Wyre Green Infrastructure Strategy

Supplementary Report: Maps and Indicators

wyre council

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How the maps were prepared

Overview

The central green infrastructure mapping process for this study consists of four main stages:

- Typology
- Functionality
- Needs
- Needs met and not met

These stages follow a methodology that has been developed by The Mersey Forest team for green infrastructure planning. The general methodology (an overview of which has been published in collaboration with Ordnance Survey and RICS[1]) has garnered significant acclaim in the North West of England and further afield, and has been used for several previous studies, although it is always evolving.

Green infrastructure is defined, for the purposes of this mapping method, as all plants and surface water, wherever they occur. A few examples are an agricultural field, the lawn in a private domestic garden, a football pitch, a moor, a river, and the sea. The green infrastructure approach considers all of these things as a system which performs multiple functions upon which people and other species rely, such as evaporative cooling, food production and recreation.

Typology

The first step is to classify all of the land in the study area as either *not green infrastructure*, or one of a list of green infrastructure types, which are defined below.

Agricultural land

Land managed for agriculture, including grazing lands, crop production fields and hedgerows. Potentially irregular field margin trees may be included.

Allotment, community garden or urban farm

Allotments are small plots which collectively make up a larger green space. These plots are available for members of the public to rent for the cultivation of fruit, vegetables and flowers. Community gardens and urban farms are community-managed projects ranging from wildlife gardens, to fruit and vegetable plots on housing estates, community polytunnels, to large city farms. They exist predominantly in urban areas and are often community led projects, created in response to a lack of access to green space. They combine a desire to encourage strong community relationships and an awareness of gardening and farming. Most projects provide food-growing activities, training courses, school visits, community allotments and community businesses. Dedicated orchards are classified separately.

Cemetery, churchyard or burial ground

Land used as burial grounds, including cemeteries and churchyards, usually grass covered with occasional shrubs and trees.

Coastal habitat

Typology continued

Beaches, sand dunes, marshes, mudflats and semi-natural open land by the coast.

[1] http://www.merseyforest.org.uk/files/The_Value_of_Mapping_Green_Infrastructure_pdf.pdf

Derelict land

Land which has been disturbed by previous development or land use but is now abandoned. Waste or derelict land is often re-colonised by processes of natural succession. Land is classed as derelict whist it is in the early stages of natural succession.

General amenity space

Usually publicly owned and managed, and always accessible for public enjoyment. Their function is usually as a green 'landscape backdrop' but their landscape value can sometimes be minimal because of poor design. They include the 'left over' green spaces within housing and other forms of development, as well as most road verges. Most commonly, but not exclusively in housing areas - including informal recreation spaces, green spaces in and around housing, and village greens.

Grassland, heathland, moorland or scrubland

Grassland which is not agriculturally improved. Could include established vegetation on reclaimed derelict land which is not part of a formal recreation green space. Includes downlands, commons and meadows. Also includes areas of moorland and heathland vegetation consisting mainly of ericaceous species, and including moorland grass, shrub moor, shrub heath and bracken. Likely to include some commons within urban areas. Scrubland areas predominantly consist of shrubs, with grasses and herbs also present.

Green roof

Roofs of buildings, bus shelters or any other form of construction which are partially or completely covered with vegetation. Vegetation may be sedums, plants, perennials, grasses, trees and shrubs. Larger green roofs may contain small ponds.

Institutional grounds

Green space in the grounds of institutions such as schools, universities and colleges, hospitals and nursing homes, and associated with commercial and industrial premises. Land usually consists of expanses of grass, scattered trees, hedgerows and shrubs. Outdoor sports facilities are not included.

Orchard

Areas populated with fruit bearing trees, can be publicly or privately owned, could be for commercial selling or local community use.

Outdoor sports facility

Includes sports pitches, school and other institutional playing fields, golf courses and other outdoor activities. Usually consist of vegetated sports surface and boundary shrubbery, trees and hedges. Can be publicly or privately owned and often occur within parks.

Park or public garden

Includes urban parks, country parks and formal gardens (including ones where you may have to pay for access). Generally designed for public access and enjoyment, combining a variety of landscape and horticultural elements. Extraneous facilities for the public may be present onsite which enhance visitor attraction.

Typology continued

Private domestic garden

Privately owned greenspace within the curtilage of individual dwellings, which is generally not publicly accessible. These plots of private land vary in size but often make up a significant part of the green fabric of urban areas. Land may include trees, shrubs, grass and flowering plants.

Street trees

Generally in urban areas, a row/collection of individual trees along the side of a road. Trees will vary in size and species depending on location and size of street. Usually located on the pavement edge in tree pits, requires reasonably wide pavements. Tree pits may be planted with small flowering plants.

Water body

Expanses of open water, including large lakes, small ponds, reservoirs and harbours. The sea is also classed as a water body.

Water course

All areas of running water, including large rivers, small streams, canals and aqueducts.

Wetland

Land dominated by wet habitats, including fen, marsh, bog and wet flush vegetation. Wetland associated with the coast, such as salt marshes, is classified as coastal habitat.

Woodland

All forms of woodland including deciduous woodland (both ancient semi-natural and woodlands of more recent origin) and mixed and coniferous woodland (including plantations and shelterbelts). Includes newly planted woodland. Small clusters of trees, in our case, will be classed as woodlands.

This list was developed from (the now superseded) Planning Policy Guidance Note 17[2] typology to cover all green infrastructures in broad, functionally distinct categories. This mapping gives a complete picture of the green infrastructure resource of the study area.

Instead of defining a bespoke system of land divisions, types have simply been applied to all of the non-overlapping polygons from Ordnance Survey's MasterMap Topography Layer. The main advantages of this approach are enumerated in the methodology document mentioned above.

In order to classify the MasterMap polygons, a three-step process was employed.

1. **Classification using standard MasterMap attributes and other existing vector datasets** (with each step only classifying areas that hadn't already been classified)
    a. Firstly, a figure, called *E*, is calculated for each shape which is a measure of how intricate it is, or conversely how similar to a circle of the same area. For example, a long thin shape such as a river will have a higher *E* than a round or square shape such as a pond.
    b. Areas where land is identified in MasterMap as pylon, rail, road or track, path, steps, building, glasshouse or slope and where the area is identified as man-made – defined

Typology continued

[2] https://www.gov.uk/government/publications/assessing-needs-and-opportunities-a-companion-guide-to-planning-policy-guidance-17

as 'features that have been constructed, for example, areas of tarmac or concrete' – were classed as *not green infrastructure*.

c. Shapes identified in MasterMap as tidal water were classed as *water course*.

d. Shapes identified in MasterMap as inland water were classified as follows.

   - *E* < 3.5: *water body*
   - *E* between 3.5 & 5 and area < 1ha: *water course*
   - *E* between 3.5 & 5 and area > 1ha: *water body*
   - *E* > 5: *water course*

e. Areas where land is identified in MasterMap as natural environment and is described as trees, but not scattered trees, were classed as *woodland*.

f. Areas where land is identified in MasterMap as natural environment and is described as marsh land were classed as *wetland*.

g. Areas where land is identified in MasterMap as orchard were classed as *orchard*.

h. Areas where land is identified in MasterMap as natural environment were classed as *grassland, heathland, moorland or scrubland*.

i. Areas where land is identified in MasterMap as rail were classed as *grassland, heathland, moorland or scrubland*.

j. Areas where land is identified in MasterMap as general surface or multi surface, the shape area is less than or equal to 800m^2 and *E* is less than or equal to 10 were classed as *private domestic garden*.

k. Areas where land is identified in MasterMap as unclassified were classed as *derelict land*.

l. Areas where land is identified in MasterMap as foreshore were classed as *coastal habitat*.

m. Areas where land is identified in MasterMap as general surface or multi surface were classed as *general amenity space*.

n. Areas where land is identified in MasterMap as roadside were classed as *general amenity space*.

o. Areas where the Open Space Audit indicates that the land is a public park or garden were classed as *park or public garden.*

p. Areas where MasterMap annotation or the Open Space Audit indicates that the land is allotments were classed as *allotment, community garden or urban farm*.

q. Areas where MasterMap annotation or the Open Space Audit indicates that the land is used for football, rugby, cricket, bowling, golf, tennis, recreation ground, sports ground or playing field was classed as *outdoor sports facility*.

r. Areas where MasterMap annotation or the Open Space Audit indicates that the land is a cemetery or graveyard were classed as *cemetery, churchyard or burial ground*.

Typology continued

s. Areas where land is identified in MasterMap as general surface, shape area is greater than or equal to 0.6ha and *E* is less than or equal to 4 were classed as *agricultural land*.

t. Polygons of area greater than or equal to 0.3ha and *E* less than or equal to 5, and polygons intersecting a 2m buffer of these were classed as *agricultural land*.

u. Polygons of area greater than or equal to 0.6ha were classed as *grassland, heathland, moorland or scrubland*.

v. Areas where MasterMap annotation indicates that the land is part of the grounds of a school, university, college, museum, library or other educational establishment were classed as *institutional grounds*.

w. Polygons intersecting a 10m buffer of those already classed as agricultural land were also classed as *agricultural land*.

x. Polygons adjoining buildings of area greater than 150m^2 were classed as *institutional grounds*.

y. Remaining polygons were classed as *general amenity space*.

2. Manual improvement

A series of manual 'sweeps' are carried out to check for significant errors in each type relative to aerial photography, Ordnance Survey raster mapping and the Open Space Audit (concentrating on types not adequately addressed by the above process, such as institutional grounds and outdoor sports facilities).

3. Consultation with Council officers

Council officers were asked to look at the results of the steps above and identify any significant remaining errors. This process led to a series of further changes.

Note that street trees and green roofs could not be identified due to data availability and time constraints.

The first step of this typology mapping process has been shown to classify approximately 80% of land correctly.

The addition of the second and third steps, however, means that this accuracy level is higher for the completed Wyre typology mapping.

Functionality

The next step is to determine which polygons currently perform which of a list of 35 functions. The functions are defined below, with references confirming that green infrastructure can perform them where necessary and available.

Pollination (UK National Ecosystem Assessment, 2011)

Transfer of pollen is important in plant reproduction, and hence in biodiversity and agriculture. This is mostly carried out by animals (especially insects) that need suitable habitat close to the plants they pollinate. Green infrastructure provides this habitat and thereby helps to perform the function.

Pest and disease control (UK National Ecosystem Assessment, 2011)

Functionality continued

Various components of biodiversity, all of which are heavily

influenced by green infrastructure, have been shown to help regulate pathogens and pests. This is important both in agriculture and in maintaining biodiversity. A key example is providing a habitat for predator species. However, green infrastructure can also help to spread pests and diseases, an effect that cannot be ignored.

Community cohesion (Forest Research, 2010)

Green infrastructure can provide a pleasant setting for community events and where people can meet and interact informally, and tends to encourage these interactions. Social ties tend to be stronger in greener neighbourhoods. This effect may be particularly strong where community members are involved in the creation or management of their local green infrastructure, such as around allotments or 'Friends Of' groups.

Providing jobs

Human work is needed to manage green infrastructure and use it to obtain other benefits (notably food). Green infrastructure therefore provides jobs.

Physical movement barrier

Various types of green infrastructure, especially hedges, can be used in different situations to guide people, to provide security, and to contain animals. Examples include hedges enclosing fields containing livestock and around private domestic gardens.

Visual contribution to landscape character (replaces aesthetic) (CABE, 2005)

Where it makes a positive visual contribution to the character of the landscape, green infrastructure can improve the image of an area for people as they arrive, and for those who reside there, and thereby make it a more attractive place to live and visit. This is often reflected in surrounding property prices, and can contribute to improved mental health and well-being.

Connection with local environment (Kearney, 2006)

People often feel a stronger bond with their neighbourhood when it contains more or higher quality green infrastructure. This can result in reduced vandalism and increased community involvement in management, as well as potentially increased well-being and quality of life. Another term for this is neighbourhood pride.

Opportunity to hear more natural sound

Urban areas and other areas near to grey infrastructure (especially roads) can be unpleasant due to the domination of the soundscape by manmade noise. Larger expanses of green infrastructure, often in rural areas but also, for example, large urban parks, can provide a more tranquil refuge from this, where manmade noise fades and more natural sounds can be distinguished.

Recreation – public

Anyone can use for recreational purposes (formal/informal and active/passive), without having to pay or have access to keys. Can include areas which are closed at night, on specific days, or seasonally but a judgement call will be required as to whether this restricts public use. Can include sports fields, fishing lakes, playgrounds, etc, and open access land.

Functionality continued

Recreation – private

Land which is used for recreation but only by owners of the land or those invited by the owners to use. This includes private gardens and other privately owned green spaces to which access for the public is prohibited.

Recreation – public with restrictions

Public use for recreational purposes (formal/informal and active/passive) is allowed but is restricted to those who pay or have keys. Can include sports fields, golf courses, fishing lakes, allotments, etc, but not public rights of way.

Encouraging green travel

Green infrastructure can make off-road routes more attractive for commuting, recreational and other purposes. These routes include public rights of way and the National Cycle Network.

Shading from the sun (Huang *et al*. 2006, Parker, 1981)

Shading of people, buildings, and surfaces from solar radiation to reduce temperatures and increase comfort levels. Usually provided by trees and taller plants and vegetation. Particularly found in urban areas to reduce the urban heat island, this function will become more critical as we have to adapt to a changing climate. Green infrastructure which provides shade will also be important for protecting agricultural land and other species from solar damage.

Evaporative cooling (Kramer & Kozlowaki, 1960)

As plants transpire water is evaporated from their surfaces cooling their immediate locality. All types of green infrastructure can provide this function, including open water. Plants with a larger leaf area are likely to be better than those with a smaller leaf area. During a drought, irrigation is likely to be necessary to maximise this function in plants, whilst open water will continue to be valuable in its own right.

Trapping air pollutants (Hill, 1971, Beckett *et al*., 1998, Smith, 1990, Hewitt *et al.*, 2005)

Removal of pollutants, especially ozone, nitrogen dioxide and particles from the air, through uptake via leaf stomata and deposition on leaf surfaces. Once inside the leaf, gases diffuse into intercellular spaces and may be absorbed by water films to form acids or react with inner leaf surfaces. This function is usually associated with more urban areas, especially close to travel routes.

Noise absorption (Fang & Ling, 2002)

Screening of noise, especially from major transport routes. Requires certain types of green infrastructure which are tall enough to incept and absorb sound waves. This function is usually associated with more urban areas, especially close to travel routes. Trees may perform this function to some extent, although a large part of their effect may be just on the 'perception' of noise. Landform is likely to have a greater effect.

Habitat for wildlife (Tree People, 2009)

Providing a habitat for wildlife – a place to live with a source of food. Different types of green infrastructure will provide habitats for a widely different range of species. The range of species will also be dependent on other factors such as climate and

Functionality continued

disturbance.

Corridor for wildlife (Benedict & McMahon, 2006)

Conduit of green and blue spaces through which wildlife can disperse to and from habitat spaces. This function will increase in importance in the future; species will need the capacity to move upwards and northwards as the climate changes. Connectivity is vital for this function. Different types of green infrastructure will provide a corridor for a widely different range of species. Range of species will also be dependent on other factors such as climate and disturbance.

Soil stabilisation (Barker, 1995)

Root structures of all vegetation can help improve the strength and stability of soil, holding together the top soil and preventing it from eroding.

Heritage

Historic links in the landscape (including ancient trees, woodlands, canals, designated sites and monuments). Heritage is "that which is inherited".

Culture

Green space used for cultural purposes, the hosting of public art, events and festivals. Examples include international garden festivals and sculpture parks.

Carbon storage (Milne & Brown, 1995)

Removing carbon from the atmosphere and storing it in plants, trees and soils. Trees and peat soils are particularly important types of green infrastructure for storing carbon. Certain types of green infrastructure are slower growing and will take longer to absorb carbon. Stored carbon in trees will stay locked away inside the wood if felled for material substitution.

Food production (TCPA, 2008)

Land used for growing crops or the grazing of animals.

Timber production

Growing trees and woodlands for timber. Includes for use as a substitute for other materials. Can be on a large scale for construction materials or a smaller scale for smaller wood products. Stored carbon in trees will stay locked away inside the wood if felled for timber production.

Biofuels production

Using vegetation as biofuels – a form of energy (including heat) production. Biofuel crops include wood from trees which may or may not be coppiced, miscanthus, rapeseed and waste from other crops.

Wind shelter

Green infrastructure can provide shelter from winds at a local level by slowing or diverting currents.

Learning

Opportunities for lifelong learning. Green infrastructure can provide a backdrop for outdoor classrooms and learning outside of the indoor school environment, and also a setting for learning new skills that may help adults back to work. Learning can also be informal. One key learning outcome is an understanding of the roles of green infrastructure and its

Functionality continued

importance for human life.

Inaccessible water storage

Water stored in soils and vegetation. Certain types of sustainable urban drainage systems and soils will store large amounts of water. Certain soils such as clay and peat will store more water than others. This water in inaccessible for human use or for irrigation.

Accessible water storage

Water stored in ponds, lakes, reservoirs, rivers and certain wetlands. This water is accessible for human use, for irrigation and fire fighting, and as a heat source, should it be required.

Water interception (Centre for Urban Forest Research, 2002)

Interception of rainwater before it reaches the ground, e.g. by the leaves of trees and plants. This will slow the flow of water to the ground. All types of green infrastructure will intercept water in some way, though certain types with a greater leaf area will intercept a greater amount and slow its flow to greater extent. This can help to reduce the risk of flooding.

Water infiltration

Vegetation and roots aid in the movement of rainwater and floodwater into the ground. Green infrastructure will help water to drain naturally into the soil. Includes both surface infiltration and deep infiltration. Green infrastructure is a permeable surface as opposed to hard surfacing such as concrete. It aids in the natural passage of water to the ground – helping reduce the risk of flooding.

Coastal storm protection

Green infrastructure can be used to protect infrastructure and agriculture close to the shore. It can protect against winds, sea spray and slow the speed and impact of waves and large tidal surges. Could include areas of woodland and marsh.

Water conveyance

Green infrastructure can transport water to areas which are in need of water and also away from areas at risk of saturation or flooding. Examples include rivers and canals. Irrigation ditches in agricultural land are another example of water conveyance.

Pollutant removal from soil/water (Barret *et al*. 2005)

Vegetation can remove pollutants from soil and water. For example green infrastructure at the side of the road can clean contaminated road runoff (reducing concentrations of pollutants such as heavy metals), and certain plants can remove pollutants from contaminated soil.

Water flow reduction through surface roughness

The speed and amount of water passing through a site can be reduced by vegetation. If the site has a varied green topography as opposed to hard standing, water will be retained onsite for longer, potentially helping to reduce flooding. Some types of green infrastructure perform this function more than others – for example, a woodland floor tends to be rougher than grass.

Functionality continued

Methodology

The following table was used to perform this step. Where there is a 1.00 in a cell (the green cells), land of the type in question (more or less) always performs the function in question to a level above a notional threshold (where it becomes 'significant'), so all polygons of that type can simply be said to perform that function.

Where there is a 0.00 in a cell (the grey cells), land of the type in question (more or less) never performs the function in question to a level above the threshold, so all polygons of that type can simply be said not to perform that function.

Where there is a different value or a letter in a cell (the orange and pink cells respectively), land of the type in question sometimes performs the function in question to a level above the threshold and sometimes doesn't, depending on other factors.

Where there is a letter (the pink cells), the conditions in the second part of the table were used to determine whether each polygon of that type would be said to perform that function.

Most of the conditions involve comparison with other datasets. Where there is a different value (the orange cells), however, whether each individual polygon performs the function could not be determined, either because data does not exist or because it is too time-consuming to analyse. Instead, an estimate of the likelihood of a polygon of the type in question performing the function is shown in the cell and was applied to all polygons of that type. This estimate is based on extensive mapping of a more detailed nature, together with expert judgement and consideration of factors that may affect it.

Once all of the likelihoods of performing the functions had been determined, the sum of them is calculated for each polygon to give multifunctionality.

	recreation - public	recreation - private	recreation - public with restrictions	encouraging green travel	shading from sun	evaporative cooling	trapping air pollutants	noise absorption	habitat for wildlife	corridor for wildlife	soil stabilisation	heritage	culture	carbon storage
Agricultural land	0.00	0.00	0.00	a	0.00	1.00	0.00	0.00	c	d	0.00	f	0.00	r
Allotment, community garden or urban farm	0.10	0.00	0.90	a	0.00	1.00	0.00	0.00	c	d	0.00	f	0.00	r
Cemetery, churchyard or burial ground	0.95	0.00	0.05	a	0.10	1.00	0.10	b	c	d	e	f	1.00	s
Coastal habitat	0.00	0.70	0.30	a	0.00	1.00	0.00	0.00	c	d	e	f	h	r
Derelict land	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	c	d	e	f	0.00	r
General amenity space	1.00	0.00	0.00	0.00	0.05	1.00	0.05	b	c	d	e	f	g	s
Grassland, heathland, moorland or scrubland	0.30	0.00	0.00	a	0.30	1.00	0.30	b	c	d	e	f	0.00	s
Green roof	0.05	0.20	0.00	0.00	0.05	1.00	0.05	b	1.00	0.00	0.00	0.00	0.05	s
Institutional grounds	0.00	0.00	0.00	0.00	0.10	1.00	0.10	b	c	d	e	f	0.00	s
Not GI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Orchard	0.20	0.60	0.20	a	0.60	1.00	0.60	b	1.00	d	e	f	1.00	s
Outdoor sports facility	0.30	0.00	0.70	0.00	0.00	1.00	0.00	0.00	c	d	e	f	0.00	r
Park or public garden	0.90	0.00	0.10	a	0.20	1.00	0.20	b	c	d	e	f	1.00	s
Private domestic garden	0.00	1.00	0.00	0.00	0.10	1.00	0.10	b	c	d	e	f	0.00	s
Street trees	0.00	0.00	0.00	a	0.30	1.00	0.30	b	1.00	d	e	f	0.00	s
Water body	0.60	0.10	0.05	a	0.00	1.00	0.00	0.00	c	d	0.00	f	0.00	0.00
Water course	0.80	0.00	0.05	a	0.00	1.00	0.00	0.00	c	d	0.00	f	0.00	0.00
Wetland	0.00	0.00	0.00	a	0.00	1.00	0.00	0.00	1.00	d	e	f	0.00	r
Woodland	0.60	0.35	0.05	a	1.00	1.00	1.00	b	1.00	d	e	f	0.01	1.00

	food production	timber production	biofuels production	wind shelter	learning	inaccessible water storage	accessible water storage	water interception	water infiltration	coastal storm protection	water conveyance	pollutant removal from soil/water	flow reduction through surface roughness
Agricultural land	1.00	0.00	0.01	0.00	0.00	k	0.00	0.00	l	0.00	n	0.10	0.00
Allotment, community garden or urban farm	1.00	0.00	0.00	0.00	j	k	0.00	0.00	l	0.00	n	0.10	0.00
Cemetery, churchyard or burial ground	0.00	0.00	0.00	0.10	0.00	k	0.00	0.06	l	0.00	n	0.35	0.00
Coastal habitat	0.00	0.00	0.00	0.00	j	k	0.00	0.00	l	m	n	0.10	0.00
Derelict land	0.00	0.00	0.00	0.00	0.00	k	0.00	0.00	l	0.00	n	0.10	0.00
General amenity space	0.00	0.00	0.00	0.05	0.00	k	0.00	0.03	l	0.00	n	0.20	0.00
Grassland, heathland, moorland or scrubland	0.00	0.00	0.00	0.30	0.00	k	0.00	0.20	l	m	n	0.50	1.00
Green roof	0.05	0.00	0.00	0.05	j	k	0.00	0.03	0.00	0.00	0.00	1.00	0.00
Institutional grounds	0.00	0.00	0.00	0.10	j	k	0.00	0.06	l	0.00	n	0.20	0.00
Not GI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Orchard	1.00	0.00	0.00	0.60	0.00	1.00	0.00	0.40	l	0.00	n	1.00	0.20
Outdoor sports facility	0.00	0.00	0.00	0.00	j	k	0.00	0.00	l	0.00	n	0.15	0.00
Park or public garden	0.00	0.00	0.00	0.20	j	k	0.00	0.20	l	0.00	n	0.35	0.00
Private domestic garden	0.00	0.00	0.00	0.10	0.00	k	0.00	0.06	l	0.00	n	0.20	0.00
Street trees	0.00	0.00	0.00	0.30	0.00	k	0.00	0.20	l	0.00	0.00	0.45	0.00
Water body	t	0.00	0.00	0.00	j	0.00	q	0.00	0.00	0.00	p	0.20	0.00
Water course	t	0.00	0.00	0.00	0.00	0.00	q	0.00	0.00	0.00	1.00	0.20	0.00
Wetland	0.00	0.00	0.00	0.00	j	1.00	0.00	0.00	0.00	m	n	1.00	1.00
Woodland	0.00	1.00	1.00	1.00	j	1.00	0.00	0.50	l	m	n	1.00	1.00

	pollination	pest and disease control	community cohesion	providing jobs	physical movement barrier	visual contribution to landscape character	connection with local environment	opportunity to hear more natural sound
Agricultural land	0.10	u	0.00	1.00	0.50	v	z	x
Allotment, community garden or urban farm	0.50	u	1.00	0.00	0.50	v	w	x
Cemetery, churchyard or burial ground	0.20	u	0.50	1.00	0.10	v	w	x
Coastal habitat	0.10	u	0.20	0.00	0.00	v	w	x
Derelict land	0.20	u	0.20	0.00	0.00	v	0.20	x
General amenity space	0.00	u	0.10	1.00	0.00	v	w	x
Grassland, heathland, moorland or scrubland	1.00	u	0.10	0.50	0.20	v	w	x
Green roof	0.10	u	0.00	0.00	0.00	v	0.05	x
Institutional grounds	0.00	u	0.00	1.00	0.20	v	0.10	x
Not GI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Orchard	1.00	u	0.10	1.00	0.50	v	w	x
Outdoor sports facility	0.00	u	0.50	1.00	0.10	v	w	x
Park or public garden	0.50	u	1.00	1.00	0.50	v	w	x
Private domestic garden	0.50	u	1.00	0.50	0.50	v	1.00	x
Street trees	1.00	u	1.00	0.20	0.00	v	w	x
Water body	0.10	u	0.00	0.50	y	v	w	x
Water course	0.20	u	0.20	0.50	1.00	v	w	x
Wetland	0.20	u	0.00	0.00	0.00	v	w	x
Woodland	1.00	u	0.60	1.00	0.10	v	w	x

Key to table

a	if near path, PRoW or Sustrans route	intersect 2m buffer of Public Rights of Way or National Cycle Network
b	if near main road, railway or airport, give tree cover value (cf. shading from sun)	do they intersect a 30m buffer of main roads (A-roads and motorways), railway lines and airport runways? if so then given approximate tree cover value
c	if intersects habitat designation	intersect biodiversity designations: Sites of Special Scientific Interest, Special Protection Areas, Special Areas of Conservation, RSPB reserves, Ramsar sites, National Nature Reserves, Local Nature Reserves, Ancient Woodland, Biological Heritage Sites
d	if near habitat	intersect 10m buffer of biodiversity designations
e	if intersects steep slope or at risk soil	intersect soil with sandy texture or slope greater than 7°
f	if intersects heritage designation	intersect heritage designations: scheduled monunments, listed buildings, heritage parks & gardens, ancient woodland, conservation areas, ancient landscapes (from Historic Landscape Character study)
g	if village green	intersect village green
h	if near shore (ie. beach)	intersect 50m buffer of seafront
j	if near educational institution, visitor centre or urban farm	intersect 20m buffer of school, university, college, museum, library, visitor centre, campus, urban farm annotation
k	if intersects high porosity soil	intersect soil with peaty texture
l	if intersects freely draining soil	intersect freely draining soil; else given approximate tree cover value
m	if sufficient total width of semi-natural types perpendicular to the coast and intersecting a buffer of it	intersect 100m buffer of Mean High Water
n	if has a watercourse running through it	intersect drain annotation
p	if connects to a watercourse	if within 10m of a water course
q	if freshwater	if inland water
r	if high soil carbon density	intersect soil carbon density greater than English average (129.4 t/ha)

s	if soil carbon is above the mean = 1, if not give tree cover value	intersect soil carbon density greater than English average (129.4 t/ha); else given approximate tree cover value
t	if big enough to be a sustainable habitat for fish	if area > 1ha
u	if part of a landscape with high habitat diversity	intersect areas where the variety of GI types within 500m is greater than 10
v	if mentioned in Landscape Character Assessment as a positive element of the character area	if centroid is within a Character Area the Character Type of which mentions the GI type as a Key Environmental Feature
w	if within 300m of settlement (ANGSt)	intersect 300m buffer of settlement
x	if more than 100m from nearest road	if more than 100m from nearest road
y	if more than 1ha	if area > 1ha
z	if within 300m of settlement (ANGSt) give 0.5	intersect 300m buffer of settlement - give 0.5

Needs

In order to plan interventions, it is necessary to know where there is particular need for each function, as well as where they are currently performed.

Therefore the areas where there is the greatest need for each function were identified.

Because need is not necessarily linked to provision, and to avoid double counting, this mapping was carried out independently from the previous stages and the MasterMap Topography Layer.

The following table explains how greatest need was mapped for each function.

Table notes

In the case of recreation, national standards exist in the form of the Access to Natural Green Space Standard (ANGSt). It therefore seems appropriate to incorporate these into the needs mapping for the recreation functions. ANGSt is usually mapped by buffering existing sites, but this is not appropriate here because provision (and lack thereof) has already been addressed in the previous stages. Instead, only other factors affecting need should be considered. For this reason, a method of 'reverse' ANGSt mapping has been developed, whereby the locations where people live are effectively buffered rather than the sites. This gives an idea of where sites for recreation are most needed, regardless of whether that provision already exists.

The reverse ANGSt score was calculated as follows.

- Population figures from the 2011 census were obtained from the Office for National Statistics

- Provisional housing growth figures were obtained from Wyre Council and converted to population projections using an average household size of 2.2
- Focal statistics calculations were run on population densities for each of the two years to each of the four distances quoted in the ANGSt documentation (300m, 2km, 5km and 10km)
- The eight resulting datasets were added together with equal weighting

The population movement gradient is based on the assumption that the movement of people through the study area is similar to the movement of water over a surface. Just as water flows away from mountain peaks towards low points in the terrain, people flow from where they live towards destinations such as schools and workplaces. Therefore a surface was generated using centres of population (both present and future) as high points, and schools and centres of employment as low points, and the areas of steepest slope were considered to be where the greatest numbers of people would want to travel. These areas will occur particularly where journeys are short, which corresponds to the primary role of green travel routes.

Function	Criteria
Recreation - public	Reverse ANGSt score (see above) > 5,000 or percentage households without a car > 25% or IMD health score > 0.4 or percentage population aged 0 - 15 > 20% or main town centre
Recreation - private	Reverse ANGSt score > 5,000 or percentage households without a car > 25% or IMD health score > 0.4 or percentage population aged 0 - 15 > 20% or main town centre
Recreation - public with restrictions	Reverse ANGSt score > 5,000 or percentage households without a car > 25% or IMD health score > 0.4 or percentage population aged 0 - 15 > 20% or main town centre
Encouraging green travel	Population movement gradient (see above) > 30°
Shading from sun	Super Output Areas with population density > 1,000km^{-2} in 2011 or in the future, > 25% population with limiting long-term illness, > 20% population aged 65+, or > 20% population aged 0 - 15, 100m buffer of educational establishments, main town centres
Evaporative cooling	Urban areas with > 25% population with limiting long-term illness, > 20% population aged 65+, or > 20% population aged 0 - 15
Trapping air pollutants	Population density > 1,000km^{-2} in 2011 or in the future and biodiversity designations, both within 100m of motorways or A roads
Noise absorption	Population density > 1,000km^{-2} in 2011 or in the future within 30m of motorways or A roads

Habitat for wildlife	Biodiversity designations
Corridor for wildlife	100m buffer of biodiversity designations
Soil stabilisation	Slope > 7° or sandy soil
Heritage	50m buffer of heritage function
Culture	Population density > 1,000km^{-2} in 2011 or in the future
Carbon storage	Everywhere equal
Food production	Agricultural Land Classification Grade 2 (no Grade 1 in Wyre)
Timber production	5km buffer of timber processing locations
Biofuels production	Land within a 2km buffer of areas with more than 100 businesses per square kilometre
Wind shelter	Average wind speed > 5.5m/s at 10m above ground level
Learning	Population density > 1,000km^{-2} in 2011 or in the future, 100m buffer of educational establishments
Inaccessible water storage	Upstream of historic flooding affecting built-up areas
Accessible water storage	Upstream of historic flooding affecting built-up areas, 100m buffer of most multifunctional green infrastructure, 100m buffer of Agricultural Land Classification Grade 2 (no Grade 1 in Wyre)
Water interception	Upstream of historic flooding affecting built-up areas
Water infiltration	Upstream of historic flooding affecting built-up areas
Coastal storm protection	Population density > 1,000km^{-2} in 2011 or in the future within 500m of the coast
Water conveyance	Downstream of historic flooding affecting built-up areas, Agricultural Land Classification Grade 2 (no Grade 1 in Wyre)

Pollutant removal from soil/water	Agricultural Land Classification Grade 2 (no Grade 1 in Wyre)
Flow reduction through surface roughness	Upstream of historic flooding affecting built-up areas
Pollination	Agricultural Land Classification Grade 2 (no Grade 1 in Wyre)
Pest and disease control	Agricultural Land Classification Grade 2 (no Grade 1 in Wyre), biodiversity designations
Community cohesion	Population density > 1,000km^{-2} in 2011 or in the future
Providing jobs	LSOAs with IMD employment deprivation score > 0.1
Physical movement barrier	Allotment, community garden or urban farm, private domestic garden, agricultural land, 100m buffer of educational establishments
Visual contribution to landscape character	500m buffers of motorways, A roads and railways, population density > 1,000km^{-2} in 2011 or in the future
Connection with local environment	Population density > 1,000km^{-2} in 2011 or in the future
Opportunity to hear more natural sound	Population density > 1,000km^{-2} in 2011 or in the future

Needs met and not met

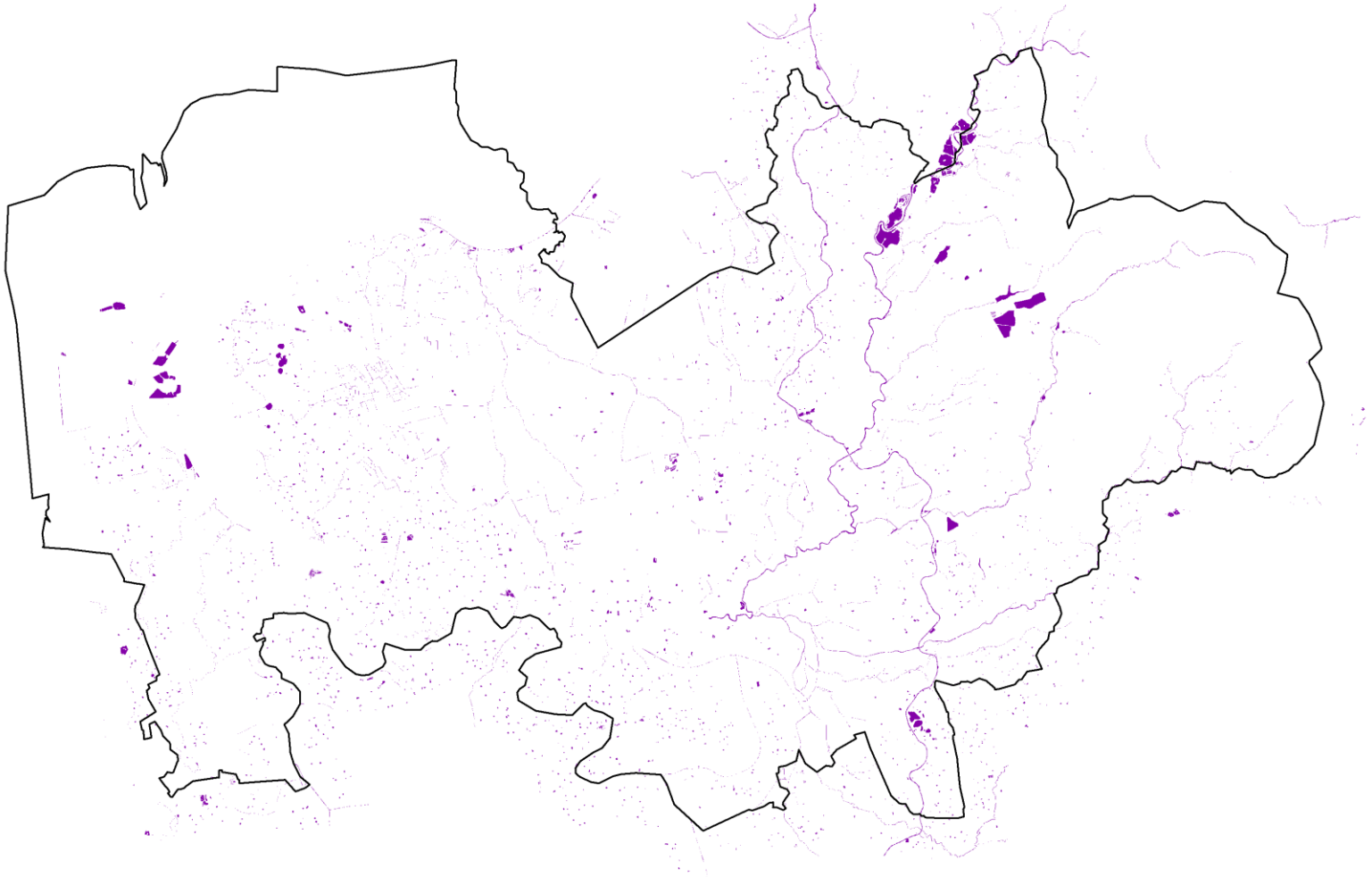
Once the locations of greatest need and existing functionality have been identified, it is possible to further identify where need for each of the functions is met by existing provision of that function, and where it isn't met, by a simple intersection. The sum of the areas where need is met can also be calculated to give the total needs met across all of the functions, as can the sum of the areas where need is not met.

Datasets used

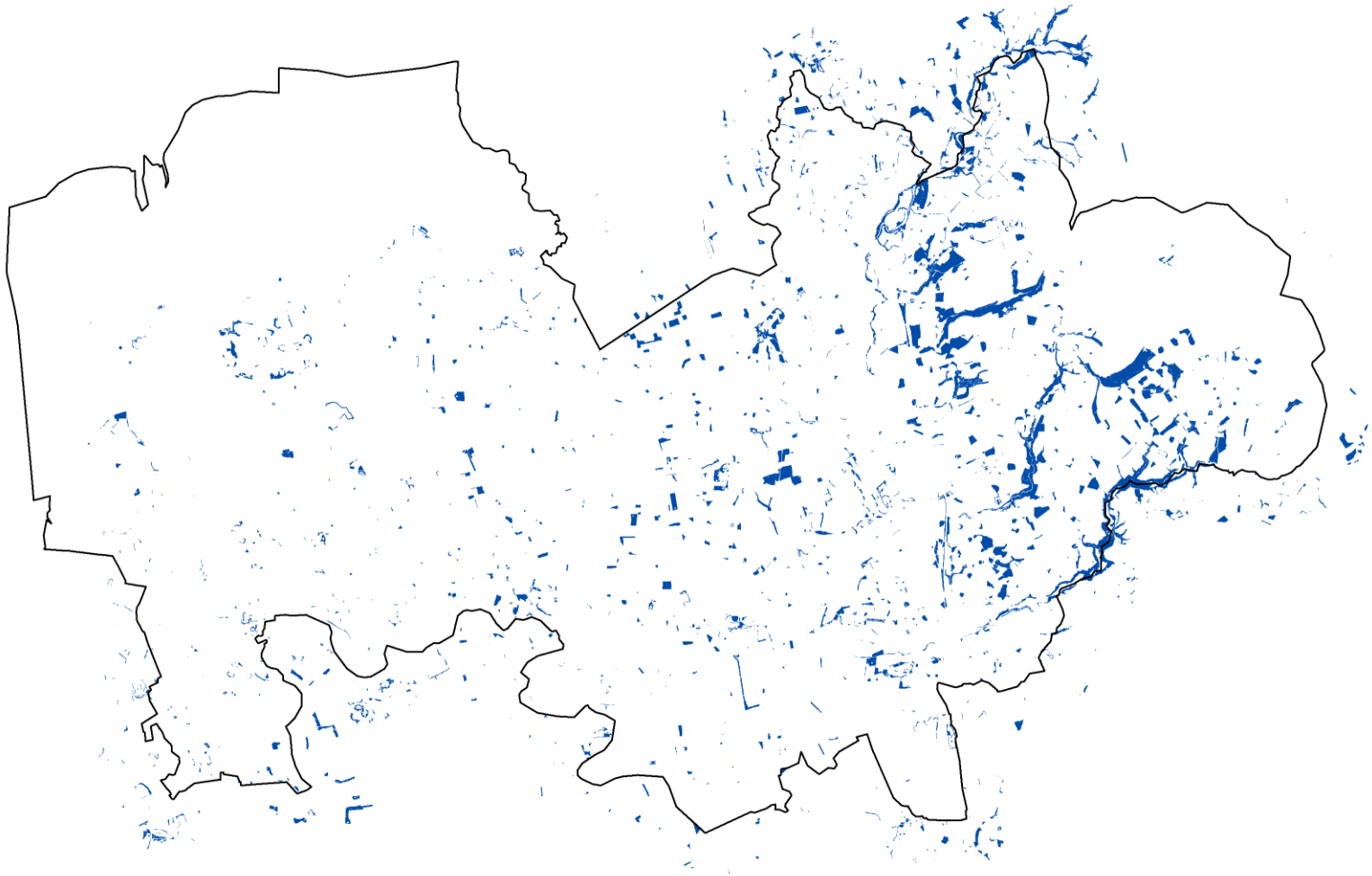
Name	Source	Application
MasterMap Topography Layer	Ordnance Survey	Primarily typology & functionality mapping
Open Space Audit	Wyre Council	Typology mapping
Public Rights of Way	Lancashire County Council	Functionality mapping
National Cycle Network	Sustrans	Functionality mapping
MasterMap Integrated Transport Network Layer	Ordnance Survey	Functionality & needs mapping
Biodiversity designations: Sites of Special Scientific Interest, Special Protection Areas, Special Areas of Conservation, Ramsar sites, National Nature Reserves, Local Nature Reserves, Ancient Woodland	Natural England	Functionality & needs mapping
Biological Heritage Sites	Lancashire County Council	Functionality & needs mapping
NATMAP Soilscapes	Cranfield University	Functionality & needs mapping
LandForm Panorama	Ordnance Survey	Functionality & needs mapping
Heritage designations (scheduled monuments, listed buildings, heritage parks and gardens)	English Heritage	Functionality mapping
Conservation areas	Wyre Council	Functionality mapping
Historic Landscape Character	Lancashire County Council	Functionality mapping
Village greens	Defra	Functionality mapping
Soil carbon density	Centre for Ecology & Hydrology	Functionality mapping
Landscape Character Assessment	Lancashire County Council	Functionality mapping
Population statistics 2011	Office for National Statistics	Needs mapping
Provisional housing growth projections	Wyre Council	Needs mapping
Indices of Multiple Deprivation 2010	Office for National Statistics	Needs mapping
Age structure statistics 2011	Office for National Statistics	Needs mapping
Educational establishments	Department for Education	Needs mapping
Wokplace population statistics 2001	Office for National Statistics	Needs mapping
Car ownership statistics 2011	Office for National Statistics	Needs mapping
Limiting long-term illness statistics 2001	Office for National Statistics	Needs mapping
Agricultural Land Classification	Natural England	Needs mapping
Business statistics 2011	Office for National Statistics	Needs mapping
Wind Speed Database	Department for Business, Innovation and Skills	Needs mapping
Historic flooding	Environment Agency	Needs mapping

