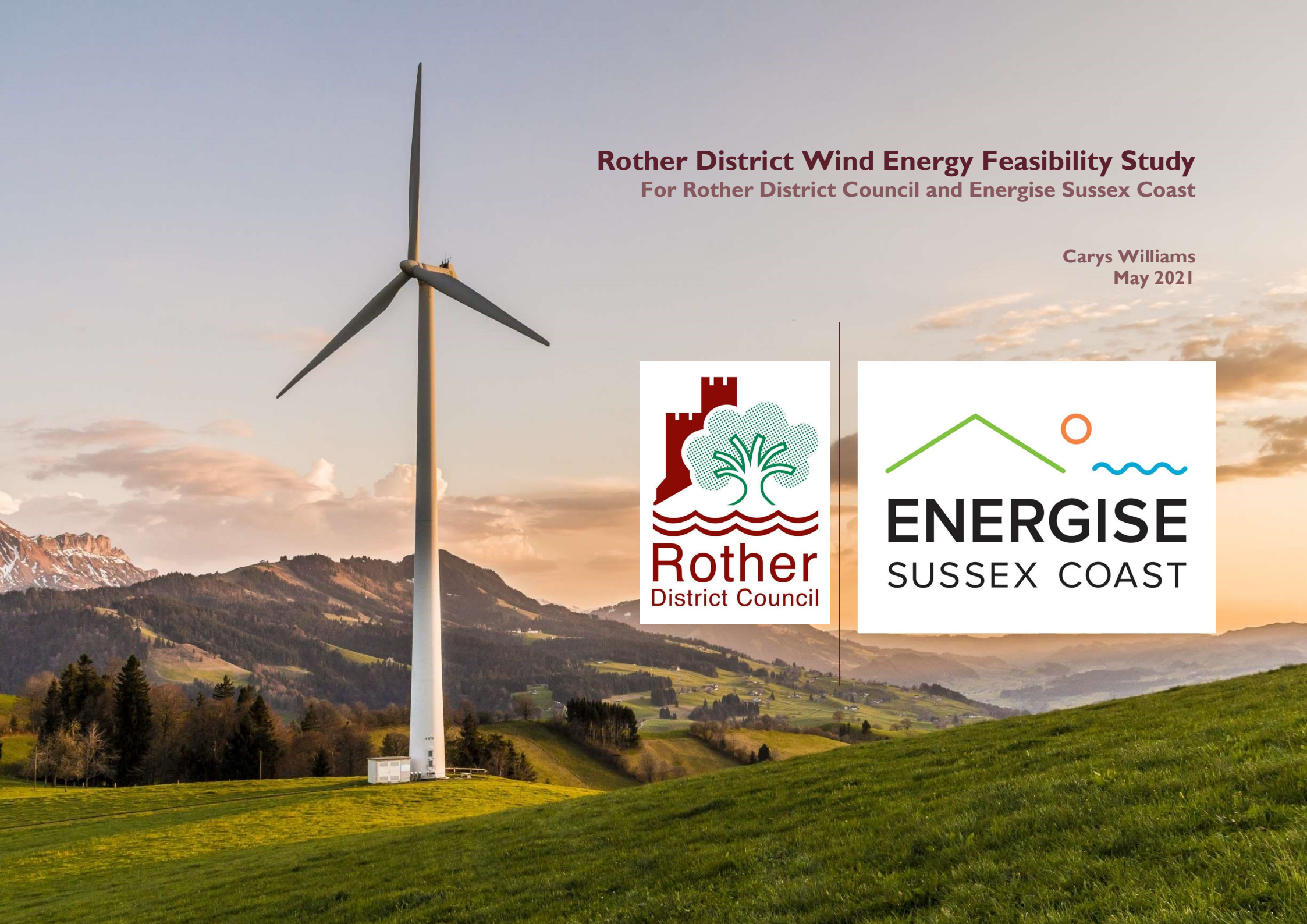

Rother District Wind Energy Feasibility Study

For Rother District Council and Energise Sussex Coast

Carys Williams

May 2021

Rother District Council

ENERGISE SUSSEX COAST

Foreword

"A report like this is an invaluable starting point for any potential renewable energy developer, in our case the community energy co-operative sector. It offers an excellent template for community energy organisations across the UK to replicate and use as a catalyst to install community owned and managed onshore wind turbines, which remain the cheapest way to generate energy. The citizen's energy movement in the EU predicts that up to 260 million Europeans could be involved in community energy by 2050 and generating 45% of all of Europe's energy. This vision can only be achieved by starting locally with community led projects inspired and informed by research such as this, which in our case has already led to an application for Rural Community Energy funding to undertake site specific feasibility studies made possible by this report." ***Richard Watson, Founder and Director of Energise Sussex Coast***

"A shining example of how collaboration between community energy, a local authority and higher education can be truly fruitful."
Ian Smith, Adviser to Energise Sussex Coast

"This Study provides a clear steppingstone to enable Rother District Council to investigate renewable energy potential, specifically wind turbines, within the district. It enables the Planning Policy Team to, through further future work consider commercial attractiveness and viability, to consider how best to develop future planning policy for such technologies within the district." ***Nichola Watters, Planning Policy Manager, Rother District Council***

"This report is a testament to the value of a local authority engaging with a higher education institution. Involving students as part of their MSc placements generates new knowledge and insights a local authority would otherwise be unlikely be able to produce. An MSc placement set up as a collaborative activity benefits the student and offers a unique opportunity for partners engagement, bringing together a diverse group of experts and enthusiasts. Such partnership approach is at the heart of the Rother's Environment Strategy and its delivery. Students are our future and any support we can lend them on their professional journey in these testing times is a worthwhile offering." ***Dr Kristina Sodomkova, Environment and Policy Manager, Rother District Council***

Rother District Wind Energy Feasibility Study

For Rother District Council and Energise Sussex Coast

By Carys Williams

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1. Introduction

Rother District Council (RDC) declared a climate emergency in September 2019 and have pledged to become carbon neutral by 2030. Renewable energy and energy efficiency has therefore become a priority for the new Environment Strategy[1]. Investment in wind energy supports clean growth and encourages improvement in air quality providing healthier places.

RDC's Corporate Plan (2014-2021)[2] also highlights the reduction of carbon emissions by supporting low carbon initiatives. Increasing the amount of renewable energy and low carbon technologies will secure the UK's energy supply, reduce greenhouse gas emissions in attempt to mitigate climate change, and encourage investment in new jobs and businesses[3].

Previous studies have explored the potential for low carbon and renewable energy in the Rother district[4,5,6]. This study will provide updated guidance for the potential siting of wind energy developments in the boundaries of the district.

Following a Ministerial Statement in 2015, local planning authorities should only grant permission for wind energy developments if a) the development site is in an area identified as being suitable in a local or neighbourhood plan and b) it can be demonstrated that the planning impacts identified by affected local communities have been fully addressed following public consultation[7]. The National Planning Policy Framework (NPPF – February 2019) reaffirms this position as set out in paragraph 154b, footnote 49.

This study provides part of the evidential basis which could address the initial part of the Ministerial Statement to identify potential areas suitable for onshore wind energy in the RDC administrative area through future policies in its new Local Plan[8]. Varying scales of wind turbines are explored to provide a range of scenarios which will require more detailed exploration and consultation to inform decision making.

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[1] Environment Strategy: https://www.rother.gov.uk/strategies-policies-and-plans/environment-strategy/

[2] RDC Corporate plan: https://www.rother.gov.uk/wp-content/uploads/2020/01/Rother_District_Council_Draft_Corporate_Plan_2014-21_for_web.pdf

[3] Government Guidance for renewable energy: https://www.gov.uk/guidance/renewable-and-low-carbon-energy

[4] Low carbon & Renewable Potential Study (2010): https://www.rother.gov.uk/wp-content/uploads/2020/01/Rother_Renewable_Energy__Low_Carbon_Study_Final.pdf

[5] High Weald wind energy assessment (2009): https://www.highweald.org/420-home/research-reports/86-wind-energy-assessment-for-the-high-weald.html

[6] Development and Site Allocations Local Plan (2016): https://www.rother.gov.uk/wp-content/uploads/2020/01/Renewable_Energy_Background_Paper_Nov16.pdf

[7] Ministerial statement: https://www.parliament.uk/globalassets/documents/commons-vote-office/June-2015/18-June/1-DCLG-Planning.pdf

[8] Rother Local Plan: https://www.rother.gov.uk/planning-and-building-control/planning-policy/background-evidence/

2. Methods

2.1 Study Area

The boundaries of the Rother District (RD), the area of study is shown in Figure 1. See Appendix 1 for a legend of the base map used for all maps in this study.

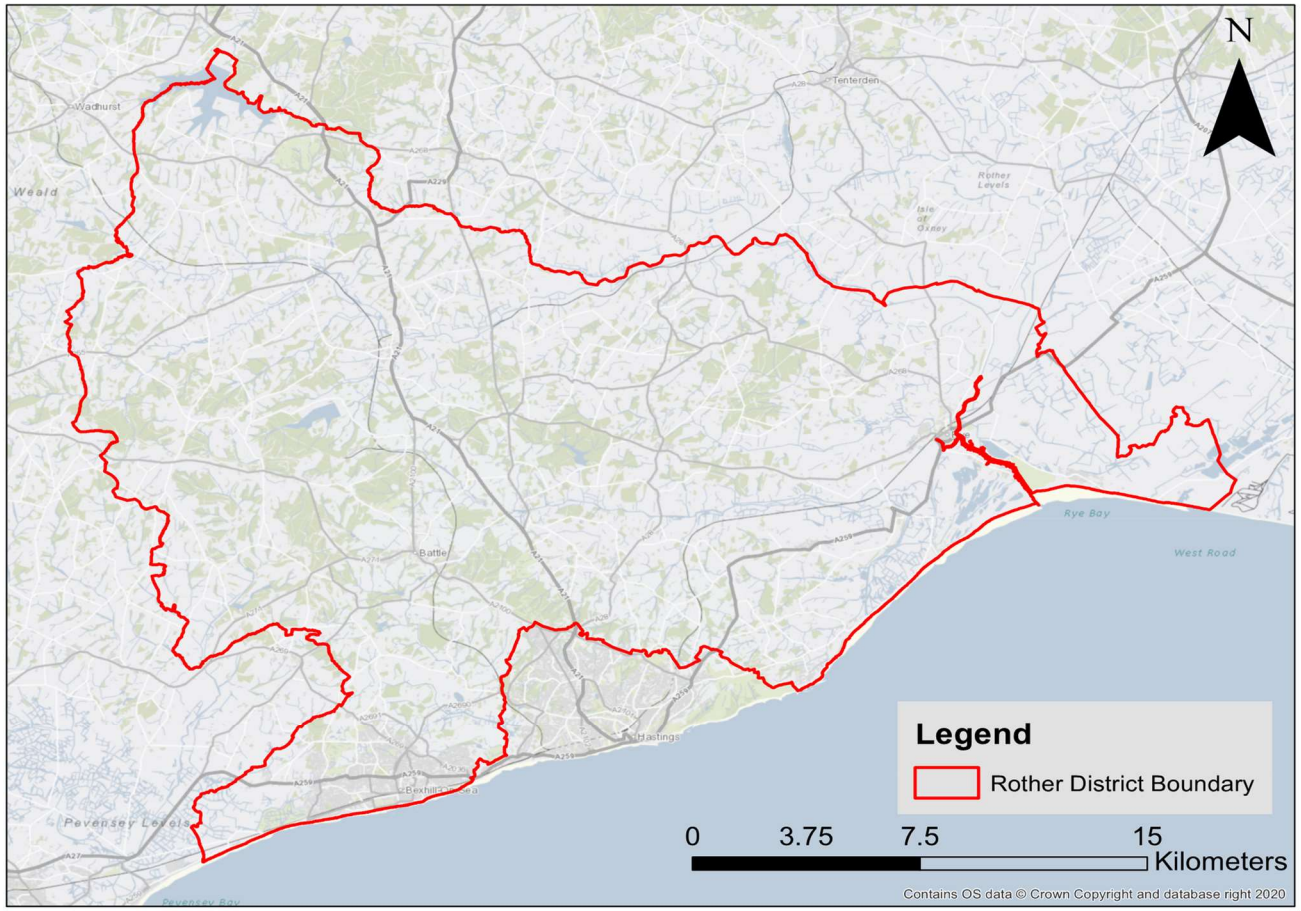

Figure 1: Map showing the administrative boundary of the Rother District

2.2 Turbine Scale

It is important to explore different scales of wind energy potential. Limiting the study to a certain turbine size would restrict opportunities. Although there are no rigid categories relating to the scale of wind turbines for the purpose of this study large, medium and small turbines have been explored as defined in Table 2. Wind turbines at a domestic scale were not included as they are not suitable at a district level as their use is site specific.

