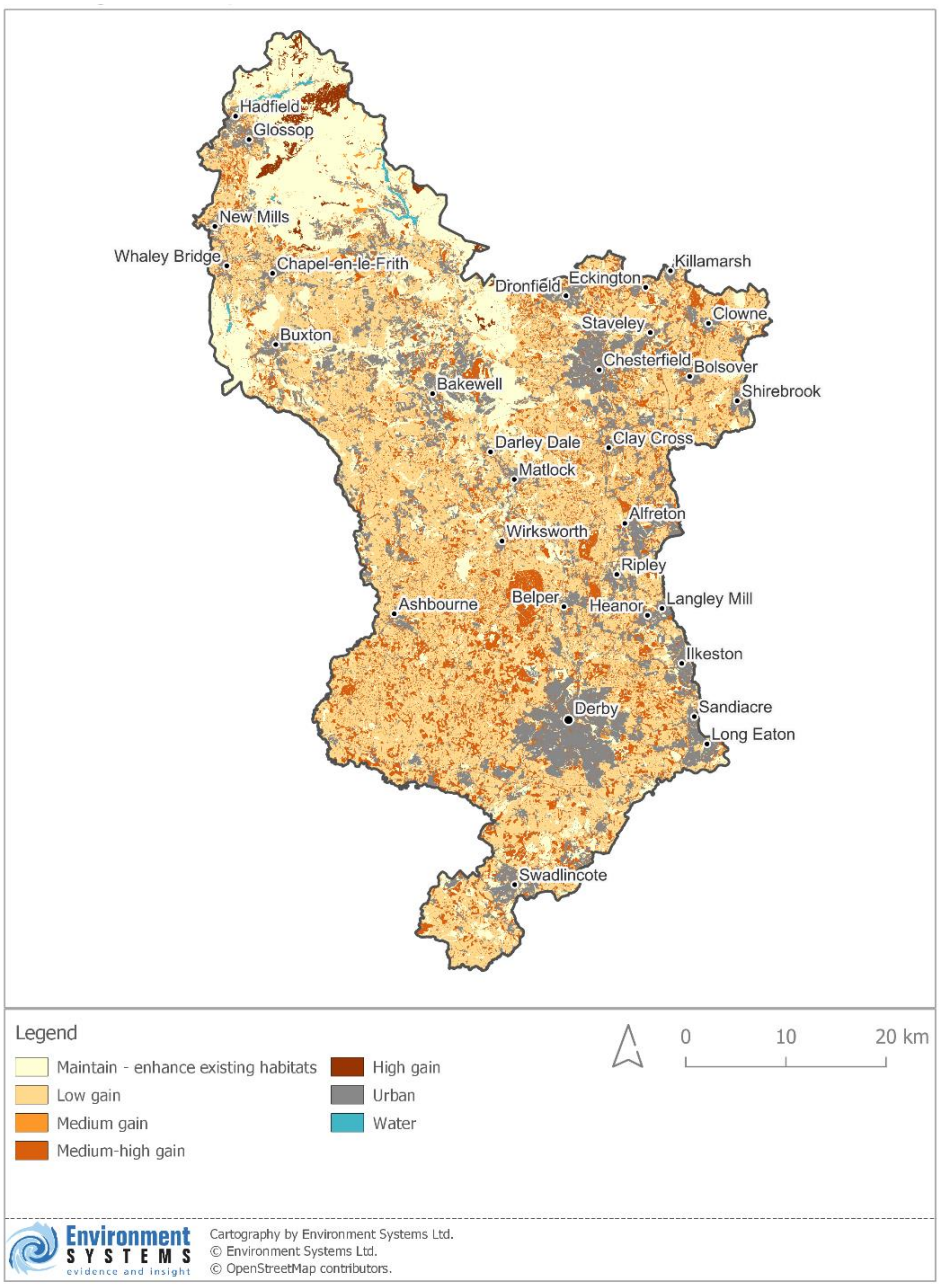
Carbon sequestration risks



This map shows risk areas for carbon sequestration, and is based on the level of carbon abatement that could be achieved by appropriate management, as an indicator of the fragility of the current carbon sequestration system. Areas of low gain, medium gain, medium-high gain and high gain (as defined in the carbon abatement opportunities map) have been highlighted as risk areas.

Associated data file	Value/Class name
Carbon_sequestration_risk.gpkg	Whole dataset: Risk of carbon loss hex colour: #d95f0e

Carbon abatement opportunities: relative gain in carbon storage/sequestration



This map shows opportunities for enhancing carbon storage/sequestration, based on the existing habitat type as mapped by the HAR.

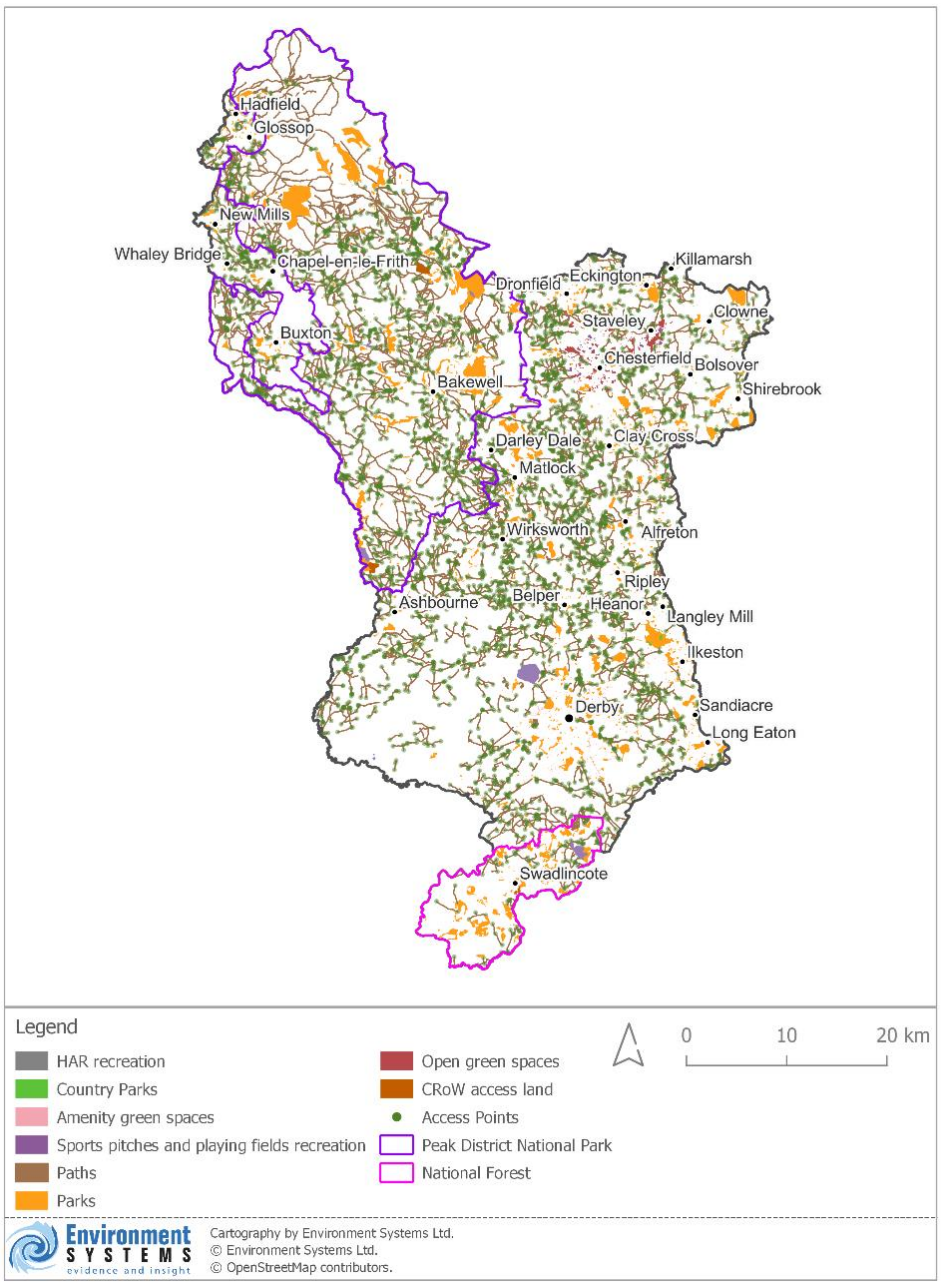
Opportunity type	Description
Maintain - enhance existing habitats	Some of our existing habitats, e.g. blanket bog on deep peat, are not in a degraded condition, and their existing carbon content is therefore likely to be close to their natural maximum. For this reason the opportunity type has been classified as maintain/enhance existing vegetation for these habitat types. To understand if the condition needs to be enhanced a more

	detailed analysis on this particular habitat/location, or a field visit is recommended.
Low gain	On productive agricultural land (intensive grassland and arable) there are possibilities to enhance carbon storage by changing land management practices, to incorporate more organic matter into the soil and to prevent oxidation of the topsoil layers. Changing management practices, even a small amount, can result in an increased carbon balance in the soil, benefiting not just climate mitigation but soil health and water regulation as well.
Low/medium gain	This was assigned where the existing habitat could be replaced with a more suitable (more natural, better condition, more carbon-rich) habitat, leading to low-medium gains in carbon storage/sequestration. For example; • If heathland is found on deep peat, restoration of any drainage channels dug in the peat would allow bog vegetation to re-establish, which is likely to sequester more carbon. • Where improved grassland is returned to a semi-natural grassland a M/L increase in soil carbon would be expected
Medium gain	This class is allocated where changing land use could result in a fairly good enhancement of carbon sequestration. Land was scored as medium where: • Coastal and flood plain grazing marsh: this habitat class has a higher level of uncertainty as it can encompass a variety of different grassland and wetland types. Returning these areas to wetland would produce good carbon storage benefits, therefore a medium score was awarded. • Marshy grasslands and fen, marsh and swamp can be enhanced to species rich marshy grassland or to wet woodlands (depending on local biodiversity objectives), giving a medium carbon abatement gain.
Medium-high gain	This was awarded where the likely carbon abatement would be good, for example: • all bare ground was awarded this class as re-establishing a natural vegetation cover would significantly enhance the carbon sequestration. • All low productivity grasslands (e.g. Acid, Calcareous, Neutral grassland') on soil suitable for native woodland may have the potential for planting native woodland and were therefore awarded this class.
High gain	The highest benefits to sequestration are restoring the fenlands which are currently under arable and intensive grazing.
Urban	It was not in scope for this project to look at carbon values in urban areas
Water	It was not in scope for this project to look at carbon values within water bodies

Associated data file	**Value/Class name**
Carbon_abatement_opps_for_storage.gpkg	1 - Maintain - enhance existing habitats: hex colour: #ffffd4

	2 - Low gain: hex colour: #fed98e 4 - Medium gain: hex colour: #fe9929 5 - Medium-high gain: hex colour: #d95f0e 6 - High gain: hex colour: #993404 7 - Urban: hex colour: #888888 8- Water: hex colour: #41b6c4