Functionality maps

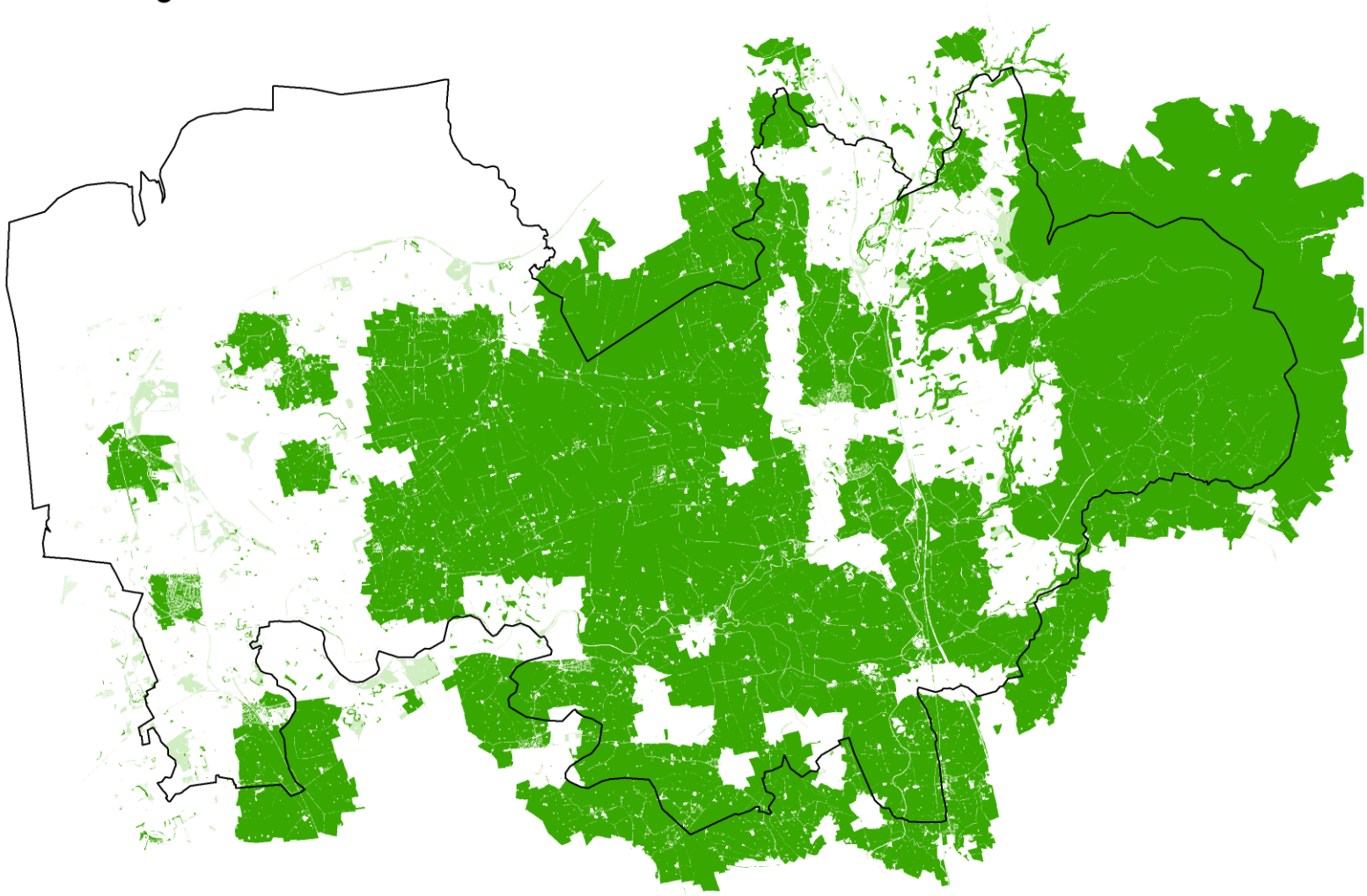
Accessible water storage



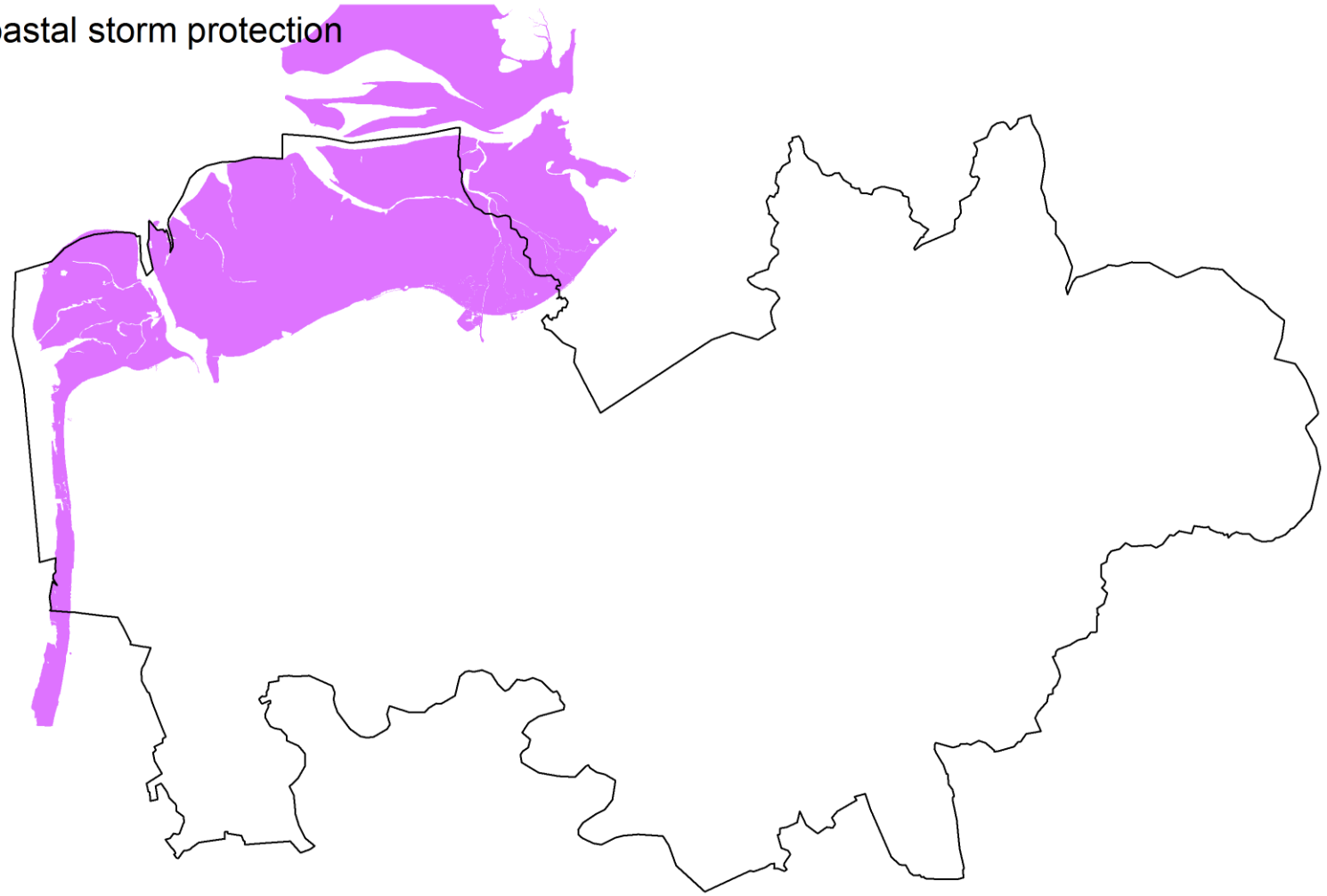
Biofuels production



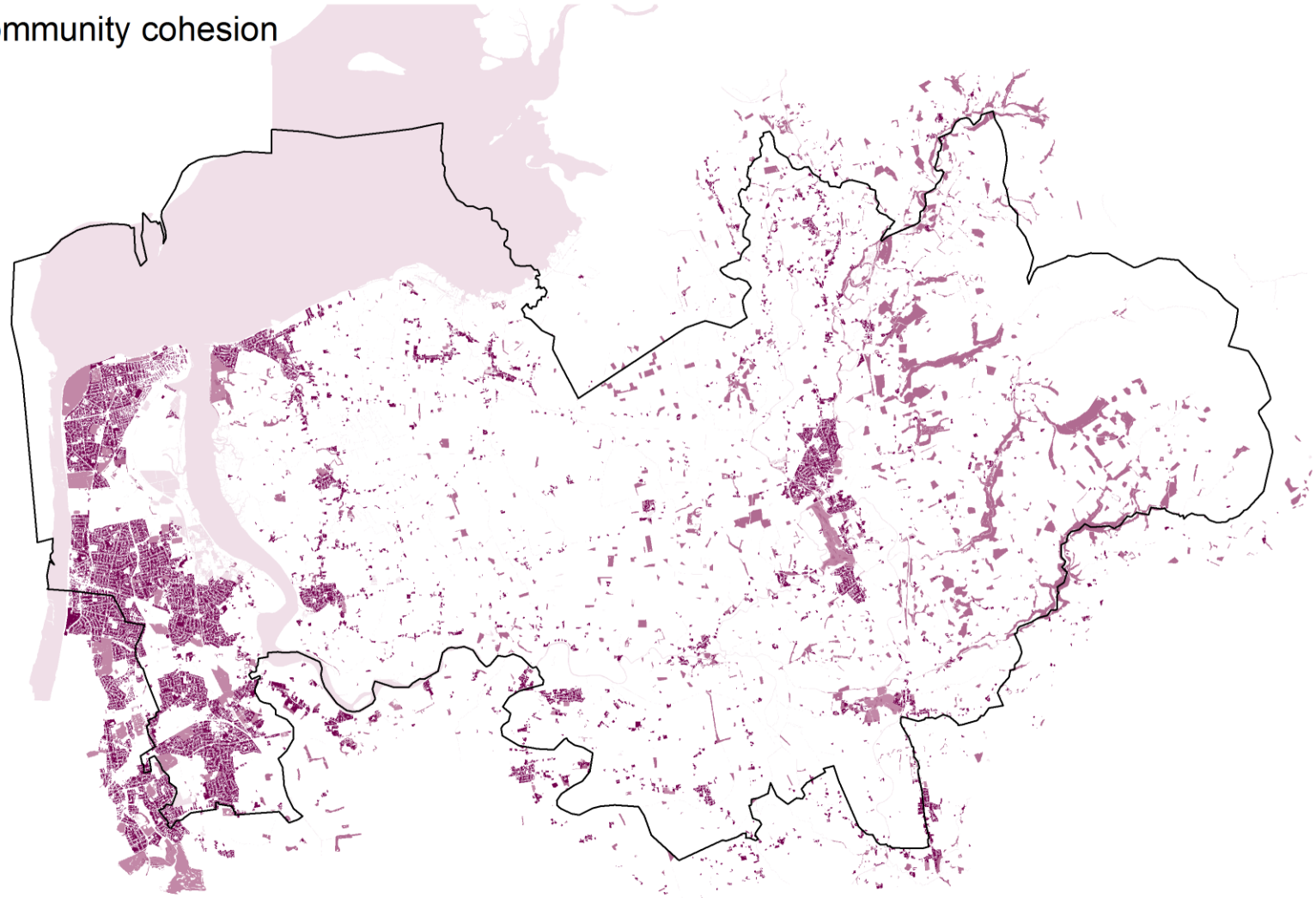
Carbon storage



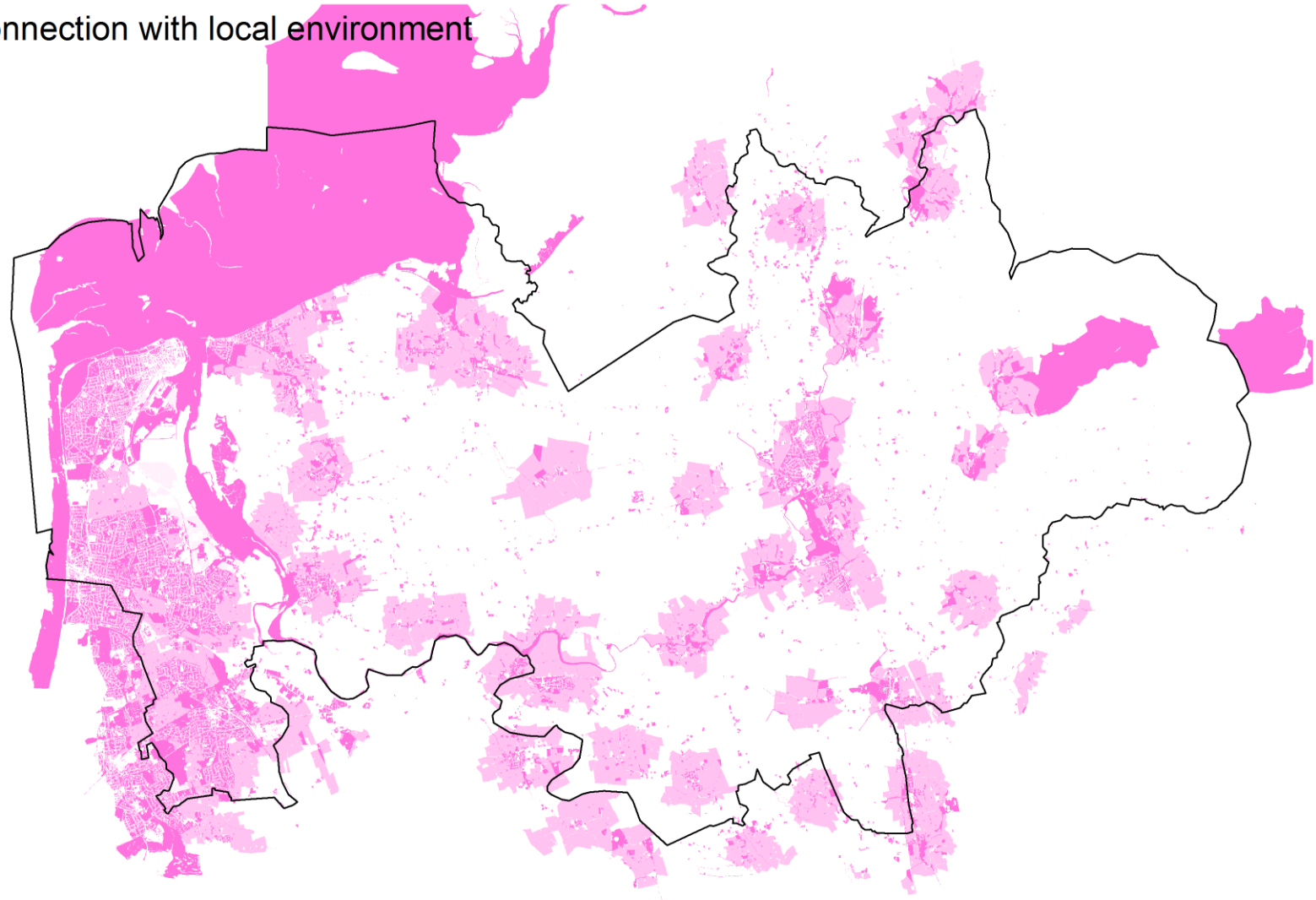
Coastal storm protection



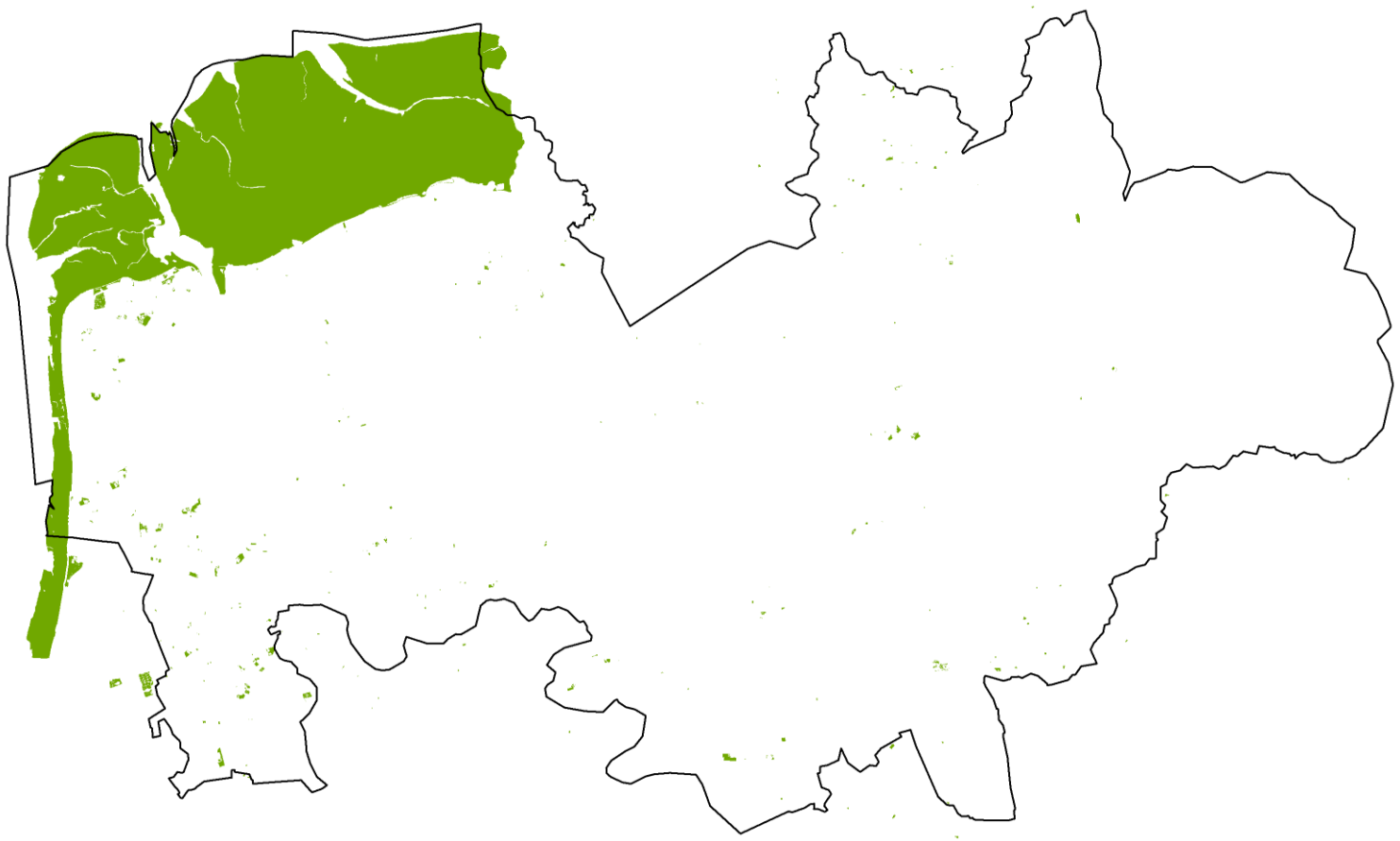
Community cohesion



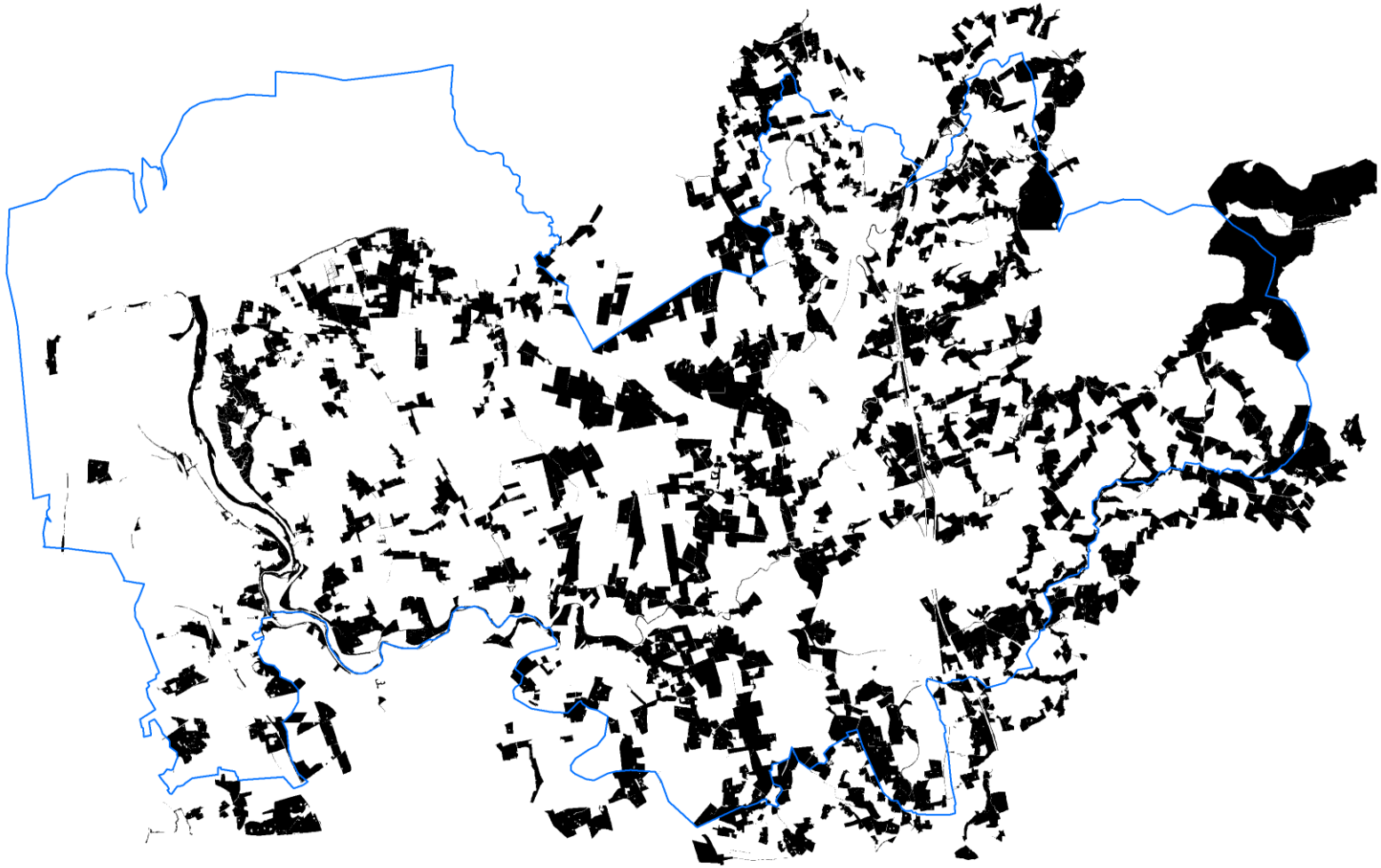
Connection with local environment



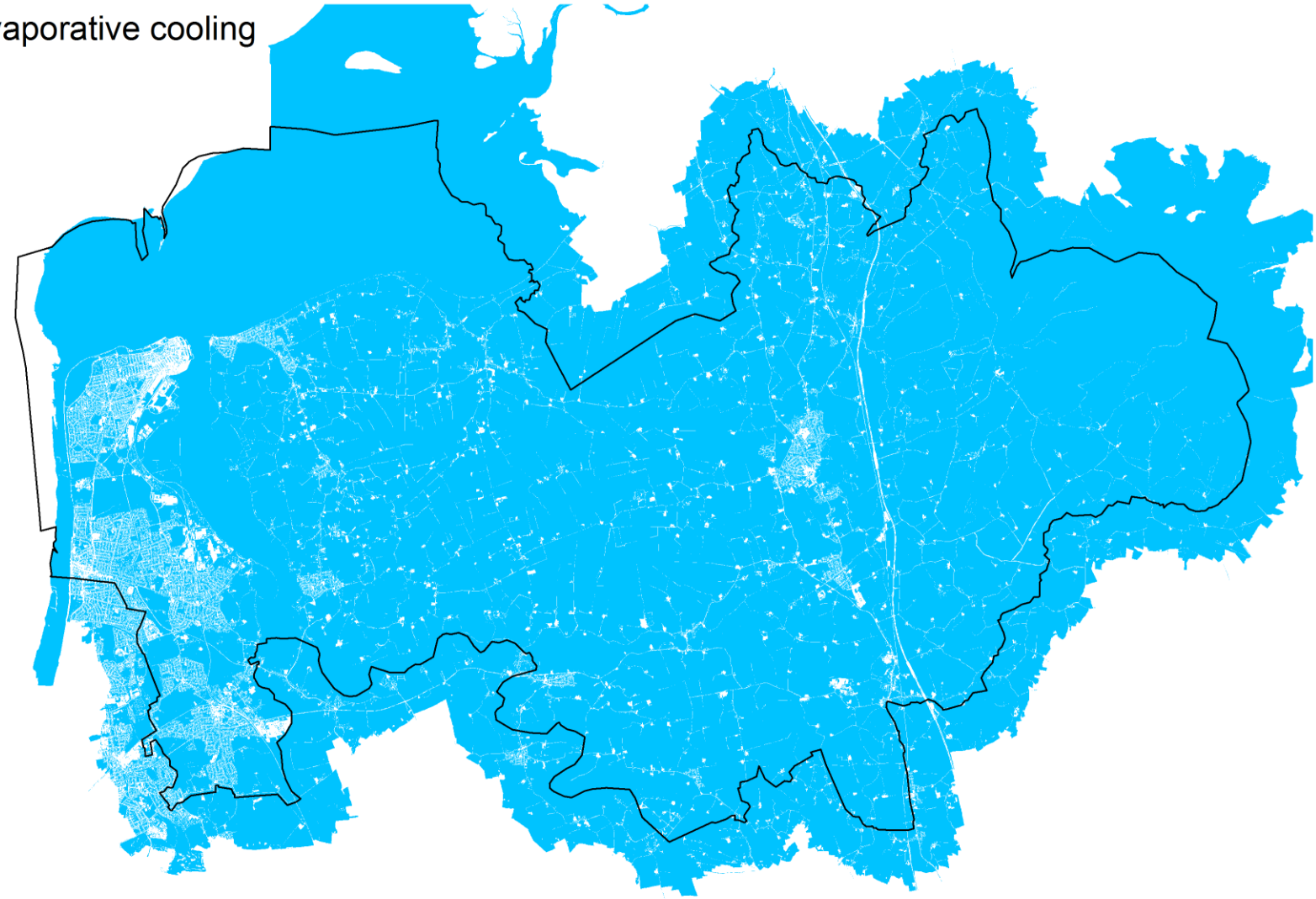
Culture



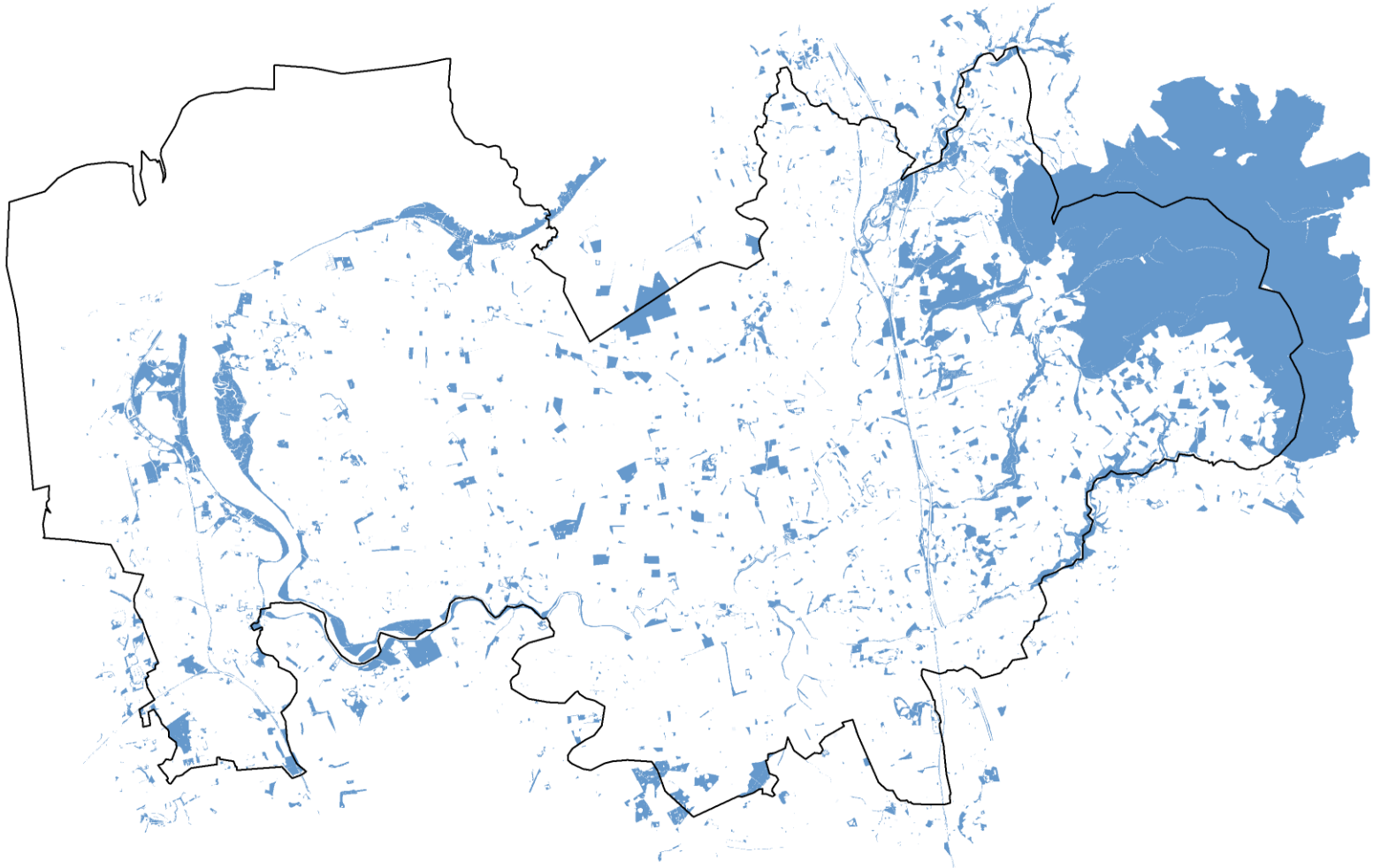
Encouraging green travel



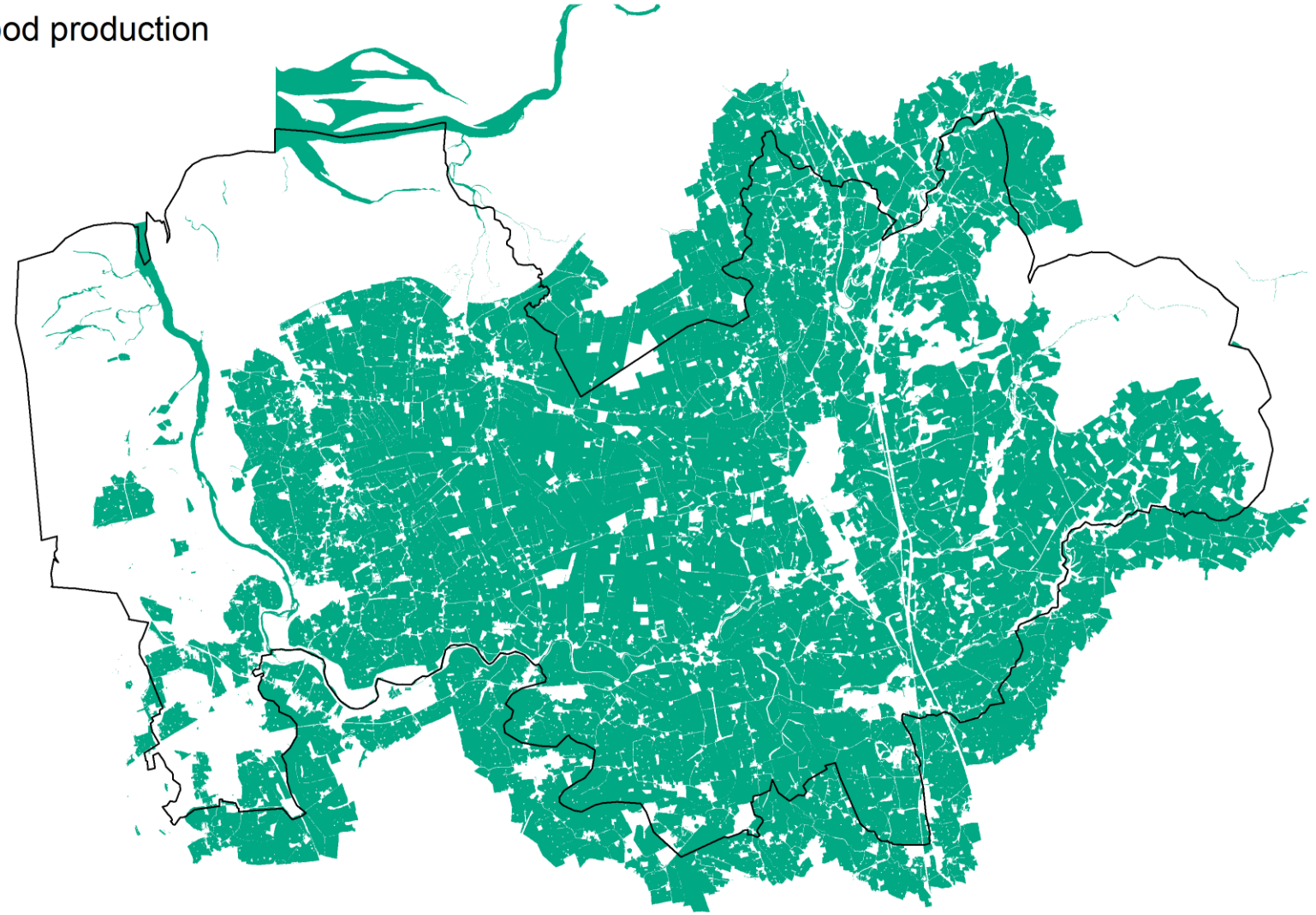
Evaporative cooling



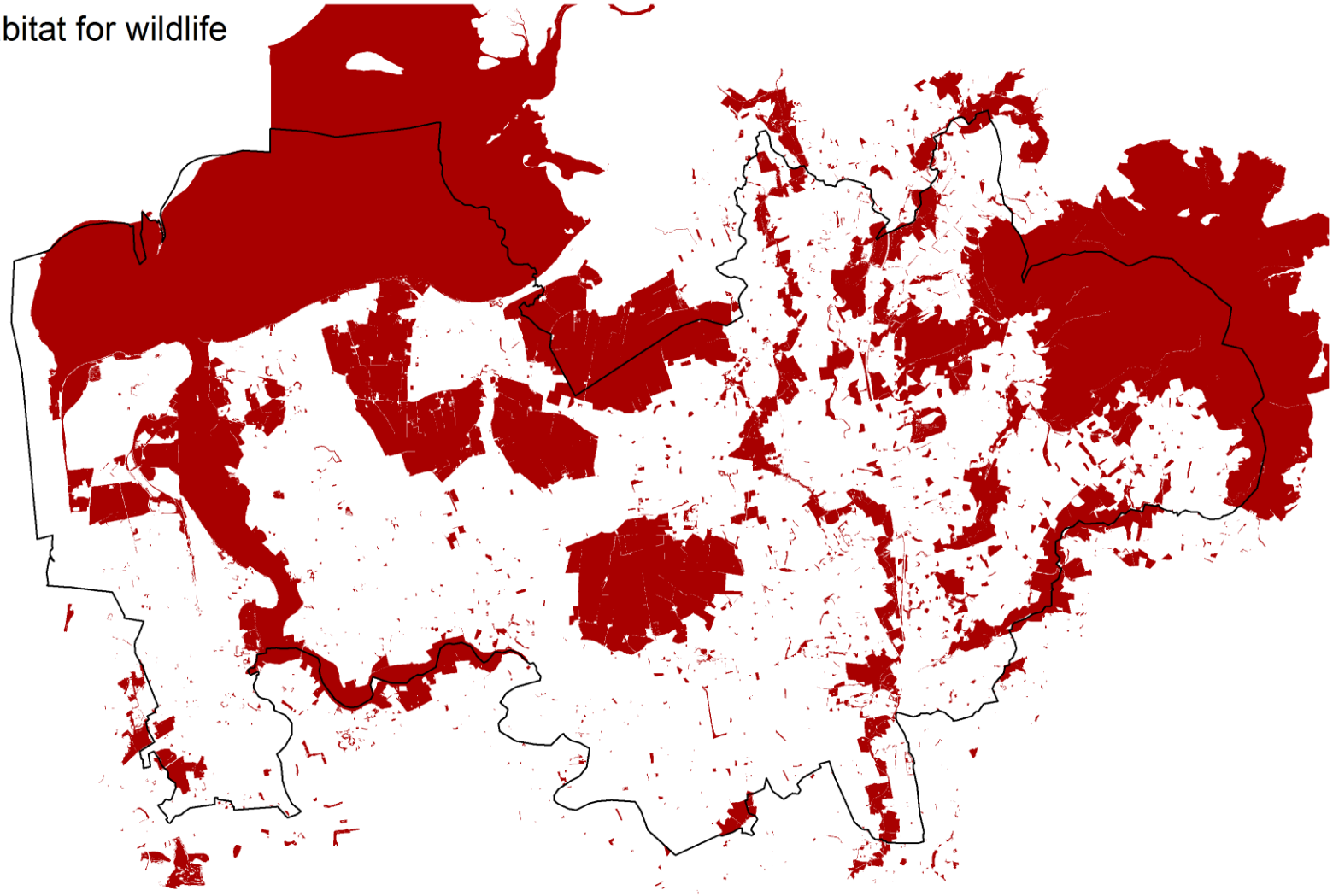
Flow reduction through surface roughness