Table 2**: **Turbine scales and dimensions

Turbine Scale	Tip Height (m)	Rotor Diameter (m)	Hub Height (m)	Power	Source
Large	135	100	85	2.5 MW	Industry standard for planning applications
Medium	115	90	70	2.3 MW	To match the dimensions of the Little Cheyne Court Wind Farm turbines (Nordex N90/2500[9])
Small	60	39	40.5	500 kW	Dimensions of the mid-size Distributed Generation Ltd turbines[10].

[9] Little Cheyne Court Wind Farm: http://www.renewables-map.co.uk/project.asp?pageid=1693
[10] Distgen Mid-Size 500kW Turbines: http://www.distgen.co/turbines/

2.3 Criteria

The criteria in Table 2 were carefully considered and aligns with the expectations set in the national resource assessment methodology commissioned by the Department for Energy and Climate Change (DECC, 2010).

Table 2**: **Multi-feature criteria with explanations and data sources

Feature	Constraint			Justification and notes	Data Source
	Large-Scale	Mid-Scale	Small-Scale		
Wind speed	> 5 m/s at 45m agl			Consider all areas with wind speed at and above 5 m/s at 45m above ground level (agl) [11] The benchmark used for the minimum commercially viable average wind speed varies between 5 m/s and 7 m/s at 45 agl [6]	National Archives wind speed database – NOABL[12]
Roads	150m buffer	125m buffer	70m buffer	Exclude and buffer of the turbine height plus 10%. [6]	Digimap OS data download
Rivers				Avoid blades extending over waterways [6]	
Railways					Rother District Council
Powerlines					National Grid

[11]Renewable and low-carbon energy capacity methodology: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/226175/renewable_and_low_carbon_energy_capacity_methodology_jan2010.pdf

[12] The National Archives windspeed database: https://webarchive.nationalarchives.gov.uk/20090609065721/http://www.berr.gov.uk/whatwedo/energy/sources/renewables/explained/wind/windspeed-database/page27708.html

Feature	Constraint			Justification and notes	Data Source
	Large-Scale	Mid-Scale	Small-Scale		
Public footpaths				Wind turbines can fall and therefore need to be positioned at a safe distance from roads, railways, power/pipelines and public rights of way. [6] Avoid re-routing fixed telecommunication signals which require line of sight which wind turbines can block. [6]	Rother District Council
Bridleways	100m buffer				British Horse Society
Built-up areas (Polygon)	600m buffer	400m buffer	350m buffer	To limit noise and shadow flicker exposure. Buffer of 8 times the rotor diameter.[6]	Digimap OS data download
Woodland	Exclude			Broadland and deciduous woodland extracted from the land cover map 2019. [6]	LCM2019 [13]
Inland Waters	100m buffer			The rationale is to account for potential construction impacts such as erosion, sedimentation and pollution caused by the construction of wind turbines and their associated infrastructure. Applying buffers is not	LCM2019

[13]LCM2019: https://www.ceh.ac.uk/services/lcm2019-lcm2018-and-lcm2017

Feature	Constraint			Justification and notes	Data Source
	Large-Scale	Mid-Scale	Small-Scale		
				considered necessary for a broad regional level assessment (as it is a site-based issue) and therefore this is not included as a constraint in the methodology.[6]	
Environmental designation ○ Local (LNR) and National Nature Reserves (NNR) ○ Local Wildlife Sites (LWS) ○ Special Areas of Conservation (SAC) ○ Special Protection Areas (SPA) ○ Sites of Special Scientific Interest (SSSI) ○ Ramsar Sites	Exclude			Designated areas with high environmental value have a greater sensitivity to change. Visual impact will be harder to minimise. [14] There are no national nature reserves within the RDC estate.	Ramsar, LNR, NNR, SSSI, SAC, SPA, Ancient Woodland – Natural England LWS - Rother District Council

[14] Centre for Sustainable Energy: https://www.cse.org.uk/downloads/reports-and-publications/community-energy/planning/neighbourhood-planning-wind-guidance.pdf

Feature	Constraint			Justification and notes	Data Source
	Large-Scale	Mid-Scale	Small-Scale		
○ RSPB Reserves ○ Ancient Woodland					
Landscape designation ○ Areas of Outstanding National Beauty	Exclude			Designated landscapes have a greater sensitivity to change. Visual impact will be harder to minimise. [9]	Natural England[15]
Heritage designation ○ Scheduled Monuments ○ Battlefields ○ Parks and Gardens ○ Listed Buildings ○ Heritage at Risk	Exclude			Heritage assets are sensitive, and impact of proposals should be considered. [9] No buffer to be applied. [6]	Historic England [16]

[15] Natural England: https://naturalengland-defra.opendata.arcgis.com
[16] Historic England: https://historicengland.org.uk/listing/the-list/data-downloads/

2.4 GIS Methods

- ArcMap version 10.8.1 was the GIS programme used to conduct the feasibility study. Individual layers were created in ArcMap to represent each constraint, these layers were then overlaid to identify areas of wind development opportunity.
- Buffers were applied to features where necessary, creating a new buffer layer.
- Euclidean distance was used to convert polygons into raster data.
- Raster calculations were then made to create a binary image for each layer where the cells within the image have an assigned value of 0 or 1, where 0 = unconstraint and 1 = constraint.
- Binary images were multiplied together to produce a final output where 0 = feasible, 1 = not feasible (Figure 3). The cells with a value of 0 are the areas that meet the criteria set in Table 3 and therefore can be considered potentially suitable for wind energy development.
- Areas found to be potentially suitable which could not host at least one turbine were removed.

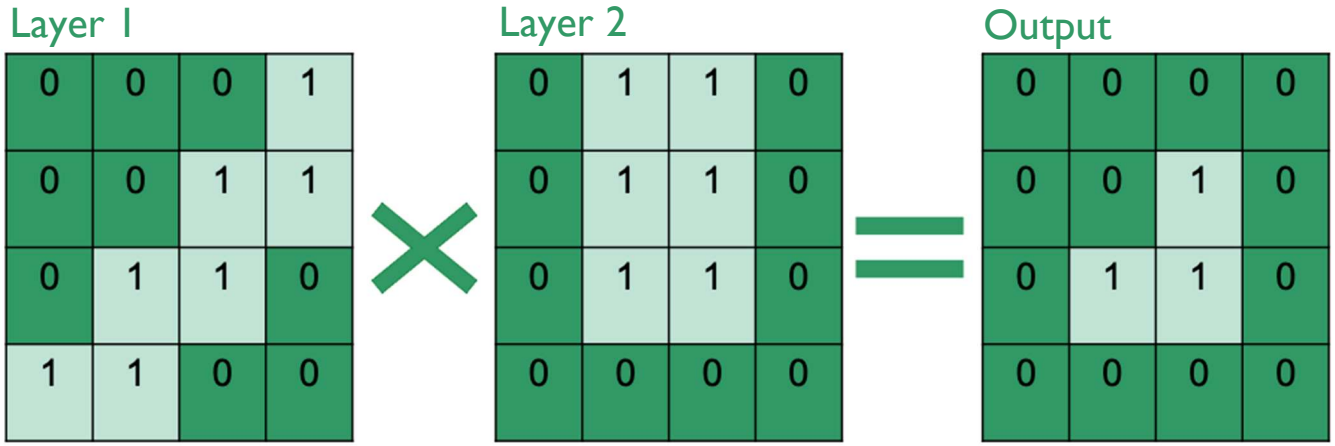

Figure 3: An example of raster math using binary images

3. Results

3.1 Overview of potential sites

An overview of the potential sites in RD can be seen in Figure 4, highlighting the three areas which have potential for wind development.

Rye/Camber/Playden, in the eastern region of RD, has the potential for all of the turbine scales.
The area to the west, north of Bexhill-On-Sea shows potential opportunities for medium and small-scale turbines.
The area west of Bexhill-On-Sea has the potential for small-scale turbines only.

A major constraint for wind development is the buffer distance required from buildings (see Appendix 2), with a 600m buffer for large scale turbines leaving just 2% of the total area unconstrained. About 90% of the district has an environmental or landscape designation (Appendix 2), which was another significant constraint affecting potential.

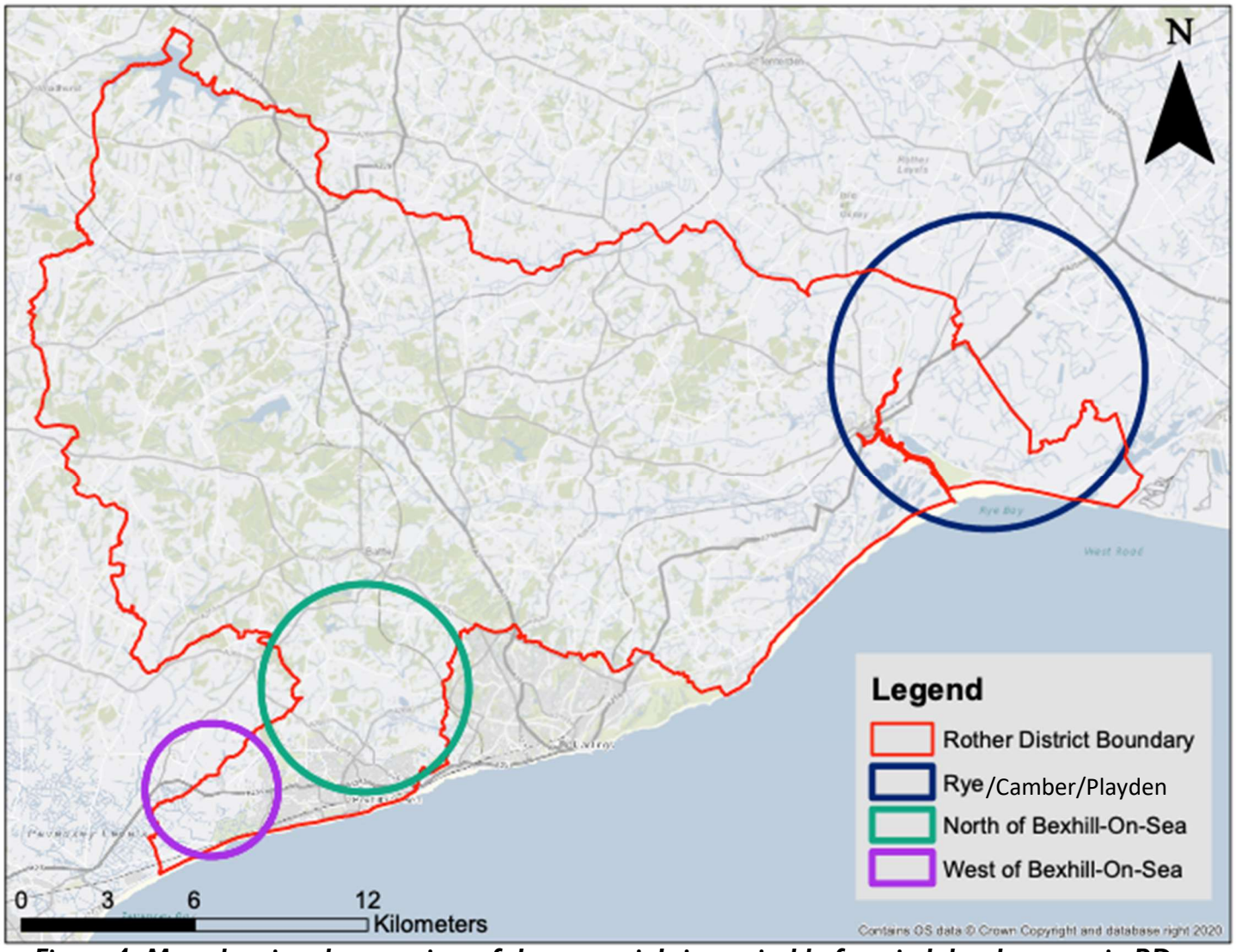

Figure 4: Map showing the overview of the potential sites suitable for wind development in RD

3.2 Large-scale potential - Rye/Camber/Playden

Parts of Rye/Camber/Playden were the only areas to meet the criteria for large-scale turbines. Figure 5 shows the proximity of the largest potential site to Little Cheyne Court Wind Farm (LCCWF). LCCWF is positioned on the Romney Marsh in Kent, outside the boundaries of Rother District.

