CHRIS BLANDFORD ASSOCIATES
environment landscape planning

Hastings Borough Council

Upper Wilting Farm
Wind Turbine Feasibility Assessment

July 2013

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Approved	
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Position	Director
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1.0 INTRODUCTION

1.1 Background

1.1.1 Between July and August 2012, as part of a focussed consultation on the Development Management Plan prepared as part of the Hastings Local Plan, Hastings Borough Council consulted upon potential site allocations for the harnessing of wind energy.

1.1.2 A study undertaken by Element Energy[1] identified the potential for renewable energy generation within the Borough. As part of this study, wind speed was measured to identify potential locations for wind turbines along with other constraints. The study used the following criteria for constraints in the consideration of general locations for siting wind turbines:

- Buffer for non-residential buildings of 100m.
- Buffer for Residential Buildings of 400m.
- Buffer for Overhead Lines of 100m.

1.1.3 Locations within Sites of Special Scientific Interest (SSSI) and in Areas of Outstanding Natural Beauty (AONB) were also ruled out. Using this filtering process, the study identified three general locations within Hastings Borough with potential for wind turbines.

1.1.4 Of the three general locations identified by the Element Energy study, two were subsequently ruled out by Officers of Hastings Borough Council on the grounds of their impact on the Hastings Cliffs Special Area of Conservation (SAC). This left one general location with potential to examine further in the west of the Borough within the Combe Valley Countryside Park. By applying the same distance criteria and sensitivity to designated wildlife sites used in the Element Energy study, planning officers from Hastings Borough Council identified two other adjacent general locations in Rother District which would appear to have equal potential to the one in Hastings. All three of these general locations are on land at Upper Wilting Farm.

1.1.5 Following consultation on the potential and principle of siting a wind turbine(s) in the Combe Valley Countryside Park, Hastings Borough Council (in conjunction with Rother District Council) appointed Chris Blandford Associates in January 2013 to undertake further investigations into the feasibility of installing wind turbines on three potential sites identified at Upper Wilting Farm.

[1] Hastings Borough Renewable Energy and Low Carbon Energy Study (Element Energy, 2009)

1.1.6 In accordance with the National Planning Policy Framework, this feasibility study provides evidence to assist Hastings Borough Council in assessing the viability and deliverability of the potential location identified for wind turbine development within the Borough in plan-making and decision-taking. It will also provide Rother District Council with information to inform their site allocation and development management policy work.

1.2 The Sites

1.2.1 The sites being assessed by this feasibility study are on land at Upper Wilting Farm located to the west of Hastings in East Sussex – see Site Context Plan (**Figure 1**).

1.2.2 Site A and B are within Rother District and Site C is within Hastings Borough. The boundaries of the sites and the Combe Valley Countryside Park are shown on the Site Location Plan (**Figure 2**). Upper Wilting Farm is a tenanted farm owned by Hastings Borough Council.

1.2.3 The sites comprise agricultural fields divided by hedgerows and small blocks of woodland. The sites extend from Decoy Pond Wood (Marline Stream) in the west to Redgeland Wood (Churchwood Steam) in the east. The sites follow the lower valley side above the reclaimed marshland valley floor. They are underlain by the predominantly sandy Ashdown Beds Sandstone with areas of overlying Wadhurst Clay along the northern margins. The sites comprise land between c.5m OD and c.25m OD and are generally south to south-west facing. Sites A and B have been cultivated and at least the south western part of Site C.

1.2.4 The main access road to Upper Wilting Farm is via the B2092 off a small country lane called Crowhurst Road. Existing farm tracks provide access to the sites across the agricultural land.

1.3 Scope of the Feasibility Study

1.3.1 In line with the brief, the Feasibility Study provides a broad 'in principle' assessment of the potential for installing wind turbines on the identified sites. There are many possible turbine development options that could be considered for the identified sites, but for practical reasons they cannot all be examined in detail. As described in **Appendix 5.1**, the study examines the environmental/technical constraints and economic viability of 5 options that have been identified as representative wind turbine development scenarios based on the experience of the study's authors. These are:

- Option 1 – one 500kW turbine, 54m rotor diameter, 50m tower height, 77m to blade tip
- Option 2 – three 500kW turbines, dimensions as above
- Option 3 – one 500kW turbine and one 900kW turbine, dimensions as above

- Option 4 – two 2.3MW turbines, 70m rotor diameter, 74m tower height, 109m to blade tip
- Option 5 – two 3MW turbines, 82m rotor diameter, 85m tower height, 126m to blade tip

Appraisal of Potential Environmental Impacts

1.3.2 Appraisals of the potential landscape and visual, heritage and ecological impacts of wind turbine development and associated infrastructure on the sites are set out in **Sections 2.0**, **3.0** and **4.0** respectively. The scope of environmental topics considered was informed by the issues raised by consultees in relation to the potential site for wind turbine(s) in the Combe Valley Countryside Park as part of Hastings Borough Council's consultation on the Development Management Plan.

Viability Assessment

1.3.3 Taking into consideration the findings of the Hastings Borough Renewable and Low Carbon Energy Study[2] and the Rother District Low Carbon & Renewable Potential Study[3], a more detailed assessment has been undertaken of the viability of locating a wind turbine(s) on the identified sites. The assessment is summarised in **Section 5.0** and full details are provided in **Appendix 5.1**.

[2] Hastings Borough Renewable Energy and Low Carbon Energy Study (Element Energy, 2009)
[3] Rother District Low Carbon & Renewable Potential Study (Scott Wilson, 2010)

2.0 LANDSCAPE AND VISUAL APPRAISAL

2.1 General

2.1.1 This appraisal considers the capacity of the landscape to accommodate wind turbine development. The baseline appraisal involved a desk-based review of existing landscape character assessment information. This was informed by an on-site review of the potential impacts of wind turbine development scenarios (as advised by the viability assessment work - see **Section 5.0/Appendix 5.1**) on sensitive landscape and visual receptors.

2.1.2 The capacity of the landscape to accommodate wind turbine development is assessed by taking into account the sensitivity of the local/wider landscape and key views to change, and also the potential number, size and siting of wind turbines.

2.1.3 The appraisal also considers the impact of wind turbine development on the Hastings-Crowhurst/Hastings-Bexhill Strategic Gap and the Combe Valley Countryside Park as defined by the Hasting Borough Council Planning Strategy and the Rother District Core Strategy[4].

2.1.4 The appraisal sets out recommendations as to the optimal 'fit' in landscape and visual amenity terms of siting wind turbine development on the identified sites.

2.2 Baseline Conditions

2.2.1 The assessment of Landscape Baseline Conditions set out in the Bexhill to Hastings Link Road Environmental Statement (BHLR ES)[5] included as **Appendix 2.1** is considered to provide a suitable baseline for assessing the potential landscape and visual impacts of a wind turbine(s) located on the identified sites. The BHLR ES evaluates the quality, value and sensitivity to change of landscape character areas identified within a local and wider study area, which is considered to provide an appropriate geographical scope for the purposes of this feasibility study.

2.2.2 In addition, the landscape assessments undertaken of search areas for development between Hastings and Bexhill to inform the Hastings[6] and Rother[7] Core Strategies in 2008 were also considered where appropriate.

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[4] Rother District Proposed Submission Core Strategy - incorporating the focused amendments (Rother District Council, July 2012)

[5] Bexhill to Hastings Link Road Environmental Statement – Chapter 13: Landscape and Visual Impact, Section 13.3 Landscape Baseline Conditions (ESCC, 2007)

[6] Hastings Borough Council Local Development Framework Core Strategy, Landscape Assessment (ESCC, July 2008)

[7] Rother District Council Local Development Framework Core Strategy, Landscape Assessment (ESCC, July 2008)

Wider Landscape Context

2.2.3 The wider landscape context for the sites is shown on Figure 13.20 in **Appendix 2.1**, which identifies broadly defined Landscape Character Area as defined by the East Sussex County Landscape Assessment. Upper Wilting Farm is situated within the Combe Haven Valley Landscape Character Area, the northern part of which lies within the High Weald Area of Outstanding Natural Beauty (AONB).

2.2.4 The Combe Haven Valley is predominantly a 'ridge and valley landscape' typical of the High Weald. The Landscape Character Area includes a series of small, winding valleys that converge to form a tract of levels which meet the coast at Glyne Gap, between Hastings and Bexhill. For the most part it is a pleasant rolling and well-wooded countryside with excellent views of the sea and coastal towns. However, the towns have a strong influence on the character of the valley.

2.2.5 To the north of the Landscape Character Area, the low lying valley floor is enclosed by the higher ground of the Battle-Hastings ridge. The valley floor is open and flat with wetland. The valley sides are intricate with minor ridges and abundant ancient woodland.

2.2.6 Being on the edge of the Hastings and Bexhill, the character of the southern part of the Combe Haven Valley landscape is affected by the urbanising influences of transport, energy and waste infrastructure. A holiday caravan park, pylons, landfill site and water treatment works are all prominent features in the landscape. Once constructed, earthworks and mitigation planting associated with the Bexhill to Hastings Link Road will also introduce new landforms and features into the landscape.

2.2.7 As shown on Table 13.11 in **Appendix 2.1**, the Combe Haven Valley Landscape Character Area is evaluated as being of good quality and medium value, and has moderate sensitivity to change.

2.2.8 The indicative extent of the Hastings-Crowhurst/Hastings-Bexhill Strategic Gap defined by the Rother District Core Strategy[8] is shown on **Figure 3**. The strategic gap is an area of largely open land between settlements, which helps to maintain the separate identity and amenity of settlements and prevent them merging together.

[8] Rother District Proposed Submission Core Strategy - incorporating the focused amendments (Rother District Council, July 2012)

2.2.9 The Combe Valley Countryside Park aims to address an identified deficiency in provision of accessible green space. The proposed Countryside Park extends from the sea between Bexhill and Hastings, around Pebsham, and westwards along the Combe Haven (see **Figure 1**). In addition to recreation and nature conservation, the Park's objectives also include protection of the strategic gap.

Local Landscape Context

2.2.10 At the more local level, **Appendix 2.1** identifies a range of generic Landscape Types (shown on Figure 13.5 and described in paras 13.3.53 – 13.3.67) and geographically specific Landscape Character Areas (shown on Figure 13.6 and described in paras 13.3.68 – 13.3.157).

2.2.11 As shown on Figure 13.5 in Appendix 2.1, the 'Open Valley and Levels' (Landscape Type A) dominate the centre of the area, adjacent to which is the 'Ridges and Slopes Overlooking Levels' (Landscape Type B). Upper Wilting Farm and the potential sites lie within Landscape Type B. To the north and south is a broad swathe of 'Rolling Countryside' (Landscape Type C). 'Reclaimed Land/Landfill' (Landscape Type F) is located within the south of the area.

2.2.12 As shown on **Figure 5** and described in paras 13.3.68 – 13.3.157 in **Appendix 2.1**, Upper Wilting Farm and the identified sites are located within Landscape Character Area 7 (Crowhurst Road/Wilting Farm). This is bounded by Landscape Character Area 15 (Crowhurst/High Weald) to the north; Landscape Character Area 12 (West Woods) to the east; Landscape Character Area 1 (Combe Haven Valley Floor) to the south; and Landscape Character Area 6 (Powdermill Valley) to the west. Table 13.10 in **Appendix 2.1** provides the following evaluation of the quality, value and sensitivity to change for each of these Landscape Character Areas:

Character Area	Quality	Value	Sensitivity to Change
1. Combe Haven Valley Floor	**Good** Attractive countryside; strong sense of place; historic land use; and, remote and quiet pastoral landscape.	**Medium** Local value; high wildlife value; and SSSI /LNR.	**High** Sensitive wildlife designations; little scope to mitigate as flat; and, open valley long views across area from surrounding ridges
6. Powdermill Valley	**Good** Attractive countryside High Weald character in north; some	**Medium** Local value as rural stream valley; Listed Buildings; SNCI; and,	**Moderate** Less wooded and more open features such as hedges and tree belts

Character Area	Quality	Value	Sensitivity to Change
	deterioration of field pattern and remnant hedges; 'improved' stream channel; and, quiet rural area.	1066 Country Walk.	sensitive to change; quiet countryside away from village; and, views down Combe Haven and Powdermill Valley from ridges.
7. Crowhurst Road/Upper Wilting	**Good** Attractive countryside, High Weald character; strong historic field patterns and ponds; and, quiet, but north influenced by traffic on Crowhurst Road	**Medium** Local value; ancient woodland; SSSI; and, Listed Buildings.	**Moderate** Topography and woodland afford cover; rural character vulnerable to change; features such as hedges and tree belts sensitive to change; local views from AONB; and, views from the south side of the Combe Haven.
12. West Woods	**Ordinary** Expansion area to Hastings and generally well planned in landscape setting.	**Medium** Residential; commercial; and ancient woodlands within urban areas.	**Moderate** Increased traffic on Queensway; long views into area from south; and, views out across urban areas to sea.
15. Crowhurst/ High Weald	**High** Attractive landscape; rolling countryside typical of High Weald; well wooded; and, historic settlement and field patterns	**High** Local value as AONB countryside; ancient woodland; LNR; and, Listed Buildings in Crowhurst Village.	**High** Rolling countryside; features such as hedges and tree belts sensitive to change; long views from the higher ground, down the Combe Haven and urban area to the sea, but interrupted by extensive tree and hedgerow cover.

2.3 Potential Impacts and Scope for Mitigation

Consultation Comments

2.3.1 The following landscape issues were raised by consultees as part of Hastings Borough Council's consultation on the Development Management Plan:

- East Sussex County Council – "*A wind turbine located in Combe Haven valley would detract from the remote unspoilt character of the area. There are key long views across the valley from the high ground to the east and on Harley Shute Road. The integrity of the unspoilt character and visual amenity of Combe Haven valley would be eroded by development in this location. Few opportunities to mitigate development. The alignment and environmental mitigation measures for the BHLR have gone to some lengths to avoid intrusion into these views and this part of the Combe Haven valley*".

- Rother District Council – *"The potential site* [is] *located within the boundary of the Combe Valley Countryside Park. Although it is acknowledged that the consultation seeks to gauge opinion about the potential and principle of siting wind turbines at this location, additional work will need to be undertaken to determine landscape and ecological impacts, particularly given the objectives of the Countryside Park. No options or alternative sites are put forward for consideration, further work is required to determine whether this is the most suitable location. Reference is made to representations made by Rother District Council regarding wind energy to Hastings 'Planning Strategy' - Proposed Submission Version."*

2.3.2 These issues are considered below.

Potential Impacts

2.3.3 The potential landscape and visual impacts will, to some extent, be influenced by the location, number and height of turbines. The appraisal has therefore considered the options for wind turbine development identified by the viability assessment in **Appendix 5.1**. These are:

- Option 1 – one 500kW turbine, 54m rotor diameter, 50m tower height, 77m to blade tip
- Option 2 – three 500kW turbines, dimensions as above
- Option 3 – one 500kW turbine and one 900kW turbine, dimensions as above
- Option 4 – two 2.3MW turbines, 70m rotor diameter, 74m tower height, 109m to blade tip
- Option 5 – two 3MW turbines, 82m rotor diameter, 85m tower height, 126m to blade tip

Impacts on the AONB

2.3.4 The identified sites do not fall within any local landscape designation and are outside of the High Weald AONB, which lies to the north. Consequently, turbines have the potential to be visible from the higher ground of the AONB and in particular from the Battle-Hastings ridge. It is unlikely that options 1-3 (with lower turbines at 77m to blade tip) would be noticeable, but options 4 and 5 (with higher turbines at 109m and 126m to blade tip respectively) would be

prominent features seen above the wooded skyline in views south from the Battle-Hastings ridge.

Impacts on Landscape Character

2.3.5 The footprint of development, irrespective of the number or location of the turbines, would have limited direct physical impact on landscape features as there would only be a relatively small loss of land to the turbine bases and access tracks. Depending on the route of these tracks, there could also be a loss of short sections of hedgerow. Overall, however, the structure of the landscape - namely field pattern, land use, hedgerows and woodland - would remain intact.

2.3.6 The scale and complexity of the landscape is an important factor when considering the ability of a landscape to accommodate wind turbines. The convention is that the large-scale, simple and open landscapes of the uplands and fens (or even the Glynebourne turbine in the South Downs) often have a higher capacity to accommodate these structures in comparison to more small-scale, intimate and complex landscapes such as the High Weald. Despite sharing many similar characteristics with the wider High Weald landscapes to the north, the southern parts of the Combe Haven Valley Landscape Character Area have a very different character. Overall, the landscape here is of moderate scale and has a relatively simple pattern and texture, making it able to accommodate turbines. The valley sides however rise from below 5m AOD to approximately 40m AOD at Upper Wilting Farm, so even options 1-3 (with lower turbines at 77m to blade tip) would in most views be seen above the skyline. They would however be broadly in scale with the Combe Haven Valley landscape, unlike options 4 and 5 (with higher turbines at 109m and 126m to blade tip respectively) which have a more limited ability to be successfully accommodated into the landscape due to their size.

2.3.7 In terms of tranquility, the introduction of turbines would, to an extent, erode the sense of remoteness experienced within the Combe Haven Valley landscape. However, as identified in **Section 2.2**, the character of the southern part of the Combe Haven Valley landscape is affected by the urbanising influences of transport, grid connection and waste infrastructure that in combination reduce the landscape's overall sense of remoteness.

Impacts on Views

2.3.8 The identified sites all have views south across the Combe Haven Valley Floor (Landscape Character Area 1 – see **Figure 5**). Presently this is towards the Pebsham Landfill Site, which is undergoing restoration and will form part of the Combe Valley Countryside Park. Given the identified sites' relative prominence on the northern valley side, turbines would be visible from

large tracts of the valley floor, including the urban edge of Hastings at Harley Shute. Even options 1-3 (with lower turbines at 77m to blade tip) would therefore be prominent features in views from the valley floor.

2.3.9 There are unlikely to be any significant views of the identified sites from within the High Weald AONB, however the turbine towers and in particular the blades may be visible from the higher ground such as the Battle-Hastings ridge particularly under options 4 and 5 (with higher turbines at 109m and 126m to blade tip respectively).

Impacts on the Strategic Gap/Combe Valley Countryside Park

2.3.10 The main function of the strategic gap is to maintain an area of largely open land between Hastings and Crowhurst and between Hastings and Bexhill, which helps to maintain the separate identity and amenity of these settlements. Protection of the strategic gap is also an objective for the Combe Valley Countryside Park. Extensive views of the turbines from within the strategic gap/Combe Valley Countryside Park are likely to be restricted due to the screening effect of both intervening topography and woodland, particularly in the case of options 1-3. Together with the slender nature of the turbine towers and rotor blades, it is considered that the location of wind turbines at the scale of options 1-3 (comprising 1-3 turbines with heights to blade tip of 77m) on the identified sites would not significantly compromise the openness of the landscape within the strategic gap/Combe Valley Countryside Park. Further wind turbine development at the scale of options 1-3 within other locations within the strategic gap/Combe Valley Countryside Park is likely to erode the openness of the landscape.

Scope for Mitigation through Design

2.3.11 In addition to the number of wind turbines, the height and siting of turbines will also be a key factor in mitigating potential landscape and visual impacts. Impacts can also be further mitigated in the layout and design of any associated infrastructure, such as access tracks. For example, it would be preferable to make use of existing tracks and gateways through hedges, wherever possible to minimise changes to the fabric of the landscape.

2.4 Summary and Recommendations

2.4.1 The identified sites at Upper Wilting Farm lie within the wider landscape context of the Combe Haven Valley, a well wooded and topographically varied landscape that meets the coast at Glyne Gap between Hastings and Bexhill. There are views across the broad low-lying valley bottom to and from the identified sites, and the infrastructure associated with the adjacent

urban areas of Hastings and Bexhill have a strong influence on the otherwise rural character of the landscape.

2.4.2 The local Landscape Character Area 7 within which the identified sites lie is assessed as being of good quality and medium value, and as having moderate sensitivity to change.

2.4.3 The introduction of a turbine or turbines within this location has the potential to cause harm to the landscape and visual qualities of the Combe Haven Valley. While the identified sites are not within the High Weald AONB, options 4 and 5 (with higher turbines at 109m and 126m to blade tip respectively) are likely to be prominent in key views from the AONB, in particular from the Battle-Hastings ridge.

2.4.4 Together with the slender nature of the turbine towers and rotor blades, it is considered that the location of wind turbines at the scale of options 1-3 (comprising 1-3 turbines with heights to blade tip of 77m) on the identified sites would not significantly compromise the openness of the landscape within the strategic gap. In terms of character, the physical landscape features of the identified sites are unlikely to be significantly affected. Options 4 and 5 (with higher turbines at 109m and 126m to blade tip respectively) would have a greater impact on the tranquility of the area and have a less optimal landscape fit, due to their overall scale in relation to the landscape. All turbine options, irrespective of height, would be prominent in views from the Combe Haven Valley Floor landscape and from some urban edges. In most views, they are likely to be seen breaking the skyline.

2.4.5 In conclusion, the appraisal would suggest that up to 3 turbines could be accommodated on the identified sites without significant harm to the landscape and visual qualities of the local and wider area. Options 1-3 (with lower turbines at 77m to blade tip) are preferable as the dimensions of these turbine options are less likely to be prominent in views from the AONB and are considered to be more in scale with the character of the Combe Haven Valley landscape.

2.4.6 There is scope for mitigating potential landscape and visual impacts through consideration of the height and siting of the turbines, and through the layout and design of associated infrastructure. Further detailed design development and landscape and visual impact assessment is recommended prior to submission of a formal planning application to ensure an optimum scheme in terms of achieving a good landscape fit and minimising adverse impacts on sensitive visual receptors. Total costs for a detailed landscape and visual impact assessment, including preparation of verified photomontages, could be expected to be in the region of £10,000 to £20,000.

3.0 HERITAGE APPRAISAL

3.1 General

3.1.1 The following heritage issues were raised by consultees as part of Hastings Borough Council's consultation on the Development Management Plan:

- East Sussex County Council – "*This is a site where there are no recorded heritage assets on the HER. However, this is likely to be due to a lack of recent survey and there is potential here for earthworks and buried archaeological remains of prehistoric to present day activity. The site lies close to the edge of the Combe Haven valley floor and recent archaeological surveys have highlighted the potential for historical and archaeological interest of this side of the Combe Haven valley. Appropriate assessment and evaluation survey, as part of EIA process, would be required in advance of decision making*".

3.1.2 These issues are considered by the appraisal of the identified sites' archaeological potential undertaken by the Archaeology Section of East Sussex County Council included as **Appendix 3.1**. The key findings of the appraisal are summarised below.

3.2 Summary and Recommendations

3.2.1 The archaeological investigations (including for academic research, local history and for development-led projects such as the Hastings Bypass in the 1990s, the more recent Bexhill to Hastings Link Road and the Pebsham Landfill extension) indicate that the identified sites are very likely to have archaeological interest. In particular there is a high probability that the identified sites will contain evidence for past activity of Late Mesolithic to Early Neolithic, Late Neolithic to Early Bronze Age and Late Iron Age to Early Romano-British date as well as the documented remains of the post-medieval coach road.

3.2.2 The types of archaeological remains that can be expected on these sites will include complex distributions of lithics (worked flints), pottery, stone and iron slag as well as palaeo-environmental remains such as charcoal, pollen and insect remains. Patterns will be complex as a result of soil movement and re-deposition and as noted above, recent cultivation will have impacted upon and may potentially have reduced the significance of any buried archaeological remains. The identified sites occupy land predominantly on the valley side above the level where one would expect to find waterlogged remains, which potentially offer greater levels of evidence for past human activity and for palaeo-environmental remains. However, it is possible that the identified sites could contain archaeological remains buried beneath later hill wash that are part of wider site activity, for example of Late Mesolthic to Bronze Age date,) extending

into the westland zone. It remains uncertain, therefore, whether the identified sites would be likely to contain archaeological remains that might be of considered to be of national importance.

3.2.3 Whilst there are no recorded heritage assets within the identified sites which would immediately rule out allocation of this land, the potential archaeological interest highlighted by this assessment should be noted.

3.2.4 The implication of this assessment is that if the identified sites were allocated for development, any forthcoming proposals should be subject to a full assessment of the impact on cultural heritage issues including archaeology. The assessment would need to include detailed archaeological desk-based assessment and evaluation including field walking, geophysical survey and trial trenching.

3.2.5 Any mitigation might be achieved through design to preserve significant archaeological remains in situ and/or by archaeological recording of remains considered to be of lesser importance by targeted and area excavations followed by full analysis, reporting and publication. Total costs for archaeological assessment, evaluation and mitigation could be expected to be in the region of £250,000 to £750,000.

4.0 ECOLOGY APPRAISAL

4.1 General

4.1.1 This appraisal of ecological constraints in and around the identified sites focuses on the importance of the adjacent Combe Haven Site of Special Scientific Interest (SSSI) for breeding, wintering and passage birds, and the potential importance of the area in providing foraging habitats and flight lines for bats.

4.1.2 The baseline appraisal involved a desk-top review of existing biological records and available ecological studies to identify background information on species present in and around the identified sites, followed by a Phase 1 habitat survey to classify habitats and evaluate the potential for the sites to support protected species.

4.1.3 The desk-top study was carried out using data acquired from the Sussex Biodiversity Record Centre (SxBRC) in January 2013 and the Phase 1 habitat survey was carried out using the standard JNCC methodology[9].

4.1.4 The appraisal takes into account the following guidance:

- Natural England Technical Information Note on the Effects of Onshore Wind Turbines on Birds (TIN069).
- Natural England Technical Information Note on the Effects of Onshore Wind Turbines on Bats (TIN051).
- English Nature, RSPB, WWF-UK and BWEA Guidance on Wind Farm Development and Nature Conservation (2001)

4.1.5 The appraisal considers the scope for appropriate mitigation, and makes recommendations requirements for further targeted protected species surveys to inform a formal planning application.

4.2 Baseline Conditions

4.2.1 A full set of results from the desk-top study and Phase 1 habitat survey are given in **Appendix 4.1.** A summary of these results are given below.

[9] JNCC (2010) *Handbook for Phase 1 habitat survey - a technique for environmental audit*. ISBN 0 86139 636 7

Designated Sites

4.2.2 No ecological designations apply to land within the identified sites. However, a wind turbine proposal could for example have an effect on the nearby Combe Haven SSSI by:

- *affecting populations of birds which reside on the SSSI but which feed on or fly through the proposed wind turbine location;*
- *displacing birds and other species on or near the SSSI;*
- *creating a barrier between designated sites and wider areas, or by affecting migratory routes;*
- *creating disturbance during construction and operation;*
- *creating run off into a watercourse, during construction, which may have an impact on the SSSI downstream;*
- *altering watercourses and drainage which may have an impact on the SSSI downstream*[10].

4.2.3 Therefore the indirect effects on designated sites within a 20km radius of the identified sites' locations have been considered, in line with guidance produced by Scottish Natural Heritage in 2008[11].

4.2.4 Within a 20km radius of the identified sites there is the Dungeness to Pett Level Special Protection Area (SPA), an international statutory site designated for its breeding and wintering waterbirds, passage warblers and breeding terns. There is also the Pevensey Levels and Hastings Cliffs Special Area of Conservation (SAC). The locations of these are shown in **Figure 3.** The potential extension to the Dungeness to Pett Level SPA and the proposed Dungeness, Romney Marsh and Rye Bay Ramsar Site are shown in **Appendix 4.2.**

4.2.5 Within a 2km radius of the identified sites there are 2 Sites of Special Scientific Interest (SSSI), 3 Local Nature Reserves (LNR) and 11 Sites of Nature Conservation Importance (SNCI). The locations of these are shown in **Figure 4.**

4.2.6 Within the context of the feasibility study, the most notable of these designated sites is Combe Haven SSSI, a wetland area considered important for breeding, wintering and passage birds and located immediately adjacent to the identified sites. Also notable is Filsham Reedbed, a Local Nature Reserve (LNR) and Site of Nature Conservation Importance (SNCI) known to support a number of notable breeding and wintering birds including bittern *Botaurus stellaris* and marsh harrier *Circus aeruginosus*.

[10] Scottish Natural Heritage (2008) *Natural Heritage assessment of small scale wind energy projects which do not require formal Environmental Impact Assessment (EIA).*

[11] Scottish Natural Heritage (2008) *Natural Heritage assessment of small scale wind energy projects which do not require formal Environmental Impact Assessment (EIA).*

4.2.7 Where wind farms are proposed their development "*should not cause adverse effects on the integrity of statutory international sites"* (SPAs, SACs) or *"adversely affect the conservation objectives and/or reasons for identification and notification or designation of sites of national wildlife importance"* (SSSIs). In addition, "*where a proposed wind farm development is likely to have a significant adverse (not trivial or inconsequential) effect on a site of regional or local nature conservation importance, it should only be permitted if it can be clearly demonstrated that there are reasons for the proposal which outweigh the need to safeguard the nature conservation value of the site"*[12].

4.2.8 The Combe Valley Countryside Park aims to address an identified deficiency in provision of accessible green space. The Countryside Park extends from the sea between Bexhill and Hastings, around Pebsham, and westwards along the Combe Haven (see **Figure 1**). In addition to recreation and protection of the strategic gap, the Park's objectives also include nature conservation.

Habitats

4.2.9 Arable fields form the majority of land cover within sites A and B. The crop is sown right up to the field margins, leaving a thin strip of grassland no more than 0.5m wide in most places with negligible ecological value. The diversity and abundance of flowering plants around the margins was found to be low.

4.2.10 There is a very limited extent of woodland within the boundaries of sites A and C; however there are several blocks of broadleaved semi-natural woodland situated immediately adjacent to them. This includes Monkham Wood and Decoy Pond Wood, ecologically valuable ancient woodland sites in favourable condition that, according to Natural England's assessment, have ivy *Hedera helix* covered trees which '*may provide cover for bats during the summer months'*[13]. The mature oak trees located on the eastern boundary of site C are also of high ecological value, with the potential to support bats, birds and invertebrates.

4.2.11 Species-poor hedges with trees form the majority of the field boundaries that dissect sites A and C. Most of these are defunct, with several gaps that livestock could easily pass through and they are all of a similar character in general, comprising a few common species. There did not appear to be a rich ground flora associated with any of the hedges. These hedges have good connectivity across the landscape as a whole, linking several blocks of ancient woodland, and could be used for dispersal by bats or dormice *Muscardinus avellanarius*.

[12] English Nature, RSPB, WWF-UK & BWEA (2001) *Wind Farm Development and Nature Conservation*.
[13] Natural England (2012) *Combe Haven - Condition of SSSI units*. Available at <http://www.sssi.naturalengland.org.uk> Accessed 18/01/13

4.2.12 The scrub on site C is comprised of common and widespread plant species and has negligible intrinsic value, but could provide cover for common breeding birds. The fields in site C are comprised of poor semi-improved grassland and overall have low ecological value with some potential to support foraging birds or invertebrates.

4.2.13 Along the southern boundary of site C is a reedbed which forms part of the Combe Haven SSSI, and is likely to be an important habitat for breeding, wintering and migrating birds. Open water with large congregations of birds was seen further to the south. A small stream runs through Monkham Wood and feeds into this reedbed and wet grasslands surrounding it.

Protected Species

4.2.14 The Combe Haven SSSI has been known to support water voles *Arvicola amphibius* and otters *Lutra lutra*. These species are strongly associated with wetland habitats and could be found within the habitats adjacent to the identified sites, but are not expected to be found within the identified sites.

4.2.15 The hazel dormouse is widespread in the area, and thought to be present in woodland, scrub and hedgerows from Marline Valley Woods SSSI to Upper Wilting Farm. This species could be found within or adjacent to the identified sites where there are areas of suitable woodland and/or dense hedgerows.

4.2.16 Evidence for the presence of badger *Meles meles* within the survey area suggests that a large population of badgers is likely to be present within the wider landscape. An apparently disused sett was found in Monkham Wood during the Phase 1 habitat survey and a recently excluded sett within a small strip of woodland adjacent to site A. Fresh badger tracks were seen within one of the arable fields, just outside the boundary of site B. It is highly possible there are other active setts within or adjacent to the identified sites.

4.2.17 Bat species that have been recorded within a 5km radius of the identified sites include Common pipistrelle *Pipistrellus pipistrellus*, Nathusius pipistrelle *Pipistrellus nathusii,* Soprano pipistrelle *Pipistrellus pygmaeus,* Brown long-eared *Plecotus auritus*, Noctule *Nyctalus noctula*, Serotine *Eptesicus serotinus,* Natterer's *Myotis nattereri* and possibly Whiskered *Myotis mystacinus,* Brandt's *Myotis brandtii* and Daubenton's *Myotis daubentonii*. In addition, brown long-eared roosts have been found at Upper Wilting Farm and possibly at Adam's Farm[14]. The

[14] East Sussex County Council (n.d.) *Bexhill to Hastings Link Road – EA Chapter 12: Nature Conservation and Biodiversity*

area in general is described as supporting a *"good, but not exceptional range of bats"*[15]. During the Phase 1 habitat survey a number of mature trees with bat roost potential were identified within or adjacent to the identified sites.

4.2.18 Great crested newts *Triturus cristatus* have been recorded within 1.5km of the identified sites. There are a network of ponds and suitable terrestrial habitat (woodland, scrub, rough grassland) in the wider landscape and there is some potential for this species to be found in such habitats where they occur on or adjacent to the identified sites.

4.2.19 Reptile species that have been recorded within a 2km radius of the identified sites include slow-worm *Anguis fragilis*, sand lizard *Lacerta agilis*, common lizard *Zootoca vivipara*, smooth snake *Coronella austriaca*, grass snake *Natrix natrix* and adder *Vipera berus*. The sand lizard and smooth snake are extremely rare species in Sussex, confined to sandy heathland habitats. Only historic records exist for these dating back to 1901. Most of the land within the identified sites represents sub-optimal habitat for the more common species but they could potentially be found within the areas of scrub, rough grassland or woodland in site C.

4.2.20 A number of notable bird species have been recorded within a 2km radius of the identified sites including 36 specially protected birds listed on Schedule 1 of the Wildlife and Countryside Act 1981 and/or Annex 1 of the Birds Directive (see **Appendix 4.1**). In addition, 20 of the 31 birds listed on Appendix 1 of Natural England's Technical Information Note TIN069 (2010)[16] that are sensitive to wind farm development have also been recorded. Where these birds are present in significant numbers, a detailed assessment of the identified sites including surveys and monitoring is likely to be necessary.

4.3 Potential Impacts and Scope for Mitigation

Consultation Comments

4.3.1 The following ecological issues were raised by consultees as part of Hastings Borough Council's consultation on the Development Management Plan:

- Natural England – "*We are concerned about the harm to the SSSI, breeding birds, waders & wildfowl, some vulnerable to displacement/collision impacts. We recommend the Council only pursue site in light of further studies that demonstrate that any potential impacts upon birds associated with the adjacent SSSI would not be significant. Certain*

[15] East Sussex County Council (n.d.) *Bexhill to Hastings Link Road – EA Chapter 12: Nature Conservation and Biodiversity*
[16] Natural England (2010) *Technical Information Note TIN069 - Assessing the effects of onshore wind farms on birds.*

species of bats are also vulnerable to collision with turbines and we would also recommend further investigation of this potential risk. Natural England has produced Technical Information Notes on the effects of onshore wind turbines on both birds (TIN069)1 and bats (TIN051)2 and these may be of assistance to the Council".

- East Sussex County Council – "*The proposed site is adjacent to Combe Haven SSSI, Monkham Wood ASNW and Redgeland Wood North ASNW. One of the features of the SSSI is its importance for breeding, wintering and passage birds. Surveys conducted for the BHLR have also demonstrated the importance of the area for bats (European Protected Species) providing foraging habitat and flightlines. Wind generators have the potential to impact on these species, both directly and indirectly through increased disturbance (visual and noise). An EIA may be required to inform appropriate compensation/mitigation".*

- Rother District Council – *"The potential site* [is] *located within the boundary of the Combe Valley Countryside Park. Although it is acknowledged that the consultation seeks to gauge opinion about the potential and principle of siting wind turbines at this location, additional work will need to be undertaken to determine landscape and ecological impacts, particularly given the objectives of the Countryside Park. No options or alternative sites are put forward for consideration, further work is required to determine whether this is the most suitable location. Reference is made to representations made by Rother District Council regarding wind energy to Hastings 'Planning Strategy' - Proposed Submission Version."*

4.3.2 These issues are considered below.

Direct Habitat Loss and Habitat Damage

4.3.3 The potential ecological impact associated with direct habitat loss and damage is not thought to be significant. The identified sites are mainly comprised of arable fields and poor semi-improved grassland which is of low intrinsic value.

4.3.4 In order to access the identified sites for construction of any wind turbine, it may be necessary to remove a small section of hedgerow located immediately opposite the bridge on Crowhurst Road. During the Phase 1 habitat survey this hedge was assessed as being species poor, with limited cover and connectivity to the other trees and hedgerows in the surrounding area. Therefore removing the end portion of this hedge would not be deemed a significant ecological loss.

4.3.5 Other potential adverse ecological effects that may arise through the construction process are unlikely to be significant, given the relatively small footprint for wind turbines. Control of effects related to sediment transport, pollution incidents and/or effects on land quality can all be managed through construction management techniques that are standard for developments of this type.

