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Landscape Values Mapping for Tranquillity in North York Moors National Park and Howardian Hills AONB

--Manuscript Draft--

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Manuscript Number:	RSPA-2018-0002R1
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Keywords:	Landscape; GIS; Tranquillity; protected areas; tourism planning.
Abstract:	A key motivation for visiting protected landscapes, concerns expectations for tranquil experiences through which visitors' overall sense of wellness is commonly reported as being enhanced. Yet planning for this expectation is challenging: tranquility is a nebulous and highly subjective concept, resulting in multiple, often unique interpretations. Adapting research first conducted in Dorset, south England, this study reports on how visitors to two protected areas in Yorkshire, north England, perceive tranquillity. Two hundred and forty research participants were engaged at six survey sites over several weeks. Distinctions amongst the views are determined by age and gender. Sketch map data was combined in Geographic Information Systems (GIS) to produce detailed maps of tranquillity across North York Moors National Park and Howardian Hills AONB. Survey location and key interests appear to influence visitor perspectives on both tranquillity and non-tranquillity. The outcome of this work provides empirical data to inform future GIS modelling efforts aimed at identifying tranquil areas for their continued protection, for their use in tourism marketing and ultimately for the wellbeing opportunities they are considered to provide to the public as a key component of therapeutic landscapes.
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Response to Reviewers:	Authors responses to Reviewers Comments. Reviewers' comments: Reviewer #1: This is a really interesting piece of work. This research is well executed and well- articulated. Authors have done a very good job. Many thanks for this statement which is very encouraging. Only some really minor comments, and this is almost ready for publication 1. Page 3 - If there is no definition of tranquillity (which is understandable), what is the working definition for this study? Point noted and addressed on page 8. 2. Page 4 - 'in earlier studies.....' , but there are no references at the end of the sentence, please provide a few examples Point noted and addressed on pp. 5-6. 3. page 6 - 'ground truth the data' - please rephrase Point noted and addressed on page 7. 4. To make justice to this work, it should really finish off with a paragraph linking the study to wellness (as per focus of the journal) Point noted and addressed on pages 27 and 28. Reviewer #2: This manuscript identifies the gap and relevance of this research both within the tranquillity modelling literature and the methodological approaches to this. The literature provides many examples of this area of research and its practical application, whilst also highlighting the ways in which the findings may influence future research around tranquillity modelling using GIS. It is very well written and presented

and I therefore recommend it to be accepted for publication.
Many thanks for these most welcome views.
A few minor recommendations that may further strengthen this paper are as follows:

Page 3
- In the first paragraph in the 'Tranquillity Mapping' section, more academic literature on the links between wellbeing and tranquillity would further the discussion of its relevance to compliment and reinforce the industry report references provided. This would further contextualise its place within the wellness literature made reference to in the abstract, and the notion of 'therapeutic landscapes' in the introduction.
Point noted and addressed on pages 2 & 4.

Page 4
- In the final paragraph there are multiple references made to 'previous studies'; it may be useful to include these citations to add further points of reference for the reader.
Point noted and addressed on pp. 5-6.

Page 12
- In the demographics section, there is reference made to frequencies and the popularity of the AONB and the national park. To help contextualise this a little more, it may be useful to include visitor numbers to these areas here or in 'The Case of York' section.
Point noted and presented on pages 13-14

Page 13
- Discussions around age demographics and activity participation trends could be strengthened by references supporting this.
Points noted, and specific visitor numbers and references added on pp. 13-14

Page 14
- Table 3 - some of these terms seem to be very synonymous, for example 'quiet' and 'quietness', 'peaceful' and 'peace', 'noise' and 'noisy'. Is there a rational for keeping them as is and not merging them? For example quiet and quietness?

The rationale was to be true to the exact phrasing of survey participants, but upon reflection, we agree that combining very similar terms will be clearer to the reader. We combined terms to match the format used in subsequent tables (where such as ‘Quiet and quietness’ were combined for statistical analysis. Please see revised Figure 3 at end of revised manuscript.

Page 23 - Discussion and Conclusion

- The discussion could be strengthened by linking the key findings back to the key literature discussed to further identify the relationship with, and contribution to, the body of knowledge.
The text presented discusses key findings resulting from the York research on purely visitors’ views on tranquillity in comparison with those related to the Dorset BETP which additionally included views of residents, community groups and of planning authorities and government offices in the Purbeck, Dorset. Both of these studies are informed by enhancements to research originally commissioned by the CPRE and created by MacFarlane et al. (2004) that introduced the notion of public consultations and participatory appraisals for informing how tranquillity could be identified, defined and managed in a given space. The alternative forms of research make use of applied acoustics thus emphasise sounds rather than the broadest range of interpretations on tranquillity possible as found with the BETP. Subsequently methodologies are distinctive, so comparable discussions with these findings are not feasibly enabled.

- A clear conclusion section (or even just a heading) after the discussion may be useful to allow for a clear difference between the discussion and the conclusions made around limitations, contributions, and recommendations for future research.
Point noted and addressed in revised text pages 27 and 28.

- It may be useful to reflect again on the relevance of this study to wellness and the

	benefits to visitors, as touched upon in the introduction, alongside the discussions around the significance for tranquillity modelling. Point noted and addressed on pp. 27-28 - Some specific examples or suggestions on the implications for the management/marketing of these areas might reinforce the claims made in the abstract that it provides empirical data for aspects such as tourism marketing. We have added to the text that LVM aids in locating certain activities in tranquil spaces and therefore have added to the management techniques and suggestions noted in pages 2-3. Table 4 and 5 - A short explanation of the highlighted sections in the table captions may aid readability and interpretation of the data. Point noted and addressed in revised tables included at the end of text, page 38 and 39. Bar charts - The addition of axis labels where relevant on bar charts. Point noted and addressed on bar charts. Figure 9 appears to be missing. We can confirm that Figure 9 is included in the submission but we will resend all 9 visuals to ensure clarity to the editorial and publishing office.

Landscape Values Mapping for Tranquillity in

North York Moors National Park and Howardian Hills AONB

Abstract:

A key motivation for visiting protected landscapes, concerns expectations for tranquil experiences through which visitors' overall sense of wellness is commonly reported as being enhanced. Yet planning for this expectation is challenging: tranquility is a nebulous and highly subjective concept, resulting in multiple, often unique interpretations. Adapting research first conducted in Dorset, south England, this study reports on how visitors to two protected areas in Yorkshire, north England, perceive tranquillity. Two hundred and forty research participants were engaged at six survey sites over several weeks. Distinctions amongst the views are determined by age and gender. Sketch map data was combined in Geographic Information Systems (GIS) to produce detailed maps of tranquillity across North York Moors National Park and Howardian Hills AONB. Survey location and key interests appear to influence visitor perspectives on both tranquillity and non-tranquillity. The outcome of this work provides empirical data to inform future GIS modelling efforts aimed at identifying tranquil areas for their continued protection, for their use in tourism marketing and ultimately for the wellbeing opportunities they are considered to provide to the public as a key component of therapeutic landscapes.

Keywords:

Landscape, GIS, Tranquillity, protected areas, tourism planning.

Article Classification: Research Paper

Introduction

The notion of natural environments, thus protected landscapes, providing opportunities for enhancing visitors' sense of wellbeing, is evidenced in research (Herzog and Barnes 1999; Herzog and Bosley 1992; Mace *et. al* 1999; MacNaghten and Urry 2000; Morris 2003) and is at the heart of what Gesler (1992) termed therapeutic landscapes. These are tranquil spaces whose attraction is a key motive for visitors to protected landscapes. This is particularly evidenced in marketing literature where tranquility is most commonly reported as a key descriptor of these spaces (Hewlett and Brown 2018). Yet tranquillity is easily impacted negatively, and therefore requires managing agencies to have foresight and sound planning skills for which quantifiable information is required to understand how tranquility is perceived by visitors to a given area. This is a particularly challenging objective in landscape planning due to the nebulous nature of the tranquility concept and its inherent complexities derived from multiplicitous interpretations (Hewlett *et al.* 2017). One approach for facilitating the information and planning strategies required is landscape values mapping (LVM).

The basic structure of LVM involves the application of participatory methods and Geographic Information Systems (GIS) to protected landscapes. Research participants identify and rank particular amenities according to various typologies such as aesthetic value, ecological significance or opportunity for active recreation (Beeco and Brown, 2013). Results can provide tremendous potential to inform the location of current and future outdoor tourism and recreation opportunities. As Beeco and Brown (2013, p. 78) state, "perhaps the greatest importance of landscape values data is the richness it provides researchers and managers [as

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well as] insight into visitors' desired management strategies." LVM has been used to examine a wide range of land use topics including tourism and development planning (Brown, 2006), wilderness quality assessment (Brown and Allessa, 2005; Carver, Evans, and Fritz, 2002), national forest management (Brown and Reed, 2000; Brown and Reed, 2009), and regional conservation strategies (Brown and Brabyn, 2012).

The relevance of LVM for recreation and tourism research is further reinforced by the central role that maps serve in these contexts. Their comfort and familiarity with maps makes protected area visitors particularly amenable to this research. With its approachable map-based interface, GIS has been widely applied as a tool for gathering and analyzing social data to inform outdoor recreation and protected area planning (Beeco and Brown, 2013; Olafsson and Skav-Petersen, 2014). In addition, the ease of accessibility to spatially-referenced ecological information has aided the comparison of social values with physical characteristics (Brown and Brabyn, 2012). GIS is particularly suited for spatial planning in protected landscapes and public lands, as the co-occurrence of variables is easily identified and areas can be prioritized for various uses (McIntyre, Moore, and Yuan, 2008; Taranto, 2007).

The research reported here was substantially influenced by a recent effort to incorporate an expansive range of views in a landscape values approach to tranquillity planning (Hewlett, Harding, Munro, Terradillos, and Wilkinson, 2017). This study entitled 'Broadly Engaging with Tranquillity Project'(BETP) comprised multiple stages and methods to determine how tranquillity is perceived by a wide range of public constituencies and was conducted in the Purbeck of Dorset Area of Outstanding Natural Beauty (DAONB) in south England. To

evaluate how results of the Dorset study might compare if the approach were to be conducted in alternative protected landscapes, visitors to two protected areas in the north of England were surveyed.

Tranquillity Mapping

Tranquillity is, as discussed previously, a quality of natural environments that is evidenced to enhance our wellbeing and is a much-desired characteristic of recreation landscapes in the UK, (CPRE, 2015) as citizens recognize the need for spaces where they can escape everyday psychological stress and enhance their general sense of wellbeing (e.g.Mace *et. al* 1999; STEPPA 2014). National parks and other protected areas are particularly valuable spaces for those seeking solitude or quiet, as these spaces are managed to protect and preserve tranquillity as a 'special quality' (DCLG 2012; NAAONB 2012). One of the foremost challenges for managers responsible for preserving tranquillity in protected areas is understanding how it can be measured, quantified, or as in the case of the UK where statute demands, protected (DCLG 2012).

In describing recreation areas, the term 'tranquillity' is a value-laden concept, related to an individual's own experiences, even memories, and is enhanced or diluted by tangible natural or man-made features in a landscape (Goosen and Langer 2000; Jackson et al. 2008; Kliskey and Kearsley 1993; Knopf 1983). Tranquillity is often used synonymously with concepts such as 'peacefulness' and 'remoteness,' which evoke places absent of human sounds and devoid of human settlement. Due to the ambiguous nature of how tranquillity might be defined and the numerous interpretations that can be made, it cannot be assumed that all users

will agree on a single definition, nor seek the same type nor level of tranquillity in their recreation experience. Therefore, it is important to collect empirical data on tranquillity from the widest range of stakeholders to provide a baseline for managing agencies who are responsible for preserving this special quality.

The history of tranquillity mapping in England extends for more than twenty-five years. Its origins can be traced to a 1991 transportation study that sought to understand the impacts of a proposed travel corridor (ASH Consulting, 1991). This work was then later developed in 1995 to produce a national set of national and regional tranquillity maps (ASH Consulting 1995; CPRE 1995). Subsequent tranquillity research has taken primarily two approaches. The first focuses on determining precise thresholds and quantities of negative attributes in urban environments, such as noise and visual blight. Researchers adopting this approach have attempted to calibrate human audial and visual perceptions of tranquillity using laboratory and field-based experiments (Pheasant, Horoshenkov, Watts, Barrett, 2008; Watts and Pheasant, 2013; Watts, Pheasant, and Horoshenkov, 2011) that has resulted in suggesting immediate improvements to Green Infrastructure that could be made to urban environments.

Whilst these studies have attracted attention amongst politicians, practitioners and academics on just how an abstract quality of the landscape might be evaluated, they have been heavily critiqued. In early studies, a particularly narrow interpretation on tranquillity was devised within positivist frameworks on the most easily evaluated parameters (e.g. volume of traffic, traffic noise and population settlement) (ASH Consulting 1991; CPRE 1995): the primary focus of which concerned what detracted from tranquillity rather than equally what might

enhance tranquil experiences. Later studies immersed in the area of applied acoustics, substantially progressed the quantification of tranquillity and enhanced our understanding of how this landscape value might be experienced (e.g. Pheasant, Horoshenkov, Watts, Barrett, 2008; Watts and Pheasant, 2013; Watts, Pheasant, and Horoshenkov, 2011). However, as with earlier studies, applied acoustics emphasizes how tranquility is related to sounds and comprises of positivist designs thus requires a predetermination and control over what might or not comprise tranquil experiences in a given area. This ultimately means that decisions about the degree and extent of impact on tranquillity are made primarily by expert stakeholders representing views of agencies, institutions and academics rather than through inclusive decision-making processes that also engage with the wider public.

Concerns over these critiques together with an increasing political context on emphasizing the public's involvement in spatial planning decisions (ODPM 2002; 2004 a & b; 2005; 2006) inspired the second alternative approach to tranquillity mapping. This strategy, commissioned by the Campaign for the Protection of Rural England (CPRE), represented a major step change in tranquillity mapping by advancing an understanding for how tranquillity could be interpreted and thus defined, by a broad group of stakeholders representing views from institutions and user groups of two contrasting areas of north-east England, the Northumberland National Park and the West Durham Coalfield (MacFarlane, Haggett, Fuller, Dunsford, and Carlisle 2004). In addition, unlike the original positivist design of 1991, the research design incorporated both a quantitative and qualitative methodology that was informed by an adaptation of Participatory Appraisal (Chambers 1994). This approach meant that no form of predetermined indicators of tranquillity could be devised. Instead, through a

series of workshops and onsite surveys, research participants were invited to both describe and sketch situations that they considered most or least represented tranquillity and non-tranquillity in each of the case study areas.

This process identified and quantified 44 factors as enhancing or detracting from the participants' notions of tranquillity, which were then constructed in GIS models. A similar approach was subsequently progressed in evaluating tranquillity experienced by visitors to the Chiltern Hills AONB (Fuller, 2005). The results of these studies contributed to the production of a national tranquillity map in 2008 (Jackson et al. 2008).

Whilst these studies hold merit, as with all early conceptual studies there were limitations. With regard to the national map of tranquillity, whilst uniquely providing for a benchmark of tranquillity in each county, concern was raised amongst landscape planners over just how accurate tranquillity maps could be in their respective areas, given they were informed by data collated originally in the North of England, then extrapolated to other regions and compiled at a coarse spatial resolution of 500 to 250 metres.