LCCWF proved to be a controversial development which was opposed by Parish, District and County Councils, the local MP and others due to the perceived detrimental effects to the visual appearance of the marsh in which it is positioned [17]. However, this was overruled by the Central Government with many supporting the development.

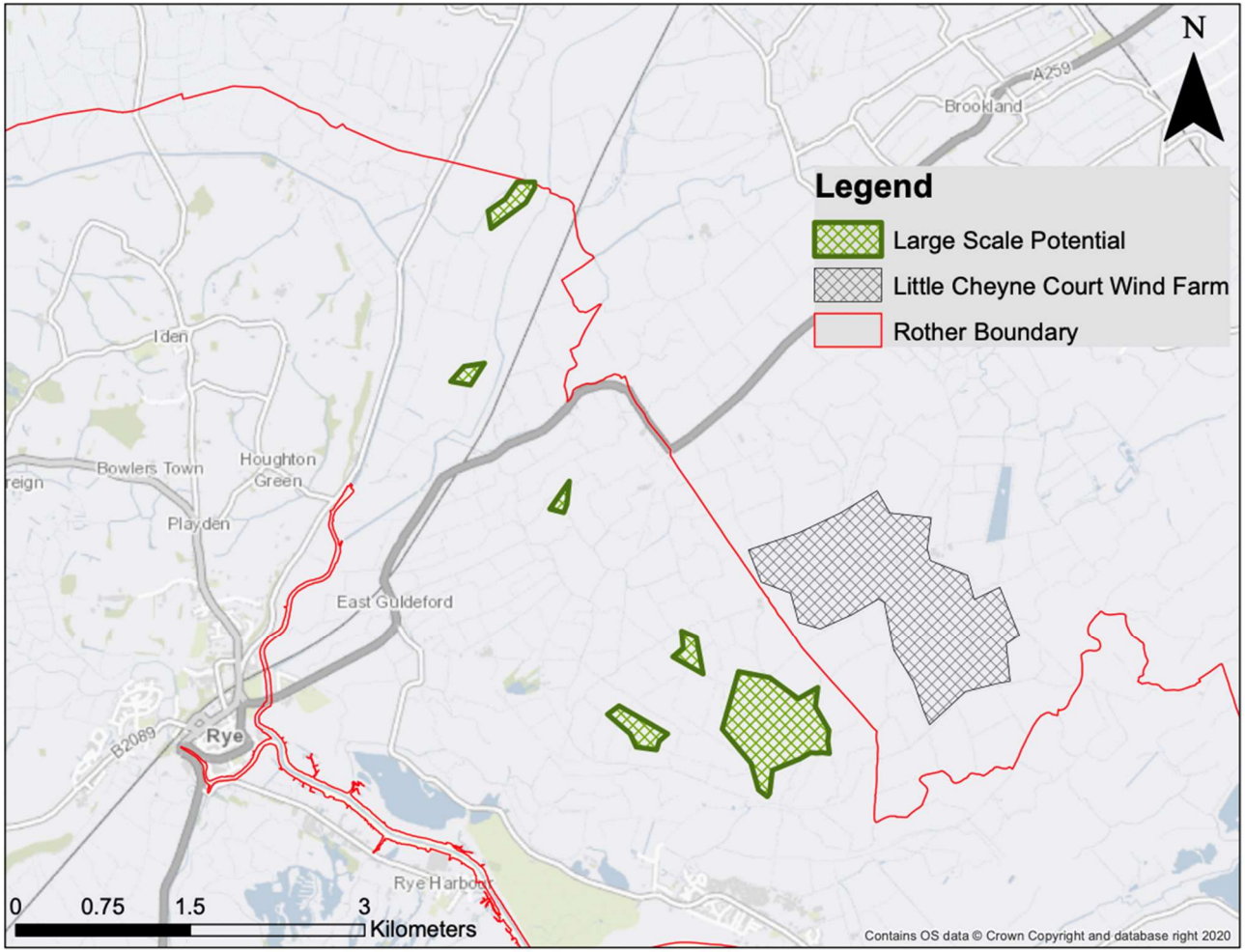

Figure 5: ***Map showing the areas in Rye/Camber/Playden with the potential for large scale wind development highlighting their proximity to LCCWF***

[17] Archive LCCWF opposition: https://web.archive.org/web/20070928032406/http://www.englishnature.org/News/story.asp?ID=772

Figure 6 shows that the largest of the potential sites borders Dungeness, Romney Marsh and Rye Bay SSSIs. It is noted that LCCWF borders an SSSI either side.

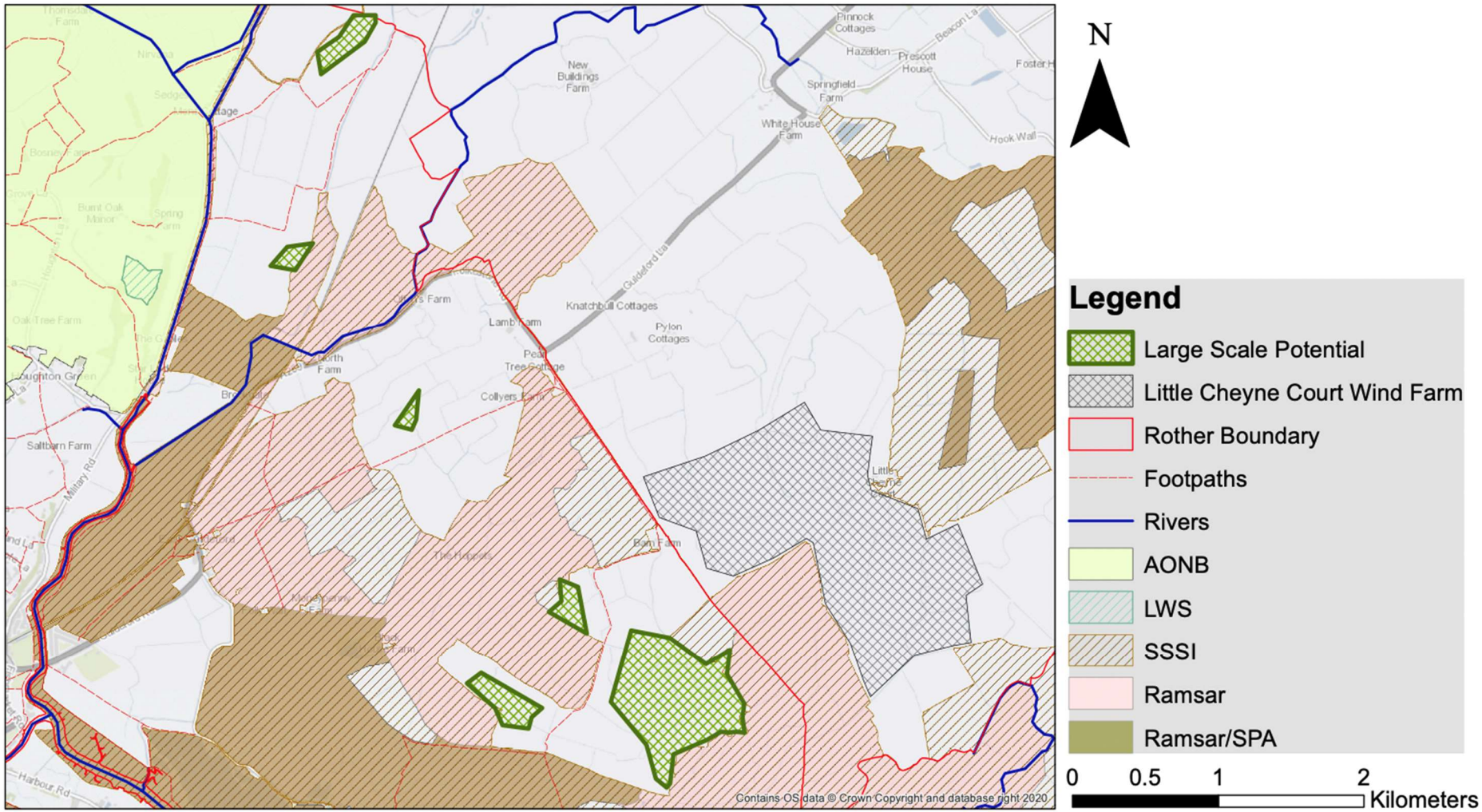

Figure 6: ***Map showing the areas in Rye/Camber/Playden that have potential for large-scale wind development with the addition of constraints that border the potential sites and LCCWF***

Another major point raised by those opposed to LCCWF was its proximity to the internationally important RSPB reserve – Dungeness, as seen in Figure 7.

The large-scale potential could provide 25MW of power with an estimated 10 (2.5MW) turbines if the total area suitable was developed.

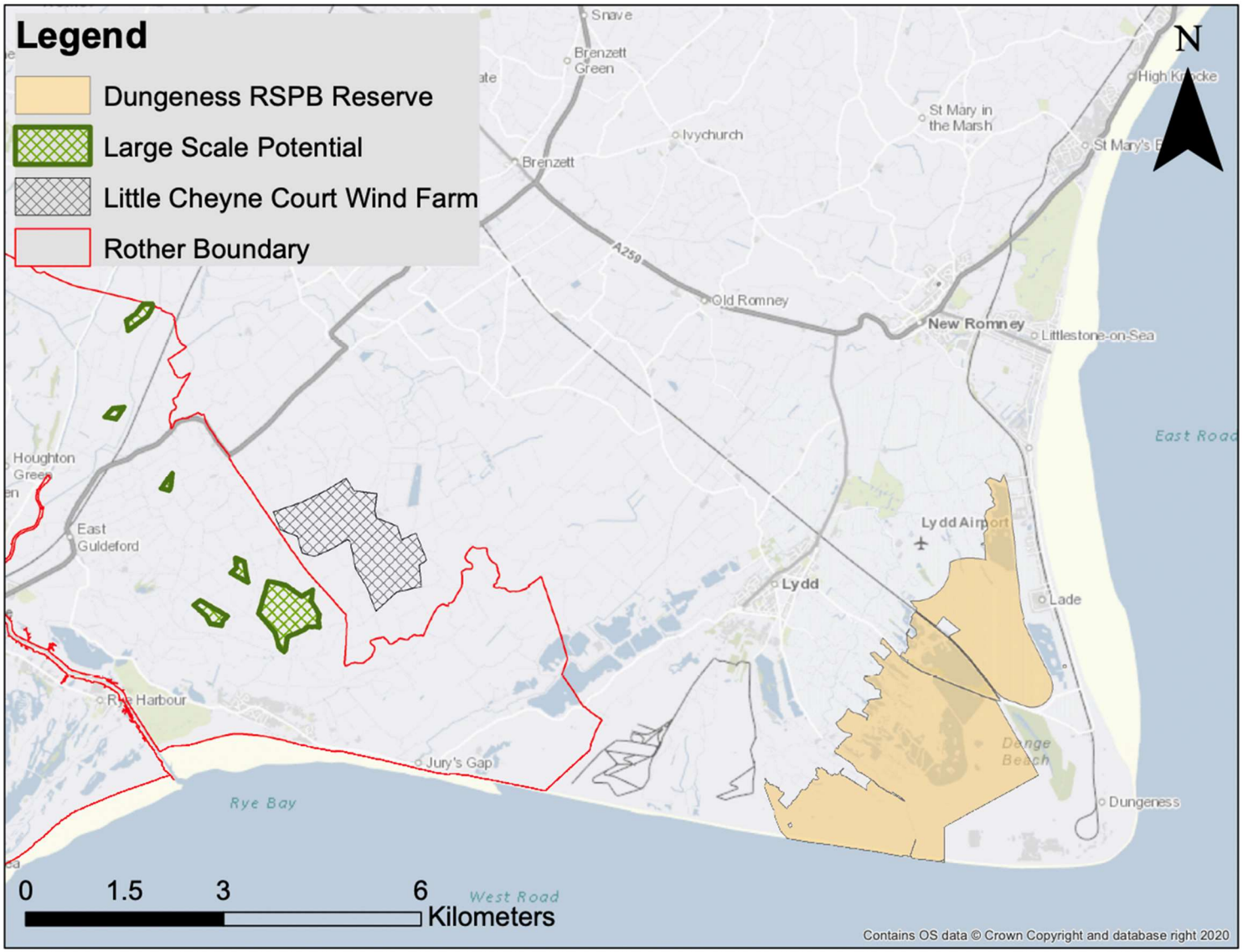

Figure 7: ***Map showing the proximity of LCCWF and large-scale potential sites to the internationally import RSPB reserve***

3.3 Medium-Scale Potential

3.3.1 Rye/Camber/Playden Area

Reducing the turbine scale by a small amount has resulted in a larger area of potential sites in the Rye/Camber/Playden area.