Disturbance to Protected Species

4.3.6 The potential impacts associated with disturbing protected species are not thought to be significant. These can largely be avoided if the timing and location of work is carefully planned. For example, any work that is carried out within 30m of an active badger sett and risks disturbing them could require a licence from Natural England. This could be resolved by undertaking work at least 30m away from any badger setts if they are present on the identified sites. Other sensitivities to consider are the breeding bird season (March to August) and the possible presence of dormice, newts and reptiles on or adjacent to the identified sites.

Bird and Bat Collisions

4.3.7 Given the location of the identified sites adjacent to an ornithological SSSI and the notable bird and bat species that have been recorded nearby, the risk of bird and/or bat collisions with turbine blades is considered to be a significant issue.

4.3.8 Bat species that are listed on Appendix 2 of Natural England's Technical Information Note TIN051[17] as being of a medium to high risk of colliding with wind turbines and that have been recorded within a 5km radius of the identified sites include Common pipistrelle, Soprano pipistrelle, Serotine, Noctule and Nathusius pipistrelle. Of these species, due to their restricted distribution and/or rarity, there is considered to be a medium to high population threat to Serotine, Noctule and Nathusius pipistrelle bats. Serotine and Noctule roosts have been recorded within a 5km radius of the identified sites whereas only individual species records exist for Nathusius pipistrelle. Brown long-eared roosts have reportedly been found at Upper Wilting Farm (presumably in the farm buildings to the north of the site B) but this species is considered to be at low risk of collision and population threat.

4.3.9 Of the notable bird species recorded with a 2km radius of the identified sites, the following have been recorded most frequently and/or recently and may be at the highest risk of colliding with turbines if their flight paths intersect the Site:

- Grey heron *Ardea cinerea*
- Great bittern *Botaurus stellaris*

[17] Natural England (2012) *Technical Information Note TIN051 – Bats and onshore wind turbines Interim guidance.*

- Marsh harrier *Circus aeruginosus*
- Little egret *Egretta garzetta*
- Merlin *Falco columbarius*
- Peregrine falcon *Falco peregrinus*
- European honey buzzard *Pernis apivorus*
- Common tern *Sterna hirundo*
- Sandwich tern *Sterna sandvicensis*
- Northern lapwing *Vanellus vanellus*

Scope for Mitigation

4.3.10 There is evidence to suggest in Britain that most bat activity is in close proximity to habitat features such as woodlands, hedgerows, treelines and rivers. Therefore to minimise the potential risk of bat collisions it is recommended by Natural England that a 50m buffer is applied around any feature, into which no part of the turbine should intrude[18]. For large scale turbines (80m hub height and 45m blade length) and for features no more than 20m tall, a buffer of approximately 75m is advised. These buffers have been applied to the spatial constraint mapping included in the viability assessment (see **Appendix 5.1**).

4.3.11 Overall mitigation of potential ecological impacts will need to follow current guidance, and be refined in light of the results of necessary surveys as outlined below.

4.4 Summary and Recommendations

4.4.1 In summary, the majority of habitats within the identified sites are of limited ecological value, the hedges and mature trees being the most prominent features with the potential to provide corridors and roosting sites for bats. The land immediately adjacent to the identified sites is of high ecological value, being considered especially important for birds. Nearby designated sites include Dungeness to Pett Level SPA, Combe Haven SSSI and Filsham Reedbed LNR.

4.4.2 Potential impacts of the scheme relating to habitat loss and damage are not thought to be significant assuming implementation of a construction environmental management plan to control pollution, changes in land quality, erosion and sediment deposition. Careful siting of access roads and paths will be necessary to limit, as far as possible, the need to remove hedgerows and other woody vegetation to enable access by construction traffic.

4.4.3 The potential impacts associated with the disturbance to protected species are not thought to be significant, given the timing and location of work is carefully planned.

4.4.4 Bird and bat collisions are the most significant potential ecological impact associated with the scheme. Further survey work is recommended in order to determine the following:

[18] Natural England (2012) *Technical Information Note TIN051 – Bats and onshore wind turbines Interim guidance.*

Bat surveys

- Species present;
- Population sizes (to determine whether or not the site is important for a given species);
- Flight lines;
- Frequency of passes;
- Variation in activity over time (with particular reference to changes during the breeding season);
- Roost sites in the surrounding woodlands, trees and buildings.

Bird surveys (vantage point) to encompass breeding, wintering and passage migration periods

- Species present within and adjacent to the identified sites;
- Density/frequency of flights across the identified sites;
- Height of passage in varying weather conditions;
- Variation in activity over time.

4.4.5 The mitigation of potential ecological impacts will need to follow current guidance, and be refined in light of the results of the surveys recommended above. Total costs for a detailed ecological impact assessment, including surveys, could be expected to be in the region of £20,000 to £30,000.

5.0 VIABILITY ASSESSMENT

5.1 General

5.1.1 Taking into consideration the findings of the Hastings Borough Renewable and Low Carbon Energy Study (Element Energy, 2009) and the Rother District Low Carbon & Renewable Potential Study (Scott Wilson, 2010), a more detailed assessment has been undertaken by North Energy Associates of the technical and economic viability of locating wind turbines on the identified sites. The viability assessment report is included as **Appendix 5.1** and summarised below.

5.1.2 The following technical issues that could affect viability were raised by consultees as part of Hastings Borough Council's consultation on the Development Management Plan:

- East Sussex County Council – "*The proposed site is just to the north west of the landfill site. There is no opposition to this location but there are some operational issues that may need to be considered: The exact location is unclear. If it is close to the landfill site monitoring points for the landfill should be avoided. It is assumed access would be from the north. However, if it is from the south there would need to be liaison with the County Council to ensure the safety of operatives and the landfill site"*.

5.1.3 As the identified sites are not close to the landfill site, and access is most likely to be from the north, the above issue was not considered further by the viability assessment.

- Highways Agency – "*The potential wind farm would likely require the transportation of abnormal loads utilising the Strategic Road Network. Should the wind farm come forward, we would require regular and early consultation to develop a plan for the transport and installation of wind farm infrastructure including any associated cabling to minimise the impact on the Strategic Road Network*".

5.1.4 The above issue is considered in **Appendix 5.1**.

5.2 Summary and Recommendations

5.2.1 Following initial consideration of a number of options, the following 5 options were selected as the best for comparison purposes in the viability assessment:

- Option 1 – one 500kW turbine, 54m rotor diameter, 50m tower height, 77m to blade tip

- Option 2 – three 500kW turbines, dimensions as above
- Option 3 – one 500kW turbine and one 900kW turbine, dimensions as above
- Option 4 – two 2.3MW turbines, 70m rotor diameter, 74m tower height, 109m to blade tip
- Option 5 – two 3MW turbines, 82m rotor diameter, 85m tower height, 126m to blade tip

5.2.2 Options 1-3 are considered to be 'medium scale' commercial turbines and Options 4-5 'large scale' commercial turbines.

5.2.3 Three sites (A, B and C) at Upper Wilting Farm were identified by planning officers from Hastings Borough Council after a study by Element Energy indicated the general location was broadly suitable for wind turbines.

5.2.4 The identified sites are suitable for wind turbines, although the wind resource cannot be considered particularly high. The sites will also suffer from turbulence due to the surrounding hills and trees, which will affect the output of any turbines. Wind monitoring is advisable, firstly to confirm the estimated energy outputs and secondly to help the turbine manufacturer give assurances that the wind turbulence is within turbine design limits.

5.2.5 The available locations for turbines are constrained, mainly because the fields are tree-lined, leaving only small areas in the middle of the fields sufficiently far from the trees to satisfy wildlife off-sets of 75m. In addition, site C is crossed by two microwave links. Links can be affected by turbines, and considering the wildlife constraints it is not possible to use site C for turbines without re-routing the links. However, a survey by BT Open Reach commissioned by Hasting Borough Council has shown that the BT links could be re-routed at a modest cost.

5.2.6 A gas pipeline runs near the sites and the utility would need to be consulted at the next stage to assess if the project's construction would affect this pipeline.

5.2.7 The identified sites are also constricted by proximity to dwellings. The Element Energy study identified a 400m off-set to dwellings, but this is considered to be extremely tight for the large-scale commercial turbines. Although the noise from such turbines would be unlikely to cause a disturbance, particularly in light of potential increased background noise from traffic using the new Bexhill to Hastings Link Road, turbines such as those used in Options 4 and 5 can be over-bearing so close to houses. Using this 400m off-set, it would be possible to install two large-scale turbines, but 600m to 700m from dwellings would be more desirable. The medium-scale turbines suggested in Options 1 to 3 are considered to be more suited to the identified sites.

5.2.8 Access to the identified sites is reasonable, although new site tracks would have to be built, possibly cutting across land which is currently used for arable purposes.

5.2.9 Because of the archaeological sensitivity of the area, archaeological surveys for the proposed development would be needed at a mid-range cost estimate of £500,000. These costs would significantly affect the viability of Options 1-3 with paybacks in the range of 6 to 7 years.

5.2.10 Grid connection of turbines to the local network by the local distribution network operator, UK Power Networks, would be possible. For Options 1 to 3, the cost would be in the region of £240,000. For Options 4 and 5, the costs would be approximately £900,000 and £1,200,000 respectively. This is because the higher power rating and generation output of Options 4 and 5 would require a connection back to a primary substation some distance from the sites.

5.2.11 It is not anticipated that there will be objections from aviation interests, as the identified sites for turbines are not believed to be within line of site of radar facilities.

5.2.12 Shadow flicker (particularly from Options 4 and 5) might affect some houses – but only for a few hours per year. Shadow flicker is something that can easily be mitigated by an inexpensive technical fix on the wind turbines should the need arise. It should not affect the chances of a project being approved.

5.2.13 Wind turbines have high capital costs and some running costs to consider. The output, costs and income of the turbines can be summarised as follows (including planning application costs, wind monitoring, archaeology costs, ecology costs, telecom links re-routing costs, access costs and grid connection costs):

	Option 1	Option 2	Option 3	Option 4	Option 5
Electricity generated kWh/yr	1,540,045	4,620,135	3,401,000	8,276,780	10,771,290
Total capital costs	£1,890,000	£3,922,000	£2,922,000	£6,643,000	£8,990,800
Total annual running costs	£32,553	£83,602	£62,589	£114,716	£149,290
Total gross income	£338,810	£646,819	£476,140	£743,255	£991,174
Net income per annum	£306,256	£563,217	£413,551	£628,539	£841,884
Payback in years	6.17	6.96	7.07	10.57	10.68
CO_2 Savings ($kgCO_2e$)*	842,435	2,527,306	1,860,415	4,527,564	5,892,111

5.2.14 Economically, Options 4 and 5 bring in a much bigger revenue stream than Options 1 to 3, once capital expenditure was repaid. However, the former would also require a much larger capital investment than the latter, and take much longer to achieve 'simple payback' (i.e. taking no account of interest payments) – in the region of ten years, as opposed to between 6 and 7 years.

5.2.15 This is due in part to the high capital (including a more expensive grid connection) and running costs of the larger machines, but is also because of the way the financial support system for wind turbines currently works in the UK. This has two parts – the generation tariff and the export tariff. For the identified sites, it is assumed that all electricity would be exported – but if a use for the electricity could be found, it would improve profitability.

5.2.16 The feed-in tariff has different bands of support, with higher generation tariffs for smaller installations. Options 1 to 3 take advantage of the 500kW to 1,500kW band, which pays 9.5p/kWh. Over 1,500kW, the tariff is only 4.48p/kWh, which means that turbines have to generate at least twice as much as the smaller installations to receive the same level of generation tariff income. Over 5MW (Option 5), an installation is not eligible to receive the feed-in tariff, and must receive support through Renewable Obligation Certificates and the open market, where prices are not fixed, although are similar to the feed-in tariff 1,500kW to 5MW band. This is why Options 4 and 5 would take so much longer to payback than Options 1 to 3.

5.2.17 Of the first three options, the most economic option is Option 1, because of the high tariff payments. Options 2 and 3 have similar payback periods of around 7 years. Option 3 would be preferable, because it only involves two turbines (less capital cost), whilst still reaching nearly the maximum installed capacity allowed under the feed-in tariff band.

5.2.18 Whilst any of the options considered would, in theory, be possible, and Option 1 has the best payback, it is recommended that Option 3 would be preferable, in terms of reasonable payback, low capital cost (including a low grid connection charge) and reasonable annual net income, and also in terms of the spatial constraints affecting the identified sites and the size of turbines that can reasonably be accommodated.

6.0 SUMMARY AND RECOMMENDATIONS

6.1 Key Findings

6.1.1 This study provides a broad 'in principle' assessment of the potential for installing wind turbines at Upper Wilting Farm within the Combe Valley Countryside Park between Hastings and Bexhill. The study examines the environmental/technical constraints and economic viability of 5 options that have been identified as representative scenarios for wind turbine development on the identified sites:

- Option 1 – one 500kW turbine, 54m rotor diameter, 50m tower height, 77m to blade tip
- Option 2 – three 500kW turbines, dimensions as above
- Option 3 – one 500kW turbine and one 900kW turbine, dimensions as above
- Option 4 – two 2.3MW turbines, 70m rotor diameter, 74m tower height, 109m to blade tip
- Option 5 – two 3MW turbines, 82m rotor diameter, 85m tower height, 126m to blade tip

6.1.2 The viability assessment has found that Option 3 (one 500kW turbine and one 900kW turbine with heights up to 77m to blade tip) is preferable in terms of technical and economic considerations. Subject to detailed design, mitigation measures and assessment as recommended below, Option 3 is also considered to be potentially feasible in terms of minimising risks of significant adverse landscape/visual, heritage or ecological impacts, and in terms of meeting the Combe Valley Countryside Park's objectives. Subject to re-routing the two microwave links that cross site C, it would be possible to locate one of the turbines under Option 3 on site C (within Hastings Borough). In line with the technical siting advice set out in the viability assessment (see Appendix 5.1), the other turbine should be located on site A (within Rother District).

6.2 Recommendations

6.2.1 The feasibility study identifies the key issues which would need to be addressed prior to submission of a planning application for wind turbine development on the identified sites. The main recommendations are:

- Submit request for an Environmental Impact Assessment (EIA) screening opinion to the relevant local planning authority to formally determine the need for an EIA.
- Submit request for an EIA scoping opinion to the relevant local planning authority to agree the detailed scope of the EIA with statutory consultees – it is expected that the key issues will include assessment of ecology (birds and bats), archaeology and visual effects.

- Undertake the required environmental surveys and assessments to inform the EIA.
- Refine the archaeological assessment costs once the turbine layout is decided.
- Undertake wind monitoring of the site (at one turbine location for at least one year).
- Undertake further work on identification of the preferred detailed site layout, turbine numbers and specifications (including associated grid connection and access infrastructure).
- Consult all relevant statutory consultees (including gas and telecom providers, aeronautical bodies, etc) and undertake technical studies/risk assessments as required in line with the recommendations of the viability assessment report.
- Develop a public relations and local stakeholder engagement strategy for the project.

6.2.2 With respect to the screening process, it is considered that a planning application for the two turbines proposed under Option 3 would require an EIA under the Town and Country Planning (Environmental Impact Assessment) Regulations 1999 (as amended). Under Schedule 2 of the EIA Regulations, the development would involve the installation of turbines with a hub height exceeding 15m and it is located in a 'sensitive area' (on land within 2km of an SSSI). Taking into account the selection criteria in Schedule 3 of the EIA Regulations, it is considered that EIA may also be required on the basis of the nature and size of development proposed by Option 3 being likely to have significant environmental effects by virtue of the environmental sensitivity of its location.

FIGURES

KEY

- Site location
- Proposed Combe Valley Countryside Park
- Main roads
- Indicative route of the Bexhill-Hastings Link Road

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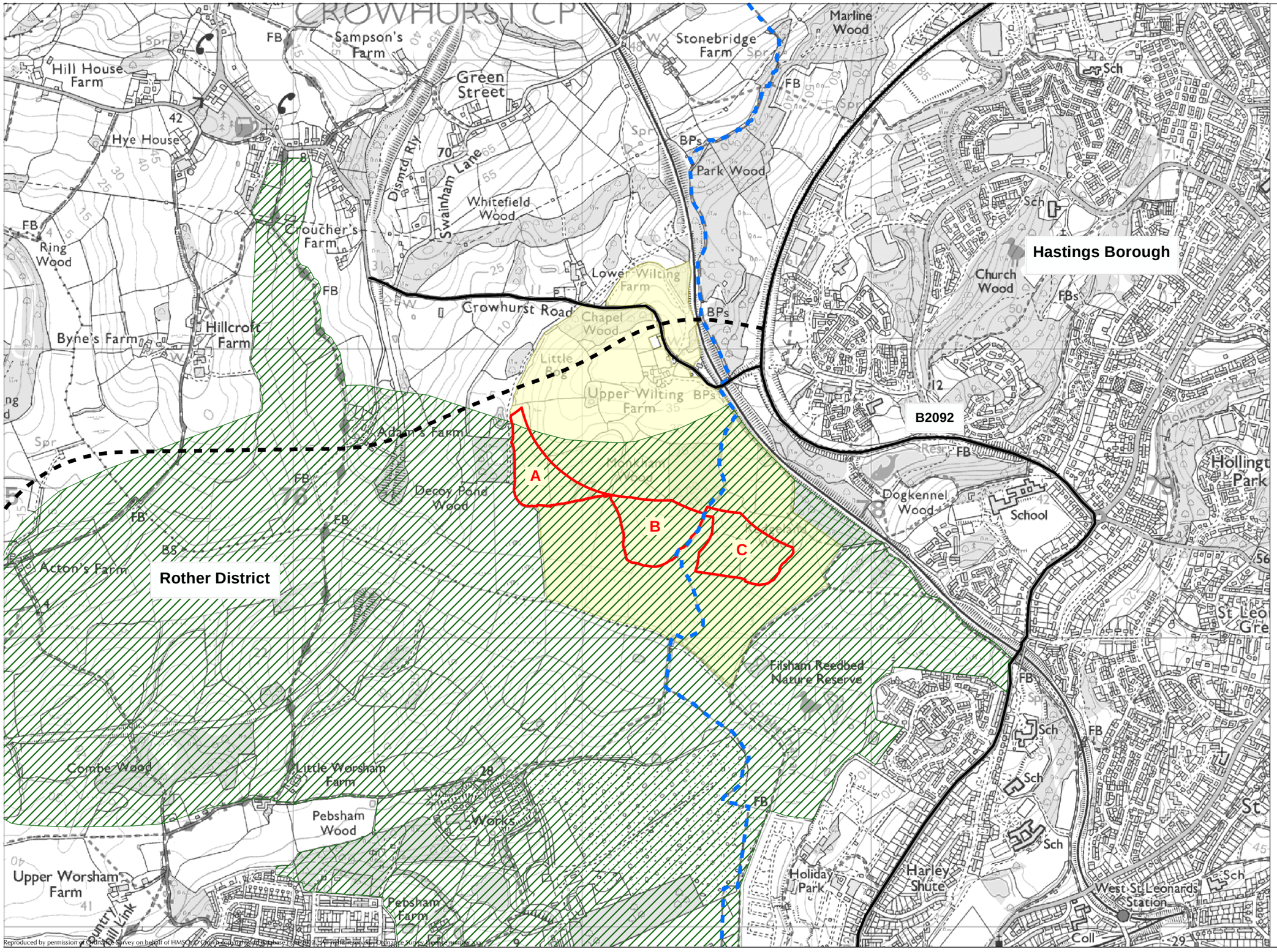
environment landscape planning

UPPER WILTING FARM
WIND TURBINE FEASIBILITY ASSESSMENT

N

FIGURE 1
Site Context Plan

MARCH 2013



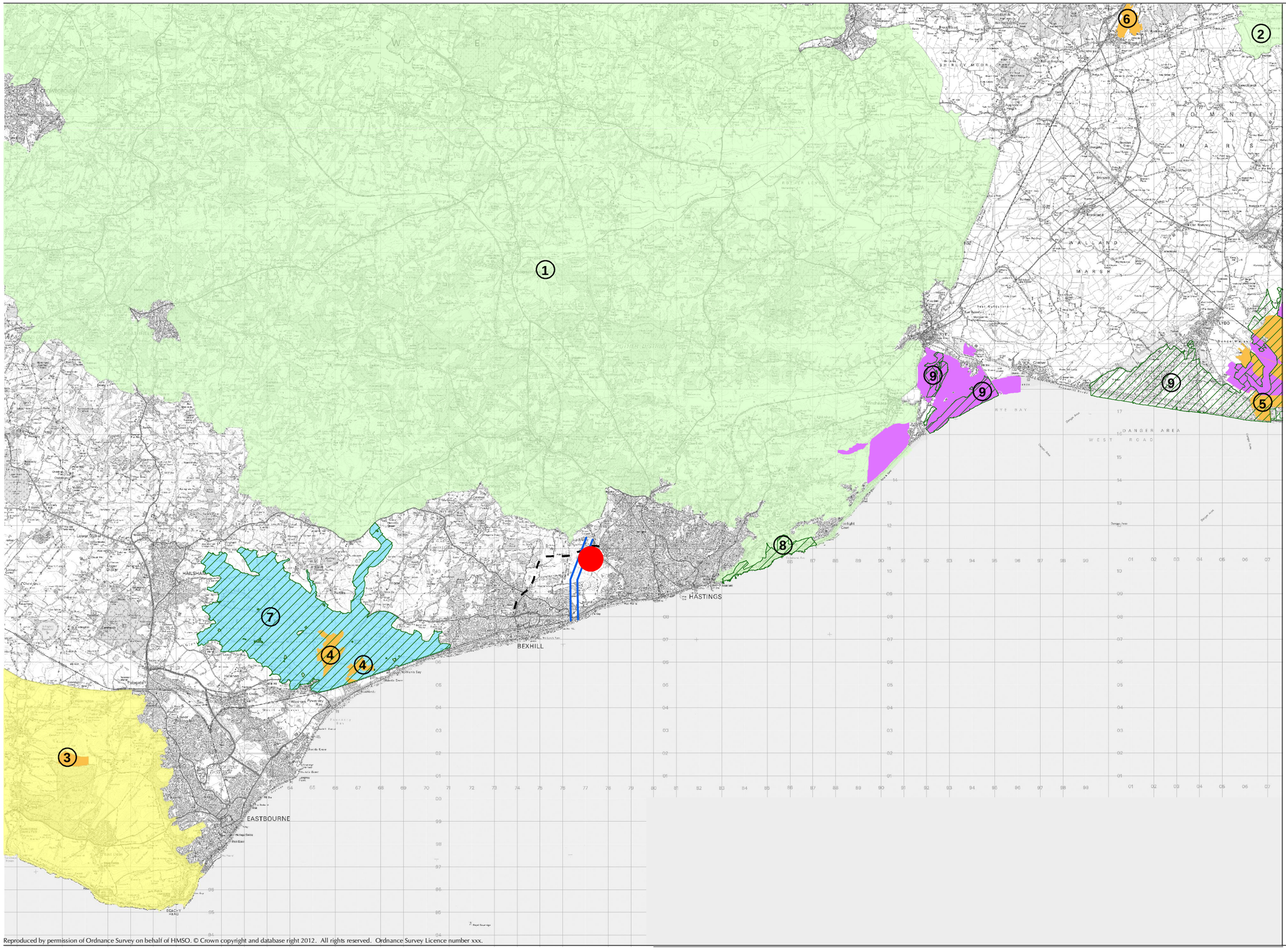
CHRIS BLANDFORD ASSOCIATES
environment landscape planning

UPPER WILTING FARM
WIND TURBINE FEASIBILTY ASSESSMENT

N

FIGURE 2
Site Location Plan

MARCH 2013



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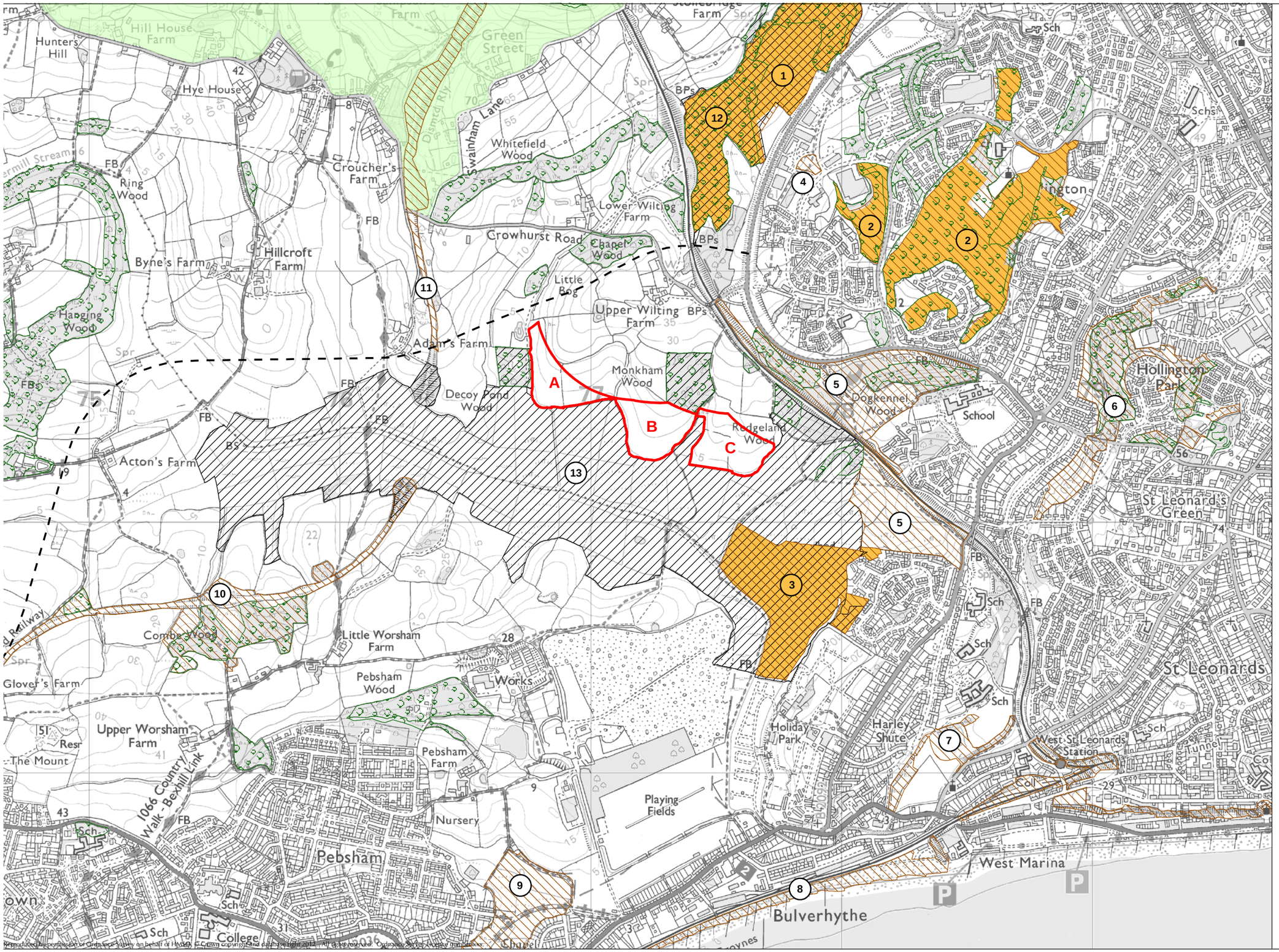
environment landscape planning

UPPER WILTING FARM
WIND TURBINE FEASIBILITY ASSESSMENT

FIGURE 3

Site Context - Environmental Designations

MARCH 2013



KEY

- Site boundary
- High Weald Area of Outstanding Natural Beauty
- Local Nature Reserve
  1. Marline Valley Woods
  2. Church Wood and Rosback Wood
  3. Filsham Reedbed
- Site of Nature Conservation Interest/Local Wildlife Site
  1. Marline Valley Woods
  2. Church Wood and Rosback Wood
  3. Filsham Reedbed
  4. Wainwright Close
  5. Wishing Tree
  6. Ponds Wood
  7. South Saxons
  8. Bulverhythe Shingle Beach and Cliffs
  9. Glyne Gap
  10. Disused Railway, Bexhill
  11. Disused Railway, Crowhurst
- Site of Special Scientific Interest
  12. Marline Valley Woods
  13. Combe Haven
- Ancient Woodland
- Indicative route of the Bexhill-Hastings Link Road

See Appendix 3.1 for heritage designations

0 250 500 m

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environment landscape planning

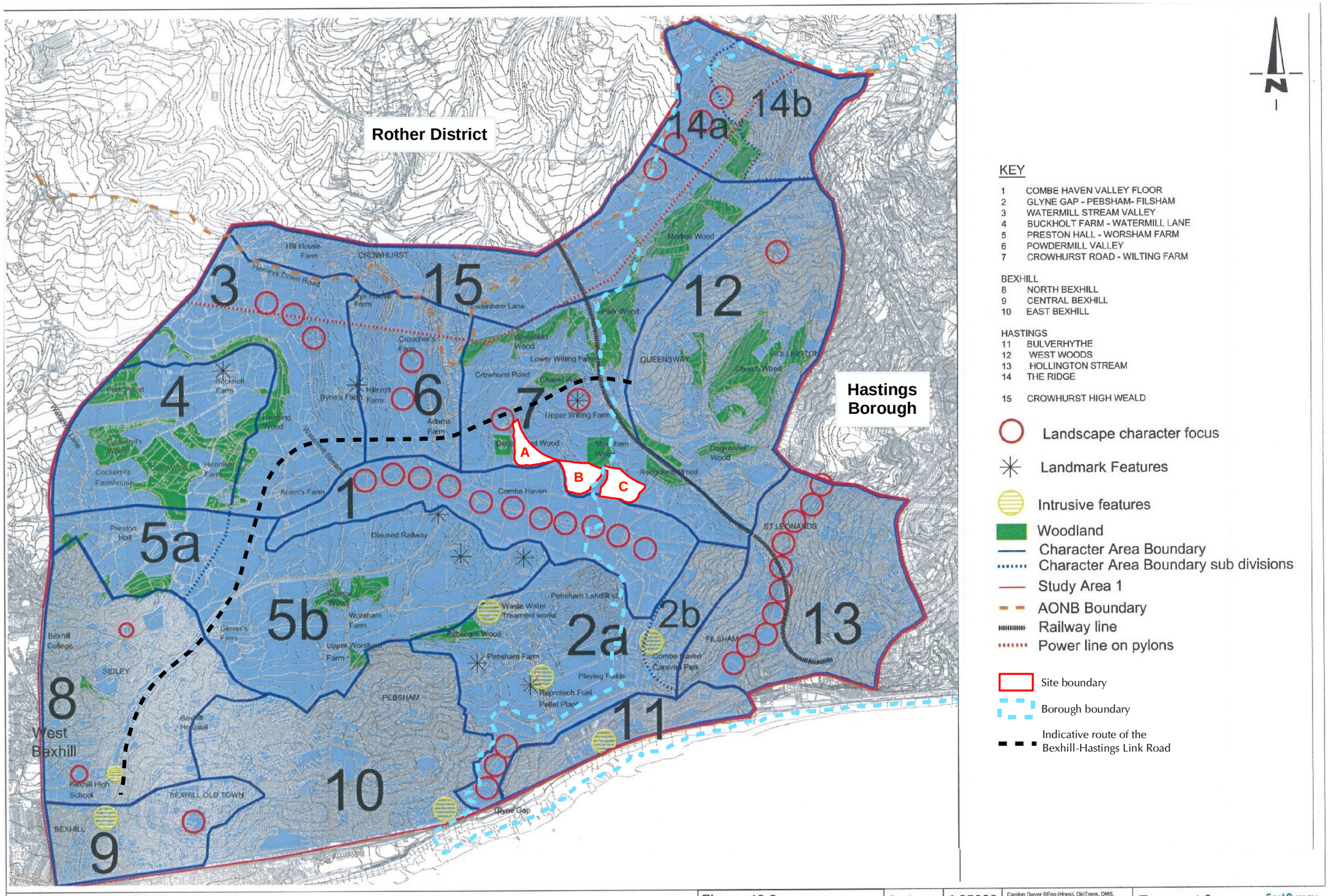
UPPER WILTING FARM
WIND TURBINE FEASIBILTY ASSESSMENT

N

FIGURE 4

Site Location - Environmental Designations

MARCH 2013



BEXHILL TO HASTINGS LINK ROAD

Figure :13.6	Scale	1:25000	Carolyn Dwyer BEng (Hons), DipTrans, DMS, MIHT MILT Assistant Director, Transport & Waste County Hall, St. Anne's Cresent Lewes, East Sussex BN7 1UE Telephone: 01273 481000
Landscape Character Areas (Baseline)	Sheet	1of 1	
	Revision		April 2007

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APPENDIX 2.1

Landscape Baseline Conditions –

Extract from Bexhill-Hastings Link Road Environmental Statement

13.3 Landscape Baseline Conditions

Landscape Context

13.3.1 The Study Area 1 and landscape designations are indicated on Figure 13.1 which comprises the Combe Haven Valley and surrounding landscape and townscape. The northern part of the Study Area 1 is in the High Weald AONB.

13.3.2 The Combe Haven area lies between, and on the edge of, the towns of Bexhill and Hastings, on the southern edge of the High Weald. It shares many characteristics of the High Weald landscape:

- Rolling terrain,
- Abundant woods, trees and hedges;
- Streams; and,
- Farms and settlements sited prominently on ridges.

13.3.3 The landscape to the north of Bexhill is dominated by the Combe Haven Valley and surrounding ridges. This broad, flat-floored main valley curves north then west. With its ecologically important and visually distinctive wetlands, notably the Filsham reed beds, the valley is the focus of the Study Area 1. The tributary valleys running in to the Combe Haven Valley create a ridge and valley system, particularly marked on the north side of the Combe Haven.

13.3.4 Settlements within the Study Area 1 include the urban area of north Bexhill, the western edges of Hastings and the village of Crowhurst to the north. Other wise there are scattered farms, usually on the surrounding ridges. Some of these are small settlements with several residential buildings associated with the farms for example Hillcroft, Hye House, Actons and Worsham Farms.

13.3.5 The area has local value as accessible, attractive countryside, with public and permissive footpaths.

Landform and Drainage Patterns

13.3.6 The series of ridges extending in to the valley rise to 45m AOD at Hye House Farm and Upper Worsham Farm and 35m AOD at Upper Wilting and Little Worsham Farms. The artificial hill created by the Pebsham landfill operation will have a final height of 36m AOD after settlement. The urban area of Bexhill slopes gradually towards the sea from the Worsham ridge. The urban extension of Hastings at Bulverhythe is on the flat coastal flood plain. The west St Leonard's area, which forms the eastern edge of the Study Area 1, rises gradually to the urban parts of Hastings. The land to the north of the Combe Haven rises up to the Battle to Hastings Ridge (136m AOD) and the High Weald AONB.

13.3.7 The Combe Haven River valley runs from west to east and is the main valley. The tributary streams of the Watermill Stream, Powdermill Stream and Decoy Stream run into the Combe Haven from the north creating a distinctive ridge and valley system. The streams emerging in the south side of the valley are smaller. The Pebsham Stream and springs arising on Worsham Farm and Glovers Farm run in to the valley from the south. These have created a ridge and valley system on the south side of the main valley.

Land Cover

13.3.8 Figure 13.8 shows the vegetation pattern within the Study Area 1. The Combe Haven valley floor and main tributary valleys are floodplain grassland. There are fields within the floodplain where scrub is encroaching and changing the open nature of the valley. The historic pattern of drainage channels support reeds and other wetland habitat species. The Filsham and Glyne Gap reed beds are therefore significant landscape and habitat features. Above the floodplain on the valley slopes there is a mix of arable, rye grass ley and pasture.

13.3.9 The surrounding ridges support significant areas of woodland, much of this is semi-natural ancient deciduous woodland. The largest area of woodland is in the west of the Study Area 1 between Combe Haven Valley and Watermill Stream, notably Cole Wood, Park Wood and Hanging Wood. There are ghyll woodlands in the Decoy Stream valley linking Chapel, Little Bog and Decoy Pond woods. The disused railway running through the urban area of Bexhill and into the Combe Haven Valley supports mature secondary woodland. This extends in to the valley on the embankments of the dismantled railway. The woods around the urban edge of Bexhill are significant in softening the impact of the built up area on the countryside, for example Levetts, Roundacre and Pebsham Woods. The heavily treed railway line from Hastings to Crowhurst merges with the significant woods of Redgeland Park and Marline Woods to give a heavily wooded cover to the north-east of the area.

13.3.10 The agricultural fields on the slopes surrounding the main Combe Haven Valley are generally enclosed by mature hedges with scattered mature trees. There are significant mature and ancient hedgerows in the Glovers and Worsham Farm areas. The hedgerow structure on the Powdermill Valley slopes has fewer substantial hedges and more remnant hedges. The tall overgrown hedge surrounding Adams farm is an exception to this. To the west of Acton's and Glovers Farm the hedges are low and intermittent with the exception of those associated with the ancient track and bridleway between Buckholt Lane and Hillcroft Farm. This is linked to a significant hedge/tree belt to the north of Acton's Farm. There is also a significant hedge to the north of Glovers Farm, which links the disused railway to the allotment garden hedge. There is a strong hedge structure on the north slopes of the Combe Haven Valley between Adam's Farm and Upper Wilting Farm. The hedges, tree belts and woodland on these slopes give this area a heavily wooded appearance.

13.3.11 There is not a heavy tree cover in the urban area of Bexhill, the vegetation on the disused railway line being an exception. Similarly trees on Bexhill Down and in Sidley Wood are significant. The tree lined avenues in the older settlements along Hastings Road and Chantry Lane are also significant.