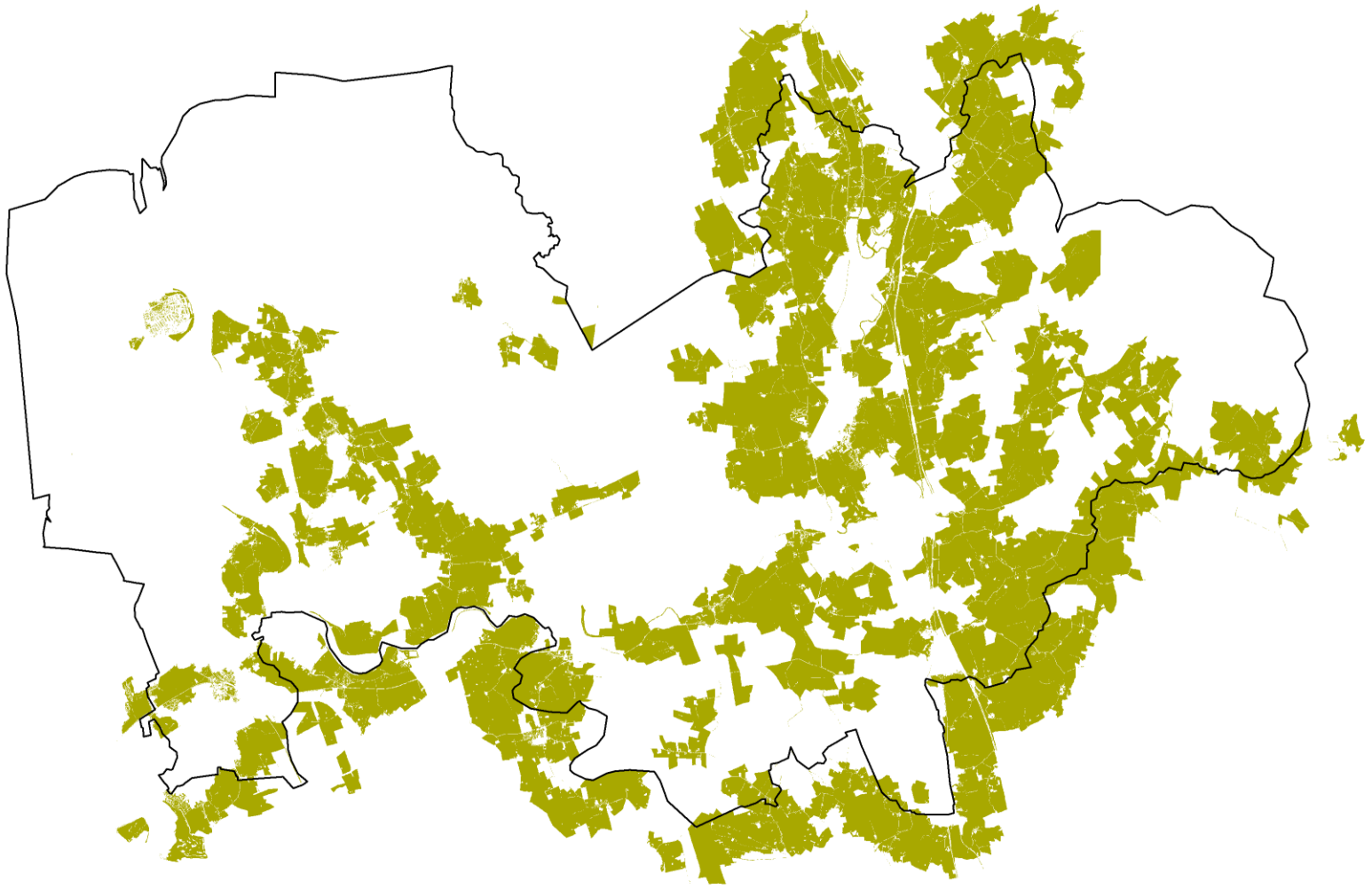
Food production



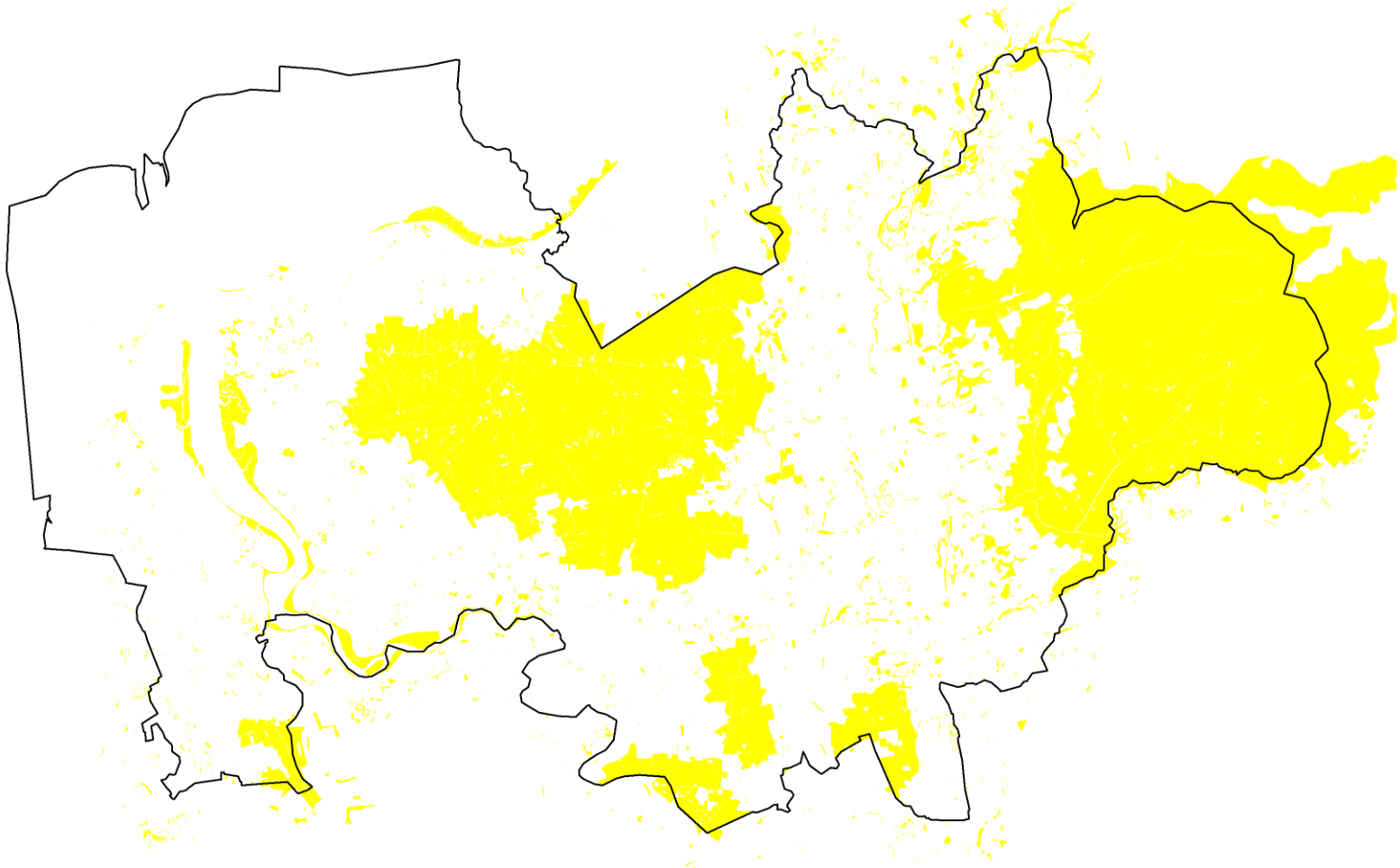
Habitat for wildlife



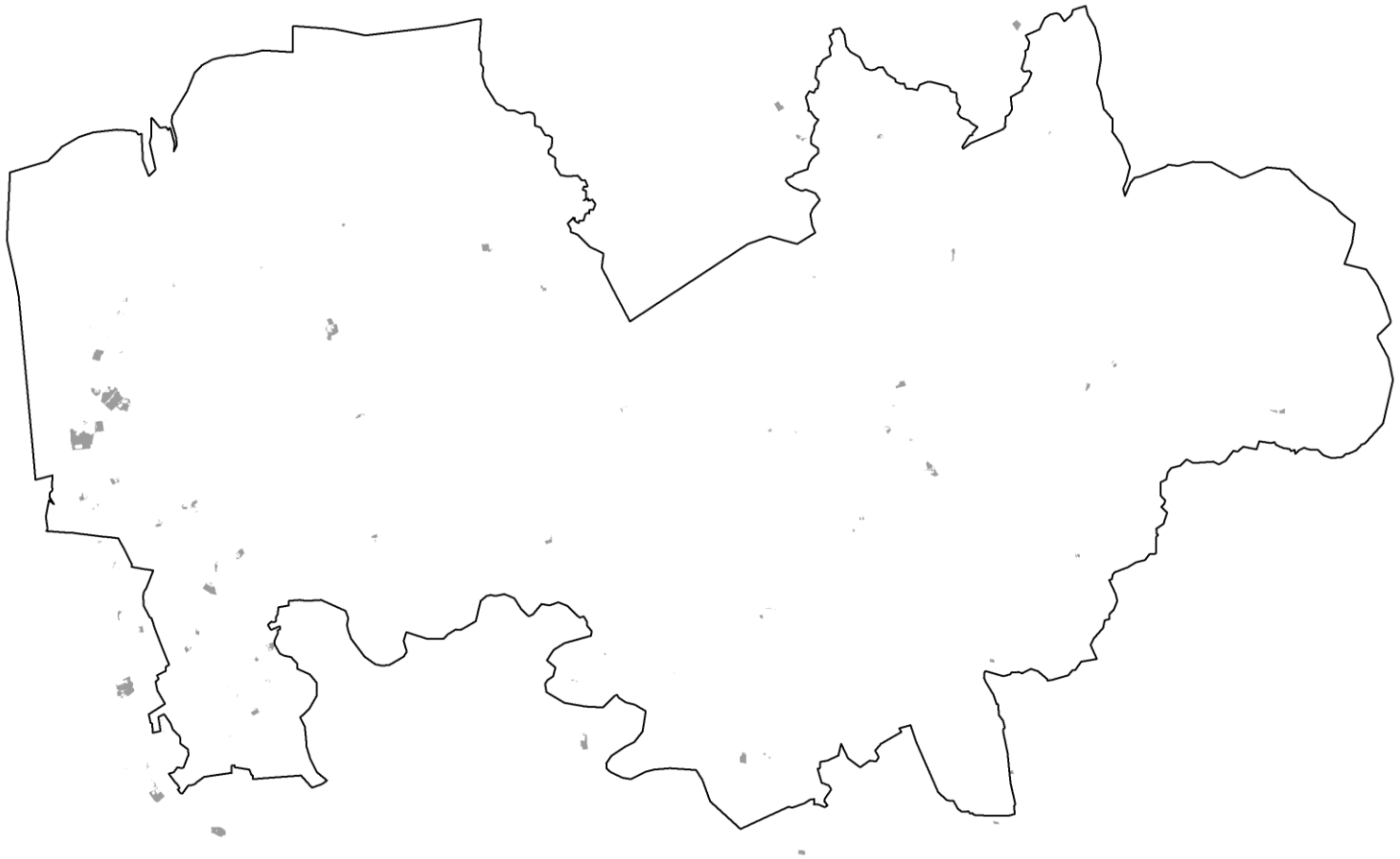
Heritage



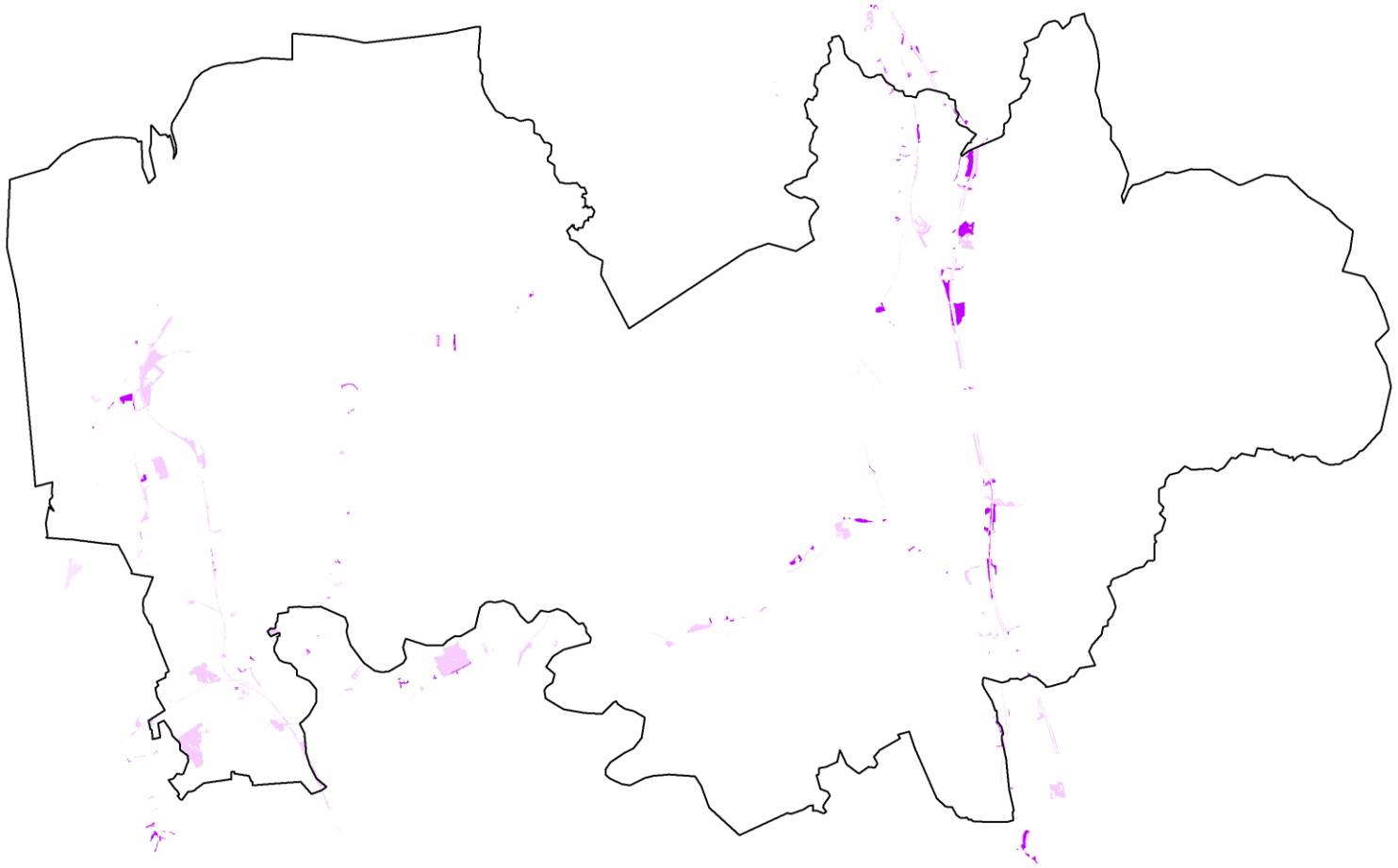
Inaccessible water storage



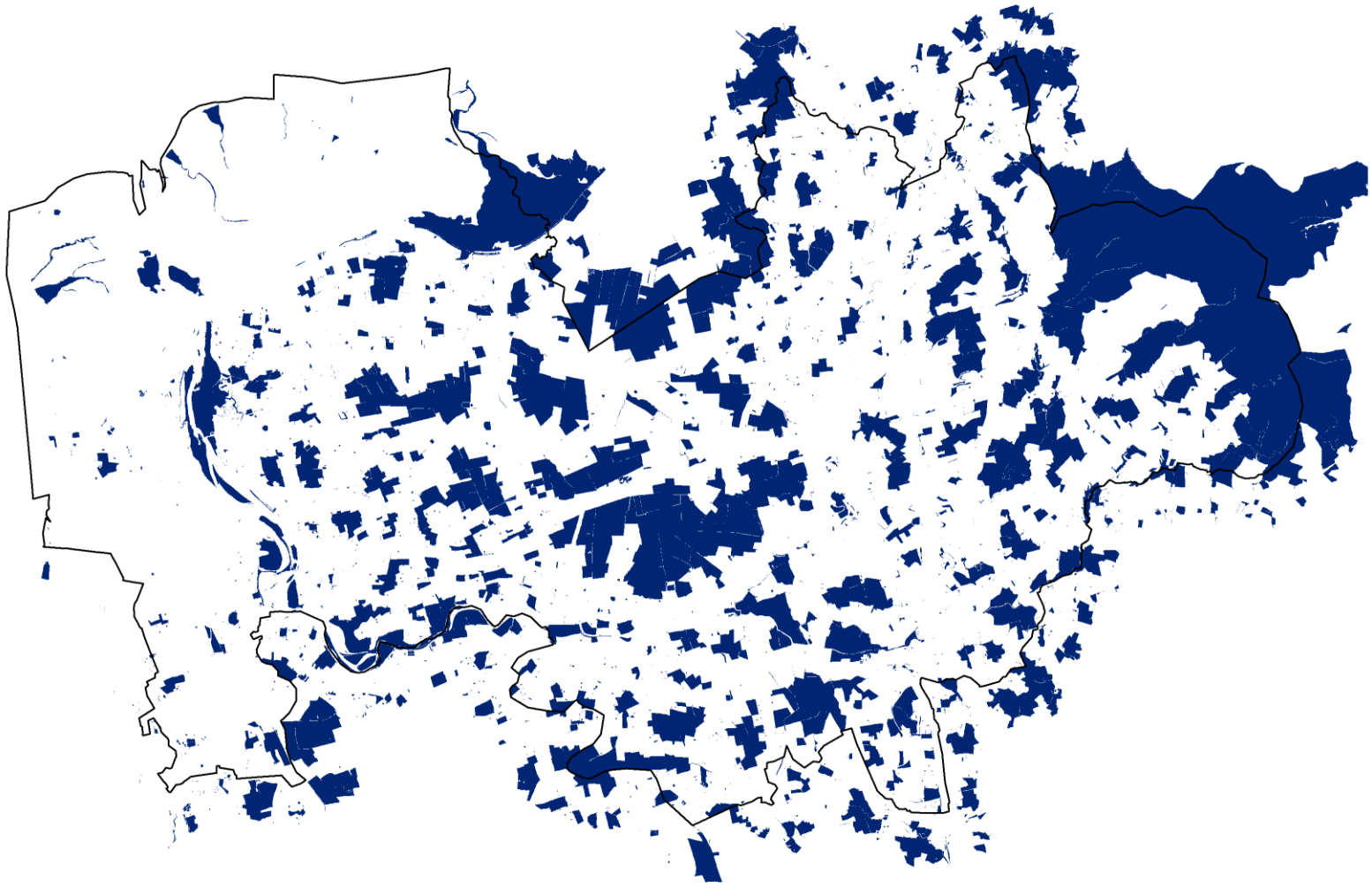
Learning



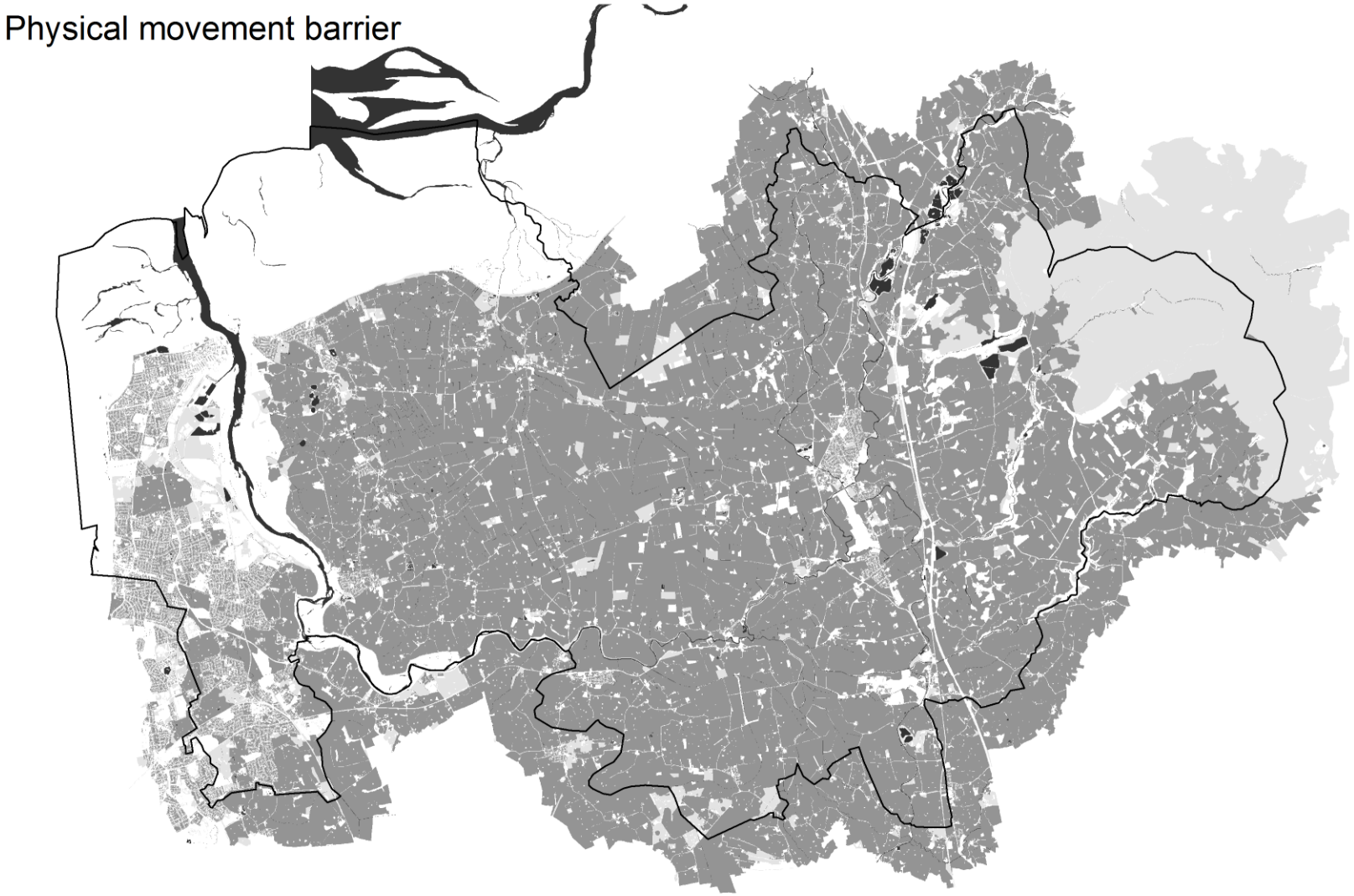
Noise absorption



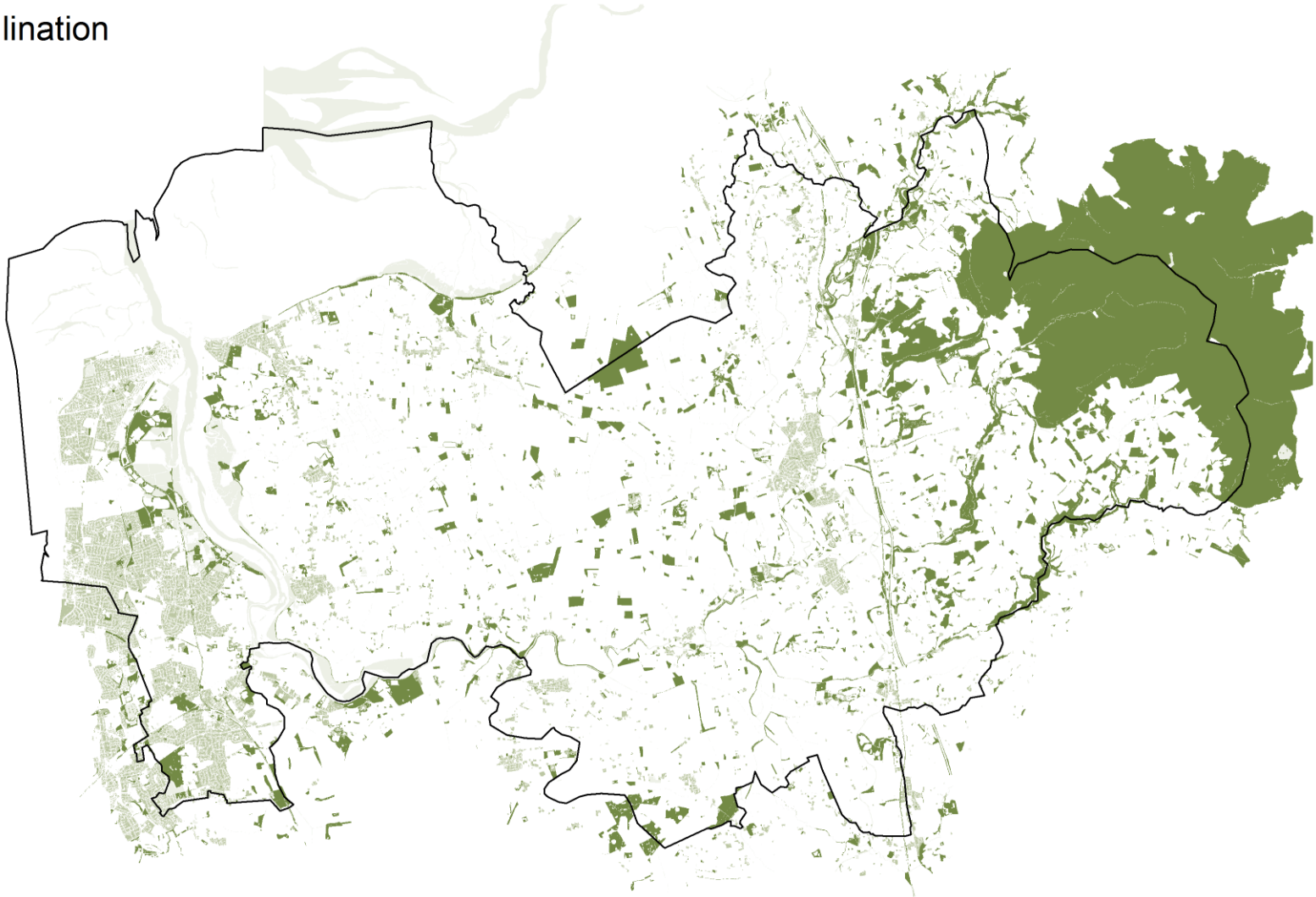
Opportunity to hear more natural sound



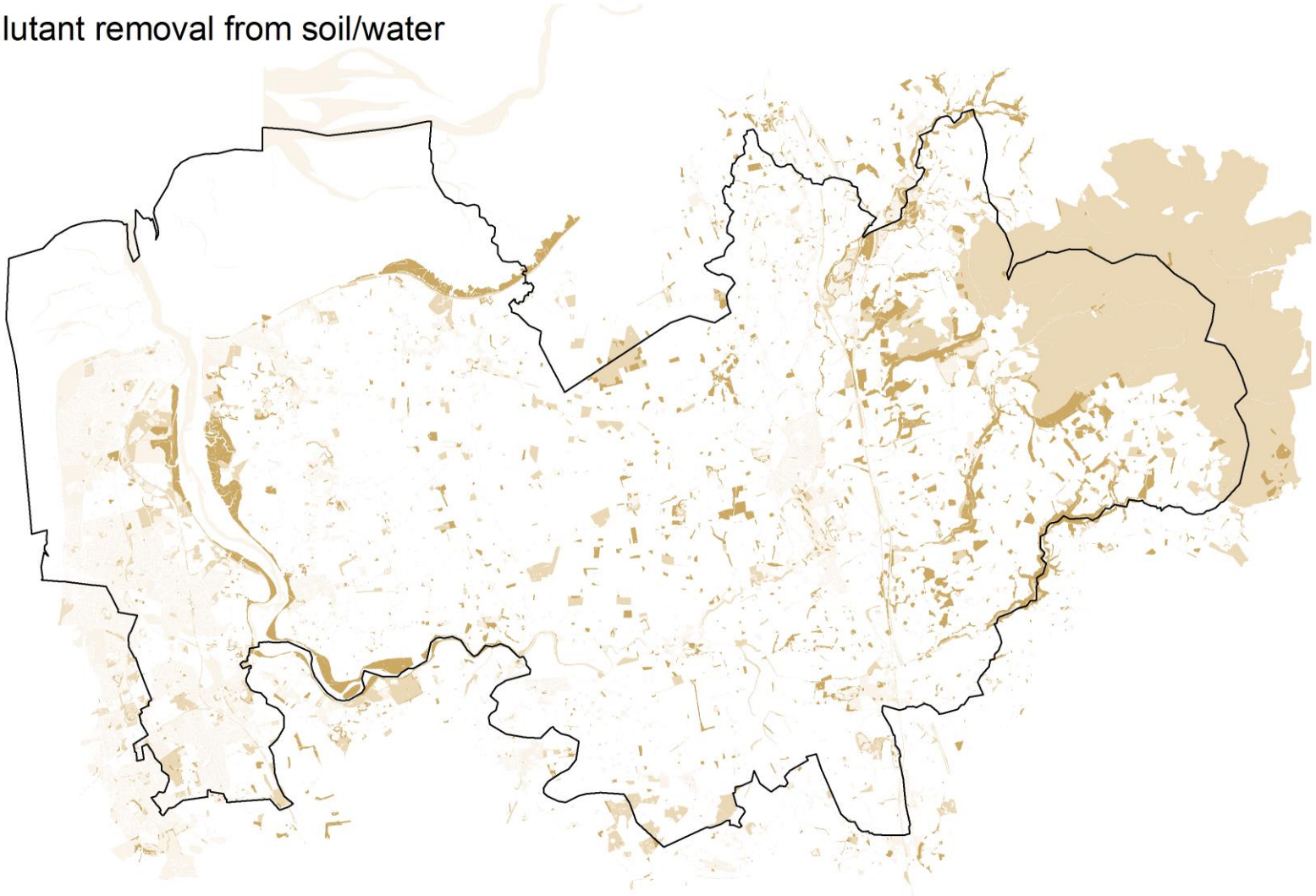
Pest and disease control



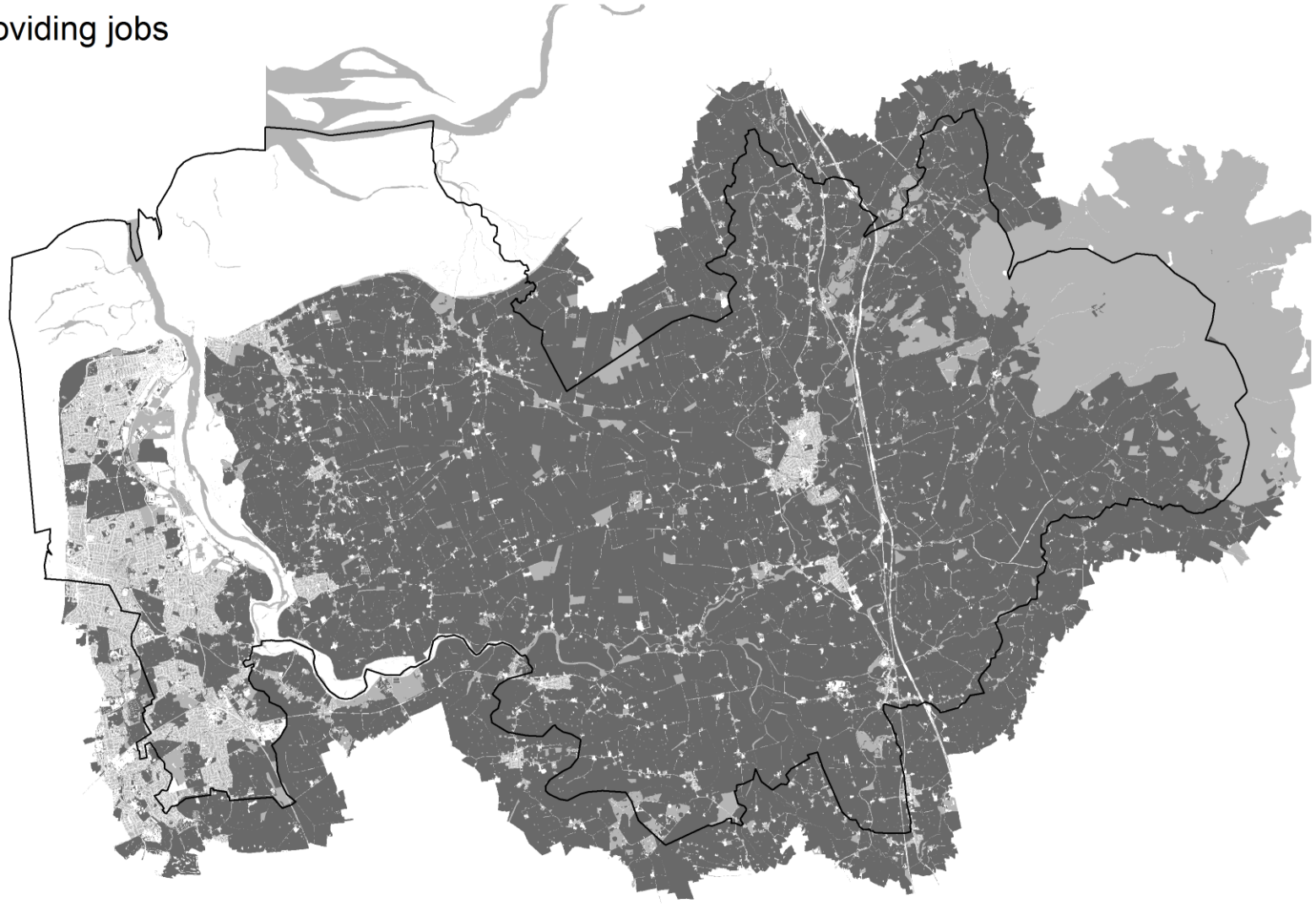
Pollination

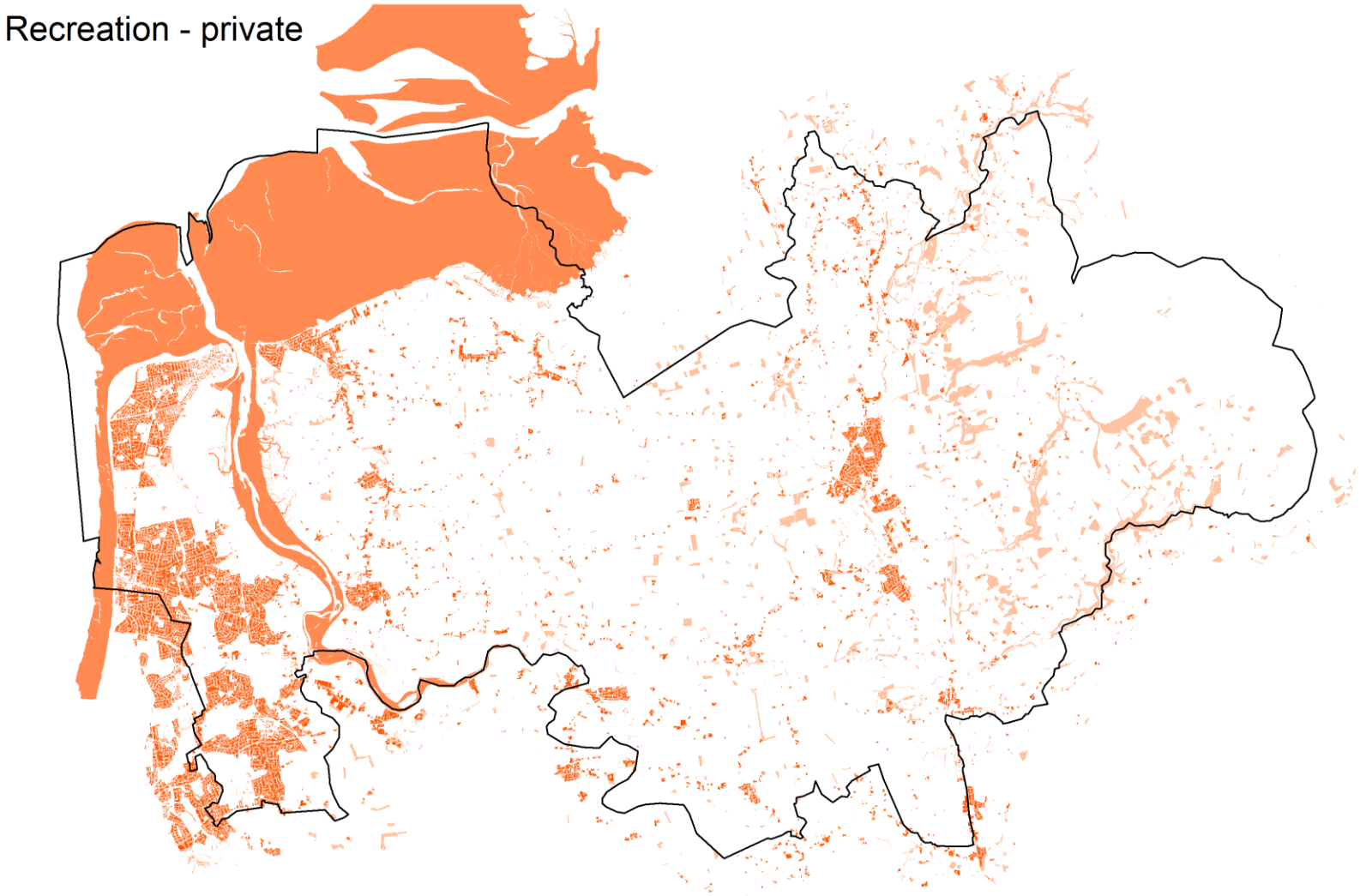


Pollutant removal from soil/water

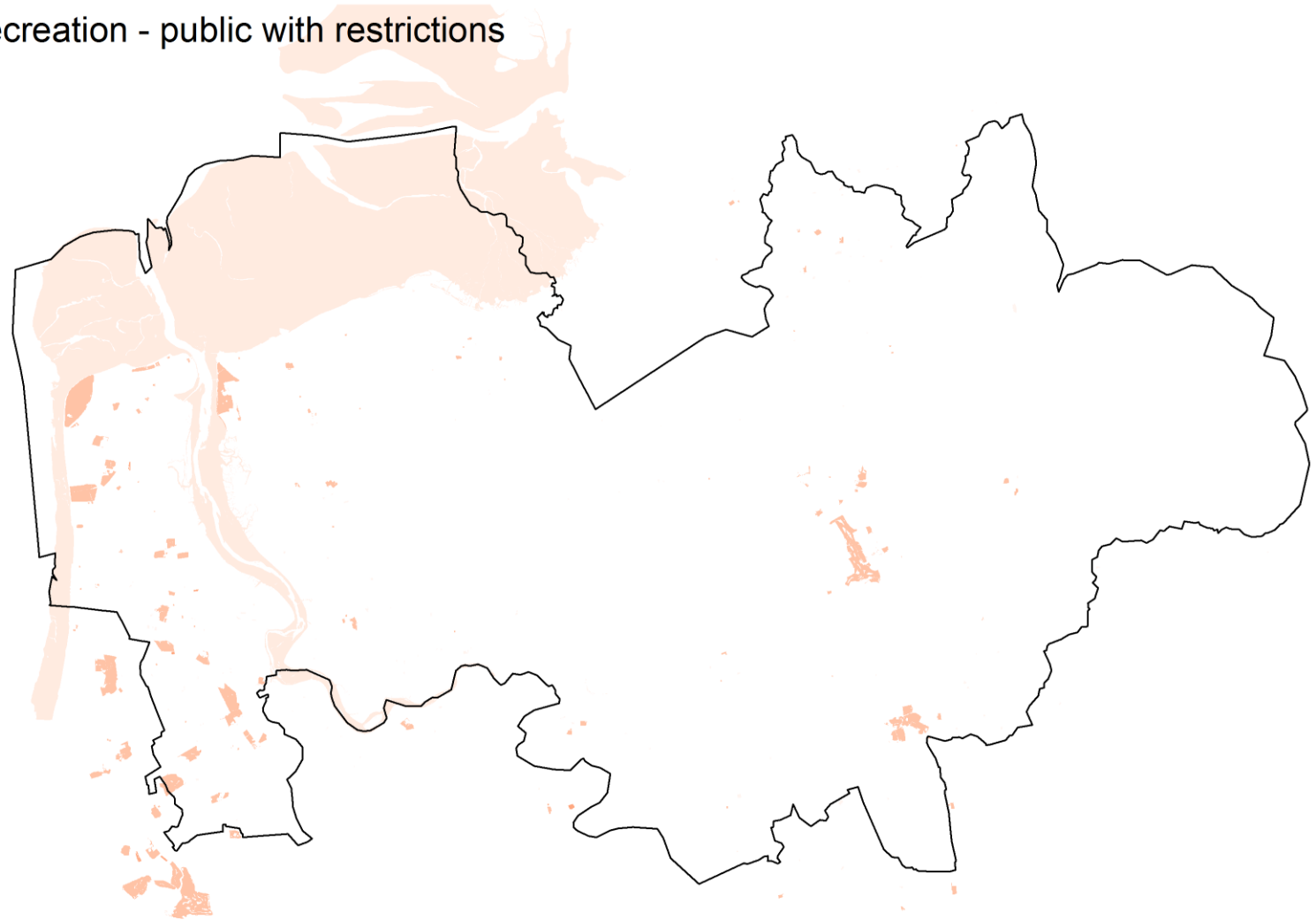


Providing jobs

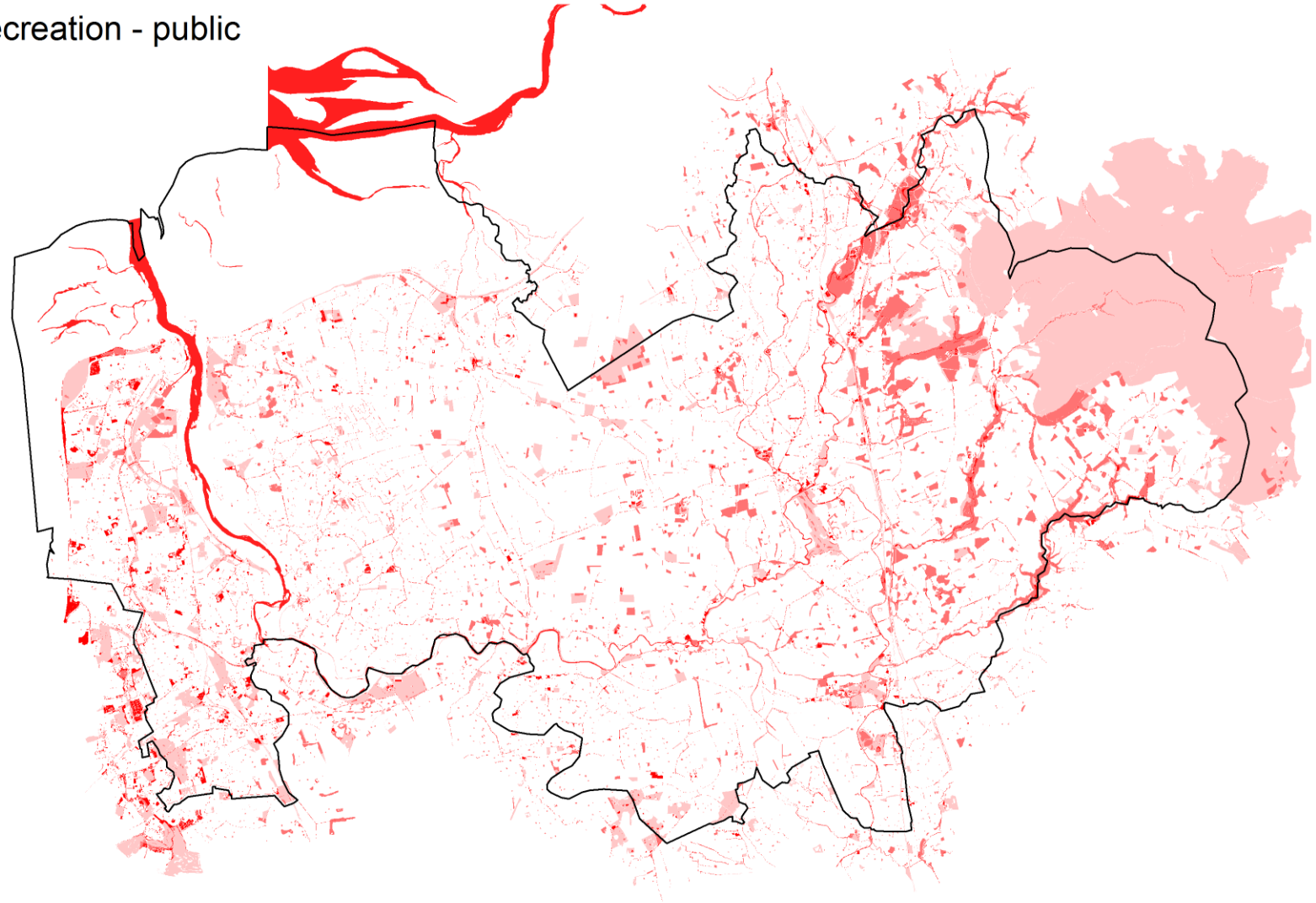




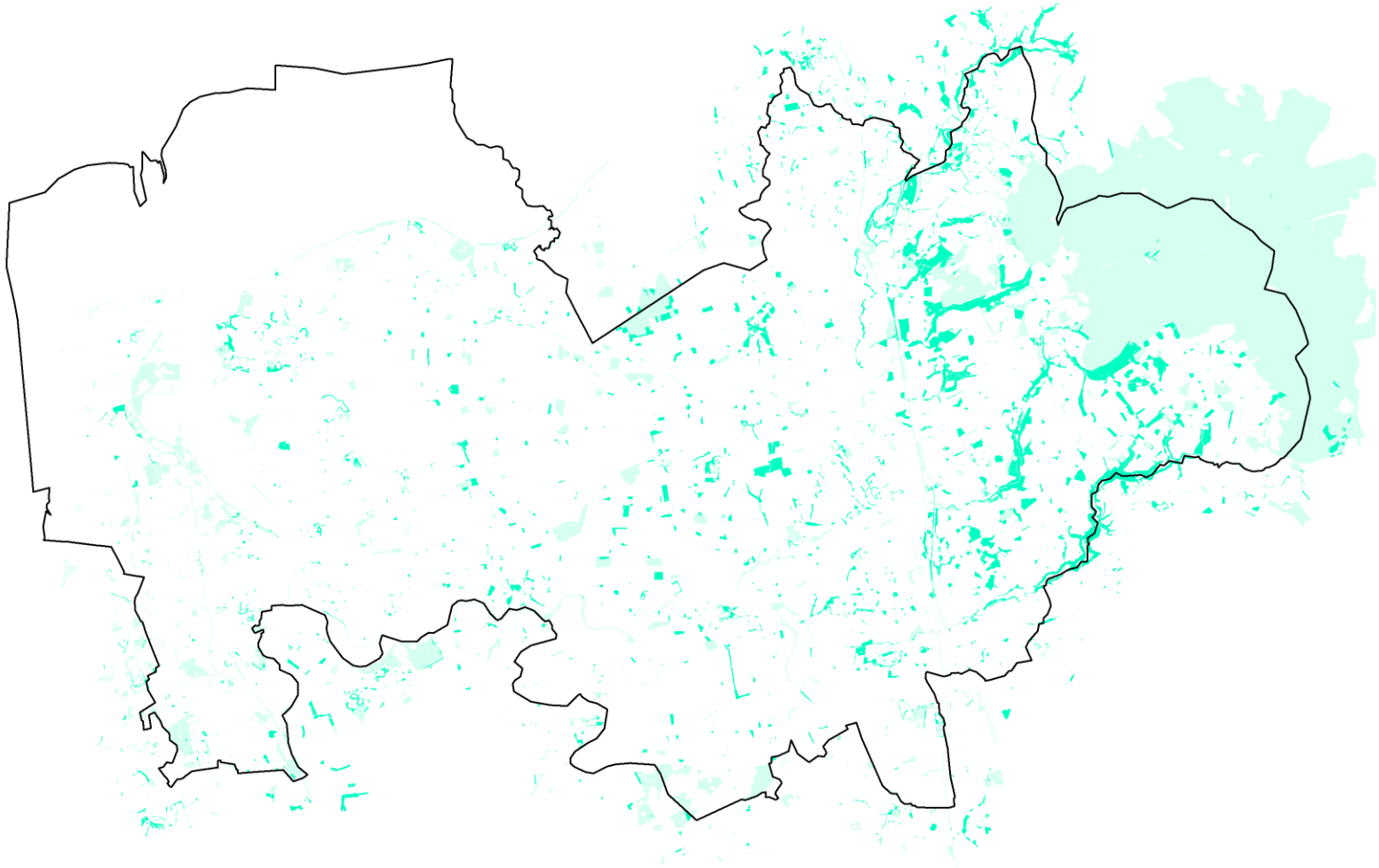
Recreation - public with restrictions



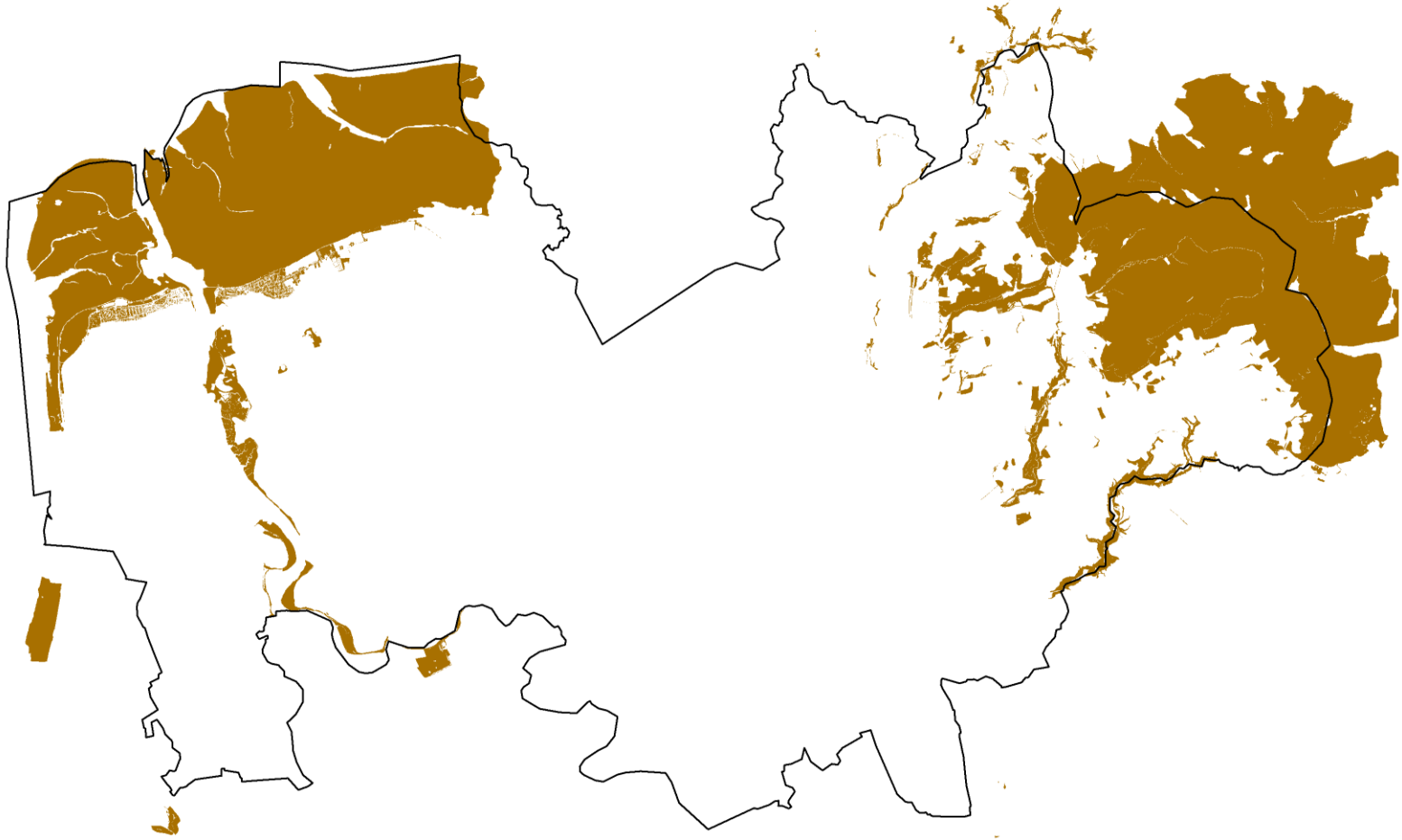
Recreation - public



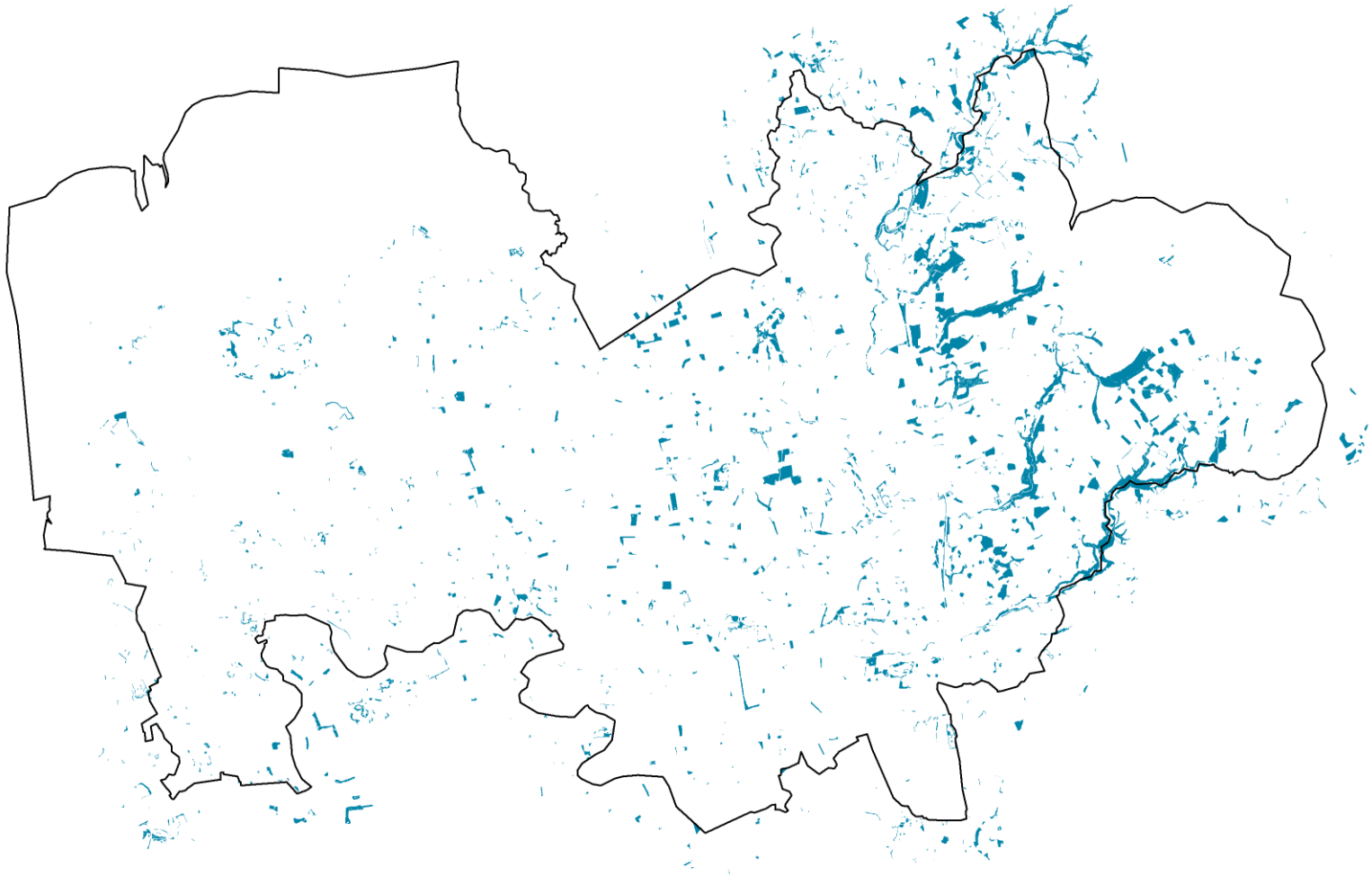
Shading from the sun



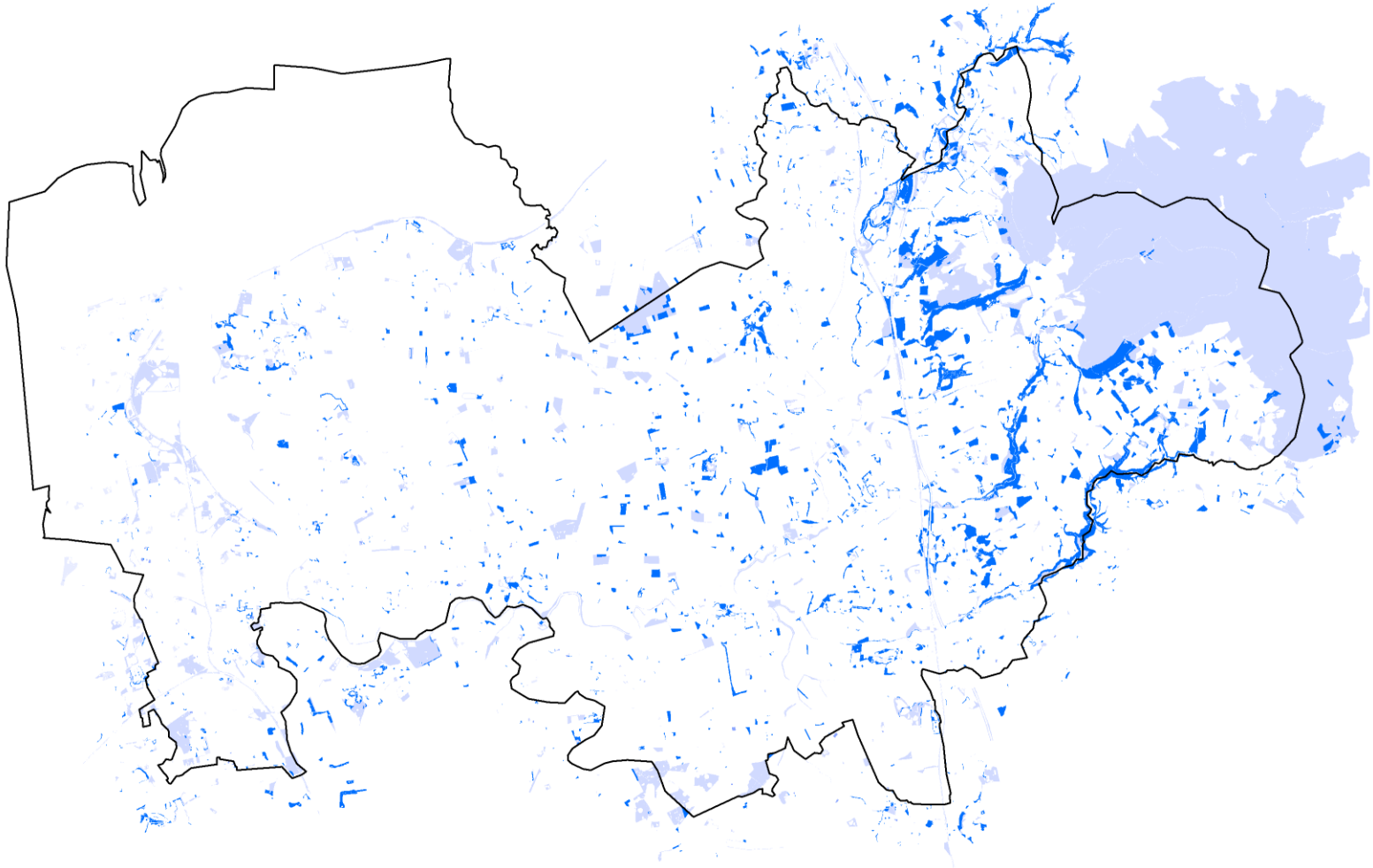
Soil stabilisation



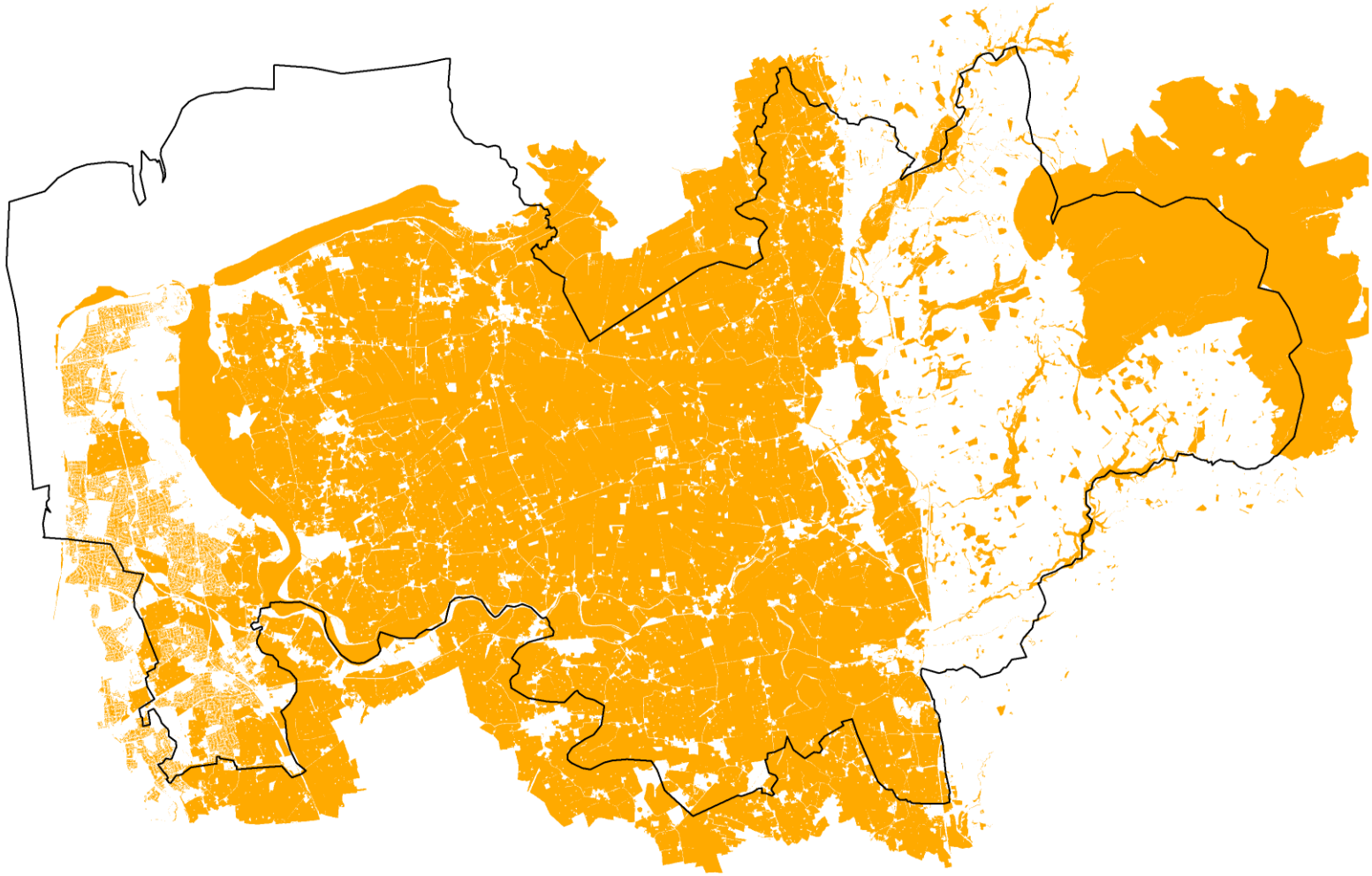
Timber production



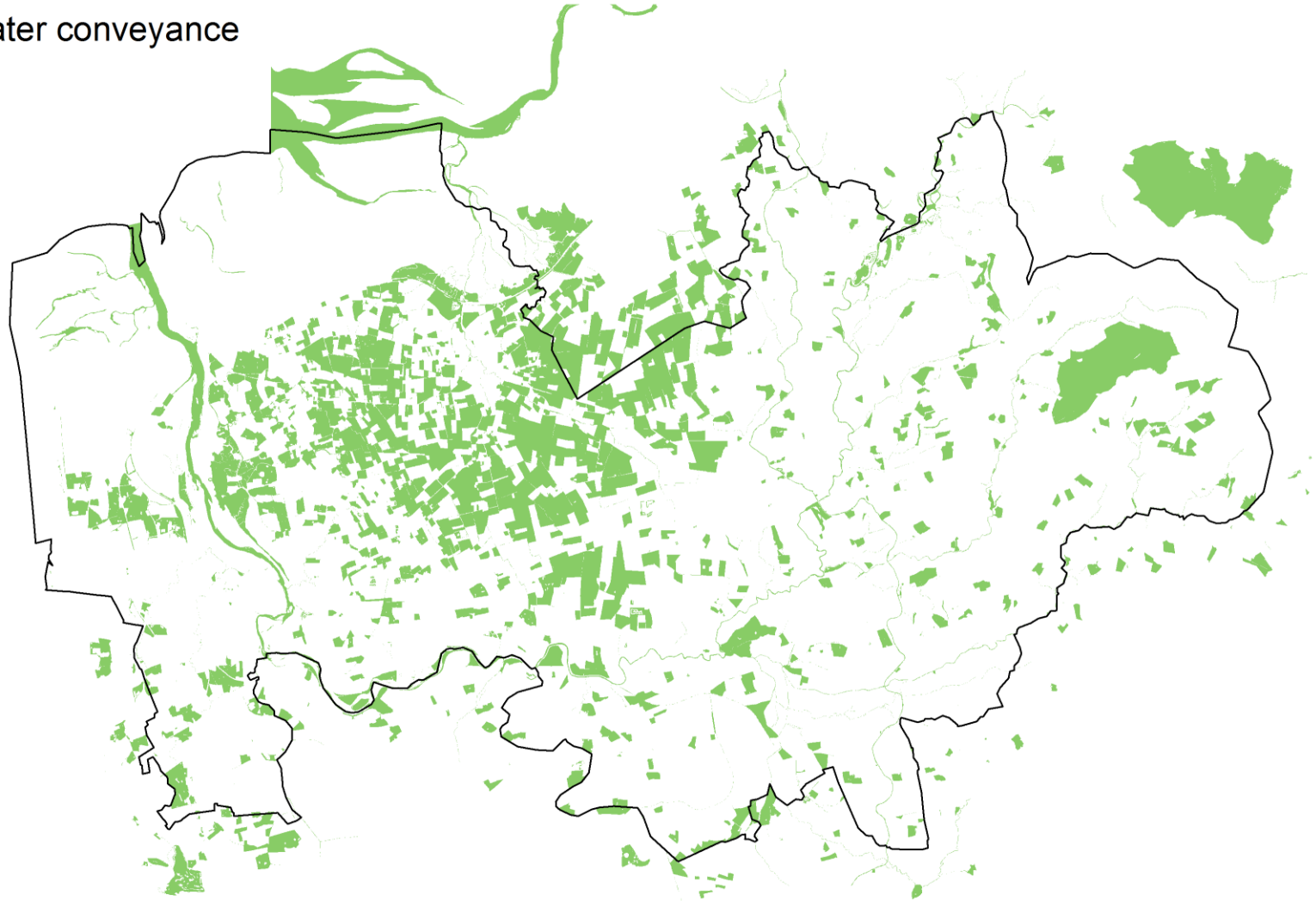
Trapping air pollutants



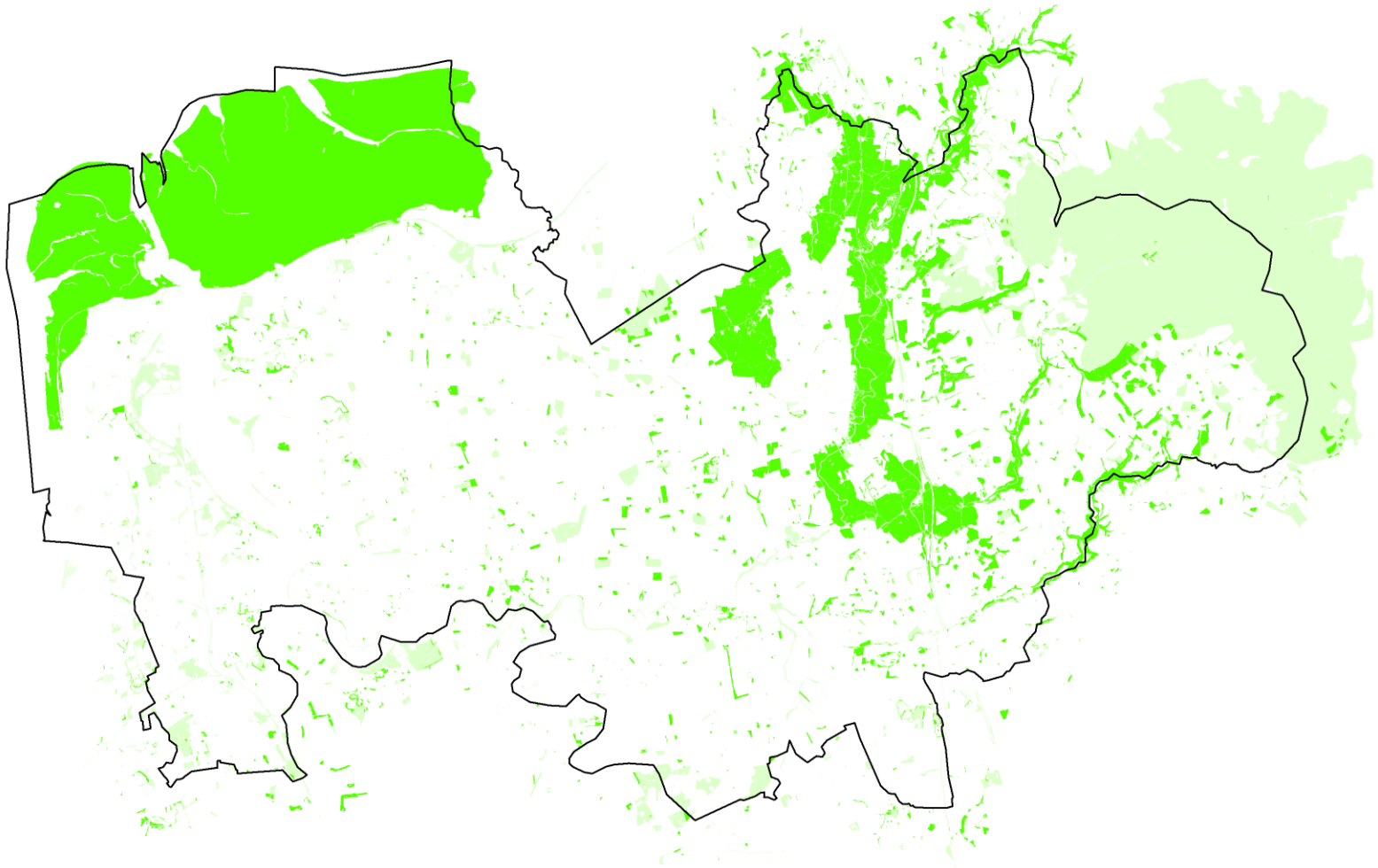
Visual contribution to landscape character