An estimated 17 medium-scale turbines could produce 34.5 MW of energy if the total suitable area in Figure 8 was to be developed.

Figure 9 shows where landscape designations border the potential sites.

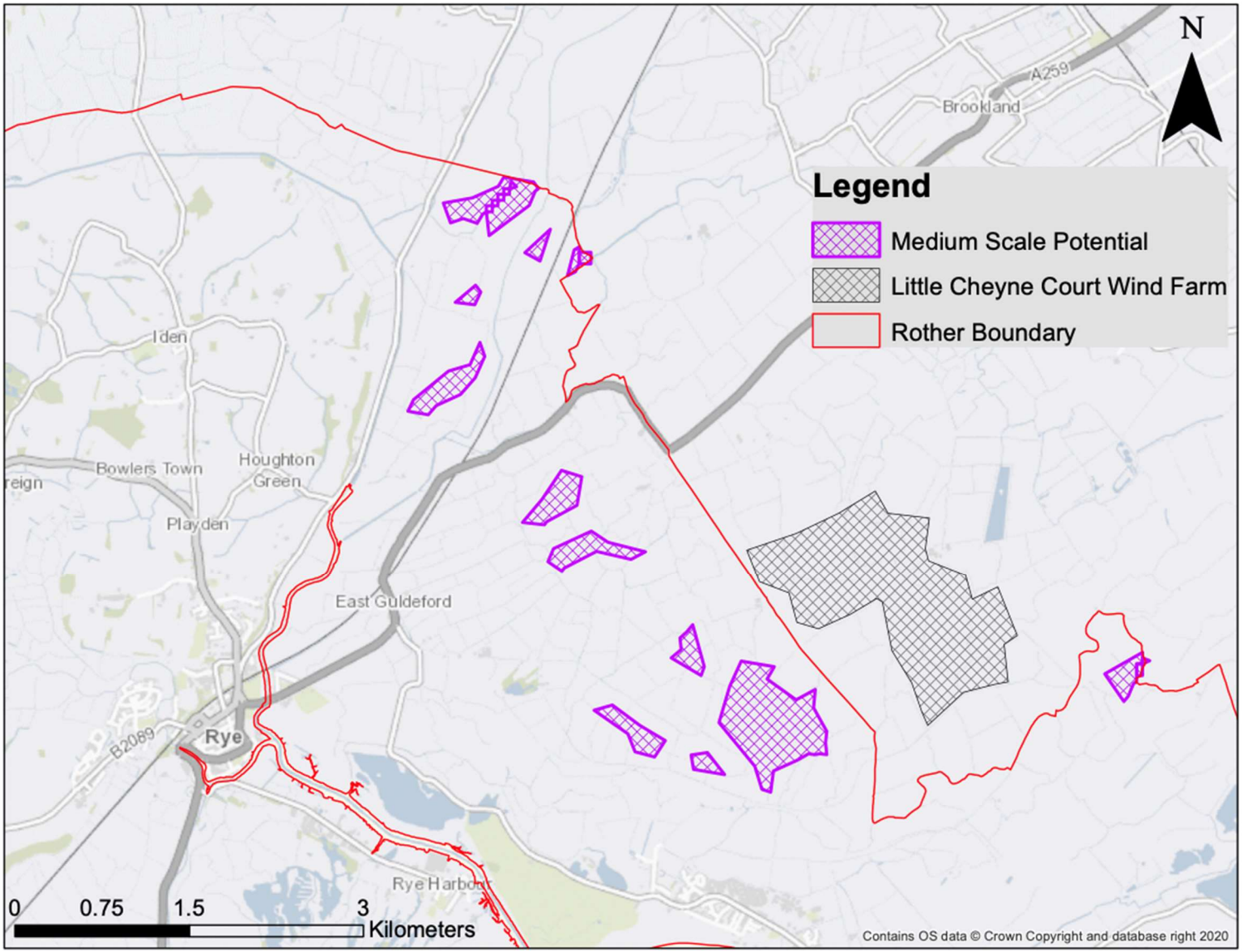

Figure 8: ***Map showing the Rye/Camber/Playden area with the potential for medium scale wind development, highlighting their proximity to LCCWF***

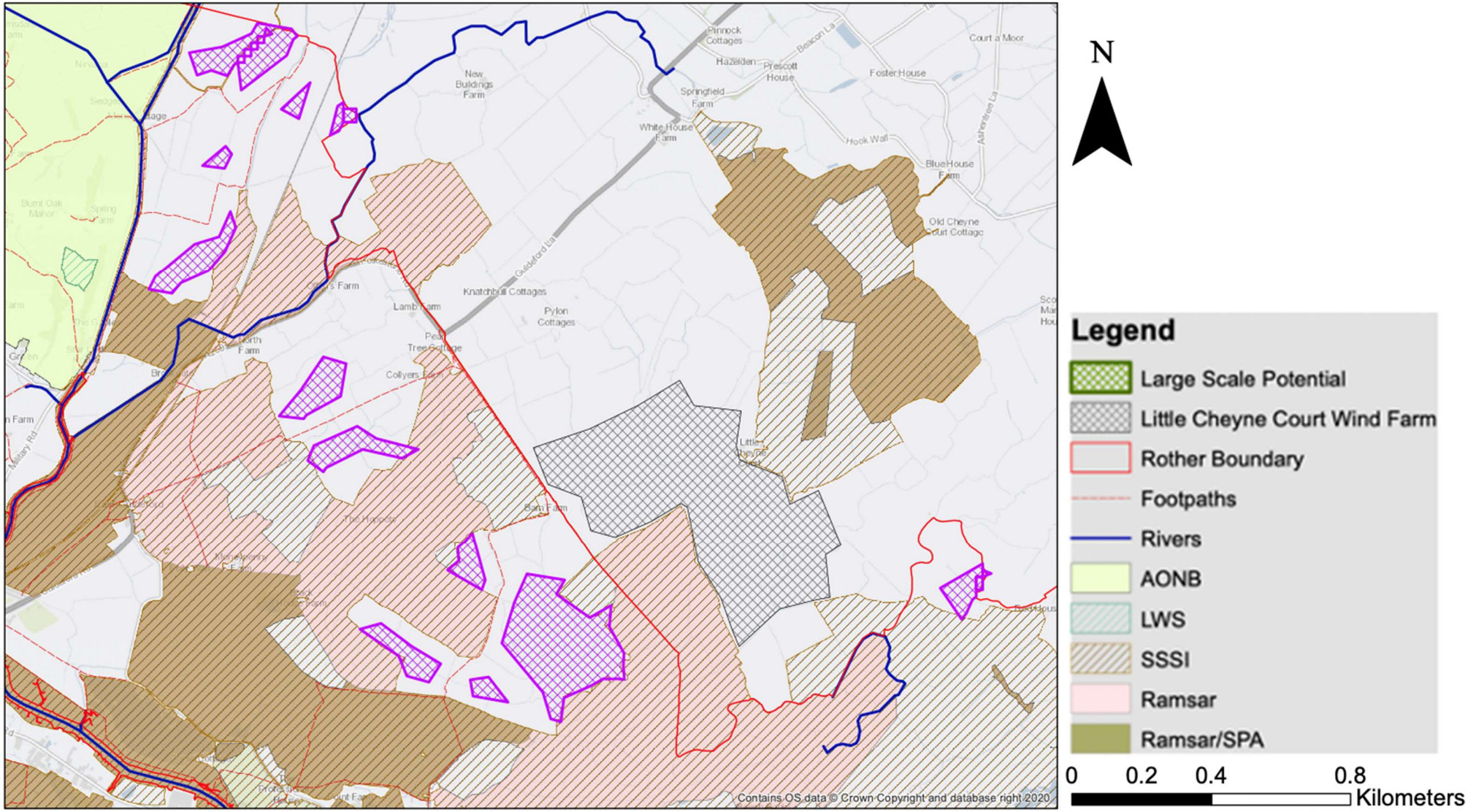

Figure 9: ***Map showing the Rye/Camber/Playden area and the potential for medium scale wind with the addition of constraints that border the potential sites and LCCWF***

3.3.2 North Bexhill-On-Sea

Reducing the turbine scale discovered a new area with potential for development to the north of Bexhill-on-Sea (Figure 10). **However, the area is small, and would only provide space for one turbine in each suitable site, which would produce 6.9MW in total.**

Figure 11 shows that the potential sites border ancient woodland and the Combe Haven SSSI.

It is unlikely to be economically viable to consider development at this scale, given the small suitable area. The environmental impact would likely outweigh the economic benefit of a single turbine, which would mean its development would not be justified.