Much of the tree cover is in the older settlements of Sidley and Old Town and in gardens. New planting associated with King Offa Way contributes to the urban tree cover. There are some mature oak trees scattered in the urban area, notably around Woodsgate Park Bridge.

13.3.12 There are significant areas of woodland within the western built up area of Hastings, notably the Hollington Stream Valley and Church Wood. Planting associated with the new development areas and the Queensway is maturing to create a woodland setting for the suburban areas.

Landuse

13.3.13 Most of the Combe Haven Valley is in mixed agricultural landuse. The open levels which are subject to seasonal flooding are mainly under pasture. There are areas of arable farming on the slopes rising out of the valley. There are equestrian interests on some farms notably Acton's, Bynes, Haven on the Hill, Buckholt , Upper Wilting, Glovers and Pebsham. The disused railway on the south side of the valley is used as an informal path from the urban area of Sidley giving access to footpaths which cross the valley. The northern part of the railway from Adam's Farm to Crowhurst Road is in private ownership and is used for clay pigeon shooting. The Pebsham landfill site will be restored to public open space. The area to the south of the landfill site has been restored as sports pitches. There are several wooded areas which are not in commercial forestry and are generally unmanaged some of these have informal recreational value as they are close to the urban area, for example Levetts Wood, Roundacre Wood, Church Wood and Marline Wood.

13.3.14 The urban areas are mainly residential with some commercial centres. There is a large caravan holiday park on the eastern slopes of the Combe Haven Valley and a balancing pond used for fishing adjacent to Queensway. Queensway is also the focus of urban edge industrial estate developments.

Cultural Associations

Belle Hill and Wrestwood Estate

13.3.15 The area of Belle Hill originally grew up around the Napoleon barracks which were established around Belle Hill and Old Town. The remainder of the barracks were removed when King Offa s Way was built in 1978–1980. The construction of King Offa Way swept away much of Belle Hill, the road which linked Old Town to Bexhill Down. Other notable buildings which were removed by the King Offa Way scheme were Belle Hill laundry and the Corn Stores. The former served the many private schools for which Bexhill was well known in the early to mid 20th century. The laundry also thrived due the growing popularity of the town as a seaside resort during late Victorian times and rapid increase in hotels in the area.

13.3.16 Wrestwood Mansion and surrounding estate was owned by Sir Edward Baldwin Malet from 1837 to 1908. He was a wealthy local benefactor and his widow established the Malet Memorial Institution as a recreational and

religious meeting place for local men. This building became the Church of the Good Shepherd and is now a Chinese restaurant on the junction of Belle Hill and London Road. The mansion is now St Marys Wrestwood Educational Trust on Wrestwood Road.

Railway Bexhill to Crowhurst

13.3.17 The Bexhill branch line was constructed between 1887 and 1902, this linked Bexhill to Crowhurst. A grand suburban station was built in Crowhurst at the junction of the new railway spur in 1902, in anticipation of expansion of development. The railway was removed as part of the Beeching closures and the viaduct across the Combe Haven Valley was finally demolished in 1969. The abutments of this are still evident as significant and heavily wooded features extending in to the valley. There was a station at Sidley and the old Station House was opposite the Pelham Hotel on Holliers Hill. There is a goods shed on the opposite side of the disused railway here which is now derelict. The original railway bridges are still in use as access routes across the disused railway line at Woodsgate Park, Ninfield Road and Glovers Lane.

Historic Settlements and Farmsteads

13.3.18 Prior to the coming of the railway and the rise in popularity of Bexhill as a seaside resort in the late Victorian period, the original settlements were a series of scattered villages and farms. The village of Sidley Green was linked to the fishing village of Bexhill via Holliers Hill and Chantry Lane. The old town of Bexhill was the core of the village and the area between here and the coast was undeveloped. There was a settlement at Glyne Gap as this was the nearest accessible part of the coast between cliffs. Bexhill was linked to Glyne Gap and Hastings via Lodge Hill, now Wrestwood Road and Hastings Road. The Barracks were located around Bexhill Down, to the west of Bexhill.

13.3.19 There were many scattered farms, some of which no longer exist. Some, such as Belle Hill Farm, were swallowed up by the expanding urban development. Belle Hill Farm was owned by Samual Scrivens who laid out the southern part of London Road (originally Lower Station Road) from Victoria Road in the south to Belle Hill. This linked the coastal development to the main Bexhill Common Road. The northern part of London Road was built by 1925 as a direct connection to the growing Sidley area.

13.3.20 Many of the existing farms have retained the same names since the maps of late 1700s and early 1800s Other farms to the north of Sidley which have since disappeared include Ingrams Farm and Woods Farm , to the north of Sidley and Combe Farm to the north of Combe Wood, little evidence of these buildings exist today.

13.3.21 Crowhurst is noted for its Home of Healing founded by Reverend Howard Cobb in 1928 and its ancient yew trees, thought to be some of the most ancient in existence.

Brick Works

13.3.22 Small brick works were scattered across the area and there is still evidence on the ground of local clay workings. There were brick works at Sidley Green, to the east of Levetts Wood and in Pebsham east of Roundacre Wood. The rapid development during the late 19th and early 20th century would have provided a demand for bricks which are a characteristic and vernacular building material for this area at the time.

Landscape Assessment Framework

13.3.23 The Countryside Character Map of England Volume 7: South East and London (Countryside Agency 1999) is a study at the regional scale which identifies broad landscape character areas across England. The entire Study Area 1 is within the High Weald character area.

13.3.24 The following is a summary of the key characteristics for the High Weald character area from this document:

- A well wooded landscape rising above the Low Weald and deeply incised to give a complex pattern of ridges and steep stream valleys;
- Distinctive and scattered sandstone outcrops rise above the farmland and woodland;
- Heathland at Ashdown Forest;
- Main roads and settlements are sited along prominent ridges-lines with a dense network of small winding lanes linking scattered villages, hamlets and farms;
- Legacy of the early iron industry, based on sandstone, ore, water and timber;
- High forest, small woods and copses and a network of hedges and shaws link small irregular fields created from cleared woodland. Flower rich meadows bordered by species rich hedges. Quiet pastoral landscape with mixed farming predominating;
- Fruit and hop cultivation; and,
- Distinctive red tile, brick, local stone and timber building materials. Local building materials characterize the area but recent ‘suburbanisation’ of farm buildings is eroding distinctiveness in many places.

13.3.25 The key characteristics from the Countryside Character Map of England Volume 7: South East and London (Countryside Agency 1999) which are relevant to the Study Area 1 are in summary:

- A well wooded landscape rising above the Low Weald and incised to give a complex pattern of ridges and stream valleys;
- Main roads and settlements are sited along prominent ridges-lines with a dense network of small winding lanes linking scattered villages, hamlets and farms;

- Legacy of the early iron industry, coppice woodland and hammer ponds based on sandstone, ore, water and timber;
- High forest, small woods and copses and a network of hedges and shaws link small irregular fields created from cleared woodland. Meadows bordered by species rich hedges. Quiet pastoral landscape with mixed farming predominating; and,
- Red tile, brick and timber are characteristic of historic settlements, farms and cottages. Local building materials characterize the area but recent 'suburbanisation' of farm buildings is eroding distinctiveness in many places.

13.3.26 The relevant forces for change are:

- Development around built up areas;
- Loss of characteristic landscape features, hedgerows, meadows, and wooded ghylls due to inappropriate management;
- Fragmentation of agricultural holdings, introduction on non-characteristic materials and planting;
- Pressures on the landscape from new main roads;
- An increase in traffic on small roads and lanes;
- Loss of remoteness and erosion of local character; and,
- Decline in traditional management of small coppice woods.

13.3.27 The High Weald, Exploring the Landscape of the High Weald AONB (Countryside Commission 1994). This document is a regional landscape assessment covering the area of the High Weald AONB. It was produced as a collaboration between The Countryside Agency, East Sussex, West Sussex, Kent and Surrey County Councils. It is an advisory document and not Supplementary Planning Guidance.

13.3.28 According to the above document the northern part of the Study Area 1 lies at the western edge of the Brede character area:

"*On the steeper slopes near Hastings and Battle smaller fields and a predominance of pasture give the landscape a less intensively farmed feel, interspersed by the subtle influence of the pony paddocks and barbed wire of the urban edge".*

13.3.29 The pressures on this area are :

- Increasing traffic on country lanes;
- Suburbanization;
- Agricultural diversification;
- Lack of woodland and hedgerow management;
- Loss of hedges; and,
- Degradation of ponds.

13.3.30 East Sussex Trees and Woodland Strategy (East Sussex Trees and Woodland Forum 1990) is a county level landscape assessment document which identifies landscape character areas based on 1km Ordnance Survey grid squares. It is not Supplementary Planning Guidance but a technical landscape assessment available as a tool to all those involved in arboricultural or forestry activities in the county. The Study Area 1 falls into the following areas:

Combe Haven Basin: "*Series of small winding High Wealden Valleys converging to form the tract of levels which curve east and south to reach the sea at Glyne Gap, between Hastings and Bexhill. Distinguishing features of the area include views of the sea and coastal towns and the historic parklands of Battle Abbey. The area is influenced by the adjacent urban areas, with Hastings Town Development Area encroaching, a number of power lines and caravan sites, but much pleasantly rolling, well wooded countryside.*"

Bexhill: "*Large 20th Century mainly residential town built on gently sloping ground. The seafront severed from rest of town by railway has notable features, e.g. De La Warr Pavilion. Bexhill Old Town with its church, Church Street and Manor grounds is of particular note. The town is marginally but vitally separated from Hastings St Leonards by Glyne Gap and Combe Haven Valley, a fragile but vital green space with Galley Hill of some local dominance and attraction."*

Hastings: "*The High Weald sandstone ridges meet the sea at Hastings creating a series of headlands particularly to the east of the town. The Castle takes advantage of the West Hill and other Old Town buildings relate well to the bold landform. The town has strong ribbon of parks, open spaces, and sheltered ghylls eroded into sandstone, with good trees and woodlands only curtailed by sea winds on the exposed seafront. The bold landforms and woodland have influenced the development of the town and should continue to do so.'*

13.3.31 *East Sussex Landscape Assessment (ESCC 2007)* is an update of previous assessments at a county scale, it is a technical document produced in consultation with the district and borough councils. The Study Areas 1 and 2 are covered by seven character areas:

- The Combe Haven Basin, 10;
- Bexhill, 30;
- Hastings, 31;
- Pevensey Levels, 25;
- South Slopes of the High Weald, 5;
- Battle 40; and,
- Brede Valley, 11.

The Combe Haven Basin, 10

13.3.32 The key characteristics, features and pressures relevant to the Study Area:

- Focal open flat winding valley floor;
- Contrast between open valley floor and slopes;
- Extensive areas of ancient woodland;
- Filsham Reed Beds;
- Urban edges;
- Bexhill Hastings Link Road; and,
- Reducing viability of farming.

13.3.33 The landscape action priorities are:

- Establish strong development boundaries to Hastings and Bexhill;
- The development of proposed Pebsham Countryside Park;
- Urban fringe landscape management;
- Review conservation and enhancement of Combe Haven Valley; Increase flooding areas and wetland and reduce engineered features; and,
- Increase tree cover on slopes to help contain development.

Bexhill, 30

13.3.34 The relevant priorities are:

- Traffic management;
- Improved pedestrian and cycle access and tree planting;
- Development of proposed Pebsham Countryside Park in conjunction with other regeneration initiatives; and,
- A tree strategy for the town to strengthen character.

Hastings, 31

13.3.35 The relevant priorities are:

- Improve connections to seafront beach and town;
- Continue the regeneration and improvement programme to the seafront; and,
- Improve western approach through Glyne Gap and Bulverhythe.

Pevensey Levels, 25

13.3.36 Key characteristics, pressures and priorities relevant to the study area are:

- Remoteness;
- Open and flat landscape;
- Traffic on the A259 and rat running in country lanes;
- Agricultural change; and,
- Coastal conservation and managed retreat.

South Slopes of The High Weald, 5

13.3.37 Key characteristics, pressures and priorities relevant to the study area are:

- High Weald landscape, well wooded and remote in places;
- Scattered rural settlement;
- Winding lanes and rat running; and,
- Agricultural change and suburbanisation.

Brede Valley, 11

13.3.38 Key characteristics, pressures and priorities relevant to the study area are:

- Wide river valley, remote and pastoral landscape;
- Historic villages and scattered farm steads on ridges;
- Pressure from holiday developments; and,
- Transport improvements to the A21 and rat running on country lanes.

Battle, 40

13.3.39 Key characteristics, pressures and priorities relevant to the study area are:

- Ridge top picturesque historic town, dominated by the Abbey;
- Medieval and Georgian high street attracting high visitor numbers;
- Reduction of Traffic speeds through the town and on approaches;
- Rationalisation of Parking, especially in the summer season; and,
- Control of Ribbon development on approaches.

13.3.40 Tranquil Areas were mapped nationally for England and Wales the maps were drawn at a regional level, ignoring the most local effects (England Map, South East Region (CPRE and Countryside Commission 1995)). They are defined as "*places which are sufficiently far away from the visual or noise intrusion of development or traffic to be considered unspoilt by urban influences"*. The Study Area 1 is not within an area of tranquillity according to this study, there are areas to the north of Crowhurst and within the AONB which are mapped as tranquil.

13.3.41 Saving Tranquil Places (CPRE 2006) is a national map of tranquillity produced by CPRE to build on the previous work using more sophisticated mapping techniques and extensive public consultation. These maps are not an update of the original maps because the methodology is not directly comparable.

"The methodology developed differs from the previous work on tranquillity mapping in four key ways:

- *Rather than starting with an 'expert' definition of what comprises tranquillity , we have started with extensive public and stakeholder consultation To define what factors contribute to and detract from tranquillity;*
- *Previous work has focused exclusively on factors that detract from tranquillity. Our approach includes factors that contribute to, as well as detract from tranquillity;*
- *We use the term 'relative tranquillity' to describe what we are mapping. Relatively tranquil areas are those which have higher scores for the positive factors, than other areas. Our maps reveal areas, both large and small, where people are likely to experience tranquillity. But they do not include sharp lines dividing tranquil from non tranquil areas; and,*
- *Our approach incorporates more advanced modeling techniques to look at the diffusion of these factors."*

13.3.42 In 2000 a critique of the original CPRE maps was published. It argued that what was needed was a measure of tranquillity that included all, and only those sources of disturbance which people feel actually damage

tranquillity; and which weighted them in proportion to peoples "*perceptions of relative impacts on tranquillity*".

13.3.43 The maps have been produced using a Geographic Information System on 500m grid squares. The mapping produces a spectrum of more or less tranquil areas. The tranquillity mapping for East Sussex is reproduced in Figure 13.3A and, for Study Area 1, in Figure 13.3.

13.3.44 There is a gradation of increasing tranquillity away from the urban areas of Bexhill and Hastings. There is a small pocket of tranquillity in the Combe Haven Valley and extending west onto the heavily wooded ridge of Buckholt Farm in the centre of the Study Area 1, this is relative to the disturbance of the urban area. There are small pockets of relatively most tranquil areas in the High Weald to the north of the Study Area 1 around Dallington and Darwell and an extensive area to the east of Rye at Camber. There are also tranquil areas on the Pevensey Levels.

13.3.45 Remoteness at the Local Scale, An Application in East Sussex (ESCC 1997) is a topic paper of the East Sussex Landscape Assessment. The work in East Sussex has been concerned with remoteness rather than tranquil areas (see CPRE definitions above). Tranquillity is defined in the document according to the CPRE quotes above. According to the ESCC study "*Remoteness, on the other hand, implies an ability to experience a degree of solitude as well as separation from noise and visual disturbance and urban-associated activity, so it is more affected by scattered development, and sometimes less affected by distant noise sources."*

13.3.46 As shown in Figure 13.2, part of the Combe Haven basin is identified as an area of exceptional remoteness, which is surrounded by remote countryside. There are other areas of remote landscape to the north and west of the Study area 1 and pockets of exceptional remoteness in the High Weald AONB and on Pevensey Levels.

High Weald AONB

13.3.47 AONB policy is dealt with in detail in Chapter 5. The north part of the Study Area 1 is within the High Weald AONB. AONBs are designated by the Countryside Agency subject to confirmation by the Secretary of State, under the National Parks and Access to the Countryside Act 1949. The primary objective of designation is to have regard to conserving and enhancing the natural beauty of the landscape.

13.3.48 The Character Map of England identifies the entire Study Area 1 as being in the High Weald character area, including the urban areas of Hastings and Bexhill. In terms of regional character this is the case as it has the typical characteristics of this character description. However not all of this regional landscape Character Area is within the High Weald AONB because it is not of the same quality as the designated landscape.

13.3.49 The boundaries to the AONB generally follow identifiable features in the landscape in this case Henleys Down Road, Crowhurst Road and Swainham Lane. For this reason the boundaries are not necessarily the limit of the High Weald landscape character. Indeed, in this Study Area 1 the countryside adjacent to the AONB is of similar character to the AONB landscape, but not necessarily of the same quality. Local character areas for Study Area 1 are identified on Figure 13.6. These have been evaluated using the Evaluation Criteria in Table 13.1 and the evaluation summary in Table 13.10.

13.3.50 The High Weald AONB, character area 15, is identified as High Quality landscape. Character area 14A is of similar character, but the quality of the area is affected by the urban expansion of Hasitngs and is therefore considered to be ‘Good’. Character Areas 3, 6 and 7 have similar character to the High Weald AONB, but are not of the same quality and are therefore categorized as Good landscape. Area 1, the valley floor is categorized as Good landscape but is of a different character to the High Weald AONB. Those areas immediately to the north of the valley are also valued for their nationally significant wildlife importance. The character areas to the south of the valley, 5 and 2, are of similar character but are of lower quality due to proximity to the urban area and urban influences on the landscape. Other character areas are urban.

13.3.51 There is in effect a buffer zone to the AONB landscape; this is identified in Figure 13.4. As described above this is an area of similar character but not of the same quality as the AONB landscape and not covered by the same planning policies. This is supported by East Sussex Brighton and Hove Structure Plan 1991-2011 AONB policy EN2 (f) is as follows:

“Conserving and enhancing landscape quality and character will be the primary objective in the Sussex Downs and High Weald AONBs. This will be sought through measures including :-

f)... minimising the impact of any development within AONBs, or close to them and affecting their setting, by measures to carefully integrate the development

into the AONB landscape and, where appropriate, providing compensating environmental resource for any necessary loss that is accepted."

Character of the Study Area 1

13.3.52 The Study Area 1 is identified on Figure 13.1. For the purposes of this assessment the area has been divided into broad landscape types. As defined below the sensitivity of these different landscape types to the proposed type of development is assessed. The detailed assessment of impacts is based on the two most distinctive features of the Study Area 1:

- The broad flat-floored main valley curving north then west, with its ecologically important and visually distinctive wetlands, notably Filsham Reed Beds Local Nature Reserve which is within the Combe Haven (SSSI) This valley and particularly its broad open floor is the focus of the Study Area 1.
- The impact of the adjacent urban areas, including prominent built-up edges, the conspicuous Pebsham landfill site, pylons, development and recreational pressures. This impact is less obvious towards the north-west, but is everywhere evident. The development along Filsham Ridge, and the landfill site, are widely visible, particularly from the open valley floor.

Landscape Types

13.3.53 These are distinct types of landscape that are relatively homogenous in character. They may occur in different parts of the country, but wherever they occur they share broadly similar combinations of geology, topography and drainage patterns. Landscape types are identified in Figure 13.5.

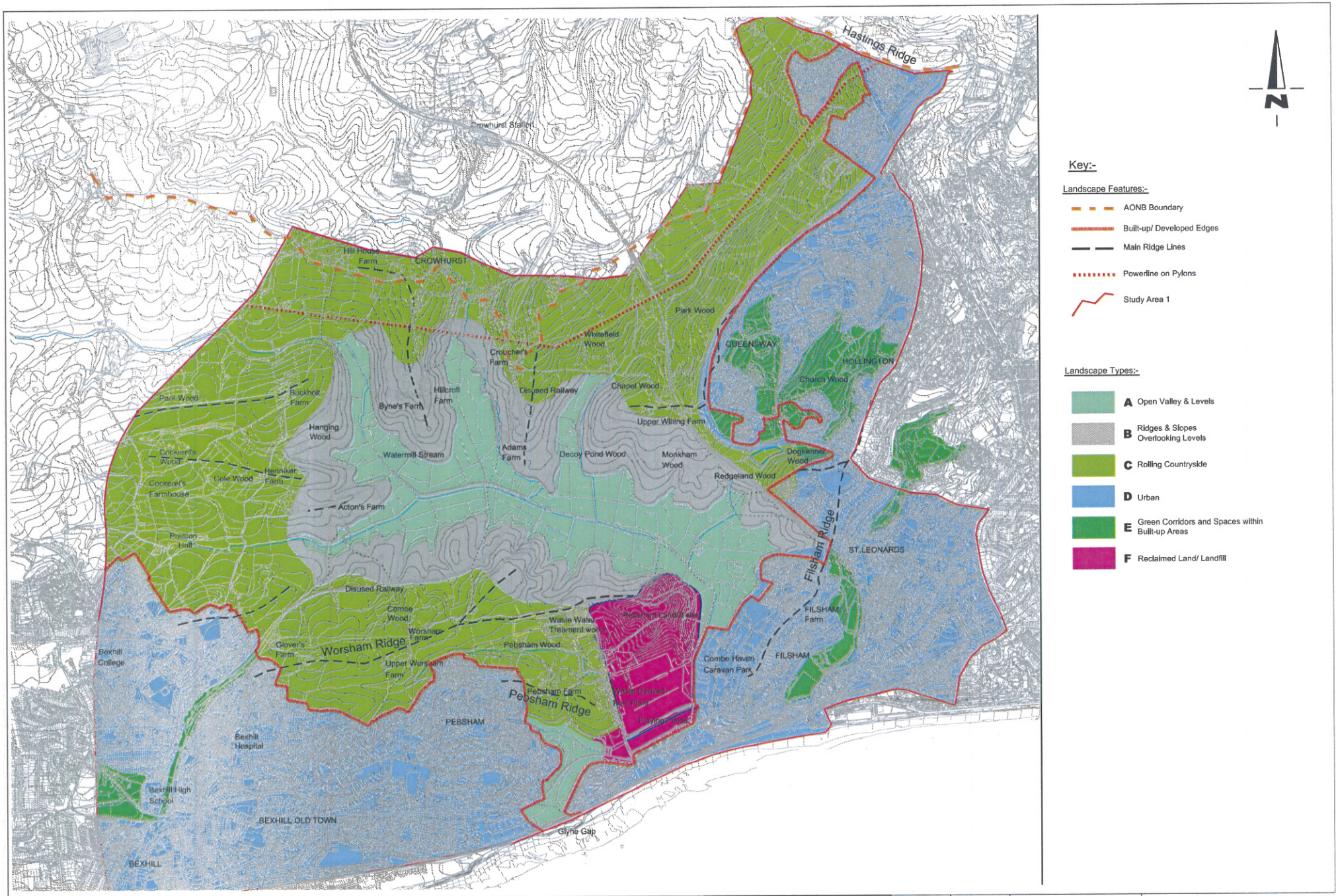
13.3.54 These are landscape areas which occupy a significant area. They are not the same as landscape character areas, which may contain more than one landscape type. The following landscape types are found within the Study Area 1:

A - Open valley floor and levels

13.3.55 The main area of this type lies along Combe Haven, extending north from Bulverhythe before curving westwards for about 3 km. The main tract of levels ends near Acton's Farm, but narrow bands extend up side valleys to Crowhurst as the Powdermill Stream valley and into the Watermill Stream valley. A smaller area of levels extends north from Glyne Gap towards Pebsham.

B - Ridges and slopes overlooking the levels

13.3.56 These combine with the levels to create the distinctive landscape of the main valley. Slopes are gentle and the contrast with the flat valley floor is emphasized by a strong pattern of woods, trees and hedges. Open views across the levels are interspersed with secluded dips and closed woodland



Key:-

Landscape Features:-

- AONB Boundary
- Built-up/ Developed Edges
- Main Ridge Lines
- Powerline on Pylons
- Study Area 1

Landscape Types:-

- **A** Open Valley & Levels
- **B** Ridges & Slopes Overlooking Levels
- **C** Rolling Countryside
- **D** Urban
- **E** Green Corridors and Spaces within Built-up Areas
- **F** Reclaimed Land/ Landfill

BEXHILL TO HASTINGS LINK ROAD

Figure : 13.5	Scale	1 : 25000	Carolyn Dwyer BEng (Hons), DipTrans, DMS, MIHT MILT Assistant Director, Transport & Waste County Hall, St. Anne's Crescent Lewes, East Sussex BN7 1UE Telephone: 01273 481000
Landscape Types (Baseline)	Sheet	1 of 1	
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areas, with farm building groups adding to the variety. The following distinct ridges are apparent:

- The ridge crowned by Hillcroft Farm. This ridge is open, but patterned with hedges and trees, and with conspicuous buildings and tree groups on its crest. Some of these buildings are traditional, but others are modern and rather intrusive;
- The Buckholt Farm ridge. This is a broader ridge, but the steeper slopes. Areas where it descends to the valley are emphasized by bold woodland belts;
- The rolling slopes of Worsham ridge on the south side of the valley; and,
- Adams Farm ridge which is heavily treed.

C - Rolling countryside away from the main valley

13.3.57 This is the area away from the main valley, and visually more separate from it than the ridges and slopes. It is most extensive in the south and west of the Study Area 1 and extends into the AONB north of Crowhurst. The upper Watermill Stream valley, north of Buckholt Farm, is included in this landscape type. This area is the westward continuation of the main valley; however the flat valley floor fades away and is of lesser landscape significance.

13.3.58 The gently rolling terrain of this landscape type is complemented by a rich tapestry of fields, hedges, trees and woods. Some of the woods are extensive. There is a scatter of farms and dwellings, but the rolling terrain and trees create good cover.

13.3.59 The urban edge of Bexhill is well hidden in all but the closest views. North of the valley the areas with this type of landscape occur along Crowhurst Road, along the railway and north into the AONB. Blocks of woodland such as Monkham Wood and Redgeland Wood separate it from the slopes adjacent to the main valley. The area across the railway is influenced by Queensway and the built up area of Hastings.

D - Built-up areas

13.3.60 These are areas in which building development is dominant or conspicuous. They include the east of Bexhill and the communities of Old Town, Sidley and Pebsham. The urban edge of Bexhill is enclosed largely by mature woodland around Sidley. The eastern edges of the town at Pebsham are intrusive in the neighbouring countryside and from long views on the Hastings ridge.

13.3.61 Also within the Study Area 1 is the urban area of west Hastings including St. Leonard's on sea, Bulverhythe, Filsham and Queensway. Despite an abundant tree cover, particularly north of the railway, the rolling or sloping terrain sometimes increases the visual impact of development from surrounding countryside.

13.3.62 This is particularly the case on Filsham ridge, where the housing development and holiday park are visible from the west, particularly the open levels around Combe Haven. However some of the new residential estates east of Queensway are set in a pleasantly secluded, woodland environment, and time may further soften their impact as new planting matures.

E - Green corridors and spaces within the built-up areas

13.3.63 These are areas of open, or partially open, land further extending into the built-up areas of Bexhill and Hastings. These areas are urban in character, and closely associated, both visually and functionally, with adjacent built-up areas.

13.3.64 The significant areas in Bexhill are:

- The corridor of mainly undeveloped, partly wooded land along the disused railway line;
- Bexhill Down; and,
- Open space and playing fields on restored landfill in Bulverhythe.

13.3.65 The significant areas in Hastings are:

- The open space along Filsham Valley (much of it school grounds and playing fields but with areas of wetland and woodland);
- Churchwood, within the new housing expansion area east of Queensway; and,
- Hollington Stream valley.

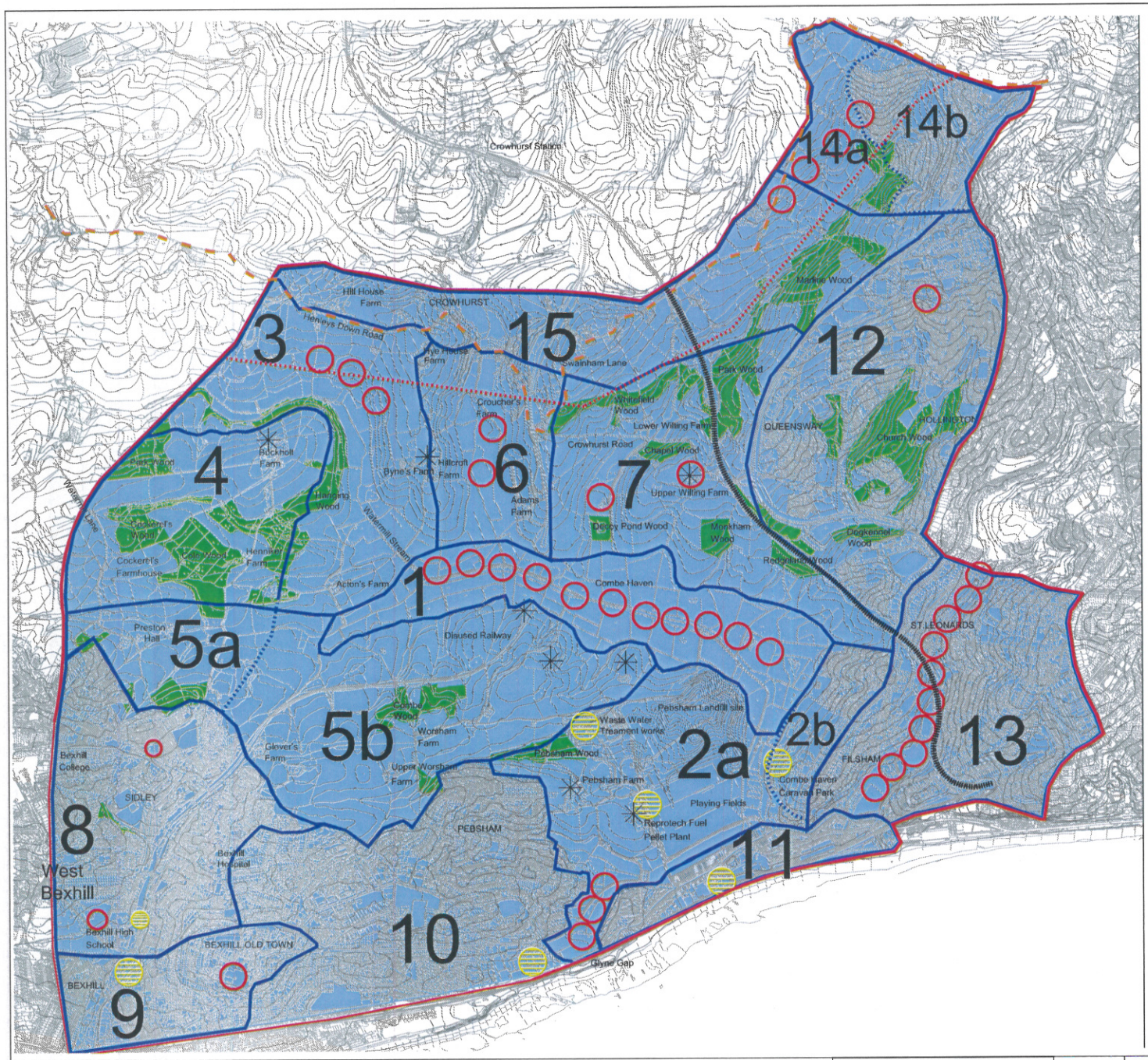
13.3.66 A third area - the narrow belt of levels at Glyne Gap - could be included in this type, but is also open levels, and somewhat less urban in character and has therefore been identified more closely with Landscape Type A.

F - Landfill and reclaimed land

13.3.67 This area includes Pebsham landfill, associated substantial structures and their environs, and the reclaimed recreational land to the south. The impact of the landfill, and the large buildings to the west of it, is substantial throughout this area, and beyond. The flat open-ness of the playing fields to the south enhances the impact.Landscape Character and Sensitivity.

Landscape Character Areas:

13.3.68 By comparison to landscape types these are single unique areas and are discrete geographical areas of a particular landscape character. These areas share general characteristics with other areas but have their own particular identity. The Study Area 1 has been divided into 15 landscape character areas. Landscape character areas are identified in Figure 13.6.



KEY

1 COMBE HAVEN VALLEY FLOOR
2 GLYNE GAP - PEBSHAM- FILSHAM
3 WATERMILL STREAM VALLEY
4 BUCKHOLT FARM - WATERMILL LANE
5 PRESTON HALL - WORSHAM FARM
6 POWDERMILL VALLEY
7 CROWHURST ROAD - WILTING FARM

BEXHILL
8 NORTH BEXHILL
9 CENTRAL BEXHILL
10 EAST BEXHILL

HASTINGS
11 BULVERHYTHE
12 WEST WOODS
13 HOLLINGTON STREAM
14 THE RIDGE

15 CROWHURST HIGH WEALD

Landscape character focus
Landmark Features
Intrusive features
Woodland
Character Area Boundary
Character Area Boundary sub divisions
Study Area 1
AONB Boundary
Railway line
Power line on pylons

BEXHILL TO HASTINGS LINK ROAD

Figure :13.6	Scale	1:25000	Carolyn Dwyer BEng (Hons), DipTrans, DMS, MIHT MILT Assistant Director, Transport & Waste County Hall, St. Anne's Crescent Lewes, East Sussex BN7 1UE Telephone: 01273 481000
Landscape Character Areas (Baseline)	Sheet	1of 1	
	Revision		April 2007

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Landscape and Townscape character areas

13.3.69 The Study Area 1 has been divided into areas of distinct character. This includes all urban and rural areas. Figure 13.6 shows that where appropriate, areas are subdivided to identify areas of urban and rural character. These areas possess distinctive landscape character and a degree of visual unity and are often areas to which local people can relate. Landscape character areas often do not have precise boundaries, but they usually possess a 'heartland' or 'focus'. The latter particularly applies to townscape, which gives them distinctiveness.

13.3.70 Some of the character areas are entirely rural and some urban. Where there are urban areas within rural character areas, these have been subdivided to identify the specific character of the urban and rural parts. The urban area of Bexhill, part of which would be directly affected by the Scheme, has been studied in greater detail than other urban areas within the Study Area 1. The detailed urban character areas are identified on Figure 13.7 and are included in Table 13.10.

13.3.71 Key characteristics and forces for change for each character area are described below, with a more detailed description of each area and supporting photographs provided in Appendix 13-A. The location and angle of view of each photograph is shown on Fig 13.9.

13.3.72 The wider Study Area 2 has been identified in order to assess the changes in traffic volumes in surrounding areas, as illustrated on Figure 13.20. Table 13.10 identifies the wider character areas which may be affected by these changes and the relative quality and value of these areas. These areas are based on the County Landscape Assessment (ESCC 2007).

Table 13.10 Landscape and Townscape Evaluation Summary

Character Area	Quality (DMRB)	Value	Sensitivity to Change	Management Opportunities
1. Combe Haven Valley Floor	**Good** Attractive countryside; strong sense of place; historic land use; and, remote and quiet pastoral landscape.	**Medium** Local value; high wildlife value; and SSSI /LNR.	**High** Sensitive wildlife designations; little scope to mitigate as flat; and, open valley long views across area from surrounding ridges	Strengthen wildlife structure; manage water levels in ditches; retain seasonal flooding; and, retain and manage trees in valley floor.
2. Glyne Gap/ Pebsham	See sub-division below	-	-	-

Character Area	Quality (DMRB)	Value	Sensitivity to Change	Management Opportunities
2a) Rural Pebsham	**Ordinary** Urban fringe; and, some rural character retained.	**Medium** Local value as strategic gap; wildlife value; SNCI; recreational value; and, Listed Building.	**Moderate** Wildlife interest in the reed beds; constraints of landfill; and, open slopes to north very visible.	Strengthen landscape structure; restored landfill; and, proposed Pebsham Countryside Park.
2b) Filsham Ridge	**Ordinary** Urban part of area on Filsham Ridge; and, intrusive from valley.	**Low** Holiday park for visitors; local residents; and, Listed Building.	**Low** Built up residential area and large holiday park; and, views across Combe Haven Valley from urban area.	Reduced traffic on Harley Shute Road; street tree planting; and, environmental improvements.
3) Watermill Stream Valley	**Good** Attractive rural landscape; High Weald characteristics; strong field patterns; historic structure; and, remote and quiet landscape.	**Medium** Local value; equestrians and walkers; historic landscape; and, ancient woods.	**Moderate** Topography and vegetation could provide cover; features sensitive to change hedges and trees; views down valley from AONB boundary; enclosure from ridges, woods, hedges and tree belts; and, scattered trees in valley floor.	Landscape structure could be strengthened, replace boundary hedges and tree planting; reduced traffic on Catsfield Road; and, retain and manage trees in valley floor.
4) Buckholt Farm / Watermill Lane	**Good** Attractive rural landscape; mature hedges ; and, historic field pattern intact.	**Medium** Local value; accessible from the urban area; and, ancient woodland.	**Moderate** Features such as hedges and tree belts sensitive to change; and, few long views across enclosed area.	Retention of field pattern; management of woods and hedges; and, diversification of farms.
5) Preston Hall/ Worsham	See sub-divisions below	-	-	-

Character Area	Quality (DMRB)	Value	Sensitivity to Change	Management Opportunities
5a) Preston Hall	**Ordinary** Urban fringe rural landscape; some mature hedges; historic field pattern intact; and, urban influences.	**Medium** Local value close to urban area; Listed Buildings; and, ancient woodland.	**Low** Rolling and wooded landscape allows scope for change; features such as hedges and tree belts sensitive to change; influence of urban area; views from urban area and local footpaths; and, enclosed area.	Strengthen hedgerow and woodland structure; manage woodlands for recreation; and, strengthen rural/ urban edge.
5b) Worsham Farm	**Ordinary - Good** Attractive rural landscape; mature hedges and historic field pattern intact; and, urban influences	**Medium** Local value close to urban area; Listed Building; ancient woodland; and, SNCI.	**Low** Rolling and wooded landscape allow scope for change; features such as hedges and tree belts sensitive to change; views from urban area; and,. long views down Combe Haven.	Strengthen hedgerow and woodland structure; manage woodlands for recreation; and, strengthen rural/urban edge.
6) Powdermill Valley	**Good** Attractive countryside High Weald character in north; some deteriation of field pattern and remnant hedges; 'improved' stream channel; and, quiet rural area.	**Medium** Local value as rural stream valley; Listed Buildings; SNCI; and, 1066 Country Walk.	**Moderate** Less wooded and more open. features such as hedges and tree belts sensitive to change; quiet countryside away from village; and, views down Combe Haven and Powdermill Valley from ridges.	Strengthen hedgerow and woodland structure; more naturalistic Powdermill Stream channel; and, reduce impact of modern farm developments.