In an effort to check the accuracy of this data, Bell and Burden (2009) applied the parameters of the CPRE national mapping effort to their local protected area, the Cranborne Chase and West Wiltshire Downs AONB. The exercise involved clipping the national map to the AONB, then the validity of a random set of map grid cells was investigated. Staff travelled to the centre of these cells, and independently assessed tranquillity. These results were then compared to the predicted (original map) values. It was concluded that the primary

discrepancies between the predicted and observed values typically related to features in the landscape too small to be part of the original low-resolution, national mapping effort. These results provide strong evidence that case-by-case enquiries are required to determine tranquillity specific to an area and that high-resolution mapping of tranquillity is necessary to capture visitors' real-world experiences.

The New Forest National Park Authority in Hampshire, commissioned their own volunteer ground-truthed data to produce a fine-scale map of the region (Land Use Consultants, 2014). Rather than using a grid-based model, they focused on threshold distances for mapping 'disturbance buffers' around various sources of noise and visual clutter. These buffers were then adjusted using areas of woodland that might absorb noise and obscure negative views. The final map provides significant detail about the impacts of traffic volume, and railway and airport disturbances, though it lacks the continuous gradation of tranquillity scores found in other studies.

Hewlett *et al.* (2017) strictly adhered to the perspective that tranquility is subjective, highly context dependent yet was most commonly related to describe a state of mind and/or to an experiential quality perceived to be found in protected areas. This stance informed a working definition of tranquility that was progressed by Hewlett *et al*. (2017) who enhanced the original MacFarlane *et al.* (2004) studies by applying a multi-faceted community engagement process in which they solicited conceptions of tranquillity from the broadest range of constituencies possible. They deliberately sought a wide range of perspectives, including representatives from all institutions, land-managing agencies and public authorities, user groups, visitors to the area and residents, including a dimension that could target the so-called hard-to-reach members of local communities. More than fifteen thousand views were captured on what participants considered did or not enhance or impact their notions of

tranquility. Results were then linked to GIS data layers and used to model tranquillity and non-tranquillity in the Purbeck's area of the Dorset Area of Outstanding Natural Beauty. The researchers employed a spatial resolution of 5 metres, which supported incredibly detailed maps of tranquillity. While the aim was to capture participants' views as accurately as possible, this resolution may be unnecessarily fine for dynamic modeling. It may need to be resampled to a larger resolution to support modeling of diurnal and seasonal changes in tranquillity factors.

The case of York

Two protected areas in Yorkshire, North York Moors National Park and Howardian Hills Area of Outstanding Natural Beauty, were selected as a study site for their proximity to large urban areas, their varied terrain, and location in north England which contrasts with previously examined sites in the South. The lead author established connections with staff responsible for protected area planning and tourism marketing.

The recently completed BETP Dorset LVM study was identified specifically by protected area staff as the framework most appropriate to be progressed in York, and its methodological approach was adapted for this study. As the primary emphasis of the research was LVM, which centres on maps as data collection tools, the work focused specifically on visitors' views of tranquility. These stakeholders were viewed as relatively easy to engage, especially through easy to complete sketch mapping tasks. In addition, national park staff were particularly interested in the impact on visitors of various activities, including the expansion of a potash mine in the north of the park.

Materials and Methods

The overall methodological approach to the York study progressed an adaptation of Mixed Methods used in the original BETP Dorset research (see Hewlett *et al.* 2017; Hewlett and Brown 2018). This resulted in a series of visitor onsite surveys and further visitor perspectives collated through the use of sketch maps as detailed below.

Survey Instrument

The visitor survey was adopted from the BETP Dorset project and comprised of three parts: a sketch mapping exercise; a free-listing task; and a demographic section. Within the sketch mapping task, visitors were asked to identify specific tranquil and non-tranquil areas using an outline map of each area. The map included basic location information with place names, major roads, forests, and topography. Major physical features were identified along with villages and settlements. Participants circled or marked with a 'T' the most tranquil places and circled or marked with an 'N' the least tranquil places. Participants could mark as few or as many places as they felt necessary. If a participant was unfamiliar with the area, the sketch map was overlooked and the survey was progressed.

The second component of the survey asked participants to list and rank characteristics of tranquillity that came to mind for the places they marked:

> *Why do you consider the areas marked 'T' most tranquil? Please list up to 5 characteristics that make this area tranquil. Rank in the boxes provided in the order of importance: 1 being most important and 5 being least.*

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Why do you consider the areas marked 'N' least tranquil? Please list up to 5 characteristics that make this area least tranquil. Rank in the boxes provided in the order of importance: 1 being the characteristic you consider most negatively affects your view on tranquillity and 5 being least.

If a participant did not fill out the map they were asked to list and rank five characteristics of tranquillity that come to mind *"When you hear the word tranquillity"* and characteristics *"which detract from your view on tranquillity."*

The third and final component of the survey included questions about gender, age, as well as means of transportation to the park, and the participant's home postal code.

Survey Locations

An intercept survey was conducted over three weeks from mid-October to early November, at six locations throughout the North York Moors National Park and Howardian Hills AONB (Figure 1). The survey locations were selected to gain access to a wide variety of visitor types, including retirees, families, casual visitors and active recreationalists. Surveys were conducted on weekends and weekdays in order to reach a range of day and overnight visitors. The survey sites included historical landmarks, visitor centers, villages, and points of access to recreation.

[Figure 1 Here]

Visitors were surveyed at four sites within the National Park and two within the AONB. These sites were identified in consultation with protected area staff. The National Park sites

included Sutton Bank Visitor Centre, a point of access along the southwest edge of the Park. The Centre attracts day visitors with a gift shop, tearoom, mountain bike rentals, and public restrooms. Walking and mountain bike trails surround the centre, and it experiences a high volume of visitor traffic, particularly on the weekends.

Rievaulx Abbey is an historical landmark managed by English Heritage, nestled in a valley at the southern part of the Park. The Abbey is easily accessed via road and walking path from the market town of Helmsley. It sees a large number of visitors throughout the year, many of whom enjoy the quiet solitude of this peaceful setting. In contrast, the adventure-centered Dalby Forest attracts a range of young, active walkers and mountain bikers, families with small children, as well as retired visitors. The Forest hosts zip lines, a tree walk experience, Segway tours, and a busy visitor center with a gift shop, tearoom, and bike rentals. It attracts those interested in the rugged terrain and forested areas that surround the centre, and sees a high volume of weekend visits.

The fourth National Park survey location was Staithes, a coastal fishing village and the filming location of a popular children's television show. It sees a wide variety of visitors, but especially families with small children, and those seeking the experience of beachcombing and exploring the tidal zone. Public traffic is restricted within Staithes village, and visitors were surveyed beside the main car park where most begin their stroll into the village. The car park sits high above the surrounding town, with a clear view of a large, conspicuous potash mine to the west. This location was chosen in part to determine the impact of the mine on visitors' perception of tranquillity.

The AONB has a lower overall number of visitors, and finding locations with a large concentration of foot traffic during the autumn season was difficult. The most popular destination within the AONB, Howard Castle, was avoided as the majority of the visitors there are specifically choosing the Castle, rather than the AONB, as a destination. Instead, a recreation area in the eastern part of the area were selected, and a village market along the western side.

Yearsley Moor is a remote area of forest and open space that is popular with day visitors for walking and cycling. There is a small parking area with some interpretative signs, which provides access to the local paths. While survey participation numbers represented only 4% of the total (Table 1), those who participated were very interested to share their views. The second AONB site was in the village of Hovingham, a popular destination along a well-travelled road between York and Helmsley. Each month, the village hosts a market, and the survey was conducted here in early November. In order to attract more participants, a small tent near the front of the market was erected, and visitors were asked to place locations on a large poster-sized map of the AONB.

[Table 1 Here]

Results

Demographics

A total of 240 surveys was collected across the six survey sites (Table 1). The majority of surveys (202 of 240, or 84%) was collected from the National Park sites, where visitor numbers are generally much greater than in the AONB. While specific numbers are elusive,

the most popular site within the AONB is Castle Howard, which sees more than 200,000 visitors a year (Association of Leading Visitor Attractions 2017). In comparison, the National Park sees more than seven million visitors annually (North York Moors National Park Authority 2016). At least two days were spent surveying visitors at each location, with the exception of Sutton Bank, where one full day was conducted. The higher frequency counts for National Park sites compared to AONB sites is mainly a reflection of the Park's popularity with visitors. With an initial goal of collecting 300 surveys across the six sites, the research team left the Park sites once approximately 50 surveys had been reached. At the two AONB sites, wet and windy conditions were experienced which influenced the number of survey participants. In retrospect, these sites should have been surveyed earlier in the season, when fair weather is more dependable, and more visitors are present.

Survey respondents comprised more females (n = 128; 53%) than males (n =112; 47%). The survey sample was skewed toward older adults with those 56 and older comprising exactly half of the total (n = 120) (Table 2). Meanwhile, those in the 18-35 age range represented only 25, or slightly more than 11% of the total. This age distribution is a reflection of national park visitation in the UK as a whole, as older adults have the resources for extended holidays, and a stronger interest in spending time relaxing in nature. We expect that those in the 18-35 age range are more likely to spend their leisure time in urban areas. When members of this younger group visit protected areas, it is often for active recreation such as walking, cycling, or rock climbing. More people in this age range were observed during the surveys than is reflected in the survey numbers, but their focus on physical activities made it more challenging to engage them.

[Table 2 Here]

Respondents were asked to report how they travelled to the survey site that day, and to categorize the nature of their visit to the Park or AONB. The vast majority of subjects who responded to this question (n = 238) travelled by car (210; 88%), while a small number walked (23; 10%), and the remainder arrived by bike (3; 1%) or bus (1; .05%). These results are unsurprising given the survey locations, all of which were adjacent to a car park and distant from large densities of accommodation. It became clear that many visitors were spending the majority of their visit walking or cycling, and the car-ride was simply the first stage of their journey.

In order to further explore the motivation for their park visit, the nature of participants' visits was investigated. The majority were visiting for the day (n = 131; 55%), or on holiday (n = 78; 32.5%), while the remainder were visiting friends, or lived in the area (Figure 2). The large number of day visitors is again unsurprising given the autumn season, when fewer people are likely to take holidays, and given the proximity of the Park and AONB to large population centres in Yorkshire and adjacent counties. These protected landscapes are within a one to two-hour drive of major cities in the North of England, and provide an attractive destination for a weekend day trip.

[Figure 2 Here]

Analysis of Tranquil and Non-Tranquil Terms

Respondents provided a total of 986 responses for tranquillity and 776 for non-tranquillity.

After removing duplicate responses, we identified 504 unique tranquility terms and 355 non-tranquil terms. Terms were sorted and counted, and ranked by frequency (Table 3). The higher number of tranquil terms likely reflects the general attitude of visitors who, seeking enjoyment and respite from daily life, are more likely to emphasize positive attributes in their experience of a protected area. The emphasis of specific non-tranquil terms on noise and business may reflect the immediate environment at each of the survey locations, as most of these were near dense infrastructure, rather than explicitly in a natural setting.

[Table 3 Here]

Overall, respondents reported significantly more tranquil terms (M= 4.1, SD =.97) than non-tranquil terms (M = 3.23, SD = 1.14), $t(478) = 9.05$, $p < .001$. This suggests that park visitors perceive more positive traits in their experiences than negative traits, however it could also be a reflection of bias in the order of survey questions, which requested respondents to list tranquil terms before listing non-tranquil terms.

When examining gender differences, females reported significantly more *non-tranquil* terms (M = 3.37, SD = 1.11) compared to males (M = 3.08, SD = 1.15), $t(238) = 1.96$, $p = .026$. This suggests that females are more sensitive to, or at least more willing to identify, negative aspects of their protected area experience compared to males.

When we grouped terms according to broad age classes of younger (ages 18-55, n = 120) and older (ages 56+, n = 120) respondents, no significant difference in the number of tranquil terms was found (M = 4.16 and M = 4.05, respectively), nor in the number of reported non-

tranquil terms (M = 3.25 and M = 3.22, respectively).

Tranquil Terms

In order to more extensively explore the answers to the free-response task, we grouped the tranquil terms into 11 broad categories, as well as an 'other' category (Figure 3). The most frequent responses fell within the categories of what subjects can see (e.g. views/landscapes, few people), and what they can hear (e.g. peace/quiet, lack of traffic). More specific categories such as 'trees' and 'water,' as well as 'remote' and 'rural' had fewer responses, but these categories were important to retain for making comparisons between groups, and to support future geographic modelling.

[Figure 3 Here]

A chi-square goodness of fit test was conducted to explore if there was an equal proportion of responses in each category, across the survey sites. As the Yearsley Moor site in the AONB had too few terms (N = 74), it was dropped from this analysis. The results reveal that sites had a significantly higher or lower number of responses for at least one category of tranquil terms, X^2 (44, N = 943) = 74.04, $p < .05$. Examining the cross tabulation table, we highlight those categories with substantially fewer or greater responses than expected for each of the five survey sites (Table 4), and describe these in more detail below.

[Table 4 Here]

Dalby Forest has a considerably lower number of 'access/recreation' responses than other sites, which is very surprising, given that the Forest is a nexus for walking, cycling, and other

active sports options. It is surmised that those participating in these activities do not consider them 'tranquil,' but rather part of a regular or occasional fitness regime. Conversations with park managers confirm that the Forest is a destination for what has been coined 'weekend warriors' and those seeking the adrenaline rush that comes with mountain biking and walking in extreme terrains.

Rievaulx Abbey has a significantly larger proportion of 'peace and quiet' occurrences than the other four sites. The Abbey is the site of a twelfth century stone structure, most of which was dismantled in the sixteenth century during the reign of Henry VIII. Nestled in a valley and surrounded by forests and a small collection of houses, the Abbey evokes a very peaceful experience. The results confirm that visitors are influenced by the meditative quality of their experiences here.

Staithes sees a relatively high number of responses for 'water' compared to other sites, and especially in comparison to Sutton Bank. This is likely a reflection of the proximity and abundance of water views at Staithes, which is a coastal location, perched on a cliff overlooking the North Sea. This contrasts with Sutton Bank, which is among the furthest survey sites from the ocean, and is situated high atop the moors, with limited flowing water.

Lastly, respondents at the Hovingham site listed 'views/landscape' and 'other' terms more frequently than those of other categories. The survey site, a local market, did not afford views of the surrounding landscape, but many market visitors pass through the distinctly pastoral landscapes of the Howardian Hills on their way to Hovingham. It might be assumed

that the situation of Hovingham within this larger agricultural landscape resonated with survey participants. Hovingham and the previously described sites demonstrate that survey location may influence how respondents report their feelings of tranquillity, and thus support the use of survey sites with widely varying attributes.

Non-Tranquil Terms

Non-tranquil terms were grouped into nine categories, with a tenth category of 'other' (Figure 4). The most frequent responses were within categories that have an immediate visual and auditory impact, but can vary over time (e.g. traffic, noise, and crowds). The remaining popular categories refer to physical infrastructure (shops, buildings, industry), with the exception of 'pace/stress.' This category received the second highest number of responses, which might be expected when considering stress is an antonym of the most popular tranquil response, 'peace.'

[Figure 4 Here]

Subsequently, the categories of non-tranquil terms reported by respondents were analysed. A chi-square goodness of fit test was used to determine if an equal proportion of responses was provided in each category, across the survey sites. The Yearsley Moor site was again dropped from the analysis because there were too few responses (N = 34). Results revealed that each site had a significantly higher or lower number of responses for at least one category of non-tranquil terms, X^2 (36, N = 742) = 57.56, $p < .05$. Examining the cross-tabulation table, those categories with substantially fewer or greater responses than expected for each of the five survey sites are highlighted (Table 5).