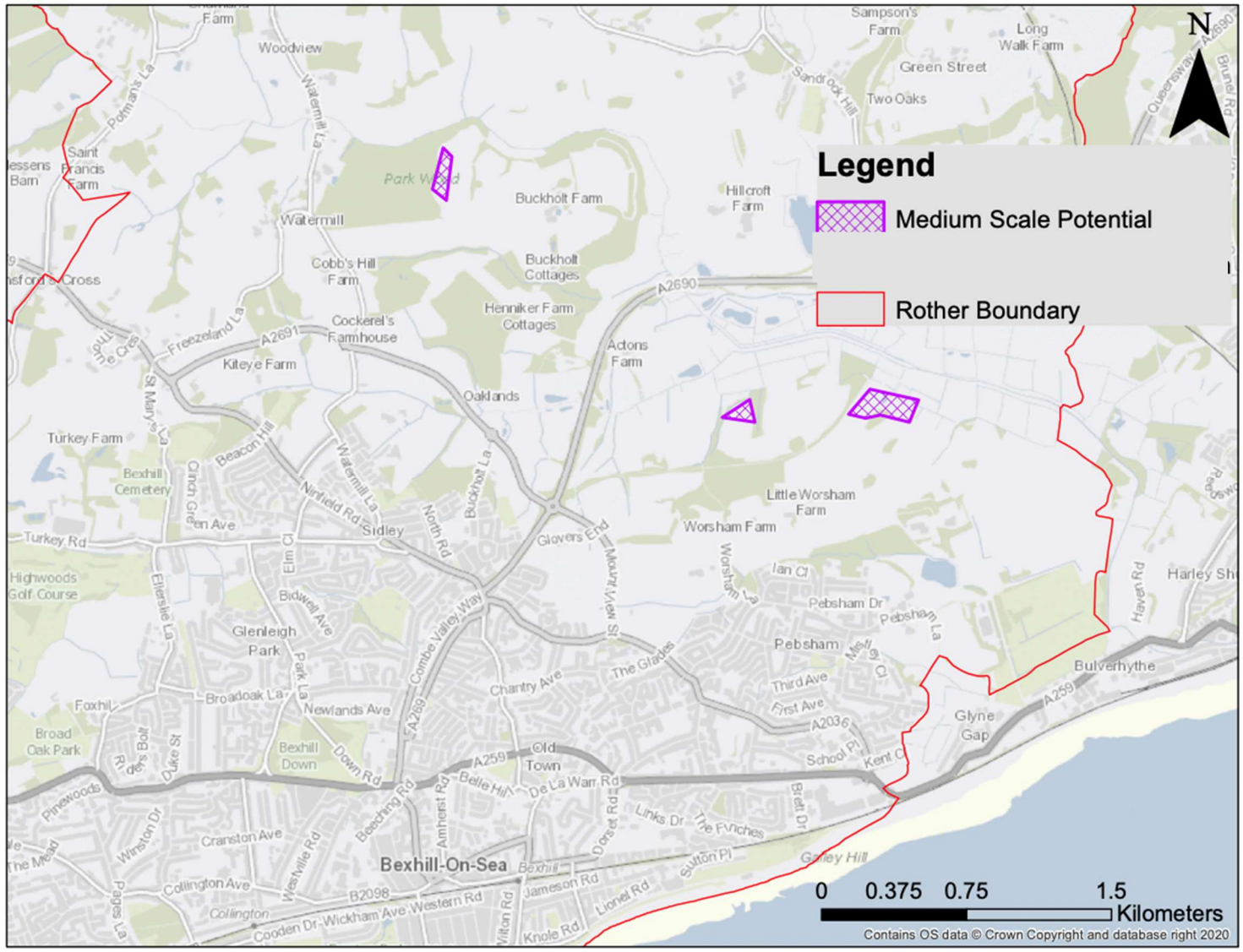

Figure 10: ***Map showing the area in the region north of Bexhill-On-Sea which has potential for medium scale wind development***

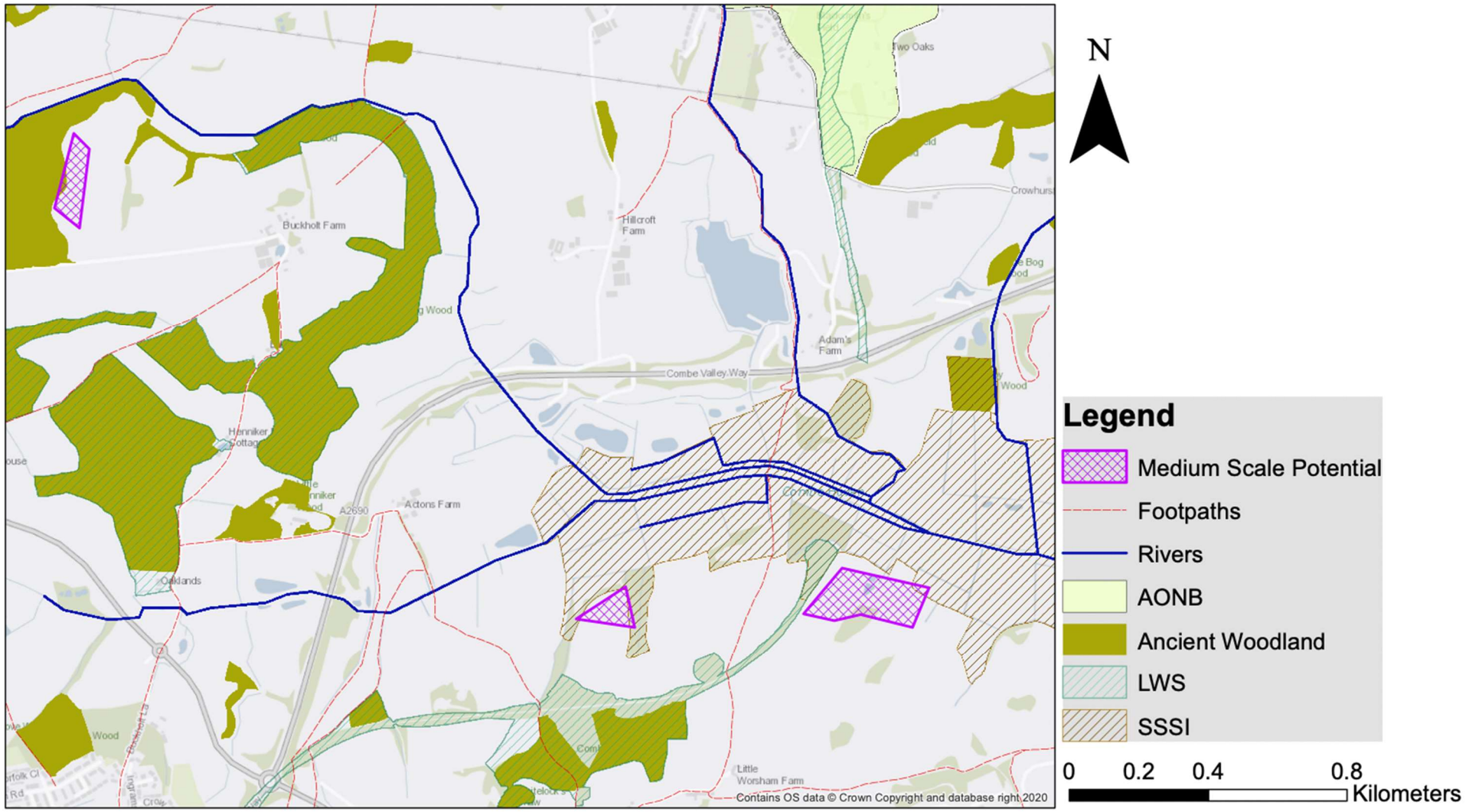

Figure 11: ***Map showing the area in the region north of Bexhill-On-Sea with the potential for medium scale wind development with the addition of constraints that border the sites***

3.4 Small-Scale Potential

3.4.1 Rye/Camber/Playden Area

Reducing the turbine scale by a large amount has further increased the area suitable for development in the Rye/Camber/Playden area.

This area has the potential to provide 46.5 MW of power if development was to take advantage of the total suitable area in Figure 12. Figure 13 shows the constraints which border the sites in the Rye/Camber/Playden area.

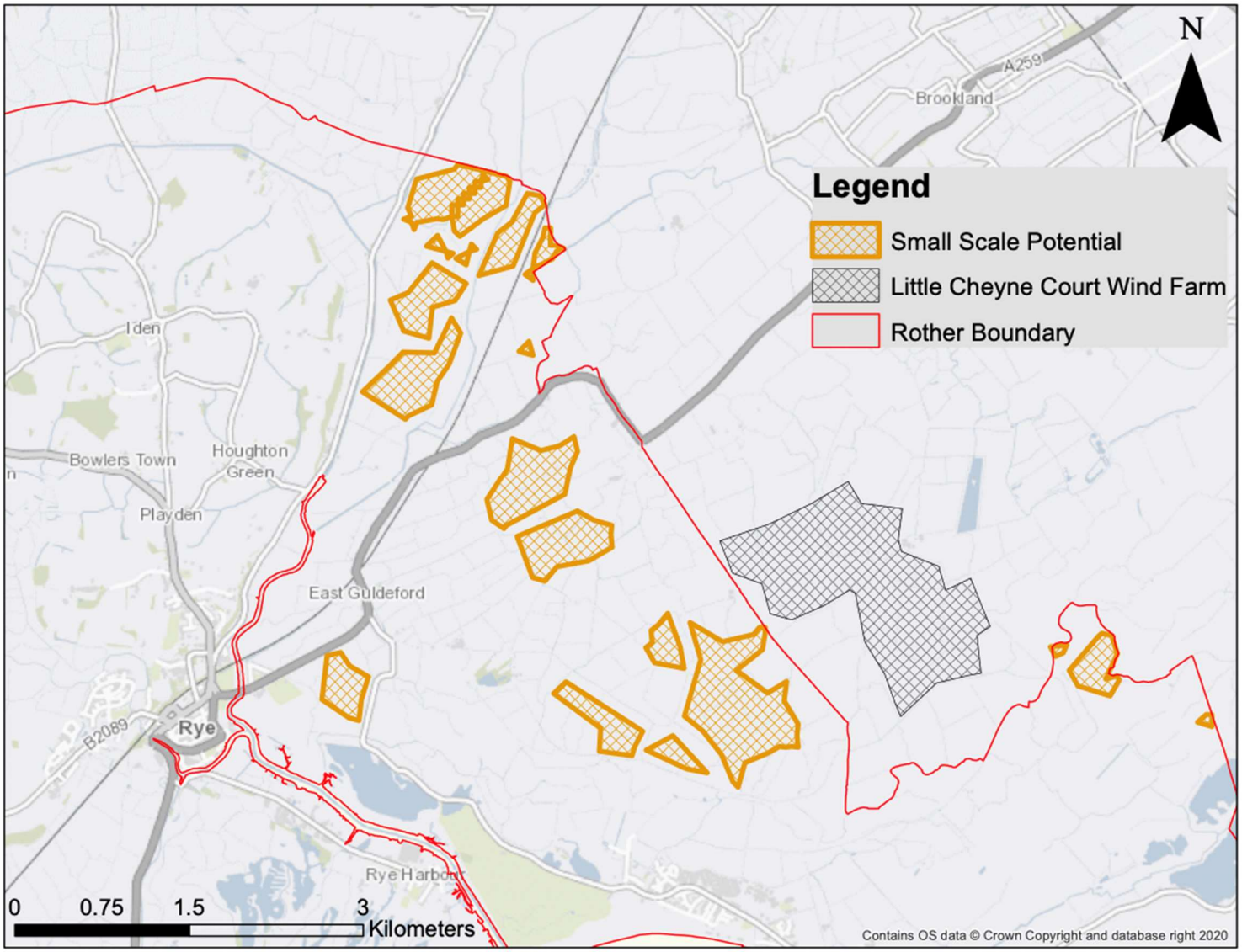

Figure 12: ***Map showing the Rye/Camber/Playden area with the potential for small scale wind development highlighting their proximity to LCCWF***