Character Area	Quality (DMRB)	Value	Sensitivity to Change	Management Opportunities
7) Crowhurst Road /Upper Wilting	**Good** Attractive countryside, High Weald character; strong historic field patterns and ponds; and, quiet, but north influenced by traffic on Crowhurst Road	**Medium** Local value; ancient woodland; SSSI; and, Listed Buildings.	**Moderate** Topography and woodland afford cover; rural character vulnerable to change; features such as hedges and tree belts sensitive to change; local views from AONB; and, views from the south side of the Combe Haven.	Management of woods and hedges; and, reduced traffic on Crowhurst Road.
8) North Bexhill	See sub-divisions below	-	-	-
8a) North Sidley	**Ordinary** Older residential areas with mature trees have better urban grain; occasional development, which is out of character; and, tree cover on disused railway.	**Medium** Local centre; historic green; Listed New Inn; and, TPOs.	**Low** Derelict disused railway corridor; few long views within townscape; and, views north out of area to local countryside.	Environmental improvements to main shopping street; street tree planting; environmental enhancements; and management of disused railway land.
8b) Bexhill Down	**Ordinary** Primarily residential area; few distinctive features; foci or landmarks; tree cover in disused railway.	**Medium** Schools; Bexhill Down; historic open space; and TPOs.	**Low** Derelict disused railway corridor; and, few long views within townscape.	Street tree planting; environmental enhancements;. management of disused railway land; redevelopment of goods yards and depots on disused railway land; and, development improvements on school sites.

Character Area	Quality (DMRB)	Value	Sensitivity to Change	Management Opportunities
8c) London Road North	**Ordinary** Unremarkable residential terraces of varying age developed around London Road; and, tree cover in disused railway.	**Medium** Densely developed older residential area of local value; hospital; school; and, TPOs.	**Low** Derelict disused railway corridor on boundary of area; few long views; and, some views from raised ground in east.	Reduced traffic on London Road and opportunities for environmental improvements; street tree planting; and, reduce severance effect of traffic on A259 to Old Town and town centre.
9) Central Bexhill	See sub-divisions below	-	-	-
9a) London Road South	**Ordinary** Older established residential /commercial area with good urban grain; and, intrusive trading estate.	**Medium** Local value as Civic Centre; and, Listed Buildings.	**Low** Densely developed; and, few long views within area.	Environmental improvements to industrial estate and main shopping street; street tree planting; improve road layout at A259 junction; and, traffic on A259 severance and noise impacts.
9b) Old Town	**Good** Historic centre of Bexhill with many distinctive buildings in local vernacular.	**High** Old Town conservation area and Listed Buildings; and, TPOs.	**Moderate** Historic grain of townscape sensitive to change; and, few long views across area.	Conservation of historic features; traffic management; and, improved pedestrian access from areas to north.
10) East Bexhill	See sub-divisions below	-	-	-
10a) Ancaster / Hastings Road	**Ordinary** Some fine tree lined avenues and older residential areas with good urban grain	**Medium** Local value; educational focus; and, TPOs.	**Moderate** Some long views across the town to the sea and views north to countryside.	Reduce severance effect of traffic on the A259; improve appearance of retail and industrial estates; and, street tree planting.

Character Area	Quality (DMRB)	Value	Sensitivity to Change	Management Opportunities
10b) Pebsham	**Ordinary** Suburban residential area with few distinctive features; little local vernacular; and, few focuses of character.	**Medium** Local value.	**Moderate** Views to countryside in the north.	Street tree planting and planting around urban edge.
Hastings				
11) Bulverhythe	**Ordinary- Low** Dominated by through traffic and some characteristic older residential terraces	**Low** Local value, some vernacular pubs and terraces; a SAM; and, a Listed Building.	**Low** Densely developed and mainly residential and few views across area.	Reduction of traffic on A259; redevelopment of brown field land and environmental enhancements; improve access to coast; and, environmental improvements to the Combe Haven Stream channel.
12) West Woods	**Ordinary** Expansion area to Hastings and generally well planned in landscape setting.	**Medium** Residential; commercial; and ancient woodlands within urban areas.	**Moderate** Increased traffic on Queensway; long views into area from south; and, views out across urban areas to sea.	Management of ancient woodland and new planting
13) Hollington Stream	**Ordinary** Suburban expansion of Hastings and some attractive well treed avenues.	**Medium** Some older areas with Edwardian and Victorian villas and Filsham Valley linear open space.	**Moderate** Reduced traffic on Harley Shute and Filsham Roads; potential increased traffic in Wishing Tree area; and, long views down Combe Haven Valley.	Environmental improvements to Harley Shute Road, Filsham and Wishing Tree Roads, including street tree planting
14) West Ridge	See sub-divisions below	-	-	-

Character Area	Quality (DMRB)	Value	Sensitivity to Change	Management Opportunities
14a) Rural	**Good** Attractive wooded landscape on south facing ridge.	**Medium** Countryside adjacent to urban area; AONB buffer zone; ancient woodland; LNR; and, Listed Buildings.	**Moderate** Open to long views from south AONB buffer zone.	Management of woodland; clearly defined development boundaries; and,. reduce impact of urban edges.
14b) Urban	**Ordinary** Expansion area for development on south side up to AONB boundary	**Medium** Some older institutional buildings with local character; ribbon development along road; new housing development on ridge slopes; and, AONB boundary.	**Moderate** Increased traffic; long views to countryside in north and across urban area to sea.	Traffic management on ridge; reduced traffic on Battle Road; potential improvements to Baldslow Junction.
15) Crowhurst High Weald, Including part of Crowhurst Village	**High** Attractive landscape; rolling countryside typical of High Weald; well wooded; and, historic settlement and field patterns	**High** Local value as AONB countryside; ancient woodland; LNR; and, Listed Buildings in Crowhurst Village	**High** Rolling countryside**;** features such as hedges and tree belts sensitive to change; long views from the higher ground, down the Combe Haven and urban area to the sea, but interrupted by extensive tree and hedgerow cover	Reduction in traffic on rural roads

Landscape and Townscape Character Areas – detailed appraisal

1) Combe Haven Valley Floor

13.3.73 This character area is the flat floor of the Combe Haven Valley. Views of the Combe Haven Valley Floor are shown in Figure 13.10, Viewpoint 5. The boundaries are poorly defined as the valley floor extends into the tributary stream valleys. These valleys are identified as separate character areas, as the main valley has a distinct character and is visually contained from most viewpoints by the surrounding ridges. Hedges and other tree belts or woodland contain the valley and distinguish the valley from the tributary valleys.

13.3.74 This is the most distinctive landscape character area. Its main feature is the broad tract of open level, and most notably the Filsham Reed Beds Local Nature Reserve (LNR) and Site of Special Scientific Interest (SSSI).

13.3.75 The best views of the valley and levels are from the Filsham ridge near the railway bridge. This view is shown in Figure 13.10, Viewpoint 1. Three public footpaths cross the area north to south, including the 1066 Country Walk. There are other permissive paths along the Combe Haven Valley river. Within the levels, particularly the reed beds, there is a strong sense of remoteness, accentuated by the tall reeds that rustle in the wind. This is a valuable, attribute in an area close to, and accessible from, major built-up areas.

13.3.76 West of the Filsham Reed Beds the levels are mainly damp, rushy pasture with reeds and sedge along watercourses. The field boundaries are mainly ditches with associated tall reed vegetation. The intricate field patterns are defined by these.

13.3.77 There is a historic drainage pattern identifiable on the historic map of 1783 (Yeakell and Gardner's Sussex 1778-1783). There are no occupied buildings or settlements within the valley floor; this contributes to the sense of remoteness.

13.3.78 Key features of the area's character are:

- The predominantly open character;
- Watercourses, which apart from the main, embanked Combe Haven, also consist of many smaller channels, often lined by reeds, sedge, and scattered alder and willow. All of these, including Combe Haven itself, are straightened, man-made watercourses;
- The embankments of the old railway. Its wooded embankments protrude into the valley on either side, the Victorian brick viaduct which crossed the levels must once have been a conspicuous feature was demolished in 1969 and little trace of it remains;
- Regular seasonal and long periods of flooding; and,
- Probably the best lowland valley outside the AONB areas in East Sussex.

Detracting features and forces for change

13.3.79 The main detracting features are outside the character area but have an influence on views out:

- Pebsham Landfill with its high northern end conspicuous in many views south and west across the valley. In addition to the visual intrusion, there is noise and smell. These effects should diminish in a few years as the landfill is completed and the land restored;
- The housing estates and Combe Haven Holiday Park on the slopes of Filsham ridge, particularly that south of the railway. This development is widely visible from the open valley floor and slopes, even from the west of the area;
- Some modern farm buildings and structures, particularly on the ridges north of the valley;
- Changes in farming practices reducing management and allowing scrub and rank vegetation to encroach; and,
- Changes in water regimes and seasonal flooding allowing scrub and rank vegetation to encroach.

2) Glyne Gap – Pebsham

13.3.80 This area extends from the edge of the levels in the Combe Haven Valley southwards to the Coast Road at Glyne Gap and the coastal development at Bulverhythe. Its eastern boundary is the Filsham Ridge up to Harley Shute Road. To the west the boundary is formed by the built-up edge of Pebsham and Pebsham Wood. The area is subdivided into rural Pebsham 2a), illustrated on Figure 13.10, Viewpoint 12, and urban Filsham Ridge 2b), Figure 13.10, Viewpoint 32. The latter is the built up Filsham ridge, west of Harley Shute Road.

13.3.81 This area does not have such a strong character focus as the Combe Haven Valley Floor. However the levels and reed beds at Glyne Gap are the most notable feature and a significant focus. They extend north from the A259, curving westwards to the south of Pebsham Farm. The reed beds have a striking similarity to the Filsham Reed Beds, but are smaller, drier and much more tightly defined by development to the east and west. In the north of the area the slopes are open and undeveloped. In the east, the Filsham ridge is developed down to the edge of the floodplain of the Combe Haven. This affords long views from Harley Shute Road down the Combe Haven Valley. Despite the close proximity and visual impact of built-up areas, the reedy levels in Glyne Gap are a surprisingly peaceful place, and a valuable 'green gap' separating Bexhill and Hastings.

13.3.82 The other key features are:

- The extension of Combe Haven Valley where the river turns south to the sea. Despite the proximity of the Combe Haven Caravan Park to the east and the Landfill to the west, the Haven forms a pleasant, if narrow, green corridor, lined by willows and poplars and with a footpath on its western side giving ready access to the open valley further north;

- Pebsham Ridge and southern slopes of the Combe Haven Valley;
- Pebsham Wood occupies the northern slopes of a small stream valley, which is floored by reedy wetland and a large pond. Trees on the south side of the valley combine with the wood to create a pleasantly secluded, sheltered local landscape. The housing estates of Pebsham are mostly concealed behind the trees;
- The slopes south of Pebsham Farm are patterned with hedges, rows of conifers and horse paddocks. These slopes are part of the 'green gap' between Bexhill and Hastings, and are traversed by well-used footpaths. Views of the built-up areas and the landfill, which also generates noise, are offset to some extent by views to the reed beds and the sea beyond;
- Pebsham Farm comprises a pleasant traditional brick and tile farmhouse in a prominent position on the ridge; and,
- Pebsham playing fields occupy reclaimed land south of the landfill and are flat, open and rather bleak. However they are another key part of the strategic gap.

13.3.83 Detracting features in this character area are:

- Pebsham landfill has an impact on the whole area, generating noise and smell as well as visual eyesore. Its impact is increased by its height, forming as it does the eastern end of Pebsham Ridge. However its impact would eventually decline as landfill is completed and the area is restored to merge with the natural topography. The restored landfill area would form the gateway to the proposed Pebsham Countryside Park and be an important recreational area for the surrounding population;
- The waste derived fuel plant and associated chimney. This is sited south west of the landfill and the scale ensures a substantial impact on the area. It is to be hoped that tree planting would eventually soften the impact, but it is always likely to be significant;
- The waste water treatment works sited to the west of the landfill site is large and intrusive and is sited high on the slopes of Pebsham Ridge;
- The scale and location of Combe Haven Caravan Park. on the slopes of Filsham Ridge make it a dominant feature, overlooking the whole area from the east. Tree planting within the site is gradually maturing and softening its impact; and,
- Built-up edges are conspicuous, particularly that overlooking Glyne Gap from the raised ground to the east. Trees soften the edge of Pebsham, particularly towards its northern end. The new housing and caravan site to the west side of Harley Shute Road.

3) Watermill Stream Valley

13.3.84 This area is the north-western extension of the Combe Haven Valley where Watermill Stream Valley joins the Combe Haven Valley. It is bounded to the north by the Henleys Down Road along the ridge crest between Henley's Down and Crowhurst. To the west its boundary is less well defined, but roughly follows Watermill Lane. To the east the Byne's and Hillcroft Farm ridge forms a strong boundary. To the south, the area is bounded by the edge of the

Combe Haven level. The view from Henleys Down Road is shown in Figure 13.10, Viewpoint 28.

13.3.85 This character area is relatively simple, with the valley itself the clear focus. Open levels, though present in the south-east, are much less of a focus than in the main Combe Haven Valley, and disappear westwards.

13.3.86 The other key features are:

- The Watermill Valley is the most rural part of the Study Area 1, and the most remote from built-up areas;
- The wooded slopes of the Buckholt Farm Ridge to the west. These slopes are accentuated by a belt of fine woodland, which curves around the lower slopes to merge with the extensive coppice woodland of Park Wood;
- The pattern of woods, fields and hedges on the northern slopes and in the valley itself. A large number of small woods, linked by hedges, create a strong pattern on these wide, gentle slopes;
- Farm building groups are sited boldly on the ridges around the valley. Most notable, in both character and setting, is Bynes Farm and Haven on the Hill, splendidly sited on the crest of the ridge to the south and dominated by the fine traditional farmhouse. Trees enhance the building group. Acton's Farm and associated buildings are to the south;
- The bold ridges enclosing the valley on either side give a remote and secluded character;
- The Watermill Stream is small but pleasant, and its environs are the most unspoilt and peaceful part of the area, yet accessible by public footpaths; and,
- Trees and scrub in the valley break up views across the area and increase the wooded character.

13.3.87 The most notable detracting feature is the major power line, which crosses the northern slopes from east to west, with tall pylons. This is visible from the whole area. The only other significant detracting feature is modern farm buildings, particularly associated with Hye House and Hillcroft Farms to the east.

13.3.88 Through traffic using the lane on the north boundary as a rat run through Crowhurst detracts from the rural character, it should be noted that these lanes are on the boundary of the AONB.

4) Buckholt Farm - Watermill Lane

13.3.89 This character area lies at the western end of Study Area 1. Its boundaries are not well-defined, but it is bounded to the north by Park Wood and the Buckholt Farm Ridge, and to the east by Ring Wood. A ridge west of Freezeland Lane forms a western boundary, but to the south the area is bounded by the north side of the Combe Haven Valley. A view of this character area is shown in Figure 13.10, Viewpoint 22.

13.3.90 The main character focus is Buckholt Farm on a prominent ridge. The area is a fairly homogeneous tract of rolling countryside.

13.3.91 The other key features are:

- This area lacks steep slopes or bold topographic features but consists of small-scale, gentle east-west valleys resulting in gently rolling terrain; and,
- The bold framework of woods is the most distinctive feature of the area. Ring Wood in the east separates the area from the Watermill Valley. Park Wood, Cockerel's Wood and Cole Wood are all substantial areas of woodland. These woods give the whole area a secluded and sheltered character. Apart from a few glimpses, there is little impression of the proximity of Bexhill, and much of the built-up edge is well screened by trees.

13.3.92 The main detracting features are:

- The Scattered Ribbon development along Watermill Lane and Freezeland Lane, partly screened by trees; and,
- Some modern farm or farm-related buildings, particularly at Preston Hall and Buckholt Farm, though the visual impact of these is not viewed from wide areas.

5) Preston Hall - Worsham Farm

13.3.93 This is another area where boundaries are not very clearly defined. To the south, the edge of Bexhill does form a clear boundary. To the west and north-west, hedge and tree-lined tracks (bridleways), coupled with faint ridges form the boundary as far as Acton's Farm. To the east, Pebsham Wood and ridge defines the area. The northern boundary is the edge of the Combe Haven Valley floor. There is no clear character focus in this fairly homogeneous area, though the western reaches of the Combe Haven Stream valley provides some focus. The area is divided into two areas: 5(a) Preston Hall and 5(b) Worsham Farm. Views into these areas are shown in Figure 13.10, Veiwpoints 33 and 13 respectively.

13.3.94 Area 5a) is the area to the west, with the listed Preston Hall as its focus. Area 5b) consists of the Glovers Farm to Worsham Farm area. These areas differ in that the Preston Hall area is more discrete and enclosed with few long views into or out of the area. The Worsham Farm area is more open rolling countryside forming the south side of the Combe Haven Valley. Both of these areas are distinct from surrounding character areas in that they are influenced by the urban areas and have urban fringe characteristics.

13.3.95 Other key features in this character area are:

- Gently rolling terrain in this area resembles Buckholt Farm - Watermill Lane. However there is a significant ridge line running west to east right through the south of the area, linking The Mount, Upper Worsham Farm and the Pebsham Ridge. North of this ridge, the rolling countryside slopes gently but steadily north towards the Combe Haven Valley floor. These slopes are diversified by several tiny valleys, or folds. South of the ridge a

gentle, fairly open valley abuts onto the urban edge of Bexhill;

- Though it is less heavily wooded than the Buckholt Farm - Watermill Lane area, trees and woodlands are an important part of this area's character. Combe Wood is the largest single woodland block but there are numerous smaller tree groups and scattered hedgerow trees. Levett's Wood and associated tree belts are important as they enclose the urban edge of Sidley. The area is patterned by small fields and hedges, particularly north of the ridge-line;
- There is a good network of footpaths and bridleways, which give ready access to the area and are often lined by hedges and trees;
- The ridge, and the north facing slopes offer some fine views across Combe Haven, often framed by trees;
- The line of the long-disused railway runs north from Sidley, curving east around Combe Wood before turning north to cross the valley near Adam's Farm. Its wooded embankments protrude into the valley on either side; and,
- Some farm building groups are conspicuous on the slopes and ridges above the valley, notably Glovers Farm and Worsham Farm. These groups are a mixture of traditional and modern buildings. Preston Hall is more tucked away at the head of the Combe Haven Valley.

13.3.96 The main detracting features in this character area are:

- The fairly open, unattractive built-up edge south of Worsham Farm - The impact of this is mainly limited to the area south of the Worsham Farm ridge-line;
- Modern farm buildings that have a significant impact on the ridge-line, particularly at Upper Worsham Farm, where they create conspicuous clutter; and,
- The Mount is crowned by a conspicuous communications mast, and by a rectangular reservoir mound.

6) Powdermill Valley

13.3.97 This is a small valley character area bounded by Crowhurst village in the north, by the Hillcroft Farm ridge to the west and Adams Farm ridge to the east. In the south the boundary is the edge of the more open Combe Haven Valley floor. A view of Powdermill Valley is shown in Figure 13.10, Viewpoint 6.

13.3.98 The focus of this area is the flat-floored valley of the Powdermill stream extending south towards Combe Haven. It is more sheltered, small-scale and intimate than the main valley, and the valley floor, though quite open, is patterned with fields and hedges and there is little wetland. The alder lined stream valley is an important feature.

13.3.99 Other key features in the Powdermill Valley character area are:

- The tops of the ridges on either side of the valley carry abundant trees and hedges, which give them a wooded appearance contrasting with the

more open valley floor. The eastern slopes are particularly well-wooded;

- Some farm building groups are conspicuous on the slopes and ridges above the valley, notably Hillcroft and Adams Farms. These groups are a mixture of traditional and modern buildings. Hye House Farm is in the north-west corner;
- Proximity to the village - The area is adjacent to, and visible from, the southern edge of Crowhurst village; and,
- Views - There are occasional fine views from the bridleway on Hillcroft Farm ridge across the Combe Haven Valley.

13.3.100 The detracting features of the Powdermill Valley character area are:

- Pylons - A large power line crosses the northern end of the valley; and,
- Modern farm buildings - These are mainly associated with Hye House and Hillcroft Farms. Other structures are well contained by trees.

7) Crowhurst Road - Upper Wilting Farm

13.3.101 This area is bound by the Queensway to the east and by the Adam's Farm ridge to the west. The northern boundary is the north side of Whitefield and Park Woods. To the south, the boundary is the bottom of the slope and the open levels of Combe Haven Valley floor. A view of the Crowhurst Road – Upper Wilting Farm character area is shown in Figure 13.10, Viewpoint 25.

13.3.102 The focus of this area is Upper Wilting Farm and a secondary focus is the small, secluded Decoy Valley. It is flat-floored, but of closed character, partly wooded and with no public access. It is therefore very different in character from the open Combe Haven Valley.

13.3.103 Other key features of this area are:

- Woods - Decoy Pond Wood, Chapel Wood, Little Bog Wood and Marline Wood SSSI are the main woods, but the area has a generally wooded character;
- Decoy valley is inaccessible and visually isolated; it has a tranquil, rural character; and,
- Railway in deep cutting.

13.3.104 There are no significant detracting features apart from a group of farm sheds at Decoy Farm, which is visible in long views across the valley.

Bexhill

13.3.105 Bexhill on Sea arose as a medieval trading port, built on gently sloping ground before it was transformed in the 19th century by the seventh Earl De La Warr into an exclusive seaside resort. By the mid 20th century, the resort began to lose its appeal and became more residential in nature, while retaining much of its quiet Edwardian character. The town is now comprised of several merged villages. It is marginally separated from Hastings by Glyne

Gap and Combe Haven Valley. At the eastern end of the town the railway severs the town from the seafront.

13.3.106 Bexhill has developed from the core of original villages and the Edwardian seaside town between the Old Town and the sea. The development in between is mostly infill residential development which has grown up in the inter war period and since the end of the Second World War. Much of the development is similar in age and character and the distinction between different areas is fairly subtle.

8) North Bexhill

13.3.107 The urban area of Bexhill is considered in greater detail than other urban areas, which are not directly affected by the Scheme. Figure 13.6 shows that the north Bexhill character area is entirely within the urban area of Bexhill. It extends from Sidley in the north to the A259 in the south. The eastern boundary is less distinct but is considered to be the edge of older and denser development, which grew up around the London Road and linked the Old Town with Sidley. North Bexhill has developed around the original village of Sidley and the A259, Little Common Road. With the coming of the railway the area to the east of this has grown up along the London Road. The busy A259 and King Offa Way artificially create a boundary to the south of this character area separating areas of similar character. Similarly the disused railway and the belt of semi-mature trees, which has grown up since the closing of the line, create a severance effect within the townscape. This tree feature links up with the trees on Bexhill Down.

13.3.108 Figure 13.10, Viewpoint 20 shows the view south along London Road in in the North Bexhill character area.

13.3.109 Other features are the Green at Sidley and the various open spaces within the urban area. The gently rolling nature of the landscape means there are few long views out of the area or prominent features.

13.3.110 There is a commercial centre at Sidley and some businesses on the A259. Otherwise the area is largely residential in character.

13.3.111 The area can be subdivided in to three character areas: North Sidley; Bexhill Down and London Road North.

8a) North Sidley

13.3.112 The heart of this area is the original village of North Sidley. Remnants of the village character are still evident although this has been mostly swallowed up by later development. The area is bounded by the commercial area of Ninfield Road in the south and countryside to the north, Wrestwood Road to the east and Watermill Lane in the west. The area is mixed age high density residential development with a local commercial centre on Ninfield Road.

13.3.113 The busy Ninfield Road shopping area is a social focus for the area. The existing railway corridor is overgrown and inaccessible due to the steep banks and frequent flooding. It has little value as a recreational resource and attracts vandalism and tipping. A view along Ninfield Road is shown in Figure 13.10, Viewpoint 40.

13.3.114 Other features are:

- The Green and listed New Inn which sits on it;
- The brick constructed Ninfield Road railway bridge, and the bridge at Glovers Farm;
- Levetts Wood on the urban edge; and,
- Views to the countryside from the north of the area

13.3.115 The main detracting feature is traffic on the Ninfield Road, which constricts free flow of pedestrians to the shops and schools.

8b) Bexhill Down

13.3.116 This area is bounded to the east by, the disused railway line and to the north by Ninfield Road. The western boundary is difficult to define as the residential areas to the west of the railway developed later than most areas to the east and the suburban residential development spreads west with few distinctive boundaries. The A259 Little Common Road and Belle Hill make the boundary to the south.

13.3.117 This gently undulating landscape affords few long views, but there are views across the area from the higher areas in the north. However, few landmarks or high points are seen from within the area. A view north along Buxton Drive is shown in Figure 13.10, Viewpoint 41.

13.3.118 Key features in the Bexhill Down character area are:

- The Bexhill Down is a well treed open area with a distinctive character of its own and an important gateway to the town centre;
- Egerton Stream runs in open channel through the west of the area. This open corridor and associated trees are a feature;
- Woodsgate Park Bridge is a brick built railway crossing; and,
- Tree cover in the disused railway line.

13.3.119 The main detractors in this townscape are:

- The depot areas adjacent to the old railway, notably those close to Ninfield Road;
- The groups of flat roofed and prefabricated buildings to the east of Bexhill College do not follow the urban grain and are intrusive in the local area; and,
- Lack of management on the disused railway has led to fly tipping in the accessible areas especially close to roads and footpaths.

8c) London Road North

13.3.120 This is bounded by the disused railway line to the west, to the east by St James Road and Holliers Hill and to the north by Wrestwood Road. The A259, King Offa Way is the boundary to the south. A view of London Road North is shown in Figure 13.10, Viewpoint 42.

13.3.121 There are few landmark buildings within this townscape.

13.3.122 Key features in the London Road character area are:

- Some older buildings of note in the local context are the Chapel at the junction of London Road and Belle Hill, the old school buildings and adjacent barracks;
- The older, Victorian and Edwardian terraces, give an element of maturity to this area; and,
- Tree cover on the disused railway line.

13.3.123 Detracting features include traffic on the A259, which severs this area from the southern part of Bexhill and Old Town. The wide road junction with London Road conflicts with the local scale and the urban grain. Traffic on London Road restricts pedestrian movement across London Road, particularly at the southern and close to the junction with the A259.

9) Central Bexhill

13.3.124 This is the area to the south of the A259 and includes Bexhill Old Town. This part of the town has developed around the Old Town the landscape is gently sloping towards the sea, although the Old Town was built on a raised area. A view of Amhurst Road in Central Bexhill is shown in Figure 13.10, Viewpoint 34.

13.3.125 The area can be subdivided in to two character subdivisions: London Road South and the Old Town.

9a) London Road South

13.3.126 This area is bounded by the A259 in the north, Amherst Road and Old Town to the east and the railway to the south.

13.3.127 This area is the extension of the seaside Edwardian town north from the station. It is centered on what was originally Lower Station Road and has been renamed London Road at some point in time. The urban grain is generally good but is disrupted by the large light industrial development, which has been developed on the disused railway. Tree cover is sparse and largely limited to gardens. A view down Eastwood Road in the London Road South character area is shown in Figure 13.10, Viewpoint 43.

13.3.128 There are few foci or features within this area:

- The Town Hall and adjacent green is a pleasant space in the townscape;
- The London Road is a busy commercial area, surrounded by residential streets.

9*b) Old Town*

13.3.129 The Old Town sits on an area of slightly higher ground and affords long views to the sea. This area is bounded by King Offa Way to the north, Amherst Road to the west, Manor Road in the east and the southern boundary is the railway line. The key feature in this area is the picturesque old part of Bexhill centered on St. Peters Church, Church Street and Manor Gardens. This part of the town is a conservation area and there are no significant detractors. A view down Church Street is shown in Figure 13.10, Viewpoint 44.

13.3.130 The improved A259 King Offa Way has been designed to improve traffic flow through the town and provide a bypass for through traffic in the Old Town. This has been effective and the Old Town is very quiet as a result. However the road does have a severance impact on the townscape and divides the Old Town from the town to the north.

10) East Bexhill

13.3.131 This area of mainly residential development is the urban extension of Bexhill eastwards towards Hastings. The area slopes gently to the sea from the higher ground in the north. This affords long views to the sea from some areas. There are some large educational establishments in the area with landmark buildings. Much of the area is post War residential development. The Ravenside Retail Park and adjacent industrial estate is an unsympathetic development at the extreme eastern end on the former gas works site. A view west along De La Warr Road is shown in Figure 13.10, Viewpoint 35.

13.3.132 The area can be divided into two character sub divisions: the Ancaster/Hastings Road and Pebsham.

10(a) Ancaster/Hastings Road

13.3.133 The boundaries of this area are Holliers Hill and Manor Lane to the west, Glyne Gap to the east and Wrestwood Road/Hastings Road to the north. The railway line is a convenient boundary to the south. A view along Hastings Road is shown in Figure 13.10, Viewpoint 45.

13.3.134 The key features of this area are:

- The higher ground on Worsham Ridge, which slopes down towards the sea. This area affords long views south across Bexhill to the sea. From the north of the area there are views to the local ridge at Worsham Farm; and,
- The large buildings and open spaces associated with the Charters Ancaster School campus are local focus of character.

13.3.135 There are few detractors within the area:

- Derelict land on Galley Hill View, adjacent to the railway, which is due to be developed;
- The light industrial estate at the east end and Ravenside Retail Park in Glyne Gap - These areas of large sheds contrast with the residential grain of the townscape; and,
- Severance effect of traffic on De La Warr Road.

10(b) Pebsham

13.3.136 This area is distinct from the previous area due to the proximity to the countryside. The boundaries of this area are the open countryside to the west, north and east and Wrestwood Road Hastings Road to the south. The view down Seabourne Road is shown in Figure 13.10, Viewpoint 46.

13.3.137 The key features are in the Pebsham character area are:

- The views across the countryside to the north;
- Ancaster House School, which is now converted to flats; and,
- The attractive central public open space on Seabourne Road.

13.3.138 There are no obvious detractors within this area.

Hastings

11) Bulverhythe

13.3.139 This urban area is bounded by Glyne Gap and the Hastings Borough boundary to the west, the edge of Combe Haven Caravan Park and Harley Shute Road to the east. The open playing fields and Glyne Gap to the north and the coast to the south. A view along the Bexhill Road in Bulverhythe is shown in Figure 13.9, Viewpoint 36.

13.3.140 The area lacks a key focus of character but local townscape features are:

- The open space of Glyne Gap with its reed beds dominates the western end;
- The seafront is a key focus but is severed by the railway from the built up area;
- The low cliffs, beach and grassy space at the western end of the seafront are a local feature;
- The Combe Haven flowing through the built up area is a green intrusion in to the urban area; and,
- The pubs, including the Listed Bull Inn, on the main road at either end of the area

13.3.141 The detracting features of this area are:

- Traffic on the A259 through this area - This includes heavy lorries accessing the waste sites and almost constantly queuing traffic;
- Poor environment, road related clutter and pollution on this road;
- The large railway sheds and water tower adjacent to the railway;
- The open built up edges to the north and west; and,
- Poor unattractive access to the beach from residential areas over an intimidating footbridge or via the tunnel at Glyne Gap.

13.3.142 This area is mainly residential in character, with some commercial development on the main road and between the road and the sea. There is an air of dereliction associated with the railway development. The older residential areas have local seaside character, which is degraded by surrounding neglected areas. Traffic on the A259 Hastings Road severs the community and cars dominate the area.

12) West Woods

13.3.143 This is the north-western edge of Hastings Borough. It is defined to the east by the ridge crest running south from Beauport and Castleham towards Filsham, and to the south by Queensway. It extends north to the Battle Ridge, and west to the ridge at Breadsell Lane (which is also the Borough boundary). A view down Icklesham Drive is shown in Figure 13.10, Viewpoint 37.

13.3.144 This is the newest part of the built-up area, originally the Town Development Area and developed since the 1970's. Most of the area consists of planned residential and industrial development with abundant open space and tree planting. Substantial portions of the original coppice woodland have been retained so that the area has a wooded character. The best surviving woods include part of Church Wood and its ghylls. However despite its wooded feel, development dominates most of the area, particularly the huge Castleham industrial estate on the ridge, and the broad swathe of Queensway.

13.3.145 Key features of the landscape in West Woods are:

- Church-in-the-Wood and its coppice woodland surrounds, a tranquil, secluded place despite the encircling development;
- The reservoir at Crowhurst Road;
- The bold valley form; and,
- Fine views across the countryside to the sea from the northern end and ridges.

13.3.146 The detracting features include:

- Houses and factories creeping over the ridge crest to the east;
- The pylon line crossing the area; and,
- The rather open, untidy environs of the reservoir.

13) Hollington Stream

13.3.147 The Harley Shute Road area is the lower section of the Hollington Stream Valley. The area is bounded by ridges to the west and east. It extends southwards from Gillsmans Hill to Bulverhythe. This open valley and the stream are the focus of the area. The valley widens, south of the railway, to give a flat, open floor, given over to playing fields. North of the railway the valley floor is a typical narrow, wooded ghyll, closely contained by residential areas. A view of this character area is shown in Figure 13.10, Viewpoint 29.

13.3.148 The slopes above the valley floor are mostly built up with residential areas, mostly low density mid to late 20th Century suburban housing in standardised street patterns. Small groups of trees, notably Corsican pines, break up some of the residential areas. There is also some open space on the slopes, mainly west of the railway where there are playing fields and scrub woodland. The South Saxons Secondary School, dominates the valley.

13.3.149 The main feature of the landscape is the open space, trees and scrub along the valley floor and western slopes, as well as the Hollington Stream itself. However trees and smaller open spaces within the built-up area are also important.

13.3.150 The main detracting features are:

- Indistinct urban grain in the estates, especially in the south-west part of the area; and,
- The general lack of distinct character in this suburban residential area, apart from that provided by topography.

14) West Ridge

13.3.151 The Ridge is the northern boundary of Hastings Borough and generally the limit of the built up area. To the north of the Ridge is the High Weald AONB.

13.3.152 The key features in the West Ridge character area are:

- The ridge and valley topography extending south from the main ridge; and,
- The focus of character is the heavily wooded Marline Ghyll.

13.3.153 The main detractors are:

- Traffic on the Battle to Hastings Road, which gives access to the A21 at Baldslow and Rye in the east;
- The residential development encroaching on the open slopes is a detractor, but this is enclosed by surrounding woodland; and,
- The electricity pylons, which cross in the east.

13.3.154 This area can be divided into two character sub divisions. A view in the rural area 14(a) is shown in Figure 13.10, viewpoint 38 and a view in the built up part of the Ridge, 14(b) is shown in Figure 13.10, Viewpoint no. 39. The urban area is residential.

15) Crowhurst - High Weald

13.3.155 This area straddles the High Weald AONB boundary and includes the southern parts of Crowhurst village. A significant feature is the heavily wooded ghyll to the east, which supports Marline Wood. A view from the High Weald AONB Footpath 17b is shown in Figure 13.10, Viewpoint 15.