[Table 5 Here]

Dalby Forest saw a considerably higher number of references to ‘pollution’ than other sites, while Rievaulx Abbey had considerably fewer than expected. These results are likely influenced by the small numbers of responses within this category (22), but might also reflect the immediate context at each survey site. At Dalby Forest, the large car parks were crowded with vehicles on the two days visited, and cars are much less conspicuous at Rievaulx Abbey, which has a small gravel car park. While air pollution was not directly observed in either location, the presence of an abundance of cars likely creates this association for survey respondents.

Staithes revealed a significantly higher proportion of references to ‘shops/commercial’ than other sites. This is very likely due to the tourist-oriented economy here, and in nearby communities, such as Whitby. In contrast, Sutton Bank witnessed substantially fewer references to ‘industry’ than other sites, which probably reflects the lack of industrial activity in this area of the National Park.

Lastly, Hovingham saw a larger share of references to ‘traffic’ than the other sites, which is clearly an outcome of the site’s proximity to a major thoroughfare, which connects York and Helmsley. As market patrons drive from some distance to visit Hovingham the first Saturday of each month, they likely experience high traffic volumes in the AONB and National Park. Parking in the densely settled village centre can also be difficult on market days. As was the case in Staithes and Sutton Bank, the influence of the immediate environment to the

Hovingham site clearly influenced the responses of subjects. This finding lends support to choosing a variety of survey locations for data collection.

Sketch Mapping Results

Survey participants were first asked to identify locations on a paper map of the protected area. In order to maximize the scale of sketch maps, separate maps were used for the National Park and the AONB survey sites. The maps were printed in colour on A4 sized paper with labels indicating select place names, and with major roads drawn for context. Sketch maps were collected from 156 participants in the National Park, and thirty-seven in the AONB. Subjects indicated tranquil and non-tranquil sites using point locations, indicated by the letter 'T' or 'N,' and by using shapes to enclose larger areas. For the national park map, no minimum nor maximum number of points was suggested, and subjects drew as few as one, and as many as twenty distinct locations. At the Hovingham Market site in the AONB, a single poster-sized map was used, and participants were asked to place up to six map pins, three each, for tranquil and non-tranquil sites.

National Park Sketch Map Results

Sketch maps were scanned and converted to TIFF format, for import into GIS software (ArcGIS 10.3, Redlands, CA). In GIS, each map was rectified using the known coordinates of the four map corners, and sketched features were digitized using points and polygons. Points were subsequently converted to polygons by buffering a distance of one mile in order to account for the margin of error in placement and the size of the letter drawn (T or N). In addition, it can be generally assumed that a point identified as tranquil is influenced by the

sights and sounds present within approximately one mile. Polygons were drawn by tracing marked areas, and coded as either tranquil or non-tranquil.

A binary scoring system was employed in the combined result, with tranquil areas receiving a score of 1, and non-tranquil areas receiving a score of -1. The results illustrate areas of strong agreement, where the majority of subjects considered the same places 'tranquil' or 'non-tranquil,' leading to either large positive or negative scores. Those areas with less agreement are indicated in places where scores effectively cancelled one another (Figure 5). In addition, large areas of the park were not indicated as either tranquil or non-tranquil. Most subjects stated that they could only mark those areas with which they were familiar, and unfamiliar areas were left unmarked. As such, a second image of sketch map results was produced illustrating the most and least frequently marked areas of the map, which can be interpreted as the level of familiarity of subjects with these areas, or the degree to which these areas evoked either a positive or negative emotional response (Figure 6).

[Figure 5 Here]

[Figure 6A Here]

[Figure 6B Here]

The sketch map analysis produced tranquillity scores ranging from -47 to 44, with negative numbers indicating less tranquil areas, and positive values representing more tranquil areas. Values of -47 are found near the downtown portion of the city of Scarborough, while values as high as 44 are found at Rievaulx Abbey. Scarborough is the largest city within the sketch map extent, and it is relatively well known beyond Yorkshire. Other regions within the map that received low values include the market towns of Pickering, Whitby, and Helmsley.

Helmsley also received relatively high values, and the lack of agreement led to a moderation of scores here. While it is a bustling market town, Helmsley's proximity to tranquil locations such as Rievaulx Abbey, as well as its role as gateway to the southern portion of the park, likely contributed to mixed impressions. Visitors from more urban areas likely consider Helmsley tranquil for its small size and its lively, compact village center with many high-end shops.

In addition to Rievaulx Abbey three other survey sites received high scores for tranquillity: Sutton Bank, Dalby Forest, and Staithes. A large number of respondents als identified as tranquil the central region of the park, particularly Rosedale Abbey and Blakely Bank, as well as Robin Hood's Bay, Goathland, and Ravenscar. Each of these locations is easily accessed by road, and together they have long served as popular destinations within the park. A recent visitor survey indicates that Rosedale Abbey is not heavily visited, but its reputation continues to positively influence visitor perceptions.

AONB Sketch Map Results

As described, a separate A4-sized map of the AONB was used to survey visitors to the Yearsley Moor site. These results were combined with those of the Hovingham Market site, although the data collection method differed in these two locations. Yearsley Moor results were processed in the same manner as the National Park sketch maps. In contrast, Hovingham Market subjects placed pins on a poster-sized (A1) map, which was photographed, converted to TIFF format, and imported to ArcGIS, where it was georectified.

Hovingham Market sites were digitized as points, and buffered a radius of one mile, to produce circular polygons. Twenty-eight subjects at Hovingham placed 123 locations. Using the same scoring system as the national park, the polygons were coded as tranquil and non-tranquil, and given a value of 1 or -1, respectively. Results were combined to highlight areas of strong agreement (Figure 7).

[Figure 7 Here]

The majority of AONB responses (28) were collected at Hovingham Market in early November. From postal code data analysis, it is clear that the majority of subjects were from the immediate area (Figure 8). This contrasts with summer, when many market visitors come from some distance away. As such, the results show a particular affinity for Hovingham and nearby areas. Similarly, the Yearsley Moor results were obtained primarily from respondents living in the immediate area, who use the site as a place for casual walks. The Moor, and nearby sites such as Ampleforth, the location of a monastery and college, received the most attention from respondents. Given the smaller sample size and the local bias in the results, the AONB map provides only a limited perspective about tranquillity within this protected area.

[Figure 8 Here]

The highest scores are found in the vicinity of the two AONB survey sites, at Yearsley Moor and just west of Hovingham, in addition to the village of Nunnington. The bias of the survey sites clearly played a significant role in these results, although a number of areas within the AONB away from these survey locations received positive scores. Negative tranquillity scores are found in Helmsley, in Hovingham, as well as Malton and Easingwold. These are

market towns, where shopping and traffic dominate the local landscape, and relative to many of the remote and quiet areas within the AONB, they represent the busiest and noisiest areas.

Discussion

This research was designed to investigate how visitors in York perceived tranquillity in two protected areas and through utilizing the framework designed for the BETP Dorset study, additionally facilitated comparison of how visitors to North York Moors National Park and Howardian Hills AONB perceived tranquillity compared to those who visited Dorset AONB in the south of England. Adapting the methodology of BETP Dorset, the surveys conducted in York were designed to primarily elicit qualitative responses from visitors.

Unlike the BETP Dorset, fewer respondents undertook the surveys in York - 240 compared to 309 in Dorset - a result that was as dependent on the seasonal timing of the surveys (in York during the Autumn season and in Dorset, during the peak summer periods) as effected by the locations selected (Hewlett and Harding 2015). Of these visitors, in both Dorset and York case study areas the respondents comprised more females than males (58.6% females in Dorset and 53.3% in York) and also reflected an older demographic – in York, more than half of those surveyed were of 56 years and older; in Dorset, this age group contributed to almost 44% of the total visitors surveyed.

Further similarities with Dorset were found in respondents reporting significantly more tranquil terms than non-tranquil terms: the most popular were ‘peace and quiet,’ ‘views,’ ‘nature and wildlife,’ as well as ‘lack of people,’ and ‘lack of traffic.’ While these terms

were unsurprising, the consistency of their reporting indicates an emphasis among visitors on what primarily can be seen and subsequently, heard. In general, visitors reported they are seeking respite from everyday experience, and the opportunity to find relaxation, solitude, as well as access to active recreation experiences.

Nevertheless, protected area managers also recognize that visitors' needs vary with each location, and this was generally reflected in the results. For example, Rievaulx Abbey in North York Moors National Park saw a significantly larger proportion of 'peace and quiet,' terms reported, as might be expected at this site. Visitors here appear to be impacted by the serene setting of an ancient religious site nestled in a densely forested valley. It would be useful in the future to compare responses of those entering the site with those departing, as a means to measure the impact of the experience itself.

However, in the specific case of York, a wider variety of survey locations and conditions might also support a broader understanding of visitor perceptions. For example, the AONB is less visited than the National Park throughout the year, and recreation and tourist sites are likely to see the most use on summer days, when families are on holiday. In addition, less visited sites require longer survey windows in order capture numbers similar to those of popular sites.

Field observations indicate that the variety of responses is negligibly different with twenty-five or fifty respondents. For the national parks sites, we are confident that the results are representative of the majority of visitors. For the AONB sites, the results appear to indicate a

bias for local residents visiting the area as opposed to tourists, but AONB staff suggest that this may also represent the composition of key visitors experienced nationally amongst the network of AONBs.

Leading with the sketch mapping exercise was a useful means to familiarize respondents with the goal of the research, though it may have introduced bias. The locations labeled on the map were meant to provide enough context to orient subjects to the protected area, but may have influenced them to emphasize these locations in their response. It would be interesting to conduct the same survey as a free-listing task, where subjects are asked to name locations and sites within the area that they find tranquil or not. Here, qualitative references, such as 'around Sutton Bank' or 'heathlands south of Goathland' might be comparable to a hastily drawn oval encircling a large, vaguely defined area. Such descriptions might include landmarks and reference points that provide more precise locations than hand-drawn shapes. This technique would remove the inherent bias of labeling some points of interest and not others.

[Figure 9 here]

Conclusion

The BETP York, informed by its predecessor in Dorset was fundamentally worked to conduct an approach to tranquility mapping of public consultation that originally was deployed by MacFarlane et al (2004) in Northumberland. Consequently, this approach facilitated an extensive range of views conveyed on the subject of tranquility. Amongst these views, although fewer numbers of visitors were included in the York study, the responses provided were similar to those captured in both Dorset and Northumberland: namely that tranquility is

more frequently reported than non-tranquility and of these the most popularly cited terms were related to experiencing peacefulness and panoramic views of naturalistic environments. Conversely the presence of people, infrastructure and particularly traffic overwhelmingly represented participants' notions of non tranquillity.

These views supported one of the most valuable technological aspects of this study, its potential to inform the subsequent modeling of tranquillity using GIS and our current activities in testing the automation of key processes devised. Previous studies have sought to match variables reported by visitors, residents and experts to GIS data layers. For example, 'traffic noise' can be modeled in GIS using data on major roads, traffic counts, and terrain to calculate the distance that sound will travel across the landscape. These models can be modified to address seasonal changes, for example, as foliage in summer will dampen sound more effectively than bare trees in winter. If designed with enough sensitivity, these models could predict the impact of developments, festivals, and road construction on tranquillity. As such, there will continue to be a need to calibrate these models with qualitative data collected from those who reside within, and visit, protected areas.

Finally, what was evident from the views collated, was that tranquillity represents a highly valued and much-anticipated experience for participants' visiting protected areas. This aspiration was specifically identified in many cases for what research has increasingly evidenced, that natural, tranquil environments are considered by visitors to have enabling properties for enhancing their wellbeing. This finding, warrants further investigation and through GIS modelling, informed through extensive public consultations, has the potential to

advance the body of knowledge on tranquillity and on its relationships with wellbeing further.

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Top Ranked 'Tranquil'			Top Ranked 'Non-Tranquil'	
26	peace/peaceful		39	traffic/heavy traffic
23	quiet/quietness		31	noise/noisy
11	scenery		14	busy
6	lack of people		5	industry
8	lack of/less traffic		5	litter
4	peace and quiet		5	too many people
4	wildlife		5	traffic
3	beautiful scenery		4	crowded
3	nature		4	people
3	open space			

Table 3. Features that come to mind when respondents hear the word 'tranquil' vs. 'non-tranquil'

Terms:	**Dalby** n = 201	**Rievaulx** n = 211	**Staithes** n = 203	**Sutton** n = 209	**Hovingham** n = 119
peace/quiet	18.91	**24.64**	18.72	17.22	8.40
countryside/rural	6.47	4.27	6.90	3.83	2.52
few people	9.95	10.90	11.33	10.05	5.04
lack of traffic	6.47	7.58	7.88	7.18	5.04
nature/wildlife	13.93	9.00	7.88	14.35	12.61
views/landscape	9.45	8.06	9.36	11.96	**19.33**
water	5.97	4.27	**7.39**	**2.39**	3.36
trees	6.97	4.74	2.96	4.31	5.88
access/recreation	**1.49**	3.32	4.93	2.87	6.72
open space	5.97	2.84	6.40	5.26	3.36
remote	4.48	5.21	2.96	6.22	2.52
other	9.95	15.17	13.30	14.35	25.21
Total:	100%	100%	100%	100%	100%

Table 4. Cross-tabulation of Tranquil Categories and Survey Sites. Highlighted cells represent responses either significantly below (light gray) or significantly above (dark gray) the average.

Terms:	Dalby n = 158	Rievaulx n = 172	Staithes n = 144	Sutton n =179	Hovingham n = 89
traffic	18.99	23.26	21.53	18.44	**32.58**
manmade noise	15.19	18.02	11.81	11.73	15.73
shops/commercial	8.23	12.79	**18.06**	7.26	10.11
litter	2.53	3.49	2.78	5.03	3.37
people/crowds	16.46	17.44	18.75	20.11	8.99
pace/stress	12.03	6.98	8.33	13.41	2.25
industry	5.06	1.74	5.56	**1.12**	6.74
buildings/structures	5.06	4.07	3.47	7.82	4.49
pollution	**5.06**	**1.16**	2.08	2.23	3.37
other	11.39	11.05	7.64	12.85	12.36
	100%	100%	100%	100%	100%

Table 5. Cross-tabulation of Non-Tranquil Categories and Survey Sites. Highlighted cells represent responses either significantly below (light gray) or significantly above (dark gray) the average.