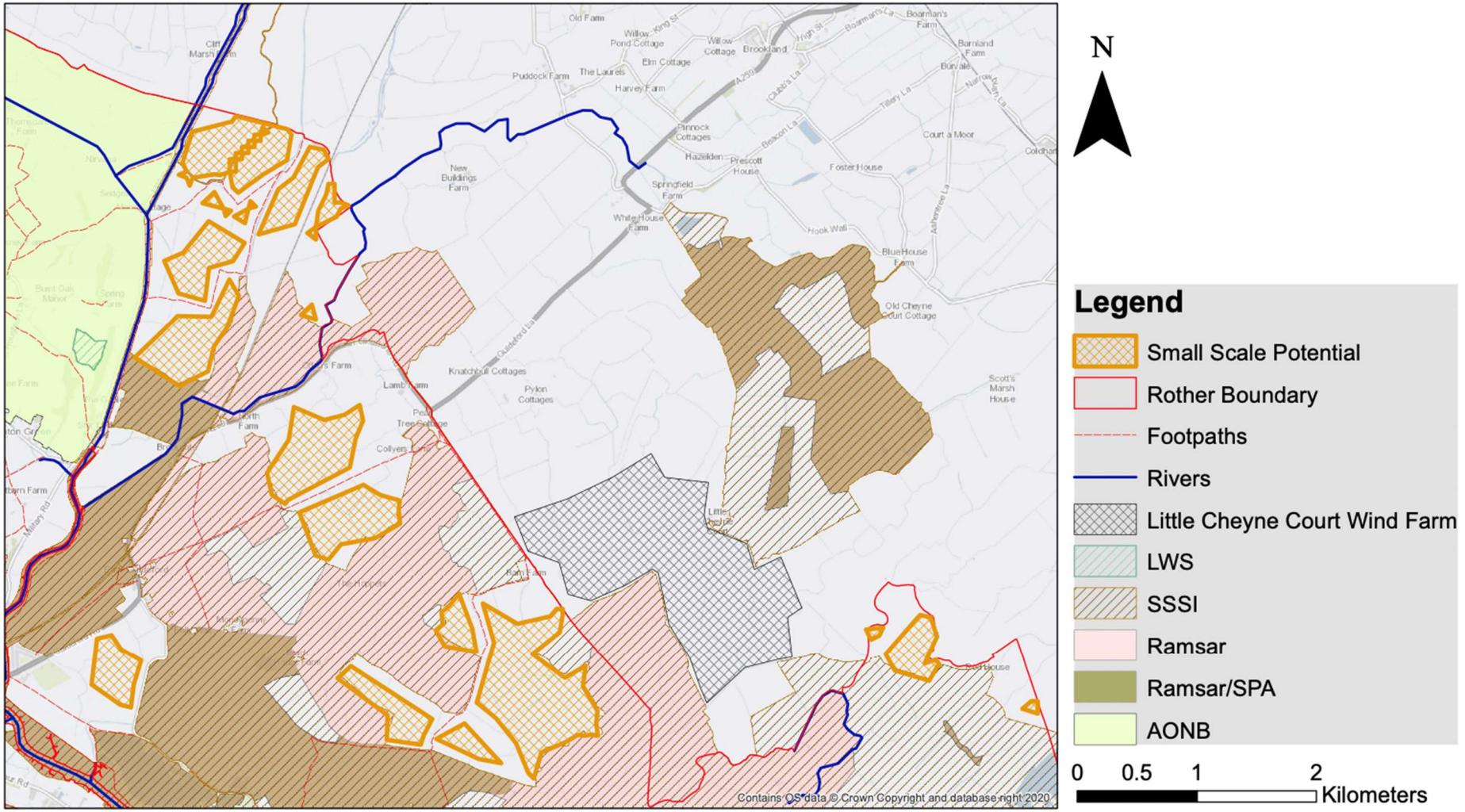

Figure 13: ***Map showing the Rye/Camber/Playden area and the potential for small-scale wind with the addition of constraints that border the potential sites and LCCWF***

3.4.2 North Bexhill-On-Sea

An approximate 16.5 MW of wind power could be generated by small-scale wind turbines within the potential areas in Figure 14.

The sites in Figure 14 do not connect as continuously as those in the eastern region of RD. This is likely to provide more issues associated with access and connection between individual turbines. New development is planned to the south of these areas of small-scale potential so may need to be reviewed.

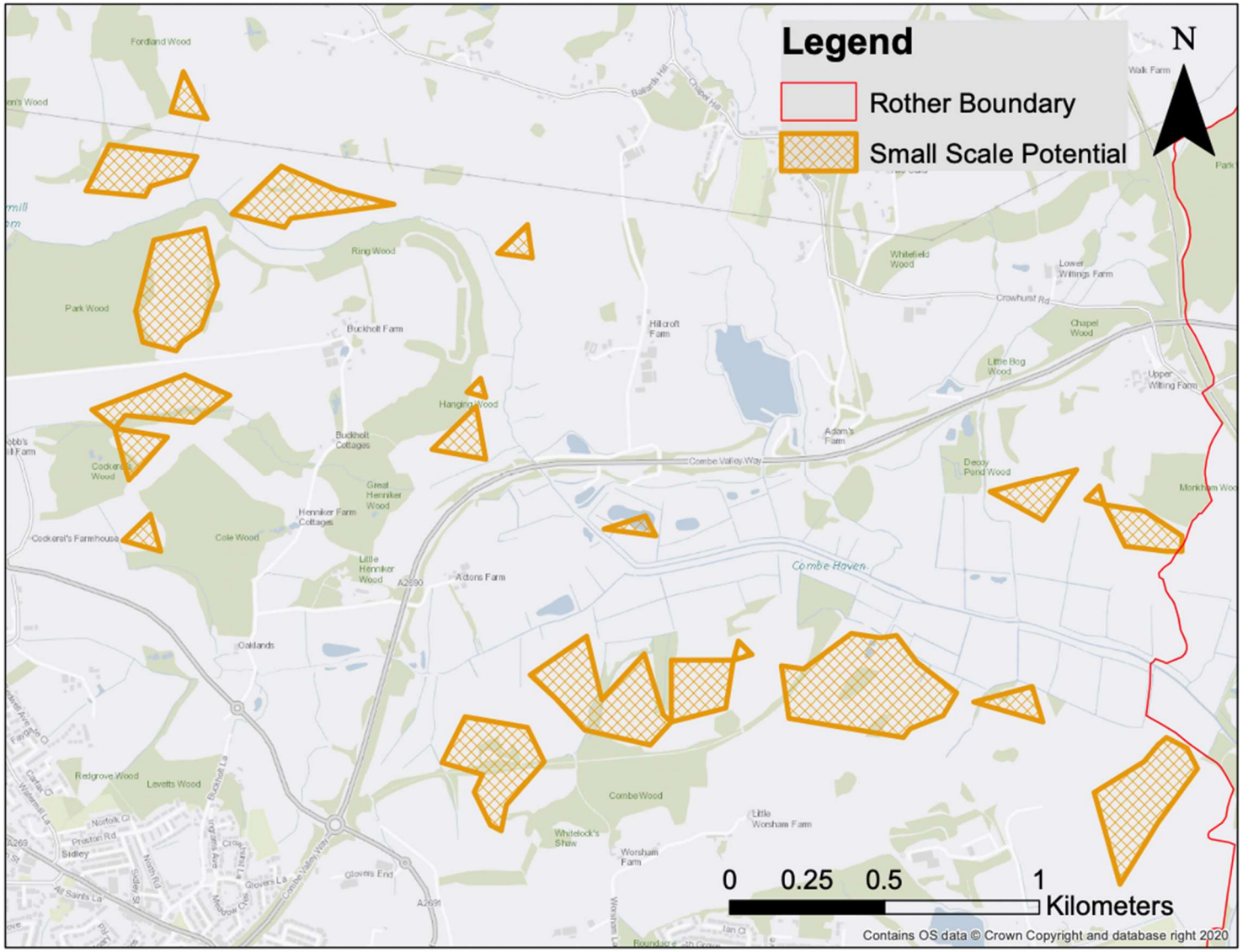

Figure 14: ***Map showing the area in the region north of Bexhill-On-Sea which has the potential for small scale wind development***

Figure 15 shows the majority of potential small-scale sites border ancient woodland or the SSSI in the region of north Bexhill-On-Sea

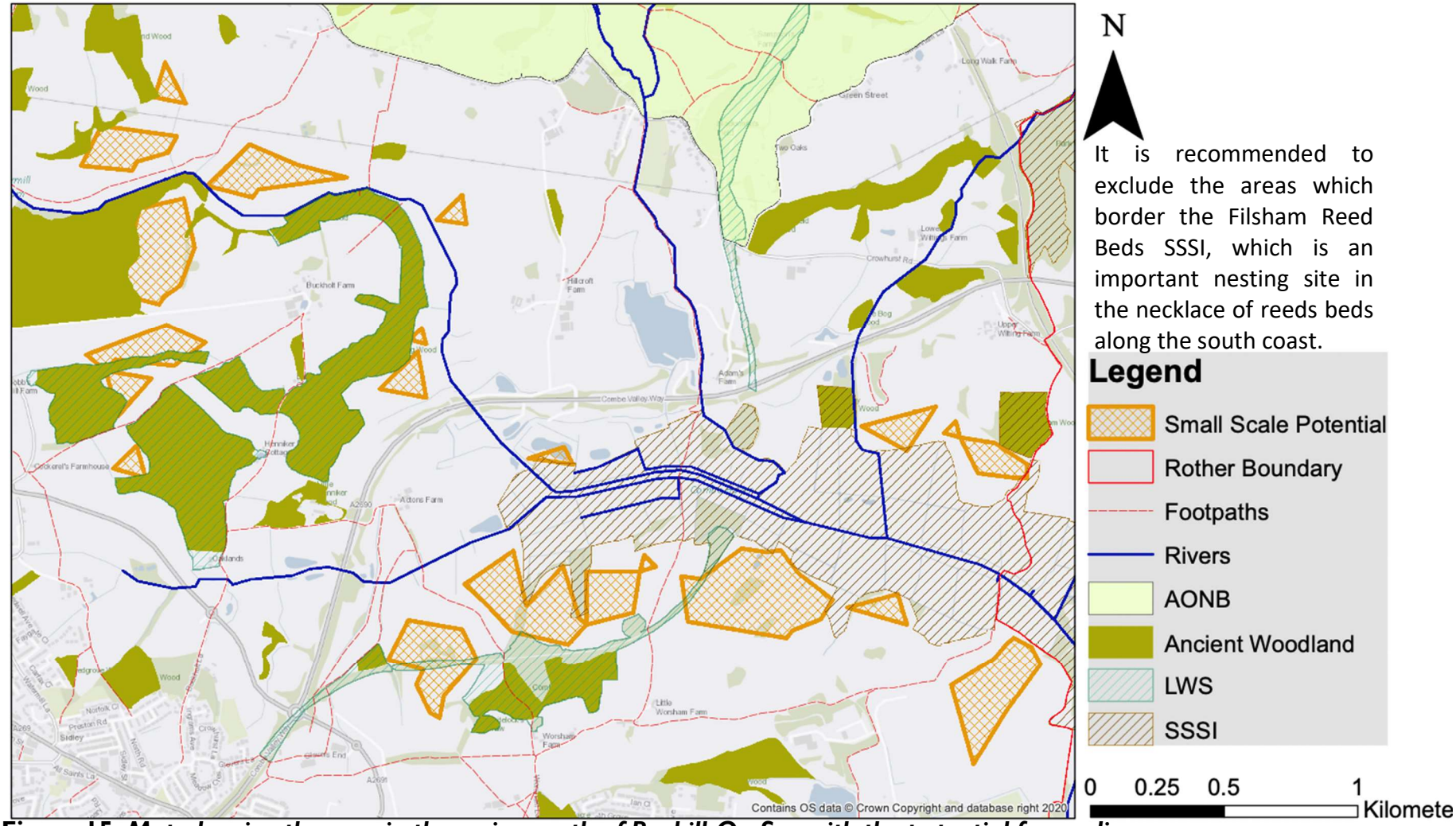

Figure 15: ***Map showing the area in the region north of Bexhill-On-Sea with the potential for medium scale wind development with the addition of constraints that border the sites***

3.4.3 West Bexhill-On-Sea

A new area, to the west of Bexhill-On-Sea, was identified when the turbine scale was reduced (Figure 16).

An estimated 7 small-scale turbines could be positioned here, producing an output of 3.5MW. This is unlikely to provide sufficient economic incentive for development.