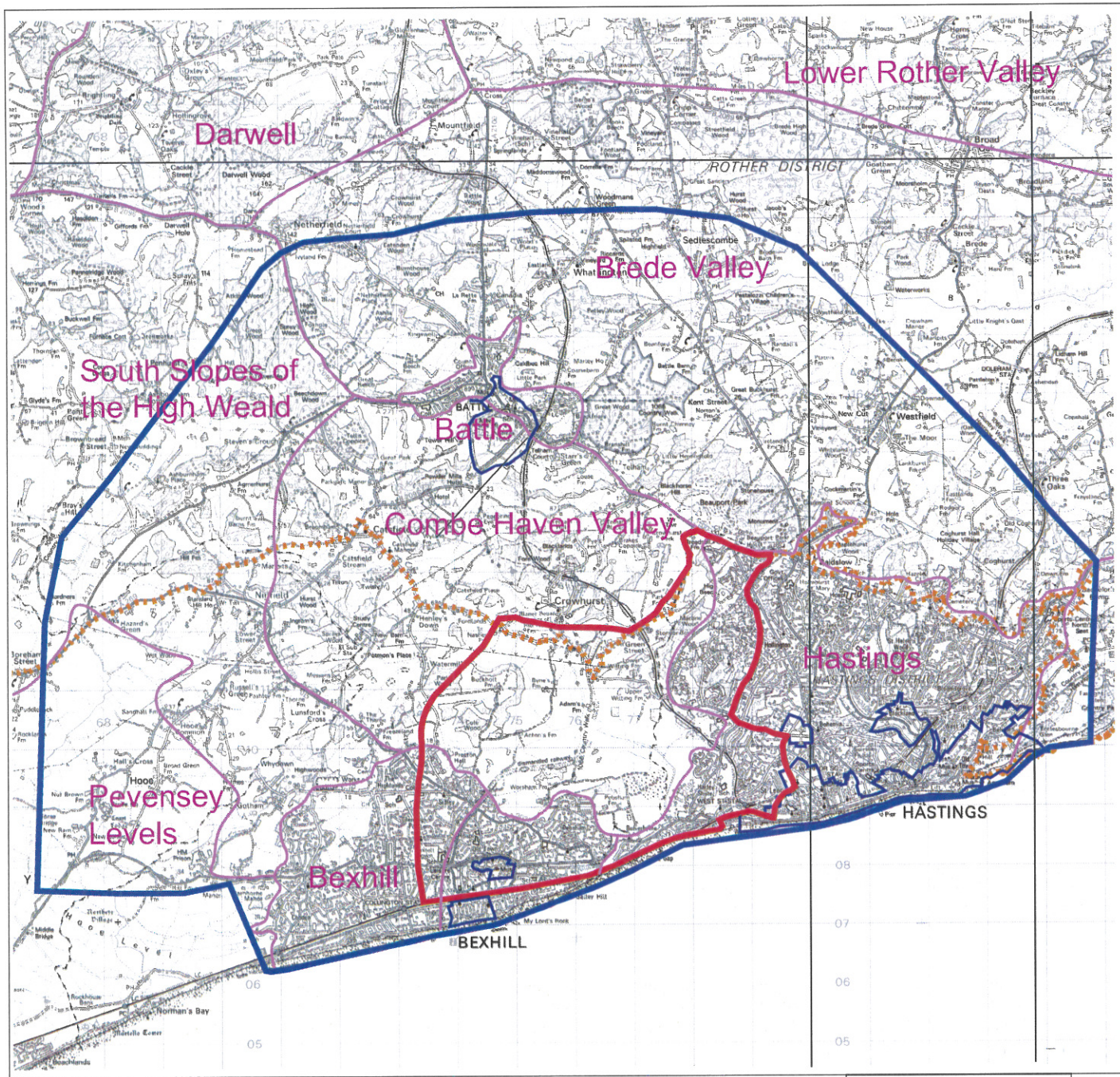
13.3.156 The key features in this area are:

- Long views across the Combe Haven Valley, over the urban areas to the sea;
- The wooded stream valleys converging to the south of Crowhurst village, notably the Powdermill stream;
- The gently rolling Wealden countryside;
- The patchwork of woods, fields and hedges, typical of High Weald countryside;
- The strong structure of woods, shaws and hedges in the valley around Marline Ghyll, and its relationship to the topography; and,
- The secluded, shady ghyll streams.

13.3.157 There are few detractors in this area. The electricity pylons which cross the area are visible in many of the views towards the sea.

Wider Study Area 2

13.3.158 The Table 13.11 summarises the evaluation for the wider Study Area 2 (Figure 13.20) areas which would be affected by traffic changes.



KEY

- Study Area 1
- Study Area 2
- High Weald AONB Boundary
- Landscape Character Areas from County Landscape Assessment (ESCC 2007)
- Conservation Area Boundaries

BEXHILL TO HASTINGS LINK ROAD

Figure : 13.20	Scale	NTS	Carolyn Dwyer BEng (Hons), DipTrans, DMS, MIHT MILT Assistant Director, Transport & Waste County Hall, St. Anne's Crescent Lewes, East Sussex BN7 1UE Telephone: 01273 481000
Study Area 2 (Baseline)	Sheet	1of 1	
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Table 13.11 Landscape Evaluation Summary Table Study Area 2

Character Area	Quality (DMRB)	Value	Sensitivity to Change	Key Characteristics and Forces for Change
Pevensey Levels	Good	Medium	Moderate	Open, flat expanse of wetland grazing marsh extending to the coast; Winding lanes and drainage channels; Isolated farms and settlements; Ribbon coastal development; Traffic on A259 and rat running in lanes; Intrusive coastal development; Urban expansion; and, Agricultural management.
South Slopes of High Weald	High	High	Moderate	High Weald landscape; Intricate pattern of ridges and ghylls; Abundant woodland; Scattered villages and farm settlements; Historic field patterns; Part within AONB; Traffic on country lanes; Suburbanisation and ribbon development; Decline of woodland; and, Urban fringe of Bexhill.
Combe Haven Valley	Good	Medium	Moderate	Battle ridge to north; Flat valley floor; Winding valley and ridges with abundant woodland; Part within AONB; Urban expansion reducing viability of farming; and,. Proposed link road.
Brede Valley	High	High	High	Flat open levels on valley floor; Wooded valley slopes with farm settlements and orchards; Within AONB; Caravan and chalet development;. Urban expansion on Hastings Ridge; Loss of orchards; and, Transport improvements A21 and A259.

Character Area	Quality (DMRB)	Value	Sensitivity to Change	Key Characteristics and Forces for Change
West Bexhill	Good	Medium	Low	Suburban post war expansion of Bexhill merging the villages of Cooden and Little Common; Traffic on A259; and, Pressure for residential and business development.
Hastings Marina, St. Leonards/ Old Town	High	High	High	Historic centre and Conservation Areas of Hastings and seafront; Fine Regency buildings; Traffic on the seafront road severs the beach from the town; and, Need for environmental enhancement of seafront.
North Hastings	Good	Medium	Moderate	Varied urban expansion of Hastings north to the ridge; Development on slopes and cliffs giving long views and distinctive terraces; Open spaces and parks in deep stream valleys; Need for environmental improvements to some areas and regeneration; New development on the urban edges, notably the ridge to the north; and, Traffic on the Ridge and A259.
Battle	High	High	High	Historic ridge top town with fine architecture and distinctive Abbey; Medieval and Georgian High Street and conservation area; Within AONB; Through traffic on the busy main road through village; and, Parking pressures.

Visual Baseline

13.3.159 The Study Area 1, shown in Figure 13.1, covers the area which could have potential views to the Scheme, as defined previously. Figures 13.15A and B display the ZVIs for the Scheme at the Opening year and the Design Year respectively. Key viewpoints and footpath reference numbers are identified in Figure 13.9. Supporting photographs from key viewpoints are shown in Figure 13.10.

Views from the AONB

13.3.160 There are views across the Study Area 1 from outside the study area in the AONB north of Crowhurst. The higher ground rising to Hastings Ridge in the north affords long views across the Study Area 1 to the sea. There are some views in to the Combe Haven Valley from parts of the High Weald AONB, however the pattern of woodland, tree belts and hedges obscures views to the valley from much of this area.

13.3.161 There are long views from the Hastings - Battle Ridge south across the valley and surrounding urban area to the sea. These include views from footpaths in the High Weald AONB, notably 21a. This view is shown in Figure 13.10, Viewpoint 38.

13.3.162 Closer views into the Study Area 1 from the AONB can be gained from paths and roads in and around Crowhurst. There are long views across the valley to the Pebsham and Worsham ridges from footpaths 21c, 21d and 20. As shown in Figure 13.10, Viewpoint 15 from Footpath 17b there are glimpses between hedges and woods and the lower parts of the Combe Haven Valley are obscured by woodland from these areas. Henleys Down Road, Crowhurst Road and Swainham Lane form the southern boundary of the AONB.

13.3.163 Within the Study Area 1 there are views from the lanes on the boundary of the AONB, these are identified on Figure 13.9. The most notable of these are:

- Views down the Watermill Valley and into the west end of Combe Haven Valley from Henley's Down Road Figure 13.10, Viewpoint 28;
- Glimpses across the eastern part of Combe Haven Valley and into Decoy Valley, between trees and hedges, from Crowhurst Lane, between Crowhurst and Queensway, Figure 13.10, Viewpoint 25. This also affords long views across the valley to the Pebsham landfill site and the sea;
- Views from Crowhurst Road towards Adam's Farm, the Powdermill Valley and across to the wooded ridge on the opposite side, Figure 13.10, Viewpoint 27; and,
- Views from Swainham Lane to the Chapel Wood Ridge, Decoy and Upper Wilting Farms, Figure 13.10, Viewpoint 26.

Views within the Combe Haven Valley

13.3.164 Key viewpoints, visual barriers and locations for photographs are shown on Figure 13.9 and supporting photographs from key viewpoints are shown in Figures 13.10 Viewpoint 1 to 39. Other photograph locations, from Viewpoints 40 to 46, inform the character area assessment and are not key viewpoints for the visual assessment of the purposed Scheme

13.3.165 The Combe Haven Valley is a visually unified and contained landscape; there are long views across the area from the surrounding ridges and within the wide flat valley. These views are localized to within the valley landscape.

13.3.166 The key views from public footpaths in the valley are from:

- Footpaths in the east of the valley;
- Paths across the middle of the valley; and,
- Paths at the west end of the valley.

13.3.167 There are long views from footpaths at the east end of the valley looking west. Panoramic views across the valley are broken by the woodland, which extends in to the valley on the disused railway abutments.

13.3.168 There are views from the east end of Combe Haven Valley from footpaths 28, 23a, 29b and 21 shown in Figure 13.10 from Viewpoints 1, 3, 4 and 23 respectively. Views within this area tend to be dominated by the activity and visual intrusion of the landfill site. Path 23a, Viewpoint 3 is in the bottom of the valley and long views to the west are obscured by woodland on the ridges, notably on the disused railway line embankments and by scrub within the valley itself. There are views from here to surrounding ridges and notably the top of the landfill site. The view from footpath 28, Viewpoint 1 near Harley Shute Road, provides the best vantage point for long views down the valley, taking in the ridges on both sides.

13.3.169 The 1066 Country Walk crosses the middle of the valley from Pebsham to Crowhurst. There are views across the valley to the ridge on the opposite side from the higher ground at Worsham Farm. These are narrow views as Combe Wood and vegetation on the railway viaduct obscure wider views. As the path crosses the middle of the valley there are wide views along the valley to the west and east and views up to the surrounding ridges. Within the Powdermill Valley the views are enclosed by the ridges to west and east, there are longer views looking south down the Powdermill Valley to the Worsham Ridge, Figure 13.10, Viewpoint 7.

13.3.170 At the west end of the valley there are two footpaths, one crossing from Glovers Farm to Actons Farm, path 33, and one crossing from Worsham Farm to Actons Farm paths 31a and b. These merge into a public bridleway 34, to continue up the Hillcroft Ridge to Crowhurst on path 13 a, b and c. Path 15 drops down to Crowhurst on the east side of Hillcroft ridge (Viewpoint 8). These PROWs afford long views across the valley to the Hillcroft and Adams

Farm ridges and some long views towards Filsham and the urban edge of Hastings. The bridleway, pat no. 13b and 13c, across Hillcroft Ridge is largely enclosed by tall hedges. There are views between the buildings at Hye House Farm down the Powdermill Valley to the Combe Haven Valley. This bridleway continues west to meet the Buckholt Lane Byway. This part of the bridleway is enclosed by hedges and does not have long views across the valley.

13.3.171 The footpath 32a, crossing from Glovers to Worsham Farm affords some views into the western end of the valley, Figure 13.10, Viewpoint 24, further east views from this path are obscured by vegetation on the disused railway and Combe Wood.

13.3.172 The disused railway line is an informal permissive path from Glovers Lane in to the countryside and it links the footpaths which cross the valley from north to south. Much of this is enclosed by dense vegetation; however there are views through gaps across the western end of the Combe Haven Valley to the Hillcroft and Adams Farm ridges on the north side and the Watermill and Powdermill valleys, Figure 13.10, Viewpoints 13 and 14.

Views From the Urban Areas

13.3.173 There are long views across the area from the urban areas of Hastings in the east. The most significant view is from Harley Shute Road close to the railway bridge. This is a long view across most of the Combe Haven Valley from an elevated position. The wooded ridges extend in to the valley obscuring views to the tributary valleys on the north side. Upper Wilting Farm is prominent on the ridge to the north in these views and the landfill site is on the ridge to the south.

13.3.174 Similar views, albeit it from a lower level and glimpsed between buildings can be gained from the residential development on Filsham Road, Figure 13.10, Viewpoint 32. There are more restricted views across the area from the Combe Haven Holiday Park but views down the valley are obscured by the landfill site and the tree belt on the boundary of the site.

13.3.175 There are long views down the Combe Haven Valley and the ridges on either side from the elevated parts of the urban area of Hastings in the east. Notably from areas west of Filsham Road, in Gresham Way and St. Dominics Close, Figure 13.10, Viewpoint 29 and 30 respectively. There are long views across the valley and the urban areas to the sea from The Ridge at Hastings in the north, Figure 13.10, Viewpoints 38 and 39.

13.3.176 Generally long views across the Study Area 1 from the built up area of Bexhill are obscured by landform and woodland. From the residential area of Pebsham there are views to the countryside at Worsham Farm but long views across the valley are obscured by the Worsham Ridge, Combe and Pebsham woods. There are views in to Glyne Gap and playing fields from the urban area of Bulverhythe. Long views across the Study Area 1 from Glyne Gap are obscured by the Pebsham Ridge, Figure 13.10, Viewpoint 12. There are views from the residential area on the north edge of Sidley and Glovers Lane into the western end of the Combe Haven Valley, Figure 13.10, Viewpoint 31.

13.3.177 Within the built up area of Bexhill there are few long views or significant visual landmarks. Old Town is on an area of raised ground and there are local views to the church,Figure 13.10, Viewpoint 44. There are longer views across the town from the ridge in the eastern parts of the town around Hastings Road. These look across the countryside in the Study Area 1 in the north and the sea to the south. There are few long views in the London Road and Sidley area, Figure 13.10, Viewpoints 40 and 41. Other views of London Road are on Figure 13.10 Viewpoints 17, 18 and 20 and Belle Hill junction Viewpoint 16. Views along the disused railway line are from the bridge at Ninfield Road, Figure 13.10, Viewpoint 21 and Woodsgate Park BridgeFigure 13.10, Viewpoint 19.

Lighting Baseline

13.3.178 Photographs of the existing night time situation from key rural viewpoints within the Study Area 1 are provided in Figure 13.10, locations are indicated on Figure 13.9, photographs 1, 31, 47, 48 and 49. These photographs were taken using a long exposure with a 35mm camera on a tripod, manual focus and 200ASA film. These locations have been selected as the most representative viewpoints, which provide an assessment of the existing light intrusion in the night time sky. The photographs were taken on the same night in November 2006.

13.3.179 The proposed Scheme would have new street lighting at the junction of London Road and the A259 at Belle Hill. At Belle Hill there is street lighting that currently lights the A259 and London Road junction and traffic light control. New lighting around the junction would be assessed in the context of the existing urban scene. The urban area of Bexhill has not been included in these photographs, as the Scheme would not have a significant impact on the existing situation.

13.3.180 The existing junction of Crowhurst Road and Queensway is currently unlit and not controlled by traffic signals. The Scheme design would require street lighting and new traffic signals at the Queensway junction.

13.3.181 The Queensway is unlit and at this point there are no light columns or traffic signals in the area of the proposed junction. Photographs 47A and B, 48A and B indicate the existing situation at both day and night in the location of the proposed junction with Queensway. Passing car headlights provide the light in these images. There is little glow in the night sky at these locations. The road is in cutting and screened from the lights in adjacent residential areas. There is a background of urban lighting in the Church Wood area to the east of Queensway. There are no long views in to this part of Queensway, established tree planting and deep cutting on either side of Queensway forms an effective visual screen to neighboring properties on the Church Wood estates. Properties to the south and west are also screened by mature trees. The key visual receptors would be users of the proposed road between Crowhurst Road and Queensway.

13.3.182 From Henleys Down Road to the west of Crowhurst there are views down the Watermill Stream valley. A night time view was taken from this point, as photograph 49. The lights on the urban areas of Bexhill and Hastings give

off a glow above the distant ridge. The countryside in the valley between appears dark from this viewpoint.

13.3.183 The night time assessment from Glovers Lane is shown in Figure 13.10, from Viewpoint 31. The glow of lights on the horizon, probably originates from the Battle ridge and in the foreground from Crowhurst village. The scattered farms in between and properties on Henley's Down Road give off some limited glow and the landscape in the valley between is quite dark.

13.3.184 The view from Harley Shute down the Combe Haven Valley at night is shown in Figure 13.10, from Viewpoint 1. The valley is dark from this location with scattered areas of light glow evident on the distant ridge. This is from the edge at Bexhill and Sidley and other ridge top settlements.

APPENDIX 3.1

Appraisal of Archaeological Potential

Combe Haven Potential Renewable Energy Site: Advice to Tim Cookson at Hastings Borough Council for use by Chris Blandford Associates on archaeological potential of the defined site.

East Sussex Historic Environment Record search

Archaeology Section, Environment Team, East Sussex County Council
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January 2013

Introduction

This document is an appraisal of archaeological potential based on information held within the East Sussex Historic Environment Record (ESHER) and information not yet entered into the HER but in the public domain as a result of recent archaeological investigations. This document does not represent an archaeological desk-based assessment.

Background

The site proposed for allocation is shown on the Hastings Borough Council figure 'Appendix A, Proposed sites for wind turbines at Upper Wilting Farm'. The western two fields are in Crowhurst parish, Rother District and the eastern field in Hastings Borough.

The site comprises three fields which run from Decoy Pond Wood (Marline Stream) in the west to Redgeland Wood (Churchwood Stream) in the east. The three fields follow the lower valley side above the reclaimed marshland valley floor. The three fields are underlain by the predominantly sandy Ashdown Beds Sandstone with areas of the geologically overlying Wadhurst Clay along the northern margins. The site comprises land between c.5m OD and c.25m OD and is generally south to south-west facing. The western two fields have been cultivated and at least the south western part of the eastern field. Cultivation will have impacted to some degree on any below ground archaeological remains but the extent of any impact is not presently known.

Aim

The aim of this appraisal of archaeological potential is to help determine whether the site could be allocated for development related to renewable energy in line with the requirements set out in the National Planning Policy Framework 2012. A core principle of plan making under the NPPF is 'to conserve heritage assets in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life of this and future generations'.

HER information

Designated heritage assets

A search of the East Sussex Historical Environment Record confirms that the site does not contain any designated or registered heritage assets.

Historic landscape character

The Historic Landscape Characterisation for East Sussex suggests that the present character was largely defined in the medieval period as aggregate assarts (field clearings from woodland). A rapid review of historic mapping also confirms that the principle field boundaries have remained largely unchanged since the early 19th century. We are not aware of any existing land management agreements on the holding, such as Higher Level Stewardship.

Undesignated heritage assets

There is one principle recorded undesignated heritage asset that runs north to south through the centre of the site (MES 15422): the line of a post-medieval road thought to have been constructed by the Pelham family to provide access to the coast. It is possible, however, that the route is older and was re-used in the post-medieval period. This feature, which has been investigated by the Hastings Area Archaeological Research Group (HAARG) survives as an earthwork in Monkham Wood to the north of the site but within the site it appears to have been reduced by cultivation. There are three other monument records within or close to the site on the HER (MES 15421, 9158 and 7262). These are for individual find spots associated with local investigations and include a prehistoric flint flake and a probably humanly worked log of Bronze Age date from close by but outside the site. There is limited information associated with these records at present but the potential which they indicate is taken into account in the assessment below.

Event records and archaeological interest

The only HER event records (records of past archaeological investigations) presently on the HER are those for evaluation trial trenching carried out by Wessex Archaeology in 1996 to test claims by Nick Austin that the site contained remains associated with the Norman Conquest of 1066 and in particular evidence for a landing place for boats and related invasion activity. The locations of the trenches to test the claims have been entered on to the HER and some of these fall within the site. No evidence was found to substantiate the claims that had been made for Norman activity but the work did indicate the presence of colluvial layers (hill wash) on the valley sides, which has the potential to bury earlier land surfaces and soils containing archaeological remains, particular towards the base of the valley sides. Trench D of the WA 1996 evaluation, which was situated in the northern part of the eastern field of the proposed site, revealed no significant evidence for past human activity. Nick Austin's claims for the archaeological potential of this area are set out in his book Secrets of the Norman Invasion.

Previous to the 1996 WA investigations, in December 1992 field walking by Oxford Archaeology, in preparation for the proposed Hastings Bypass recorded a discrete cluster of fire-cracked flint (possibly of late Neolithic/early Bronze Age date) in the western field adjacent to Decoy Pond Wood. This work also identified a small scatter of metal slag suggesting later reuse of the site for iron-working, possibly in the Iron Age or Roman period.

Local research by HAARG has highlighted the potential for a causeway to have extended south (outside the site) to the present river channel and peat sampling by Christine Smyth & Simon Jennings in 1988 indicated that deposits upstream dating back to c. 2000 years ago had ponded against it.

The Chris Blandford Associates desk- based assessment for the Bexhill to Hastings Link Road (CBA 2003) notes a personal communication from Simon Jennings and Christine Smyth of sediment and pollen records from a site in Redgeland which indicated the presence of Bronze Age activity. In addition they note the record of an oak log of Middle Bronze Age date (ESHER MES 7262), which had probably been shaped by humans. (SJ pers. Comm. to CBA for DBA 2003). The site lies outside the proposed development site boundary, within a wetland channel but highlights potential. The ESHER MES7262 includes the following description "An oak log was exposed when a drainage ditch was deepened. A radio carbon date of 1890-1520 BC places the log in the middle Bronze Age. Ten auger holes were sited in a transect across the drainage ditch in July 2000 to locate the buried portion of the log prior to excavation. The northern end of the log possessed a natural fork which hade been artificially notched in the past, the southern section has had its centre section removed either by decay or human activity and was suggested to resemble a log boat". These observations highlight the likely archaeological interest of the site and its immediate surroundings.

The recent archaeological investigations by Oxford Archaeology for the Link Road have highlighted the potential for remains of broadly Late Mesolithic to Early Neolithic, Late Neolithic to Early Bronze Age and Late Iron Age to Romano-British date to be found around the valley sides and at the wet-dry interface at the margins of the Combe Haven valley floor. In particular the recent work has highlighted the potential for in situ Late Mesolithic to Early Neolithic flint scatters, representing the remains of base camps and specialist hunting camps. These tend to be located on the lower slopes of the Ashdown Beds Formation geology and found buried below later valley floor alluvial deposits and extending up slope on to the valley sides. Such sites, if well preserved and including such features as hearths, evidence for structures, pits and preserved organic remains, could be of national importance.

Evidence for later prehistoric settlement and agriculture (including field ditches, droveways and house sites) might be expected further up the valley sides with evidence for Late Iron Age to Romano-British activity, principally associated with exploitation of local iron ore resources, bloomeries and exports from riverside locations could be expected to be more widely from the margins of the present valley floor to the hill top ridges.

A recent archaeological excavation by SLR for Biffa (2010, post field work analysis and reporting in preparation) for work at the Pebsham landfill site has also demonstrated the potential complexity and range of periods for which evidence of past activity around the valley margins in Combe Haven can be expected. These include the broad periods outlined above and in addition evidence for Saxon activity represented by small assemblages of pottery. The Pebsham site lies adjacent to a

possible ridge track way that appears to run from the Pevensey Levels in the west, through to the Combe Haven Valley and on towards the Hastings area in the east, potentially linking to this proposed site area.

Assessment summary and conclusion

The archaeological investigations (including for academic research, local history and for development-led projects such as the Hastings Bypass in the 1990s, the more recent Bexhill to Hastings Link Road and the Pebsham Landfill extension) indicate that the site is very likely to have archaeological interest. In particular there is a high probability that the site will contain evidence for past activity of Late Mesolithic to Early Neolithic, Late Neolithic to Early Bronze Age and Late Iron Age to Early Romano-British date as well as the documented remains of the post-medieval coach road.

The types of archaeological remains that can be expected on this site will include complex distributions of lithics (worked flints), pottery, stone and iron slag as well as palaeo-environmental remains such as charcoal, pollen and insect remains. Patterns will be complex as a result of soil movement and re-deposition and as noted above, recent cultivation will have impacted upon and may potentially have reduced the significance of any buried archaeological remains. The site occupies land predominantly on the valley side above the level where one would expect to find waterlogged remains, which potentially offer greater levels of evidence for past human activity and for palaeo-environmental remains. However, it is possible that the site could contain archaeological remains buried beneath later hill wash that are part of wider site activity, for example of Late Mesolthic to Bronze Age date,) extending into the westland zone. It remains uncertain, therefore, whether the site would be likely to contain archaeological remains that might be of considered to be of national importance.

Whilst there are no recorded heritage assets within the site which would immediately rule out allocation of this land, the potential archaeological interest highlighted by this assessment should be noted.

The implication of this assessment is that if this site was allocated for development any forthcoming proposals would have to be subject to EIA and full consideration of cultural heritage issues including archaeology. The assessment would need to include detailed archaeological desk-based assessment and evaluation including field walking, geophysical survey and trial trenching.

Any mitigation might be achieved through design to preserve significant archaeological remains in situ and/or by archaeological recording of remains considered to be of lesser importance by targeted and area excavations followed by full analysis, reporting and publication. Total costs for archaeological assessment, evaluation and mitigation could be expected to be in the region of £250,000 to £750,000.

ESHER

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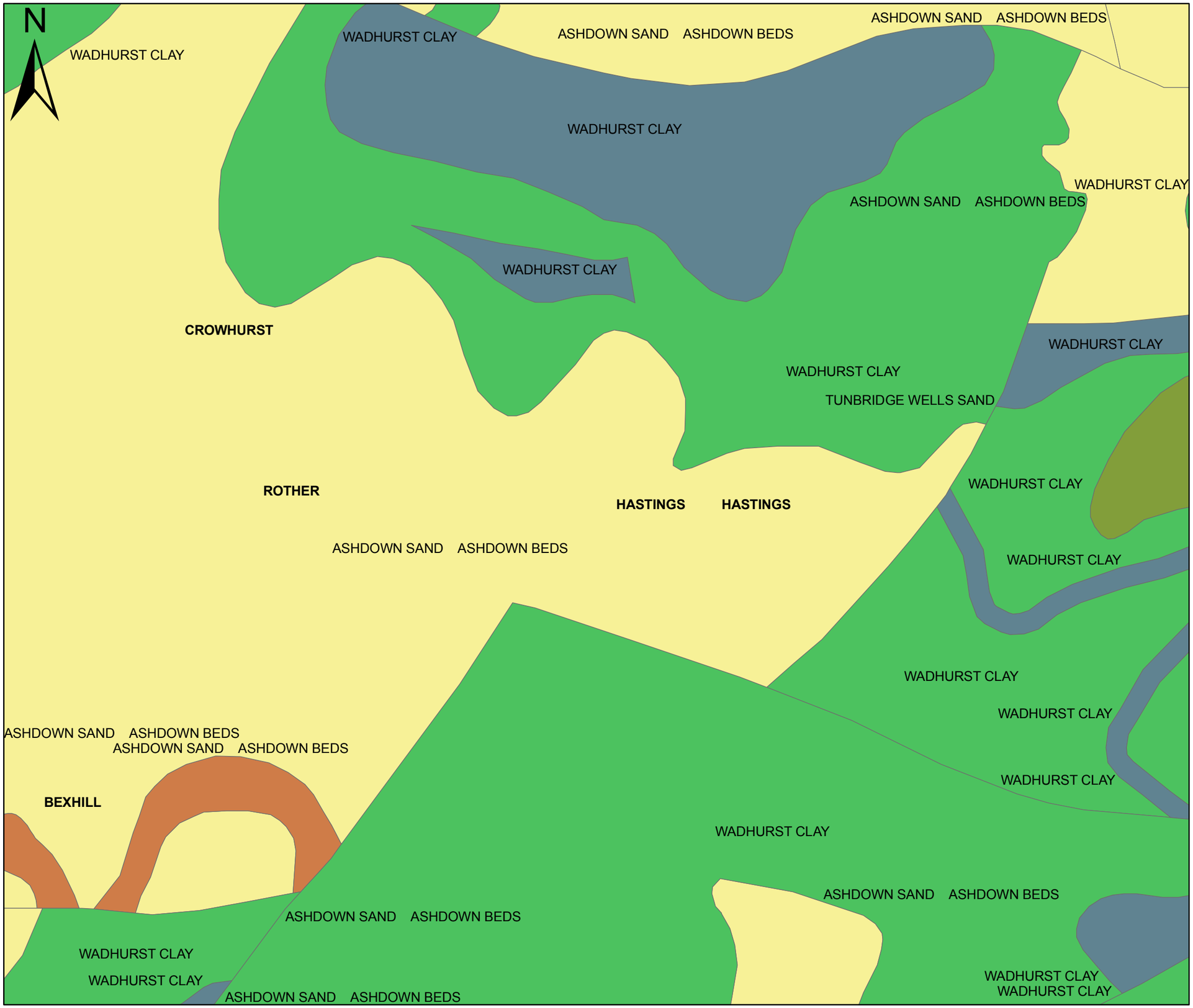

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Drawn by: S Unger

ESHER

Geology Superficial

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Drawn by: S Unger

ESHER
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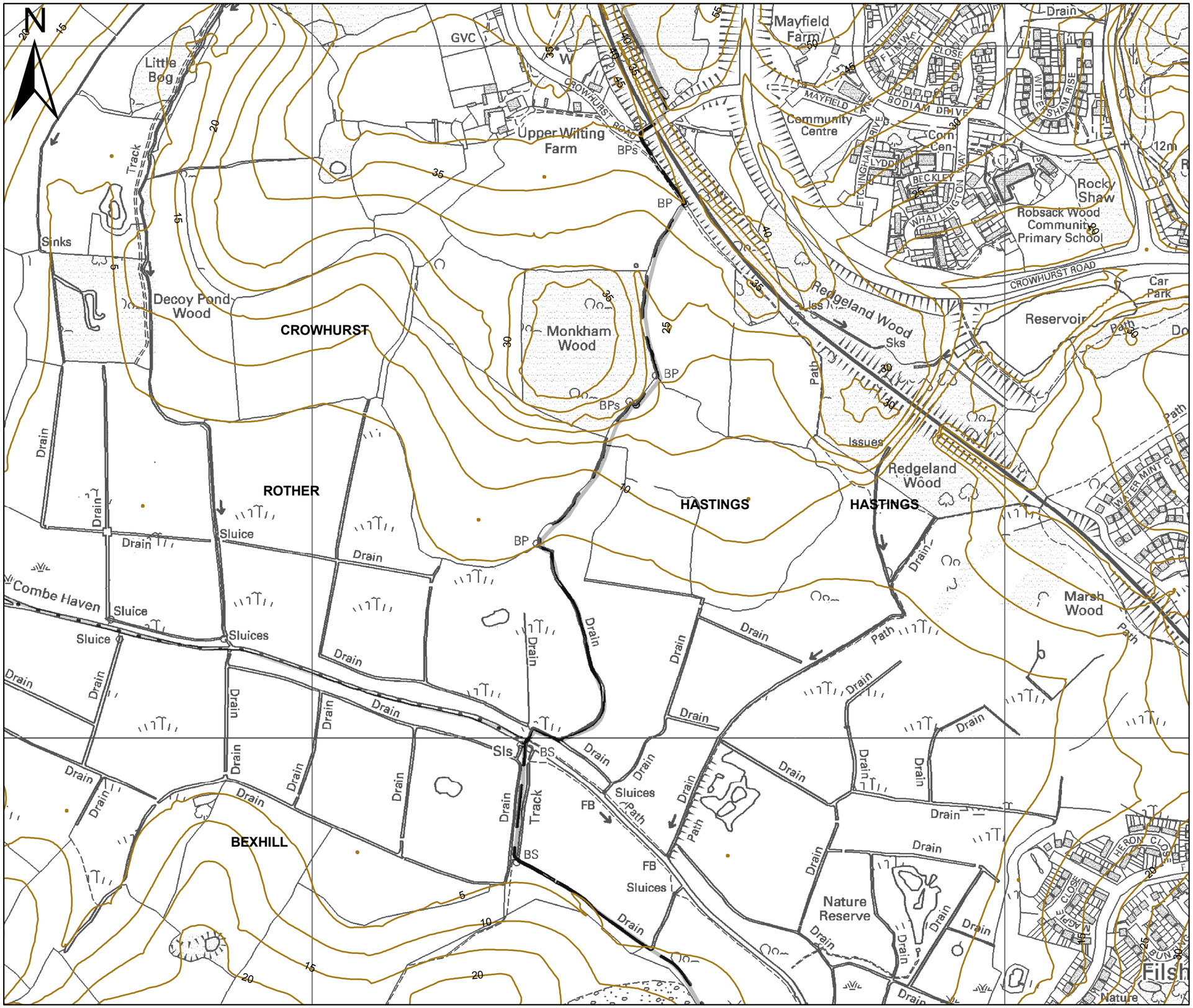

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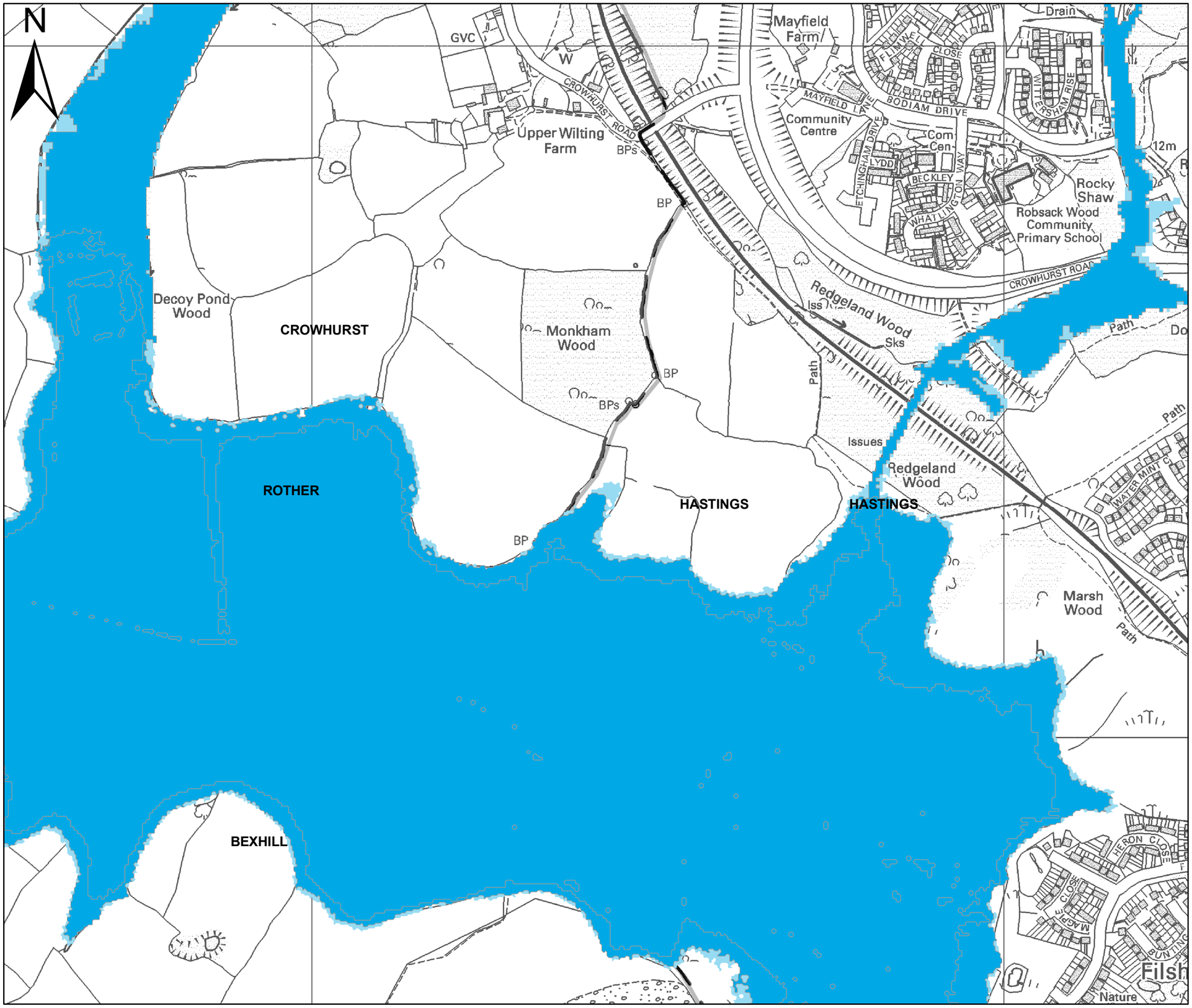
- Unitary
- District
- Parishes

Drawn by: S Unger

ESHER

Floods



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- EA_HISTORIC_FLOOD_MAP
- EA_FLOODZONE_LEVEL_2
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- Unitary
- District
- Parishes