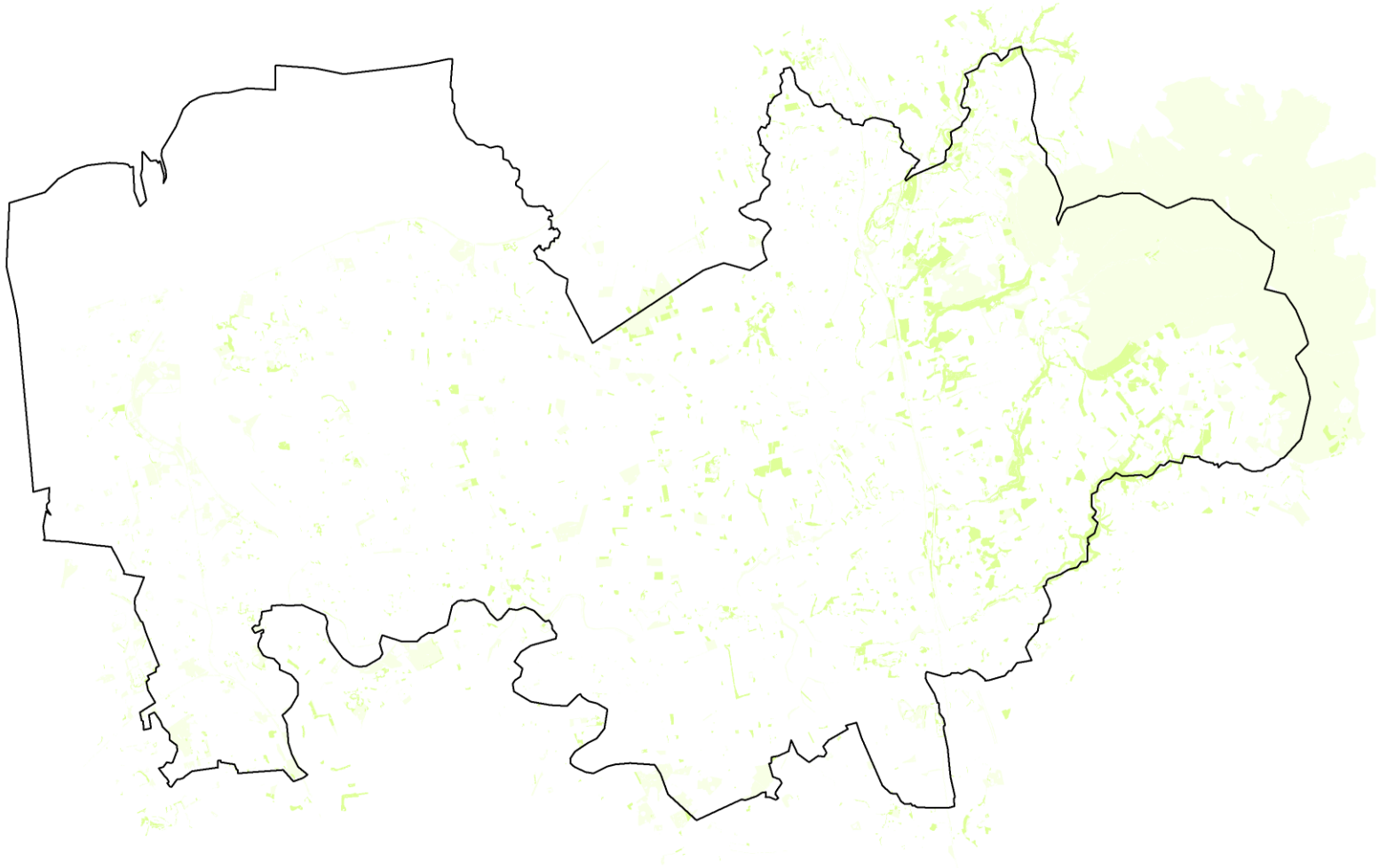
Water conveyance



Water infiltration



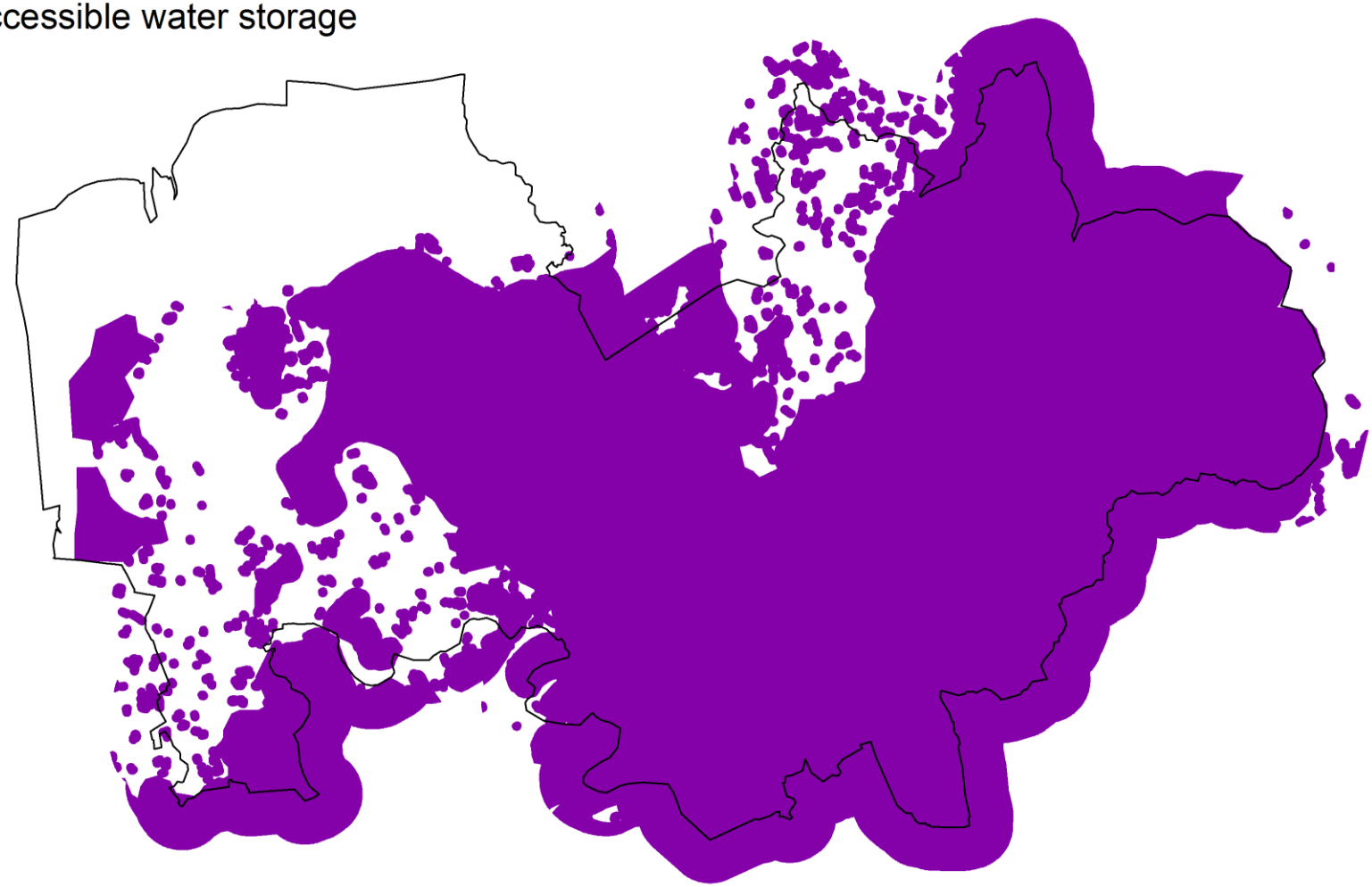
Water interception



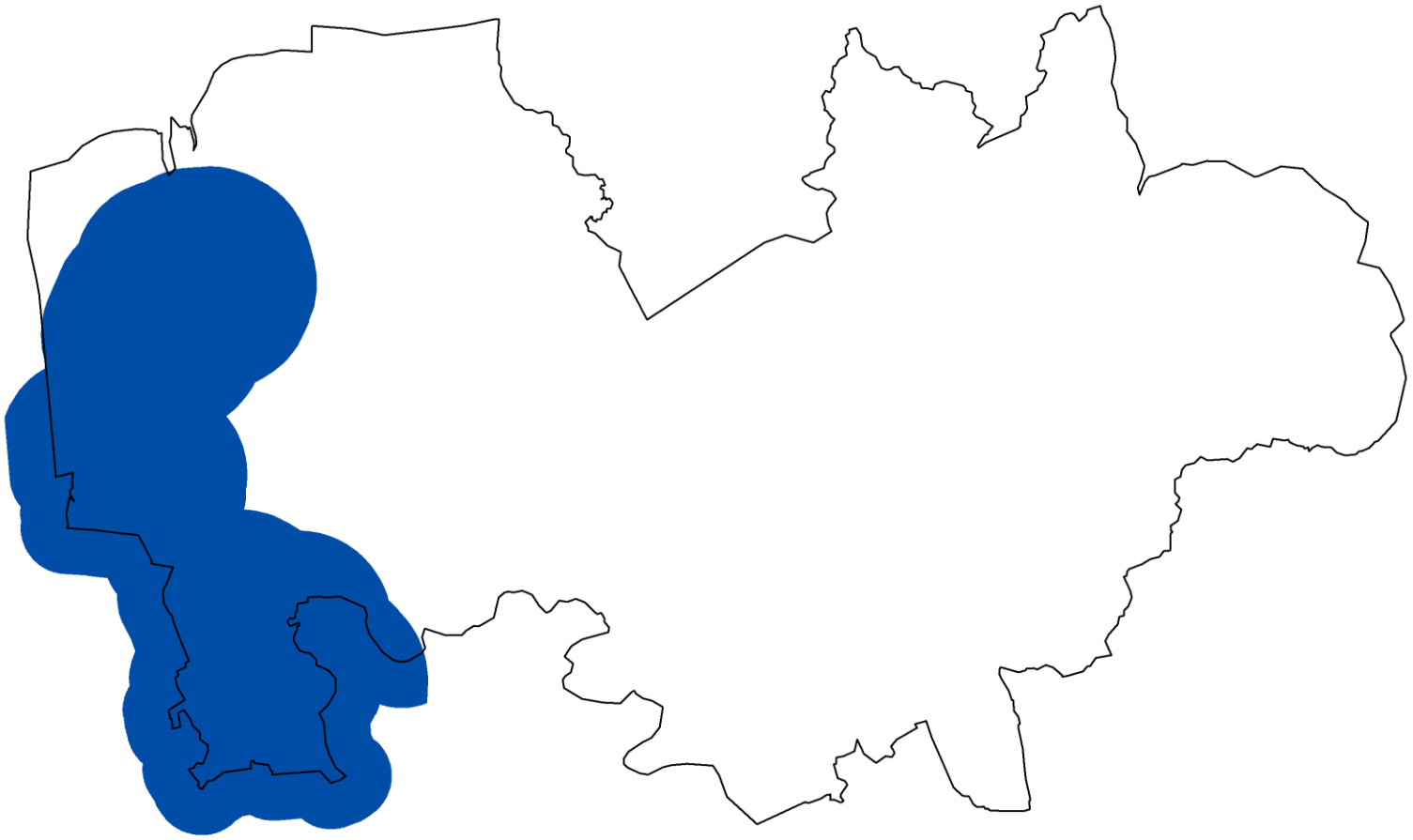
Wind shelter

Need maps

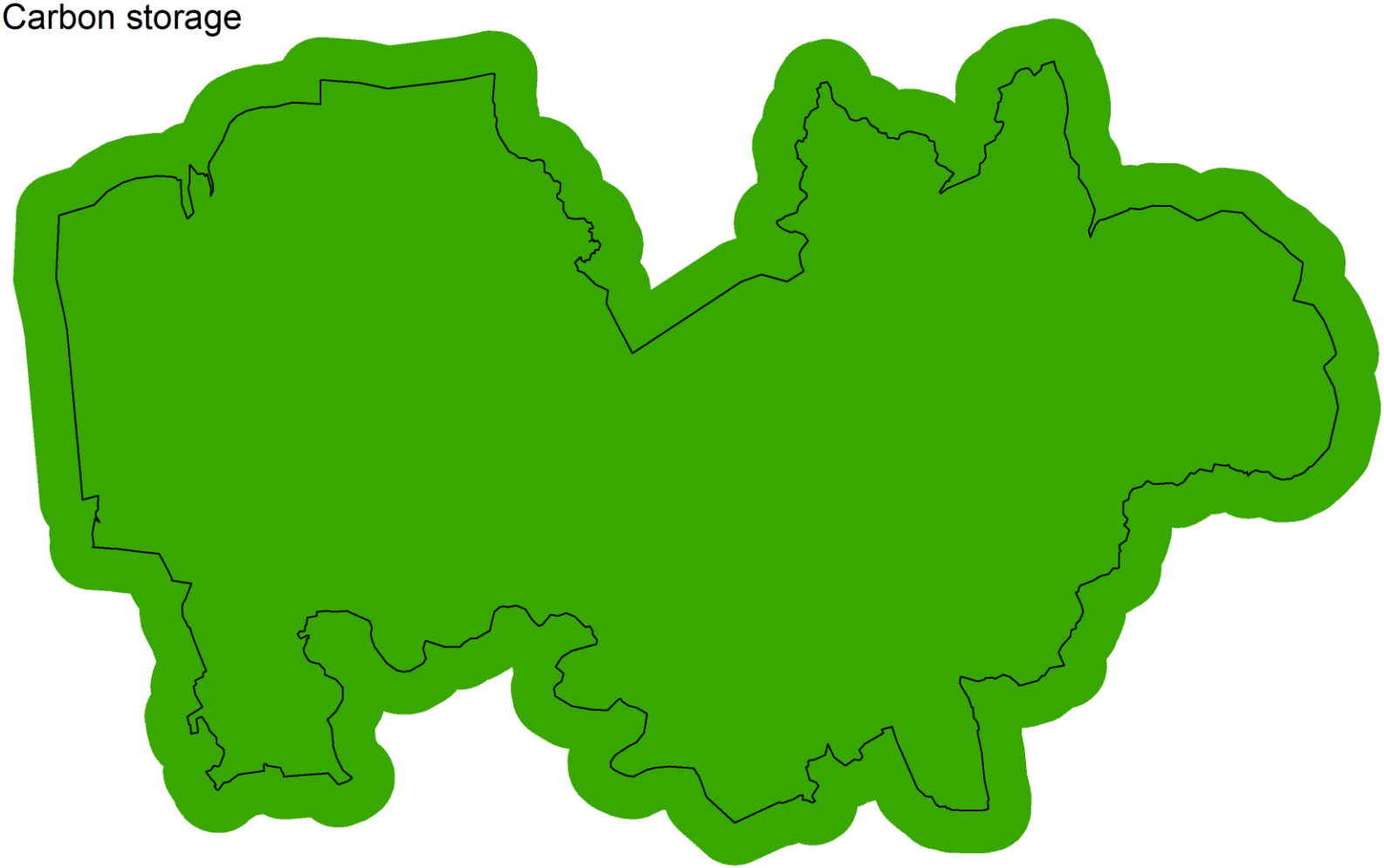
Greatest need for
Accessible water storage



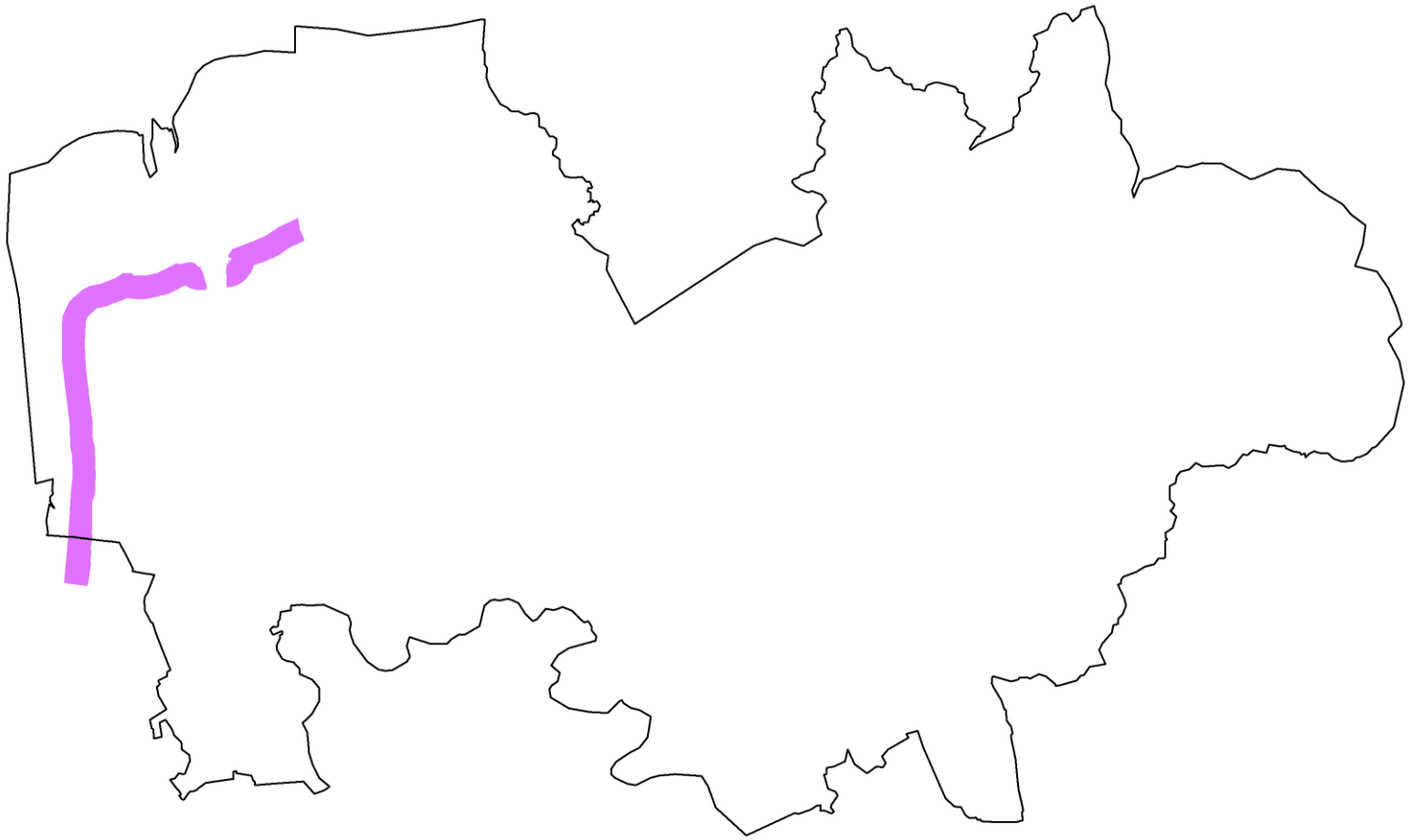
Greatest need for
Biofuels production



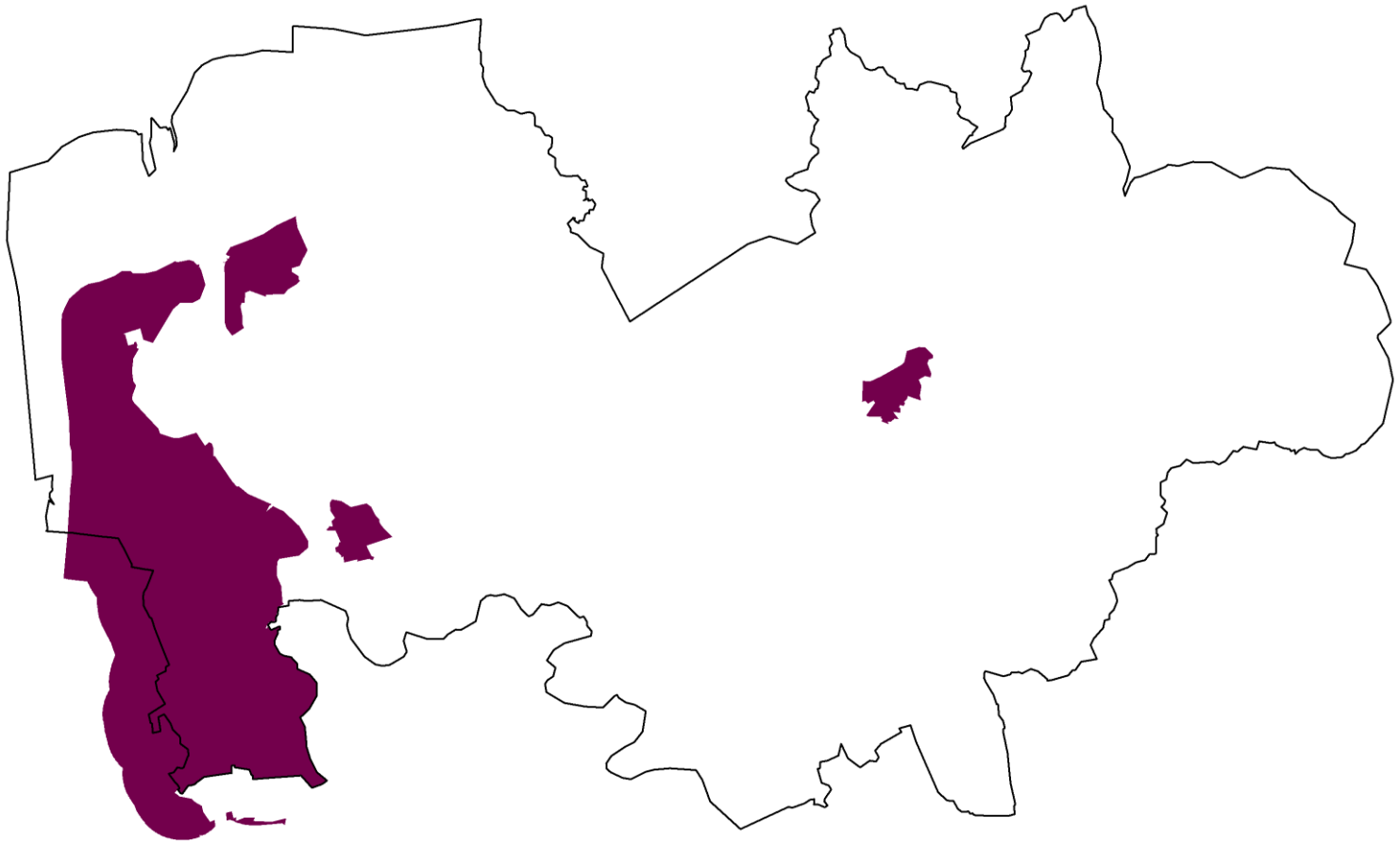
Greatest need for
Carbon storage



Greatest need for
Coastal storm protection

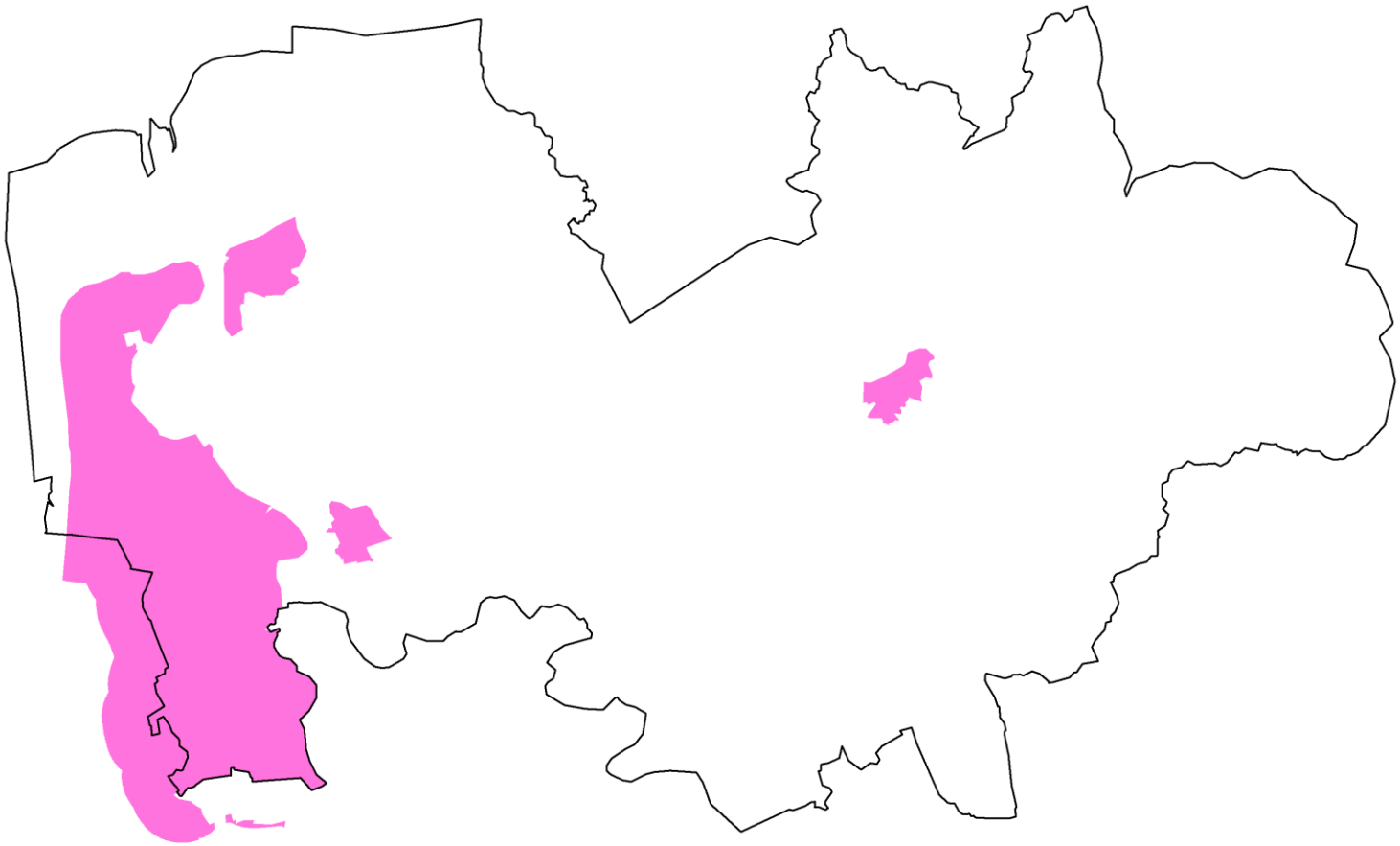


Greatest need for
Community cohesion



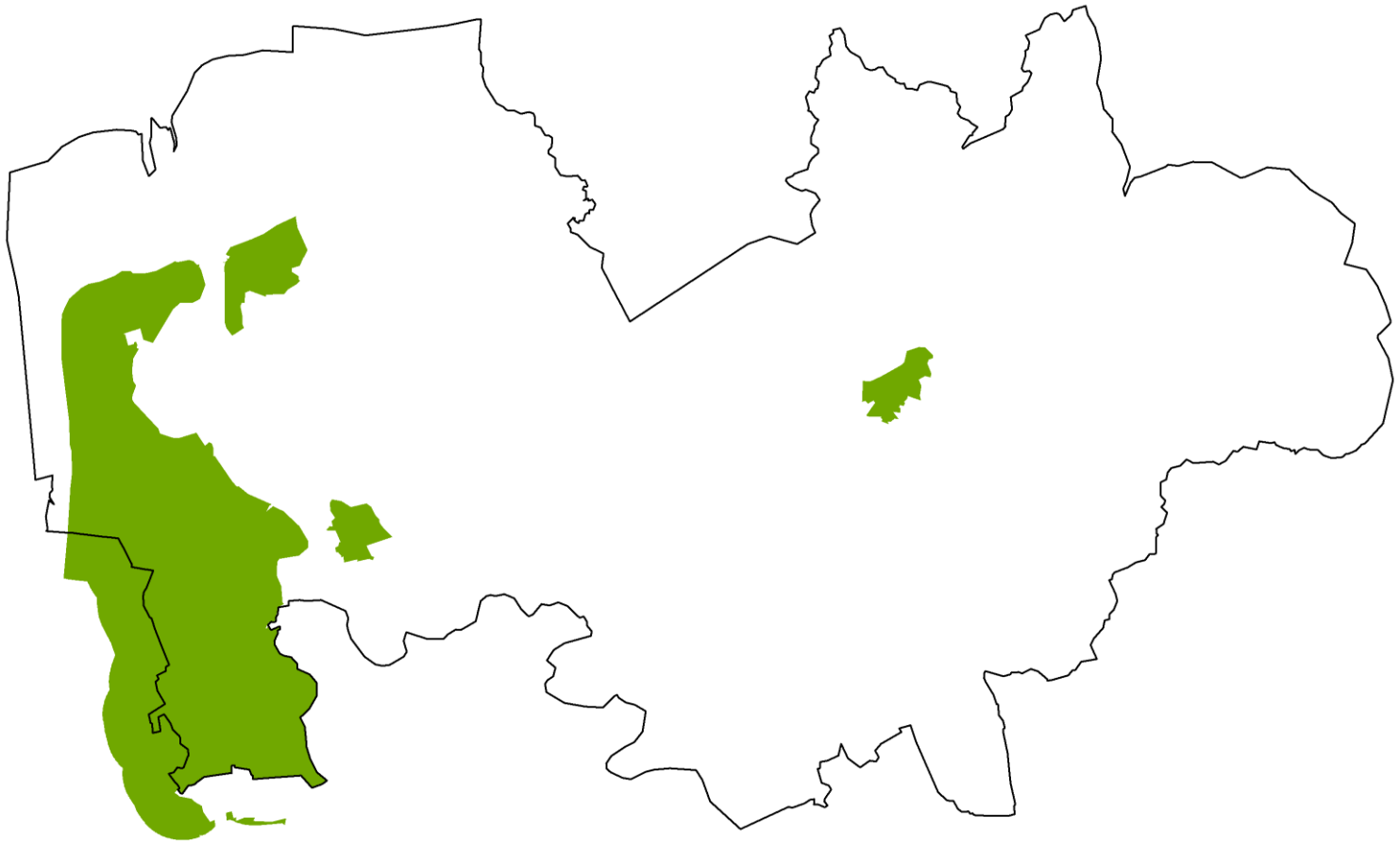
Greatest need for

Connection with local environment

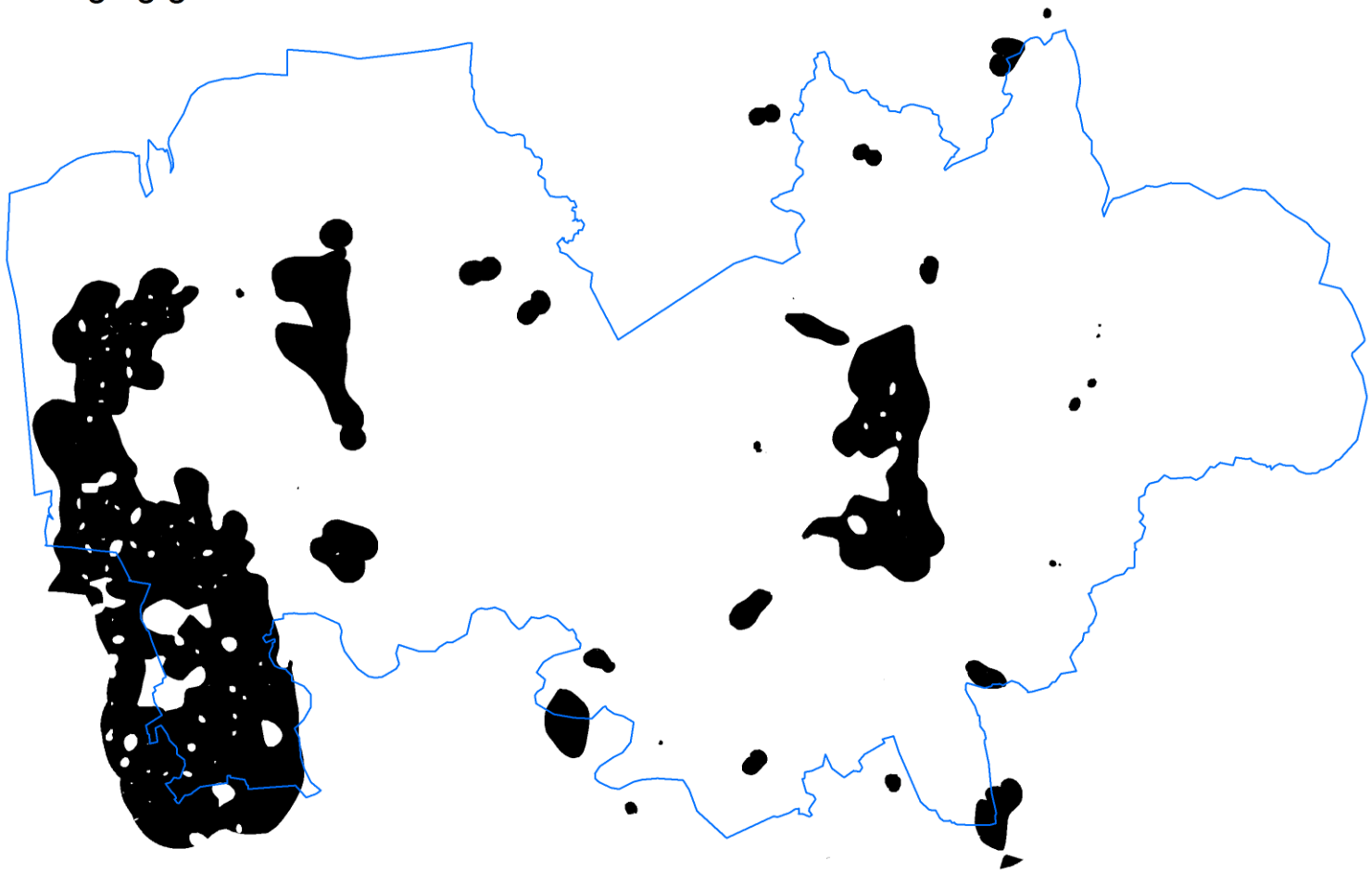


Greatest need for
Corridor for wildlife

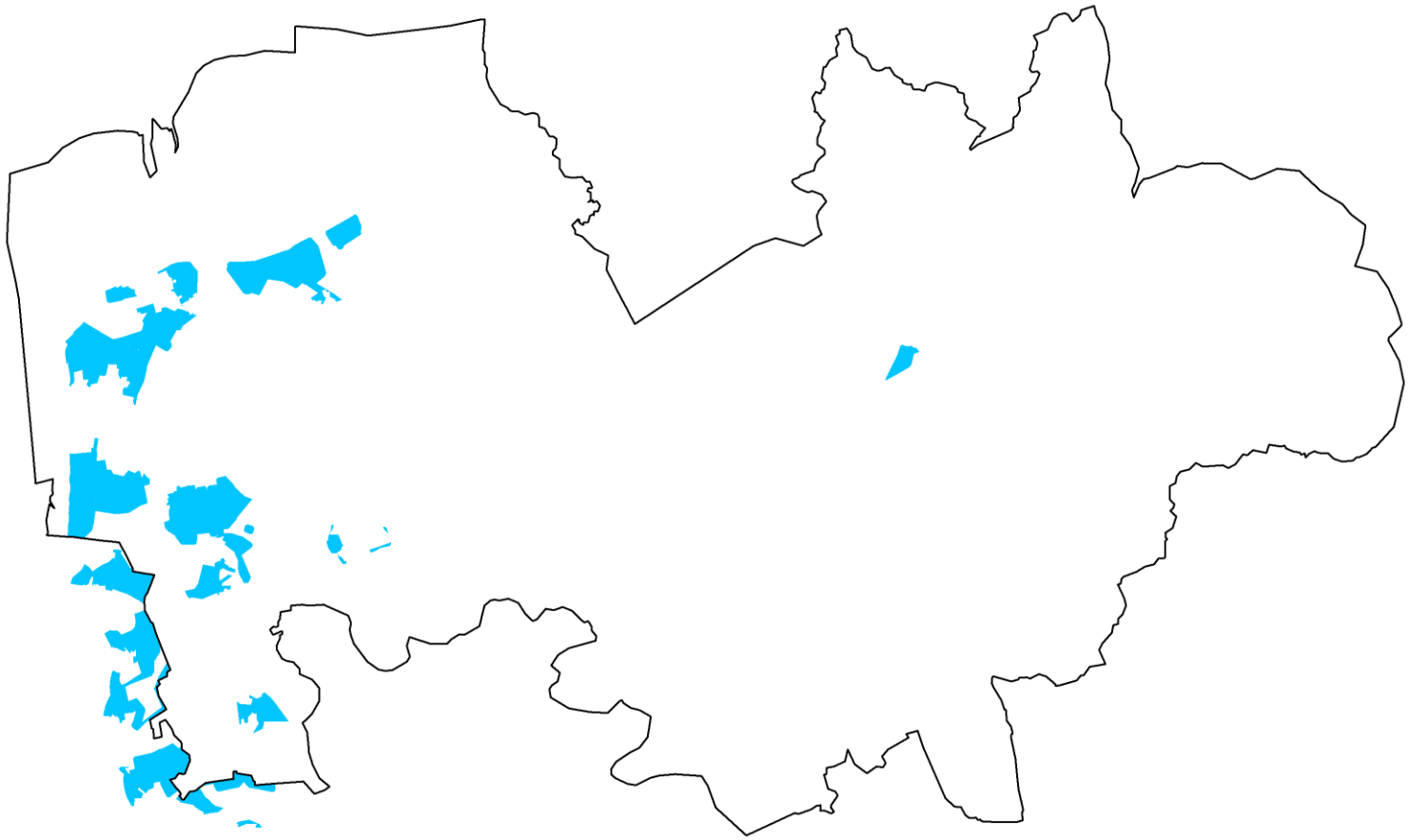
Greatest need for
Culture



Greatest need for
Encouraging green travel

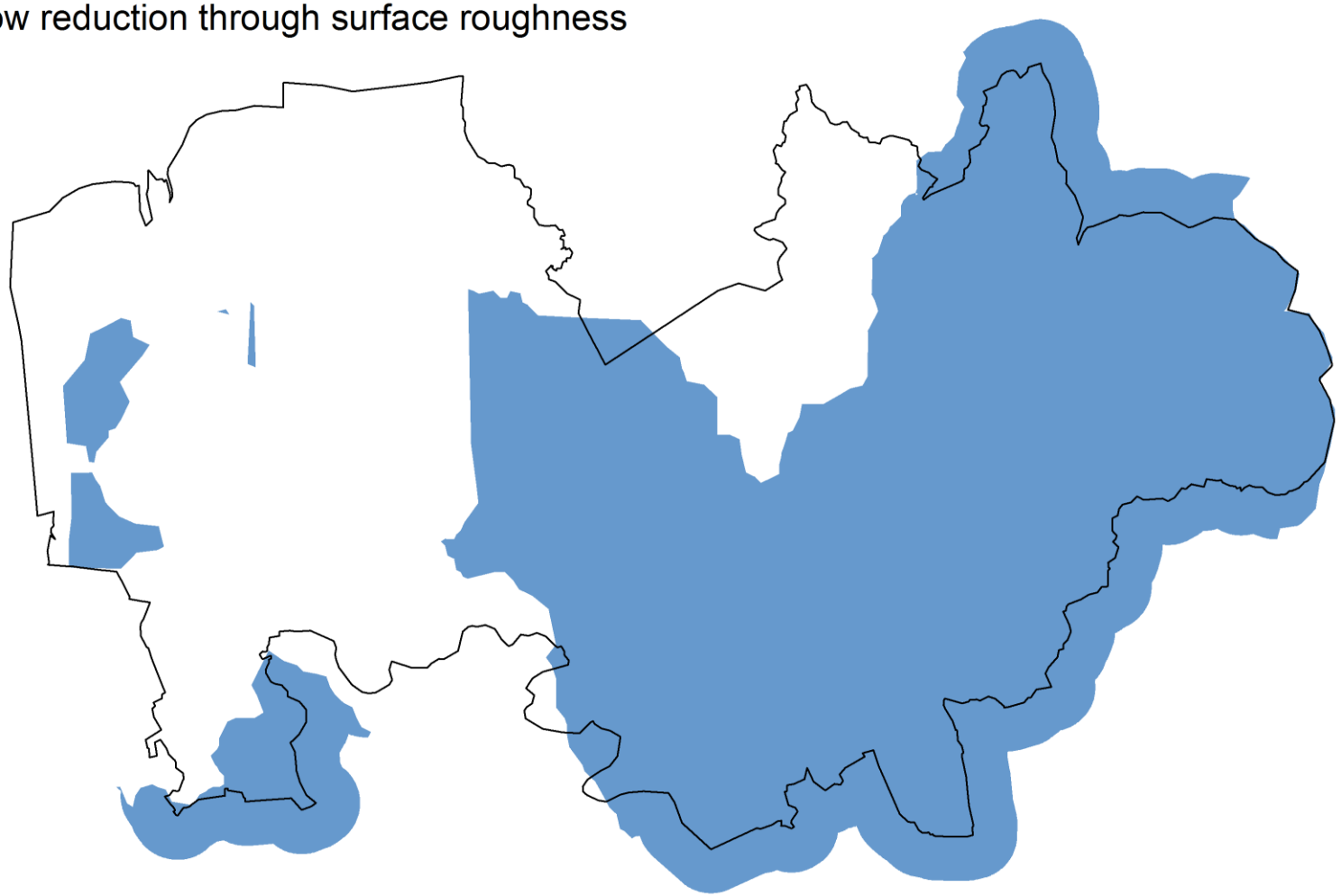


Greatest need for
Evaporative cooling

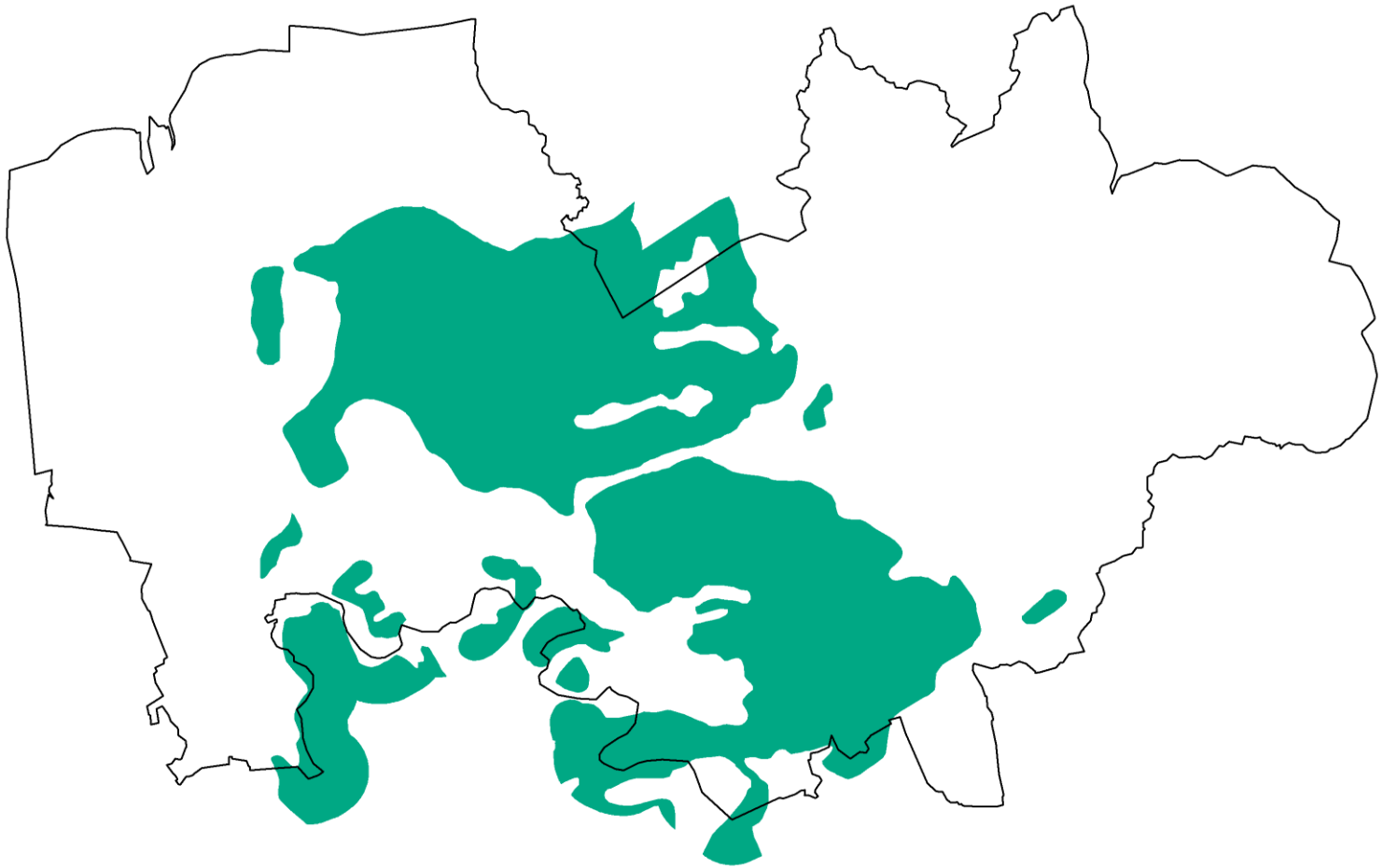


Greatest need for

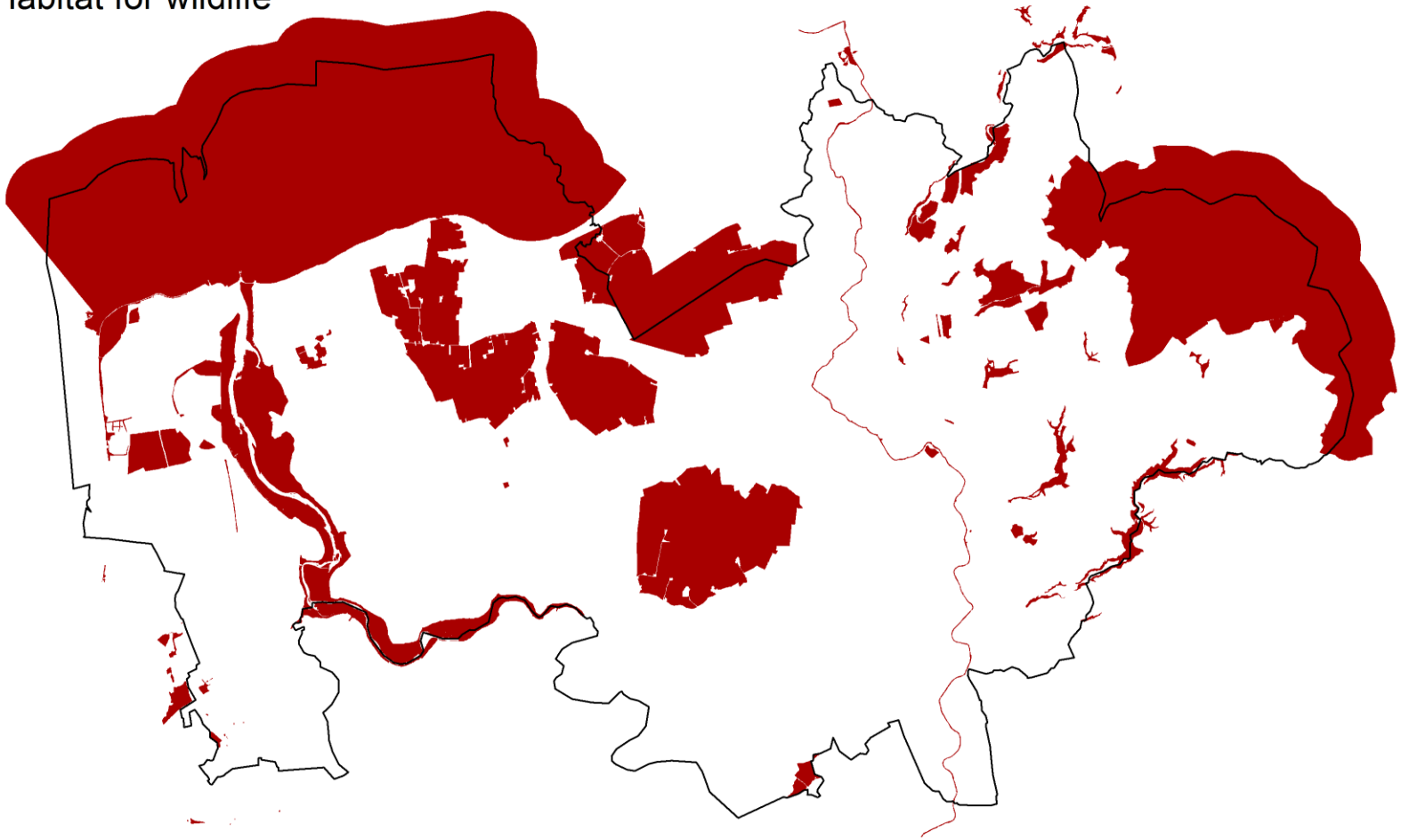
Flow reduction through surface roughness