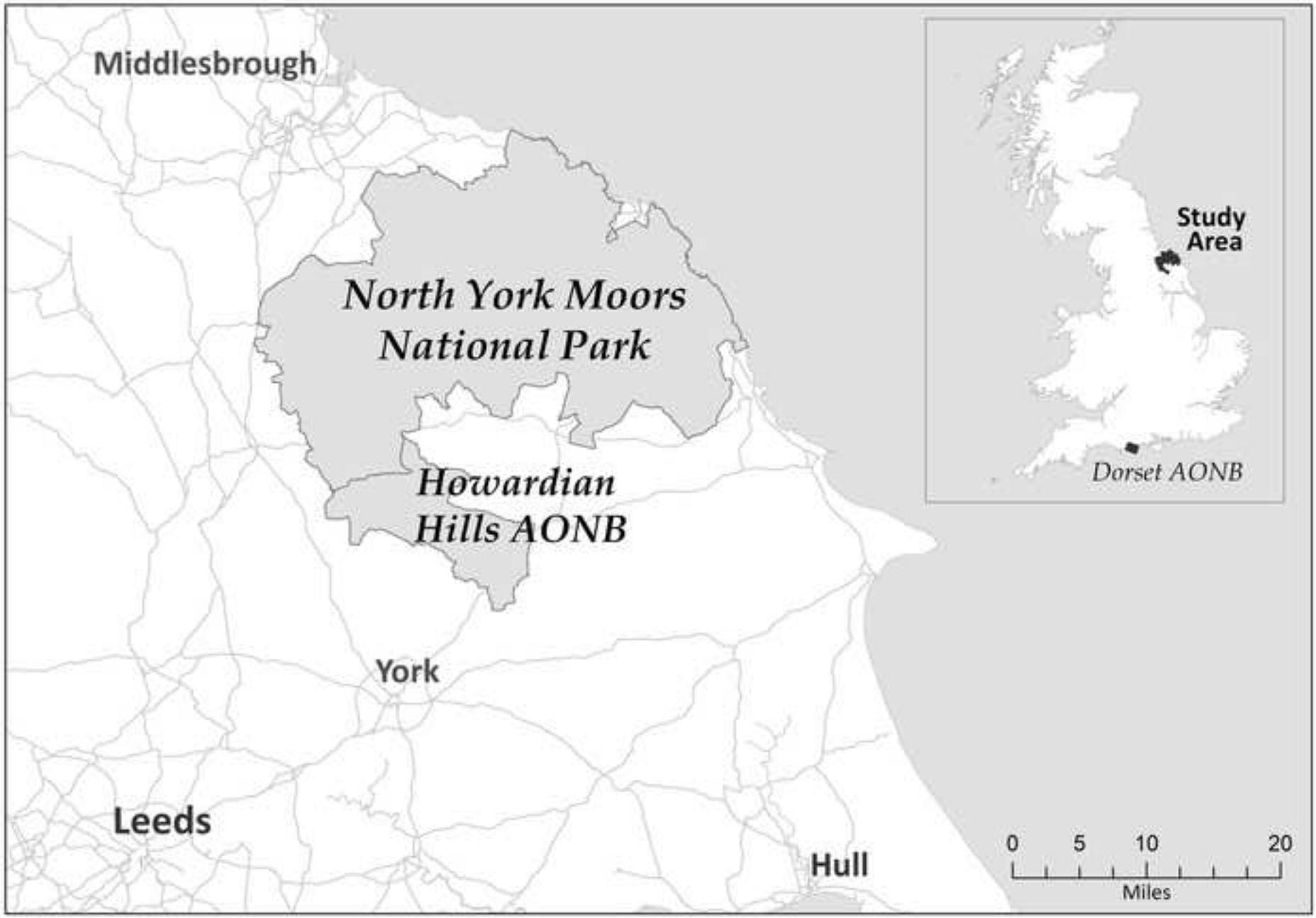
Sites	Frequency	Percent	Cumulative %
Sutton Bank	50	21%	21%
Rievaulx Abbey	51	21%	42%
Dalby Forest	52	22%	64%
Staithes	49	20%	84%
Hovingham Mkt.	28	12%	96%
Yearsley Moor	10	4%	100%
Total	240	100%	

Table 1. Survey Sites and Number of Samples

Age	Frequency	Percent	Cumulative %
18-25	8	3.3	3.3
26-35	17	7.1	10.4
36-45	42	17.5	27.9
46-55	53	22.1	50.0
56-65	68	28.3	78.3
66-75	45	18.8	97.1
76+	7	2.9	100
Total	240	100	

Table 2. Survey Participant Age Group Frequencies

Figure (high resolution)



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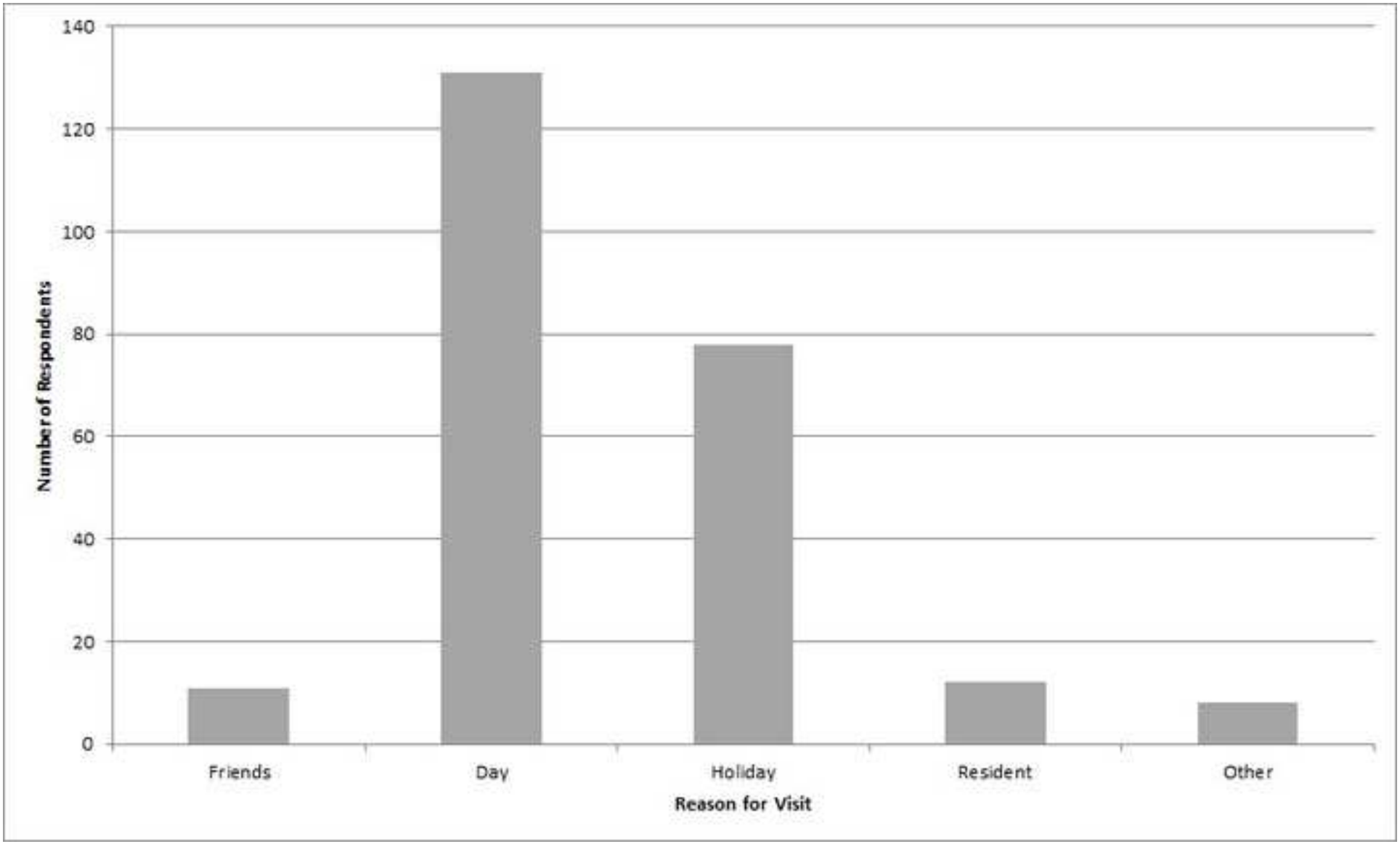

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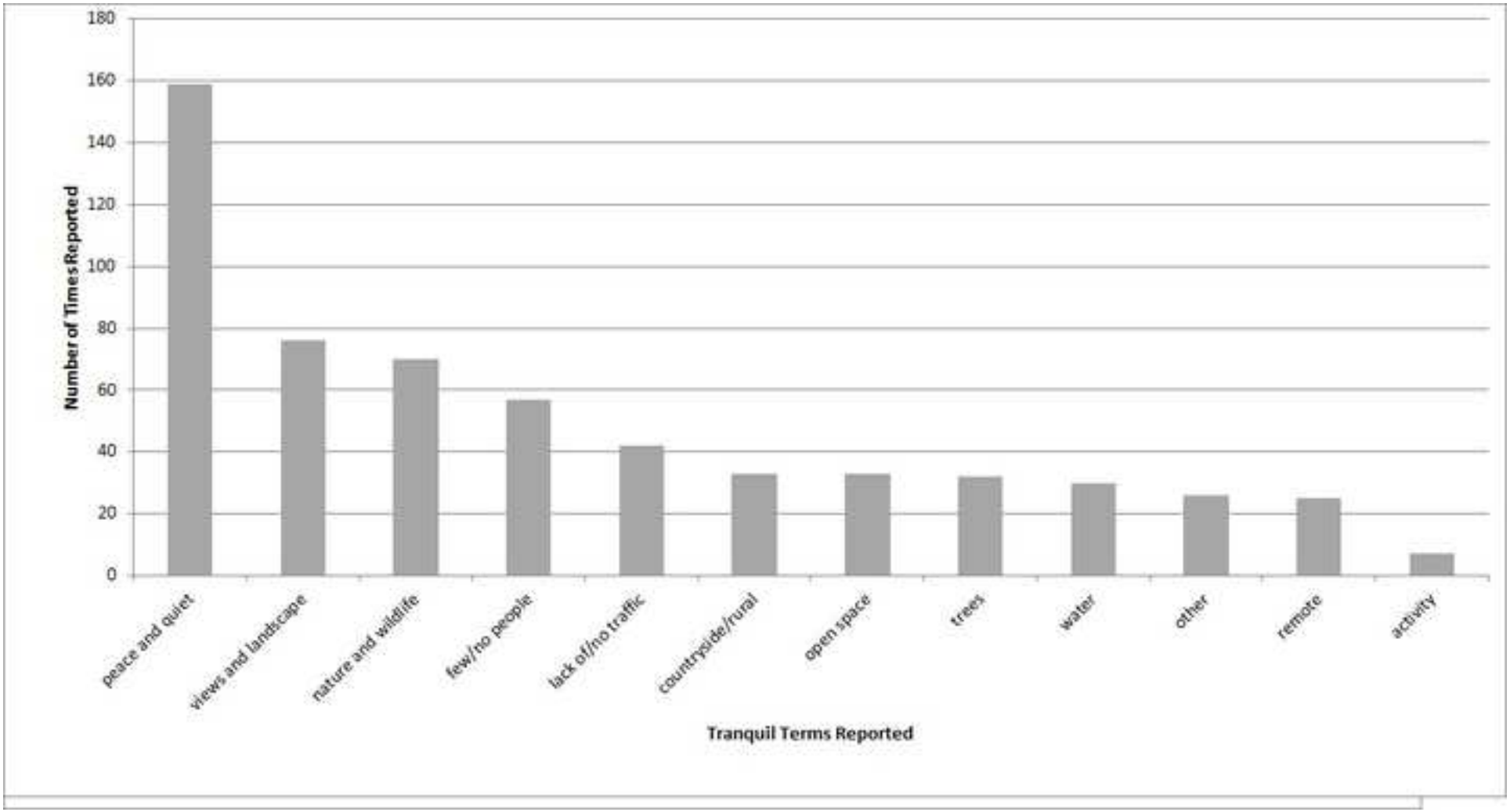

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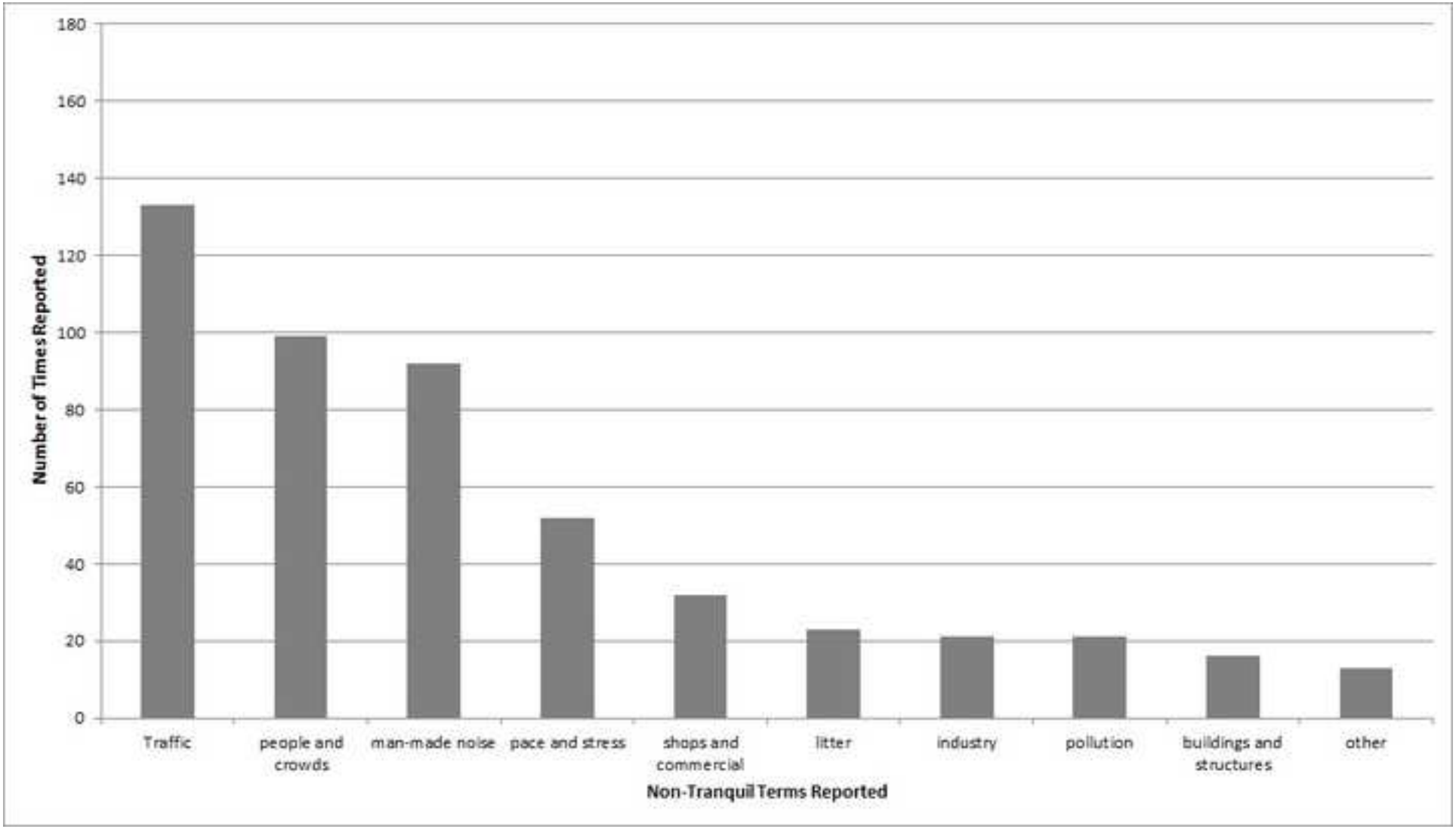