Areas of high importance for recreation: input datasets

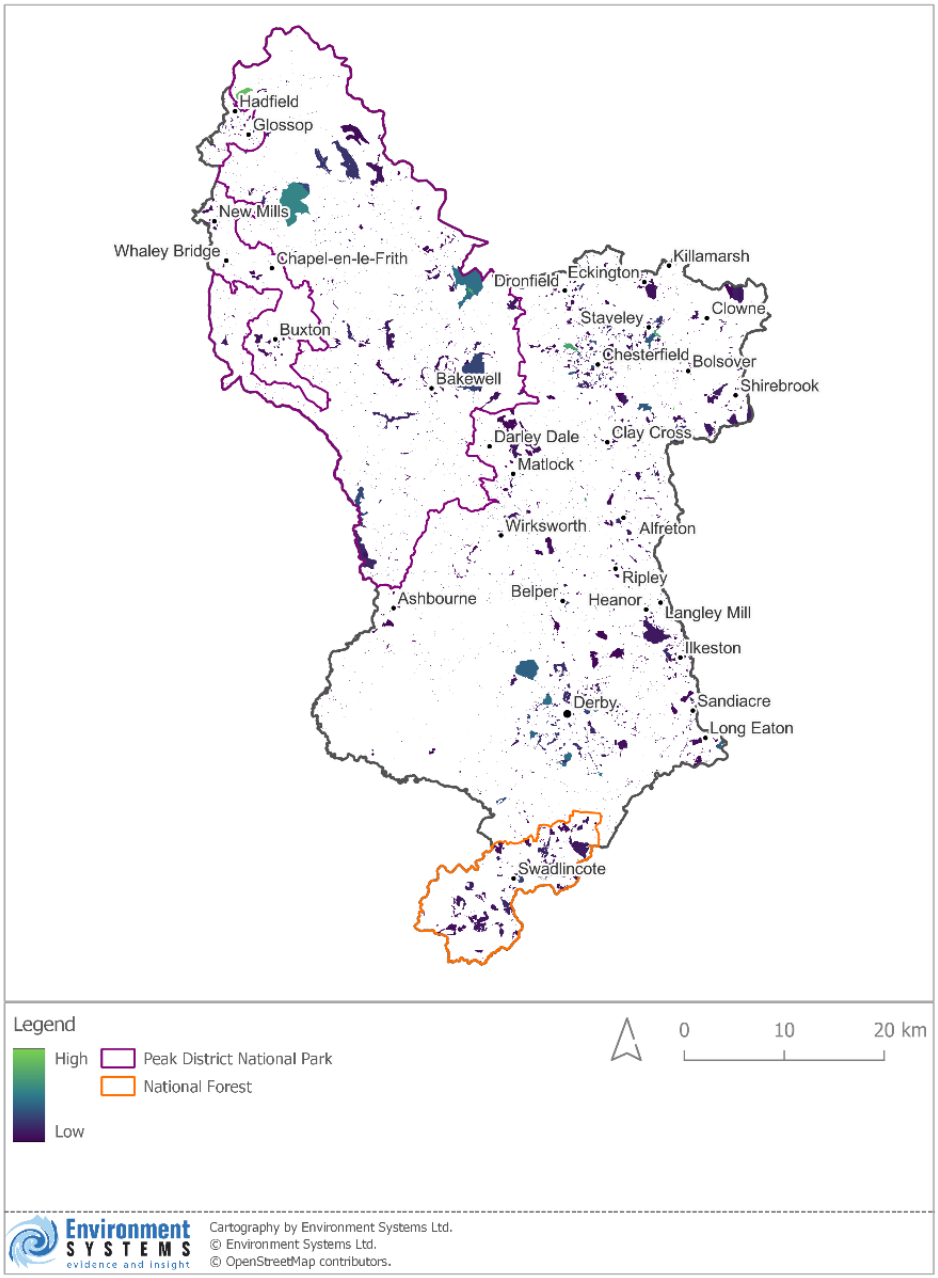


This map shows the type and distribution of input data used to produce the recreation maps, sourced from the following datasets:

- HAR habitat classes 105, 165, 180, 181, 182, 184
- Country Parks
- Amenity greenspaces
- Sports pitches and playing fields
- Paths and access points
- Parks
- Open green spaces
- CRoW access land

Associated data file	Value/Class name
Recreation_Inputs_HAR_Recreation	hex colour: #838383

Areas of high importance for recreation in terms of visitor numbers



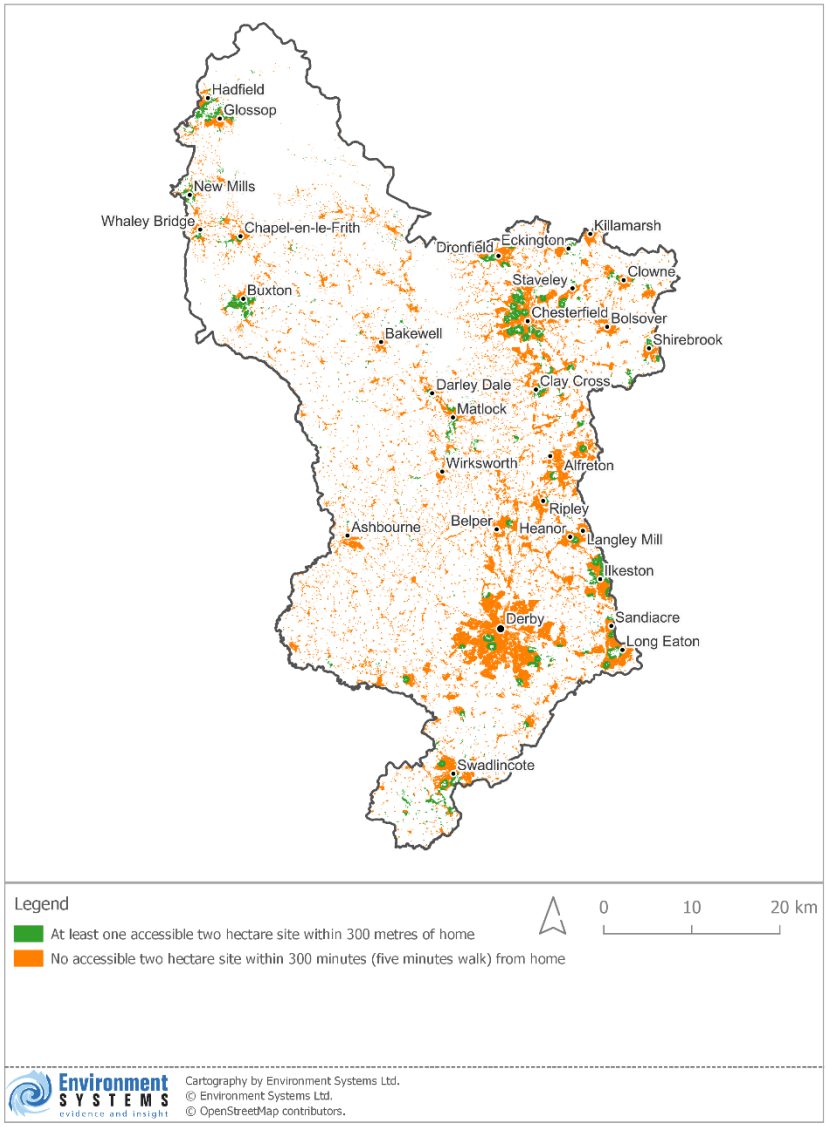
This map was created by compiling spatial datasets representing recreational assets and assessing the relative number of visitors to each feature using ORVal (Outdoor Recreation Valuation Tool Version 2.0). This was done by extracting the underlying HAR habitat classes for each polygon and assigning the corresponding ORVal classification to each habitat type, as shown in the table below. The attributed recreation features were then uploaded to ORVal, which assigned modelled visitor numbers to each feature.

ORVal class	Corresponding HAR Habitat IDs / feature parameters
Area in Hectares / Length in km	Polygon area / polyline length

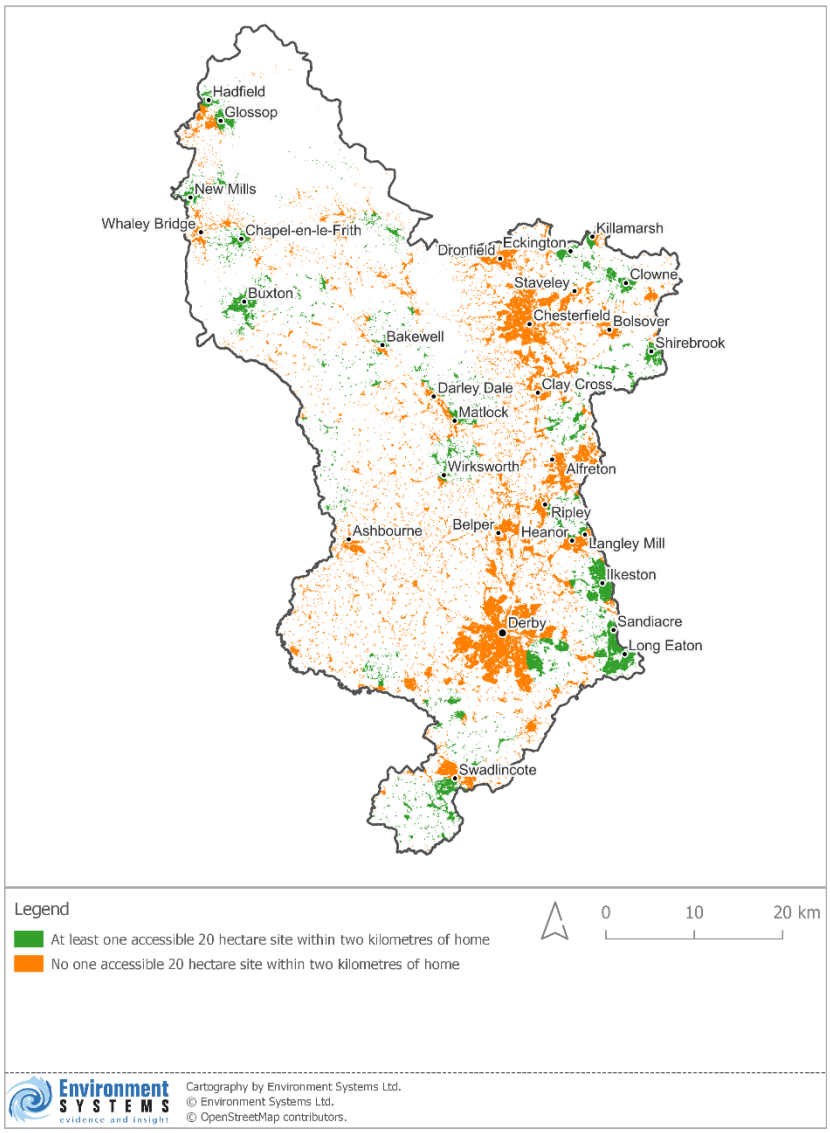
Landcover Managed Grass	1, 73, 75
Landcover Sports Pitch	184
Landcover Formal Garden	103, 104, 182
Landcover Agriculture	12, 13, 15, 16, 41, 43, 48, 69, 72, 87, 158, 159, 168, 171, 189
Landcover Allotment	105
Landcover Cemetery	180
Landcover Wood Coniferous	150, 151, 152
Landcover Wood Broadleaf	113, 114, 121, 123, 124, 125, 126, 127, 128, 130, 131, 133, 136, 137, 138, 141, 142, 143, 144, 145, 146, 147, 148
Landcover Wood Young/felled	118, 129, 154
Landcover Wood Unknown Type	107, 108, 109, 111, 112, 115, 117, 119, 120, 149, 162, 173
Landcover Wood Pasture	170
Landcover Natural Grass	44, 45, 46, 47, 49, 51, 52, 53,54, 55, 57, 58, 60, 61, 64, 65, 66, 69, 70, 71, 106, 168, 170, 171, 175, 178, 183, 195
Landcover Moors Heath	20, 21, 22, 24, 26, 27, 28, 29, 37, 77, 78, 79, 80, 81, 83, 84, 85, 86, 87, 88, 89, 99, 100, 157
Landcover Fen Marsh	17, 18, 19, 30, 31, 32, 34, 35, 36, 37, 38, 40, 161, 174
m of River/Canal margin	174
m of Lake/Reservoir margin	Perimeter of HAR reservoir polygons
River Water Quality	Assigned to WFD river segments based on quality status (1 = High Quality, 0 = Low Quality)
Playground	181

Associated data file	**Value/Class name**
Recreation_high_importance.gpkg	Range: 588 – Low: purple 350405 – High: green

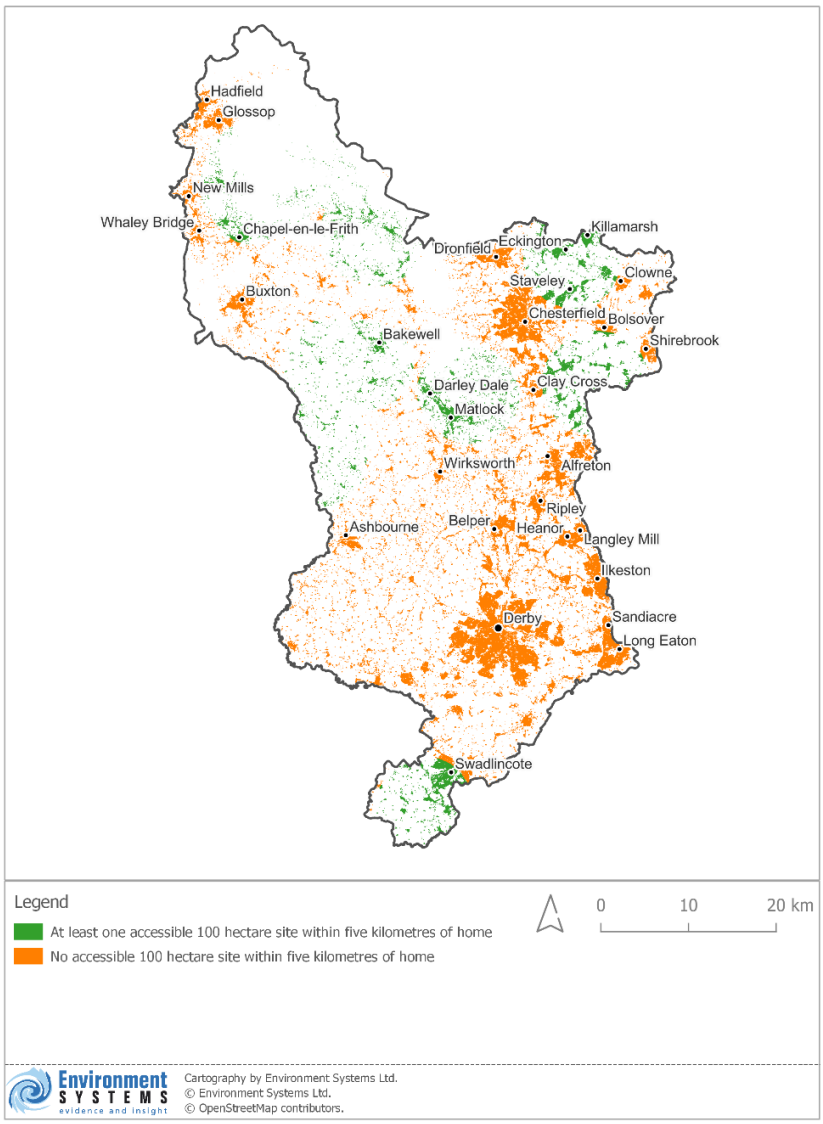
Recreation risks: urban areas with and without access to a 2ha site