Greatest need for
Food production



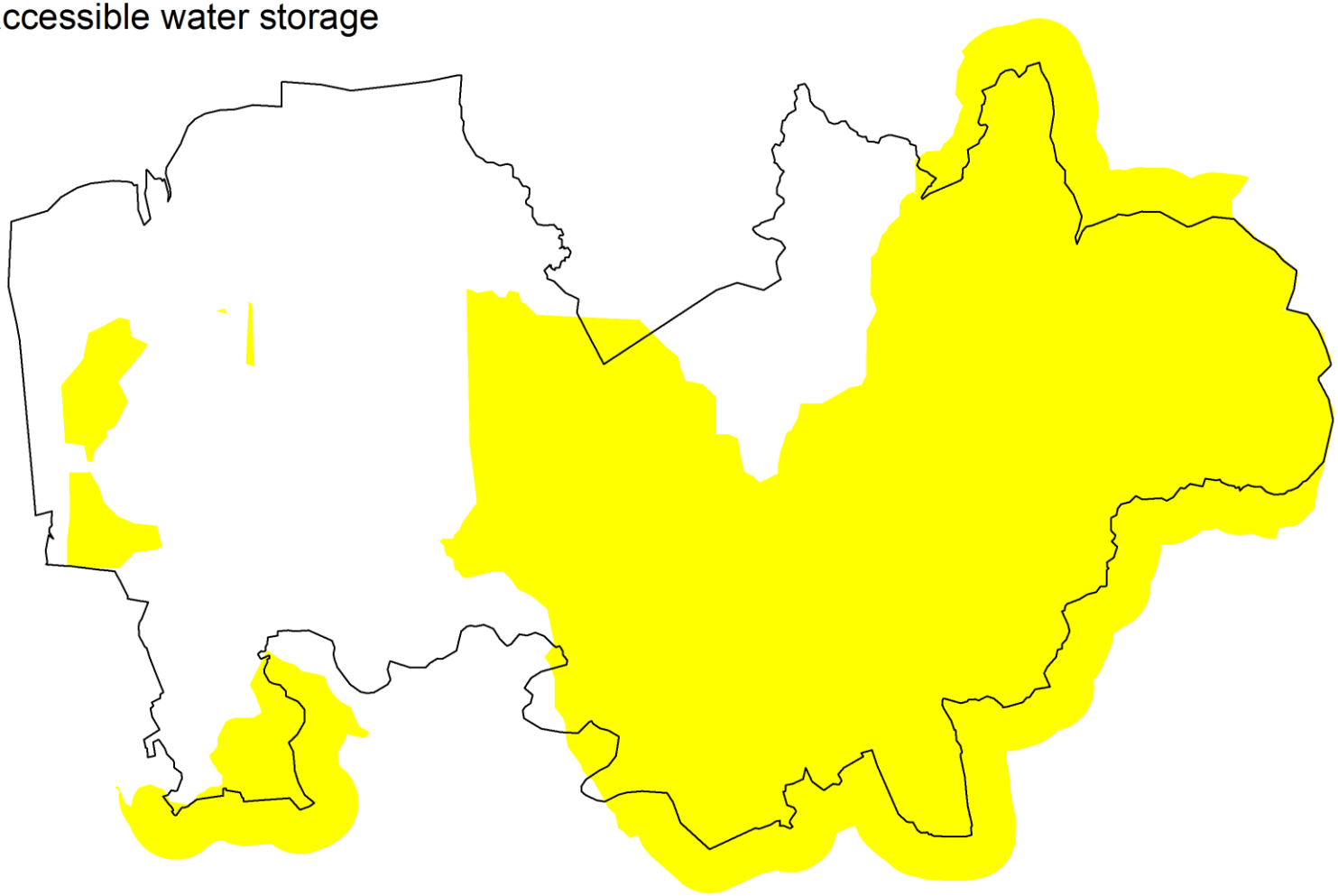
Greatest need for
Habitat for wildlife



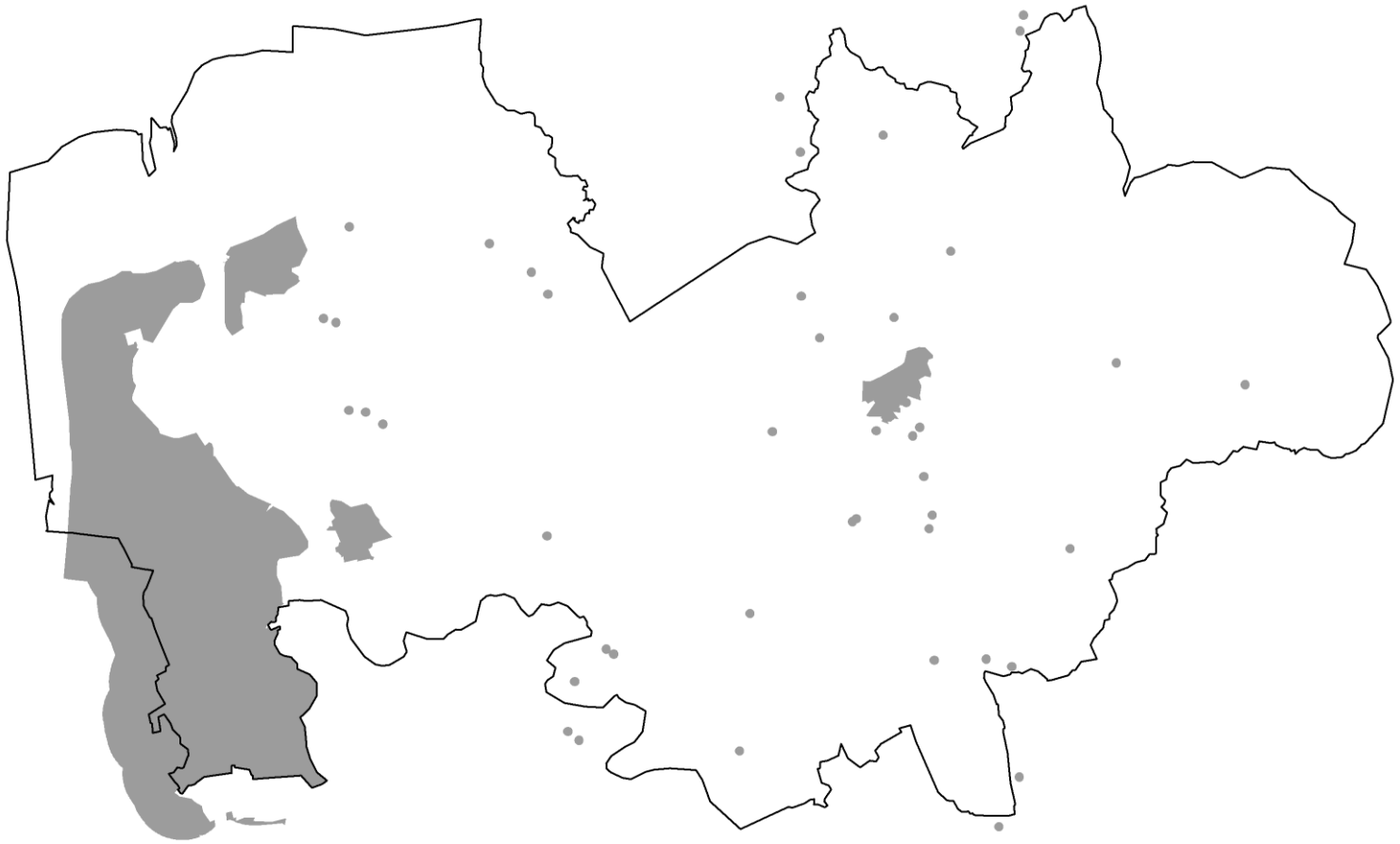
Greatest need for
Heritage

Greatest need for

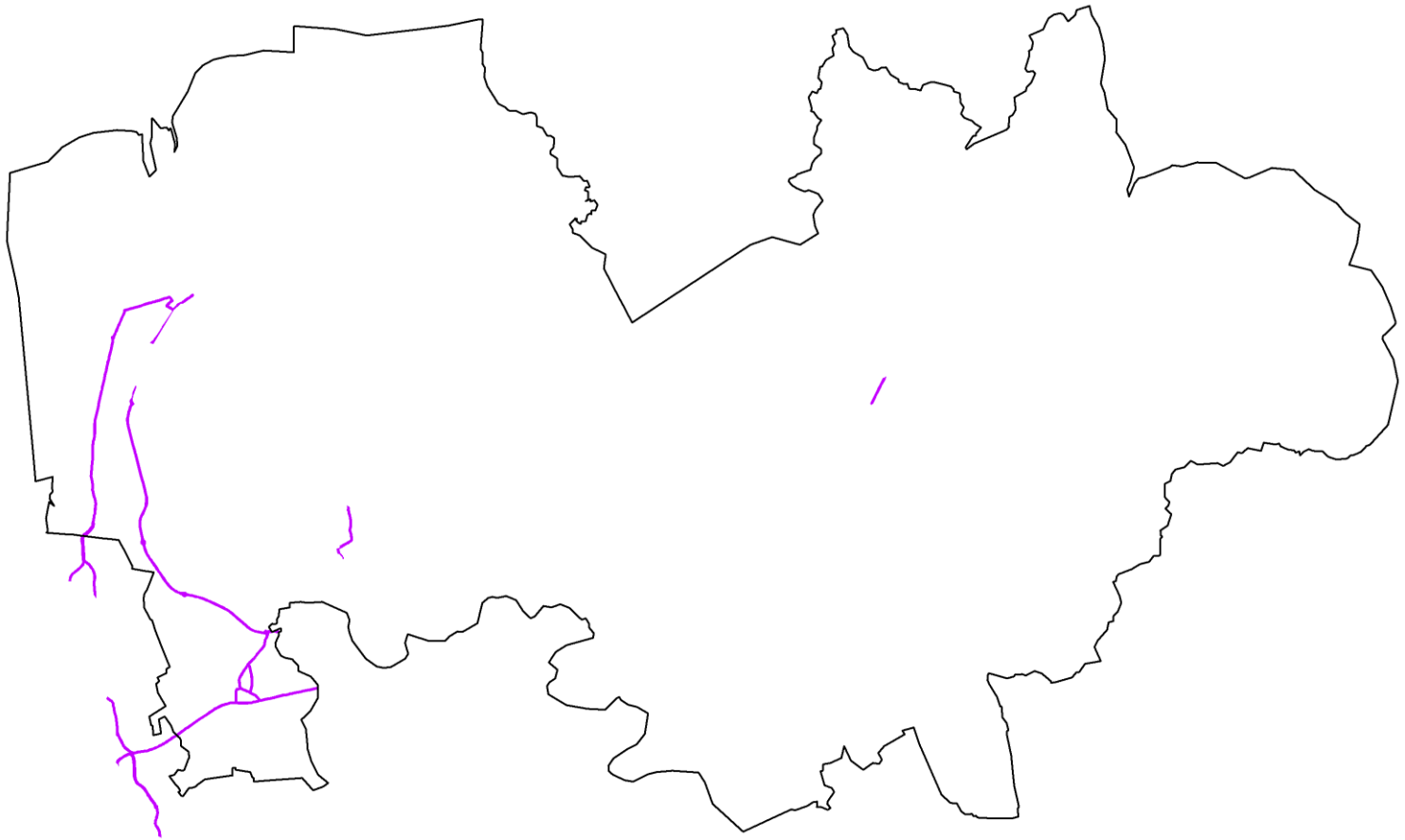
Inaccessible water storage



Greatest need for
Learning

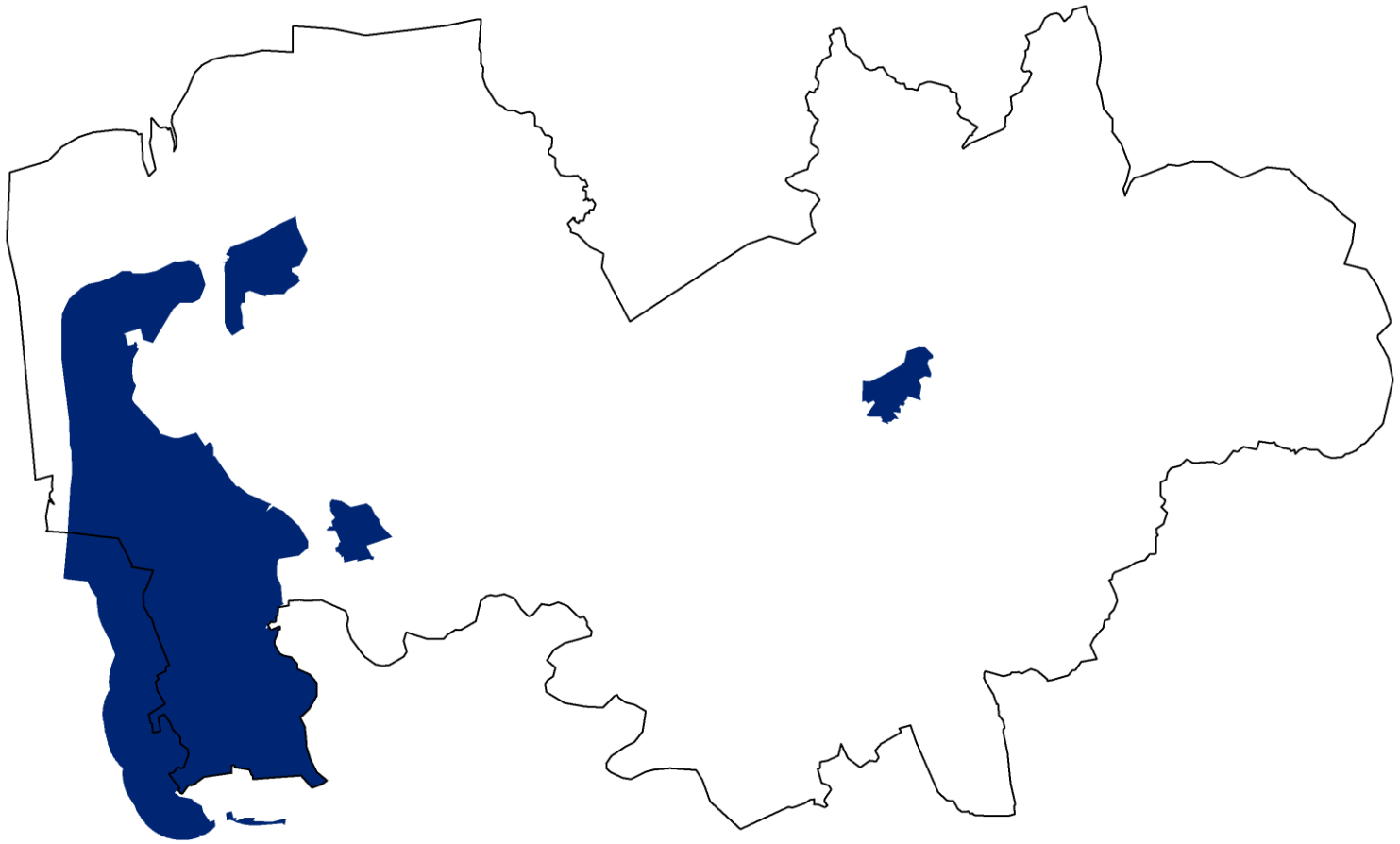


Greatest need for
Noise absorption



Greatest need for

Opportunity to hear more natural sound

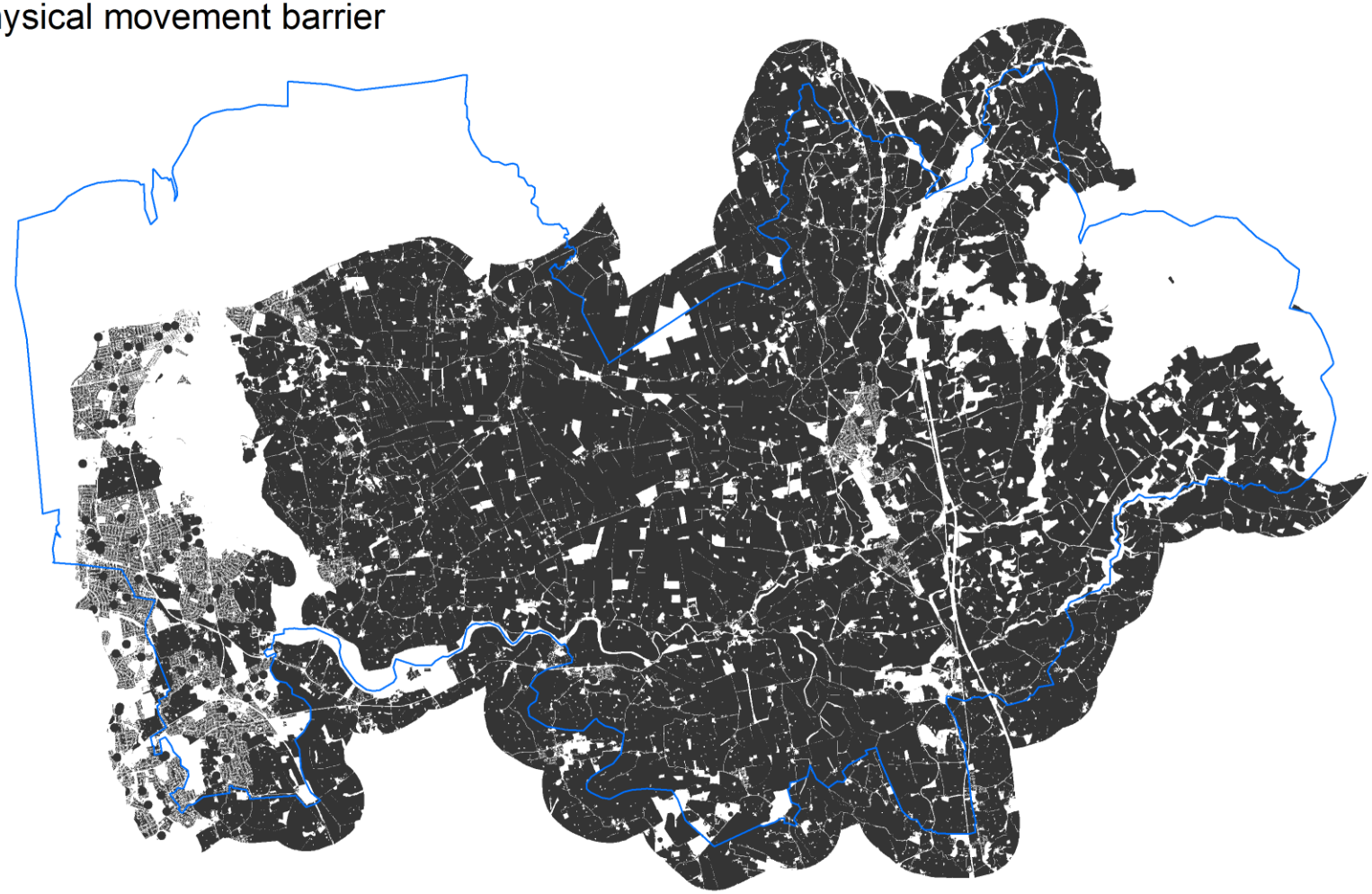


Greatest need for

Pest and disease control

Greatest need for

Physical movement barrier



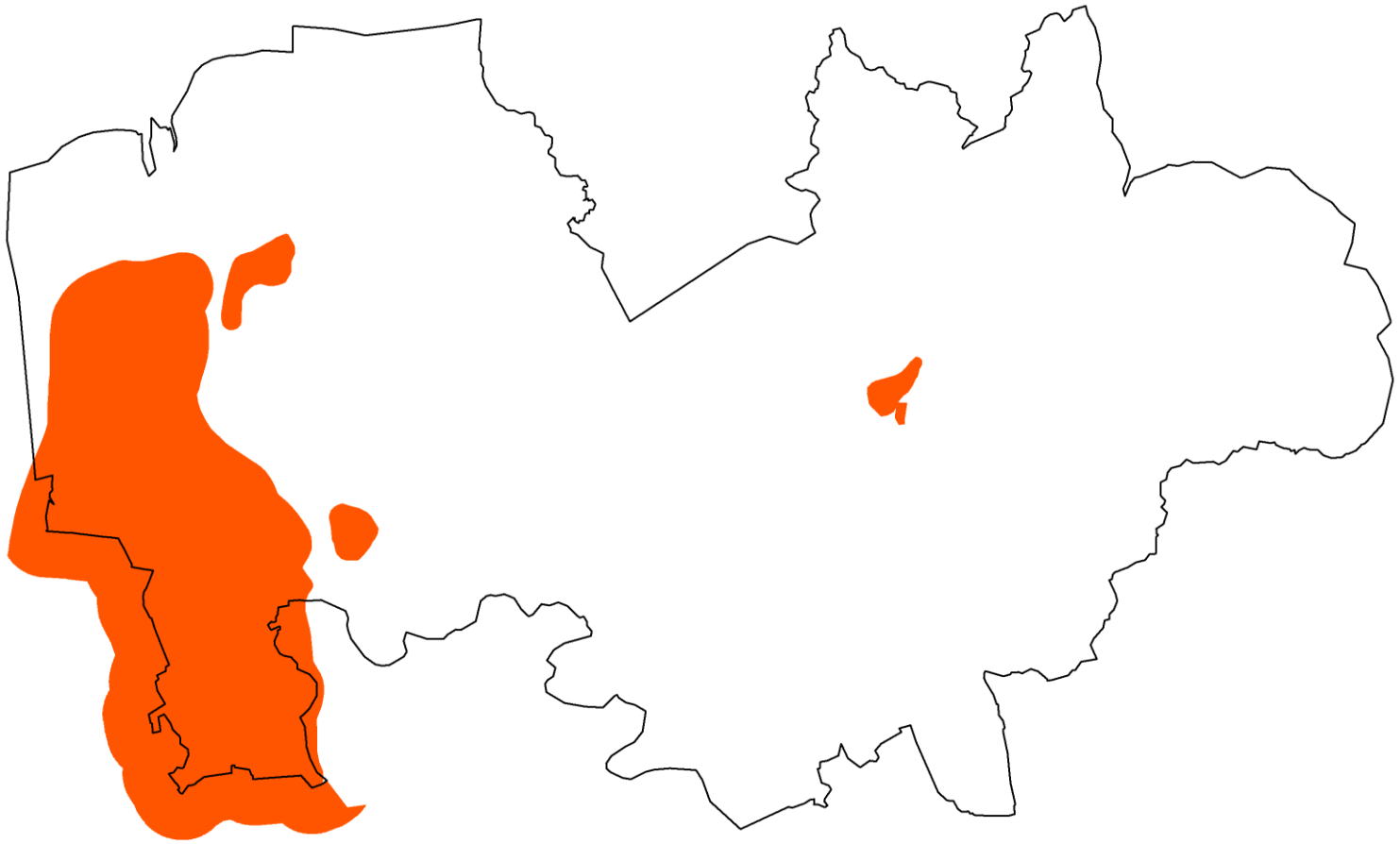
Greatest need for
Pollination

Greatest need for

Pollutant removal from soil/water

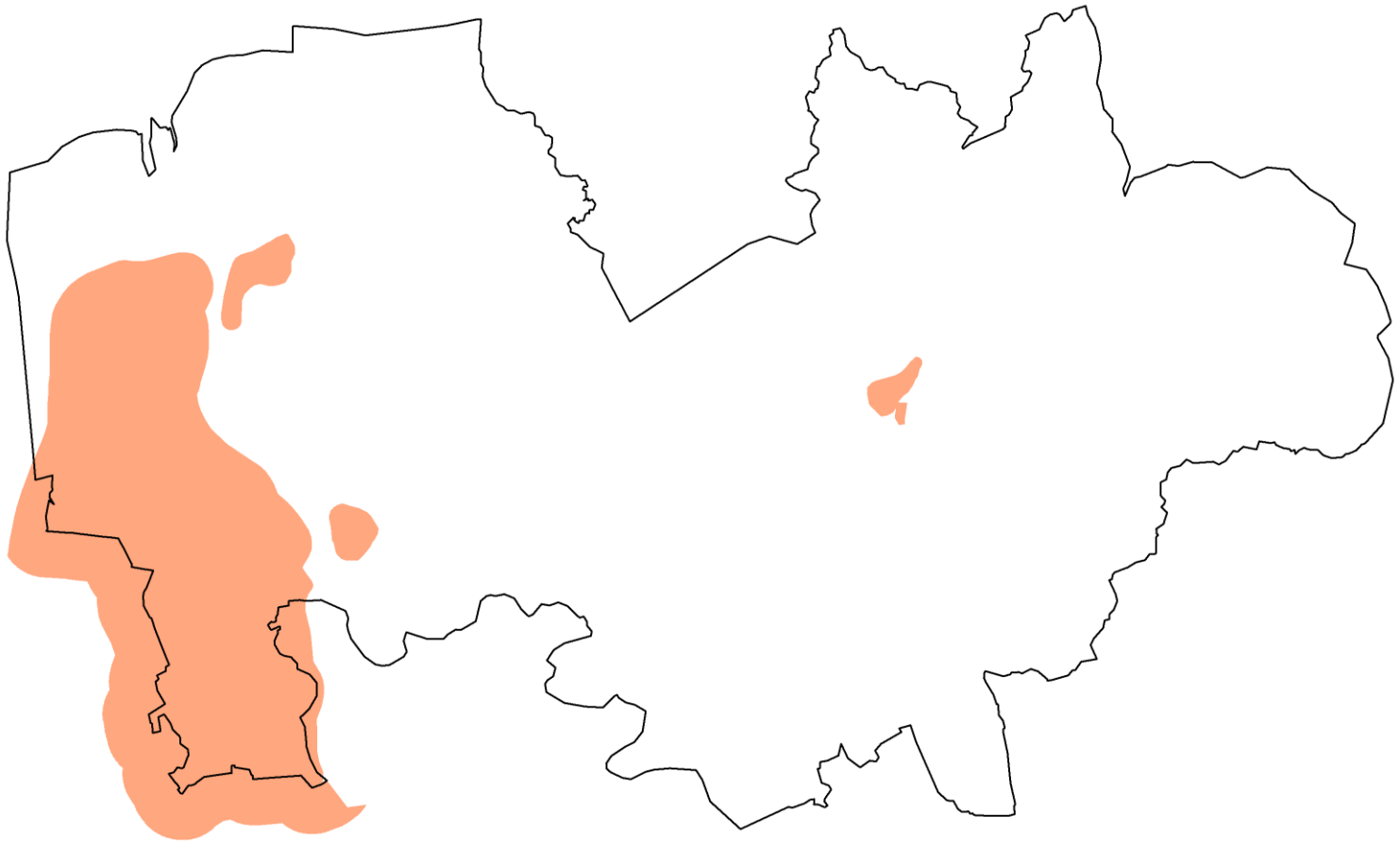
Greatest need for
Providing jobs

Greatest need for
Recreation - private

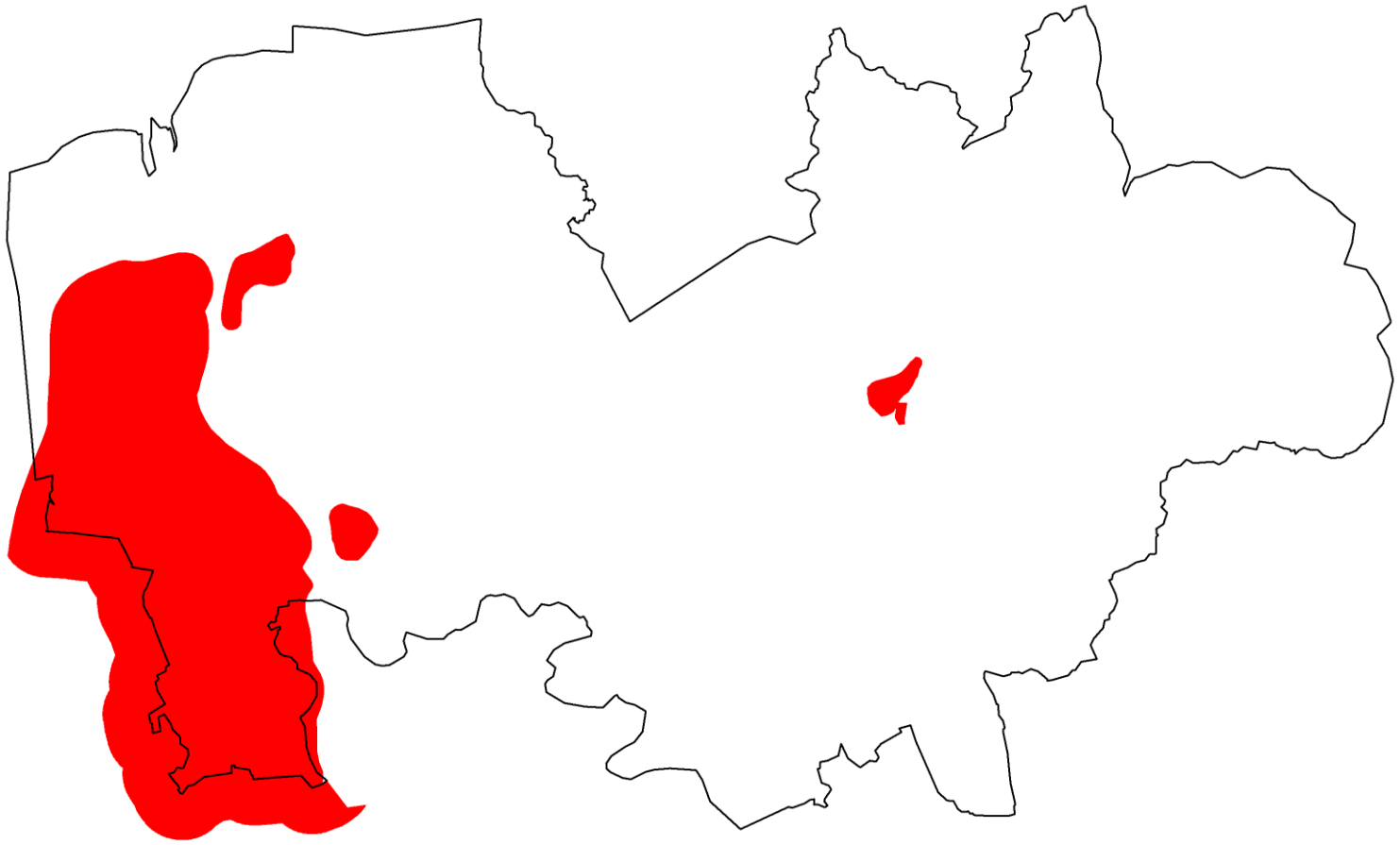


Greatest need for

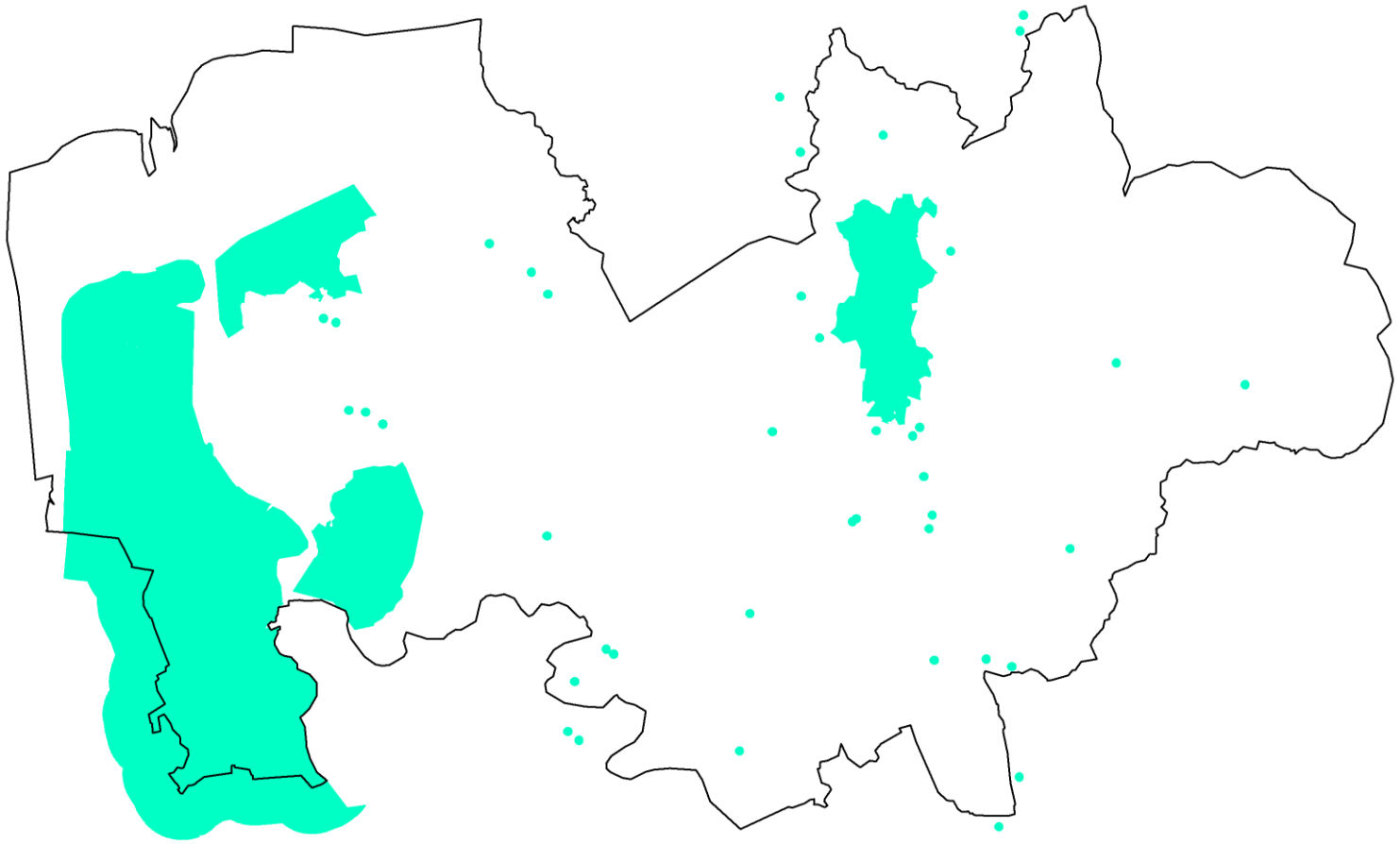
Recreation - public with restrictions



Greatest need for
Recreation - public



Greatest need for
Shading from the sun

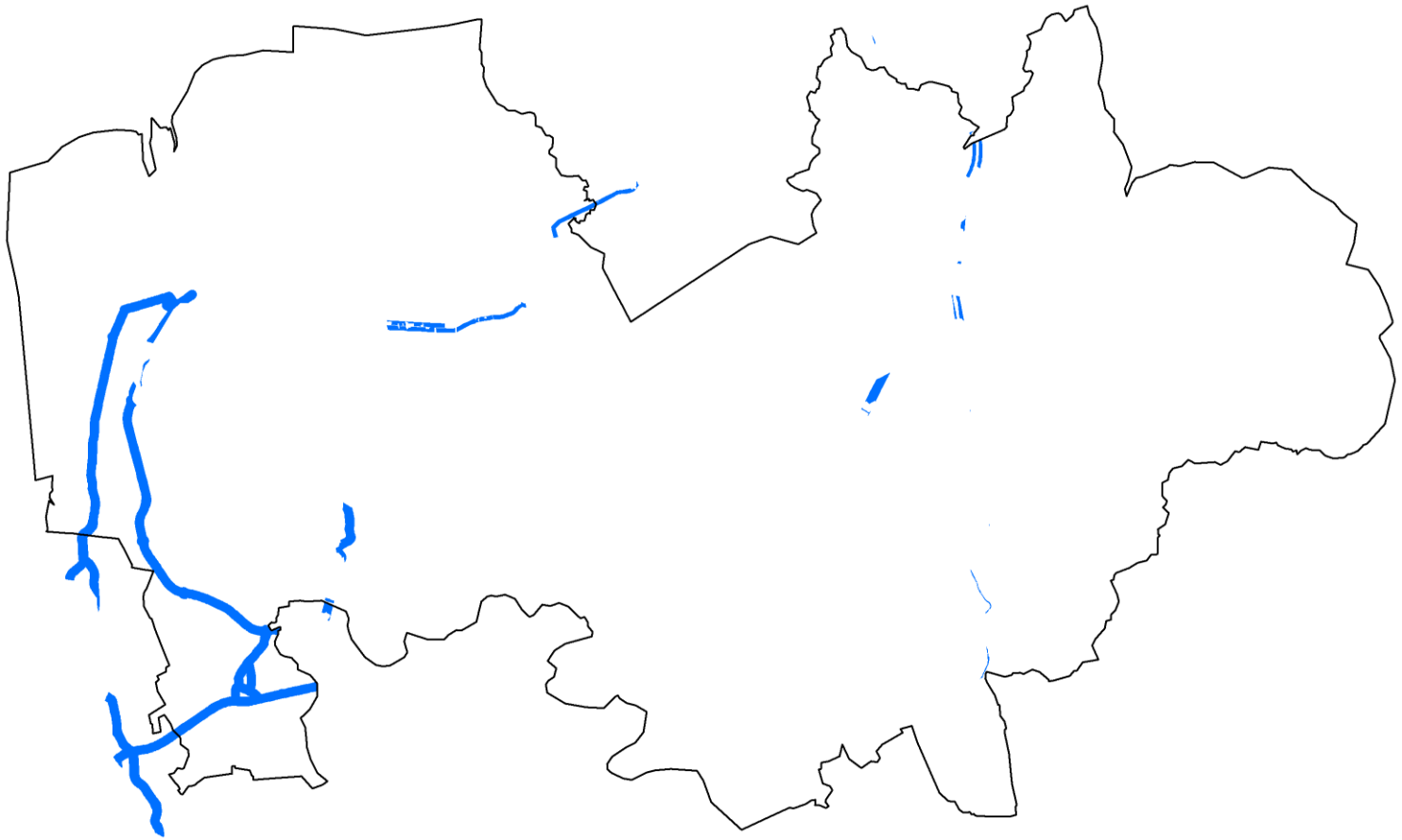


Greatest need for
Soil stabilisation

Greatest need for
Timber production

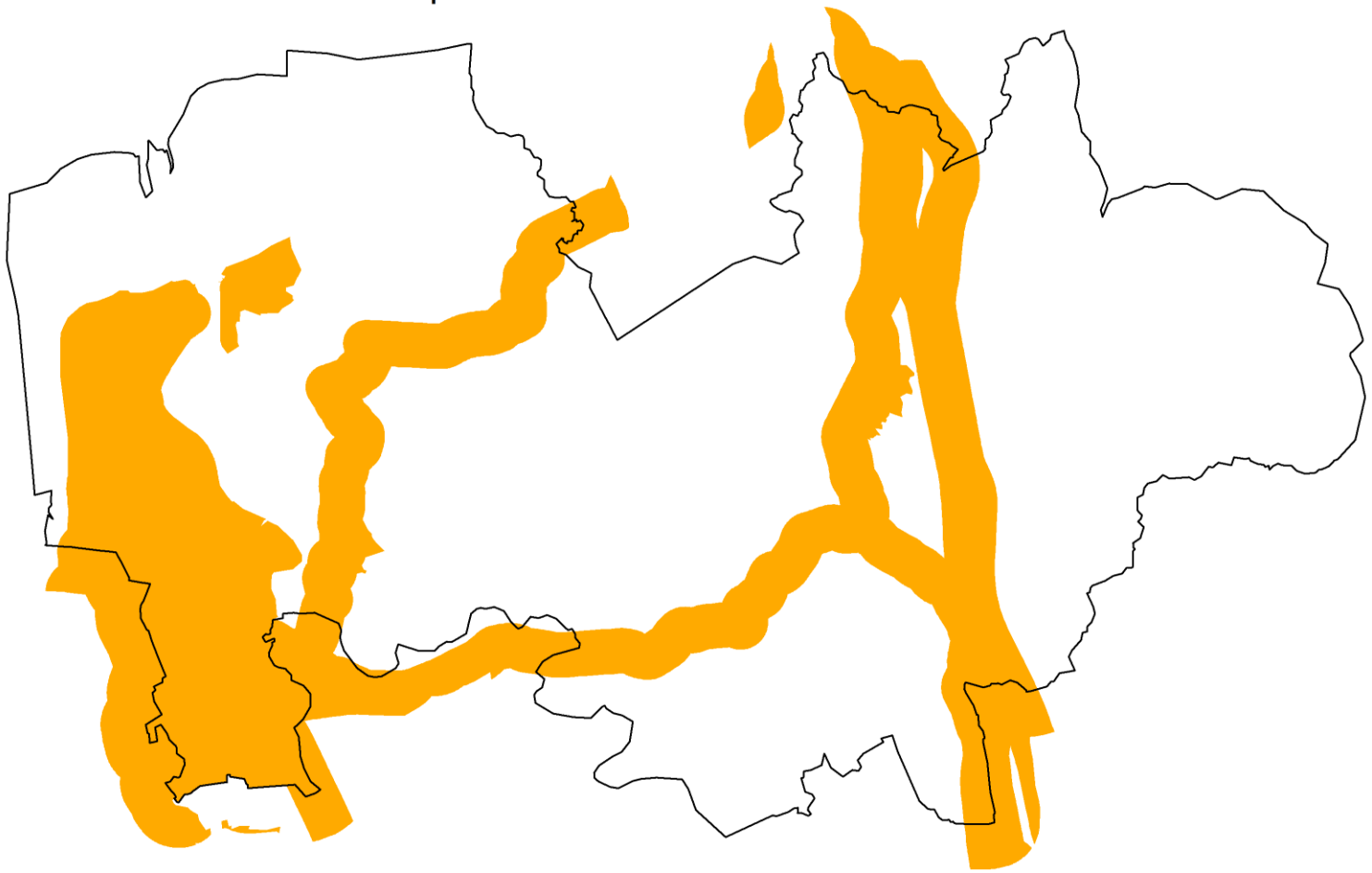
Greatest need for

Trapping air pollutants

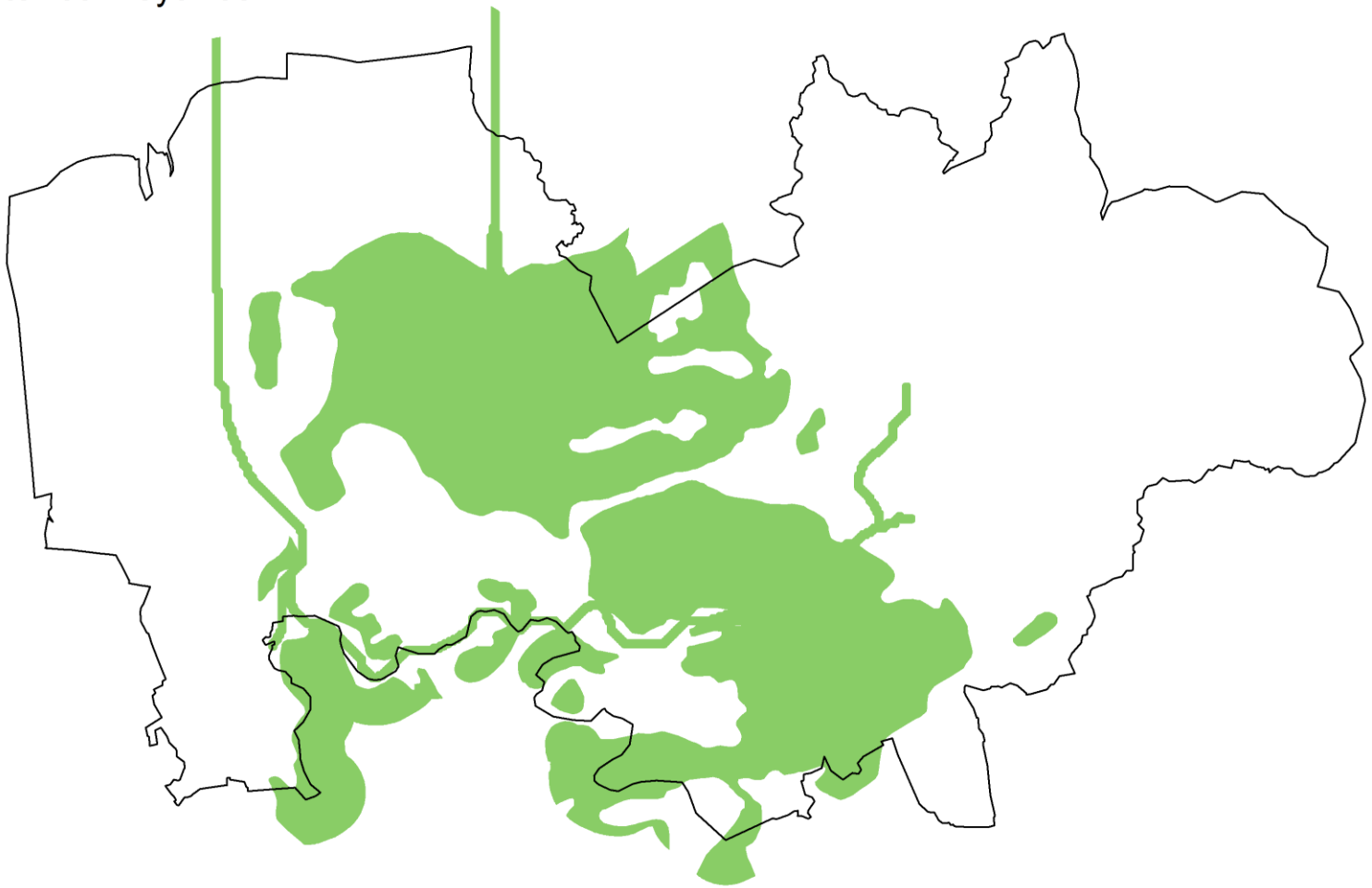


Greatest need for

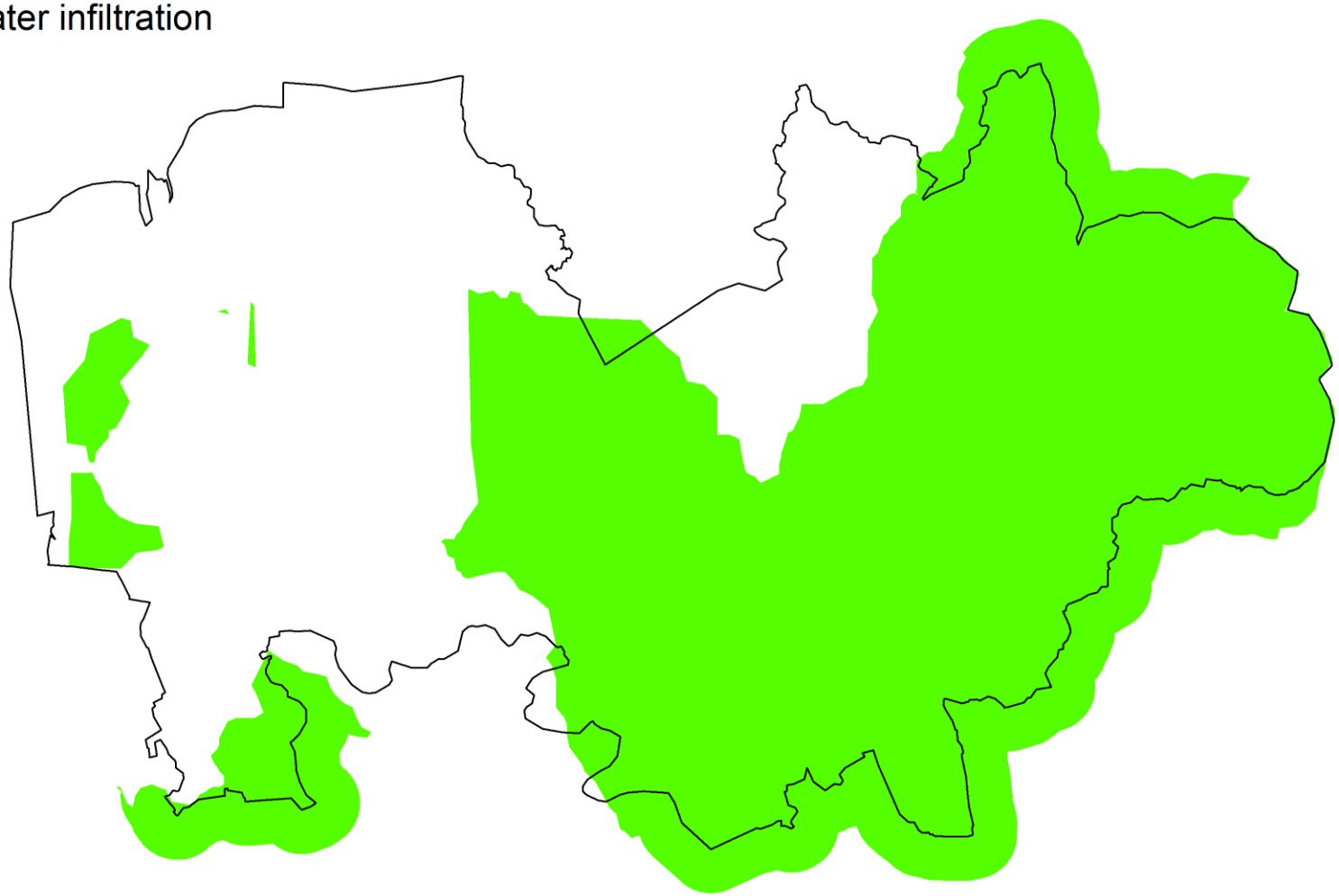
Visual contribution to landscape character