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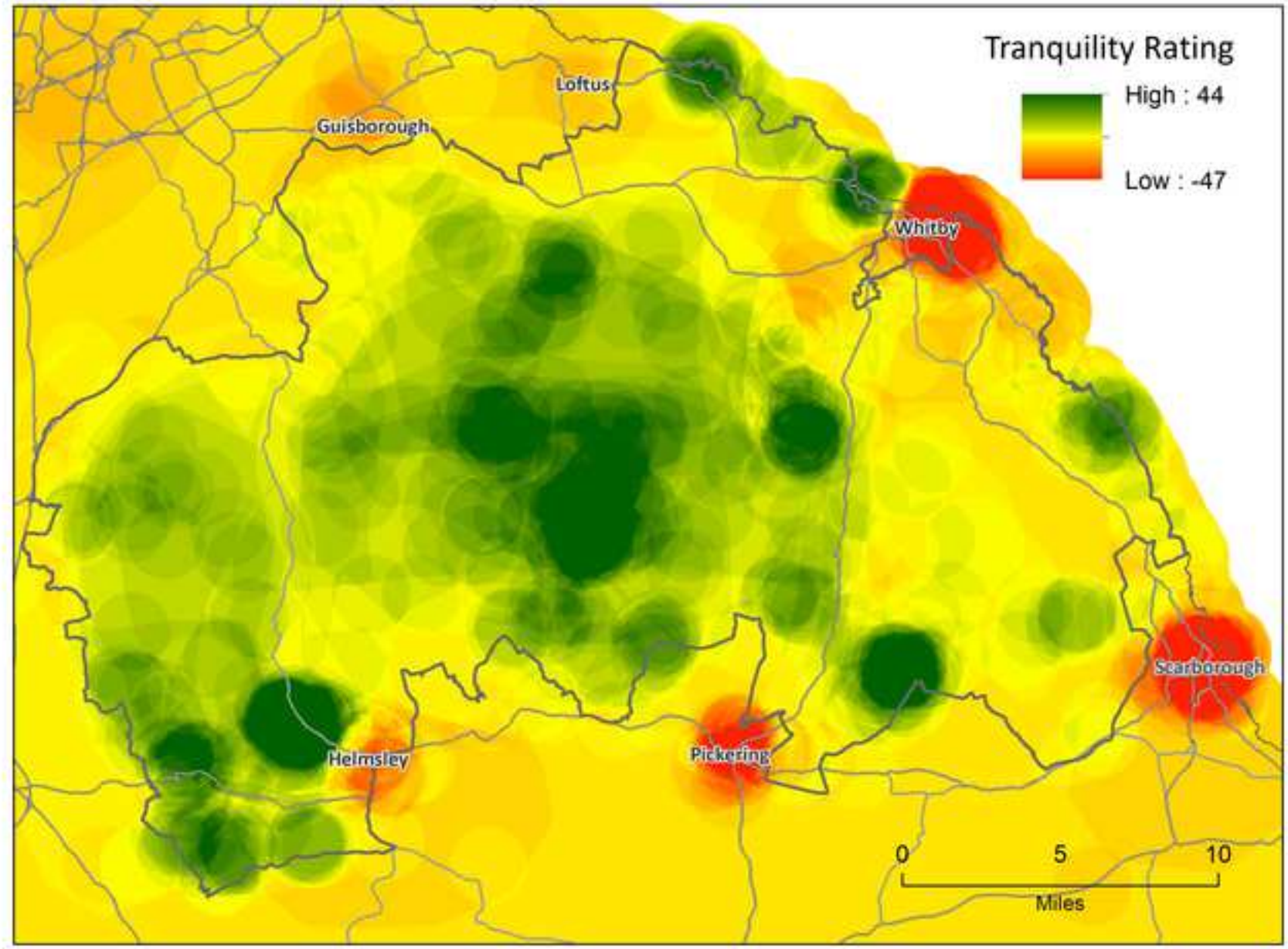

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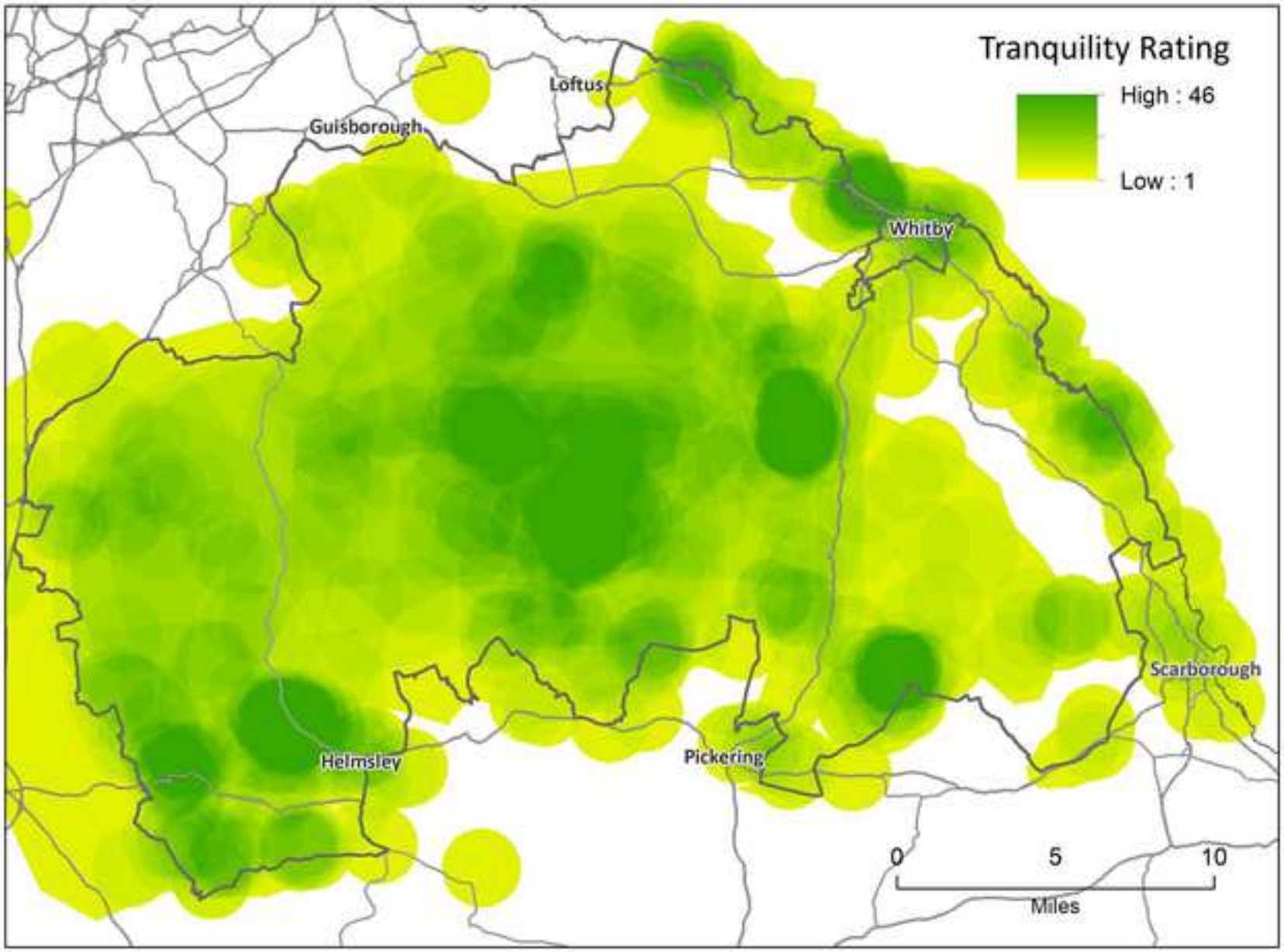

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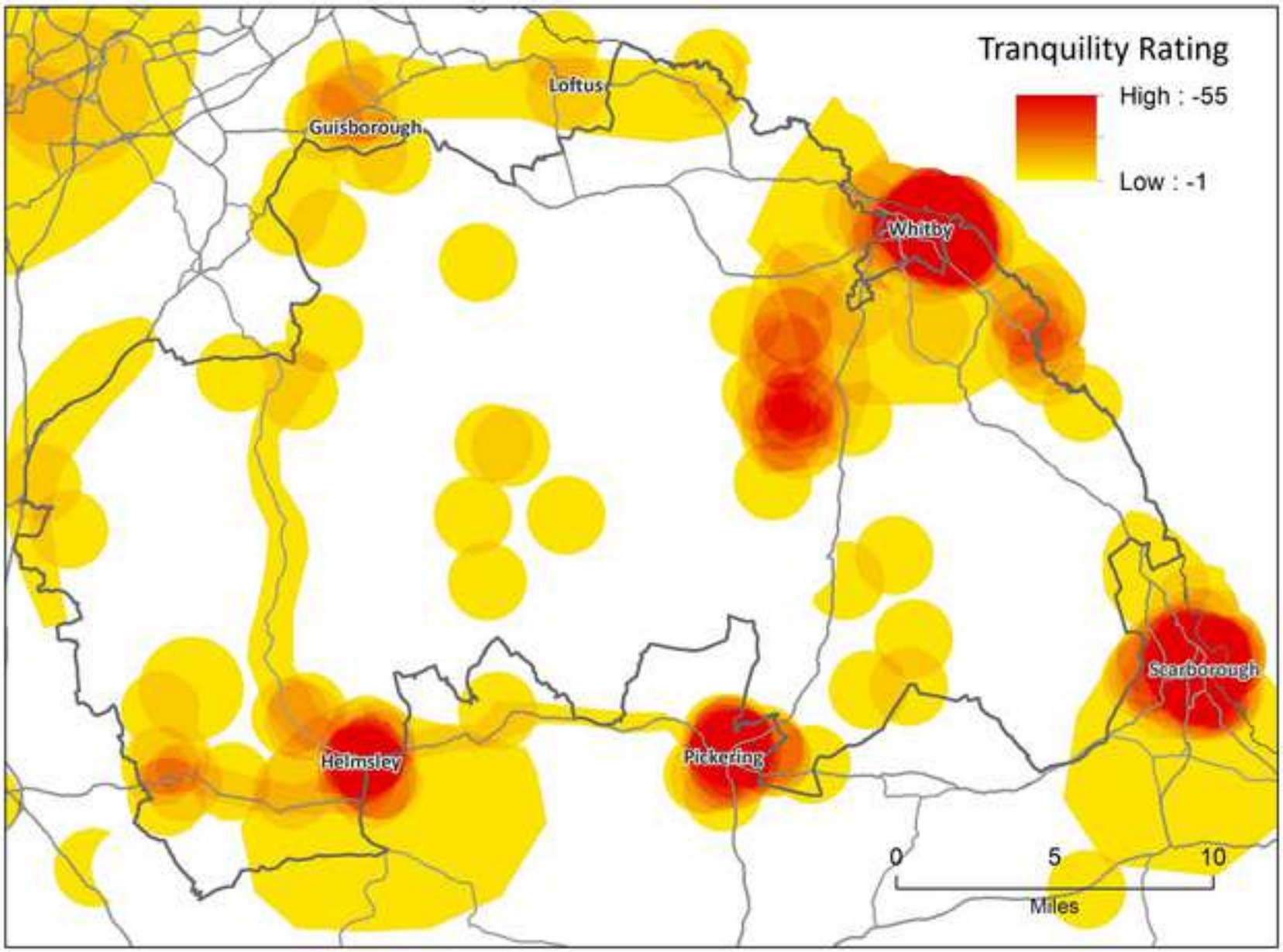

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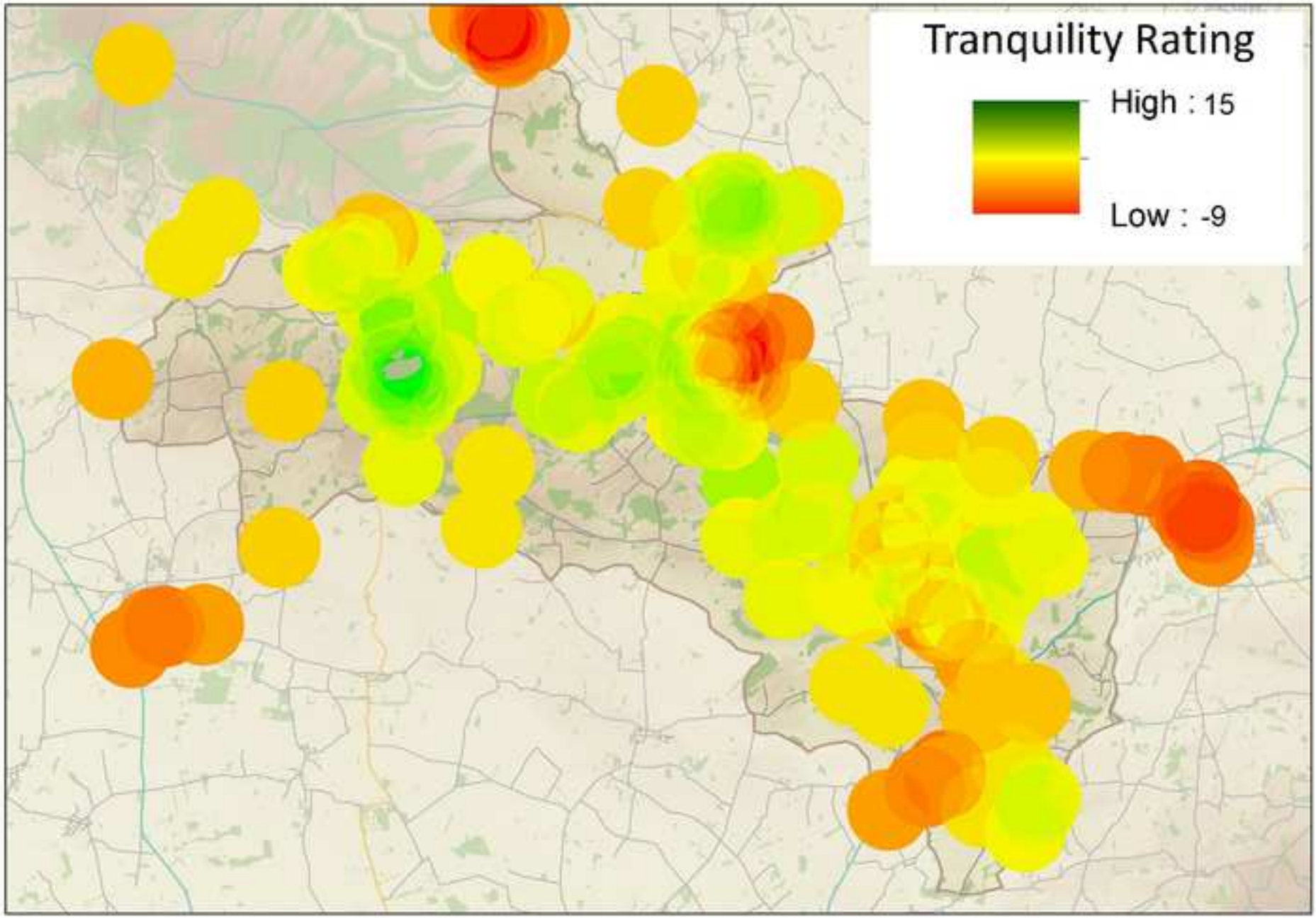