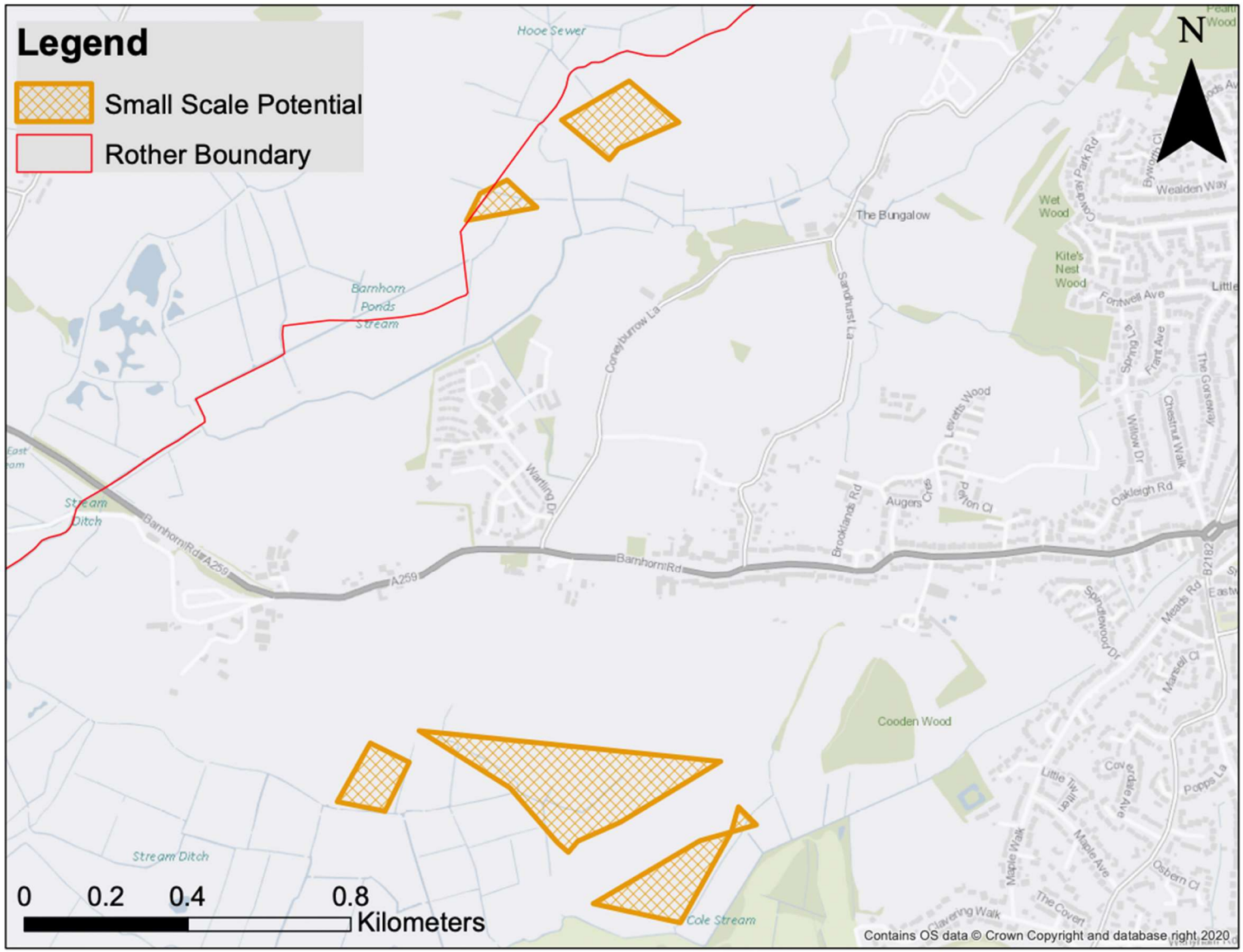

Figure 16: ***Map showing the area in the west region of Bexhill which has the potential for small scale wind development***

The small-scale potential to the south of Figure 17 borders the Pevensey Levels SAC and SSSI.

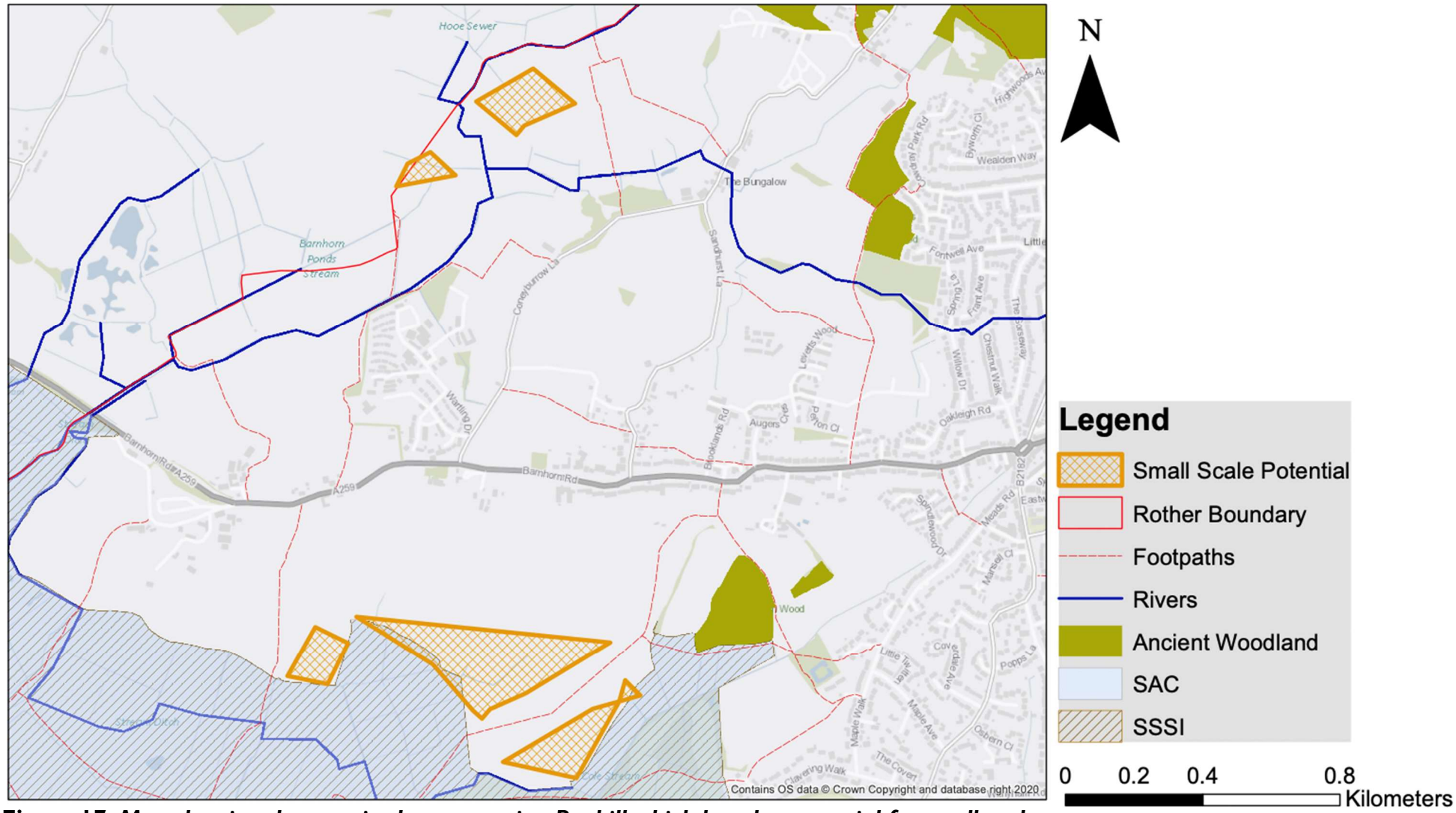

Figure 17: ***Map showing the area in the west region Bexhill which has the potential for small scale wind development with the addition of constraints which border the sites***

4. Limitations

Figure 18 shows the key stages of recommended methodology used to identify renewable energy potential[18]. This study only covers the initial stages (1-3), no guidance is provided in addressing the planning, economic and supply chain issues which could considerably limit the resource access and potential for deployment of commercial technologies. These next stages should be considered to further assess the potential. Liaison with statutory consultees such as Natural England may allow the AONB constraint to be relaxed, which would increase opportunities for wind development in Rother District.

NOABL windspeed database is currently the only accessible source of wind speed data. The database was applied with a 1km square resolution and does not take into account topography or local surface roughness (such as trees or stone walls), which can have a considerable effect on wind speeds[19]. The data used for wind speed estimations was collected between 1975 and 1985, so is outdated[1]. Therefore, this data can only be used as a guide and should be followed by on-site measurements for a reliable assessment of wind speeds.

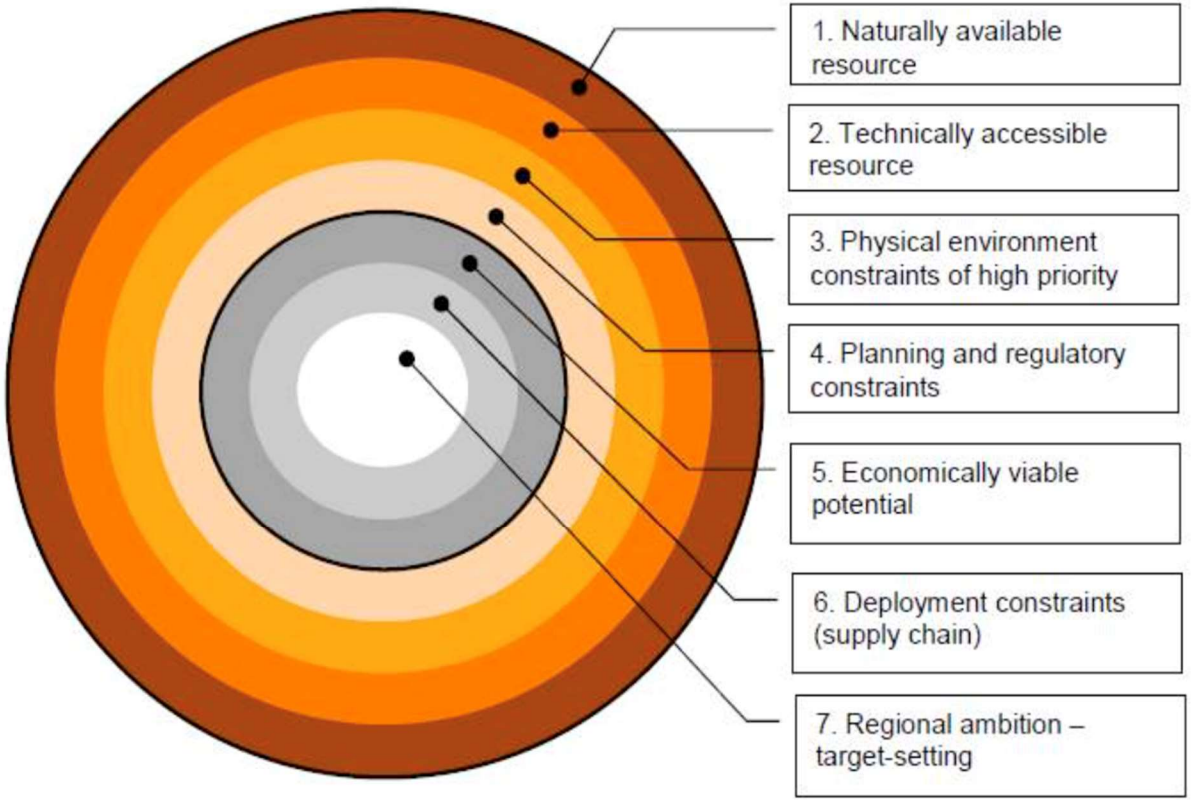

Figure 18: ***Calculating renewable targets from the naturally available resource (DECC/SQW Energy)***

[18] Renewable and Low-carbon Energy Capacity Methodology: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/226175/renewable_and_low_carbon_energy_capacity_methodology_jan2010.pdf

[19] RenSMART – NOABL database: https://www.rensmart.com/Information/NOABLModel

5. Conclusions

This report has identified potential suitable sites for wind farm development in Rother District. The area in Rye/Camber/Playden appears to have the most potential based on:

- its proximity to an already established wind farm which may provide a precedent for similar planning
- the fact that LCCWF has similar topography indicating sufficient wind resource for power generation
- the potential for large scale turbines will allow for increased power output and economies of scale (see Table 3).

Table 3: The total suitable area for each scale and the estimated power output

Scale	Total suitable area (Km^2)	Estimated total power (MW)
Large	0.80	25.0
Medium	1.49	41.4
Small	3.90	66.5

The other sites, whilst they do meet the criteria, they do not offer the same advantages as the area in Rye/Camber/Playden, on initial investigation.

An additional constraint assessment should be done to address issues with radar relating to air traffic control. The planning and regulatory constraints need to be further investigated together with consultation with relevant interested parties such as Natural England, and also undertaking a sound assessment of the economic impact of development.

As the NOABL wind speed database is outdated and can only be used as a guidance, accurate wind speed data will need to be collected. Temporary measurement towers should be positioned to collect the wind data needed to identify the most appropriate turbines scale/type for development. LiDAR (light detection and ranging) technology is an alternative to measurement towers and is a faster, easier and cheaper method for measuring site specific wind speeds[20].The next step will be to demonstrate and fully address all potential impacts in consultation with the public and local communities.