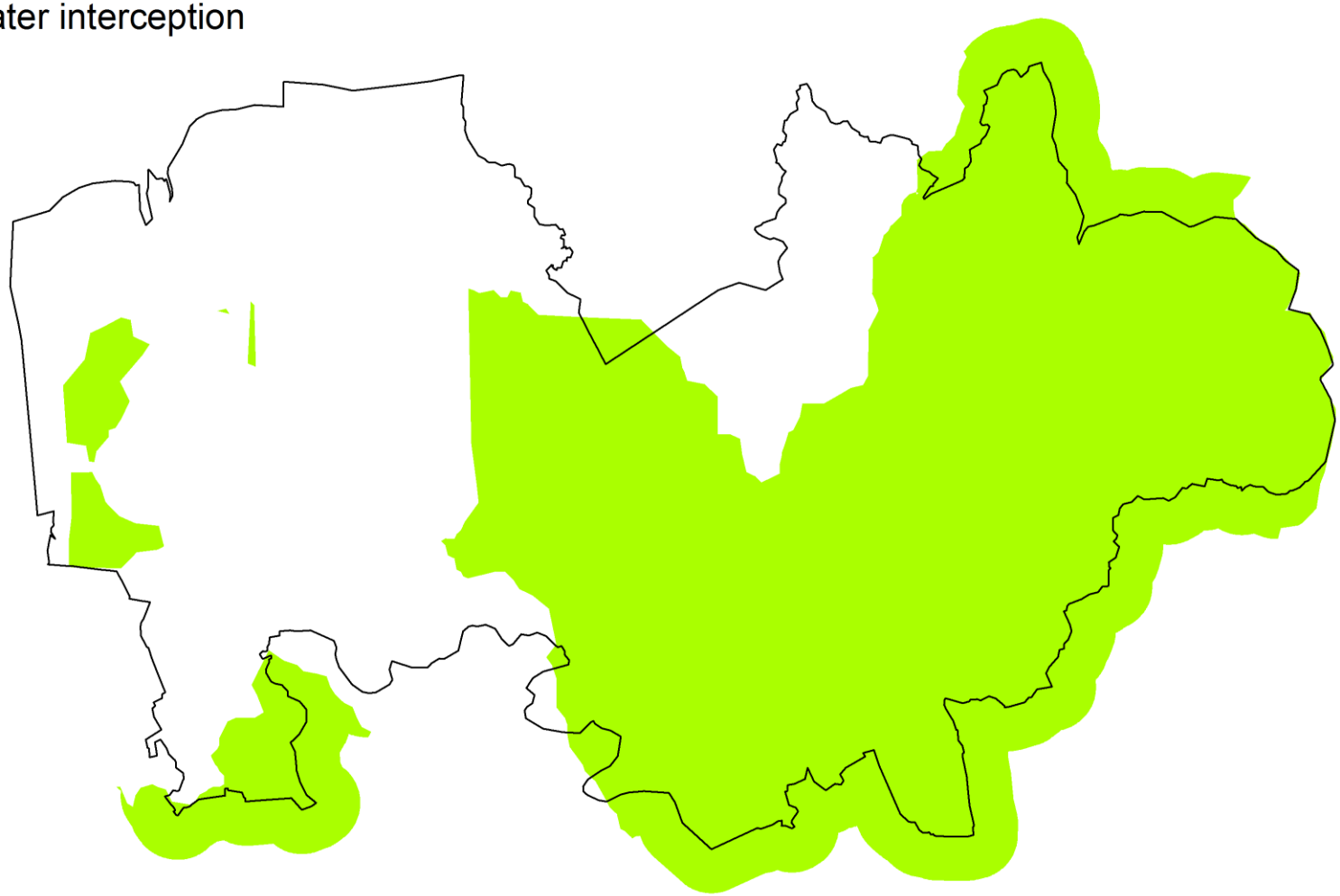
Greatest need for
Water conveyance



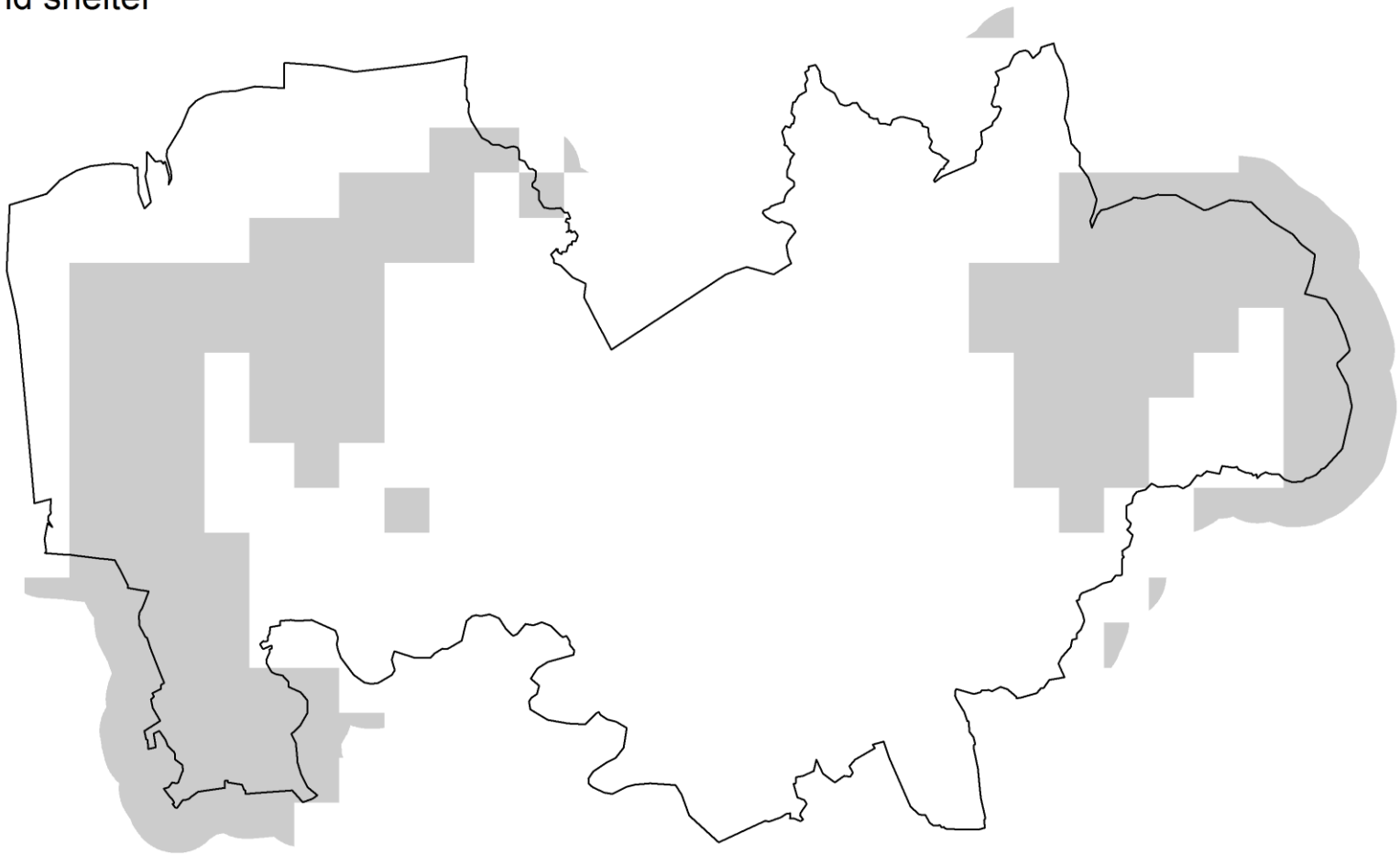
Greatest need for
Water infiltration



Greatest need for
Water interception

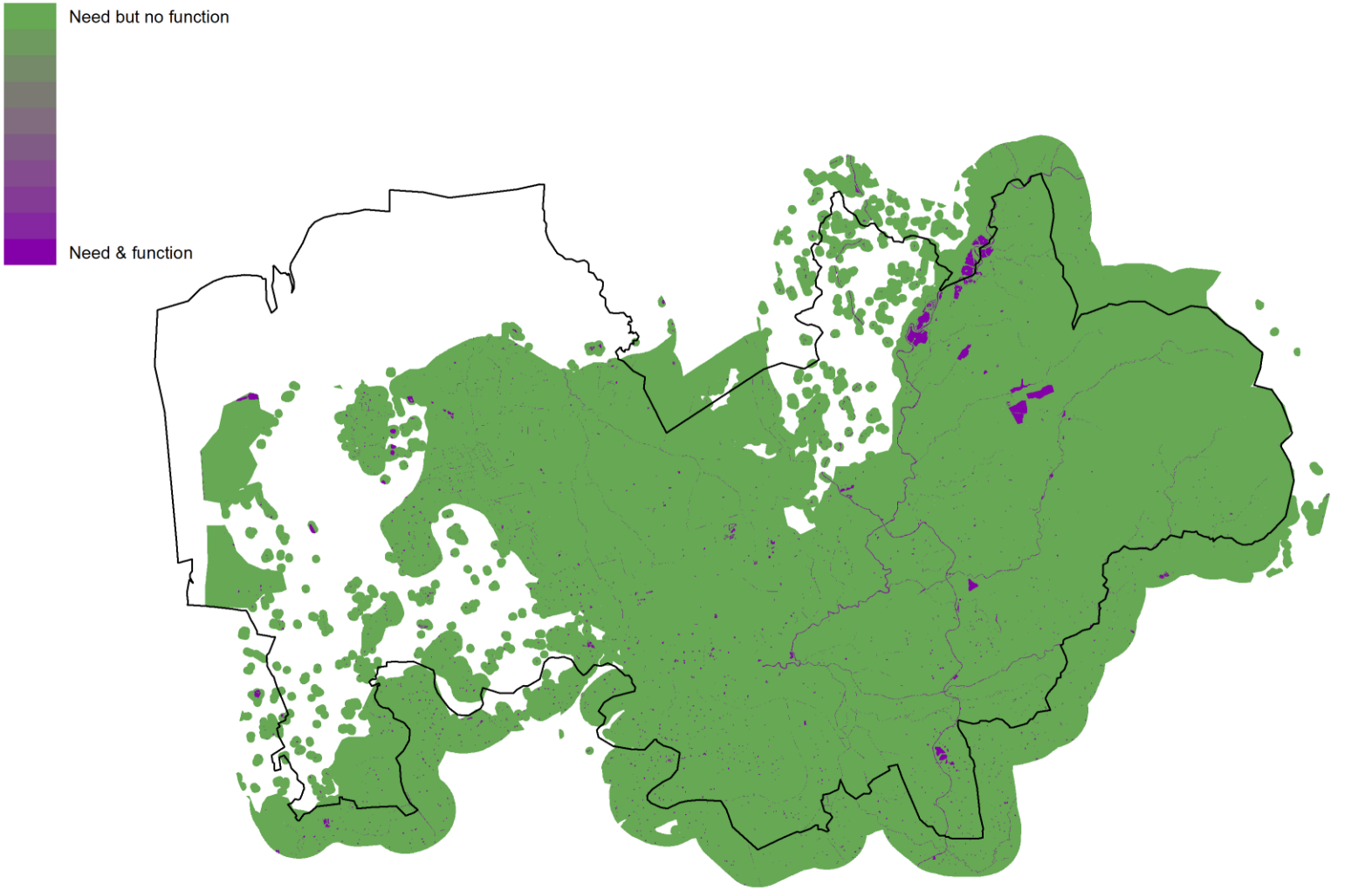


Greatest need for
Wind shelter



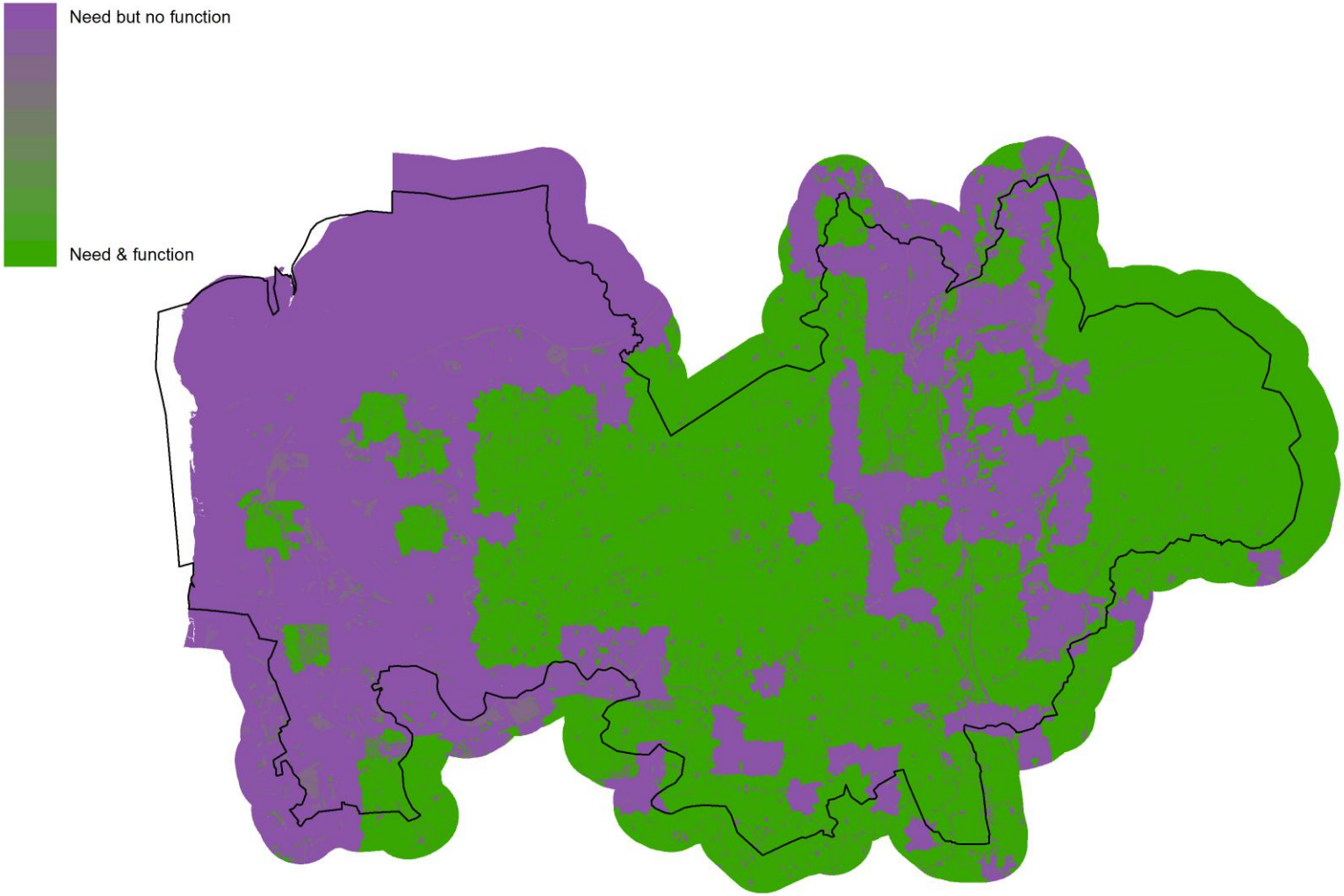
Need met and not met maps

Accessible water storage

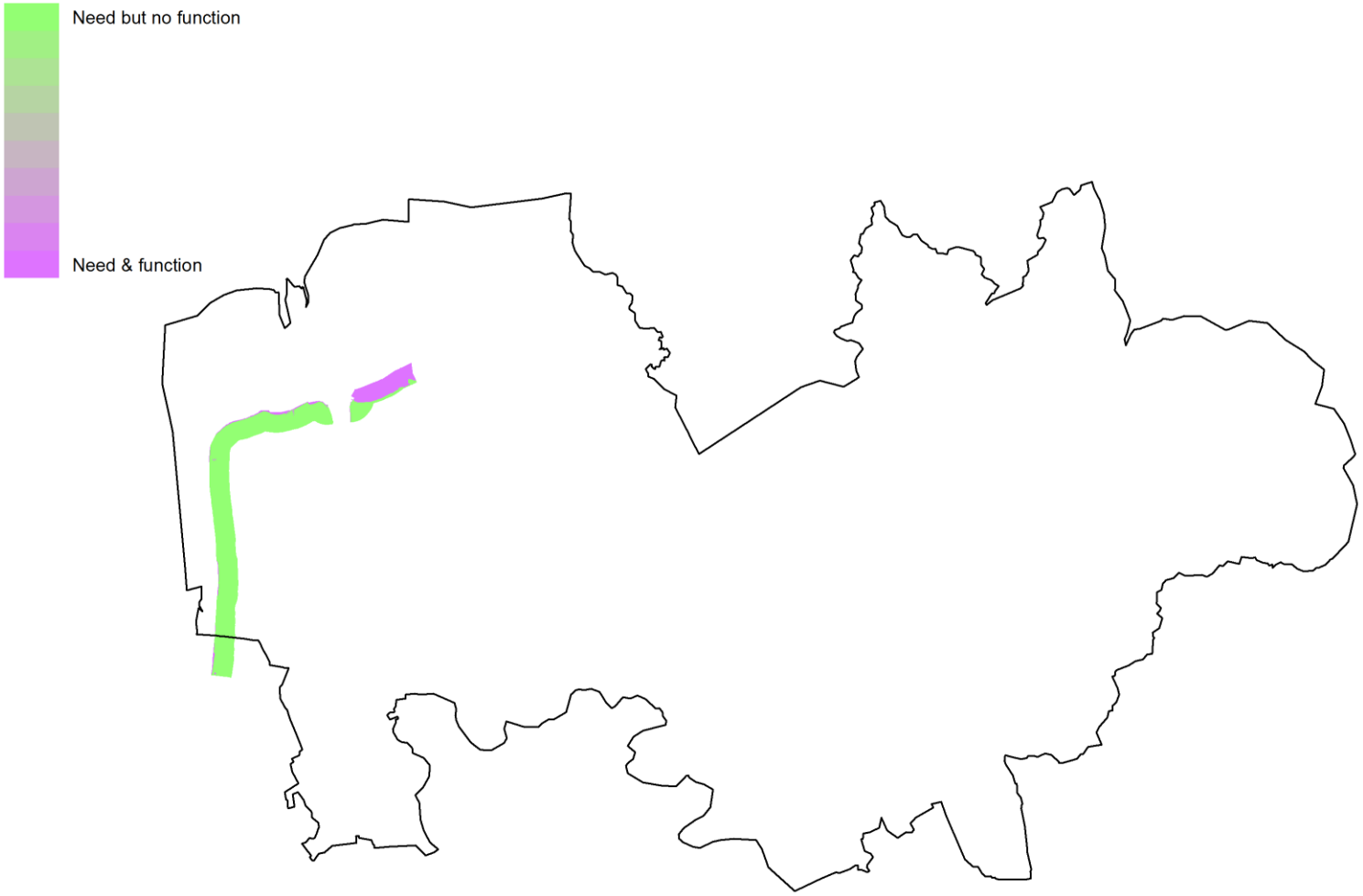


Biofuels production

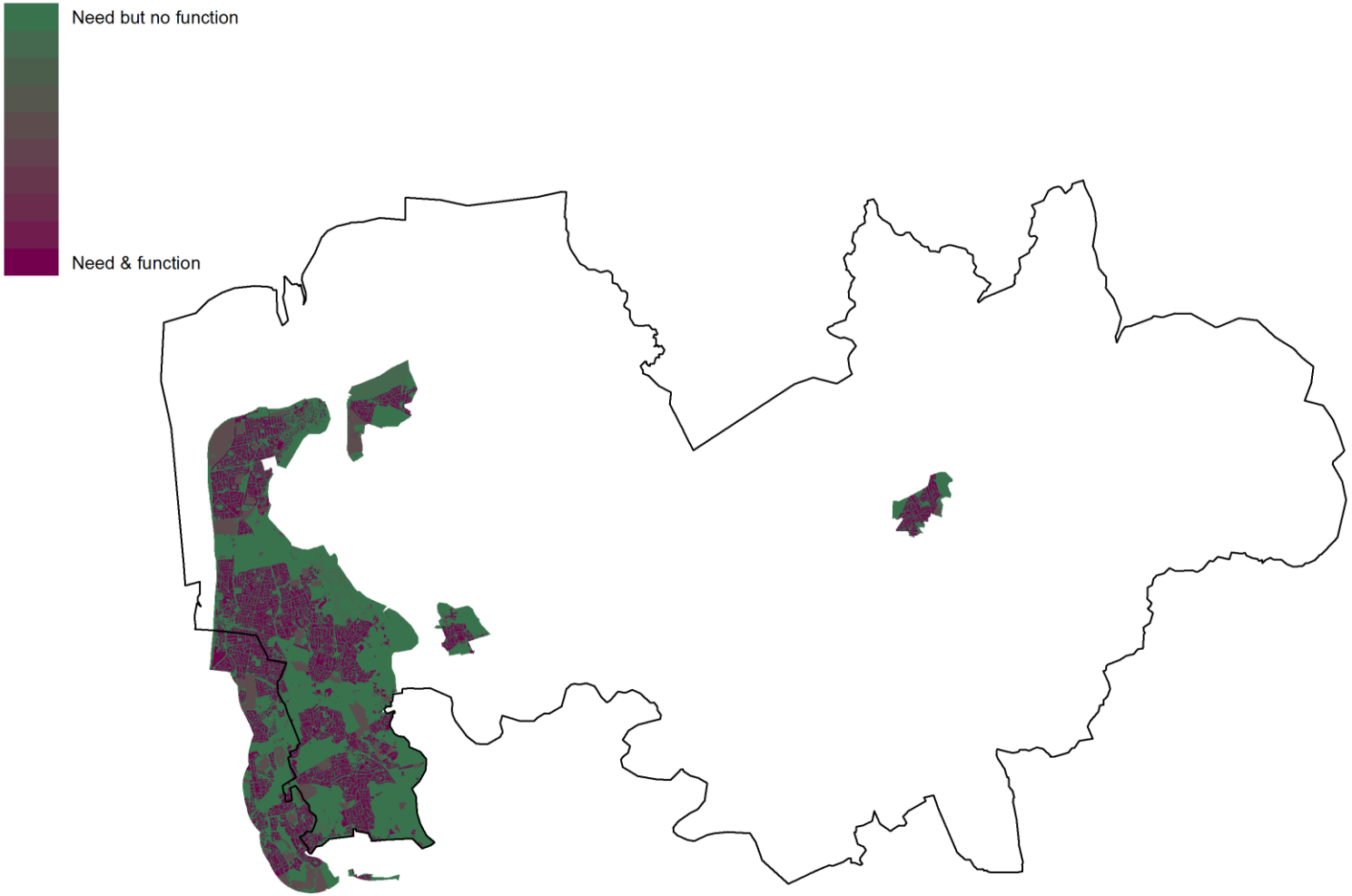
Carbon storage



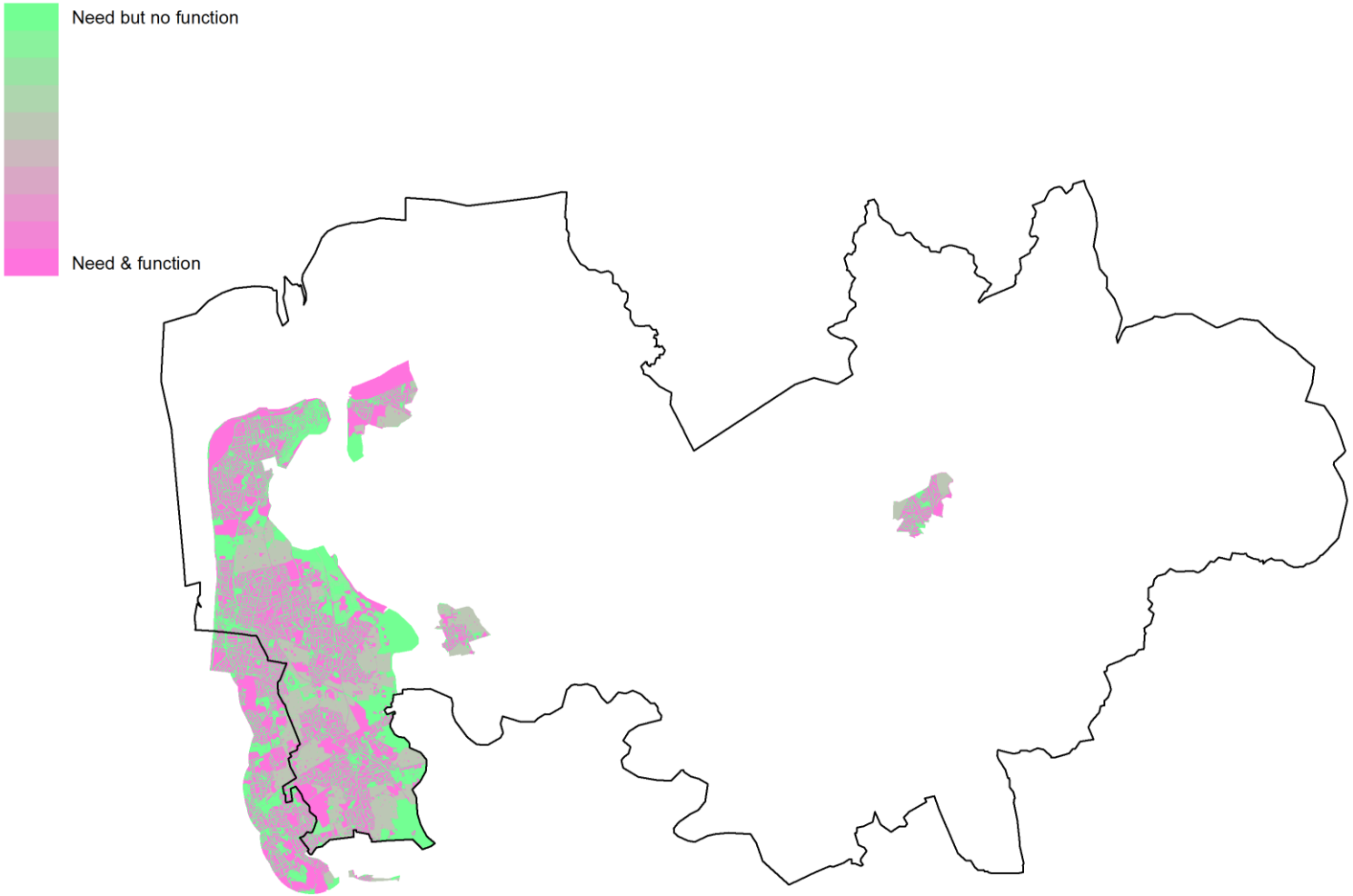
Coastal storm protection



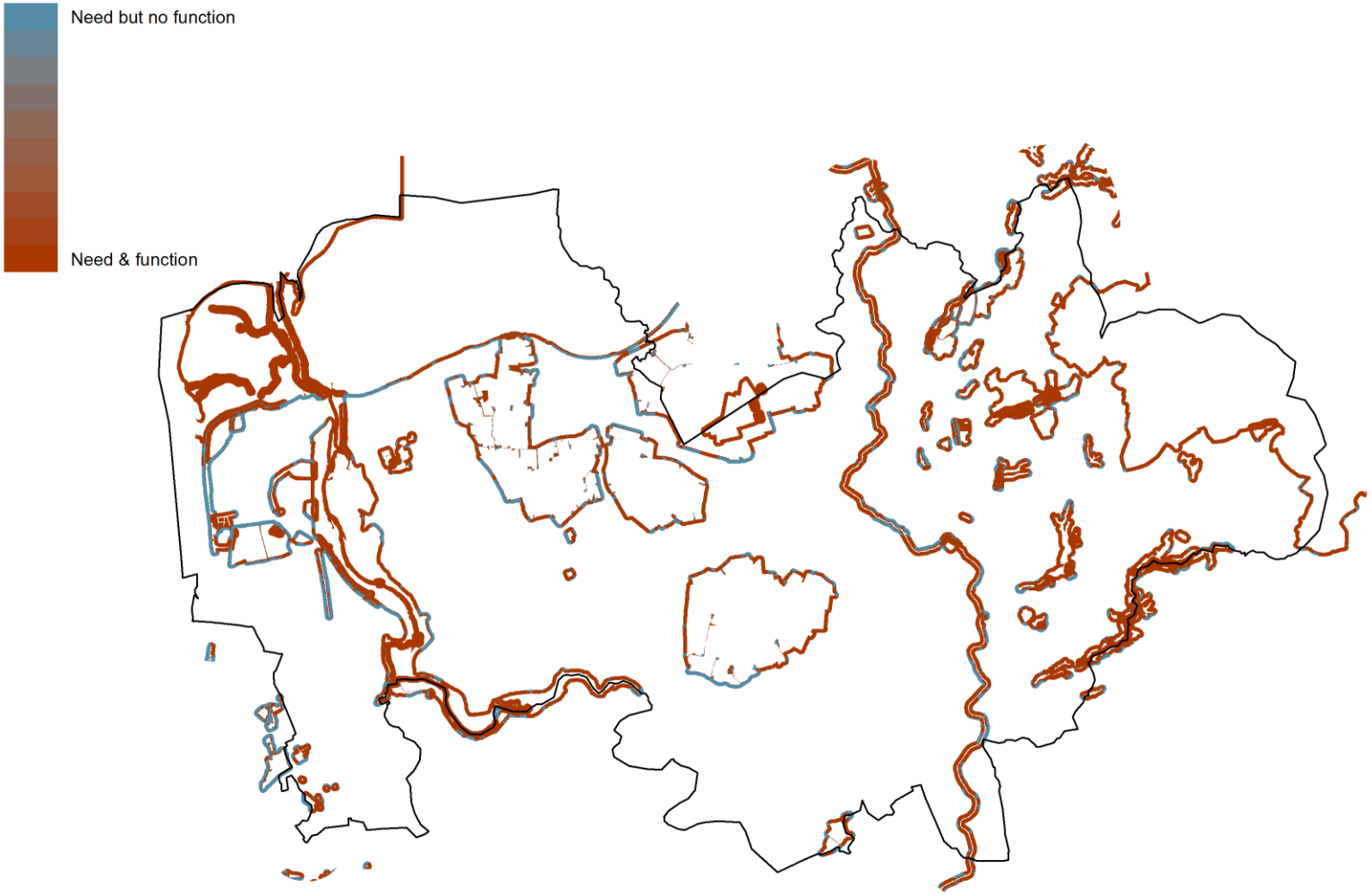
Community cohesion



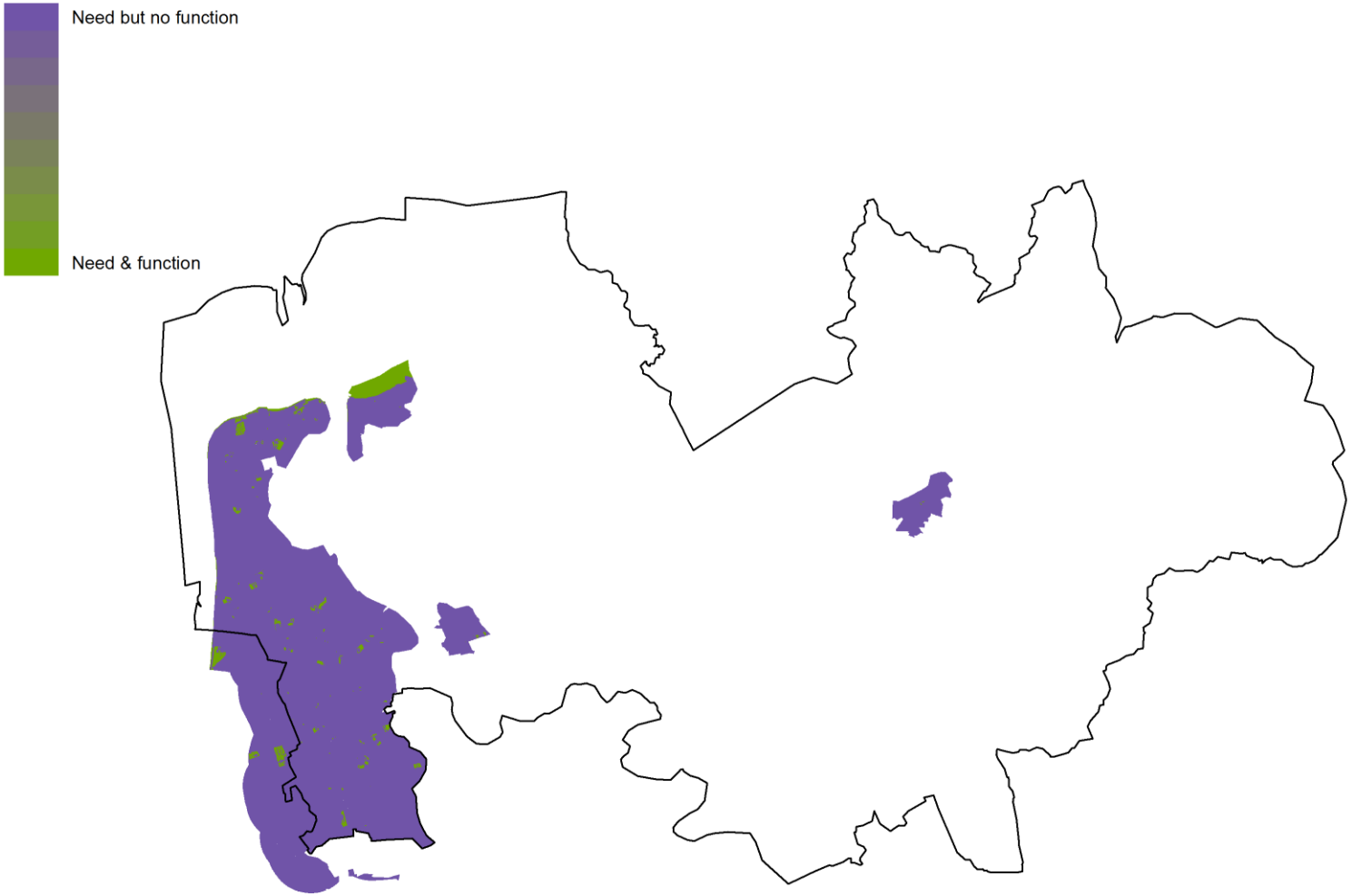
Connection with local environment



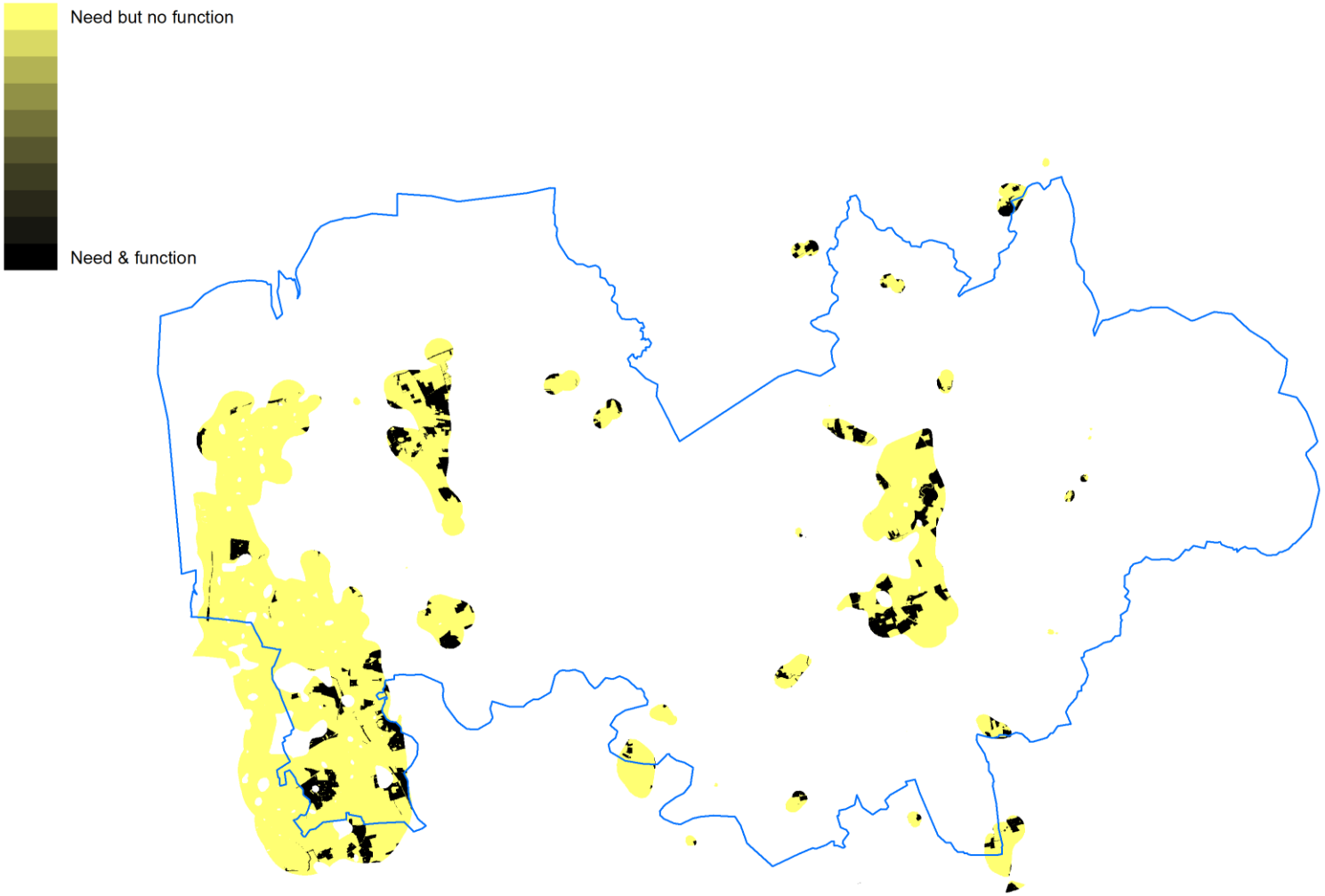
Corridor for wildlife



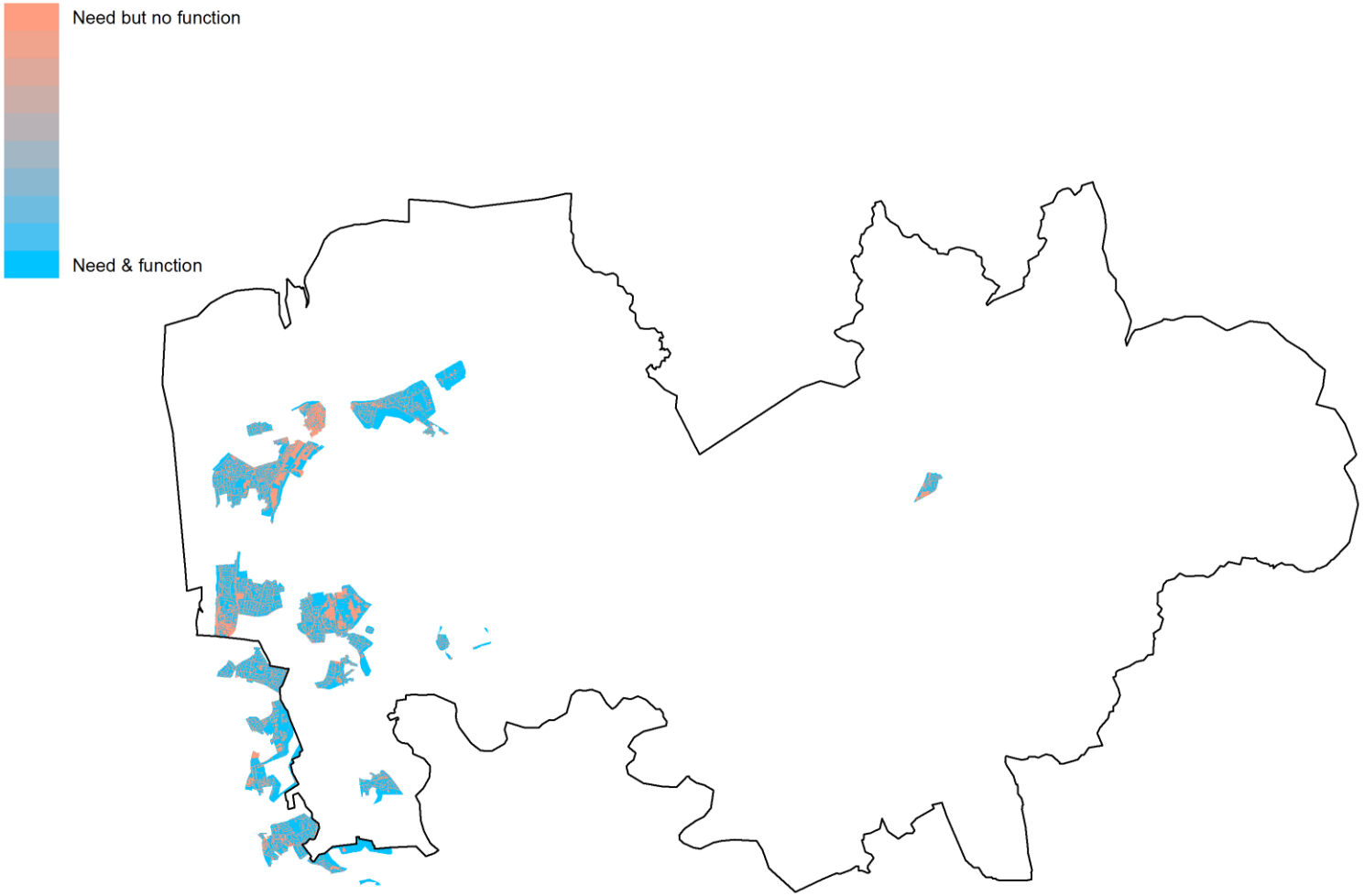
Culture



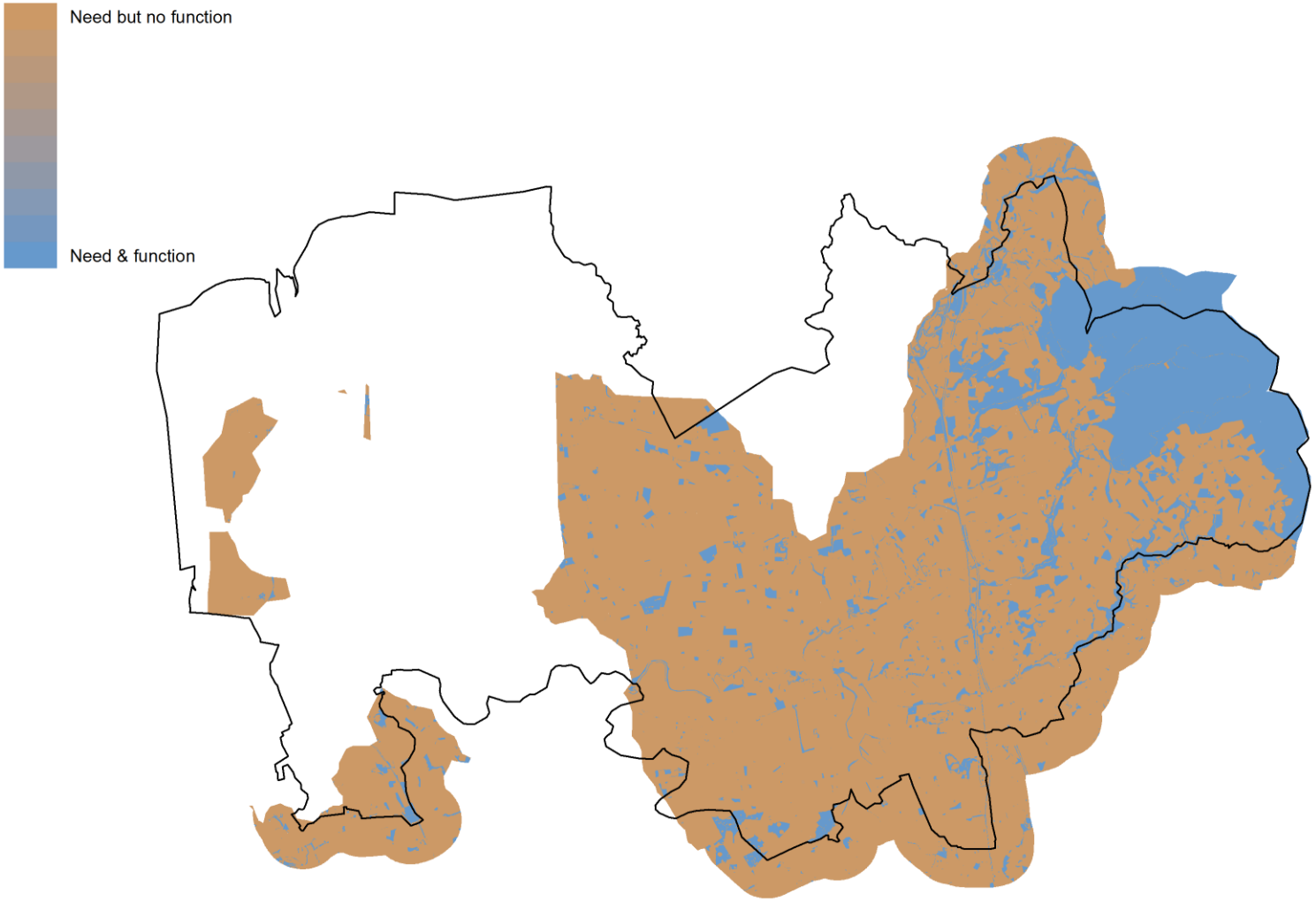
Encouraging green travel



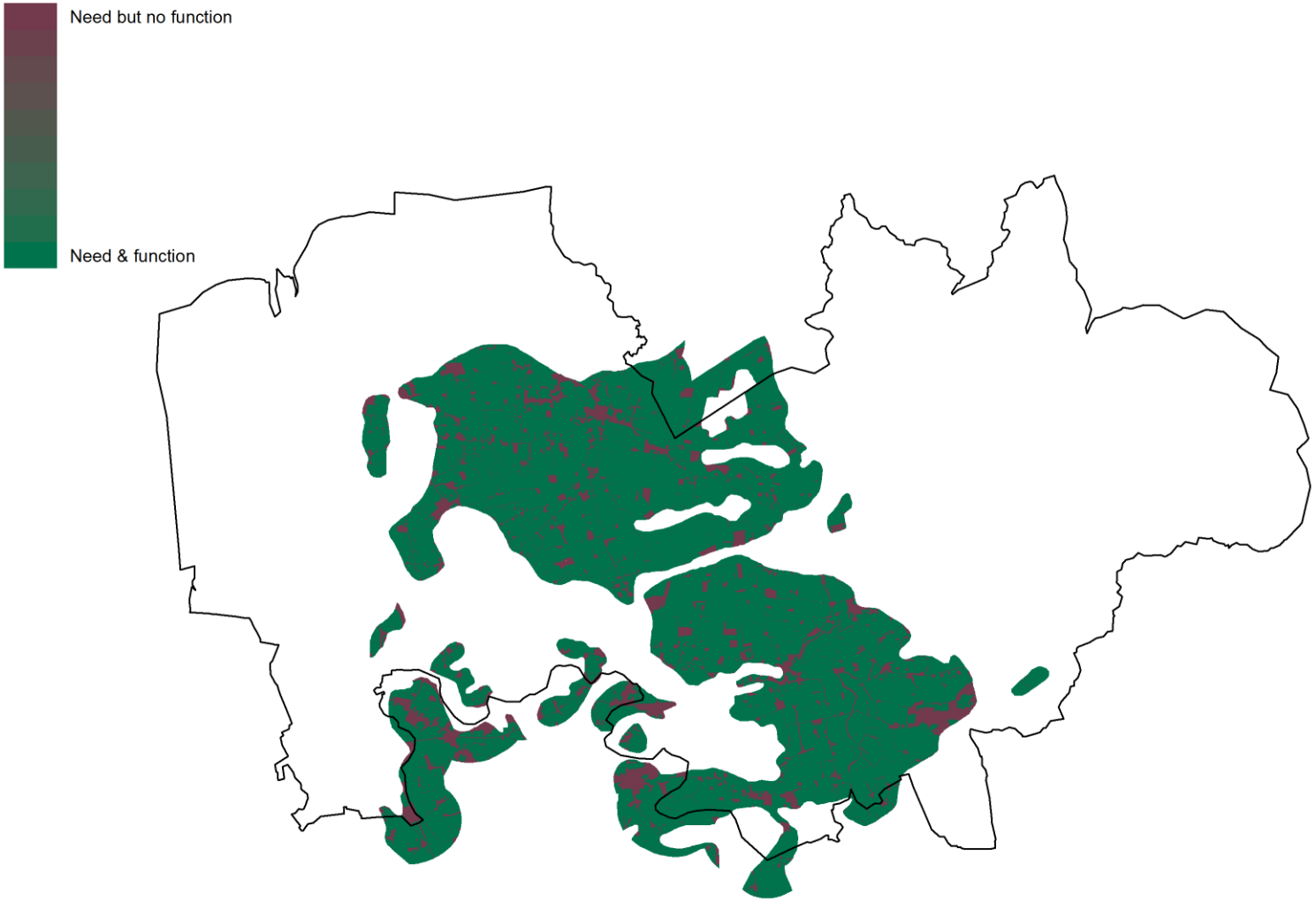
Evaporative cooling



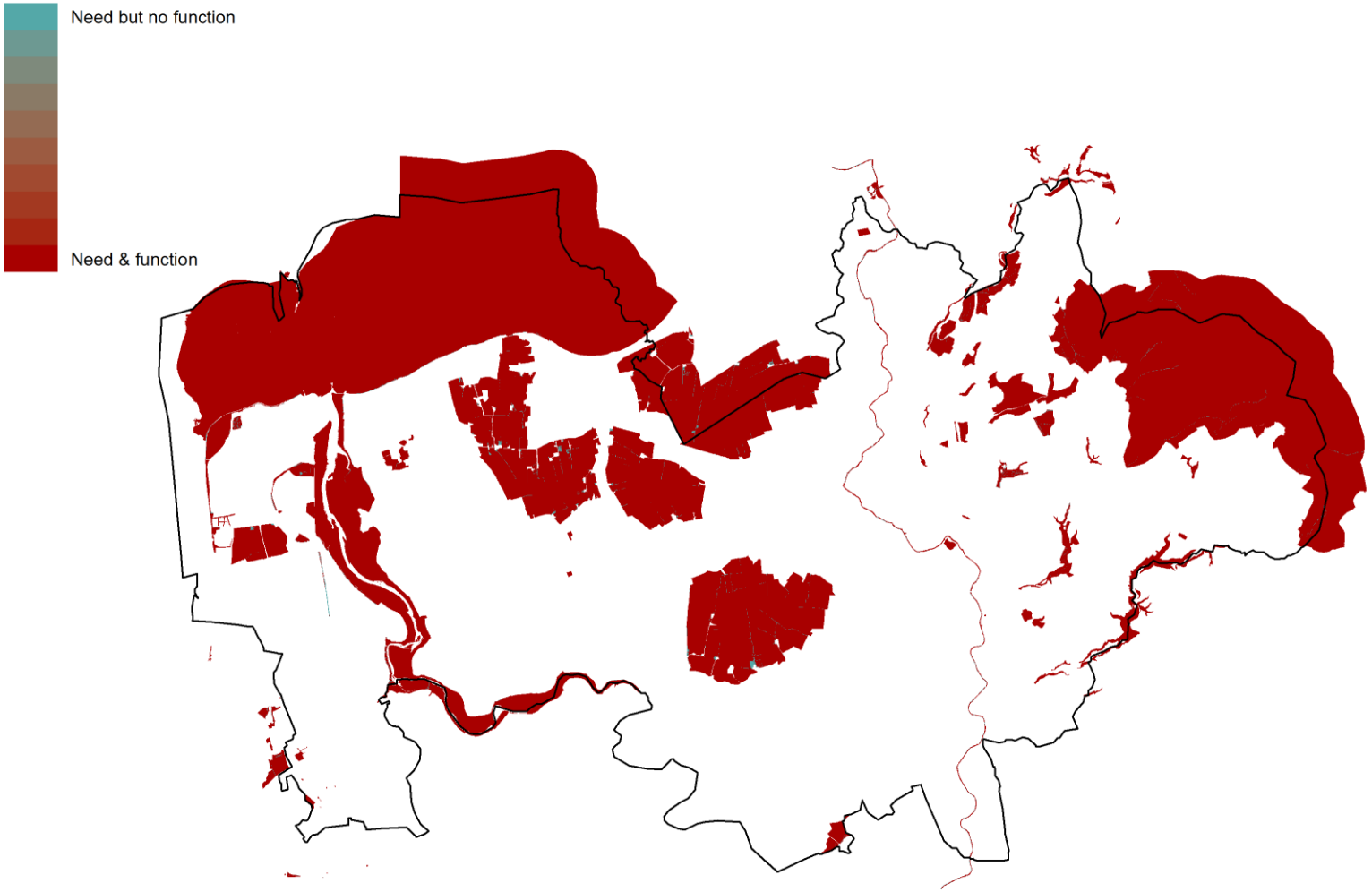
Flow reduction through surface roughness