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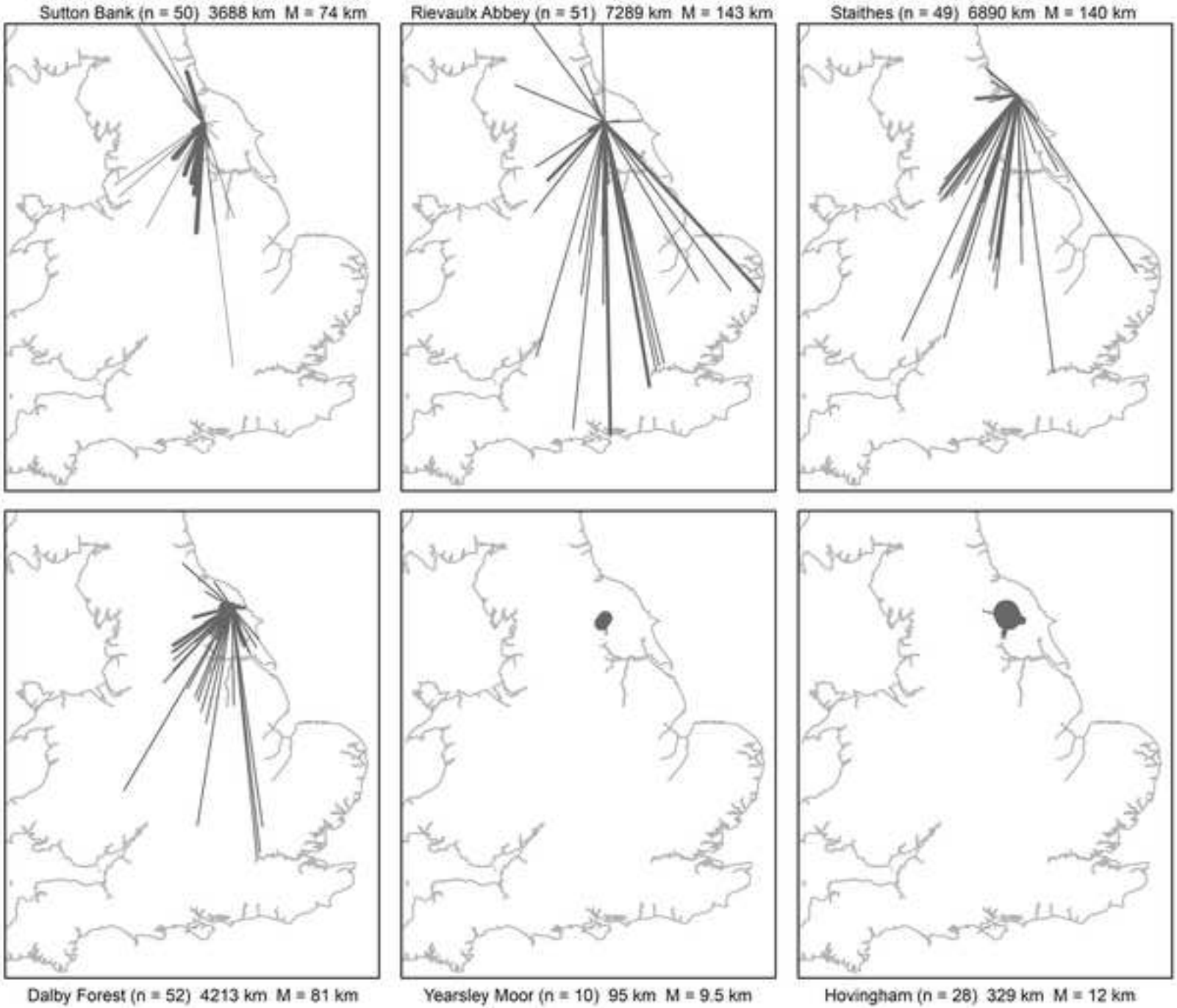

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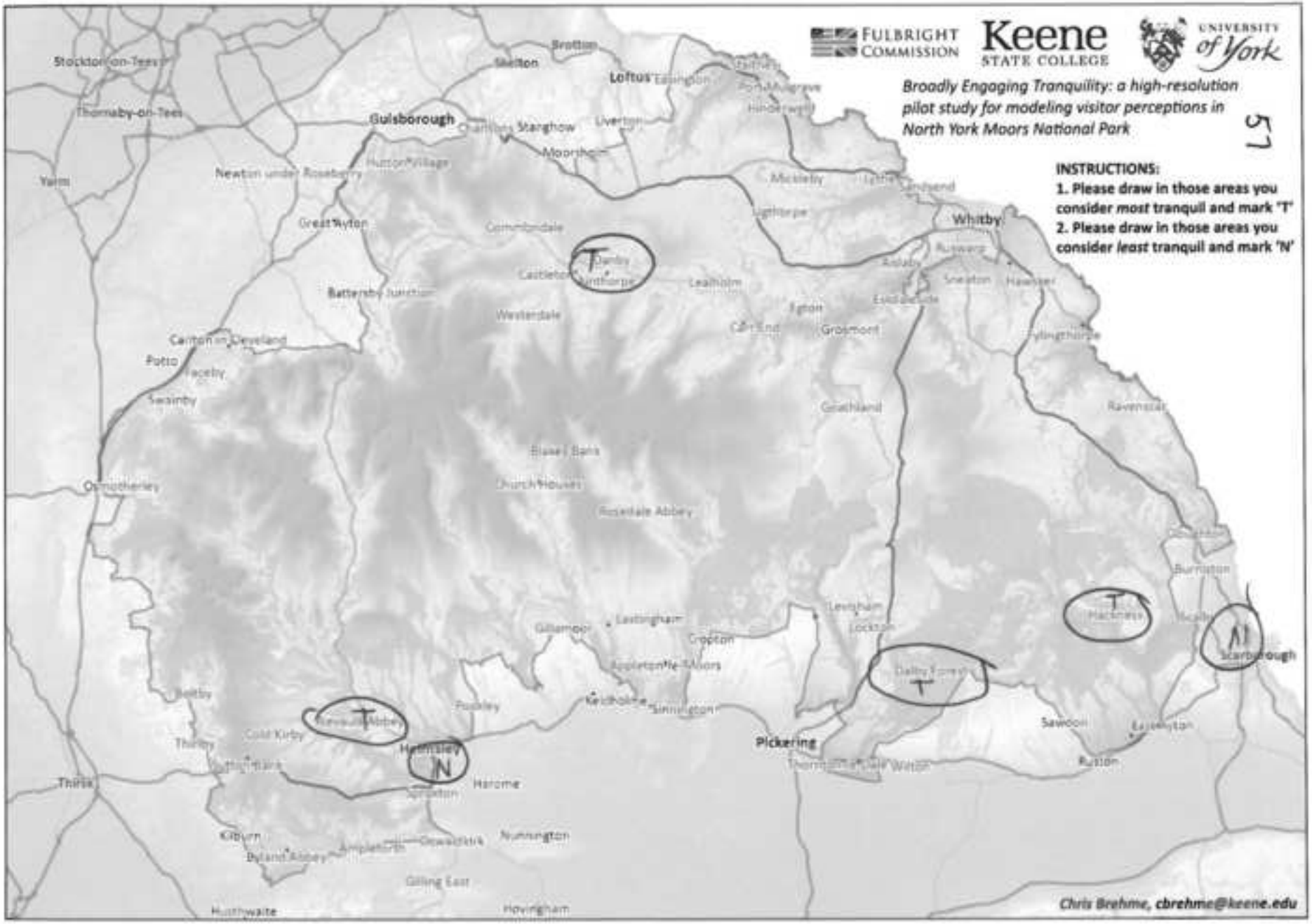

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Landscape Values Mapping for Tranquillity in North York Moors National Park and Howardian Hills AONB

Abstract:

A key motivation for visiting protected landscapes, concerns expectations for tranquil experiences through which visitors' overall sense of wellness is commonly reported as being enhanced. Yet planning for this expectation is challenging: tranquility is a nebulous and highly subjective concept, resulting in multiple, often unique interpretations. Adapting research first conducted in Dorset, south England, this study reports on how visitors to two protected areas in Yorkshire, north England, perceive tranquillity. Two hundred and forty research participants were engaged at six survey sites over several weeks. Distinctions amongst the views are determined by age and gender. Sketch map data was combined in Geographic Information Systems (GIS) to produce detailed maps of tranquillity across North York Moors National Park and Howardian Hills AONB. Survey location and key interests appear to influence visitor perspectives on both tranquillity and non-tranquillity. The outcome of this work provides empirical data to inform future GIS modelling efforts aimed at identifying tranquil areas for their continued protection, for their use in tourism marketing and ultimately for the wellbeing opportunities they are considered to provide to the public as a key component of therapeutic landscapes.

Keywords:

Landscape, GIS, Tranquillity, protected areas, tourism planning.

Article Classification: Research Paper

Introduction

The notion of natural environments, thus protected landscapes, providing opportunities for enhancing visitors' sense of wellbeing, is evidenced in research (Herzog and Barnes 1999; Herzog and Bosley 1992; Mace *et. al* 1999; MacNaghten and Urry 2000; Morris 2003) and is at the heart of what Gesler (1992) termed therapeutic landscapes. These are tranquil spaces whose attraction is a key motive for visitors to protected landscapes. This is particularly evidenced in marketing literature where tranquility is most commonly reported as a key descriptor of these spaces (Hewlett and Brown 2018). Yet tranquillity is easily impacted negatively, and therefore requires managing agencies to have foresight and sound planning skills for which quantifiable information is required to understand how tranquility is perceived by visitors to a given area. This is a particularly challenging objective in landscape planning due to the nebulous nature of the tranquility concept and its inherent complexities derived from multiplicitous interpretations (Hewlett *et al.* 2017). One approach for facilitating the information and planning strategies required is landscape values mapping (LVM).

The basic structure of LVM involves the application of participatory methods and Geographic Information Systems (GIS) to protected landscapes. Research participants identify and rank particular amenities according to various typologies such as aesthetic value, ecological significance or opportunity for active recreation (Beeco and Brown, 2013). Results can provide tremendous potential to inform the location of current and future outdoor tourism and recreation opportunities. As Beeco and Brown (2013, p. 78) state, "perhaps the greatest importance of landscape values data is the richness it provides researchers and managers [as

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well as] insight into visitors' desired management strategies." LVM has been used to examine a wide range of land use topics including tourism and development planning (Brown, 2006), wilderness quality assessment (Brown and Allessa, 2005; Carver, Evans, and Fritz, 2002), national forest management (Brown and Reed, 2000; Brown and Reed, 2009), and regional conservation strategies (Brown and Brabyn, 2012).

The relevance of LVM for recreation and tourism research is further reinforced by the central role that maps serve in these contexts. Their comfort and familiarity with maps makes protected area visitors particularly amenable to this research. With its approachable map-based interface, GIS has been widely applied as a tool for gathering and analyzing social data to inform outdoor recreation and protected area planning (Beeco and Brown, 2013; Olafsson and Skav-Petersen, 2014). In addition, the ease of accessibility to spatially-referenced ecological information has aided the comparison of social values with physical characteristics (Brown and Brabyn, 2012). GIS is particularly suited for spatial planning in protected landscapes and public lands, as the co-occurrence of variables is easily identified and areas can be prioritized for various uses (McIntyre, Moore, and Yuan, 2008; Taranto, 2007).

The research reported here was substantially influenced by a recent effort to incorporate an expansive range of views in a landscape values approach to tranquillity planning (Hewlett, Harding, Munro, Terradillos, and Wilkinson, 2017). This study entitled 'Broadly Engaging with Tranquillity Project'(BETP) comprised multiple stages and methods to determine how tranquillity is perceived by a wide range of public constituencies and was conducted in the Purbeck of Dorset Area of Outstanding Natural Beauty (DAONB) in south England. To

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evaluate how results of the Dorset study might compare if the approach were to be conducted in alternative protected landscapes, visitors to two protected areas in the north of England were surveyed.

Tranquillity Mapping

Tranquillity is, as discussed previously, a quality of natural environments that is evidenced to enhance our wellbeing and is a much-desired characteristic of recreation landscapes in the UK, (CPRE, 2015) as citizens recognize the need for spaces where they can escape everyday psychological stress and enhance their general sense of wellbeing (e.g.Mace *et. al* 1999; STEPPA 2014). National parks and other protected areas are particularly valuable spaces for those seeking solitude or quiet, as these spaces are managed to protect and preserve tranquillity as a 'special quality' (DCLG 2012; NAAONB 2012). One of the foremost challenges for managers responsible for preserving tranquillity in protected areas is understanding how it can be measured, quantified, or as in the case of the UK where statute demands, protected (DCLG 2012).

In describing recreation areas, the term 'tranquillity' is a value-laden concept, related to an individual's own experiences, even memories, and is enhanced or diluted by tangible natural or man-made features in a landscape (Goosen and Langer 2000; Jackson et al. 2008; Kliskey and Kearsley 1993; Knopf 1983). Tranquillity is often used synonymously with concepts such as 'peacefulness' and 'remoteness,' which evoke places absent of human sounds and devoid of human settlement. Due to the ambiguous nature of how tranquillity might be defined and the numerous interpretations that can be made, it cannot be assumed that all users

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will agree on a single definition, nor seek the same type nor level of tranquillity in their recreation experience. Therefore, it is important to collect empirical data on tranquillity from the widest range of stakeholders to provide a baseline for managing agencies who are responsible for preserving this special quality.

The history of tranquillity mapping in England extends for more than twenty-five years. Its origins can be traced to a 1991 transportation study that sought to understand the impacts of a proposed travel corridor (ASH Consulting, 1991). This work was then later developed in 1995 to produce a national set of national and regional tranquillity maps (ASH Consulting 1995; CPRE 1995). Subsequent tranquillity research has taken primarily two approaches. The first focuses on determining precise thresholds and quantities of negative attributes in urban environments, such as noise and visual blight. Researchers adopting this approach have attempted to calibrate human audial and visual perceptions of tranquillity using laboratory and field-based experiments (Pheasant, Horoshenkov, Watts, Barrett, 2008; Watts and Pheasant, 2013; Watts, Pheasant, and Horoshenkov, 2011) that has resulted in suggesting immediate improvements to Green Infrastructure that could be made to urban environments.

Whilst these studies have attracted attention amongst politicians, practitioners and academics on just how an abstract quality of the landscape might be evaluated, they have been heavily critiqued. In early studies, a particularly narrow interpretation on tranquillity was devised within positivist frameworks on the most easily evaluated parameters (e.g. volume of traffic, traffic noise and population settlement) (ASH Consulting 1991; CPRE 1995): the primary focus of which concerned what detracted from tranquillity rather than equally what might

enhance tranquil experiences. Later studies immersed in the area of applied acoustics, substantially progressed the quantification of tranquillity and enhanced our understanding of how this landscape value might be experienced (e.g. Pheasant, Horoshenkov, Watts, Barrett, 2008; Watts and Pheasant, 2013; Watts, Pheasant, and Horoshenkov, 2011). However, as with earlier studies, applied acoustics emphasizes how tranquility is related to sounds and comprises of positivist designs thus requires a predetermination and control over what might or not comprise tranquil experiences in a given area. This ultimately means that decisions about the degree and extent of impact on tranquillity are made primarily by expert stakeholders representing views of agencies, institutions and academics rather than through inclusive decision-making processes that also engage with the wider public.

Concerns over these critiques together with an increasing political context on emphasizing the public's involvement in spatial planning decisions (ODPM 2002; 2004 a & b; 2005; 2006) inspired the second alternative approach to tranquillity mapping. This strategy, commissioned by the Campaign for the Protection of Rural England (CPRE), represented a major step change in tranquillity mapping by advancing an understanding for how tranquillity could be interpreted and thus defined, by a broad group of stakeholders representing views from institutions and user groups of two contrasting areas of north-east England, the Northumberland National Park and the West Durham Coalfield (MacFarlane, Haggett, Fuller, Dunsford, and Carlisle 2004). In addition, unlike the original positivist design of 1991, the research design incorporated both a quantitative and qualitative methodology that was informed by an adaptation of Participatory Appraisal (Chambers 1994). This approach meant that no form of predetermined indicators of tranquillity could be devised. Instead, through a

series of workshops and onsite surveys, research participants were invited to both describe and sketch situations that they considered most or least represented tranquillity and non-tranquillity in each of the case study areas.