[20]LiDAR met masts: https://www.4coffshore.com/news/lidar-is-a-cost-effect-alternative-to-met-masts-claim-industry-experts-nid6131.html

6. Appendix

6.1 Appendix 1: Base Map Legend

Figure 1: *Base map legend*

6.2 Appendix 2: Constraints

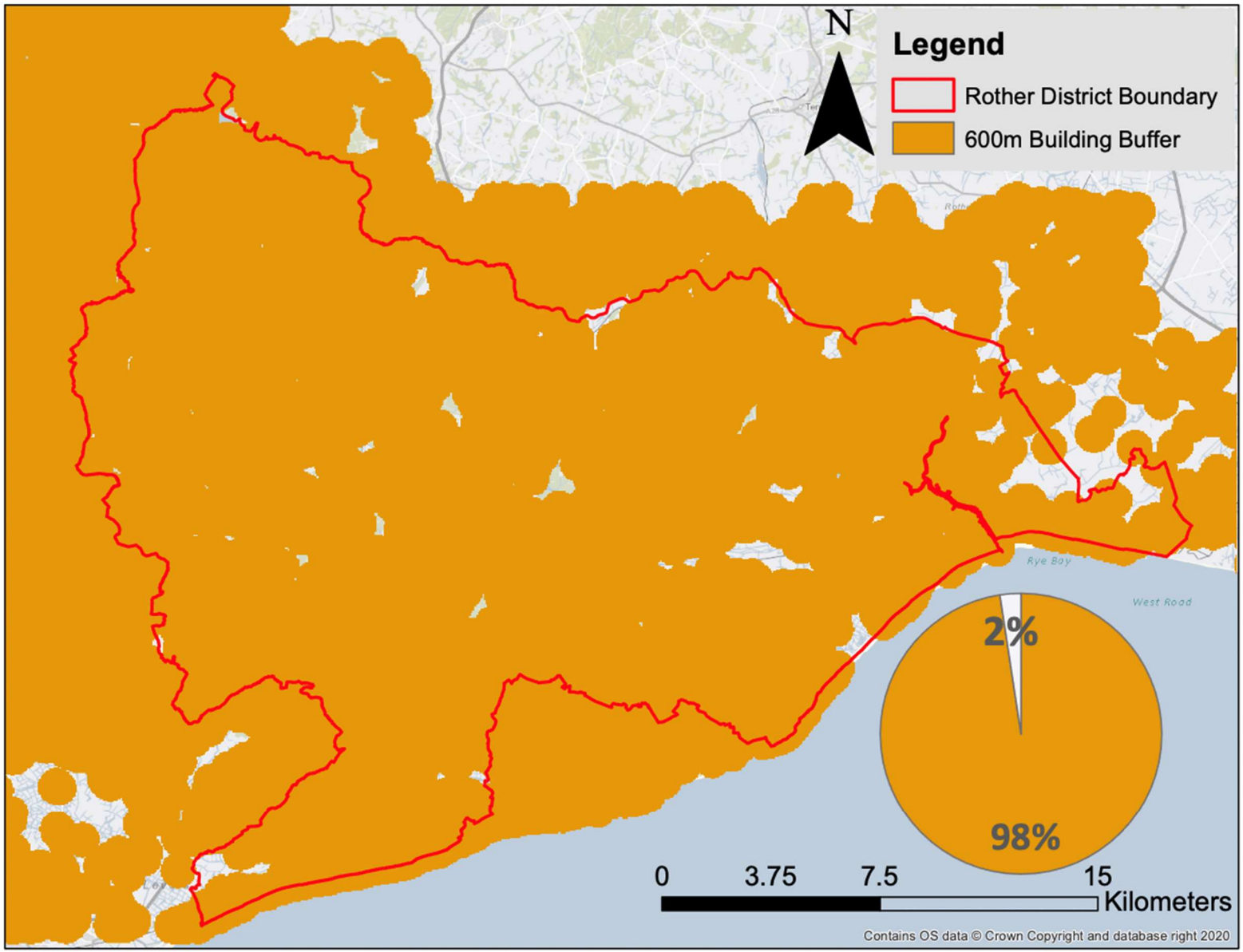

Figure 2: *Map showing the 600m building buffer for large scale turbines*

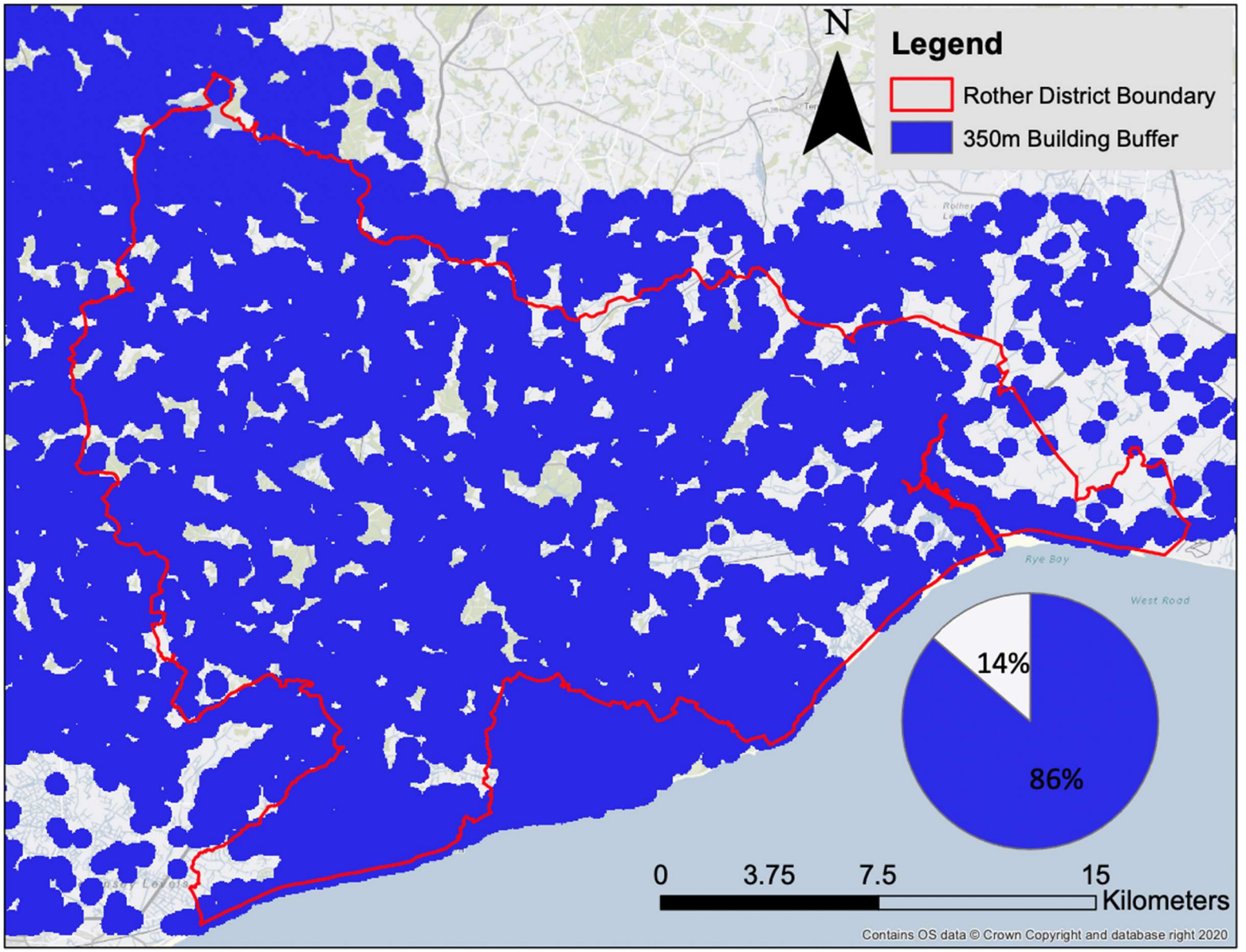

Figure 3: *Map showing the 350m building buffer for small scale turbines*

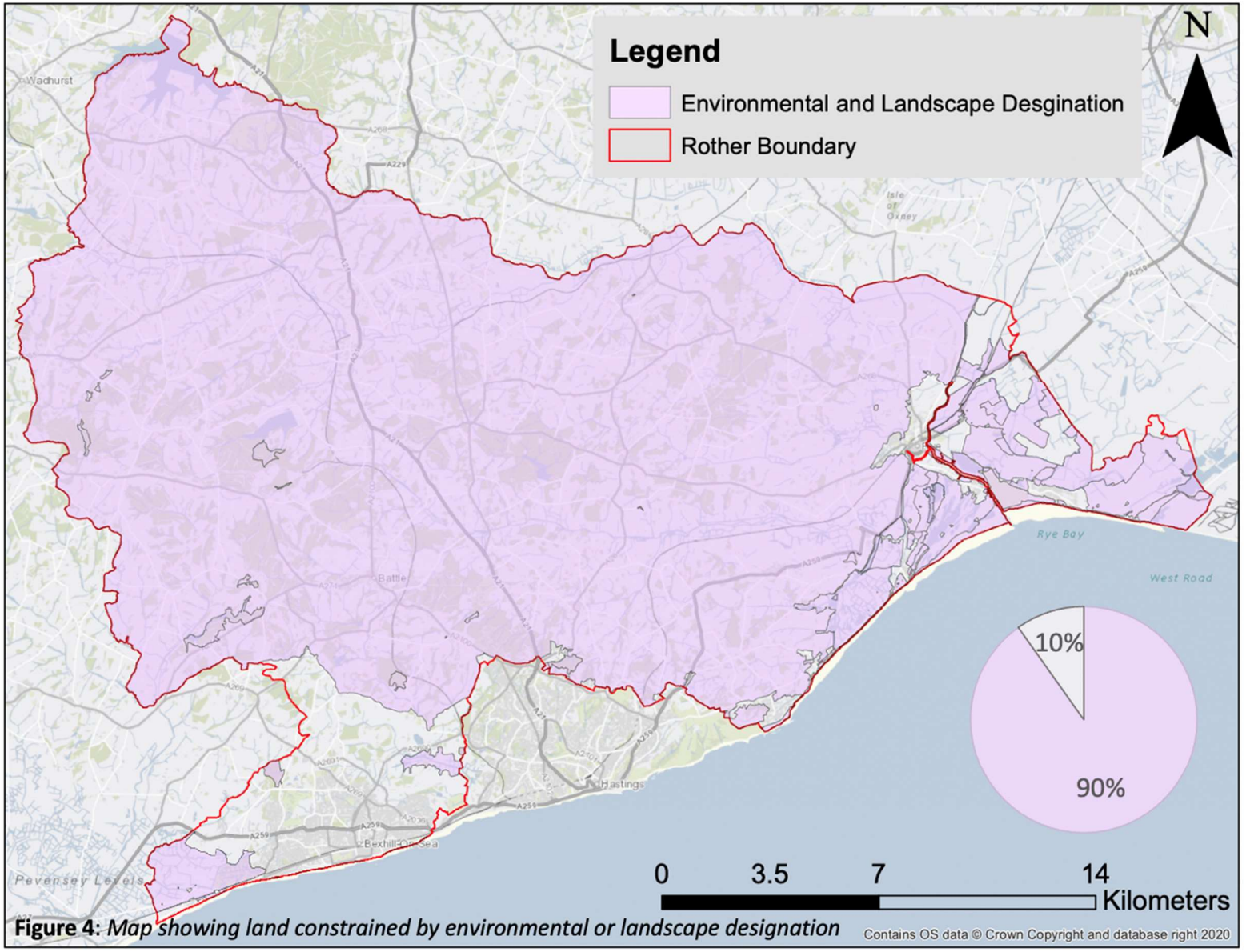

Figure 4: *Map showing land constrained by environmental or landscape designation*

Rother District Wind Energy Feasibility Study

For Rother District Council and Energise Sussex Coast

Carys Williams, University of Brighton MSc Placement with Green Growth Platform

Kristina Sodomkova, Environment and Policy Manager, Rother District Council

May 2021

Rother District Council | Town Hall | Bexhill-on-Sea | East Sussex | TN39 3JX