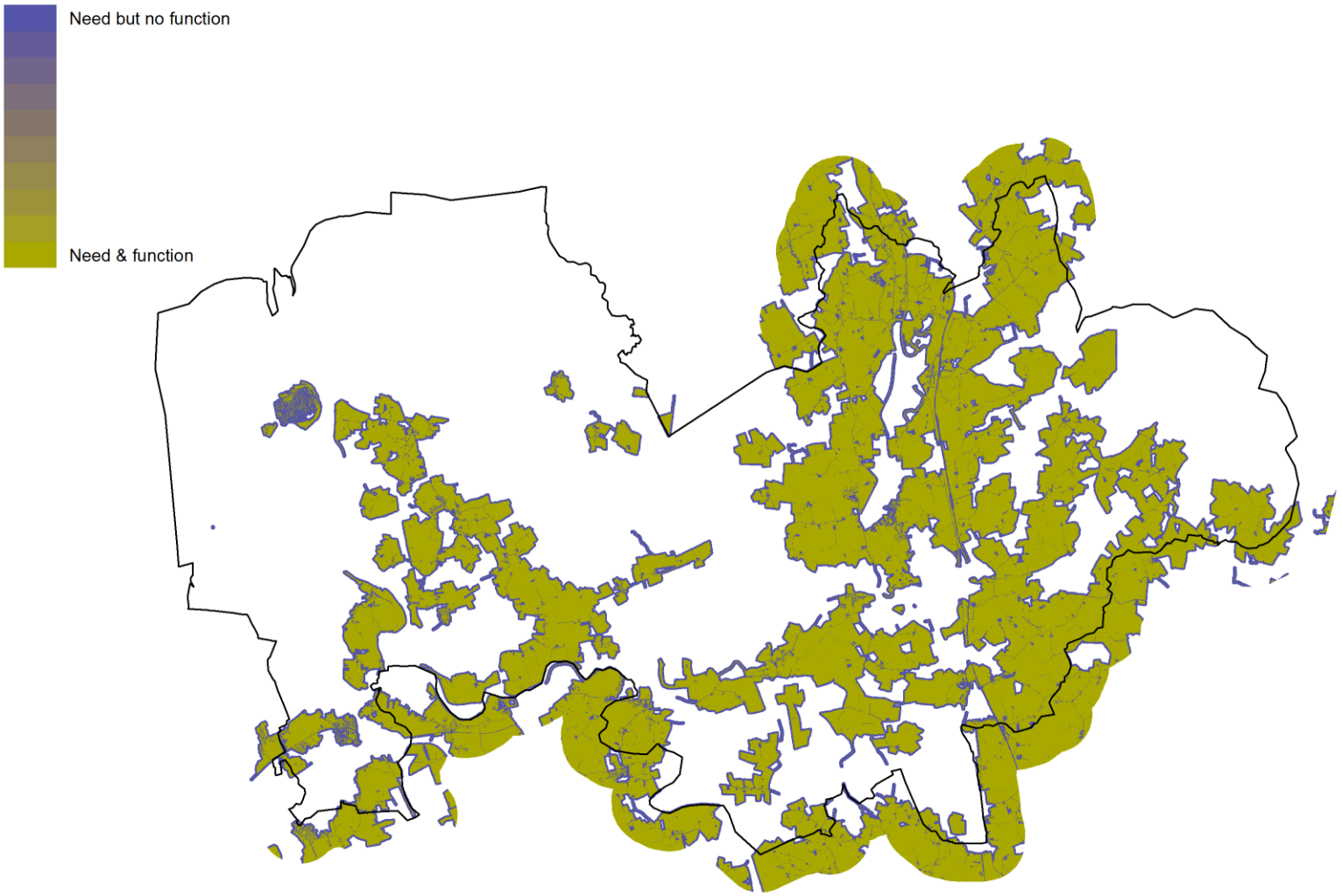
Food production



Habitat for wildlife



Heritage


Need but no function
Need & function
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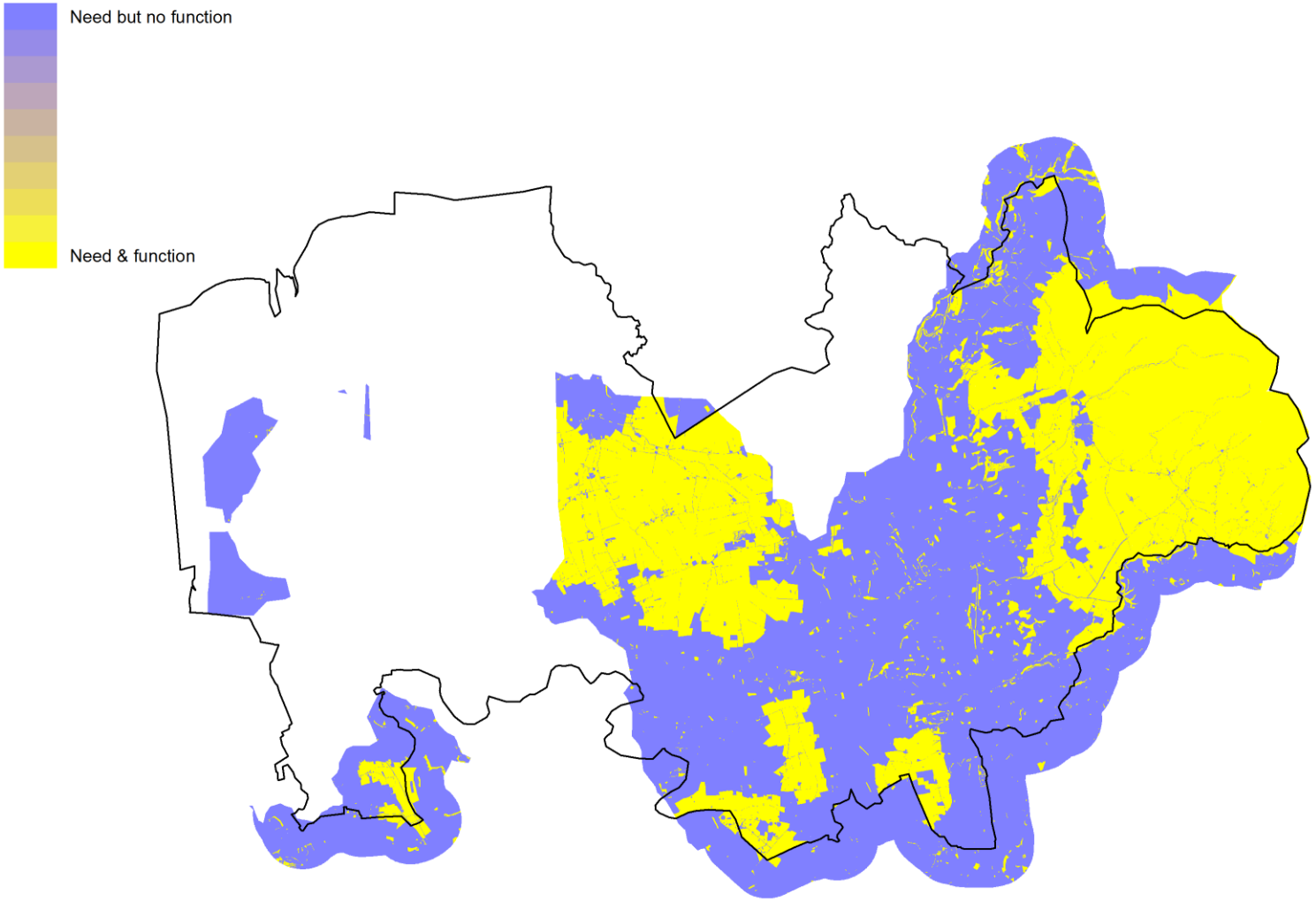
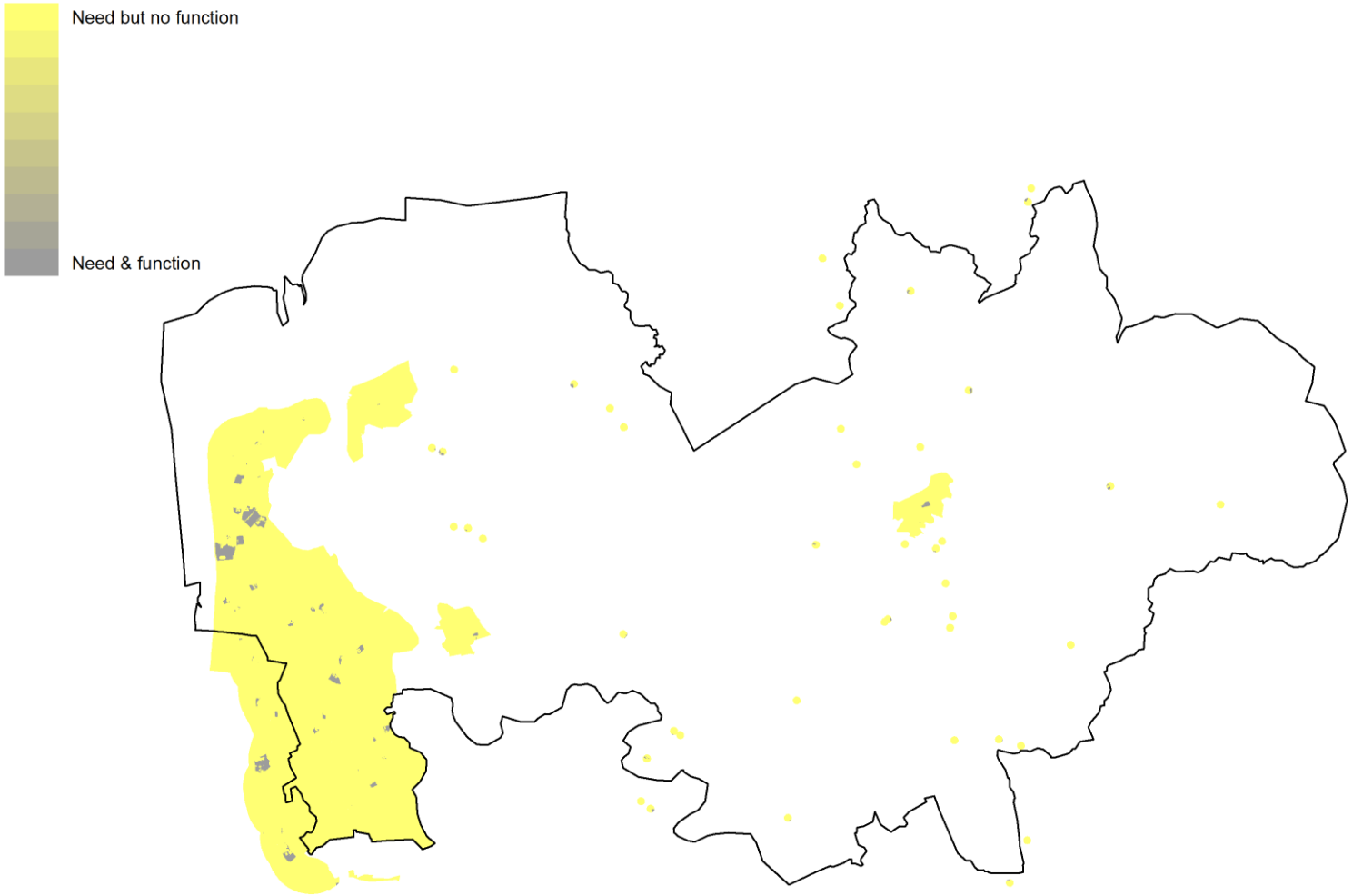
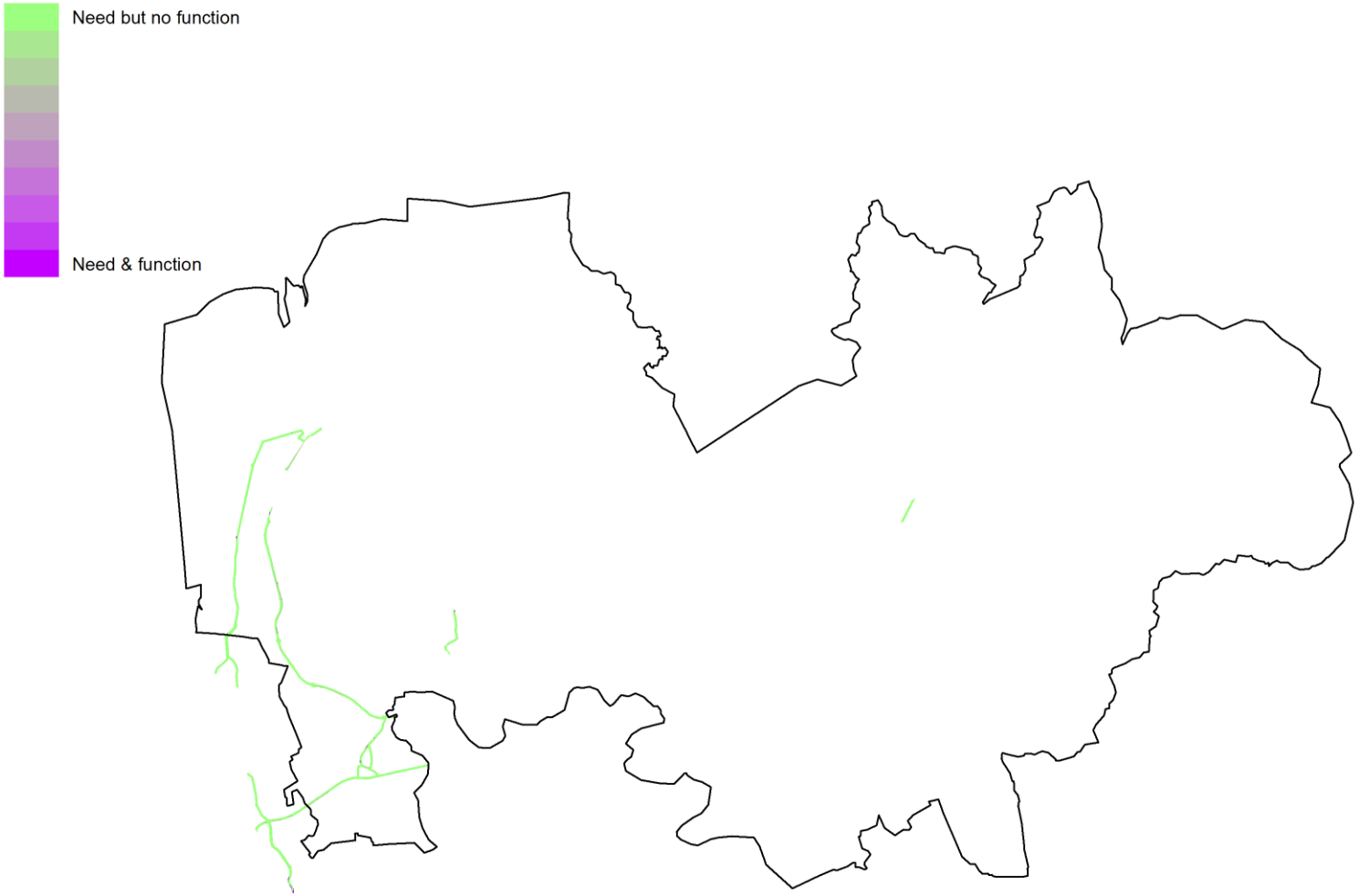
Inaccessible water storage