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ESHER
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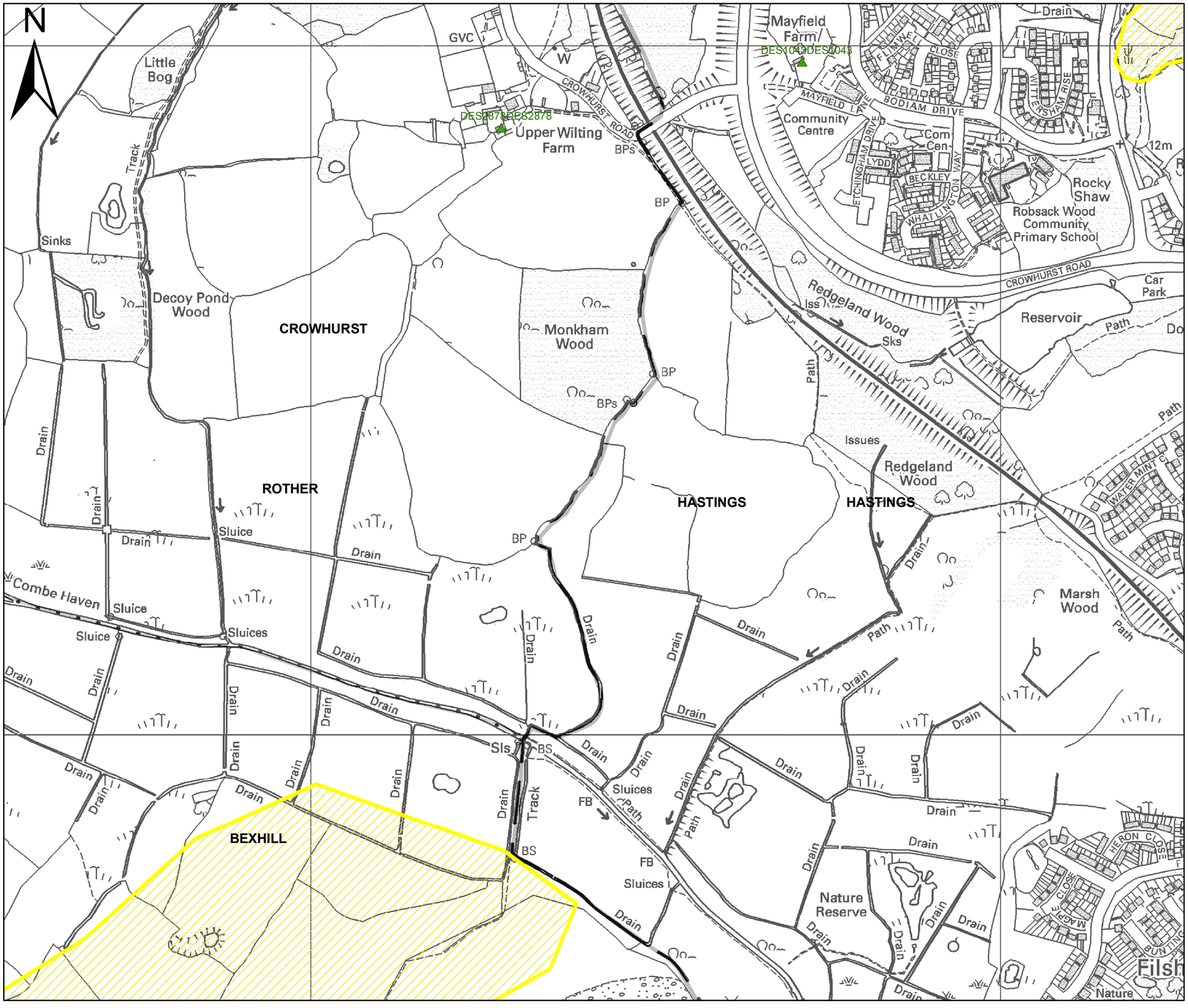

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- Registered Battlefields (poly)
- Protected Wrecks (poly)
- Archaeological Notification Areas (poly)
- Conservation Areas (poly)
- Registered Parks and Gardens (poly)
- County
- Unitary
- District
- Parishes

Drawn by: S Unger

ESHER

OS Draft

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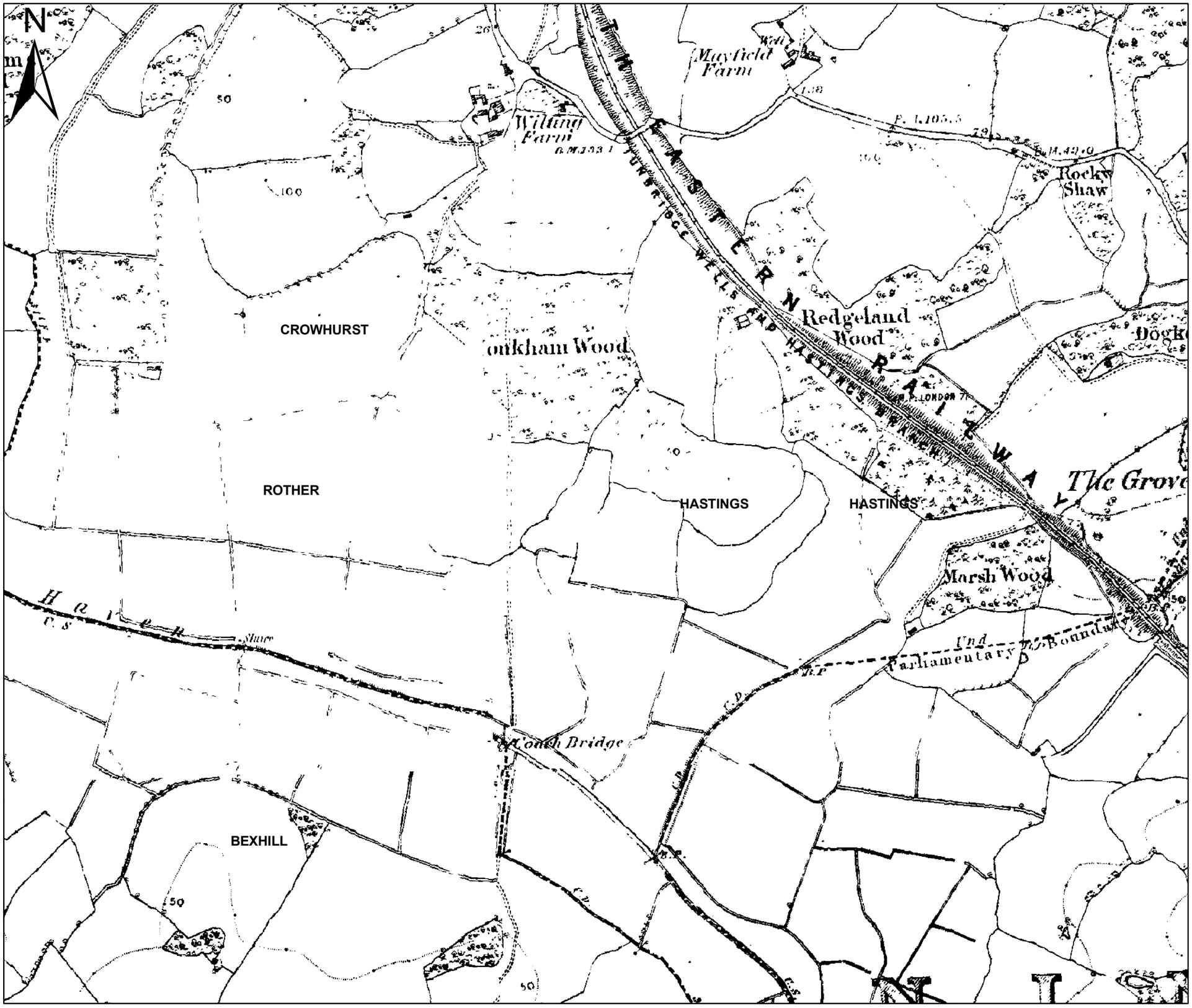
Drawn by: S Unger

ESHER
1st Ed



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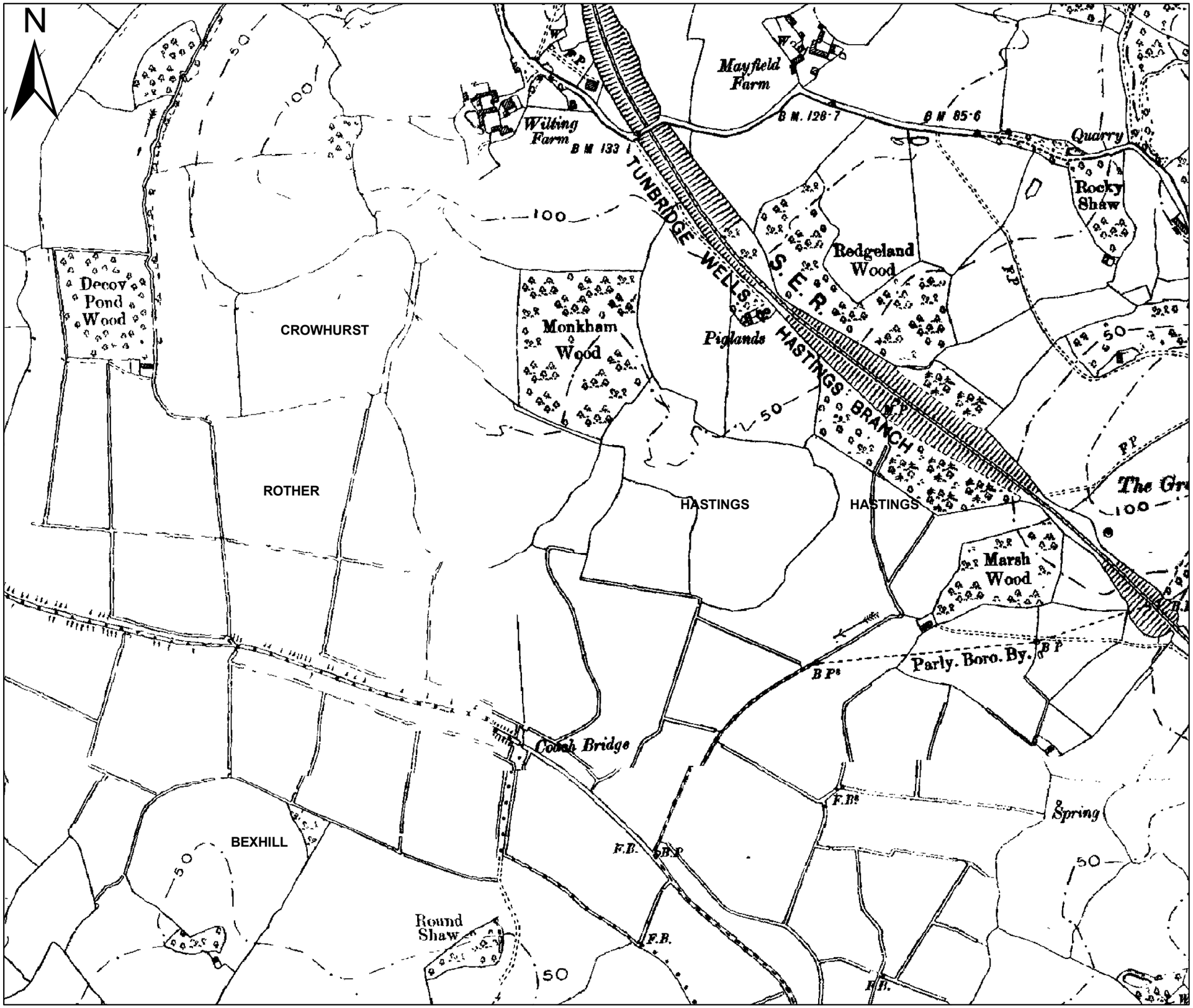
2nd Ed



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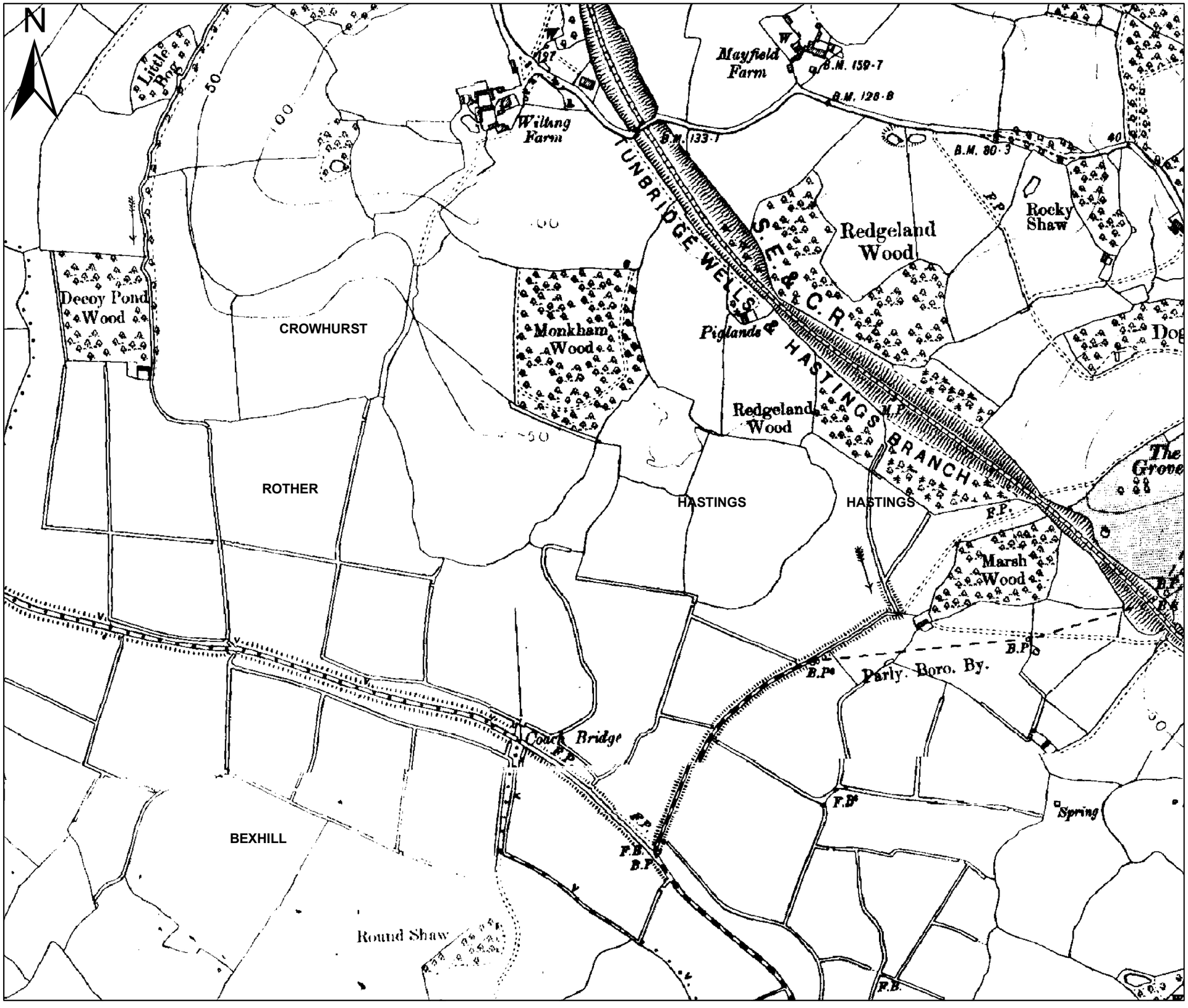

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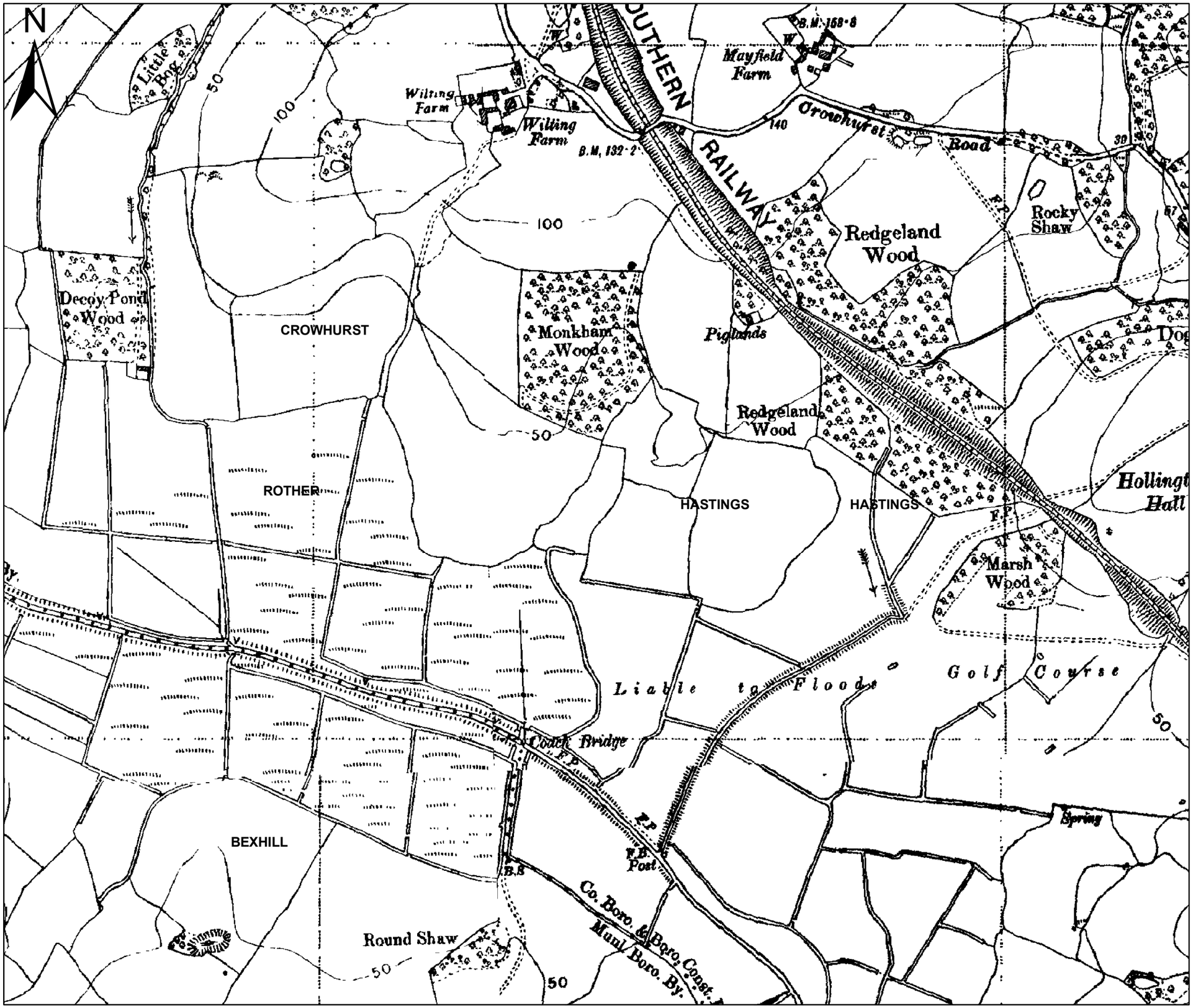
4th Ed



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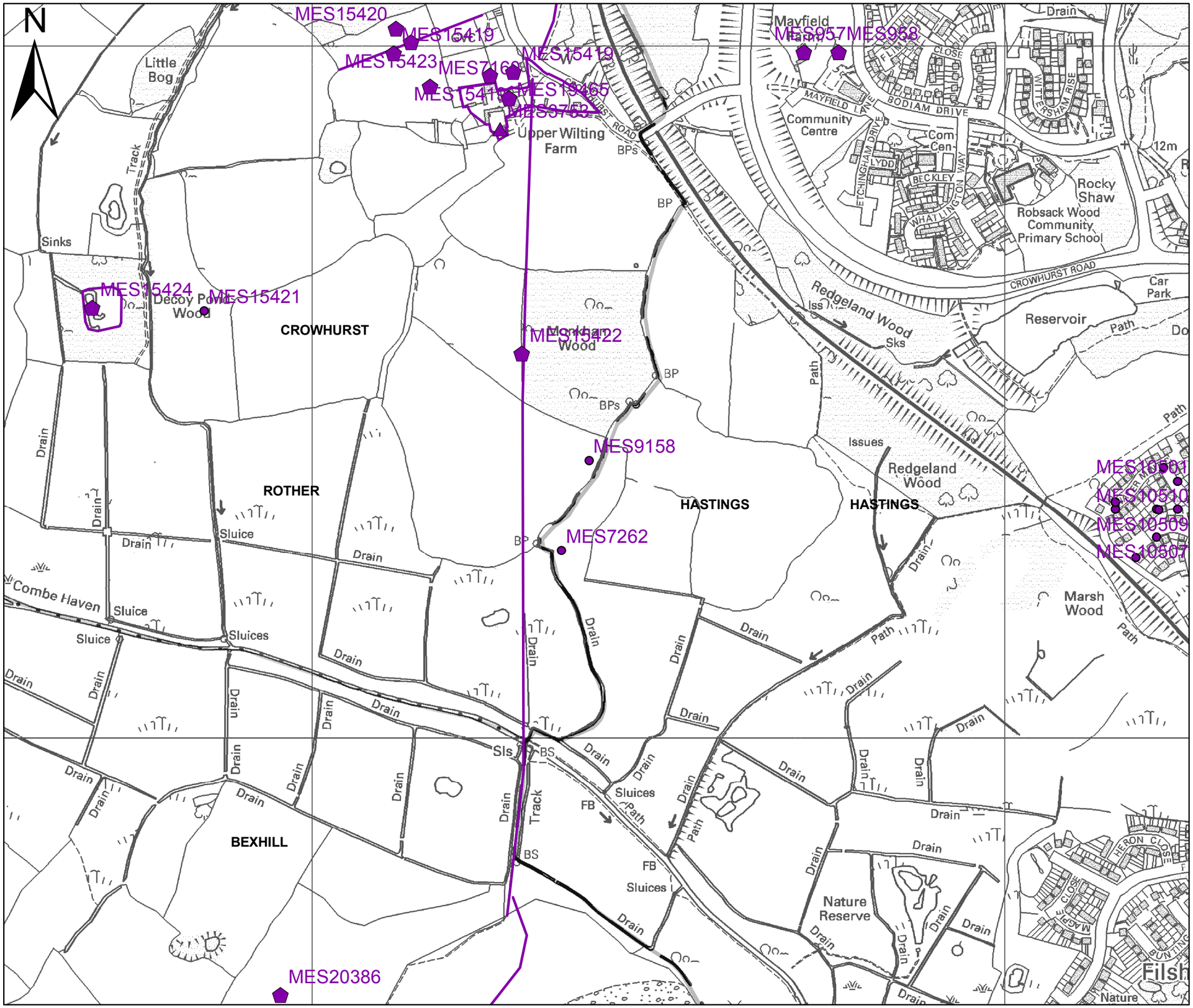
Drawn by: S Unger

ESHER
Monuments



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- LB
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- LND
- PLA
- MAR

- Monuments (line)
- Monuments (poly)
- County
- Unitary
- District
- Parishes

Drawn by: S Unger

APPENDIX 4.1

Ecological Desk-top Study and Phase 1 Habitat Survey

1.0 METHODOLOGY

1.1 Desk-top Study

1.1.1 The desk-top study was carried out using data acquired from the Sussex Biodiversity Record Centre (SxBRC) in January 2013. A review of existing ecological studies in the Bexhill and Hastings was also undertaken and further information on designated sites and habitats was retrieved from Natural England website.

1.1.2 Habitat data and all species records (except bats) were received from the SxBRC for evaluation within a 2km radius of the sites. All bat records were received for evaluation within a 5km radius of the sites.

1.2 Phase 1 Habitat Survey

1.2.1 The sites were surveyed on the 17th January 2013 by an ecologist working for CBA. The work was undertaken during the sub-optimal period for conducting Phase 1 habitat surveys; however it was felt that enough information was gathered to reliably inform the feasibility study and this did not pose a constraint to the results. Weather conditions on the day were cold (approx. 1ºC), sunny and with 0% cloud which posed no constraints to the results.

1.2.2 The survey was carried out using the methodology outlined in the 'Handbook for Phase 1 habitat survey - a technique for environmental audit'[1] to identify, map and describe the main habitats present along with their associated species. Target notes were taken on features of ecological interest and lists compiled of species observed during the survey. An assessment was also made of the presence or likely presence of statutory protected species.

[1] JNCC (2010) *Handbook for Phase 1 habitat survey - a technique for environmental audit*. ISBN 0 86139 636 7

2.0 RESULTS

2.1 Desk-top Study

Designated Sites and Habitats

Areas of Outstanding Natural Beauty (AONBs)

2.1.1 Areas of Outstanding Natural Beauty (AONBs) are statutory sites designated by Natural England under the Countryside and Rights of Way Act 2000. These are areas of high scenic quality, which are designated to conserve and enhance the natural beauty of their landscapes. There are currently 33 AONBs in England, 2 of which are located in Sussex. The High Weald AONB is located approximately 700m north-west of site A.

Sites of Special Scientific Interest (SSSIs)

2.1.2 Sites of Special Scientific Interest (SSSIs) are statutory sites notified under the Wildlife and Countryside Act 1981 as being of "special interest for nature conservation". There are approximately 4,100 in England, of which approximately 150 are located in Sussex. Under the Countryside and Rights of Way Act 2000, anyone who intentionally or recklessly damages or destroys the flora, fauna, physiological or geological features of a SSSI is guilty of an offence and liable of a fine of up to £20,000.

2.1.3 Located immediately adjacent to the sites and sharing their boundaries to the south, is Combe Haven SSSI (TQ770102). This 156ha site is a biological SSSI containing a rich diversity of habitat types including alluvial meadow, reed bed and ancient woodland that support a wide diversity of bird, invertebrate and plant life. In particular the site is considered important for breeding, wintering and passage birds, dragonflies and butterflies. According to Natural England's assessment[2] the condition of the site is 100% favourable.

2.1.4 Approximately 700m north of site B is another biological SSSI, Marline Valley Woods (TQ780122). This 55ha ancient woodland site is dominated by the nationally uncommon pedunculate oak-hornbeam (birch-hazel variant) woodland type. Also of value is the steep-sided stream valley 'ghyll' which supports plants with an 'Atlantic' distribution. This site was also assessed as being in a 100% favourable condition by Natural England[3].

[2] Natural England (2012) *SSSI Condition Summary – Combe Haven.* Available at <http://www.sssi.naturalengland.org.uk> Accessed 24/01/13
[3] Natural England (2012) *SSSI Condition Summary – Marline Valley Woods.* Available at <http://www.sssi.naturalengland.org.uk> Accessed 24/01/13

Local Nature Reserves (LNRs)

2.1.5 Local Nature Reserves are statutory sites which may be declared by local authorities under the National Parks and Access to the Countryside Act 1949. They are of importance for wildlife, geology, education or public enjoyment. There are over 1500 LNRs in England and currently 36 in Sussex.

2.1.6 Within a 2km radius of the sites there are three LNRs; Marline Wood, Church Wood and Rosback Wood and Filsham Reedbed. These sites are also designated as SNCIs and described in **Table 1.**

Sites of Nature Conservation Importance (SNCIs)

2.1.7 Sites of Nature Conservation Importance (SNCIs) are non-statuary sites that are recognised as being of importance for nature conservation at a county level. For this reason they are also sometimes called County or Local Wildlife Sites (LWSs). They may support threatened habitats or species and help fill gaps not covered by other designations. There are currently over 600 SNCIs in Sussex.

2.1.8 Within a 2km radius of the sites there are 11 SNCIs, the details of which are summarised in **Table 1**.

Local Geological Sites (LGSs)

2.1.9 Local Geological Sites (LGSs) are non-statutory sites that are identified by local geoconservation groups as being of value for educational, scientific, historic or aesthetic reasons. There are currently over 120 LGSs in Sussex.

2.1.10 Within a 2km radius of the sites is one LGS, Marline Valley Woods (TQ780122). This site features a typical Wealden ghyll, with waterfalls and Ashdown sandstone outcrops. It is designated for its scientific, educational and aesthetic value.

UK Biodiversity Action Plan (BAP) Habitats

2.1.11 The following UK Biodiversity Action Plan (BAP) priority habitats are found within a 2km radius of the sites:

- Coastal and floodplain grazing marsh
- Lowland fens
- Lowland meadows
- Maritime cliff and slopes
- Traditional orchards

Table 1 Sites of Nature Conservation Importance within a 2km radius

Site Name	Location	Size	Habitats	Species / features of interest
Filsham Reedbed	TQ778097 200m S of site C	18.80	Reedbed, open water	The open water and ditches are rich in plant life. A number of breeding and wintering birds are also associated with the site.
Wishing Tree	TQ780105 250m NE of site C	17.99ha	Semi-improved meadow, open water, semi-natural woodland	The meadow features a number of ant hills, indicating the undisturbed, unfertilised nature of the land. Dog Kennel and Redgeland Wood are in parts carpeted with an abundant and diverse ground flora.
Disused Railway, Crowhurst	TQ763116 400m W of site A	12.2ha	Ancient woodland, species-rich grassland, scrub	Some of the grassland adjacent to the line is very herb rich. The ancient woodland separating two pits features a number of indicator species.
Church Wood	TQ785112 700m NE of site C	32.98ha	Ancient woodland, stream valley (ghyll), semi-improved grassland	Areas of ancient hornbeam *Carpinus betulus* coppice support a diverse and lush ground flora. The meadow has a diverse and interesting flora ideal for a variety of invertebrates, including butterflies. There is also a very large badger sett, close to adjacent housing.
Marline Valley Woods	TQ780122 700m N of site B	55ha	Ancient woodland, stream valley (ghyll), species-rich unimproved grassland	The site is dominated by the nationally uncommon pedunculate oak-hornbeam (birch-hazel variant) woodland type. The stream valley supports plants with an 'Atlantic' distribution.
Disused Railway, Bexhill	TQ746092 – TQ761010 1km SW of site A	19ha	Secondary woodland, ancient woodland, scrub, grassland, tall herb	The railway line passes through Combe Wood, a 400 year old ancient woodland site with species-rich ground flora including 32 ancient woodland indicators.
Wainwright Close	TQ778114 1km N of site C	0.5ha	Species-rich grassland, hedgerows, scrub, pond	The mature hedgerows which border the site and the pond have a variety of plant species. The site also supports the uncommon grassland spider *Argiope breunichii*.
Ponds Wood	TQ791105 1.1km E of site C	17.89ha	Ancient woodland, meadow, pond, stream	This SNCI comprises two transitional meadow habitats, Ponds Wood and Gillsman Wood. The ground flora in Ponds Wood and the northern meadow rich and diverse. There is a large badger sett in Gillsman Wood and the western meadow is well used by butterflies and crickets.
South Saxons	TQ784090 1.3km SE of site C	3.88ha	Reedbed, willow carr, open water, rough grassland, meadow	The reedbed has a high diversity of plant species and also supports frogs, toads and breeding birds. The meadow represents an excellent invertebrate and small mammal habitat. The willow carr is a notable rarity in Hastings Borough and supports a diversity of insect and bird life.
Bulverhythe Shingle Beach and Cliffs	TQ774082 1.6km S of site C	11.24ha	Shingle beach, maritime cliffs, rough grassland, scrub	The shingle beach supports excellent populations of the rare sea-kale *Crambe maritima* and yellow horned-poppy *Glaucium flavum*. The western bank of the Combe Haven canal mouth supports a good diversity of plant species.
Glyne Gap	TQ766083 1.7km S of site B	13.66ha	Marshy grassland, reedbed, ditches, scrub	The site is renowned for its migratory wetland birds. The ditches are considered important habitats for the specialist flora and fauna they support, especially invertebrates.

Species

Botany

2.1.12 A number of scarce or rare plant, lichen and fungi species have been recorded within a 2km radius of the sites, the details of which are summarised in **Table 2.**

Table 2 Notable plant species within a 2km radius (including lower plants, lichens and fungi)

UKBAP = UK Biodiversity Action Plan priority species; **SBAP** = Sussex Biodiversity Action Plan Species; **NERC** = Natural Environment and Rural Communities Act 2006 (Section 41: Species of Principal Importance in England); **SRSIS** = Sussex Rare Species Inventory species; **IUCN(CR/EN/VU/NT)** = IUCN Red List of Threatened Species 2001 (Critically Endangered/Endangered/Vulnerable/Near Threatened)

Scientific Name	Common Name	Status	Number of records
Flowering Plants			
Apera spica-venti	Loose silky-bent	IUCN(NT); SRSI	1 (1987)
Brassica oleracea var. oleracea	Wild cabbage	SRSI	1 (1996)
Buxus sempervirens	Box	SRSI	1 (2006)
Cakile maritima	Sea rocket	SRSI	1 (2008)
Calamagrostis epigejos	Wood small-reed	SRSI	2 (1989-1992)
Cardamine bulbifera	Coralroot	SRSI	9 (1986-2009)
Carex divisa	Divided sedge	IUCN(VU); NERC; SBAP; SRSI; UKBAP	1 (1989)
Carex rostrata	Bottle sedge	SRSI	2 (1995)
Carex vulpina	True fox-sedge	IUCN(VU); NERC; SBAP; SRSI; UKBAP	1 (2011)
Catabrosa aquatic	Whorl grass	SRSI	2 (1981-1983)
Centaurium scilloides	Perennial centaury	IUCN(EN); SBAP; SRSI; UKBAP	1 (2011)
Dryopteris aemula	Hay-scented buckler-fern	SRSI	7 (1966-2011)
Eleocharis uniglumis	Slender spike-rush	SRSI	2 (1970-1981)
Eleogiton fluitans	Floating club-rush	SRSI	3 (1981-2003)
Epilobium lanceolatum	Spear-leaved willowherb	SRSI	1 (1991)
Euphorbia platyphyllos	Broad-leaved spurge	SRSI	1 (2011)
Galeopsis angustifolia	Red hemp-nettle	IUCN(CR); NERC; SBAP; SRSI; UKBAP	2 (1981-1987)
Hydrocharis morsus-ranae	Frogbit	IUCN(VU); SRSI	17 (1975-2011)
Hypochaeris glabra	Smooth cat's-ear	IUCN(VU); SRSI	1 (1996)
Juncus maritimus	Sea rush	SRSI	1 (1992)
Juncus subnodulosus	Blunt-flowered rush	SRSI	5 (1975-2006)
Lathraea squamaria	Toothwort	SRSI	1 (1988)
Matthiola fruticulosa	Sad stock	SRSI	1 (2007)
Meconopsis cambric	Welsh poppy	SRSI	2 (1995-2011)
Myriophyllum verticillatum	Whorled water-milfoil	IUCN(VU); SRSI	4 (1975-2006)
Oenanthe fistulosa	Tubular water-dropwort	IUCN(VU); NERC; SBAP; UKBAP	2 (1975-1981)
Polypogon monspeliensis	Annual beard-grass	SRSI	1 (2007)
Potamogeton trichoides	Hairlike pondweed	SRSI	3 (1981-1995)
Ranunculus hederaceus	Ivy-leaved crowfoot	SRSI	1 (1975)
Salix viminalis x caprea = S. x Smithiana	Broad-leaved osier	SRSI	1 (2004)
Sambucus ebulus	Dwarf elder	SRSI	1 (1999)
Stratiotes aloides	Water soldier	IUCN(NT); SRSI	3 (1978-1990)
Thalictrum flavum	Common meadow-rue	SRSI	8 (1975-2007)
Utricularia australis	Bladderwort	SRSI	7 (2003-2005)
Vicia lutea	Yellow vetch	SRSI	1 (1997)

Scientific Name	Common Name	Status	Number of records
Tilia platyphyllos	Large-leaved lime	SRSI	1 (1999)
Non-vascular plants			
Chara virgata	Delicate stonewort	SRSI	1 (1919)
Fissidens exiguus	Tiny pocket-moss	SRSI	2 (2006)
Fissidens rivularis	River pocket-moss	SRSI	20 (1899-2011)
Hennediella stanfordensis	Stanford screw-moss	SRSI	1 (1991)
Metzgeria conjugata	Rock veilwort	SRSI	7 (1899-2005)
Pterygoneurum ovatum	Oval-leaved pottia	SRSI	1 (2002)
Tortula freibergii	Freiberg's screw-moss	IUCN(NT);NERC; SBAP; SRSI; UKBAP	1 (1966)
Lichens			
Arthonia elegans		SRSI	2 (2005)
Arthothelium ruanum		SRSI	2 (1972)
Biatora sphaeroides		SRSI	1 (1972)
Caloplaca chrysophthalma		SRSI	1 (1950)
Leptogium lichenoides		SRSI	2 (1972-1984)
Melaspilea ochrothalamia		SRSI	1 (1972)
Moelleropsis nebulosa		SRSI	1 (1980)
Peltigera neckeri		SRSI	1 (1889)
Pertusaria hemisphaerica		SBAP	1 (1972)
Fungi			
Boletus aereus		SRSI	1 (1993)
Boletus parasiticus		SRSI	1 (1993)
Boletus porosporus	Sepia bolete	SRSI	1 (1993)
Boletus pruinatus	Matt bolete	SRSI	1 (1993)
Lepiota aspera	Freckled Dapperling	SRSI	1 (1993)
Mniaecia nivea		SRSI	2 (1972-1998)
Trametes hirsuta	Hairy bracket	SRSI	1 (1995)
Tricholoma sejunctum	Deceiving Knight	SRSI	1 (2004)

Mammals

Water vole

2.1.13 Within a 2km radius of the sites there are 5 records of water vole *Arvicola amphibius,* dated 1997-2007. The most recent record (2007) is also the nearest, and is located less than 100m south of site C in Combe Haven SSSI. This species has suffered severe declines in recent years due to a loss of habitat and predation by the American mink *Mustela vison*. For these reasons it is fully protected under the Wildlife and Countryside Act 1981 (Schedule 5) and the Countryside and Rights of Way Act 2000. It is also listed as a Species of Principal Importance in England (Section 41: Natural Environment and Rural Communities Act 2006), a UK BAP species, a Sussex BAP species and a Sussex Rare Inventory species.