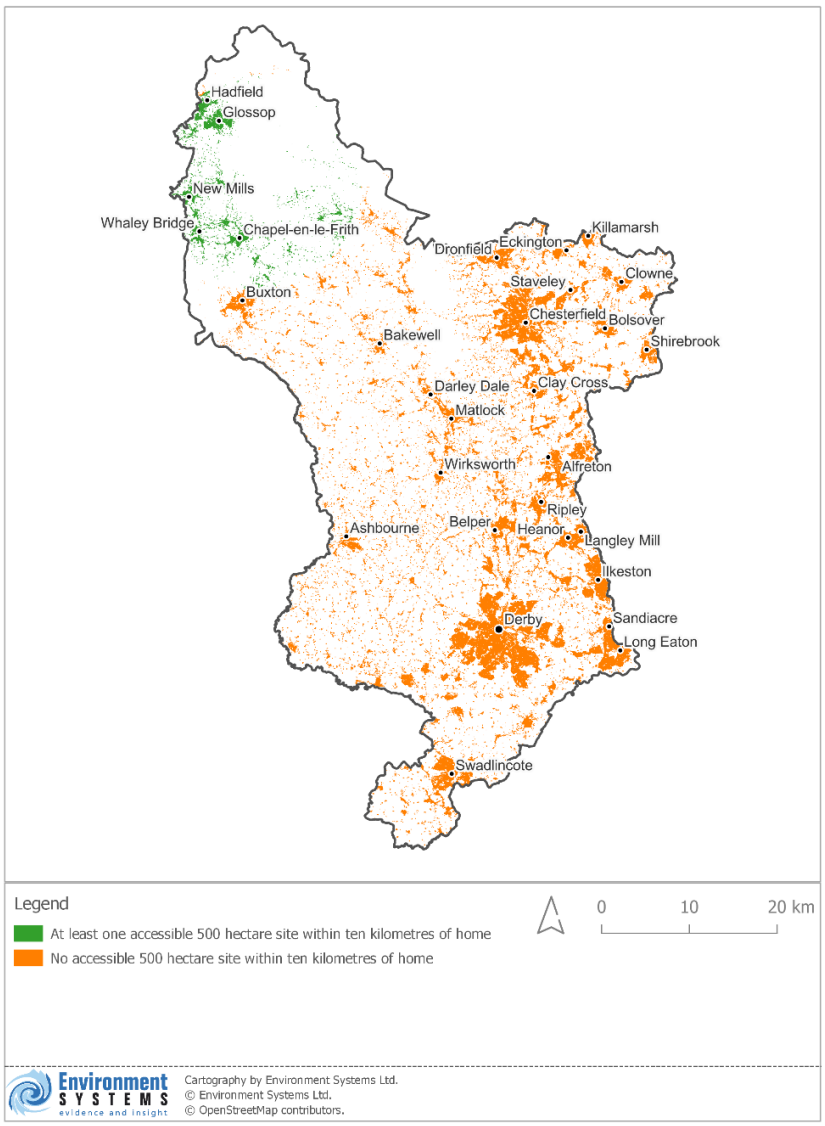
Recreation risks: urban areas with and without access to a 20ha recreational site



Recreation risks: urban areas with and without access to a 100ha recreational site



Recreation risks: urban areas with and without access to a 500ha recreational site



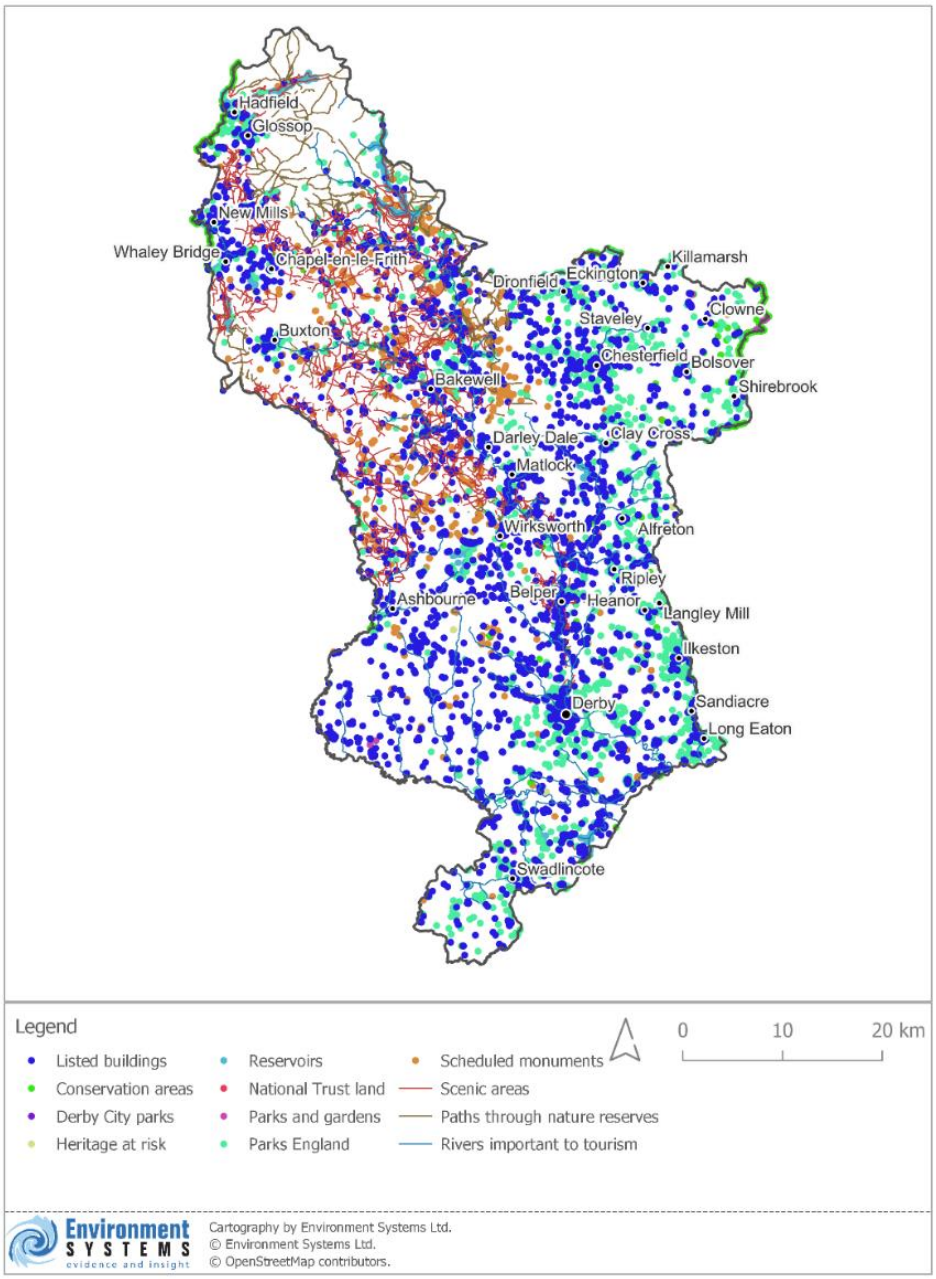
Recreation risk was assessed as residential areas that do not currently have sufficient access to greenspace according to the ANGst criteria. Settlement areas (OS Vectormap data) were buffered according to the ANGSt thresholds, and recreation features meeting the required size criteria were identified. This allowed the settlement areas to be divided into areas with and without greenspace access within the required distance. Analyses of the different greenspace criteria are shown on separate maps, as detailed below:

Map figure name	Angst criteria
Figure 44: Recreation risks: urban areas with and without access to a 2ha site	A site of at least 2ha in size within 300 m (5 minutes' walk) of home
Figure 45: Recreation risks: urban areas with and without access to a 20ha site	A site of at least 20 ha in size within 2km of home

Figure 46: Recreation risks: urban areas with and without access to a 100ha site	A site of at least 100 ha in size within 5km of home
Figure 47: Recreation risks: urban areas with and without access to a 500ha site	A site of at least 500 ha in size within 10km of home

Associated data file	Value/Class name
Recreation_Risk_300.gpkg	Buff_300: Of at least 2 hectares in size, no more than 300 metres (5 minutes walk) from home: hex colour: #33a02c Buff_300: Null - More than 300 metres (5 minutes walk) from home: hex colour: #ff7f00
Recreation_Risk_2k.gpkg	Buff_2k: At least one accessible 20 hectare site within two kilometres of home: hex colour: #33a02c Buff_2k: Null - No one accessible 20 hectare site within two kilometres of home: hex colour: #ff7f00
Recreation_Risk_5k.gpkg	Buff_5k: At least one accessible 100 hectare site within five kilometres: hex colour: #33a02c Buff_5k: Null - No accessible 100 hectare site within five kilometres: hex colour: #ff7f00
Recreation_Risk_10k.gpkg	Buff_10k: At least one accessible 500 hectare site within ten kilometres: hex colour: #33a02c Buff_10k: Null - No accessible 500 hectare site within ten kilometres: hex colour: #ff7f00

Areas of high importance for tourism: input datasets



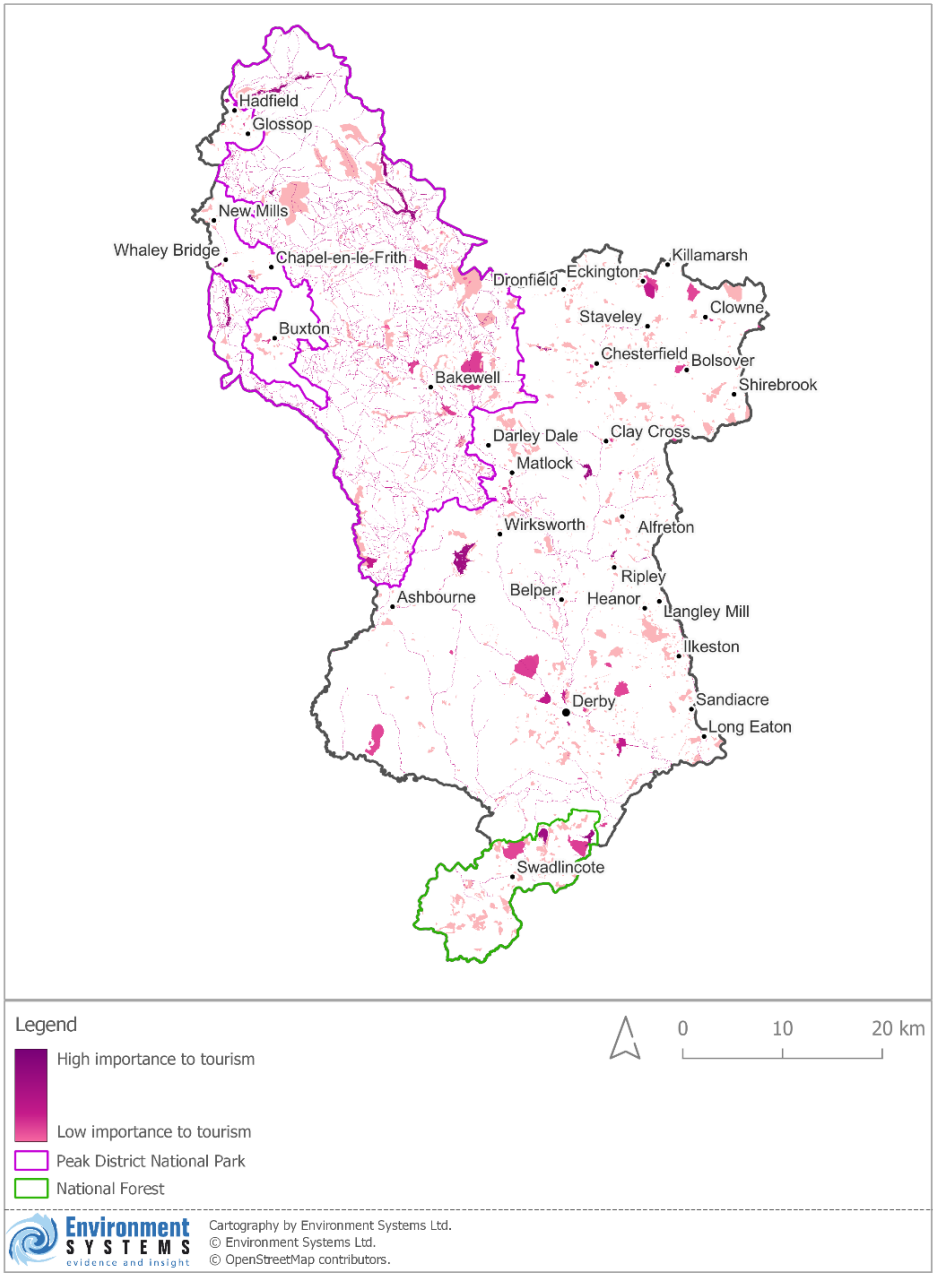
This map shows the type and distribution of input data used to produce the tourism maps, sourced from the following datasets:

- CRoW land lying within the Peak District National Park
- National Trust estates
- Registered parks and gardens
- Heritage at Risk
- Green spaces – parks
- Scheduled monuments
- Listed buildings
- Derby City parks; Darley Abbey park, Derby Arboretum, Markeaton Park only

- Reservoirs (selected from the HAR)
- Paths located within nature reserves (Ramsar sites, SACs, SPAs, NNRs, LNRs) and scenic areas (Peak District National Park, AONBs, World Heritage Sites)
- Canals
- Selected rivers: Derwent, Dove, Trent

Associated data file	Value/Class name
Tourism_Inputs_Places_of_Interest.gpkg	layer: Derby_City_parks – Derby City parks: hex colour: #791ad3 layer: HAR_Reservoirs – HAR Reservoirs: hex colour: #4ebad2

Areas of high importance to tourism: current stock



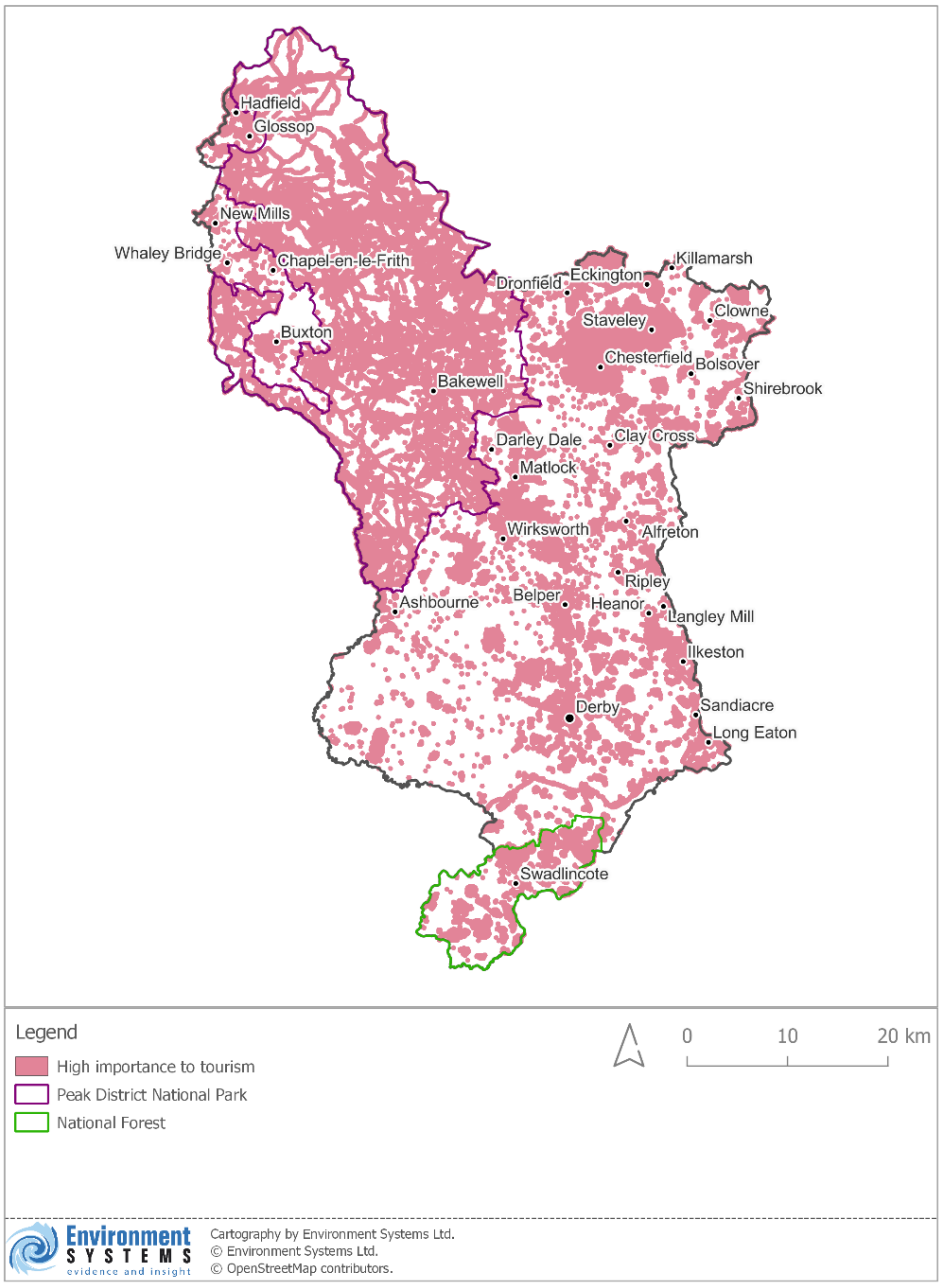
This map was created by compiling spatial datasets representing tourism assets and ranking them in terms of their relative value, as outlined in the table below.

Data input	Indicative scoring
CRoW land lying within the Peak District National Park	High
National Trust estates	High
Canals	High
Selected rivers: Derwent, Dove, Trent	High
Derby City parks; Darley Abbey park, Derby Arboretum, Markeaton Park only	High

Reservoirs (selected from the HAR)	High
Paths located within scenic areas (Peak District National Park, AONBs, World Heritage Sites)	High
Registered parks and gardens	Moderate
Heritage at Risk	Moderate
Paths located within nature reserves (Ramsar sites, SACs, SPAs, NNRs, LNRs)	Moderate
Green spaces – parks	Low
Scheduled monuments	Low
Listed buildings	Grade 1 - low Other grades - very low

Associated data file	**Value/Class name**
Tourism_High_Importance.gpkg	Range: 5 – Low: light pink 300 – High: dark pink

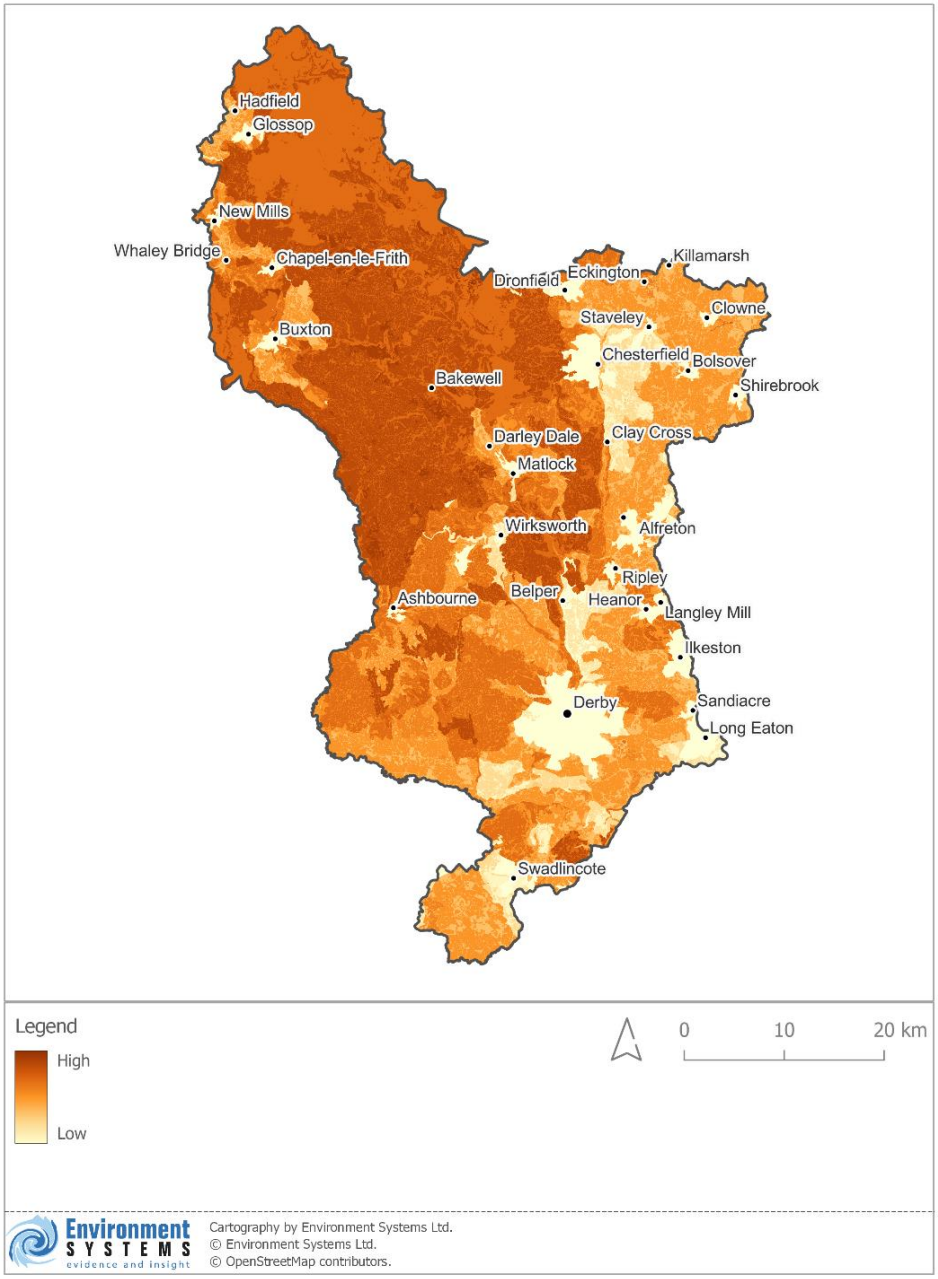
Clustered tourism sites; groupings of sites of high importance for tourism



This map was made by rasterising all of the input tourism datasets to 5m resolution, and buffering them to highlight clusters.

Associated data file	Value/Class name
Tourism_Clustering_Areas_of_High_Importance.gpkg	0: hex colour: #e28498 50: hex colour: #e28498