This process identified and quantified 44 factors as enhancing or detracting from the participants' notions of tranquillity, which were then constructed in GIS models. A similar approach was subsequently progressed in evaluating tranquillity experienced by visitors to the Chiltern Hills AONB (Fuller, 2005). The results of these studies contributed to the production of a national tranquillity map in 2008 (Jackson et al. 2008).

Whilst these studies hold merit, as with all early conceptual studies there were limitations. With regard to the national map of tranquillity, whilst uniquely providing for a benchmark of tranquillity in each county, concern was raised amongst landscape planners over just how accurate tranquillity maps could be in their respective areas, given they were informed by data collated originally in the North of England, then extrapolated to other regions and compiled at a coarse spatial resolution of 500 to 250 metres.

In an effort to check the accuracy of this data, Bell and Burden (2009) applied the parameters of the CPRE national mapping effort to their local protected area, the Cranborne Chase and West Wiltshire Downs AONB. The exercise involved clipping the national map to the AONB, then the validity of a random set of map grid cells was investigated. Staff travelled to the centre of these cells, and independently assessed tranquillity. These results were then compared to the predicted (original map) values. It was concluded that the primary

discrepancies between the predicted and observed values typically related to features in the landscape too small to be part of the original low-resolution, national mapping effort. These results provide strong evidence that case-by-case enquiries are required to determine tranquillity specific to an area and that high-resolution mapping of tranquillity is necessary to capture visitors' real-world experiences.

The New Forest National Park Authority in Hampshire, commissioned their own volunteer ground-truthed data to produce a fine-scale map of the region (Land Use Consultants, 2014). Rather than using a grid-based model, they focused on threshold distances for mapping 'disturbance buffers' around various sources of noise and visual clutter. These buffers were then adjusted using areas of woodland that might absorb noise and obscure negative views. The final map provides significant detail about the impacts of traffic volume, and railway and airport disturbances, though it lacks the continuous gradation of tranquillity scores found in other studies.

Hewlett *et al.* (2017) strictly adhered to the perspective that tranquility is subjective, highly context dependent yet was most commonly related to describe a state of mind and/or to an experiential quality perceived to be found in protected areas. This stance informed a working definition of tranquility that was progressed by Hewlett *et al*. (2017) who enhanced the original MacFarlane *et al.* (2004) studies by applying a multi-faceted community engagement process in which they solicited conceptions of tranquillity from the broadest range of constituencies possible. They deliberately sought a wide range of perspectives, including representatives from all institutions, land-managing agencies and public authorities, user groups, visitors to the area and residents, including a dimension that could target the so-called hard-to-reach members of local communities. More than fifteen thousand views were captured on what participants considered did or not enhance or impact their notions of

tranquility. Results were then linked to GIS data layers and used to model tranquillity and non-tranquillity in the Purbeck's area of the Dorset Area of Outstanding Natural Beauty. The researchers employed a spatial resolution of 5 metres, which supported incredibly detailed maps of tranquillity. While the aim was to capture participants' views as accurately as possible, this resolution may be unnecessarily fine for dynamic modeling. It may need to be resampled to a larger resolution to support modeling of diurnal and seasonal changes in tranquillity factors.

The case of York

Two protected areas in Yorkshire, North York Moors National Park and Howardian Hills Area of Outstanding Natural Beauty, were selected as a study site for their proximity to large urban areas, their varied terrain, and location in north England which contrasts with previously examined sites in the South. The lead author established connections with staff responsible for protected area planning and tourism marketing.

The recently completed BETP Dorset LVM study was identified specifically by protected area staff as the framework most appropriate to be progressed in York, and its methodological approach was adapted for this study. As the primary emphasis of the research was LVM, which centres on maps as data collection tools, the work focused specifically on visitors' views of tranquility. These stakeholders were viewed as relatively easy to engage, especially through easy to complete sketch mapping tasks. In addition, national park staff were particularly interested in the impact on visitors of various activities, including the expansion of a potash mine in the north of the park.

Materials and Methods

The overall methodological approach to the York study progressed an adaptation of Mixed Methods used in the original BETP Dorset research (see Hewlett *et al.* 2017; Hewlett and Brown 2018). This resulted in a series of visitor onsite surveys and further visitor perspectives collated through the use of sketch maps as detailed below.

Survey Instrument

The visitor survey was adopted from the BETP Dorset project and comprised of three parts: a sketch mapping exercise; a free-listing task; and a demographic section. Within the sketch mapping task, visitors were asked to identify specific tranquil and non-tranquil areas using an outline map of each area. The map included basic location information with place names, major roads, forests, and topography. Major physical features were identified along with villages and settlements. Participants circled or marked with a 'T' the most tranquil places and circled or marked with an 'N' the least tranquil places. Participants could mark as few or as many places as they felt necessary. If a participant was unfamiliar with the area, the sketch map was overlooked and the survey was progressed.

The second component of the survey asked participants to list and rank characteristics of tranquillity that came to mind for the places they marked:

> *Why do you consider the areas marked 'T' most tranquil? Please list up to 5 characteristics that make this area tranquil. Rank in the boxes provided in the order of importance: 1 being most important and 5 being least.*

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Why do you consider the areas marked 'N' least tranquil? Please list up to 5 characteristics that make this area least tranquil. Rank in the boxes provided in the order of importance: 1 being the characteristic you consider most negatively affects your view on tranquillity and 5 being least.

If a participant did not fill out the map they were asked to list and rank five characteristics of tranquillity that come to mind *"When you hear the word tranquillity"* and characteristics *"which detract from your view on tranquillity."*

The third and final component of the survey included questions about gender, age, as well as means of transportation to the park, and the participant's home postal code.

Survey Locations

An intercept survey was conducted over three weeks from mid-October to early November, at six locations throughout the North York Moors National Park and Howardian Hills AONB (Figure 1). The survey locations were selected to gain access to a wide variety of visitor types, including retirees, families, casual visitors and active recreationalists. Surveys were conducted on weekends and weekdays in order to reach a range of day and overnight visitors. The survey sites included historical landmarks, visitor centers, villages, and points of access to recreation.

[Figure 1 Here]

Visitors were surveyed at four sites within the National Park and two within the AONB. These sites were identified in consultation with protected area staff. The National Park sites

included Sutton Bank Visitor Centre, a point of access along the southwest edge of the Park. The Centre attracts day visitors with a gift shop, tearoom, mountain bike rentals, and public restrooms. Walking and mountain bike trails surround the centre, and it experiences a high volume of visitor traffic, particularly on the weekends.

Rievaulx Abbey is an historical landmark managed by English Heritage, nestled in a valley at the southern part of the Park. The Abbey is easily accessed via road and walking path from the market town of Helmsley. It sees a large number of visitors throughout the year, many of whom enjoy the quiet solitude of this peaceful setting. In contrast, the adventure-centered Dalby Forest attracts a range of young, active walkers and mountain bikers, families with small children, as well as retired visitors. The Forest hosts zip lines, a tree walk experience, Segway tours, and a busy visitor center with a gift shop, tearoom, and bike rentals. It attracts those interested in the rugged terrain and forested areas that surround the centre, and sees a high volume of weekend visits.

The fourth National Park survey location was Staithes, a coastal fishing village and the filming location of a popular children's television show. It sees a wide variety of visitors, but especially families with small children, and those seeking the experience of beachcombing and exploring the tidal zone. Public traffic is restricted within Staithes village, and visitors were surveyed beside the main car park where most begin their stroll into the village. The car park sits high above the surrounding town, with a clear view of a large, conspicuous potash mine to the west. This location was chosen in part to determine the impact of the mine on visitors' perception of tranquillity.

The AONB has a lower overall number of visitors, and finding locations with a large concentration of foot traffic during the autumn season was difficult. The most popular destination within the AONB, Howard Castle, was avoided as the majority of the visitors there are specifically choosing the Castle, rather than the AONB, as a destination. Instead, a recreation area in the eastern part of the area were selected, and a village market along the western side.

Yearsley Moor is a remote area of forest and open space that is popular with day visitors for walking and cycling. There is a small parking area with some interpretative signs, which provides access to the local paths. While survey participation numbers represented only 4% of the total (Table 1), those who participated were very interested to share their views. The second AONB site was in the village of Hovingham, a popular destination along a well-travelled road between York and Helmsley. Each month, the village hosts a market, and the survey was conducted here in early November. In order to attract more participants, a small tent near the front of the market was erected, and visitors were asked to place locations on a large poster-sized map of the AONB.

[Table 1 Here]

Results

Demographics

A total of 240 surveys was collected across the six survey sites (Table 1). The majority of surveys (202 of 240, or 84%) was collected from the National Park sites, where visitor numbers are generally much greater than in the AONB. While specific numbers are elusive,

the most popular site within the AONB is Castle Howard, which sees more than 200,000 visitors a year (Association of Leading Visitor Attractions 2017). In comparison, the National Park sees more than seven million visitors annually (North York Moors National Park Authority 2016). At least two days were spent surveying visitors at each location, with the exception of Sutton Bank, where one full day was conducted. The higher frequency counts for National Park sites compared to AONB sites is mainly a reflection of the Park's popularity with visitors. With an initial goal of collecting 300 surveys across the six sites, the research team left the Park sites once approximately 50 surveys had been reached. At the two AONB sites, wet and windy conditions were experienced which influenced the number of survey participants. In retrospect, these sites should have been surveyed earlier in the season, when fair weather is more dependable, and more visitors are present.

Survey respondents comprised more females (n = 128; 53%) than males (n =112; 47%). The survey sample was skewed toward older adults with those 56 and older comprising exactly half of the total (n = 120) (Table 2). Meanwhile, those in the 18-35 age range represented only 25, or slightly more than 11% of the total. This age distribution is a reflection of national park visitation in the UK as a whole, as older adults have the resources for extended holidays, and a stronger interest in spending time relaxing in nature. We expect that those in the 18-35 age range are more likely to spend their leisure time in urban areas. When members of this younger group visit protected areas, it is often for active recreation such as walking, cycling, or rock climbing. More people in this age range were observed during the surveys than is reflected in the survey numbers, but their focus on physical activities made it more challenging to engage them.

[Table 2 Here]

Respondents were asked to report how they travelled to the survey site that day, and to categorize the nature of their visit to the Park or AONB. The vast majority of subjects who responded to this question (n = 238) travelled by car (210; 88%), while a small number walked (23; 10%), and the remainder arrived by bike (3; 1%) or bus (1; .05%). These results are unsurprising given the survey locations, all of which were adjacent to a car park and distant from large densities of accommodation. It became clear that many visitors were spending the majority of their visit walking or cycling, and the car-ride was simply the first stage of their journey.

In order to further explore the motivation for their park visit, the nature of participants' visits was investigated. The majority were visiting for the day (n = 131; 55%), or on holiday (n = 78; 32.5%), while the remainder were visiting friends, or lived in the area (Figure 2). The large number of day visitors is again unsurprising given the autumn season, when fewer people are likely to take holidays, and given the proximity of the Park and AONB to large population centres in Yorkshire and adjacent counties. These protected landscapes are within a one to two-hour drive of major cities in the North of England, and provide an attractive destination for a weekend day trip.

[Figure 2 Here]

Analysis of Tranquil and Non-Tranquil Terms

Respondents provided a total of 986 responses for tranquillity and 776 for non-tranquillity.

After removing duplicate responses, we identified 504 unique tranquility terms and 355 non-tranquil terms. Terms were sorted and counted, and ranked by frequency (Table 3). The higher number of tranquil terms likely reflects the general attitude of visitors who, seeking enjoyment and respite from daily life, are more likely to emphasize positive attributes in their experience of a protected area. The emphasis of specific non-tranquil terms on noise and business may reflect the immediate environment at each of the survey locations, as most of these were near dense infrastructure, rather than explicitly in a natural setting.

[Table 3 Here]

Overall, respondents reported significantly more tranquil terms (M= 4.1, SD =.97) than non-tranquil terms (M = 3.23, SD = 1.14), $t(478) = 9.05$, $p < .001$. This suggests that park visitors perceive more positive traits in their experiences than negative traits, however it could also be a reflection of bias in the order of survey questions, which requested respondents to list tranquil terms before listing non-tranquil terms.

When examining gender differences, females reported significantly more *non-tranquil* terms (M = 3.37, SD = 1.11) compared to males (M = 3.08, SD = 1.15), $t(238) = 1.96$, $p = .026$. This suggests that females are more sensitive to, or at least more willing to identify, negative aspects of their protected area experience compared to males.

When we grouped terms according to broad age classes of younger (ages 18-55, n = 120) and older (ages 56+, n = 120) respondents, no significant difference in the number of tranquil terms was found (M = 4.16 and M = 4.05, respectively), nor in the number of reported non-

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tranquil terms (M = 3.25 and M = 3.22, respectively).

Tranquil Terms

In order to more extensively explore the answers to the free-response task, we grouped the tranquil terms into 11 broad categories, as well as an 'other' category (Figure 3). The most frequent responses fell within the categories of what subjects can see (e.g. views/landscapes, few people), and what they can hear (e.g. peace/quiet, lack of traffic). More specific categories such as 'trees' and 'water,' as well as 'remote' and 'rural' had fewer responses, but these categories were important to retain for making comparisons between groups, and to support future geographic modelling.

[Figure 3 Here]

A chi-square goodness of fit test was conducted to explore if there was an equal proportion of responses in each category, across the survey sites. As the Yearsley Moor site in the AONB had too few terms (N = 74), it was dropped from this analysis. The results reveal that sites had a significantly higher or lower number of responses for at least one category of tranquil terms, X^2 (44, N = 943) = 74.04, $p < .05$. Examining the cross tabulation table, we highlight those categories with substantially fewer or greater responses than expected for each of the five survey sites (Table 4), and describe these in more detail below.

[Table 4 Here]

Dalby Forest has a considerably lower number of 'access/recreation' responses than other sites, which is very surprising, given that the Forest is a nexus for walking, cycling, and other

active sports options. It is surmised that those participating in these activities do not consider them 'tranquil,' but rather part of a regular or occasional fitness regime. Conversations with park managers confirm that the Forest is a destination for what has been coined 'weekend warriors' and those seeking the adrenaline rush that comes with mountain biking and walking in extreme terrains.

Rievaulx Abbey has a significantly larger proportion of 'peace and quiet' occurrences than the other four sites. The Abbey is the site of a twelfth century stone structure, most of which was dismantled in the sixteenth century during the reign of Henry VIII. Nestled in a valley and surrounded by forests and a small collection of houses, the Abbey evokes a very peaceful experience. The results confirm that visitors are influenced by the meditative quality of their experiences here.

Staithes sees a relatively high number of responses for 'water' compared to other sites, and especially in comparison to Sutton Bank. This is likely a reflection of the proximity and abundance of water views at Staithes, which is a coastal location, perched on a cliff overlooking the North Sea. This contrasts with Sutton Bank, which is among the furthest survey sites from the ocean, and is situated high atop the moors, with limited flowing water.

Lastly, respondents at the Hovingham site listed 'views/landscape' and 'other' terms more frequently than those of other categories. The survey site, a local market, did not afford views of the surrounding landscape, but many market visitors pass through the distinctly pastoral landscapes of the Howardian Hills on their way to Hovingham. It might be assumed

that the situation of Hovingham within this larger agricultural landscape resonated with survey participants. Hovingham and the previously described sites demonstrate that survey location may influence how respondents report their feelings of tranquillity, and thus support the use of survey sites with widely varying attributes.