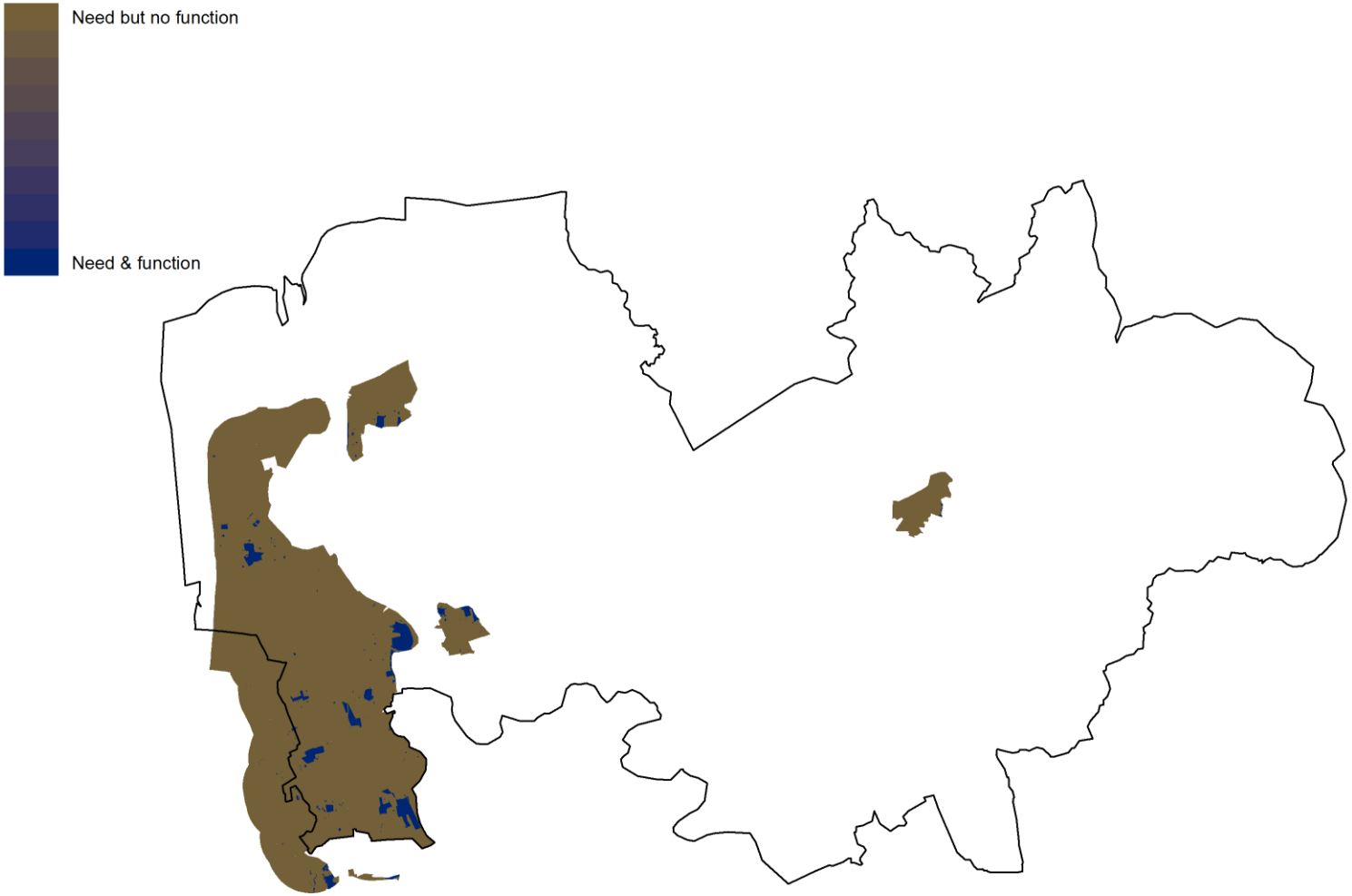
Learning



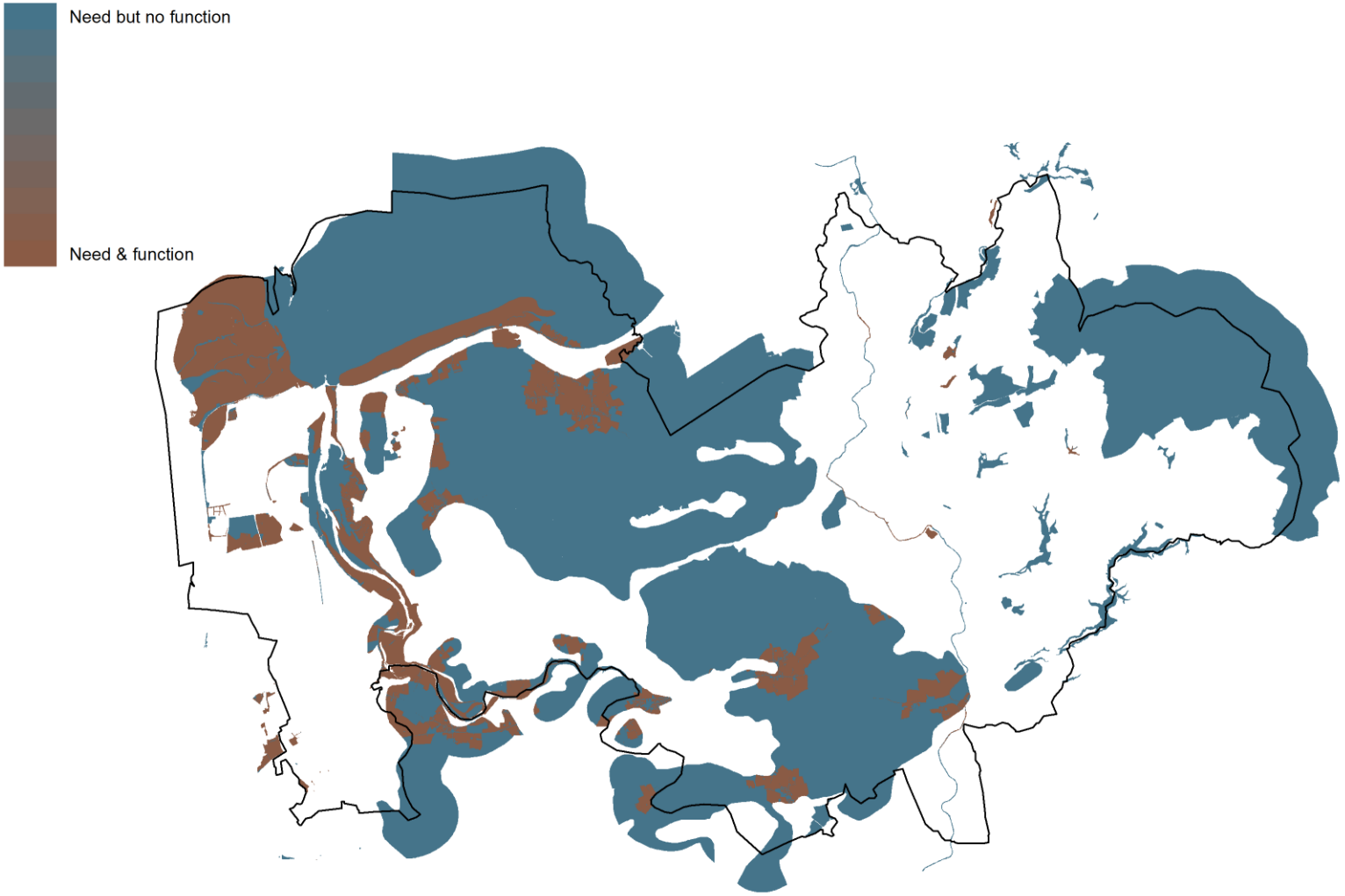
Noise absorption



Opportunity to hear more natural sound

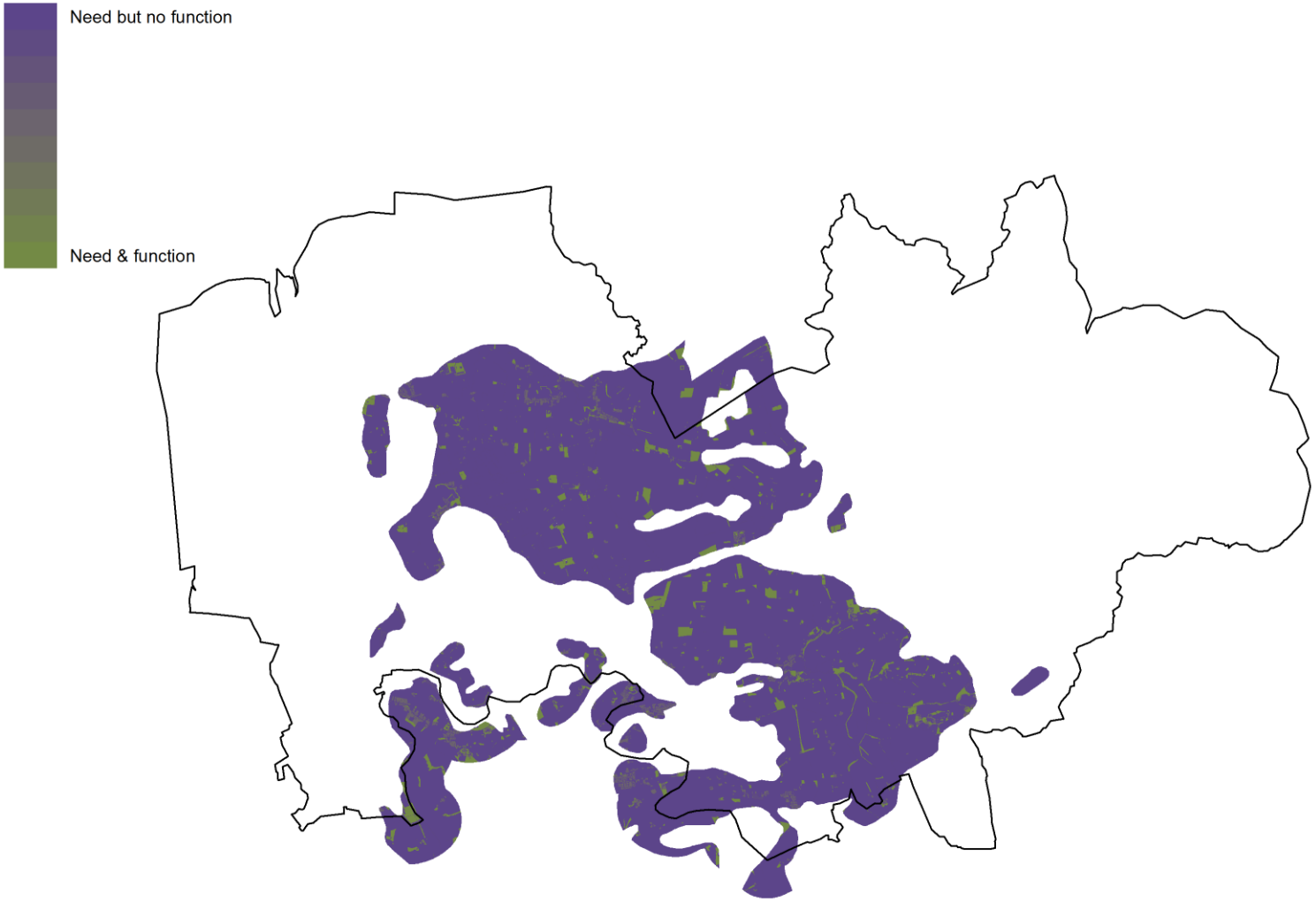


Pest and disease control

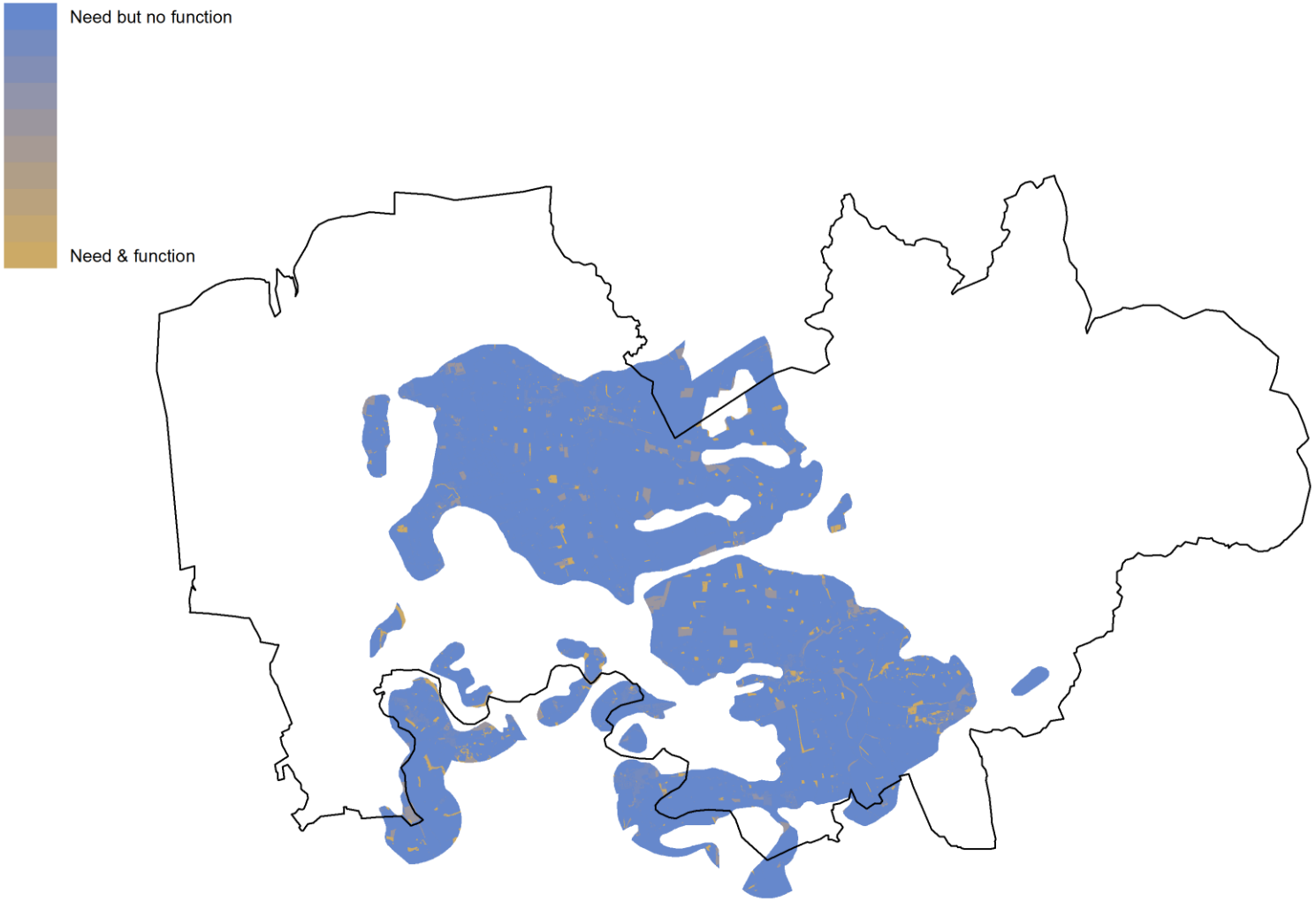


Physical movement barrier

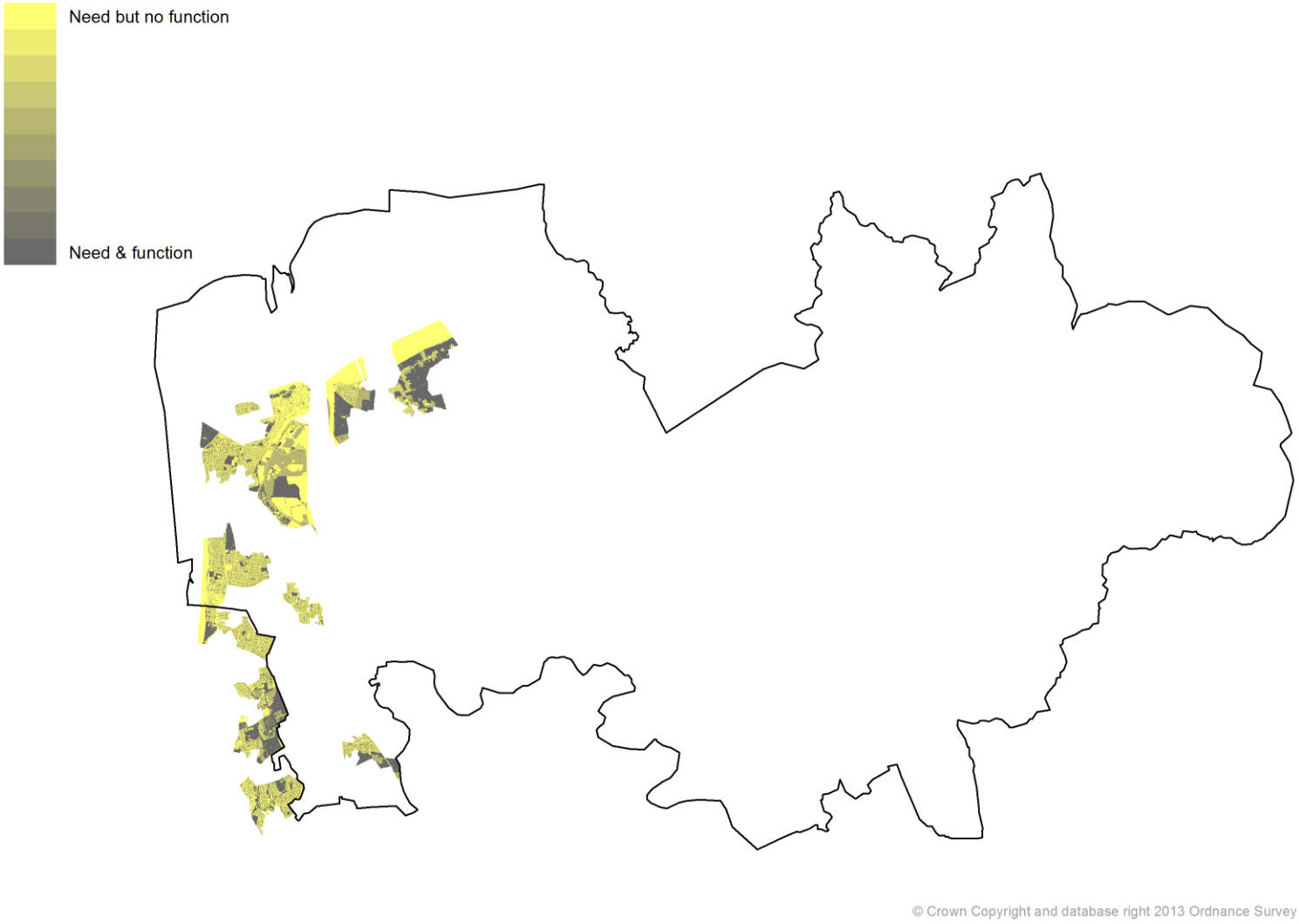
Pollination



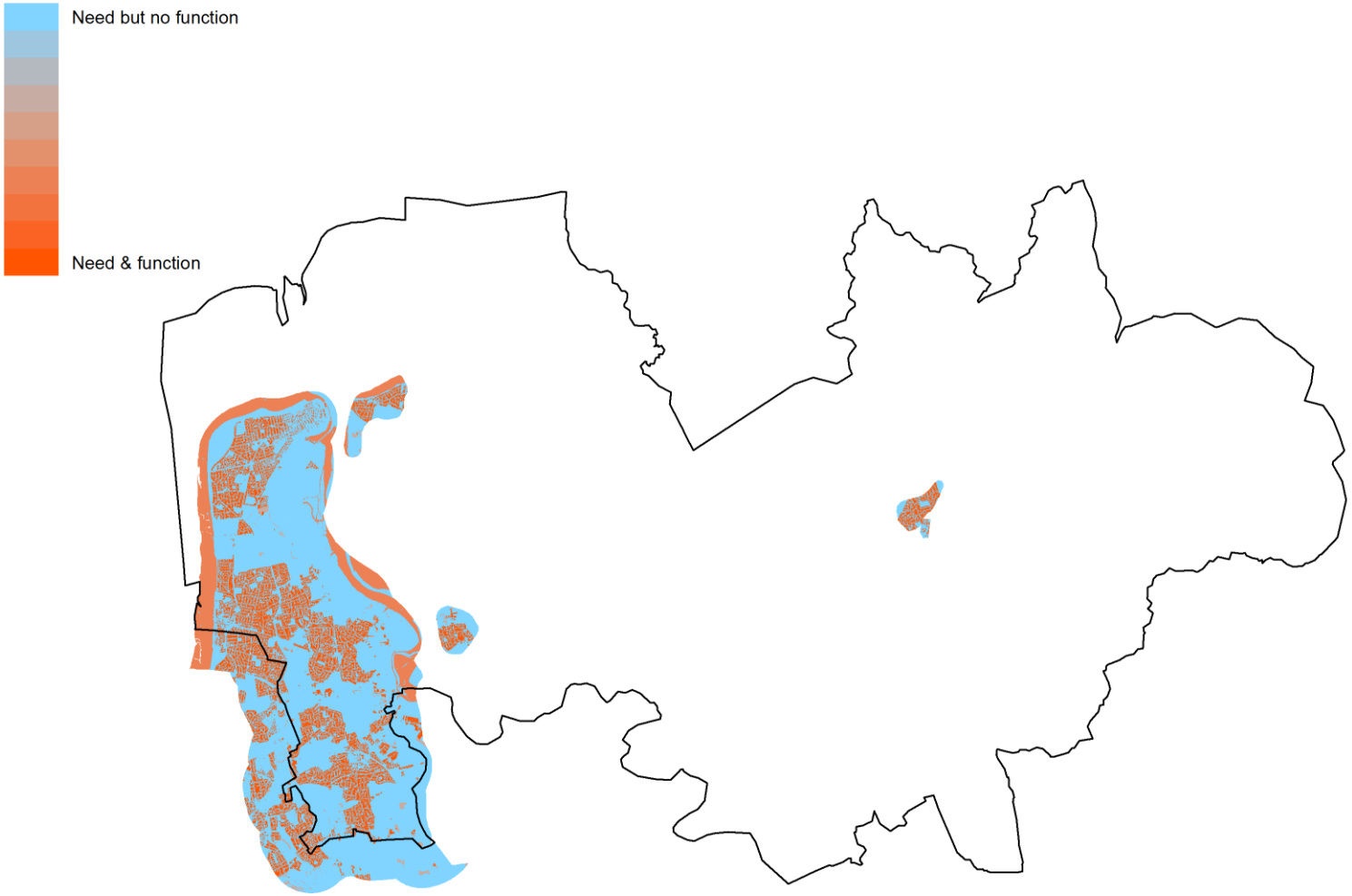
Pollutant removal from soil/water



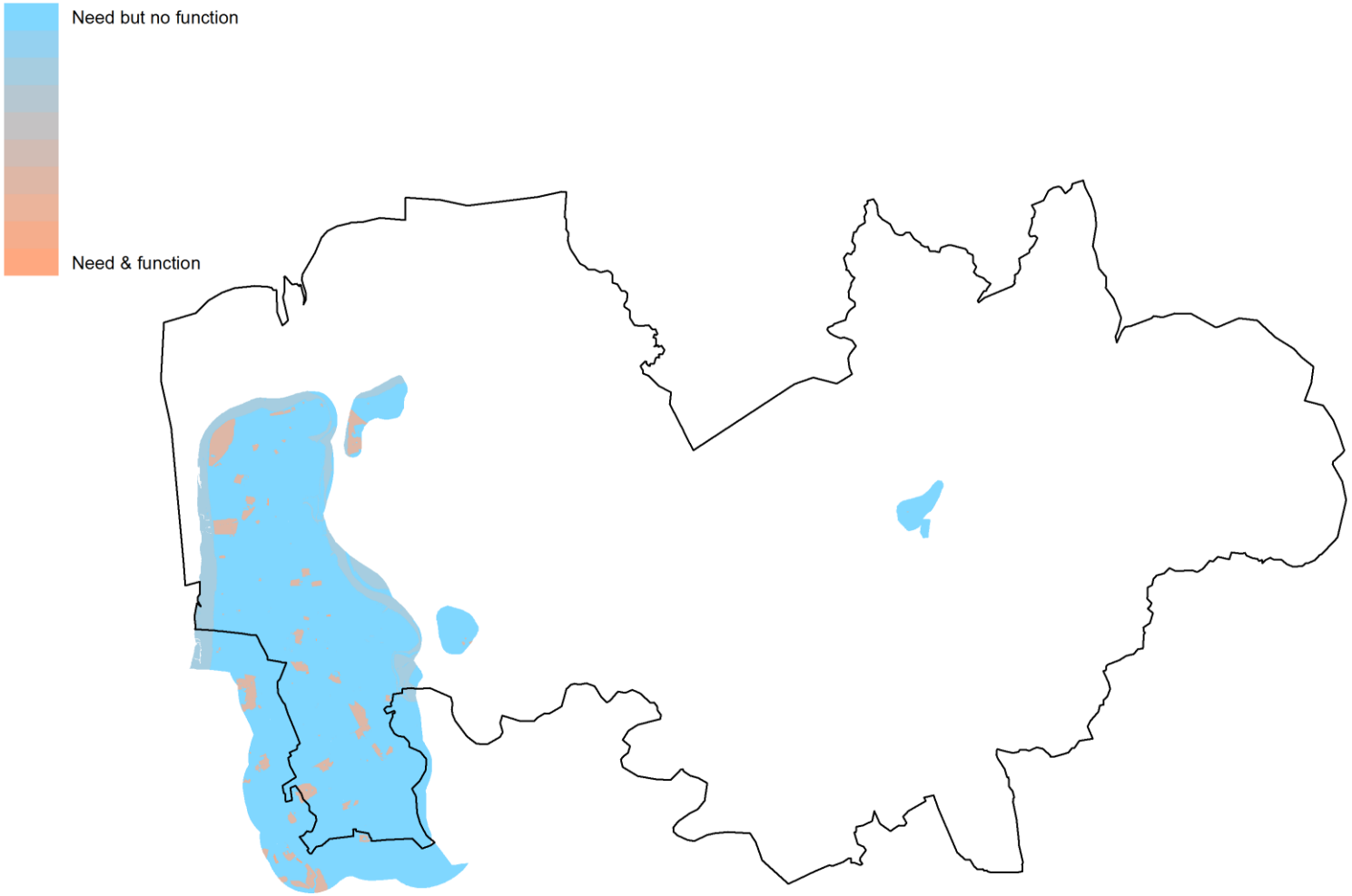
Providing jobs



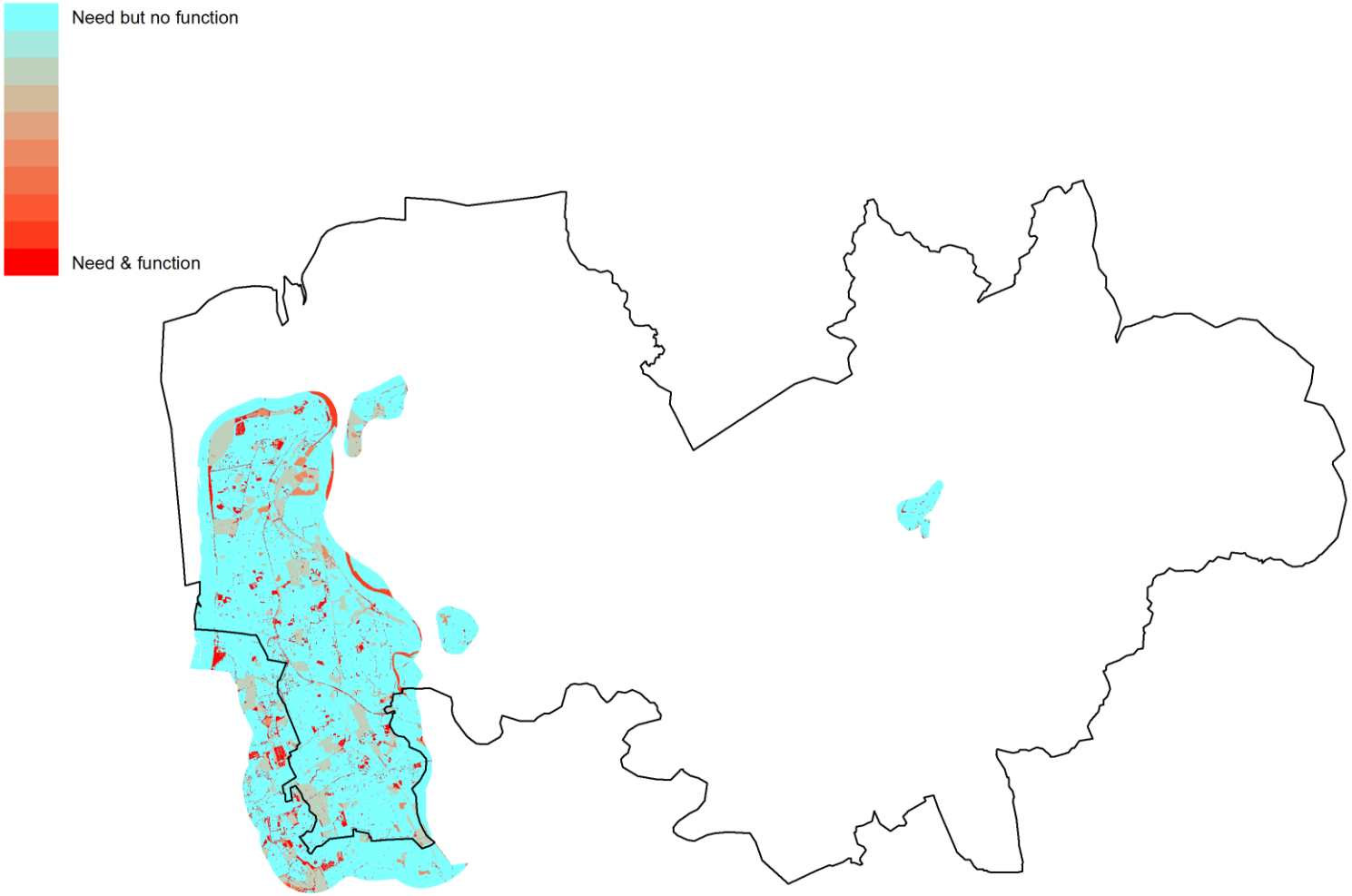
Recreation - private



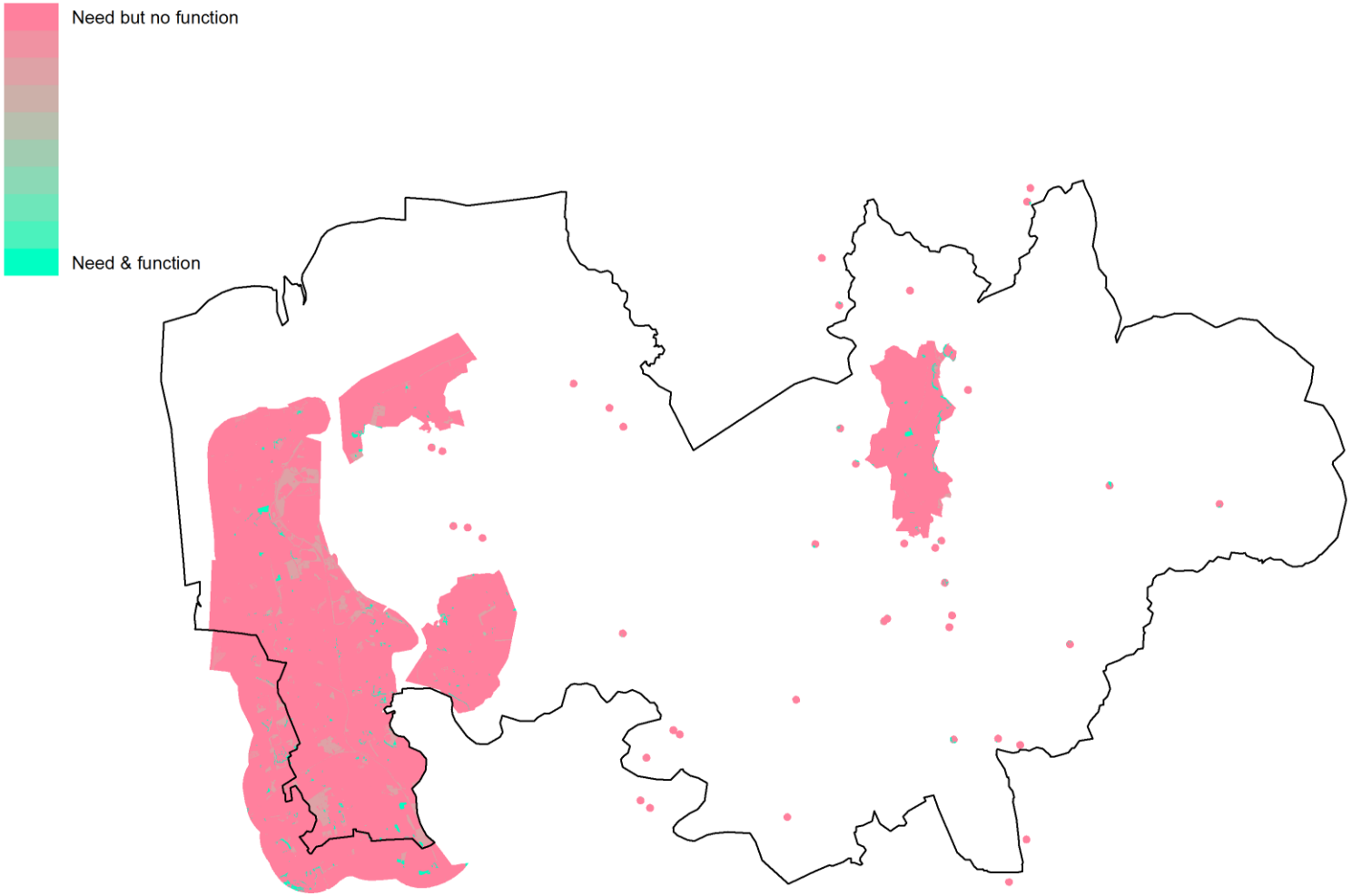
Recreation - public with restrictions



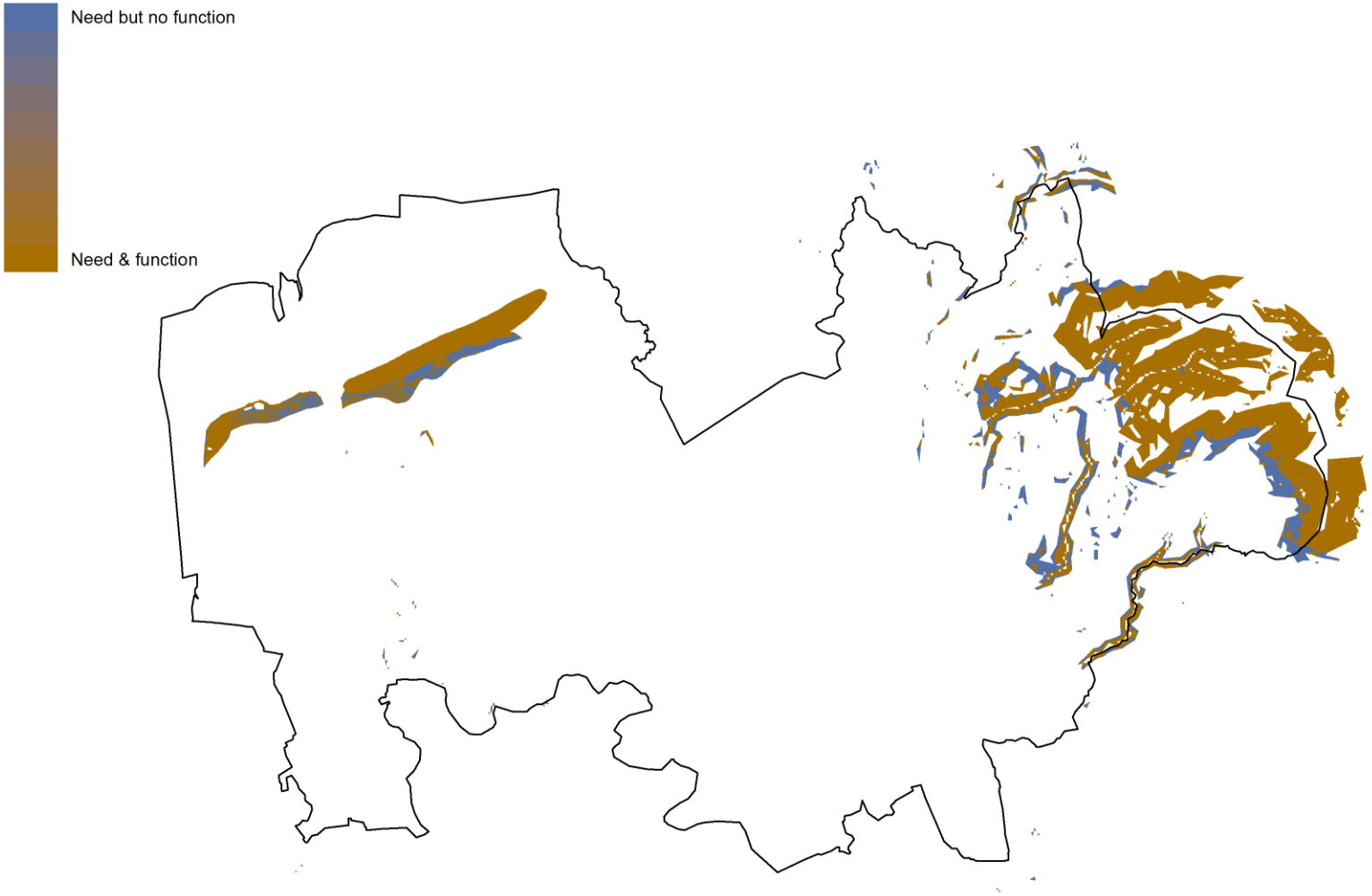
Recreation - public



Shading from the sun

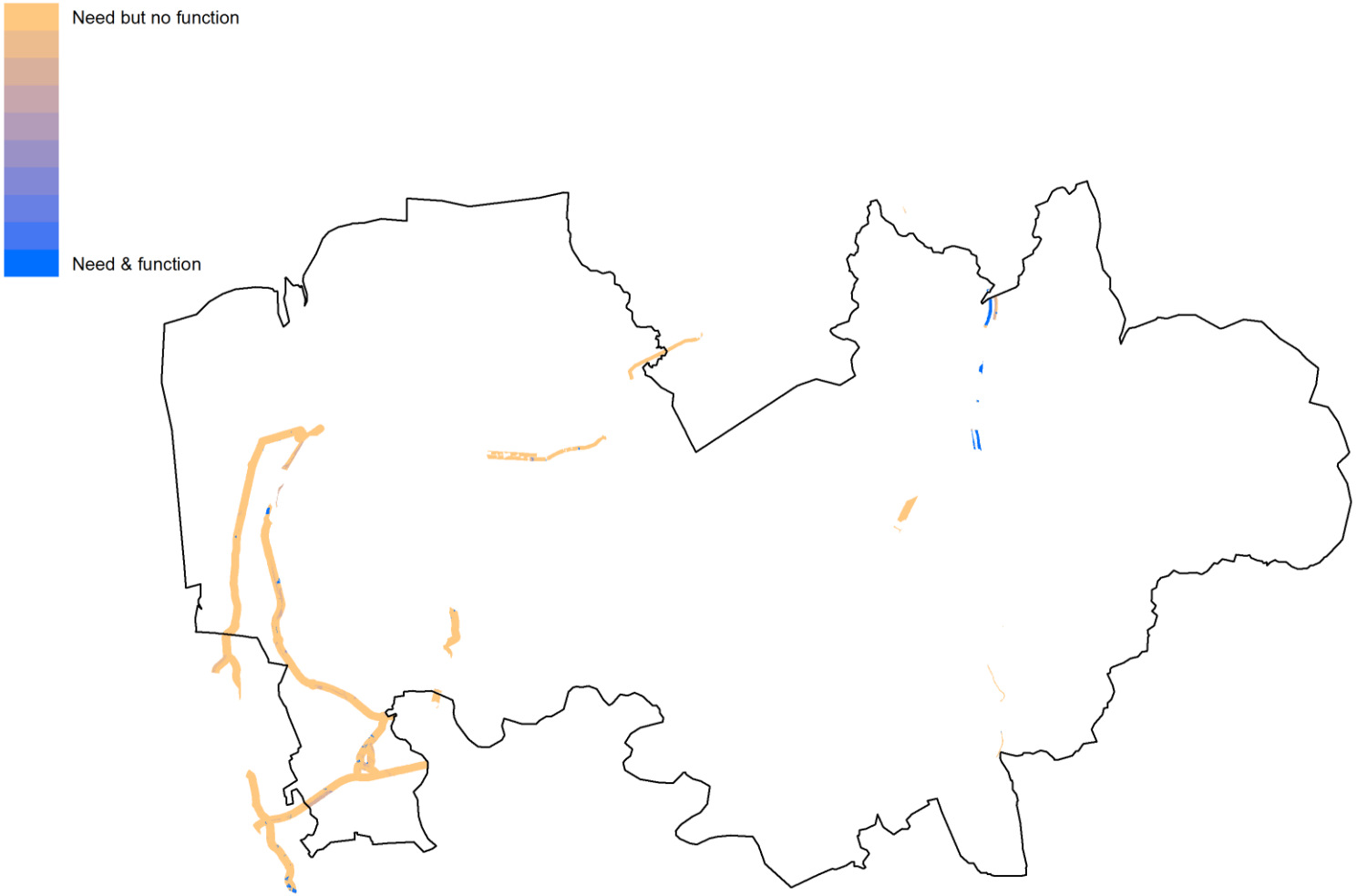


Soil stabilisation

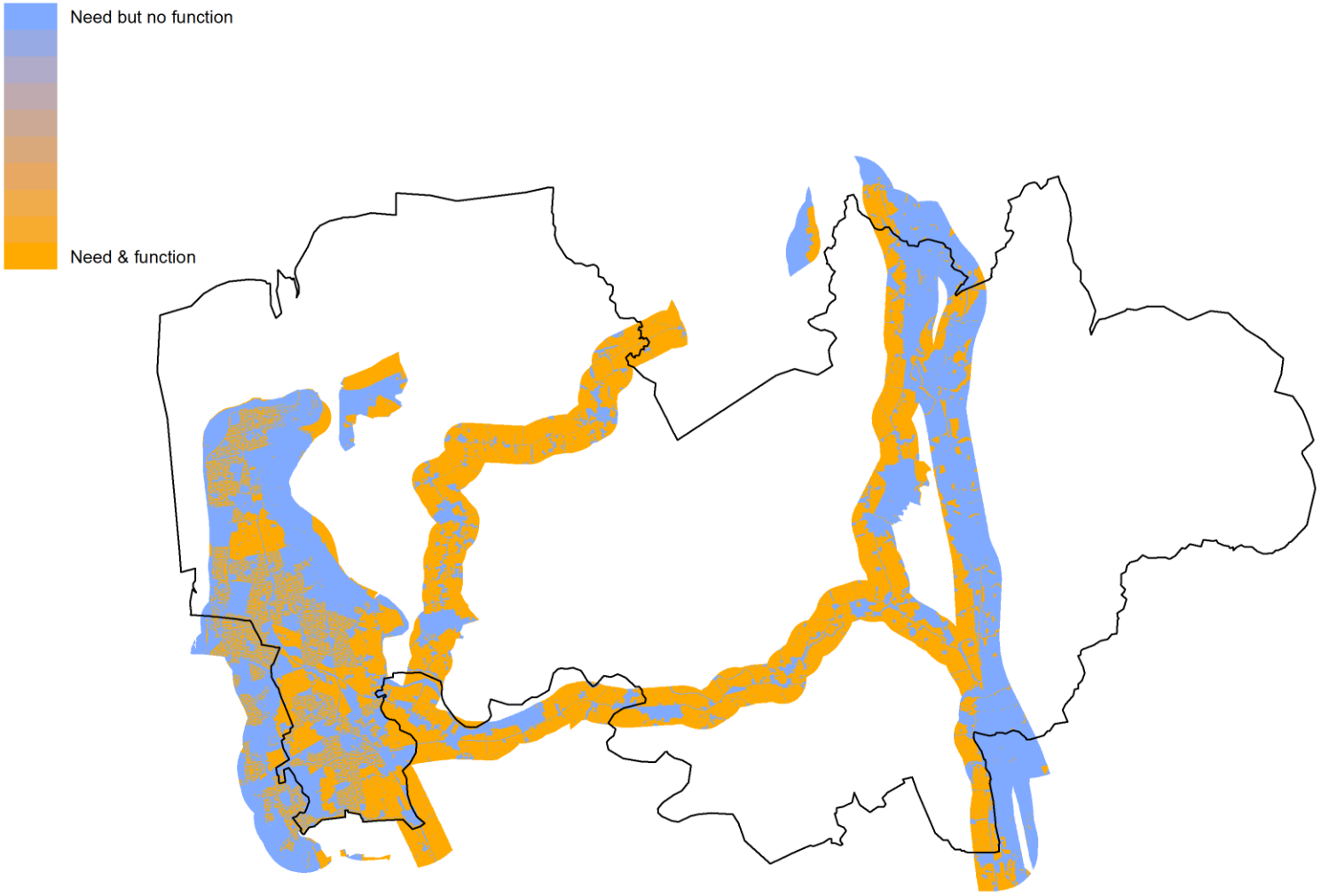


Timber production

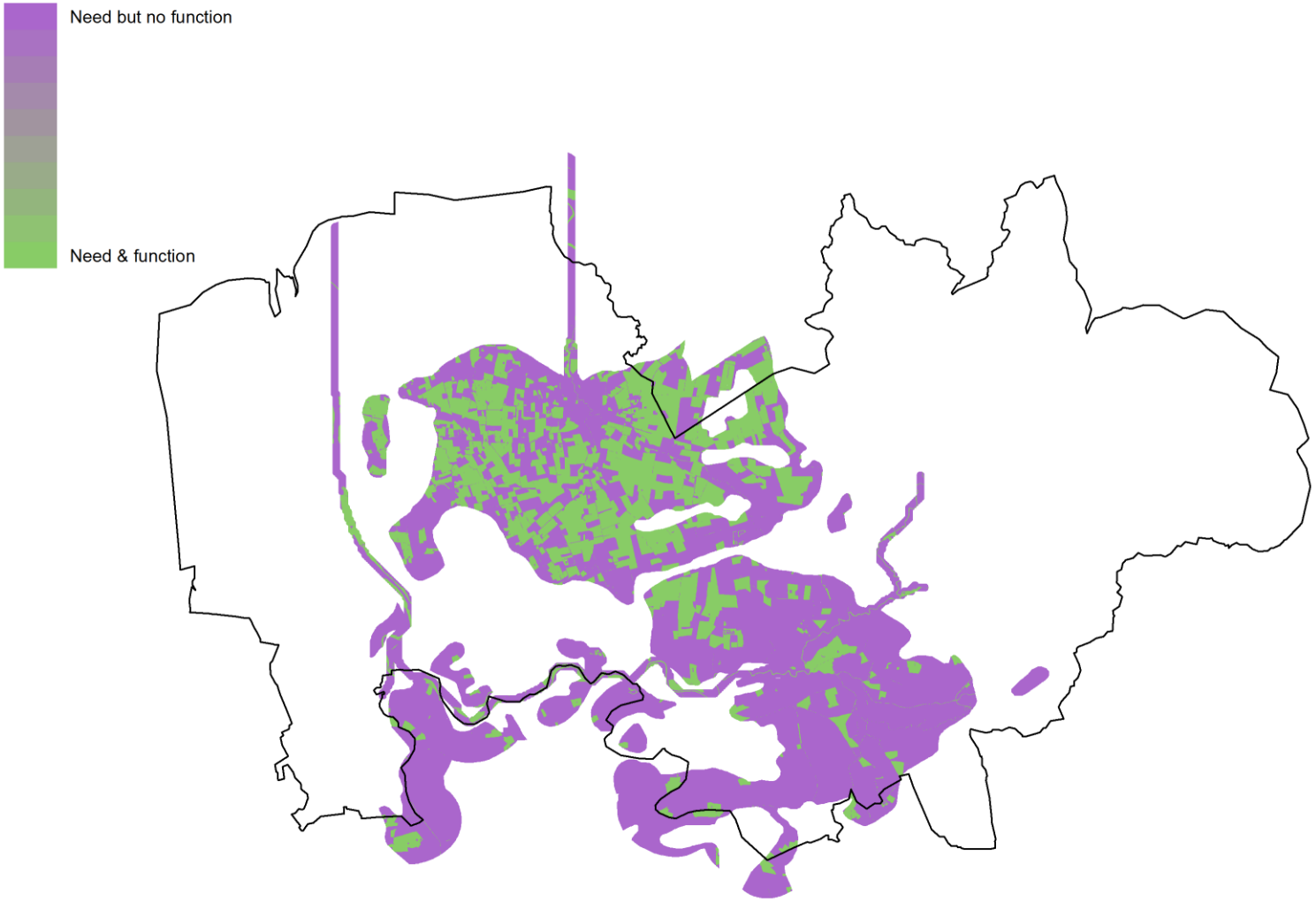
Trapping air pollutants



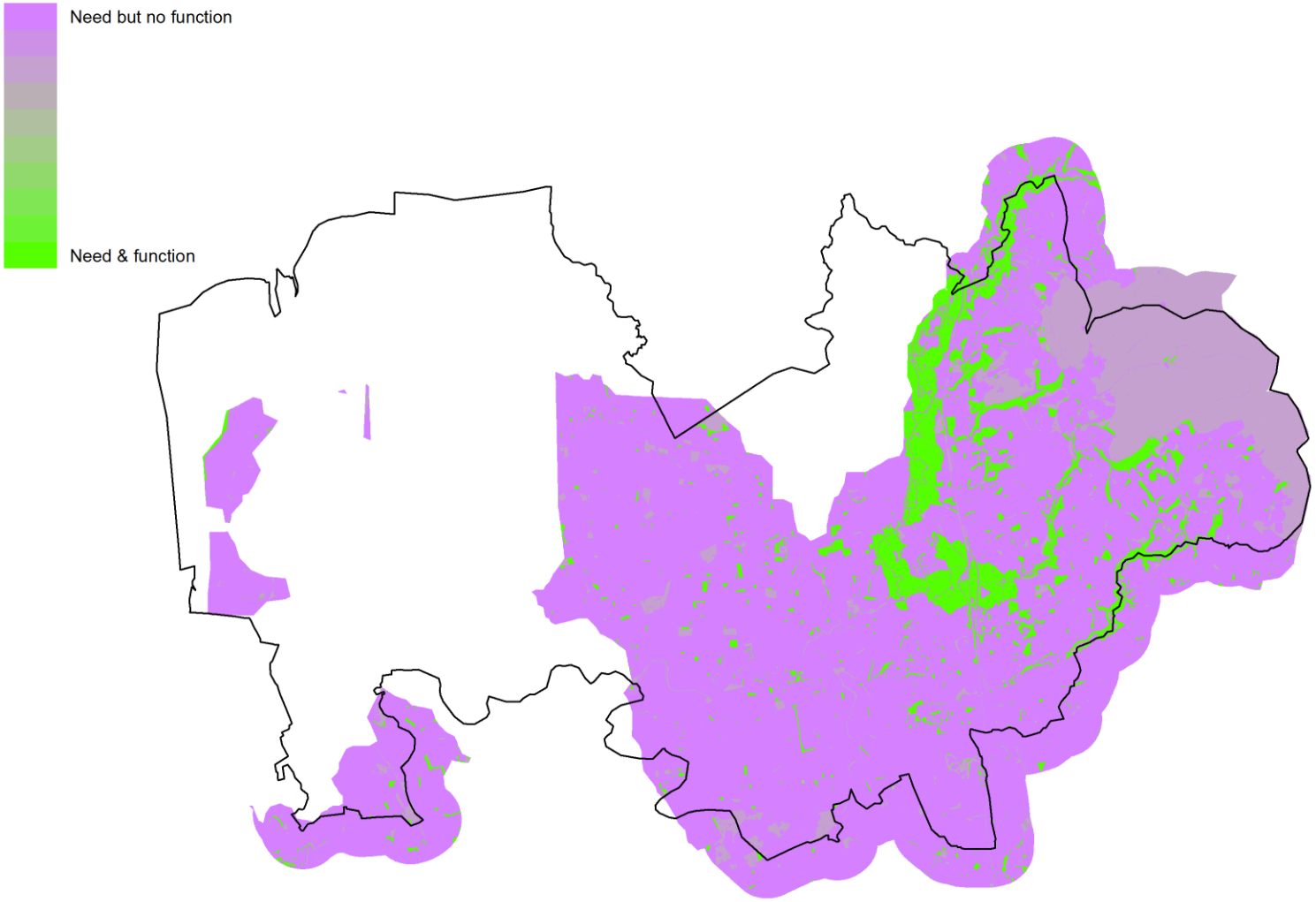
Visual contribution to landscape character



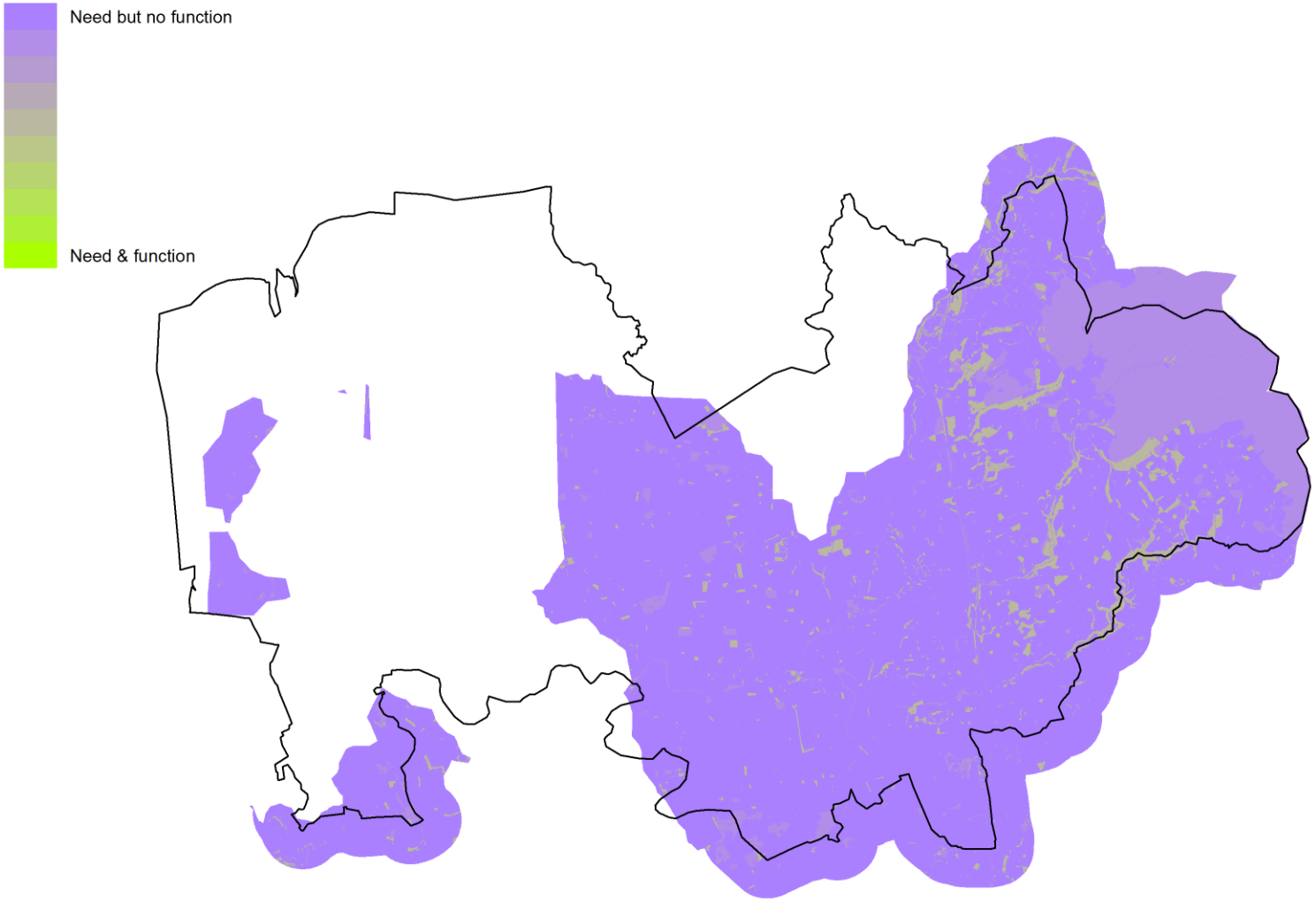
Water conveyance



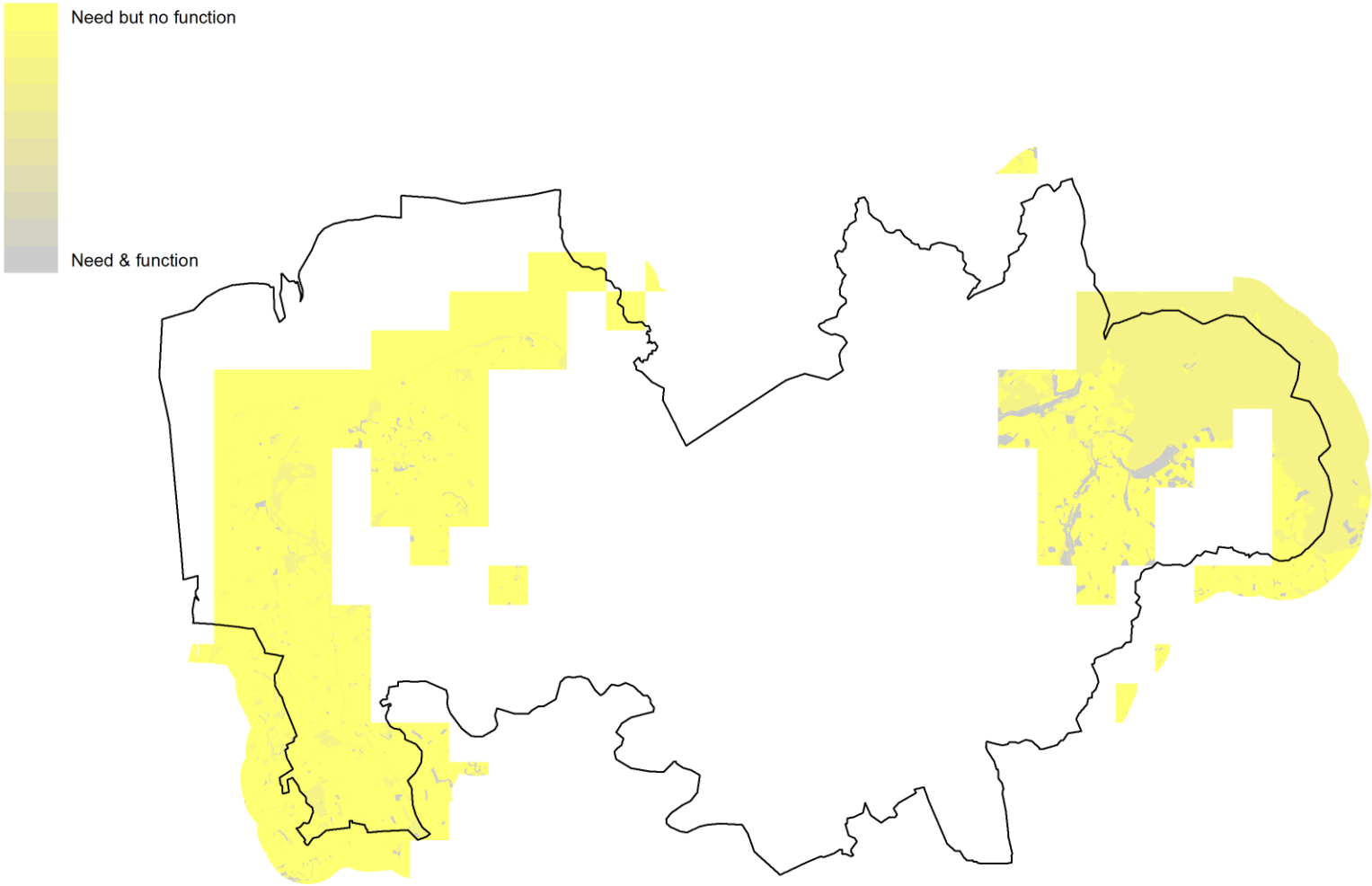
Water infiltration



Water interception

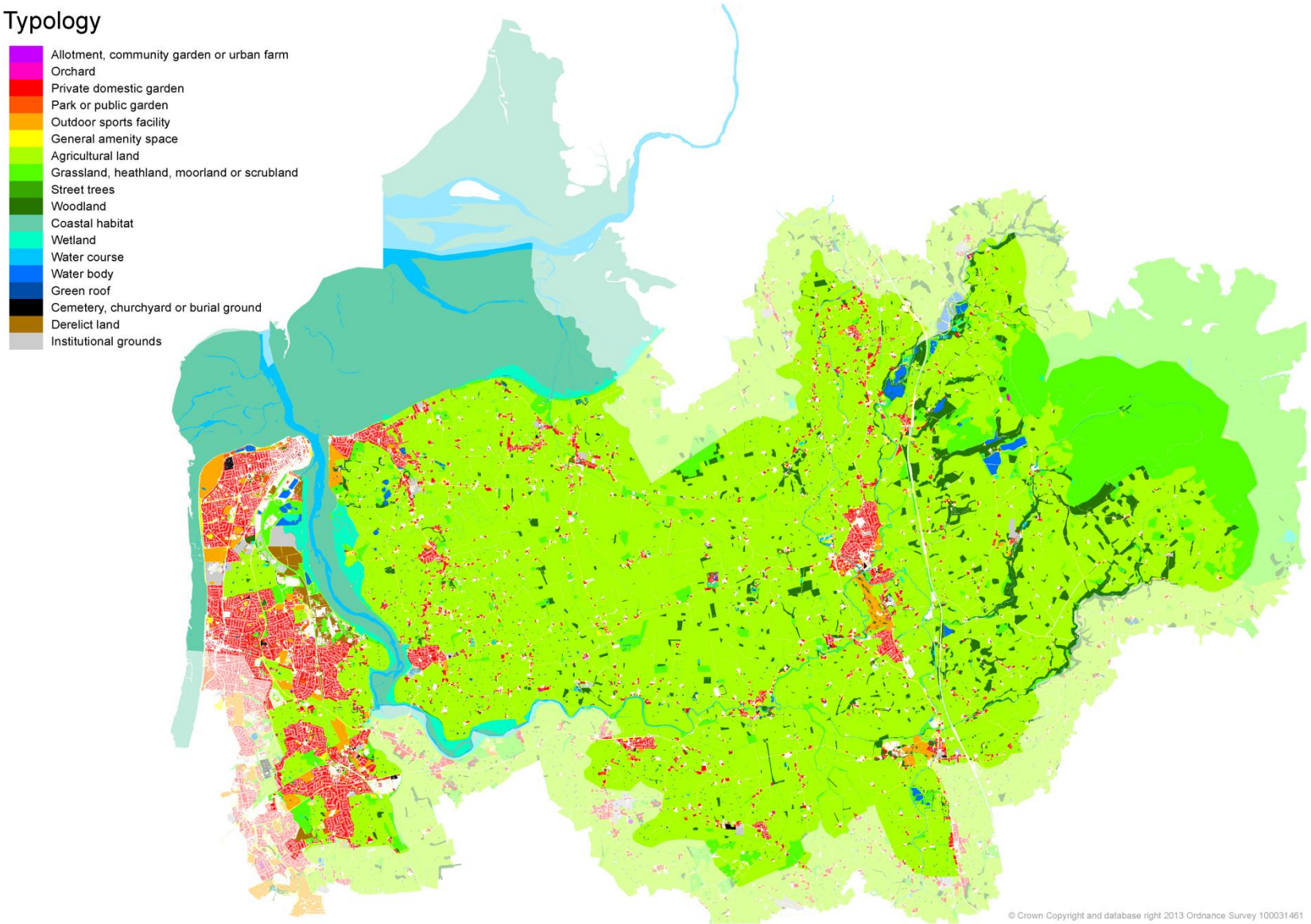


Wind shelter



Typology Map with and without GI Area boundaries

These maps show what green infrastructure is where in Wyre. White areas are not green infrastructure. The classification into types is approximately 90% accurate. These maps can be used to understand the distribution of different types of green infrastructure across Wyre, across parts of Wyre, and across particular sites.


Typology
Allotment, community garden or urban farm
Orchard
Private domestic garden
Park or public garden
Outdoor sports facility
General amenity space
Agricultural land
Grassland, heathland, moorland or scrubland
Street trees
Woodland
Coastal habitat
Wetland
Water course
Water body
Green roof
Cemetery, churchyard or burial ground
Derelict land
Institutional grounds
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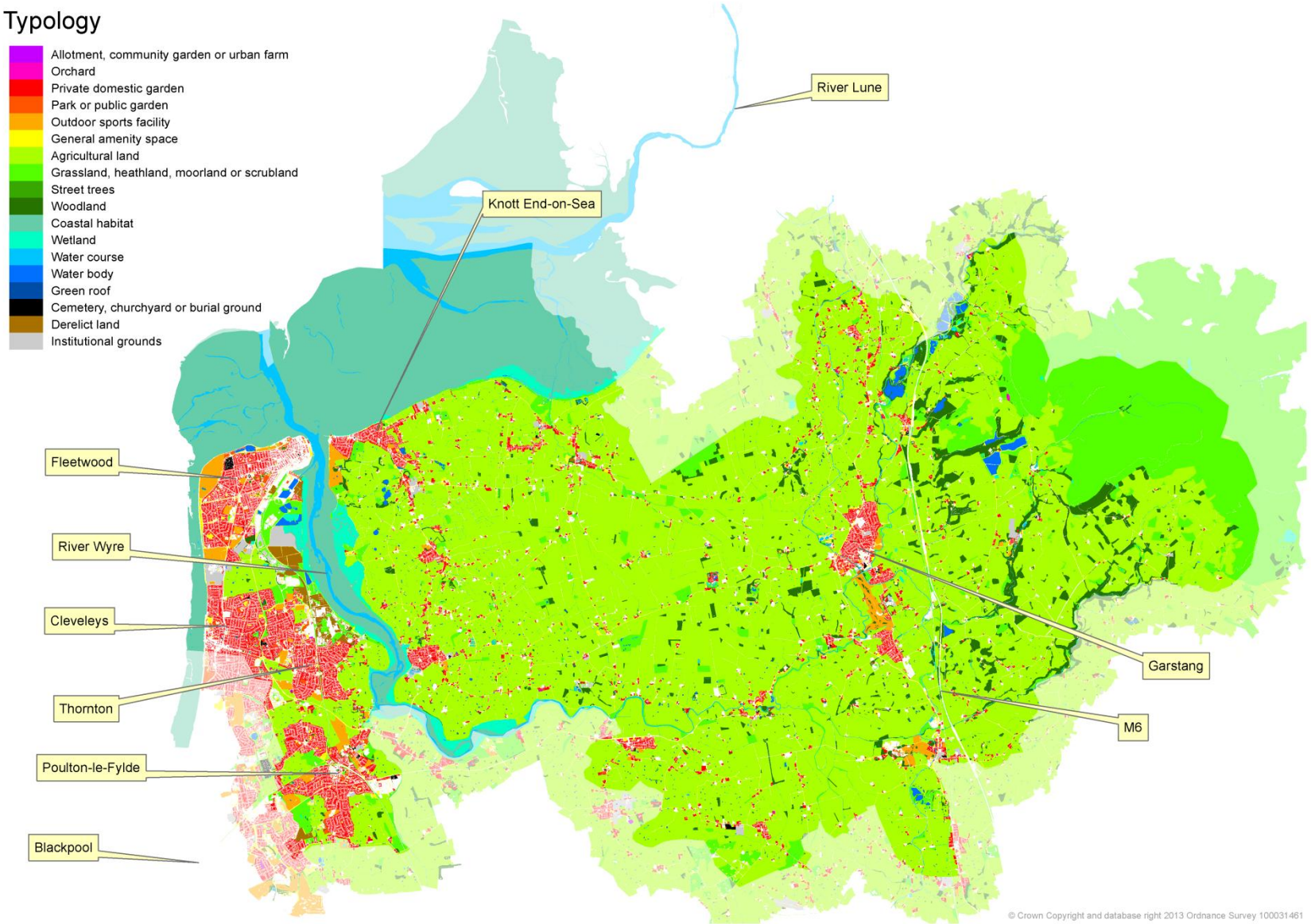
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Water course
Water body
Green roof
Cemetery, churchyard or burial ground
Derelict land
Institutional grounds
River Lune
Knott End-on-Sea
Fleetwood
River Wyre
Cleveleys
Thornton
Poulton-le-Fylde
Blackpool
Garstang
M6
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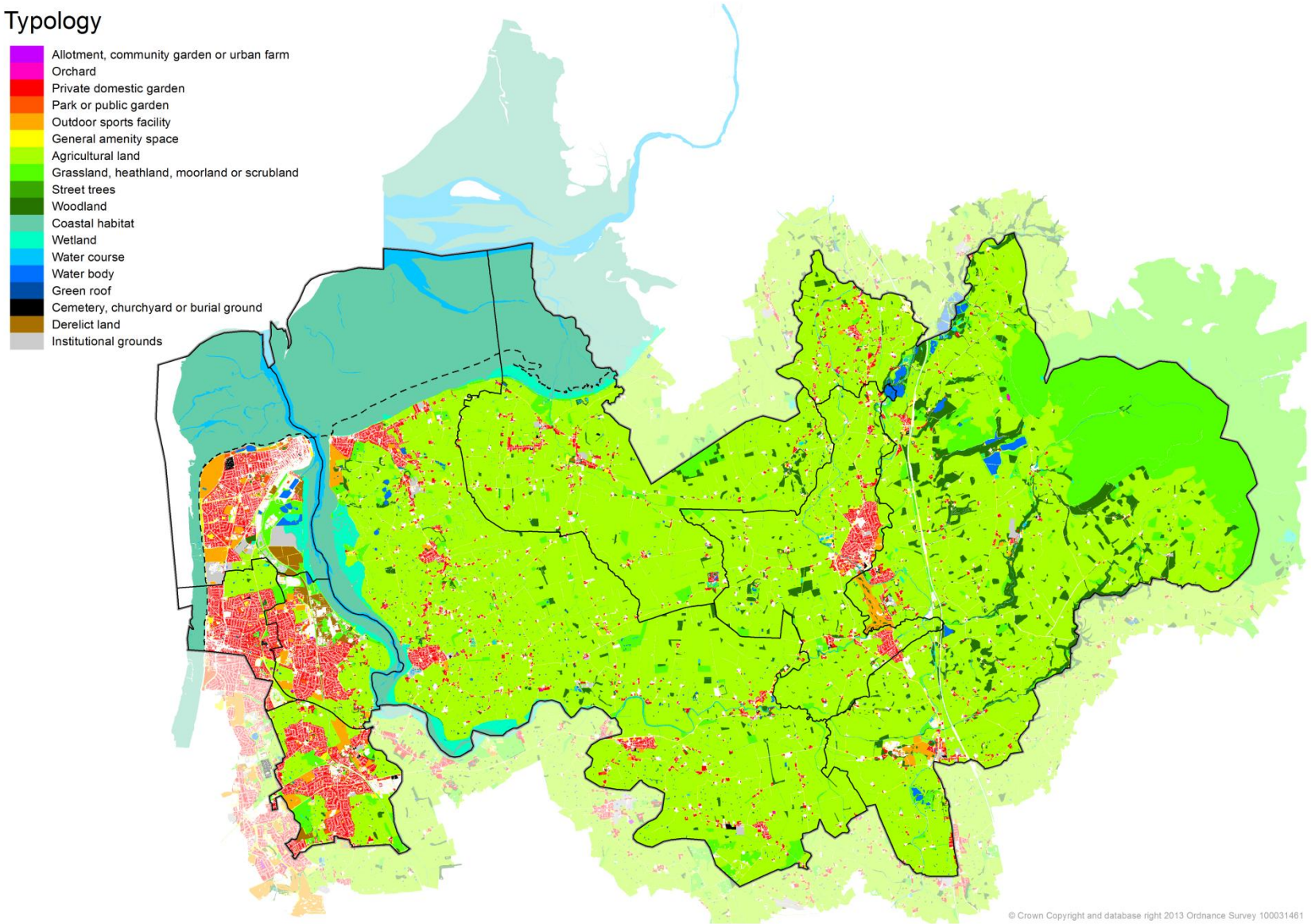
Typology
Allotment, community garden or urban farm
Orchard
Private domestic garden
Park or public garden
Outdoor sports facility
General amenity space
Agricultural land
Grassland, heathland, moorland or scrubland
Street trees
Woodland
Coastal habitat
Wetland
Water course
Water body
Green roof
Cemetery, churchyard or burial ground
Derelict land
Institutional grounds
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Compilation Maps

Needs met
This map indicates for how many functions the greatest need is met in each location across Wyre.

In the purple areas, there is a high level of need for many functions, and also many of those functions are performed by the green infrastructure, meaning that many of the needs are met. Since this green infrastructure is meeting many needs, it could be considered an asset, and potentially a priority for protection and management. However, because some functions are likely to be considered more important than others, in general and in certain locations (beyond what is captures in the needs mapping), other sites may be considered higher priority.

In the yellow areas, there may be a high level of need for many or few functions, but it is certainly the case that few of the functions that are needed there are performed, meaning that not many needs are met.

This map can be used to help understand the relative importance of different sites in terms of the number of needs met by the green infrastructure on them. This information may be used to guide development allocations and management priorities – although reference should always be made to the data on individual needs met and not met as well.

Note that the colours do not correspond exactly to the number of different functions, because exactly which areas of green infrastructure perform which functions is not known for sure in all cases. Instead the sum of the likelihoods is used.

Needs not met
This map indicates for how many functions the greatest need is **not** met in each location across Wyre.

In the purple areas, there is a high level of need for many functions, and not many of those functions are performed by the green infrastructure, meaning that many of the needs are not met. These areas should potentially be considered a priority for creation and enhancement of green infrastructure, to try to meet some of the unmet needs. However, because some functions are likely to be considered more important than others, in general and in certain locations (beyond what is captures in the needs mapping), other sites may be considered higher priority.

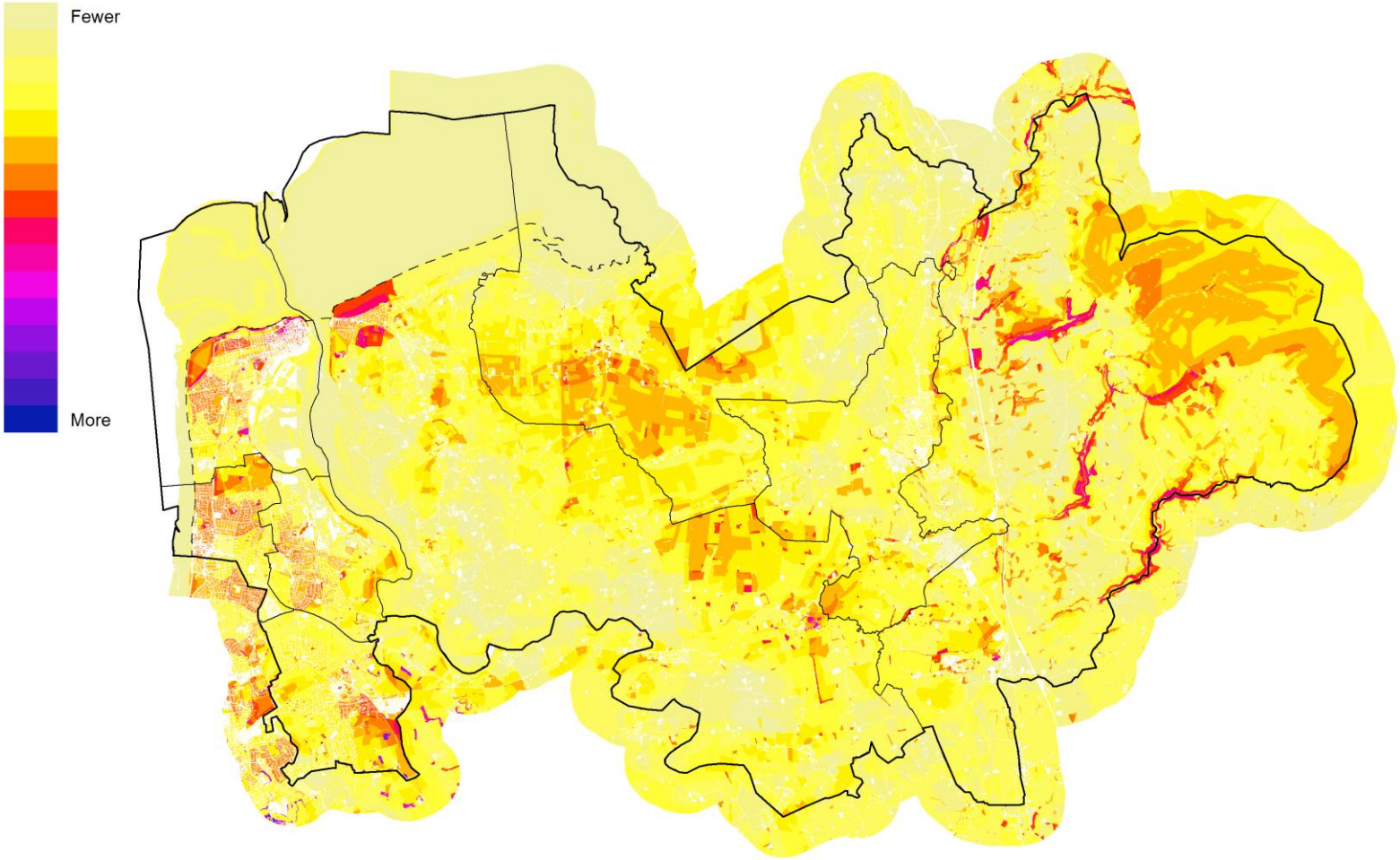
In the yellow areas, there may be a high level of need for many or few functions, but it is certainly the case that most of the functions that are needed there are performed, meaning that few needs are not met.

This map can be used to help target green infrastructure interventions and guide development conditions. Reference should always be made, though, to the data on individual needs met and not met as well.

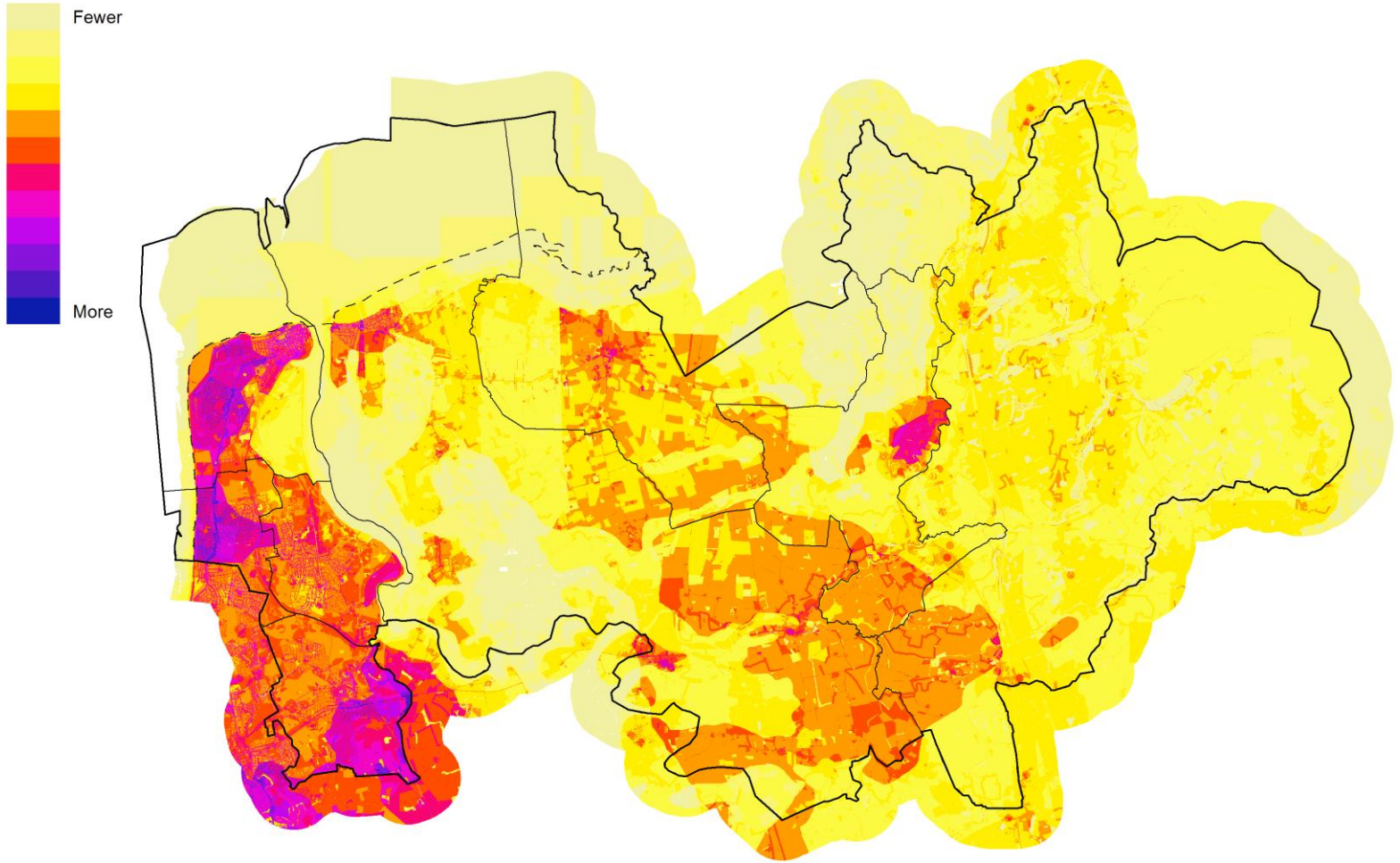
Note that the colours do not correspond exactly to the number of different functions, because exactly which areas of green infrastructure perform which functions is not known for sure in all cases. Instead the sum of the likelihoods is used.

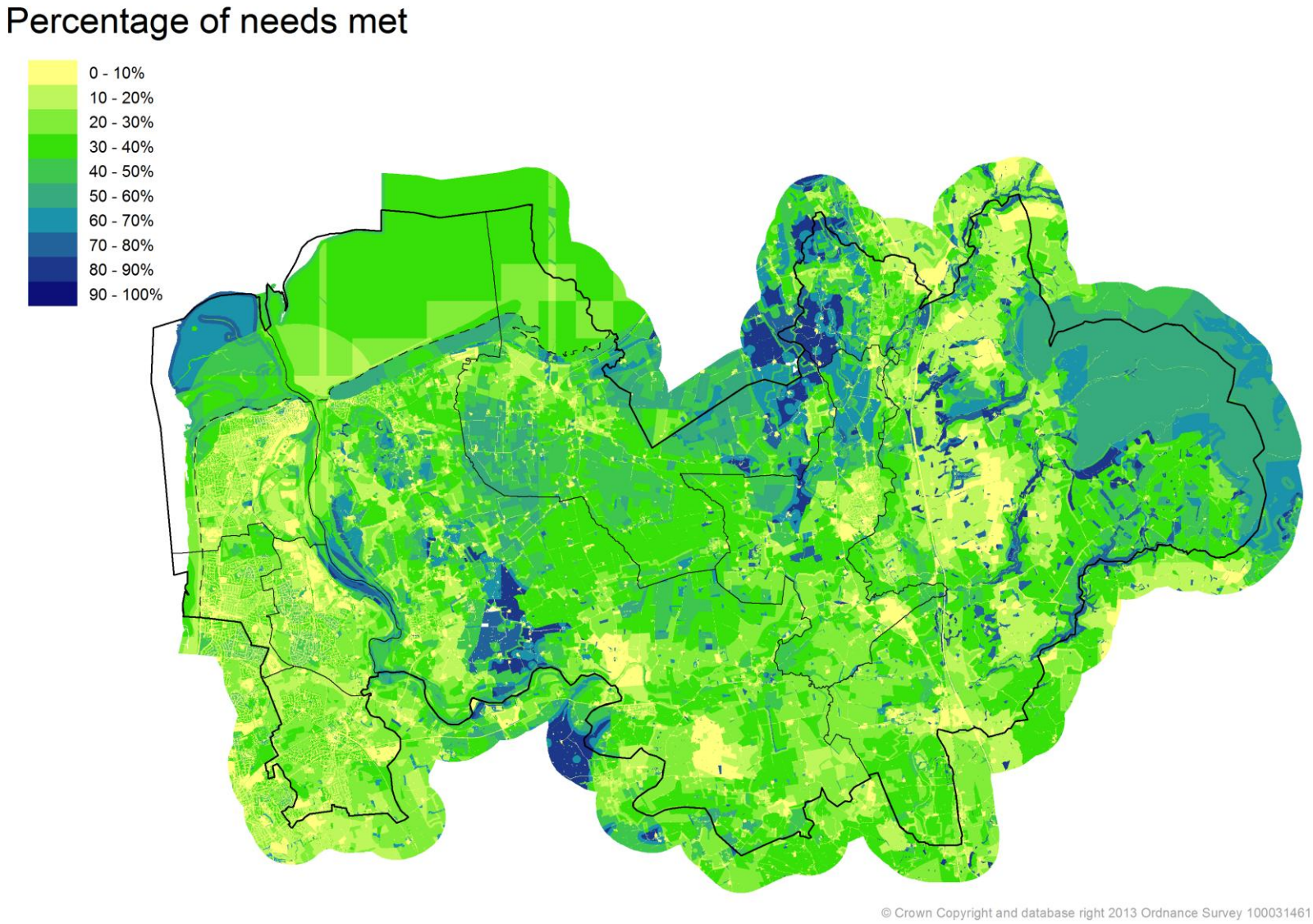
Percentage of needs met
This map indicates the percentage of the needs present that are met in each location across Wyre. It can be used to supplement the needs met map.

Needs met



Needs not met




Percentage of needs met
0 - 10%
10 - 20%
20 - 30%
30 - 40%
40 - 50%
50 - 60%
60 - 70%
70 - 80%
80 - 90%
90 - 100%
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