Relative contribution of agriculture to landscape character



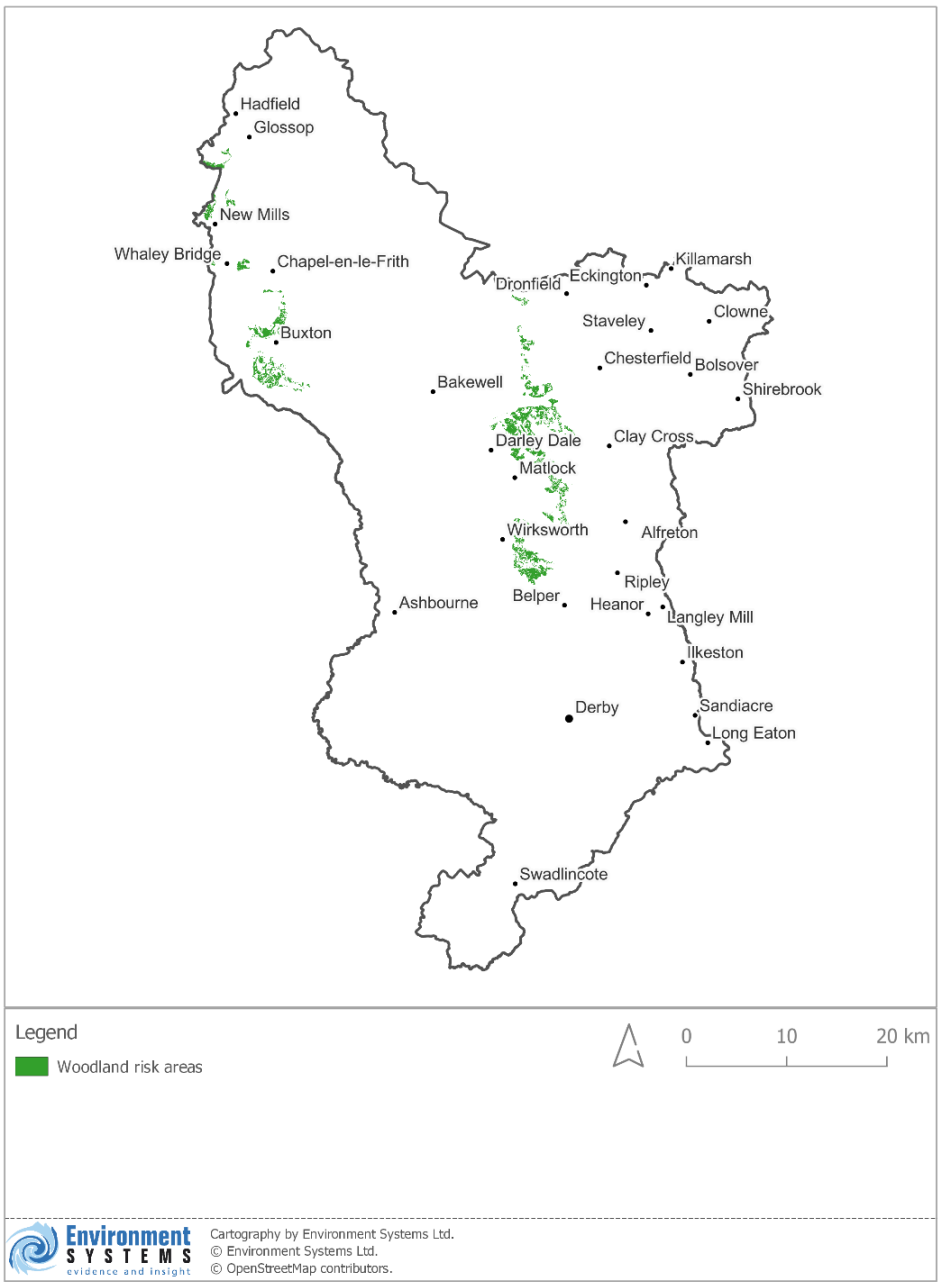
Agricultural areas were selected from the HAR and assigned a baseline score. This was then amended according to the level of visual intactness, and whether any important cultural sites are present. Input datasets were individually scored, then summed together to provide the final assessment of contribution of agriculture to landscape character.

Data input	Reason for usage	Indicative scoring
Visual intactness (October 2010 evaluation)	This dataset assesses the visual intactness of areas, using Landscape Character Types as a spatial framework. Within these areas (subdivided as necessary)	Unified: High contribution Coherent: Moderate-high contribution

	the agricultural environment forms an integral part of the assessment of intactness.	Interrupted: Moderate contribution Incoherent: Low contribution Urban: No contribution
Peak District National Park boundary	The visual intactness data does not cover the area within the national park. The national park area was therefore given an estimated visual intactness score, based on the level of land use regulation in force within the national park.	Area is within the national park: high contribution
Scheduled monuments	Cultural heritage assets add to the landscape character of an area	Low contribution
Country parks		Low contribution
Heritage at risk		Low contribution
HAR agriculture selection	The agricultural areas have an inherent value in terms of their contribution to landscape character, therefore all agricultural areas were assigned a baseline score.	Agriculture: Low-moderate contribution (baseline score)

Associated data file	**Value/Class name**
Contribution_Agri_Landscape_Character.gpkg	Range: 0 – Low: light orange 145 – High: dark orange

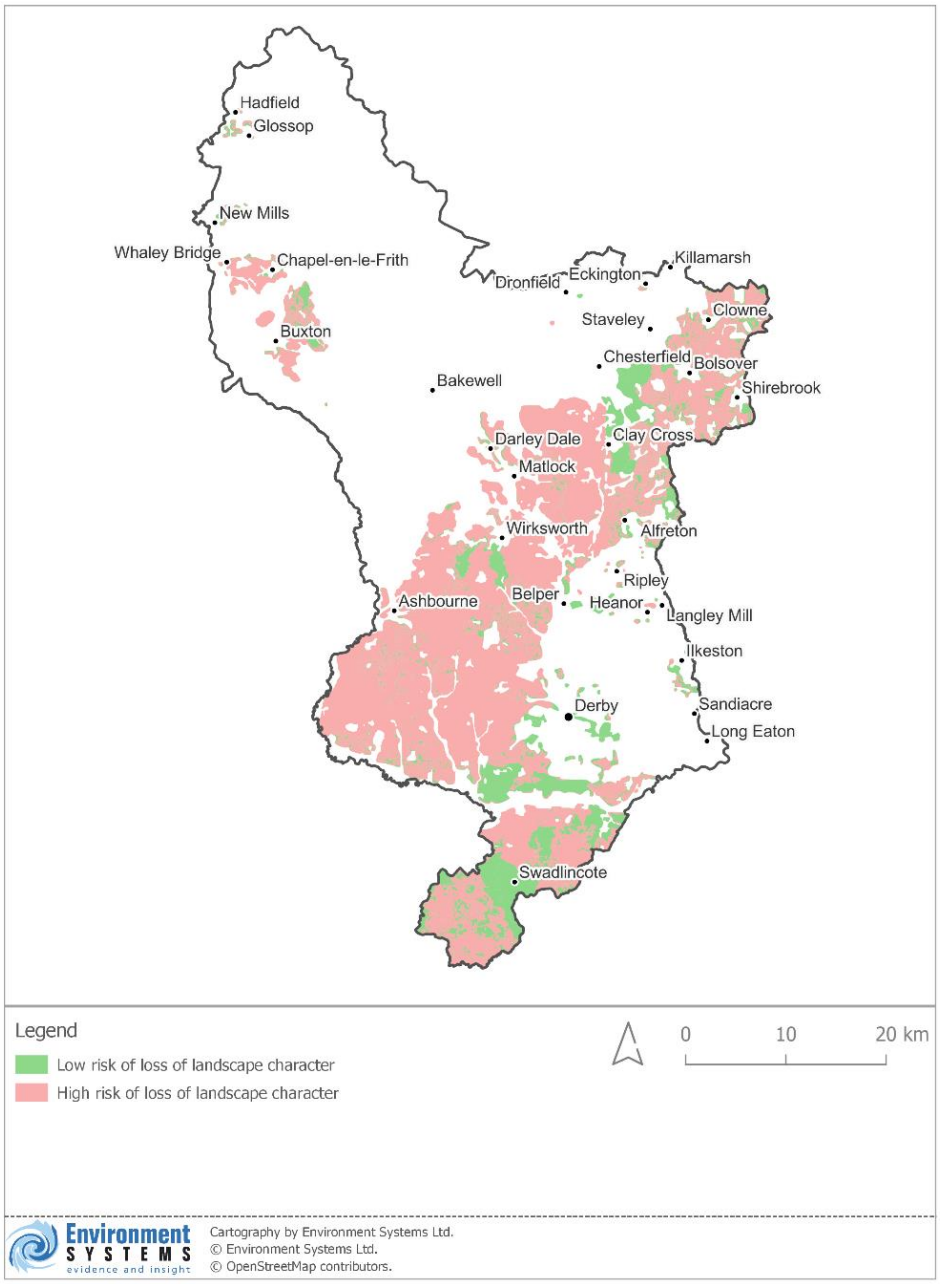
Potential risks to landscape character from woodland planting within the ecological network



This map shows areas identified as opportunity areas for woodland during the biodiversity opportunity mapping process, that occur in places where the woodland vision going forward is for the area to remain 'Open / Unwooded' according to the Landscape Character Type.

Associated data file	Value/Class name
Contribution_Agri_Landscape_Character_Woodland_Risk.gpkg	Whole dataset: Woodland risk areas hex colour: #33a02c

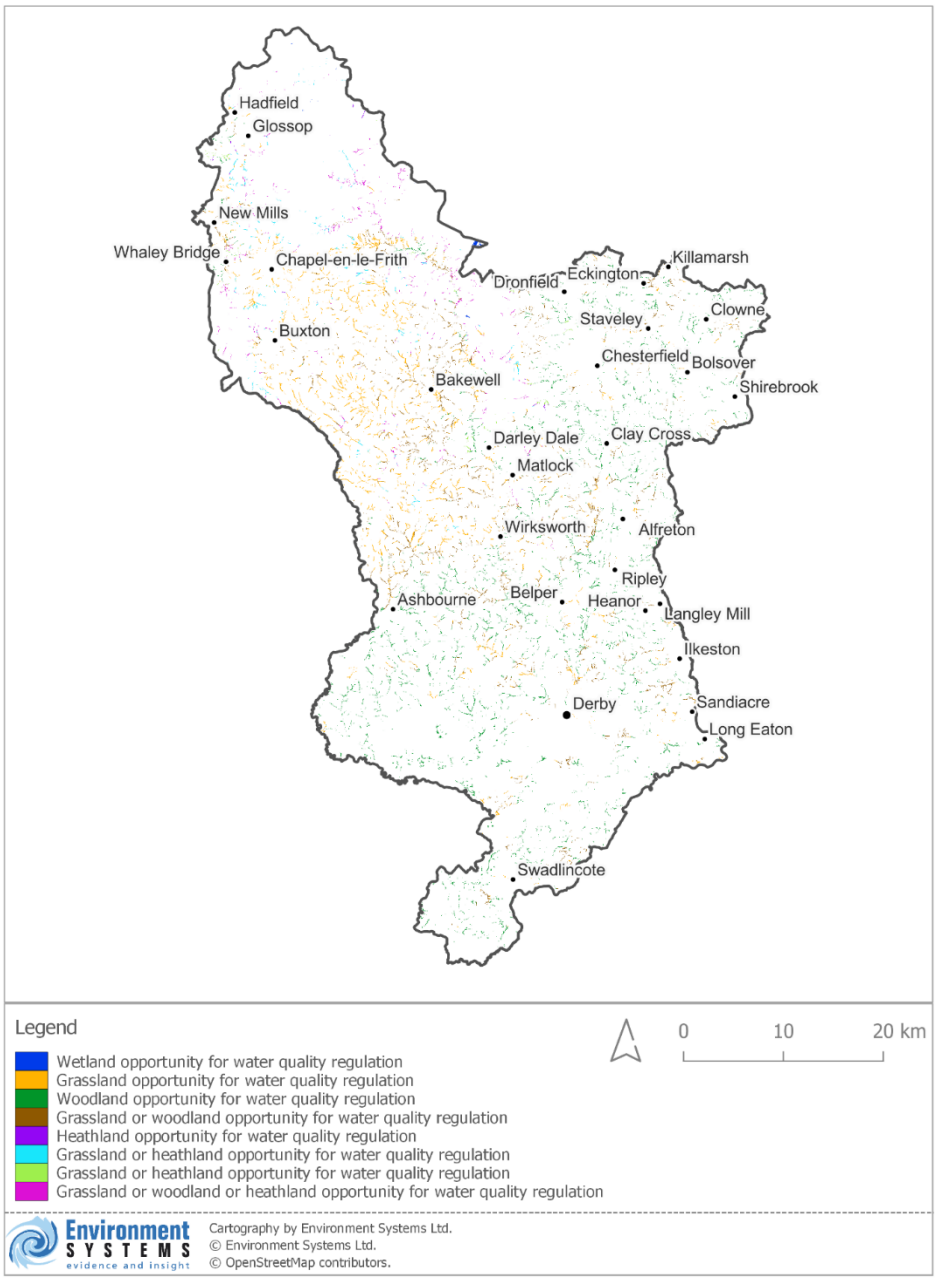
Potential risks to landscape character from solar and wind renewable energy projects



This map shows areas where the existing contribution of agriculture to landscape character has been assessed as high (in the stock map), and where there are opportunities for solar and wind renewable energy generation (as modelled under the agricultural production risks theme).