Non-Tranquil Terms

Non-tranquil terms were grouped into nine categories, with a tenth category of 'other' (Figure 4). The most frequent responses were within categories that have an immediate visual and auditory impact, but can vary over time (e.g. traffic, noise, and crowds). The remaining popular categories refer to physical infrastructure (shops, buildings, industry), with the exception of 'pace/stress.' This category received the second highest number of responses, which might be expected when considering stress is an antonym of the most popular tranquil response, 'peace.'

[Figure 4 Here]

Subsequently, the categories of non-tranquil terms reported by respondents were analysed. A chi-square goodness of fit test was used to determine if an equal proportion of responses was provided in each category, across the survey sites. The Yearsley Moor site was again dropped from the analysis because there were too few responses (N = 34). Results revealed that each site had a significantly higher or lower number of responses for at least one category of non-tranquil terms, X^2 (36, N = 742) = 57.56, $p < .05$. Examining the cross-tabulation table, those categories with substantially fewer or greater responses than expected for each of the five survey sites are highlighted (Table 5).

[Table 5 Here]

Dalby Forest saw a considerably higher number of references to 'pollution' than other sites, while Rievaulx Abbey had considerably fewer than expected. These results are likely influenced by the small numbers of responses within this category (22), but might also reflect the immediate context at each survey site. At Dalby Forest, the large car parks were crowded with vehicles on the two days visited, and cars are much less conspicuous at Rievaulx Abbey, which has a small gravel car park. While air pollution was not directly observed in either location, the presence of an abundance of cars likely creates this association for survey respondents.

Staithes revealed a significantly higher proportion of references to 'shops/commercial' than other sites. This is very likely due to the tourist-oriented economy here, and in nearby communities, such as Whitby. In contrast, Sutton Bank witnessed substantially fewer references to 'industry' than other sites, which probably reflects the lack of industrial activity in this area of the National Park.

Lastly, Hovingham saw a larger share of references to 'traffic' than the other sites, which is clearly an outcome of the site's proximity to a major thoroughfare, which connects York and Helmsley. As market patrons drive from some distance to visit Hovingham the first Saturday of each month, they likely experience high traffic volumes in the AONB and National Park. Parking in the densely settled village centre can also be difficult on market days. As was the case in Staithes and Sutton Bank, the influence of the immediate environment to the

Hovingham site clearly influenced the responses of subjects. This finding lends support to choosing a variety of survey locations for data collection.

Sketch Mapping Results

Survey participants were first asked to identify locations on a paper map of the protected area. In order to maximize the scale of sketch maps, separate maps were used for the National Park and the AONB survey sites. The maps were printed in colour on A4 sized paper with labels indicating select place names, and with major roads drawn for context. Sketch maps were collected from 156 participants in the National Park, and thirty-seven in the AONB. Subjects indicated tranquil and non-tranquil sites using point locations, indicated by the letter 'T' or 'N,' and by using shapes to enclose larger areas. For the national park map, no minimum nor maximum number of points was suggested, and subjects drew as few as one, and as many as twenty distinct locations. At the Hovingham Market site in the AONB, a single poster-sized map was used, and participants were asked to place up to six map pins, three each, for tranquil and non-tranquil sites.

National Park Sketch Map Results

Sketch maps were scanned and converted to TIFF format, for import into GIS software (ArcGIS 10.3, Redlands, CA). In GIS, each map was rectified using the known coordinates of the four map corners, and sketched features were digitized using points and polygons. Points were subsequently converted to polygons by buffering a distance of one mile in order to account for the margin of error in placement and the size of the letter drawn (T or N). In addition, it can be generally assumed that a point identified as tranquil is influenced by the

sights and sounds present within approximately one mile. Polygons were drawn by tracing marked areas, and coded as either tranquil or non-tranquil.

A binary scoring system was employed in the combined result, with tranquil areas receiving a score of 1, and non-tranquil areas receiving a score of -1. The results illustrate areas of strong agreement, where the majority of subjects considered the same places 'tranquil' or 'non-tranquil,' leading to either large positive or negative scores. Those areas with less agreement are indicated in places where scores effectively cancelled one another (Figure 5). In addition, large areas of the park were not indicated as either tranquil or non-tranquil. Most subjects stated that they could only mark those areas with which they were familiar, and unfamiliar areas were left unmarked. As such, a second image of sketch map results was produced illustrating the most and least frequently marked areas of the map, which can be interpreted as the level of familiarity of subjects with these areas, or the degree to which these areas evoked either a positive or negative emotional response (Figure 6).

[Figure 5 Here]

[Figure 6A Here]

[Figure 6B Here]

The sketch map analysis produced tranquillity scores ranging from -47 to 44, with negative numbers indicating less tranquil areas, and positive values representing more tranquil areas. Values of -47 are found near the downtown portion of the city of Scarborough, while values as high as 44 are found at Rievaulx Abbey. Scarborough is the largest city within the sketch map extent, and it is relatively well known beyond Yorkshire. Other regions within the map that received low values include the market towns of Pickering, Whitby, and Helmsley.

Helmsley also received relatively high values, and the lack of agreement led to a moderation of scores here. While it is a bustling market town, Helmsley's proximity to tranquil locations such as Rievaulx Abbey, as well as its role as gateway to the southern portion of the park, likely contributed to mixed impressions. Visitors from more urban areas likely consider Helmsley tranquil for its small size and its lively, compact village center with many high-end shops.

In addition to Rievaulx Abbey three other survey sites received high scores for tranquillity: Sutton Bank, Dalby Forest, and Staithes. A large number of respondents als identified as tranquil the central region of the park, particularly Rosedale Abbey and Blakely Bank, as well as Robin Hood's Bay, Goathland, and Ravenscar. Each of these locations is easily accessed by road, and together they have long served as popular destinations within the park. A recent visitor survey indicates that Rosedale Abbey is not heavily visited, but its reputation continues to positively influence visitor perceptions.

AONB Sketch Map Results

As described, a separate A4-sized map of the AONB was used to survey visitors to the Yearsley Moor site. These results were combined with those of the Hovingham Market site, although the data collection method differed in these two locations. Yearsley Moor results were processed in the same manner as the National Park sketch maps. In contrast, Hovingham Market subjects placed pins on a poster-sized (A1) map, which was photographed, converted to TIFF format, and imported to ArcGIS, where it was georectified.

Hovingham Market sites were digitized as points, and buffered a radius of one mile, to produce circular polygons. Twenty-eight subjects at Hovingham placed 123 locations. Using the same scoring system as the national park, the polygons were coded as tranquil and non-tranquil, and given a value of 1 or -1, respectively. Results were combined to highlight areas of strong agreement (Figure 7).

[Figure 7 Here]

The majority of AONB responses (28) were collected at Hovingham Market in early November. From postal code data analysis, it is clear that the majority of subjects were from the immediate area (Figure 8). This contrasts with summer, when many market visitors come from some distance away. As such, the results show a particular affinity for Hovingham and nearby areas. Similarly, the Yearsley Moor results were obtained primarily from respondents living in the immediate area, who use the site as a place for casual walks. The Moor, and nearby sites such as Ampleforth, the location of a monastery and college, received the most attention from respondents. Given the smaller sample size and the local bias in the results, the AONB map provides only a limited perspective about tranquillity within this protected area.

[Figure 8 Here]

The highest scores are found in the vicinity of the two AONB survey sites, at Yearsley Moor and just west of Hovingham, in addition to the village of Nunnington. The bias of the survey sites clearly played a significant role in these results, although a number of areas within the AONB away from these survey locations received positive scores. Negative tranquillity scores are found in Helmsley, in Hovingham, as well as Malton and Easingwold. These are

market towns, where shopping and traffic dominate the local landscape, and relative to many of the remote and quiet areas within the AONB, they represent the busiest and noisiest areas.

Discussion

This research was designed to investigate how visitors in York perceived tranquillity in two protected areas and through utilizing the framework designed for the BETP Dorset study, additionally facilitated comparison of how visitors to North York Moors National Park and Howardian Hills AONB perceived tranquillity compared to those who visited Dorset AONB in the south of England. Adapting the methodology of BETP Dorset, the surveys conducted in York were designed to primarily elicit qualitative responses from visitors.

Unlike the BETP Dorset, fewer respondents undertook the surveys in York - 240 compared to 309 in Dorset - a result that was as dependent on the seasonal timing of the surveys (in York during the Autumn season and in Dorset, during the peak summer periods) as effected by the locations selected (Hewlett and Harding 2015). Of these visitors, in both Dorset and York case study areas the respondents comprised more females than males (58.6% females in Dorset and 53.3% in York) and also reflected an older demographic – in York, more than half of those surveyed were of 56 years and older; in Dorset, this age group contributed to almost 44% of the total visitors surveyed.

Further similarities with Dorset were found in respondents reporting significantly more tranquil terms than non-tranquil terms: the most popular were ‘peace and quiet,’ ‘views,’ ‘nature and wildlife,’ as well as ‘lack of people,’ and ‘lack of traffic.’ While these terms

were unsurprising, the consistency of their reporting indicates an emphasis among visitors on what primarily can be seen and subsequently, heard. In general, visitors reported they are seeking respite from everyday experience, and the opportunity to find relaxation, solitude, as well as access to active recreation experiences.

Nevertheless, protected area managers also recognize that visitors' needs vary with each location, and this was generally reflected in the results. For example, Rievaulx Abbey in North York Moors National Park saw a significantly larger proportion of 'peace and quiet,' terms reported, as might be expected at this site. Visitors here appear to be impacted by the serene setting of an ancient religious site nestled in a densely forested valley. It would be useful in the future to compare responses of those entering the site with those departing, as a means to measure the impact of the experience itself.

However, in the specific case of York, a wider variety of survey locations and conditions might also support a broader understanding of visitor perceptions. For example, the AONB is less visited than the National Park throughout the year, and recreation and tourist sites are likely to see the most use on summer days, when families are on holiday. In addition, less visited sites require longer survey windows in order capture numbers similar to those of popular sites.

Field observations indicate that the variety of responses is negligibly different with twenty-five or fifty respondents. For the national parks sites, we are confident that the results are representative of the majority of visitors. For the AONB sites, the results appear to indicate a

bias for local residents visiting the area as opposed to tourists, but AONB staff suggest that this may also represent the composition of key visitors experienced nationally amongst the network of AONBs.

Leading with the sketch mapping exercise was a useful means to familiarize respondents with the goal of the research, though it may have introduced bias. The locations labeled on the map were meant to provide enough context to orient subjects to the protected area, but may have influenced them to emphasize these locations in their response. It would be interesting to conduct the same survey as a free-listing task, where subjects are asked to name locations and sites within the area that they find tranquil or not. Here, qualitative references, such as 'around Sutton Bank' or 'heathlands south of Goathland' might be comparable to a hastily drawn oval encircling a large, vaguely defined area. Such descriptions might include landmarks and reference points that provide more precise locations than hand-drawn shapes. This technique would remove the inherent bias of labeling some points of interest and not others.

[Figure 9 here]

Conclusion

The BETP York, informed by its predecessor in Dorset was fundamentally worked to conduct an approach to tranquility mapping of public consultation that originally was deployed by MacFarlane et al (2004) in Northumberland. Consequently, this approach facilitated an extensive range of views conveyed on the subject of tranquility. Amongst these views, although fewer numbers of visitors were included in the York study, the responses provided were similar to those captured in both Dorset and Northumberland: namely that tranquility is

more frequently reported than non-tranquility and of these the most popularly cited terms were related to experiencing peacefulness and panoramic views of naturalistic environments. Conversely the presence of people, infrastructure and particularly traffic overwhelmingly represented participants' notions of non tranquillity.

These views supported one of the most valuable technological aspects of this study, its potential to inform the subsequent modeling of tranquillity using GIS and our current activities in testing the automation of key processes devised. Previous studies have sought to match variables reported by visitors, residents and experts to GIS data layers. For example, 'traffic noise' can be modeled in GIS using data on major roads, traffic counts, and terrain to calculate the distance that sound will travel across the landscape. These models can be modified to address seasonal changes, for example, as foliage in summer will dampen sound more effectively than bare trees in winter. If designed with enough sensitivity, these models could predict the impact of developments, festivals, and road construction on tranquillity. As such, there will continue to be a need to calibrate these models with qualitative data collected from those who reside within, and visit, protected areas.

Finally, what was evident from the views collated, was that tranquillity represents a highly valued and much-anticipated experience for participants' visiting protected areas. This aspiration was specifically identified in many cases for what research has increasingly evidenced, that natural, tranquil environments are considered by visitors to have enabling properties for enhancing their wellbeing. This finding, warrants further investigation and through GIS modelling, informed through extensive public consultations, has the potential to

advance the body of knowledge on tranquillity and on its relationships with wellbeing further.

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Top Ranked 'Tranquil'			Top Ranked 'Non-Tranquil'	
26	peace/peaceful		39	traffic/heavy traffic
23	quiet/quietness		31	noise/noisy
11	scenery		14	busy
6	lack of people		5	industry
8	lack of/less traffic		5	litter
4	peace and quiet		5	too many people
4	wildlife		5	traffic
3	beautiful scenery		4	crowded
3	nature		4	people
3	open space			

Table 3. Features that come to mind when respondents hear the word 'tranquil' vs. 'non-tranquil'

Terms:	**Dalby** n = 201	**Rievaulx** n = 211	**Staithes** n = 203	**Sutton** n = 209	**Hovingham** n = 119
peace/quiet	18.91	**24.64**	18.72	17.22	8.40
countryside/rural	6.47	4.27	6.90	3.83	2.52
few people	9.95	10.90	11.33	10.05	5.04
lack of traffic	6.47	7.58	7.88	7.18	5.04
nature/wildlife	13.93	9.00	7.88	14.35	12.61
views/landscape	9.45	8.06	9.36	11.96	**19.33**
water	5.97	4.27	**7.39**	**2.39**	3.36
trees	6.97	4.74	2.96	4.31	5.88
access/recreation	**1.49**	3.32	4.93	2.87	6.72
open space	5.97	2.84	6.40	5.26	3.36
remote	4.48	5.21	2.96	6.22	2.52
other	9.95	15.17	13.30	14.35	25.21
Total:	100%	100%	100%	100%	100%

Table 4. Cross-tabulation of Tranquil Categories and Survey Sites. Highlighted cells represent responses either significantly below (light gray) or significantly above (dark gray) the average.

Terms:	Dalby n = 158	Rievaulx n = 172	Staithes n = 144	Sutton n =179	Hovingham n = 89
traffic	18.99	23.26	21.53	18.44	**32.58**
manmade noise	15.19	18.02	11.81	11.73	15.73
shops/commercial	8.23	12.79	**18.06**	7.26	10.11
litter	2.53	3.49	2.78	5.03	3.37
people/crowds	16.46	17.44	18.75	20.11	8.99
pace/stress	12.03	6.98	8.33	13.41	2.25
industry	5.06	1.74	5.56	**1.12**	6.74
buildings/structures	5.06	4.07	3.47	7.82	4.49
pollution	**5.06**	**1.16**	2.08	2.23	3.37
other	11.39	11.05	7.64	12.85	12.36
	100%	100%	100%	100%	100%

Table 5. Cross-tabulation of Non-Tranquil Categories and Survey Sites. Highlighted cells represent responses either significantly below (light gray) or significantly above (dark gray) the average.