Hazel dormouse

2.1.14 There are 30 records of hazel dormouse *Muscardinus avellanarius* within a 2km radius of the sites dating 1953-2012. Several of these records (most recently in 2006) have been made in the Marline Wood LNR, located approximately 700m north of site B.

2.1.15 In addition to the data provided by the SxBRC, a study carried out in 2004 to inform the proposed Bexhill to Hastings Link Road[4] suggest that dormice are widespread in the area, *"present in Marline Valley Woods in considerable numbers and in the woods and scrub south from Marline Valley Woods SSSI up to Upper Wilting Farm"*. It is also suggested that dormice in the area are *"often found in hedges and even fens in locations well away from the mature Hazel coppice"*.

2.1.16 The hazel dormouse is a European protected species listed under Schedule 2 of the Conservation of Habitats and Species Regulations 2010. They are also protected under the Wildlife and Countryside Act 1981 (Schedule 5) and the Habitats Directive (Annex 4) and listed as a Species of Principal Importance in England (Section 41: Natural Environment and Rural Communities Act 2006), a UK BAP species and a Sussex BAP species.

Hedgehog

2.1.17 There are 4 records of hedgehog *Erinaceus europaeus* within a 2km radius of the sites, dating 1992-2007. The most recent of these records (2007) is from the Marline Valley area. Due to population declines the hedgehog is listed as a Species of Principal Importance in England (Section 41: Natural Environment and Rural Communities Act 2006), a UK BAP species and a Sussex BAP species.

Harvest mouse

2.1.18 Within 2km of the sites, 2 records of harvest mouse have been made, in 1962 and 2010. The 2010 record is located approximately 400m south-east of site C in Filsham Reedbed. Due to population declines this species is listed as a Species of Principal Importance in England (Section 41: Natural Environment and Rural Communities Act 2006), a UK BAP species and a Sussex BAP species.

Badger

2.1.19 There are 54 records of badger *Meles meles* within a 2km radius of the sites. The most recent of these records was made in 2010 but the locations have been kept confidential by the SxBRC. Surveys carried out in 2005 and 2006 to inform the proposed Hastings to Bexhill Link Road[5] found several large, active setts in the area and it was suggested that the overall badger population is large. Although not rare, the badger has historically suffered from persecution and is therefore protected under the Bern Convention (Appendix III) and the Protection of Badgers Act 1992. Under the act it is an offence to kill, injure or take a badger or interfere with a sett which includes damaging it, destroying it or obstructing an entrance.

[4] East Sussex County Council (n.d.) *Bexhill to Hastings Link Road – EA Chapter 12: Nature Conservation and Biodiversity*
[5] East Sussex County Council (n.d.) *Bexhill to Hastings Link Road – EA Chapter 12: Nature Conservation and Biodiversity*

Bats

2.1.20 9 species of bat have been recorded within a 5km radius of the sites and these are listed in **Table 3.** In addition there are a further 65 records of unidentified bats dating 1944-2010, including a record of a roost (unknown species) made at Adam's Farm, approximately 600m west of site A, in 1987. Bat records provided by the SxBRC with a grid reference of at least 6 figures (100m accuracy) are shown in **Figure 1.**

2.1.21 Surveys carried out in 2004 and 2005 to inform the proposed Bexhill to Hastings Link Road[6] indicated that the area supported a *"good, but not exceptional range of bats"* including Common pipistrelle *Pipistrellus pipistrellus*, Brown long-eared *Plecotus auritus*, Noctule *Nyctalus noctula*, Serotine *Eptesicus serotinus* and possibly Natterer's *Myotis nattereri*, Whiskered *Myotis mystacinus,* Brandt's *Myotis brandtii* and Daubenton's *Myotis daubentonii*. In addition the survey located a brown long-eared roost at Upper Wilting Farm and the possible presence of a brown-long eared roost at Adam's Farm.

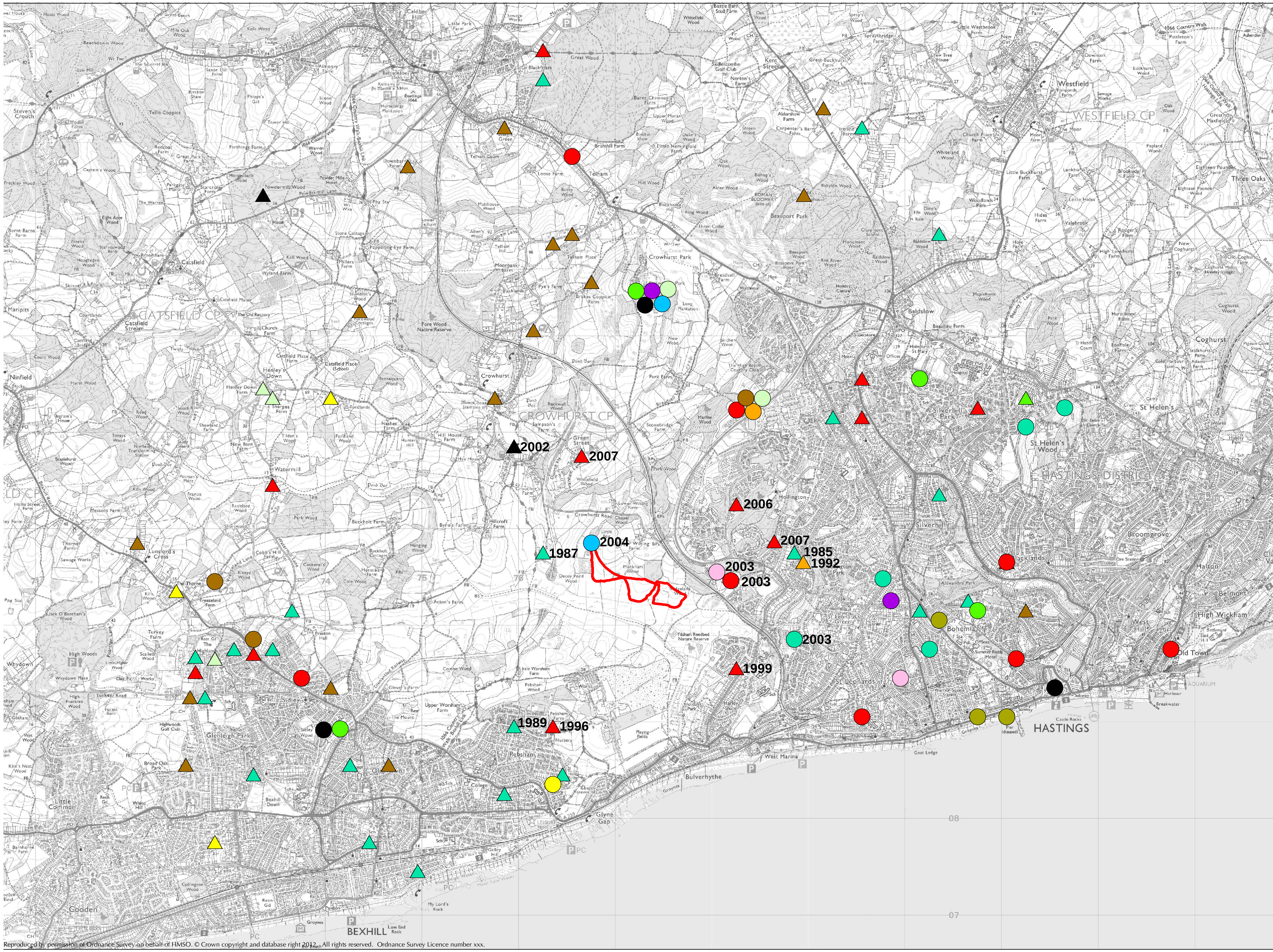
2.1.22 All species of bat and their roosts are protected by UK and European law under the Wildlife and Countryside Act 1981 (Schedule 5), the Habitats Directive (Annex IV), the Bern Convention (Annex II) and the Bonn Convention (Annex II).

Table 3 Bat species within a 5km radius

NERC = Natural Environment and Rural Communities Act 2006 (Section 41: Species of Principal Importance in England); **UKBAP** = UK Biodiversity Action Plan Priority Species

Scientific Name	Common Name	Status	Number of records		Nearest Record
			Non-roost	Roost	
Eptesicus serotinus	Serotine		3 (1990-2007)	32 1982-2010)	2km NE of Site; Non-roost; 1995
Myotis daubentonii	Daubenton's		5 (1901-2007)	0	50m NW of Site; Non-roost; 2004
Myotis mystacinus	Whiskered		3 (2003-2004)	0	2.7km SE of Site; Non-roost; 2004
Myotis nattereri	Natterer's		2 (2006-2010)	0	2.1km E of Site; Non-roost; 2010
Nyctalus noctula	Noctule	NERC; UKBAP	4 (1903-1995)	1 (1992)	2km NE of Site; Non-roost; 1995
Pipistrellus nathusii	Nathusius pipistrelle		2 (2003-2006)	0	400m NE of Site; Non-roost; 2003
Pipistrellus pipistrellus	Common pipistrelle (45kHz)		5 (2007-2010)	1 (2011)	2.8km N of Site; Non-roost; 2007
Pipistrellus pygmaeus	Soprano pipistrelle (55kHz)	NERC; UKBAP	4 (2003-2010)	3 (2002-2011)	1.4km NW of Site; Roost; 2002
Plecotus auritus	Brown long-eared	NERC; UKBAP	7 (1939-2010)	18 (1987-2008)	2km NE of Site; Non-roost; 1995

[6] East Sussex County Council (n.d.) *Bexhill to Hastings Link Road – EA Chapter 12: Nature Conservation and Biodiversity*



KEY

Site boundary

Bat species

- Brown long-eared
- Common pipistrelle (45 kHz)
- Daubenton's
- Long-eared sp.
- Nathusius's pipistrelle
- Natterer's
- Noctule
- Pipistrelle sp.
- Serotine
- Soprano pipistrelle (55 kHz)
- Unknown
- Whiskered

Record type

- Non-roost
- Roost

2003 Date of record

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0 0.5 1 km

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FIGURE 1
Bat records - based on data provided by SxBRC

Otter

2.1.23 Otter *Lutra lutra* records are kept confidential by the SxBRC but a review of records undertaken to inform the proposed Bexhill to Hastings Link Road[7] indicate that this species has been recorded in the Filsham Reedbed and Combe Haven SSSI in 2001. Otters are making a slow return to Sussex after becoming extinct in the 1960's and the population is still very vulnerable.

Otters are fully protected by European and UK legislation under the Conservation of Habitats and Species Regulations 2010 (Schedule 2), Wildlife and Countryside Act 1981 (Schedule 5), Habitats Directive (Annex 4) and Bern Convention (Appendix 2). In addition this species is listed as a Species of Principal Importance in England (Section 41: Natural Environment and Rural Communities Act 2006), a UK BAP species and a Sussex BAP species.

Herptiles

2.1.24 There are 6 records of great crested newt *Triturus cristatus* within a 2km radius of the sites dated 1986-2002. The most recent record (2002) is located approximately 1.4km north of site B. The great crested newt is afforded full legal protection under the Wildlife and Countryside Act 1981 (Schedule 5), the Bern Convention (Appendix II), the Habitats Directive (Annex II) and the Countryside and Rights of Way Act 2000. It is also listed as a Species of Principal Importance in England (Section 41: Natural Environment and Rural Communities Act 2006), UK BAP species and Sussex BAP species. Britain is a stronghold for populations of the great crested newt and has a special responsibility for its conservation.

2.1.25 One other notable species of amphibian has been recorded within 2km of the sites, the common toad *Bufo bufo*. There are 11 records dated 1984-2011. This species is protected under the Wildlife and Countryside Act 1981 (Schedule 5) with respect to sale only. It is also listed as a Species of Principal Importance in England (Section 41: Natural Environment and Rural Communities Act 2006), UK BAP species and Sussex BAP species.

2.1.26 6 species of reptile have been recorded within a 2km radius of the sites; slow-worm *Anguis fragilis,* sand lizard *Lacerta agilis*, common lizard *Zootoca vivipara,* smooth snake *Coronella austriaca,* grass snake *Natrix natrix* and adder *Vipera berus*. All of these species are protected under the Wildlife and Countryside Act 1981 (Schedule 5). As European protected species the sand lizard and smooth snake are given additional protection under Bern Convention (Appendix 2) and Habitats Directive (Annex 4). Due to substantial declines they are all listed as Species of Principal Importance in England (Section 41: Natural Environment and Rural Communities Act 2006), UK BAP species and Sussex BAP species. The smooth snake and sand

[7] East Sussex County Council (n.d.) *Bexhill to Hastings Link Road – EA Chapter 12: Nature Conservation and Biodiversity*

lizard are also listed on the Sussex Rare Species Inventory. The number of records for each species and the date range is listed below:

- Slow-worm 49 (1899-2012)
- Sand lizard 1 (1901)
- Common lizard 31 (1989-2011)
- Smooth snake 1 (1901)
- Grass snake 27 (1989-2011)
- Adder 3 (1991)

Fish

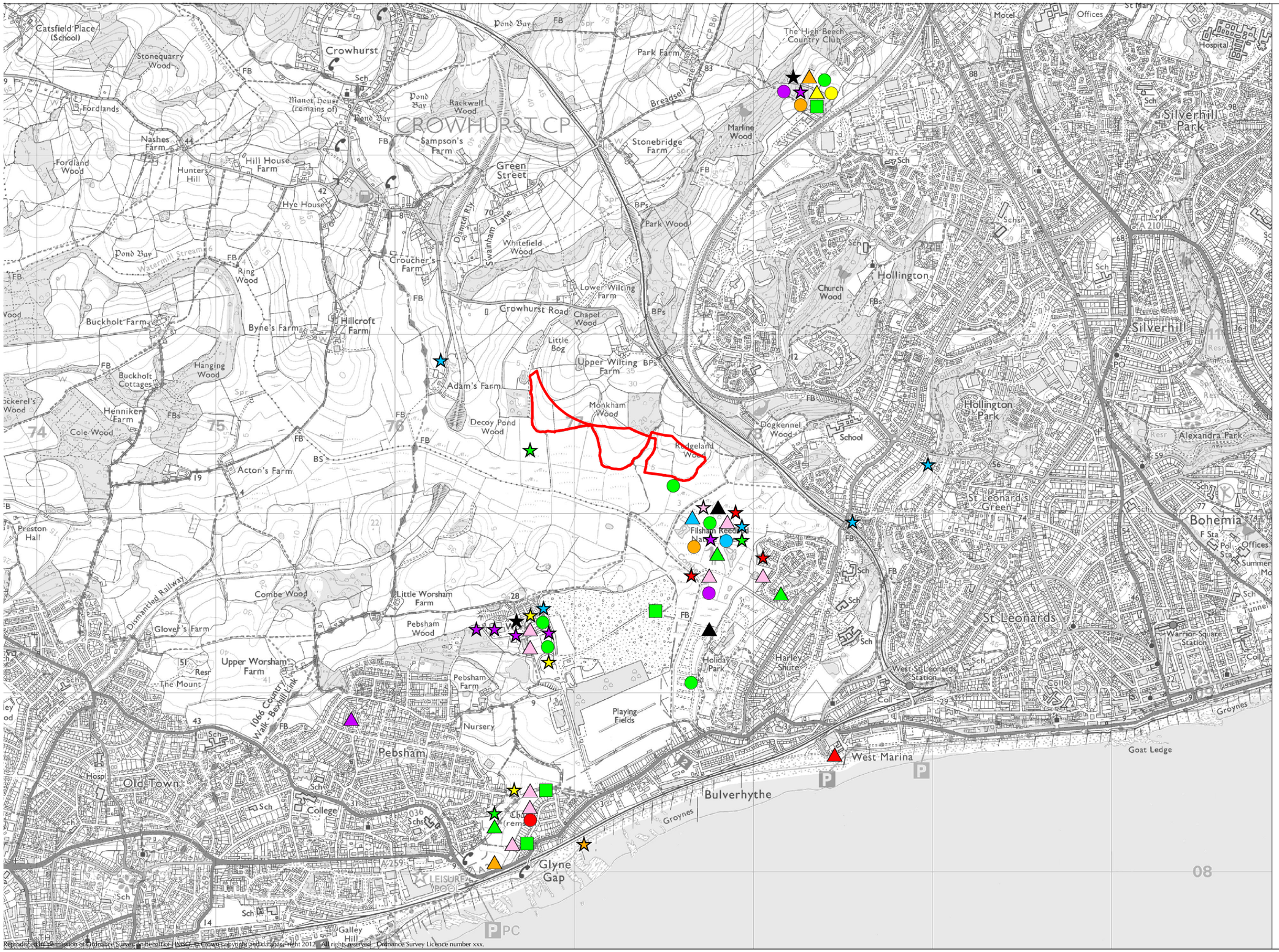
2.1.27 There are 2 records of European eel *Anguilla anguilla* within a 2km radius of the sites dating 1979 and 2011. The 2011 record is located approximately 400m south-east of site C in Filsham Reedbed. Due to sharp population declines this species is listed as a Species of Principal Importance in England (Section 41: Natural Environment and Rural Communities Act 2006), UK BAP species and Sussex BAP species.

Birds

2.1.28 All British bird species, their eggs and nests are protected under the Wildlife and Countryside Act 1981. However there is some additional protection for species considered rare or important in Britain, particularly those listed on Schedule 1 of the Wildlife and Countryside Act 1981 which are protected by species penalties. A number of notable bird species were recorded within a 2km radius of the sites and these are summarised in **Table 4**.

2.1.29 **Figure 2** displays bird records provided by the SxBRC with a grid reference of at least 6 figures (100m accuracy) and notable for being listed on at least one of the following:

- Schedule 1 of the Wildlife and Countryside Act 1981
- Annex 1 of the Birds Directive
- Appendix 1 of Natural England's Technical Information Note TIN069 (2010)



KEY

Site boundary

Bird species

- Barn owl
- Bearded tit
- Black redstart
- Cetti's warbler
- Common crossbill
- Common kingfisher
- Common quail
- Dartford warbler
- Eurasian Hobby
- Firecrest
- Garganey
- Great bittern
- Grey heron
- Little egret
- Little plover
- Marsh harrier
- Marsh warbler
- Montagu's harrier
- Northern lapwing
- Peregrine falcon
- Red kite
- Savi's warbler
- Spotted crake

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0 0.5 1 km

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FIGURE 2
Notable bird records - based on data provided by SxBRC

Table 4 Notable bird species within a 2km radius

Red/Amber list = Birds of Conservation Concern – Red/Amber List Species; **WCA (I)** = Wildlife and Countryside Act 1981 (Schedule 1 Species); **NERC** = Natural Environment and Rural Communities Act 2006 (Section 41: Species of Principal Importance in England); **UK BAP** = UK Biodiversity Action Plan Priority Species; **Bern (II)** = Bern Convention (Appendix 2); **BD (I)** = Birds Directive (Annex I); **WFS =** Wind Farm Sensitive birds[8]

Scientific Name	Common Name	Status	Legal Protection[9]	Number of records
Accipiter gentilis	Northern goshawk		WCA(I)	1 (2000)
Acrocephalus palustris	Marsh warbler	Red list; NERC; UKBAP	WCA(I)	4 (1999-2003)
Alcedo atthis	Common kingfisher	Amber list	Bern(II); BD(I); WCA(I)	68 (1992-2011)
Anas acuta	Northern pintail	Amber list	WCA(I)	7 (1992-2004)
Anas querquedula	Garganey	Amber list	WCA(I)	13 (1999-2001)
Anas strepera	Gadwall	Amber list		36 (1990-2007)
Anser brachyrhynchus	Pink-footed goose	Amber list; WFS		1 (1993)
Apus apus	Common swift	Amber list		68 (1992-2011)
Ardea cinerea	Grey heron	WFS		62 (1991-2011)
Asio otus	Long-eared owl		Bern(II)	16 (1992-2003)
Botaurus stellaris	Great bittern	Red list; NERC; UKBAP; WFS	Bern(II); BD(I); WCA(I)	29 (1988-2011)
Burhinus oedicnemus	Stone curlew	Amber list; NERC; UKBAP; WFS	Bern(II); BD(I); WCA(I)	2 (1988-2000)
Caprimulgus europaeus	Nightjar	Red list; NERC; UKBAP; WFS	Bern(II); BD(I)	2 (1992)
Cettia cetti	Cetti's warbler		WCA(I)	106 (1995-2011)
Charadrius dubius	Little plover	Amber list	Bern(II); WCA(I)	20 (1992-2003)
Circus aeruginosus	Eurasian marsh harrier	Amber list; WFS	BD(I); WCA(I)	73 (1989-2011)
Circus cyaneus	Hen harrier	Red list; NERC; WFS	BD(I)	15 (1992-2001)
Circus pygargus	Montagu's harrier	Amber list; WFS	BD(I); WCA(I)	4 (1985-2000)
Coccothraustes coccothraustes	Hawfinch	Red list; NERC; UKBAP	Bern(II)	41 (1991-2006)
Coturnix coturnix	Common quail	Amber list	WCA(I)	13 (1992-2002)
Delichon urbicum	House martin	Amber list	Bern(II)	99 (1989-2007)
Dendrocopos minor	Lesser spotted woodpecker	Red list; UKBAP	Bern(II)	58 (1991-2007)
Egretta garzetta	Little egret	Amber list; WFS	Bern(II); BD(I)	28 (1994-2008)
Emberiza calandra	Corn bunting	Red list; UKBAP		4 (1994-2000)
Falco columbarius	Merlin	Amber list; WFS	Bern(II); BD(I); WCA(I)	35 (1992-2003)
Falco peregrinus	Peregrine falcon	WFS	Bern(II); BD(I); WCA(I)	28 (1992-2002)
Falco subbuteo	Eurasian hobby		Bern(II); WCA(I)	87 (1990-2007)
Gallinago gallinago	Common snipe	Amber list		127 (1989-2011)
Grus grus	Common crane	Amber list; WFS	Bern(II); BD(I)	5 (1984-2000)
Hirundo rustica	Barn swallow	Amber list	Bern(II)	133 (1985-2011)
Larus melanocephalus	Mediterranean gull	Amber list	Bern(II); BD(I); WCA(I)	53 (1992-2009)
Locustella luscinioides	Savi's warbler	Red list; NERC; UKBAP	WCA(I)	4 (1987-2001)

[8] Birds listed on Appendix 1 of the Natural England Technical Information Note TIN069 (2010) *Assessing the effects of onshore wind farms on birds*.

[9] The provisions of the Birds Directive are implemented in the UK through the Conservation of Habitats and Species Regulations 2010 and the Wildlife and Countryside Act 1981.

Scientific Name	Common Name	Status	Legal Protection[9]	Number of records
Loxia curvirostra	Common crossbill		Bern(II); WCA(I)	27 (1992-2003)
Lullula arborea	Wood lark	Amber list; NERC; UKBAP	BD(I); WCA(I)	19 (1995-2003)
Milvus milvus	Red kite	Amber list; WFS	BD(I); WCA(I)	3 (1994-2004)
Motacilla flava	Yellow wagtail	Red list; UKBAP	Bern(II)	90 (1984-2010)
Numenius arquata	Eurasian curlew	Amber list; NERC; UKBAP		14 (1985-2000)
Pandion haliaetus	Osprey	Amber list; WFS	BD(I); WCA(I)	16 (1995-2005)
Panurus biarmicus	Bearded tit	Amber list	Bern(II); WCA(I)	170 (1985-2007)
Passer montanus	Eurasian tree sparrow	Red list; NERC; UKBAP		49 (1992-2007)
Perdix perdix	Grey partridge	Red list; NERC; UKBAP		10 (1994-2001)
Pernis apivorus	European honey buzzard	Amber list; WFS	BD(I); WCA(I)	40 (2000-2002)
Phoenicurus ochruros	Black redstart	Amber list	Bern(II); WCA(I)	36 (1992-2010)
Phylloscopus sibilatrix	Wood warbler	Red list; NERC; UKBAP		14 (1992-1999)
Pluvialis apricaria	Golden plover	Amber list; WFS	BD(I)	16 (1995-2004)
Poecile montanus	Willow tit	Red list; UKBAP	Bern(II)	48 (1991-2007)
Porzana porzana	Spotted crake	Amber list	Bern(II); BD(I); WCA(I)	9 (1981-2000)
Regulus ignicapilla	Firecrest	Amber list	Bern(II); WCA(I)	66 (1992-2006)
Sterna hirundo	Common tern	Amber list; WFS	Bern(II); BD(I)	19 (1992-2011)
Sterna paradisaea	Arctic tern	Amber list; WFS	Bern(II); BD(I)	8 (1992-1995)
Sterna sandvicensis	Sandwich tern	Amber list; WFS	Bern(II); BD(I)	12 (1992-2010)
Streptopelia turtur	European turtle dove	Red list; NERC; UKBAP		80 (1990-2007)
Sylvia undata	Dartford warbler	Amber list	BD(I); WCA(I)	54 (1993-2006)
Tringa tetanus	Common redshank	Amber list		10 (1994-2002)
Tyto alba	Barn owl	Amber list	Bern(II); WCA(I)	26 (1995-2008)
Vanellus vanellus	Northern lapwing	Red list; NERC; UKBAP; WFS		84 (1992-2009)

Invertebrates

2.1.30 135 notable invertebrate species have been recorded within a 2km radius of the sites including:

- 135 Sussex Rare Species Inventory species – 44% of which are beetles, 27% moths
- 51 UK BAP species - 82% of which are moths

2.1.31 It should be noted that the above categories overlap i.e. a species listed as a Sussex Rare Species Inventory species may also be on the UK BAP list. Some of the above are also listed as Sussex BAP species, Nationally Notable species and/or Species of Principal Importance in England (Section 41: Natural Environment and Rural Communities Act 2006).

Invasive Species

2.1.25 Outlined in **Table 5** are a number of invasive alien species that have been recorded within a 2km radius of the sites. These are non-native species which pose a threat to the UK's native fauna and flora. Legal frameworks and policies such as the Convention on the Conservation of European Wildlife and Natural Habitats (1979) require that contracting parties shall prevent the introduction of non-native species, control or eradicate them where appropriate. Section 14 of the Wildlife and Countryside Act (1981) makes it illegal to release into the wild, allow to escape or grow any non-native species of animal or plant listed in Schedule 9 (Parts 1 and 2).

Table 5 Invasive species within a 2km radius

WCA(9) = Wildlife and Countryside Act 1981 (Schedule 9 species)

Scientific Name	Common Name	Status	Number of records
Plants			
Allium triquetrum	Three-cornered garlic		8 (1995-2010)
Azolla filiculoides	Water fern		2 (1995)
Carpobrotus edulis	Hottentot-fig		1 (2008)
Centranthus ruber	Red valerian		15 (1989-2011)
Cotoneaster horizontalis	Wall cotoneaster		5 (2007-2011)
Crocosmia pottsii x aurea = C. x Crocosmiiflora	Montbretia		7 (2006-2011)
Elodea canadensis	Canadian waterweed		5 (1981-2005)
Elodea nuttallii	Nuttall's waterweed		2 (2004-2010)
Fallopia japonica	Japanese knotweed	WCA(9)	13 (1989-2011)
Hyacinthoides hispanica	Spanish bluebell		1 (1999)
Hyacinthoides non-scripta x hispanica = H. x massartiana	Hybrid bluebell		8 (2009-2011)
Impatiens glandulifera	Indian balsam		10 (1996-2010)
Lagarosiphon major	Curly waterweed		1 (2000)
Lamiastrum galeobdolon subsp. Argentatum	Variegated yellow archangel		2 (2011)
Myriophyllum aquaticum	Parrot's-feather		2 (2006-2011)
Nymphoides peltata	Fringed water-lily		3 (1995-2009)
Parthenocissus quinquefolia	Virginia creeper		2 (2010)
Petasites fragrans	Winter heliotrope		14 (1981-2011)
Prunus laurocerasus	Cherry laurel		7 (1996-2009)
Rhododendron ponticum	Rhododendron		8 (1991-2010)
Robinia pseudoacacia	False acacia		1 (1991)
Rosa rugosa	Japanese rose		6 (1993-2011)
Vertebrates			
Mustela vison	American mink	WCA(9)	4 (1979-2011)
Trachemys scripta subsp. elegans	Pond slider		1 (1999)
Invertebrates			
Harmonia axyridis	Harlequin ladybird		2 (2009)

2.2 Phase 1 Habitat Survey

2.2.1 **Figure 3** is the Phase 1 habitat survey plan, illustrating the distribution and extent of habitats present within the survey area and shows the locations of Target Notes (TNs), which highlight features of ecological interest, or provide further information on the habitats or species present. Details of the Target Notes are listed in **Table 6.**

2.1.26 The following habitats and features were identified within or adjacent to the site boundaries and are described in more detail below:

- Broadleaved semi-natural woodland A1.1.1
- Dense scrub A2.1
- Scattered scrub A2.2
- Scattered broadleaved trees A3.1
- Poor semi-improved grassland B6
- Swamp F1
- Running water G2
- Arable J1.1
- Species-poor defunct hedge J2.2
- Species-poor hedge with trees J2.3.2

Woodland, Scrub and Trees

2.2.2 There is a very limited extent of woodland within the site boundaries; however there are several blocks of broadleaved semi-natural woodland situated immediately adjacent to them. This includes Monkham Wood and Decoy Pond Wood, ancient woodland sites in favourable condition that, according to Natural England's assessment, have ivy *Hedera helix* covered trees which '*may provide cover for bats during the summer months'*[10]. Monkham Wood is varied in structure, with a canopy dominated by oak *Quercus robur*, ash *Fraxinus excelsior* and hornbeam *Carpinus betulus* and a dense understory. Dead wood is an abundant resource throughout. Decoy Pond Wood is similar, with a canopy dominated by oak and sycamore *Acer pseudoplatanus*. These woodlands form part of the Combe Haven SSSI.

2.2.3 There is a patch of dense hawthorn *Crataegus monogyna* and bramble *Rubus fruticosus agg.* scrub on site C extending out from Monkham Wood. This area provides good cover for nesting birds. Elsewhere there is occasional scattered gorse *Ulex europaeus* and broom *Cytisus scoparius*.

[10] Natural England (2012) *Combe Haven - Condition of SSSI units*. Available at <http://www.sssi.naturalengland.org.uk> Accessed 18/01/13

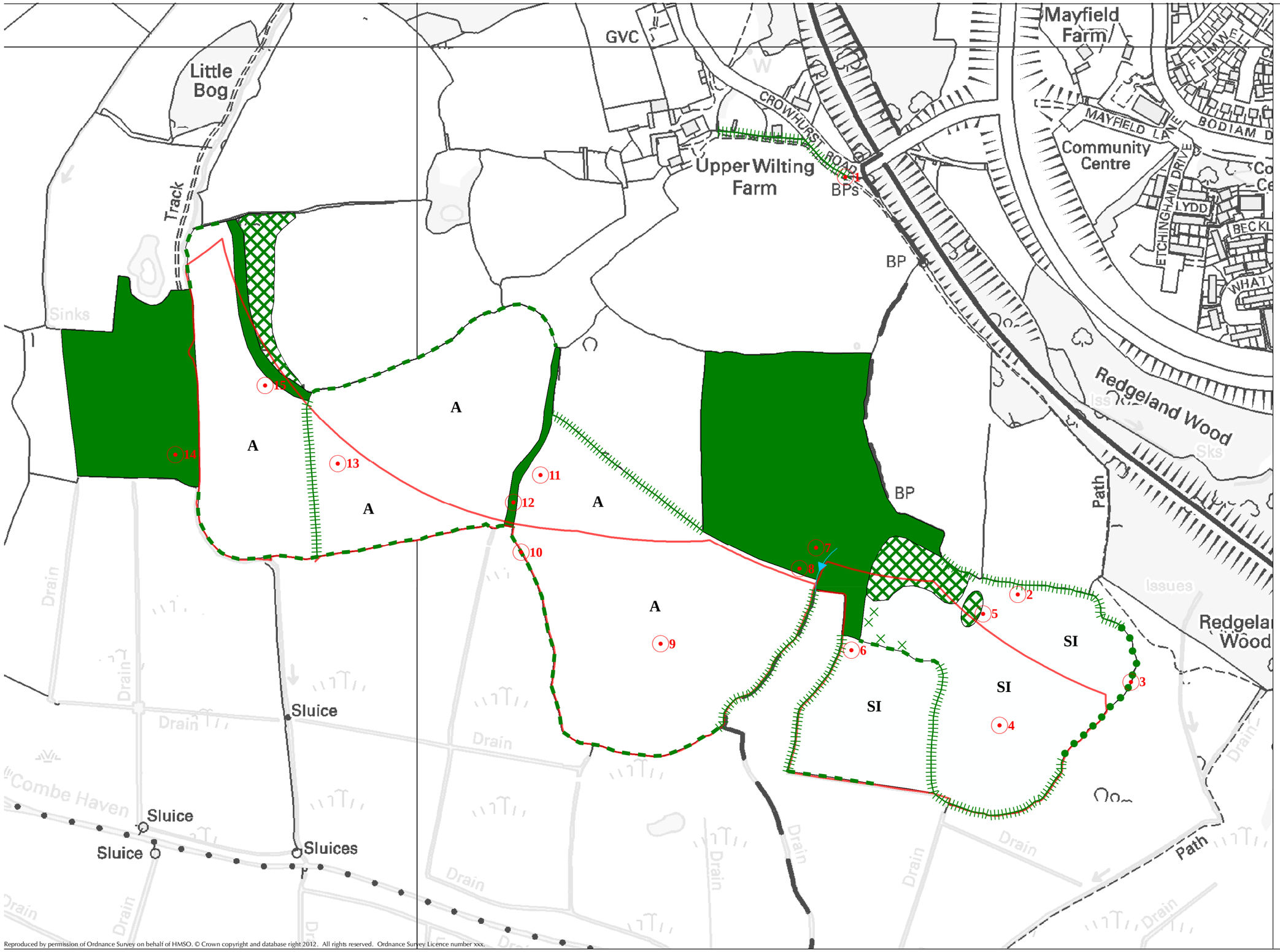

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Figure 3
Phase 1 Habitat Map

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2.2.4 A line of mature oak trees forms the north-eastern boundary of site C. Some of these have a dense covering of ivy and broken branches, fissures etc. that may provide roosting sites for bats.

Grassland

2.2.5 The two fields in site C are comprised of poor semi-improved grassland. The sward is a fairly even 5-10cm height throughout and may have been managed by cutting. There were no signs of livestock having recently grazed the land and the boundaries were not stock-proof. A few common grasses and forbs such as Yorkshire fog *Holcus lanatus,* ribwort plantain *Plantago lanceolata* and common ragwort *Senecio jacobaea* are abundant throughout. There are some low lying and wet areas with standing water and rushes *Juncus spp.* growing. Around the margins of the fields common knapweed *Centaurea nigra* is common. Overall the grassland was categorised as poor semi-improved due to the restricted number of species found, however it should be noted that the survey was carried out at a sub-optimal time of year when it is possible for species to be overlooked.

Swamp

2.2.6 Along the southern boundary of site C is a large expanse of common reed *Phragmites australis*. This reedbed is part of the Combe Haven SSSI, and likely to be an important habitat for breeding, wintering and migrating birds. Open water with large congregations of birds was seen further to the south.

Running water

2.2.7 A small stream runs along the boundary of site B through Monkham Wood and feeding into the reedbeds and wet grasslands of Combe Haven SSSI. Along its margins the vegetation includes pendulous sedge *Carex pendula* and alder *Alnus glutinosa*.

Arable

2.2.8 Arable fields form the majority of land cover within the boundaries of sites A and B. The crop is oilseed rape *Brassica napus* and this is sown right up to the field margins, leaving a thin strip of grassland no more than 0.5m wide in most places. The diversity and abundance of flowering plants around the margins was found to be low, and included hedge bedstraw *Galium mollugo,* wild carrot *Daucus carota* and crane's bill *Geranium spp.*

Hedges

2.2.9 Species-poor hedges with trees form the majority of the site boundaries and dissect sites A and C. Most of these hedges are defunct, with several gaps that livestock could easily pass through. They are all of a similar character in general, with a shrubby base comprised of hawthorn, holly *Ilex aquifolium*, rose *Rosa spp,* bramble, dogwood *Cornus sanguinea* or hazel *Corylus avellana* and several young trees at regular intervals along their length. Most of these trees are oaks. There did not appear to be a rich ground flora associated with any of the hedges, and some were lined with bracken *Pteridium aquilinum* or nettles *Urtica dioica*. These hedges have good connectivity across the landscape as a whole, linking several blocks of ancient woodland, and could be used for dispersal by bats or dormice *Muscardinus avellanarius*.