Associated data file	Value/Class name
Contribution_Agri_Landscape_Character_Renewable_Risk.gpkg	DN_1: 0 - Low risk of loss of landscape character: hex colour: #8ed88a DN_2: 1 - High risk of loss of landscape character: hex colour: #f9aead

Biodiversity and water quality regulation multi-benefits

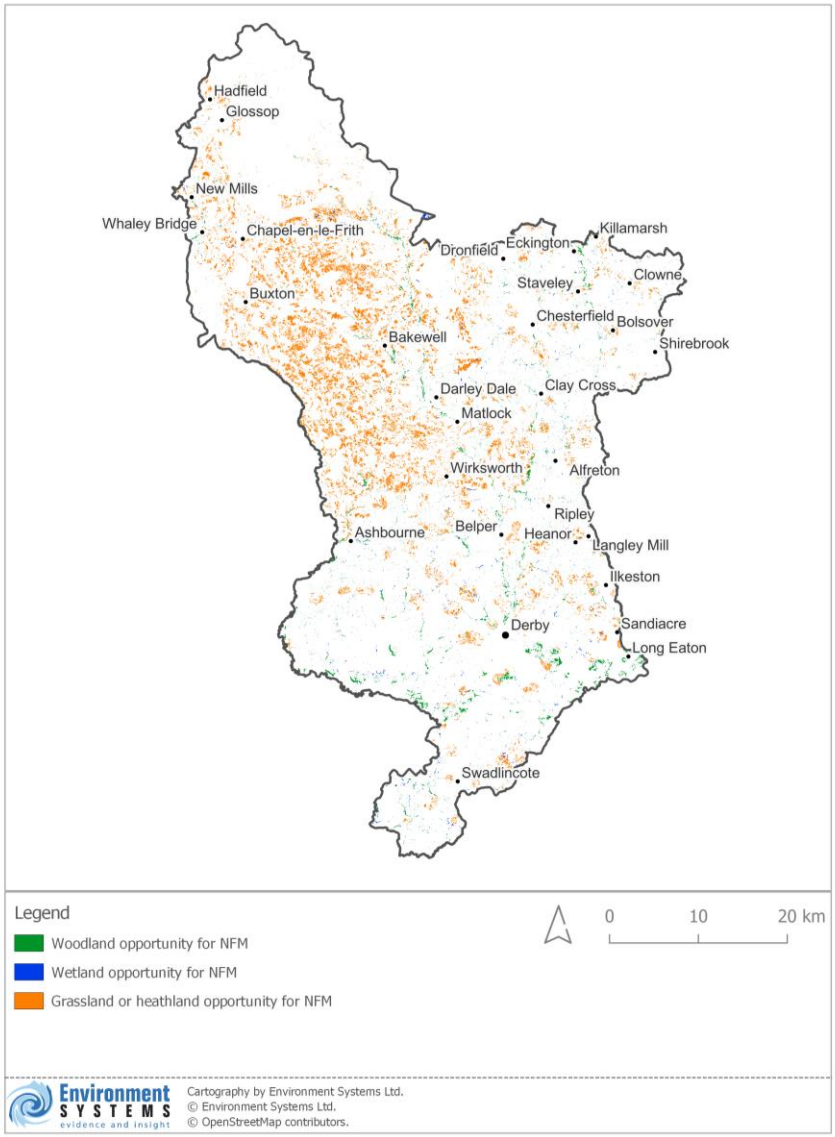


This map was created by identifying the areas of intersection between the biodiversity opportunities and the water quality regulation opportunities that were deemed compatible with each type of biodiversity opportunity. For example, wetland biodiversity opportunities would be compatible with the water quality opportunity type 'restore poor-condition peatland', but not 'create within-field headlands or small woodland clusters'.

Biodiversity opportunity type	Compatible water quality opportunity type/s
Grassland	Within-field headlands or small woodland clusters Bankside vegetation
Heathland	Within-field headlands or small woodland clusters
Wetland	Restore poor condition peatland
Woodland	Within-field headlands or small woodland clusters Bankside vegetation

Associated data file	Value/Class name
Multibenefits_Biodversity_NFM.gpkg	1 - Woodland opportunity for NFM: hex colour: #019529 10 - Wetland opportunity for NFM: hex colour: #003bea 100 - Grassland opportunity for NFM: hex colour: #ff7f00

Biodiversity and NFM multi-benefits

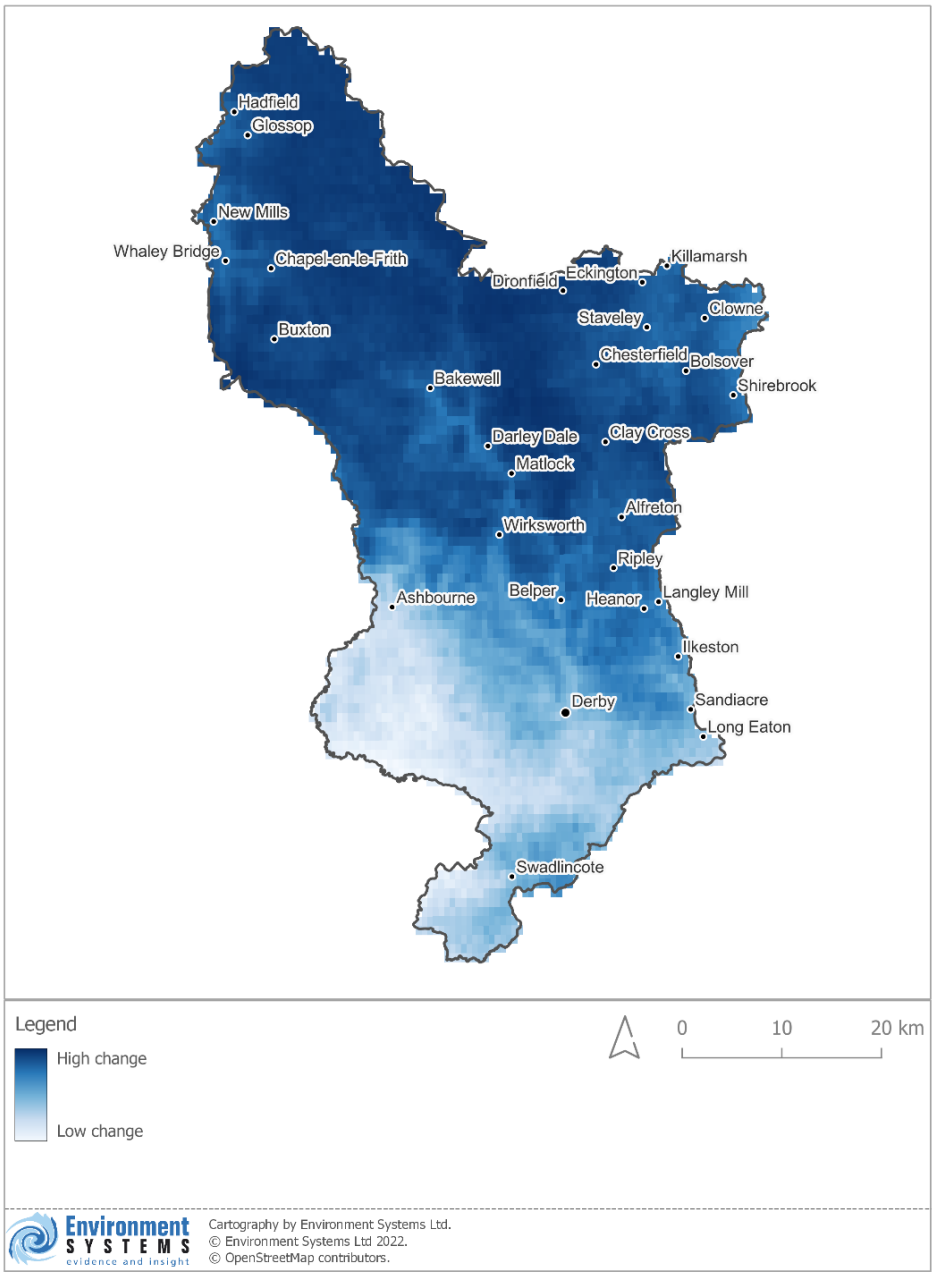


This map was created by identifying the areas of intersection between the biodiversity opportunities and the NFM opportunities that were deemed compatible with each type of biodiversity opportunity. For example, wetland biodiversity opportunities would be compatible with the NFM opportunity types 'restore peatlands' and 'create wetland', but not 'plant hedgerows'.

Biodiversity opportunity type	Compatible NFM opportunity type/s
Grassland	Deep rooted leys/species rich meadows
Wetland	Restore poor condition peatland Create wetland
Woodland	Plant hedgerows Create wet woodland

	Create riparian woodland

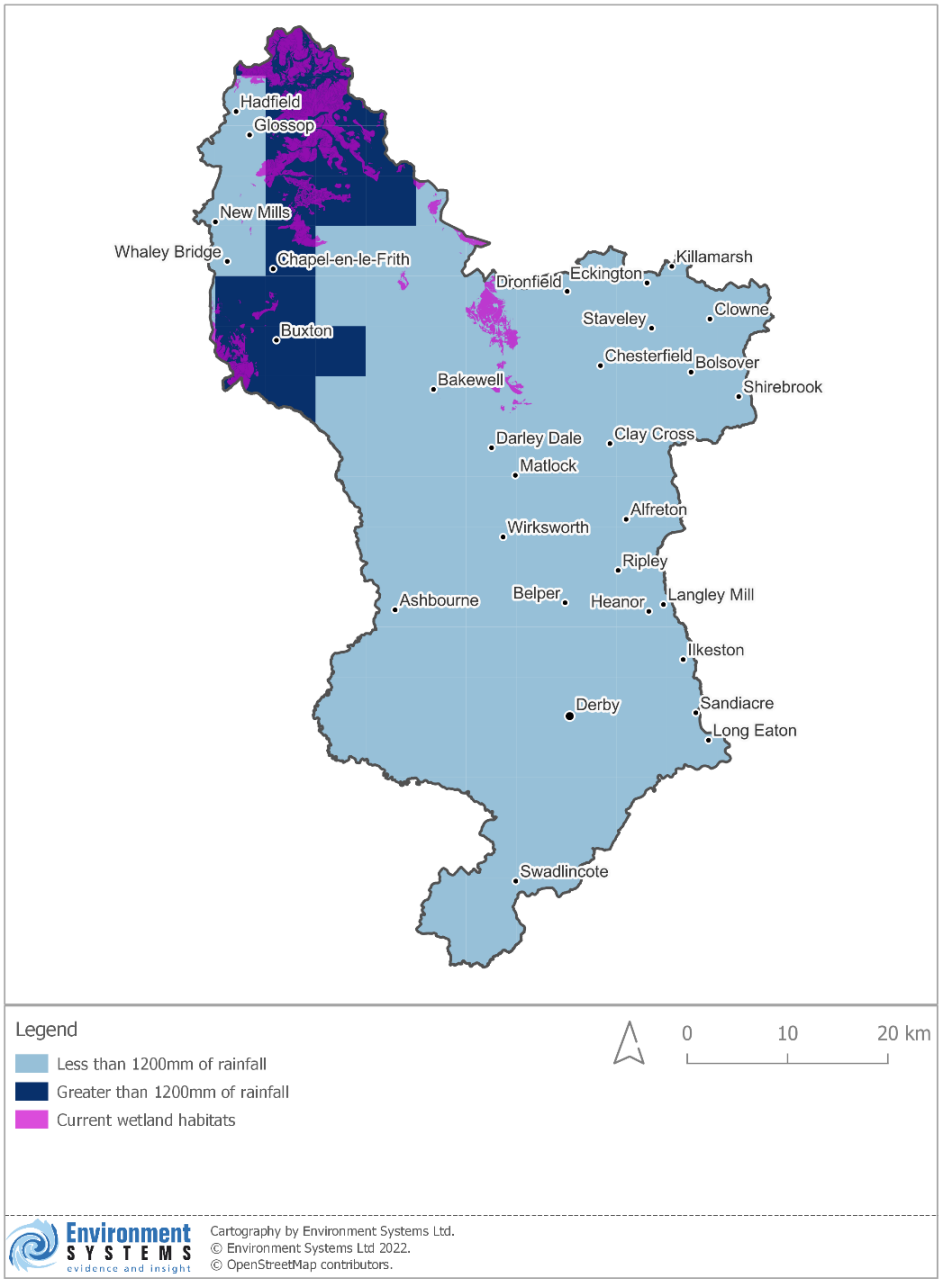
Change in seasonality of precipitation (right) between the present day and 2080 (WorldClim ssp370)



This map was generated by analysis of 30 arc second (approximately 1km) WorldClim historical and future climate data for Bioclimatic Variable 15; Precipitation Seasonality (Coefficient of Variation); SSP370. Values from the 2061-2080 data were subtracted from the historical data (representing an average of the period 1970-2000) in order to calculate the difference. The mean value across all available climate models was used. Higher values

indicate a larger increase in the seasonality of precipitation events; lower values indicate a smaller increase in the seasonality of precipitation events.

Comparison of areas receiving at least 1200mm Annual Average Rainfall in the present day



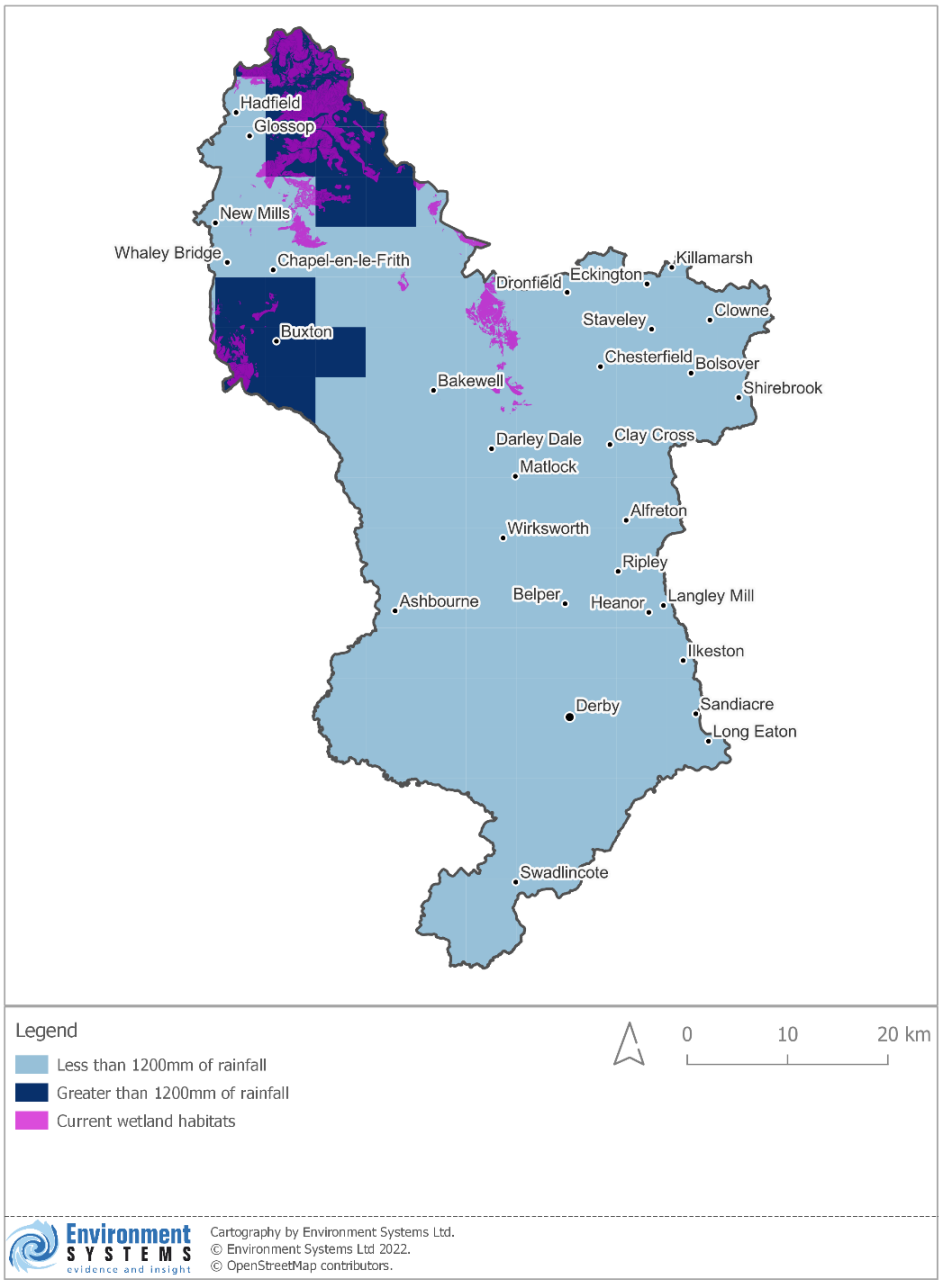
This map was generated by displaying 30 arc second (approximately 1km) historical WorldClim 2.1 data for Annual Average Rainfall, representing an average of the period 1970-2000. The rainfall data is overlain by a selection of wetland habitats from the Habitat Asset Register.

References:

WorldClim Historical climate data. https://www.worldclim.org/data/worldclim21.html [Accessed 2022-09-12]

Fick, S.E. and R.J. Hijmans, 2017. WorldClim 2: new 1km spatial resolution climate surfaces for global land areas. International Journal of Climatology 37 (12): 4302-4315

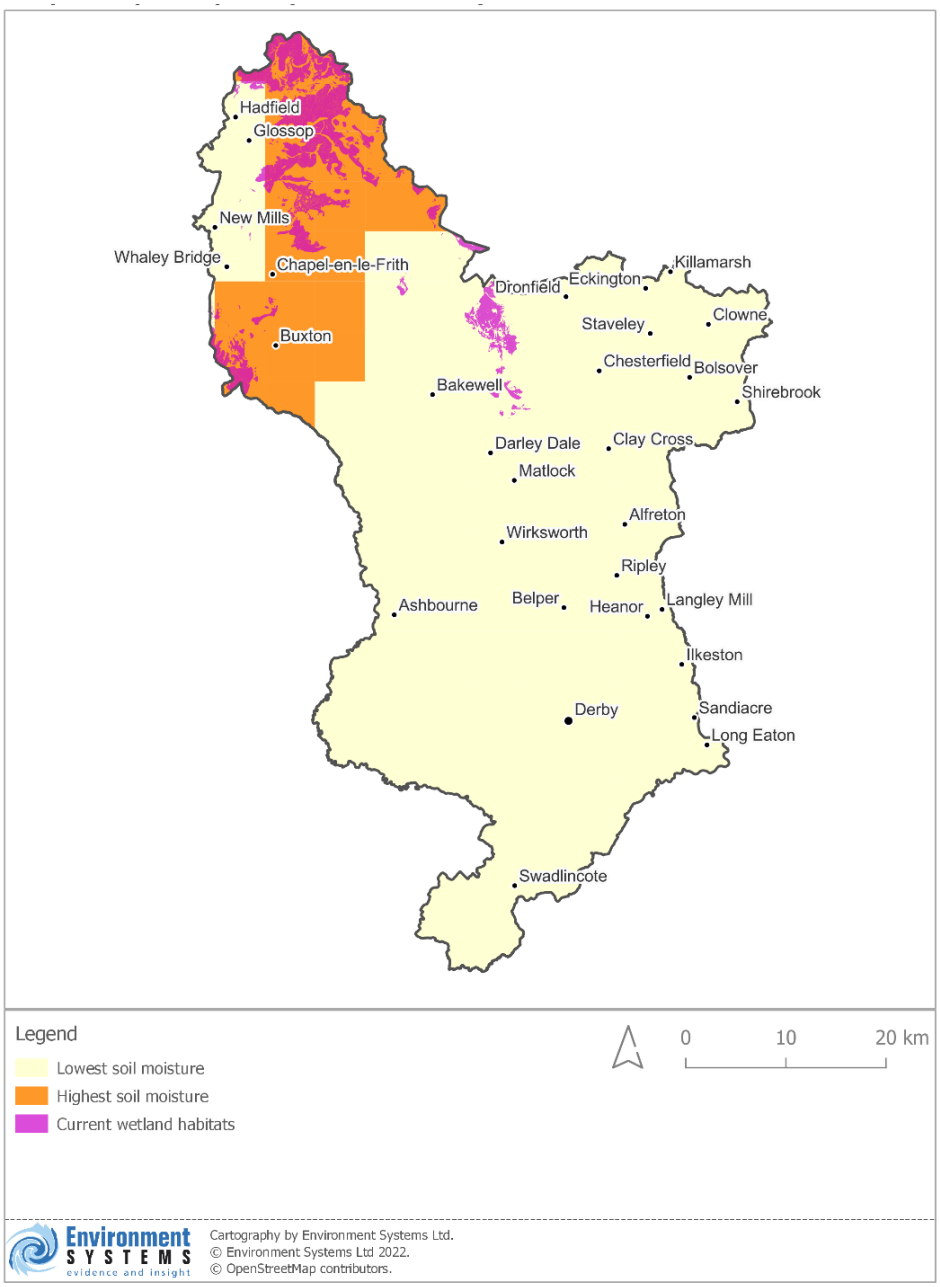
Comparison of areas receiving at least 1200mm Annual Average Rainfall in 2080 (UKCP18 RCP 6.0)



This map was generated by displaying 30 arc second (approximately 1km) WorldClim future climate data for Annual Average Rainfall, representing an average of the period 2061-2080 under Shared Socio-economic Pathway (SSP) 370. The mean value across all available

climate models was used. The rainfall data is overlain by a selection of wetland habitats from the Habitat Asset Register.

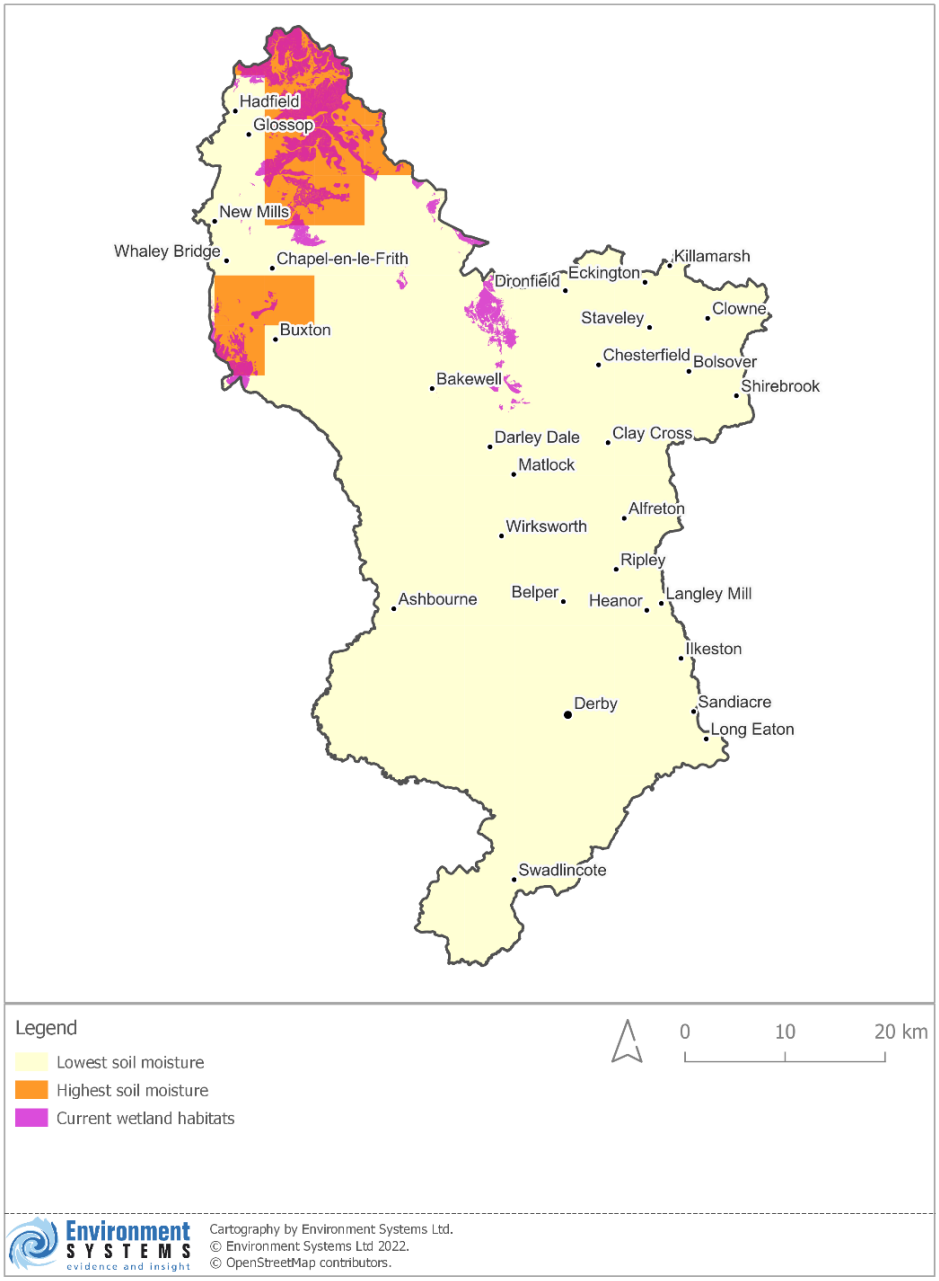
Comparison of areas where the soil experiences at least 270 Field Capacity Days in the present day (left)



17

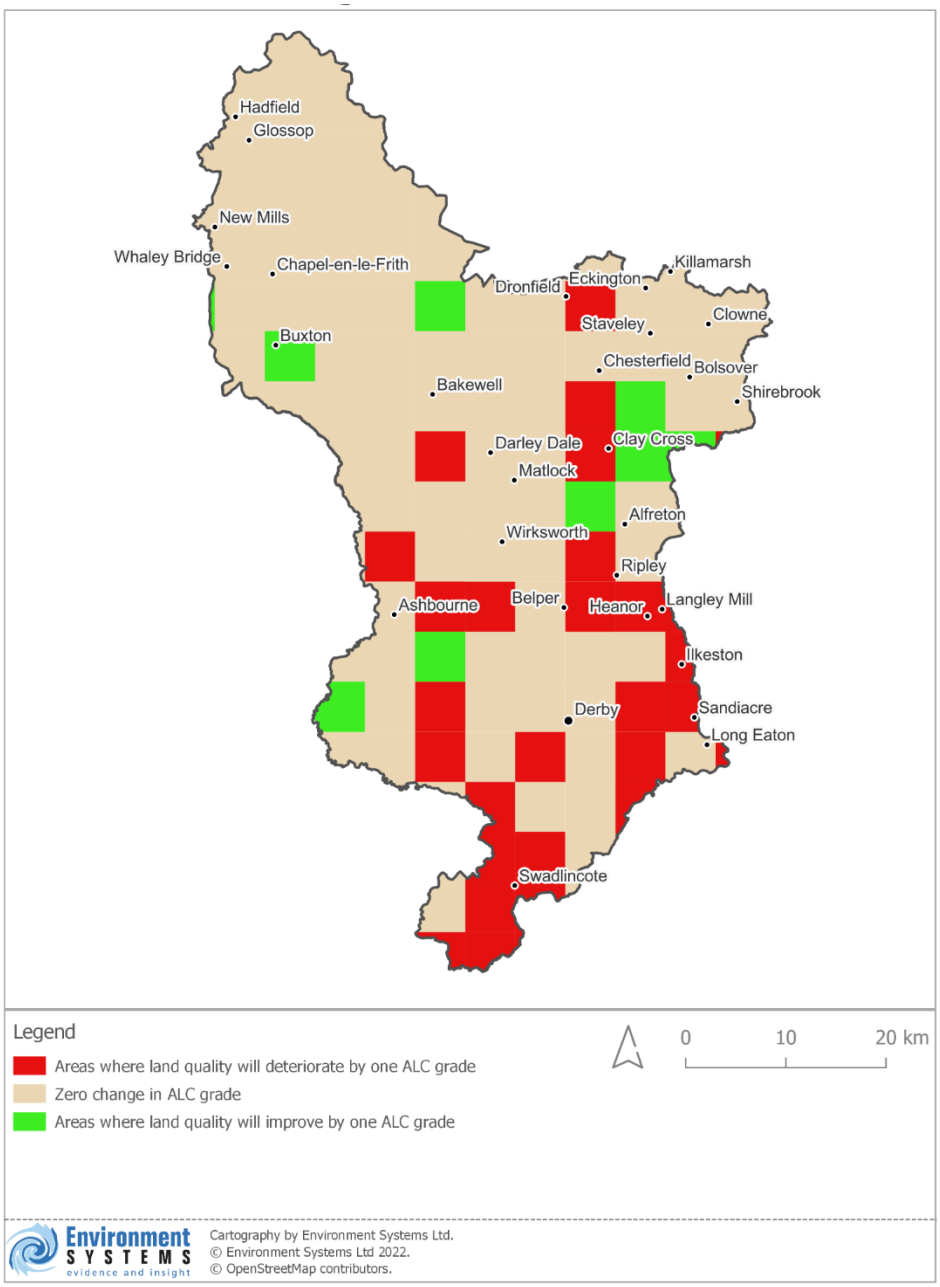
This map used modelled ALC data generated from UKCP18 climate change model data for 2020 under a medium GHG emissions scenario (RCP 6.0); Keay, 2020. The map shows areas predicted to receive greater than and less than 270 field capacity days (FCD) per year (FCD being the state of a soil holding as much water against gravity as physically possible, following saturation and free drainage).

Comparison of areas where the soil experiences at least 270 Field Capacity Days in 2080 (UKCP18 RCP 6.0)



This map used modelled ALC data generated from UKCP18 climate change model data for 2080 under a medium GHG emissions scenario (RCP 6.0); Keay, 2020. The map shows areas predicted to receive greater than and less than 270 field capacity days (FCD) per year.

Predicted changes in Agricultural Land Classification grade between the present day and 2080 (UKCP18 RCP 6.0)

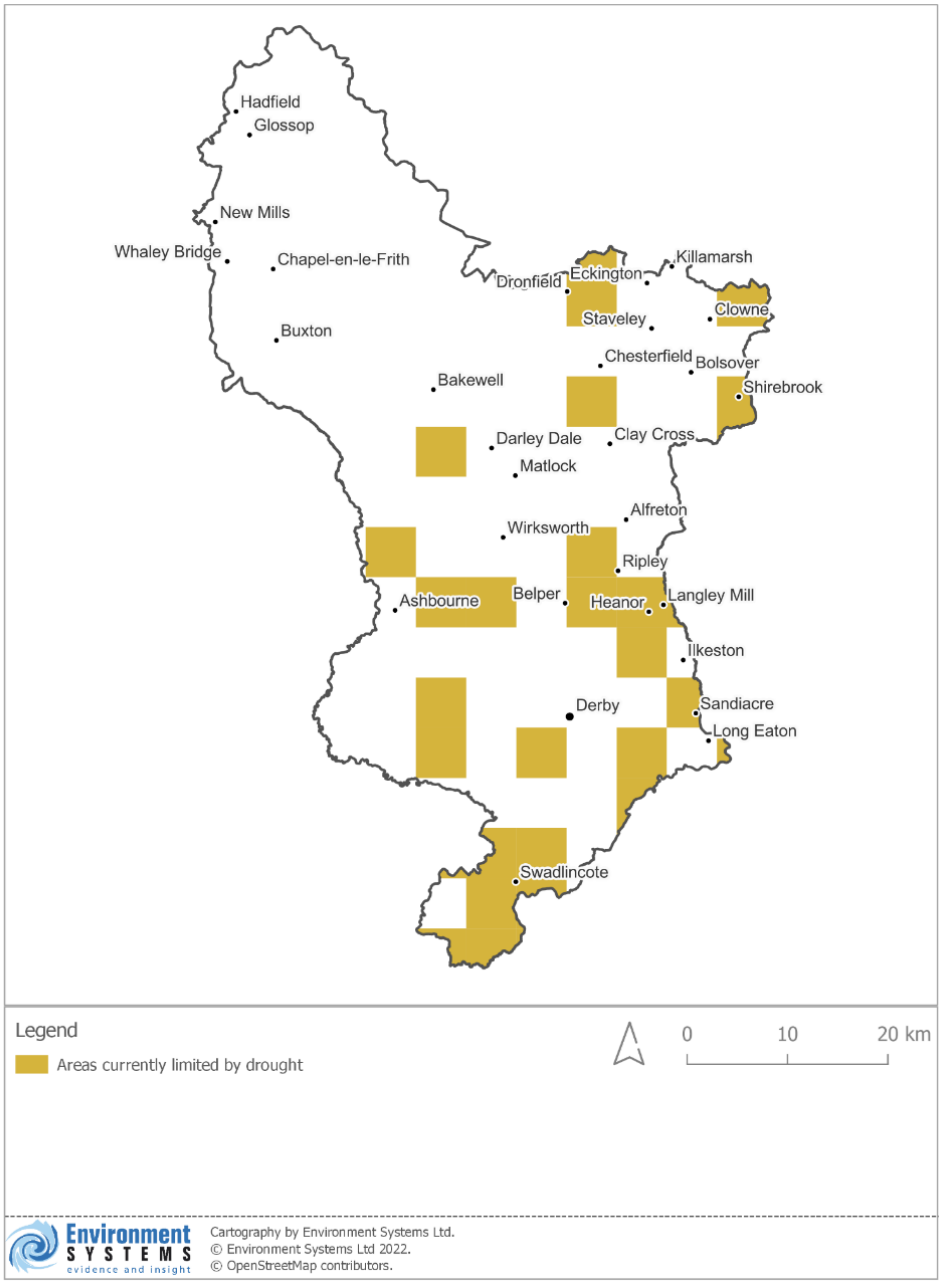


This map used modelled ALC data generated from UKCP18 climate change model data for 2020 and 2080. The UKCP18 scenarios predict conditions that will be experienced under a medium GHG emissions scenario (RCP 6.0); these models were used to generate forecasts of ALC grade, on a 5km grid; Keay, 2020. A comparison was undertaken between the 2020 grade and the 2080 grade, to identify locations where agricultural land quality improved, deteriorated, or remained static.

References:

Keay, C. 2020. Capability, Suitability & Climate Programme Rerun SP1104 with UKCP18 data. Available at: https://gov.wales/sites/default/files/publications/2021-04/capacity-suitability-climate-programme-2012-study-rerun.pdf [Accessed 2022-09-12]

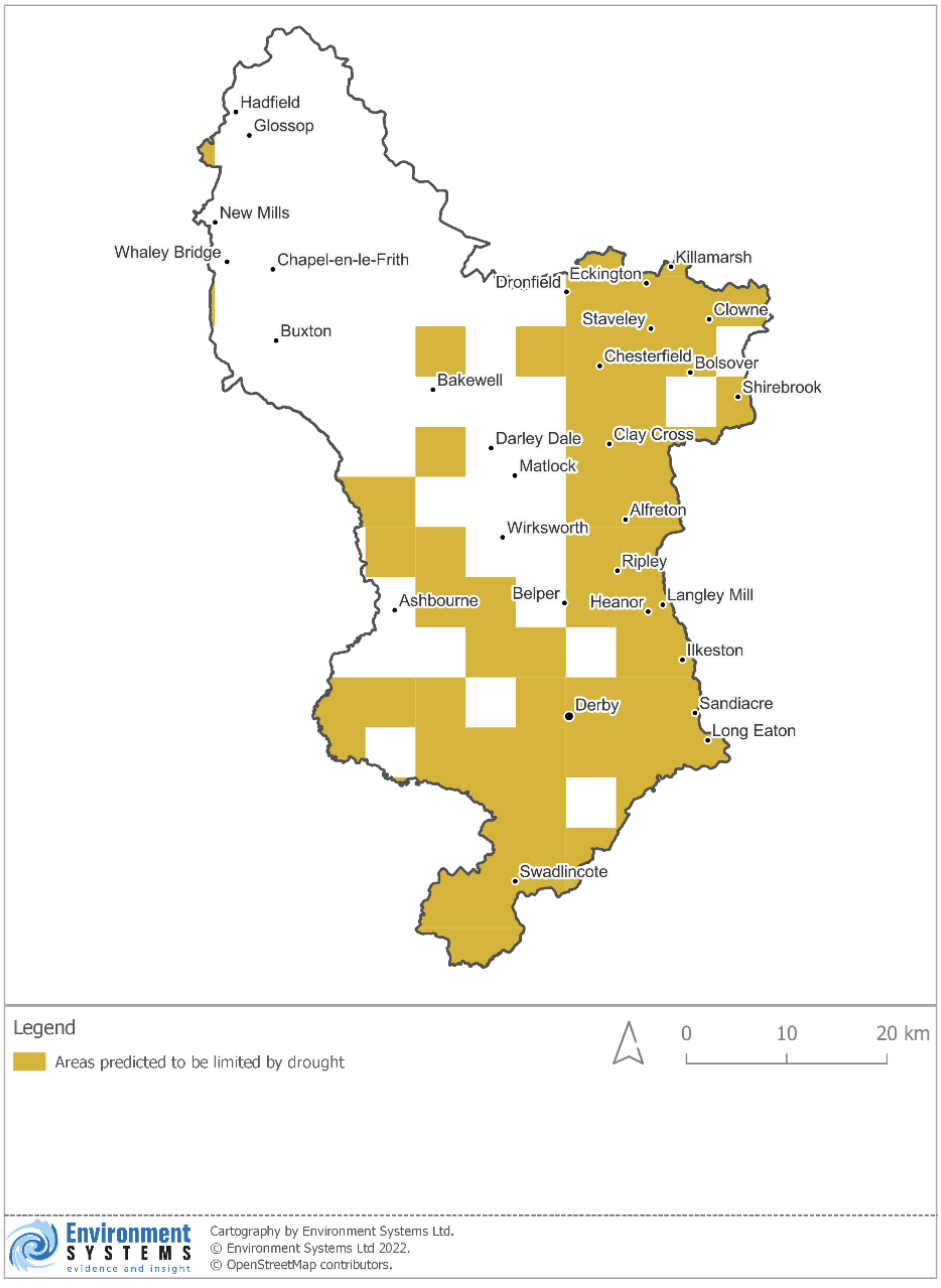
Areas where drought is a significant limiting factor for agriculture: present day UKCP18 RCP 6.0



This map used modelled ALC data generated from UKCP18 climate change model data for 2020 under a medium GHG emissions scenario (RCP 6.0); Keay, 2020. Areas where drought is listed as a limiting factor, either alone or in combination with other limiting factors, are highlighted on the map.

References:
Keay, C. 2020. Capability, Suitability & Climate Programme Rerun SP1104 with UKCP18 data. Available at: https://gov.wales/sites/default/files/publications/2021-04/capacity-suitability-climate-programme-2012-study-rerun.pdf [Accessed 2022-09-12]

Areas where drought is a significant limiting factor for agriculture: UKCP18 RCP 6.0



This map used modelled ALC data generated from UKCP18 climate change model data for 2080 under a medium GHG emissions scenario (RCP 6.0); Keay, 2020. Areas where drought is

listed as a limiting factor, either alone or in combination with other limiting factors, are highlighted on the map.

References:

Keay, C. 2020. Capability, Suitability & Climate Programme Rerun SP1104 with UKCP18 data. Available at: https://gov.wales/sites/default/files/publications/2021-04/capacity-suitability-climate-programme-2012-study-rerun.pdf [Accessed 2022-09-12]