Table 6 Phase 1 habitat survey target notes (see **Figure 3** for location of target notes)

Target Note	Habitat/Feature	Description
1	Species-poor intact hedge	Approx. 4m high and dominated by hawthorn with abundant bramble and ivy. Quite tall and leggy at possible access point in line with road, offering less cover. Immediately to the east the hedgerow breaks, with a gap approx. 10m wide before a line of trees continues.
2	Species-poor hedge with trees	A dense covering of hawthorn, bramble, rose and holly at the base up to 2m high. Some young oak trees throughout.
3	Trees with bat roost potential	A line of mature oaks approx. 20m high, some with a dense covering of ivy and broken branches, fissures etc. Good potential for summer bat roosts.
4	Poor semi-improved grassland	A rough sward approx. 5-10cm tall of a fairly even height throughout. The field slopes down to the east and south where Yorkshire fog and ribwort plantain are the most abundant grass and forb. On the upper slope bent grass is more common and there are some low lying wet areas with rushes. Overall there is a low diversity of forbs, with a few common species such as bristly oxtongue and broad-leaved dock. The fields immediately border a large expanse of reedbed to the south, with open water and large congregations of birds seen in the distance (Combe Haven SSSI).
5	Dense scrub	Dense hawthorn scrub with occasional rose, elder and young oak.
6	Barn owl boxes	2x barn owl boxes situated on wooden poles at the edge of the field, with the entrances facing south-east. Squirrels seen coming out of one box.
7	Broadleaved semi-natural woodland/ running water	Monkham Wood appears to have a varied and interesting ground flora with dog's mercury, wood avens, forget-me-not and pendulous sedge all seen in a small area. There is a small running stream feeding water into the reed and wet grasslands to the south. The trees appear to be of a similar height and age, with the odd ivy-covered tree on the southern boundary having bat roost potential.
8	Badger sett	Apparently disused, several holes seen in south-east corner of Monkham Wood.
9	Arable	Arable field with oilseed rape sown right up to the margins, leaving no more than 0.5m of grassy edge. Limited forb cover includes hedge bedstraw and wild carrot.
10	Tree with bat roost potential	A large willow (?) tree with dense ivy covering. Many branches recently broken off and died. Good bat roost potential.
11	Badger tracks	Fresh tracks seen on muddy track walking south from woodland area through arable field.
12	Broadleaved semi-natural woodland	Small block of woodland with an old track way running through the middle.
13	Buzzard	Buzzard seen flying over at height from north to south.

Target Note	Habitat/Feature	Description
14	Broadleaved semi-natural woodland	Decoy Pond wood has some densely ivy-covered trees on its eastern boundary that have bat roost potential.
15	Broadleaved semi-natural woodland/ badger sett	Small strip of woodland with an old sett that badgers have recently been excluded from using wire mesh fencing (probably in relation to Bexhill to Hastings Link Road).

APPENDIX 4.2

Potential Dungeness SPA Extension

& Proposed Ramsar Site Location Maps

The site excludes permanent structures such as buildings, roads, bridges, culverts, slipways, jetties and houseboats. However, the site does include any exposed bankside, intertidal, subtidal or other wetland habitats beneath the aforementioned structures.

NOTE:
The boundary shown is derived from larger scale mapping (Ordnance Survey Mastermap) and may not match the background detail on this map.

Between A-B, C-D and E-F the boundary follows the Lowest Astronomical Tide and is liable to change

Potential Special Protection Area

Dungeness, Romney Marsh and Rye Bay

East Sussex, Kent

Land previously classified
1478.57 Hectares

Potential Special Protection Area
2580.06 Hectares

Land previously classified and
now proposed for deletion 10.00 Hectares

EU Site Code: UK1111111
Version Number: 1
Longitude: 00:47:50E
Latitude: 50:55:40N
Projection: British National Grid
Area of SPA: 4048.63 Hectares

Theme ID: 1460500
Grid Ref: TQ965180
Version: 20100430
Plotted: 30/04/2010
PlotID: 1434

Scale 1:100000 at A3

Map 1 of 1

Grid North

0 2 4 6km
0 5000 10000 15000ft.

Special Protection Area Directive 79/409/EEC
Classified by the Secretary of State for Environment, Food and Rural Affairs. Date:

NATURAL ENGLAND

The site excludes permanent structures such as buildings, roads, bridges, culverts, slipways, jetties and houseboats. However, the site does include any exposed bankside, intertidal, subtidal or other wetland habitats beneath the aforementioned structures.

NOTE:
The boundary shown is derived from larger scale mapping (Ordnance Survey Mastermap) and may not match the background detail on this map.

Between A-B, C-D and E-F the boundary follows the Lowest Astronomical Tide and is liable to change

A B C D E F

Proposed Ramsar Site

Dungeness, Romney Marsh and Rye Bay

East Sussex, Kent

Proposed Ramsar Site
6416.15 Hectares

Ramsar Site Code: UK1000000
Version Number: 1
Longitude: 00:45:04E
Latitude: 50:58:06N
Projection: British National Grid
Area of Ramsar: 6416.15 Hectares

Theme ID: 1460497
Grid Ref: TQ931224
Version: 20100430
Plotted: 30/04/2010
PlotID: 1454

Scale 1:100000 at A3

Map 1 of 1

Grid North

0 2 4 6km
0 5000 10000 15000ft.

Wetland of International Importance, Ramsar Convention
Designated by the Secretary of State for Environment, Food and Rural Affairs. Date:

NATURAL ENGLAND

APPENDIX 5.1

Viability Assessment

A Viability Assessment of Wind Turbines at Upper Wilting Farm

Designing practical solutions for a sustainable future

NORTH ENERGY

A Viability Assessment of Wind Turbines at Upper Wilting Farm

July 2013

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QUALITY ASSURANCE

		NORTH ENERGY	
Document Identifier: Upper Wilting Farm REVISED July 2013 (v3)			
	Name	Signature	Date
Checked by	Garry Jenkins		12 July 2013
Approved by	Garry Jenkins		12 July 2013

Executive Summary

Following initial consideration of a number of options, the following 5 options were selected as the best for comparison purposes in the viability assessment:

- Option 1 – one 500kW turbine, 54m rotor diameter, 50m tower height, 77m to blade tip
- Option 2 – three 500kW turbines, dimensions as above
- Option 3 – one 500kW turbine and one 900kW turbine, dimensions as above
- Option 4 – two 2.3MW turbines, 70m rotor diameter, 74m tower height, 109m to blade tip
- Option 5 – two 3MW turbines, 82m rotor diameter, 85m tower height, 126m to blade tip

Options 1-3 are considered to be 'medium scale' commercial turbines and Options 4-5 'large scale' commercial turbines.

Three sites (A, B and C) at Upper Wilting Farm were identified by planning officers from Hastings Borough Council after a study by Element Energy indicated the area was broadly suitable for wind turbines.

The identified sites are suitable for wind turbines, although the wind resource cannot be considered particularly high. The sites will also suffer from turbulence due to the surrounding hills and trees, which will affect the output of any turbines. Wind monitoring is advisable, firstly to confirm the estimated energy outputs and secondly to help the turbine manufacturer give assurances that the wind turbulence is within turbine design limits.

The available locations for turbines are constrained, mainly because the fields are tree-lined, leaving only small areas in the middle of the fields sufficiently far from the trees to satisfy wildlife off-sets of 75m. In addition, site C is crossed by two microwave links. Links can be affected by turbines, and considering the wildlife constraints it is not possible to use site C for turbines without re-routing the links. However, a survey by BT Open Reach commissioned by Hasting Borough Council has shown that the BT links could be re-routed at a modest cost.

A gas pipeline runs near the sites and the utility would need to be consulted at the next stage to assess if the project's construction would affect this pipeline.

The identified sites are also constricted by proximity to dwellings. The Element Energy study identified a 400m off-set to dwellings, but this is considered to be extremely tight for the large-scale commercial turbines. Although the noise from such turbines would be unlikely to cause a disturbance, particularly in light of potential increased background noise from traffic using the new Bexhill to Hastings Link Road, turbines such as those used in Options 4 and 5 can be over-bearing so close to houses. Using this 400m off-set, it would be possible to install two large-scale turbines, but 600m to 700m from dwellings would be more desirable. The medium-scale turbines suggested in Options 1 to 3 are considered to be more suited to the identified sites.

Access to the identified sites is reasonable, although new site tracks would have to be built, possibly cutting across land which is currently used for arable purposes.

Because of the archaeological sensitivity of the area, archaeological surveys for the proposed development would be needed at a mid-range cost estimate of £500,000. These costs would significantly affect the viability of Options 1-3 with paybacks in the range of 6 to 7 years.

Grid connection of turbines to the local network by the local distribution network operator, UK Power Networks, would be possible. For Options 1 to 3, the cost would be in the region of £240,000. For Options 4 and 5, the costs would be approximately £900,000 and £1,200,000 respectively. This is because the higher power rating and generation output of Options 4 and 5 would require a connection back to a primary substation some distance from the sites.

It is not anticipated that there will be objections from aviation interests, as the identified sites for turbines are not believed to be within line of site of radar facilities.

Shadow flicker (particularly from Options 4 and 5) might affect some houses – but only for a few hours per year. Shadow flicker is something that can easily be mitigated by an inexpensive technical fix on the wind turbines should the need arise. It should not affect the chances of a project being approved.

Wind turbines have high capital costs and some running costs to consider. The output, costs and income of the turbines can be summarised as follows (including planning application costs, wind monitoring, archaeology costs, ecology costs, telecom links re-routing costs, access costs and grid connection costs):

	Option 1	Option 2	Option 3	Option 4	Option 5
Electricity generated kWh/yr	1,540,045	4,620,135	3,401,000	8,276,780	10,771,290
Total capital costs	£1,890,000	£3,922,000	£2,922,000	£6,643,000	£8,990,800
Total annual running costs	£32,553	£83,602	£62,589	£114,716	£149,290
Total gross income	£338,810	£646,819	£476,1402	£743,255	£991,174
Net income per annum	£306,256	£563,217	£413,5511	£628,539	£841,884
Payback in years	6.17	6.96	7.07	10.57	10.68
CO_2 Savings ($kgCO_{2e}$)*	842,435	2,527,306	1,860,415	4,527,564	5,892,111

Economically, Options 4 and 5 bring in a much bigger revenue stream than Options 1 to 3, once capital expenditure was repaid. However, the former would also require a much larger capital investment than the latter, and take much longer to achieve 'simple payback' (i.e. taking no account of interest payments) – in the region of ten years, as opposed to between 6 and 7 years.

This is due in part to the high capital (including a more expensive grid connection) and running costs of the larger machines, but is also because of the way the financial support system for wind turbines currently works in the UK. This has two parts – the generation tariff and the export tariff. For the identified sites, it is assumed that all electricity would be exported – but if a use for the electricity could be found, it would improve profitability.

The feed-in tariff has different bands of support, with higher generation tariffs for smaller installations. Options 1 to 3 take advantage of the 500kW to 1,500kW band, which pays 9.5p/kWh. Over 1,500kW, the tariff is only 4.48p/kWh, which means that turbines have to generate at least twice as much as the smaller installations to receive the same level of generation tariff income. Over 5MW (Option 5), an installation is not eligible to receive the feed-in tariff, and must receive support through Renewable Obligation Certificates and the open market, where prices are not fixed, although are similar to the feed-in tariff 1,500kW to 5MW band. This is why Options 4 and 5 would take so much longer to payback than Options 1 to 3.

Of the first three options, the most economic option is Option 1, because of the high tariff payments. Options 2 and 3 have similar payback periods of around 7 years. Option 3 would be preferable, because it only involves two turbines (less capital cost), whilst still reaching nearly the maximum installed capacity allowed under the feed-in tariff band.

Whilst any of the options considered would, in theory, be possible, and Option 1 has the best payback, it is recommended that Option 3 would be preferable, in terms of reasonable payback, low capital cost (including a low grid connection charge) and reasonable annual net income, and also in terms of the spatial constraints affecting the identified sites, and the size of turbines that can reasonably be accommodated.

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Figures

Please note that all the financial estimates and costs in the report are prepared in good faith using local and client-provided information, correct at time of writing, but are indicative only and require further detailed work before action is taken.

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1 The sites

1.1 Site description

The three sites at Upper Wilting Farm were identified by planning officers from Hastings Borough Council after a study by Element Energy indicated the area was broadly suitable for wind turbines.

These sites are in a piece of countryside immediately adjacent to the west side of Hastings. It has recently been defined as Combe Haven Countryside Park. The sites are partially in Hastings council area, and partially in the Rother area. Sites A and B, as identified in the map below are in Rother District and Site C is in Hastings Borough.

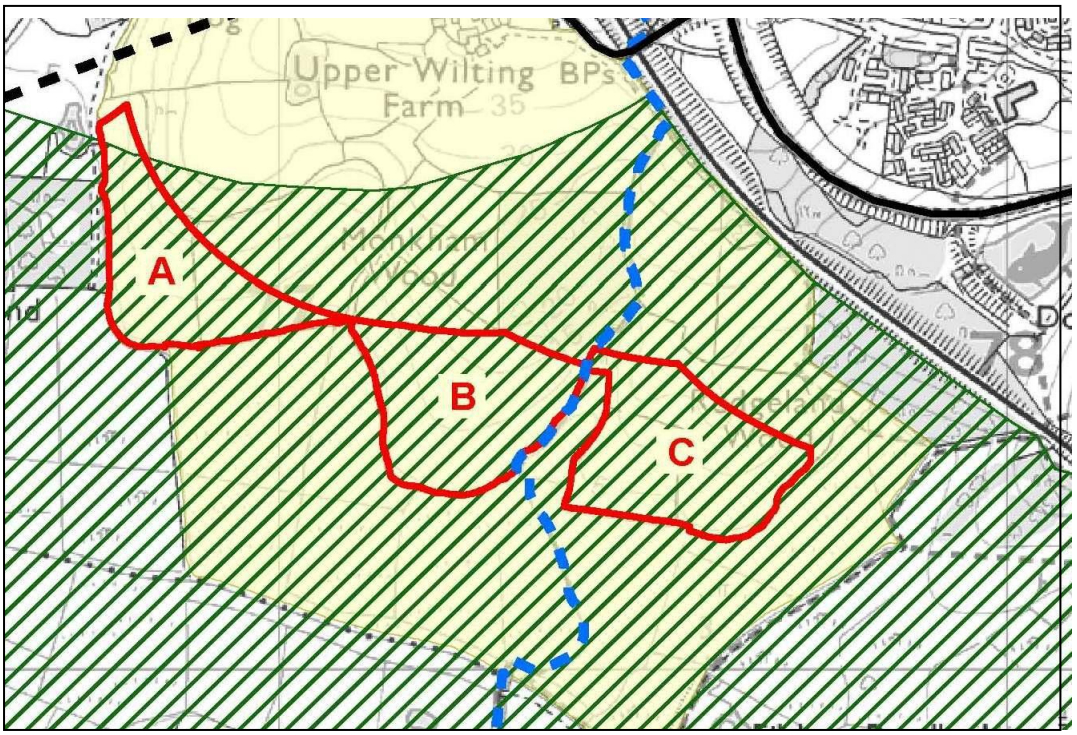


Figure 1 Areas within the identified site
Figure courtesy of Chris Blandford Associates

Despite the proximity to the sea, it is surrounded by hills higher than the sites in all directions except the west, where the hills are further away than in other directions. Bexhill is over the hill to the south-south-west. Below the fields to the south and south-west are the Combe Haven reed beds and fields, which are designated a site of special scientific interest (SSSI).

The identified sites are suitable for wind turbines, and the wind resource is reasonable. It cannot be considered particularly good in comparison with other local areas such as the downland ridges. The sites will also suffer from turbulence due to the surrounding hills and trees, which will affect the output of any turbines

There is currently a landfill site (Pebsham) on a neighbouring hill. This was in operation at the time of the site visit, with the noise of reversing machinery a constant presence. We understand that this landfill is to close in the next few years. Upper Wilting Farm is to the north of, and higher than, the sites. The railway line from Hastings to London is to the north-east of the sites. It passes from an embankment to

the east-north-east into a deep cutting to the north of the sites.

The new Bexhill to Hastings Link Road, once completed will cross the railway on a bridge and continue on an embankment to the north and north-west of the sites.

To the north of the sites is Upper Wilting Farm, with a farm house overlooking the sites. There is also a livery stable, next to the farm, and a farm shop in a converted cottage on Crowhurst Road. The land is currently used for grazing and arable purposes, and is surrounded by trees and hedgerows.

1.2 Site wind speed from the national database

The wind resource at the sites has been determined by basing it on information from the Department of Energy and Climate Change (DECC) wind speed database, which is based on the NOABL atmospheric model of wind speeds.

Initial results from the database suggest that the annual mean wind speed for the two 1km x 1km areas covered by the sites is 6.3m/s at 45m above ground level. This calculates to 6.9m/s at 85m height.

The database figures are only valid for good open sites with short vegetation. In addition, studies have shown that the database tends to over-estimate wind speeds in urban areas. The database uses historical data and has several limitations, notably that the model uses a 1km square resolution; there is no allowance for the effect of local winds, local topography or surface roughness (such as tall crops, stone walls or trees), which might have a considerable effect on the wind speed.

Therefore, the data should be used as a guide only. However, the database does give a good first indication of wind resource at the sites, on which an idea of economic viability can be based.

At the Upper Wilting site the shelter and turbulence caused by the surrounding trees and landform will reduce the available wind resource.

The wind resource at these sites is considered reasonable, at the lower end of what might be considered commercially viable. However, it appears to be sufficient to warrant the installation of medium or large scale wind turbines.

1.3 Resource corrections for these sites, and wind monitoring

The wind is likely to be turbulent in close proximity to any large trees or buildings which will cause dissipation of the energy in the wind. There are belts of trees and hills all around these sites, and we estimate that there would be approximately a 7% reduction in wind resource compared to the NOABL data. The effect of the surrounding hills and vegetation could be reduced by using very tall towers, which would enable the rotors to take advantage of cleaner wind, but this approach would, of course, increase the visibility of turbines, and turbines on towers much taller than the rotor diameter can look odd and out of proportion. In addition, landscape appraisal suggests taller turbines may have a detrimental landscape impact.

The only accurate way of assessing wind speed is to measure it at the hub height of the proposed turbine at the actual turbine position over a long period, ideally a year.

This might be necessary at the next stage of the project, if there is a need to confirm energy production for guarantees from the wind turbine manufacturer, and for confirmation of the turbulence intensity of the site. Monitoring of sites for at least a year is required. An estimated cost of £25,000 for the medium scale (77m tip) turbine Options and £30,000 for the large scale (109m, 126m to tip) turbine Options have been included in the costings for the options.

2 Spatial constraints

2.1 General considerations

These sites are highly constrained. It is relatively small in area, and is surrounded and sub-divided into separate fields by hedgerows and mature trees, which in places form small pockets of woodland.

The sites are constrained to the south by the SSSI (marked in purple on Figure 2) and to the north by a housing off-set of 400m (marked in red). These were identified by Hastings Borough Council, although the 400m off-set marked here differs slightly from that provided. This is because the off-set identified appeared to be further than 400m from any identified house.

2.2 Wildlife considerations

Wildlife considerations and off-sets from trees, hedgerows and watercourses are the main restricting factor on these sites. Natural England recommends an offset from woodland, in order to protect birds and flying mammals that might use the trees as shelter and a source of food. This offset is calculated based on the size of the turbine and the height of the trees or other feature.

Natural England, in its *Technical Information Note 51* recommends calculating an off- set using the formula

$$b = \sqrt{(50 + bl)^2 - (hh - fh)^2}$$

Where:
bl = blade length hh = hub height fh = feature height

This means that for a standard commercial scale wind turbine (2MW to 2.5MW) with an 80m hub height and a 90m rotor diameter, and assuming a 15m feature (tree) height, that the wildlife off-set should be 69m. In order to allow for some uncertainty on the exact location and height of trees and hedgelines, it was agreed to extend this off-set, if at all possible, to 75m. These are marked in green on Figure 2. The map clearly shows how restrictive this constraint is, as the only available area is within the green lines. Smaller turbines would reduce the off-set very little, and might even increase it, as lower tower heights bring the blades nearer to the feature (trees, in this instance). The only way to reduce these off-sets and increase the flexibility of the sites would be to use smaller (i.e. lower capacity, for example 500kW or 1MW) turbines on very tall towers. As noted above, although this would also improve the wind resource, turbines with tall towers and relatively small rotor diameters can look odd to eyes used to seeing blades that sweep approximately half way down the tower (i.e. tower height and rotor diameter are roughly equal). As noted in the landscape appraisal, taller towers would increase the impact on the landscape.

2.3 Overflying considerations

It is unlikely that planning permission would be granted for a turbine whose rotor blades "overfly" (i.e. pass over) a neighbouring property or a public highway. This is not a consideration at these sites.

2.4 Topple distance considerations

Wind turbines are well engineered and safe structures. However, there is always some minor risk of failure, which should be considered when siting a turbine.

The Planning Guidance in *PPS22 Companion Guide* suggests that the "topple" distance (tower height plus blade length plus 10%) should be considered when planning to install a wind turbine. This is not a consideration at these sites as the turbines are far enough from surrounding and proposed roads and railways

2.5 Roads and rights of way

The sites are well away from roads, footpaths, bridleways and byways, including the new Bexhill to Hastings Link Road. The nearest potential turbine site is around 250m from the carriageway of the Bexhilll-Hastings Link Road.

2.6 Power lines

There are no power lines near the turbine location.

2.7 Other utilities

One of the fields contains a gas pipeline marker. The exact location of the pipe would have to be established to ensure it was not threatened by construction work. The options have enough flexibility to allow micro-siting to avoid the pipeline. The other utility providers would also have to be consulted at the next stage of the project.

2.8 Dwellings

There are no national guidelines on pure separation between turbines and dwellings, although some local planning authorities are introducing their own policies. Separation distances tend to rely on the noise regulations ETSU-R-97 (see section 6).

At these sites, Hastings Borough Council has applied a set separation of 400m. For large, commercial scale turbines, such as those that measure over 100m to blade tip, this separation is on the small side, as they can appear very dominating. However, at these sites, this is mitigated a little by the nearest housing being above the level of the sites. 400m is a more suitable separation distance for medium-scale turbines such as those suggested later in this report.(77m to tip)

The nearest dwelling is Upper Wilting Farm, although it is still possible to locate turbines outside the 400m off-set from it.

The advantage of having trees on and around the sites is that they break up the views of those living in the vicinity, meaning that turbines are less likely to dominate the outlook from people's houses, than would be the case otherwise. Unfortunately this also means the wind resource is less and the wind more turbulent than in open country.

The 400m off-set is outlined in red on the map in Figure 2.

2.9 Spatial constraints map

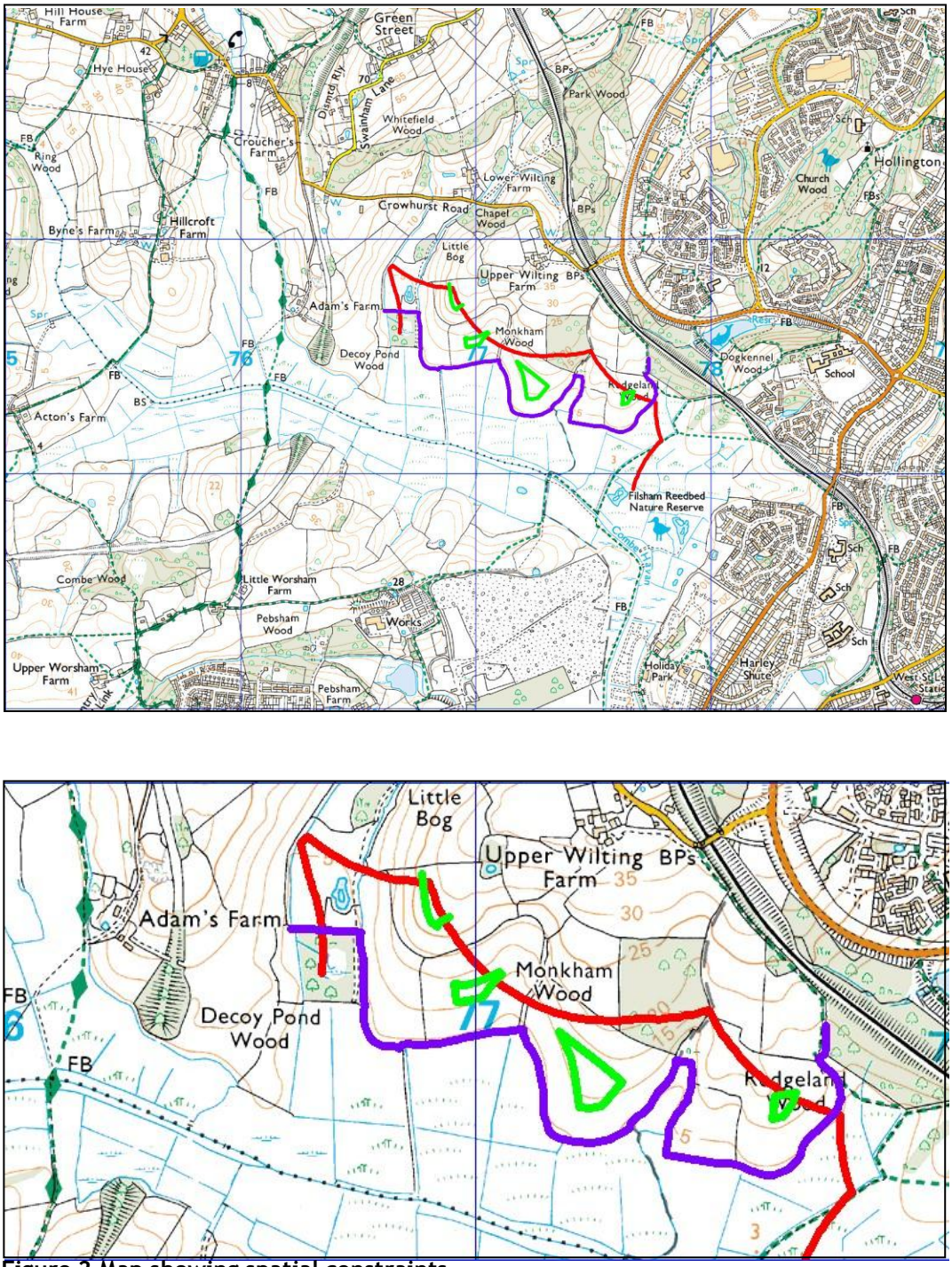


Figure 2 Map showing spatial constraints

The red line indicates the 400m off-set from houses

The purple line indicates the boundary of the SSSI

The green line indicates the 75m wildlife off-set from the trees

3 Telecommunication issues

3.1 Electromagnetic interference

Wind turbines can cause electromagnetic interference by two means:, dealt with in the following sub-sections.

- Physical interference – caused by the turbine providing a second path between the transmitter and receiver of the signal causing a "scattering" of the signals. This can lead to the phenomenon of "ghosting" on TV screens.
- Electrical interference – caused by electrical signals generated within the wind turbine. Modern wind turbines are designed to minimise the emissions of such interference.

As regards emissions from the turbine itself, *Planning Policy Statement PPS22 Companion Guide* Technical Annex Wind, paragraph 65[1] states:

> Wind turbines contain electrical machines producing power. They will therefore also produce electromagnetic radiation. This is at a very low level, and presents no greater risk to human health than most domestic appliances.

PPS22 Companion Guide also states "…it is often difficult to obtain a definitive picture of all the transmission routes across a potential site… applicants… would be well advised to make direct contact with any authorities…"

3.2 Fixed telecommunication links

The infrastructure of concern is both line of sight microwave links in the GHz band and point to point radio links in the MHz band. The former are mainly used for trunk telephone traffic and for feeding mobile phone base stations, and the latter for controlling utility infrastructure.

Initially the Office of Communications (Ofcom) was consulted as it holds a central register of all civil radio communications operators in the UK and acts as a central point of contact for identifying specific consultees relevant to a site.

There are five links that cross the sites that are of concern, operated by four different companies, Joint Radio Company, Vodafone, BT and Mobile Broadband Network.

At time of writing, no response had been received from Vodafone and Mobile Broadband Network. This would have to be followed up as a matter of priority if the scheme was taken forward.

The links operated by JRC pass sufficiently far from the sites that they are unlikely to cause concern (the two east-west running links identified in blue on the map below).

[1] ODPM *Planning Policy Statement PPS22* Companion Guide, Technical Annex Wind, paragraph 65

The two links operated by BT pass close to one of the small areas not restricted by other constraints. It is not possible to site even a small turbine within the eastern-most 'free' area (Site C) and comply with BT's request that turbines should be sited 100m plus blade length from the link (not an unreasonable request).

This is shown in Figure 3 with the paths of the links shown in blue (running north-east to south-west), and a 127m offset from the links (100m plus the blade length of an EWT DW-54 turbine (the smaller turbine suggested, see section 4), shown in pink.

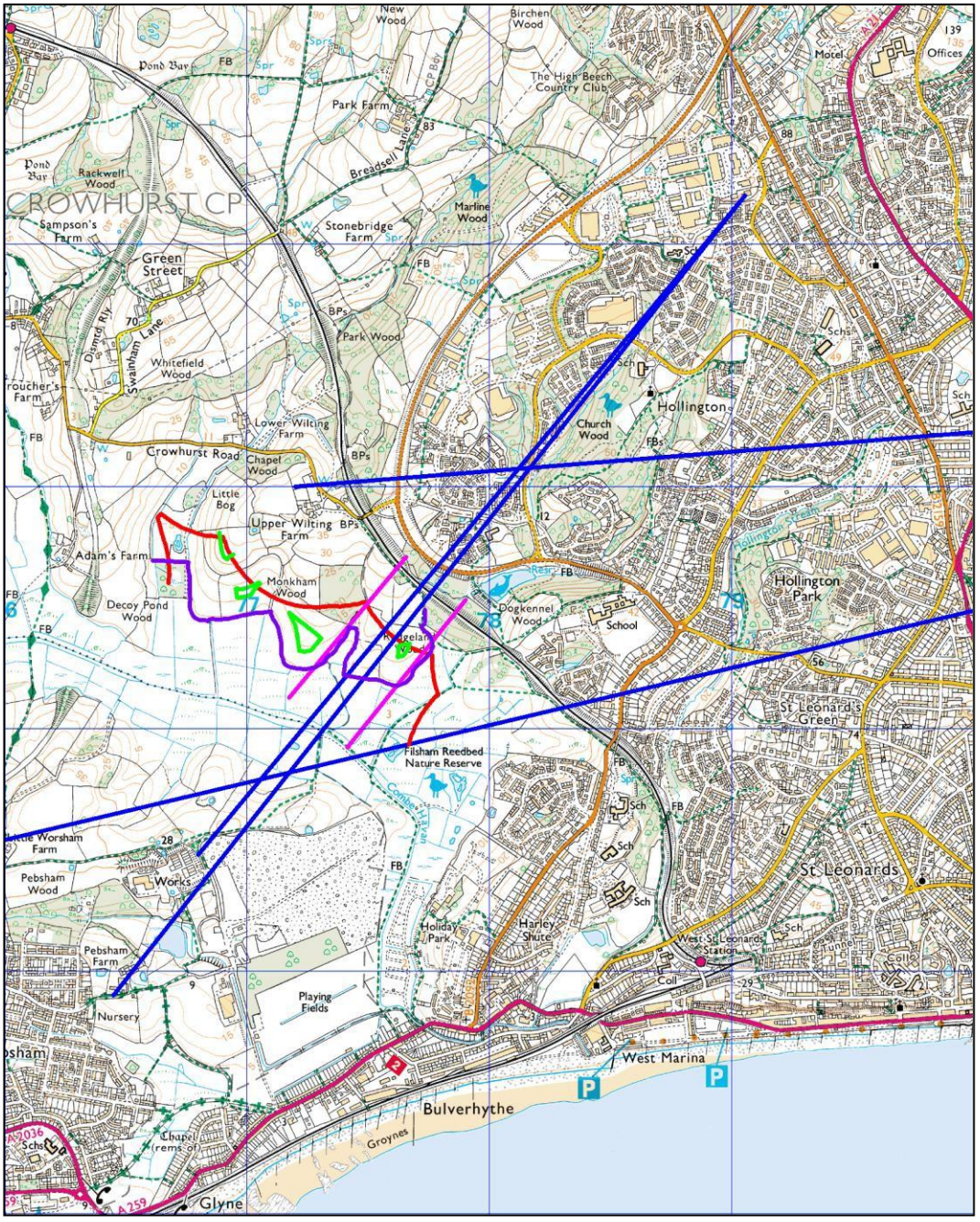


Figure 3 Map showing constraints from microwave links

Hastings Borough Council commissioned a survey from BT to determine whether re-routing would be possible. This reported in June 2013. It appears that re-routing is possible and the re-routing costs are modest, quoted as a total of £6,836.40 +VAT. This means that Site C (the eastern-most parcel of land in the study) could be used for siting one of the medium scale turbines.

Options for turbine siting are found later, in section 4.3.

3.3 Radio links

The organisations JRC (Joint Radio Company) and Atkins Global analyse whether there are likely to be any problems on 460 MHz point to multi point telemetry and radio-control systems owned by the utilities. These organisations were consulted. As yet no response has been received. It is our experience that a response is received only id the company wishes to make an objection.

3.4 Terrestrial television transmissions

Terrestrial television transmissions for domestic reception within the UK are the joint responsibility of the BBC and Ofcom. Distribution links and other radio frequency communication links are provided and operated on behalf of the broadcasters by Arqiva.

3.4.1 *BBC TV reception assessment*

The BBC has a web-based tool so that wind farm developers can carry out assessments of interference to domestic reception for themselves.

The co-ordinates of the proposed turbine were fed into the BBC tool which returned the following results:

- The turbine could affect 6,740 homes which have no alternative off-air service and 12,511 homes which might have an alternative off-air service.
- The transmitters which are likely to be affected are Dover, Heathfield and Hastings.

The BBC wind farms tool is, it must be stressed, an exceedingly rough estimator which takes no account of size of turbine and predicts a worst-case scenario.

The transition to digital television signals has reduced the effect of wind turbines on reception, although it has not completely solved the problem.

3.4.2 *Mitigation*

In the event that the wind turbine creates problems for television reception, the developer could address the situation by either re-tuning aerials to an alternative transmitter or providing an unaffected service, such as subscription-free satellite television. The cost of this mitigation is minimal when taken as part of a wind farm project.

4 Turbine layout options

4.1 Introduction

Here we have outlined a few of the possible turbine options and layouts for the Upper Wilting Farm sites. We have used two makes of turbines to illustrate the opportunities, but other configurations would be possible and there are a variety of other turbine manufacturers that make similar products. The turbines used for illustrating the feasibility of these sites are not necessarily the turbines which will finally be installed if the development goes ahead, as manufacturers are developing turbines all the time and new improved models may be available by the time of construction, which may be several years in the future.

We have assumed that the purpose of turbine installation would be to generate income, and we have tried to maximise this when designing layouts. Income from turbines is complicated and quite heavily determined by the feed-in tariff banding system, which means that at certain installed capacities, the level of support per kilowatt hour generated drops. See section 10 for a more detailed explanation. Each layout offers something slightly different, depending on the exact priorities of the developer.

4.2 Turbines

There are many options available to a wind turbine developer, as turbines come in a variety of different sizes. The standard commercial scale onshore turbine is now around 125m to blade tip, and there are much bigger turbines in existence, mainly for offshore installations. The options here have been chosen to illustrate the possibilities, whilst conforming to constraints and maximising potential income. Very small turbines would not be suited to these sites, due to the surrounding trees. Turbines would need to rise above the shelter the trees provide, without being too dominant in the landscape. The landscape appraisal indicates a preference for the shorter turbines used in Options 1 to 3.

There are four different turbines by two different manufacturers used in these examples. In these examples and calculations, we have used the tower heights that correspond the most closely with the rotor diameter, but various tower heights are available.

Turbine	Rated power	Rotor diameter	Tower height	Tip height
EWT DW54-500	500kW	54m	50m	77m
EWT DW54-900	900kW	54m	50m	77m
Enercon E70 2.3MW	2,300kW	70m	74m	109m
Enercon E82 3MW	3,000kW	82m	85m	126m

Figure 4 Summary table of examples used in this report

4.2.1 *EWT wind turbines*

EWT is based in The Netherlands, and was established in 2004. The two turbines used here are the EWT DW54 500kW and the EWT DW54 900kW. They are three-bladed, direct drive variable speed turbines with a low cut-in wind speed of 2.5m/s. The turbine is available on various tower heights. The two turbines are visually the same size.

Figure 5 Two EWT turbines

4.2.2 *Enercon wind turbines*

Enercon turbines are manufactured in Germany. It is a well-established company that has installed turbines all over the world. The turbines are three-bladed, direct drive and available on various tower heights. The examples used here are 3MW Enercon E82s and 2.3MW Enercon E70s.

Figure 6 An Enercon turbine

4.3 Layout options

The sites are very constrained. It is just possible to fit three medium-scale turbines on these sites, although using only sites A and B two of the turbines would be slightly closer together than is ideal. For the larger scale turbines, it is only possible to install two turbines.

The survey by BT has shown that re-routing of the telecom links may be possible. The implications of this are at the end of this section.

There are many possible options for the sites, but cannot all be examined here, therefore we have identified some representative scenarios.

The options discussed here are as follows:

Option 1 – one 500kW turbine, an EWT DW54-500 (this is the name of the turbine)

Option 2 – three 500kW turbines, EWT DW54-500s

Option 3 – one 500kW turbine and one 900kW turbine, an EWT DW54-500 and an EWTDW54-900

Option 4 – two 2.3MW turbines, Enercon E70s

Option 5 – two 3MW turbines, Enercon E82s

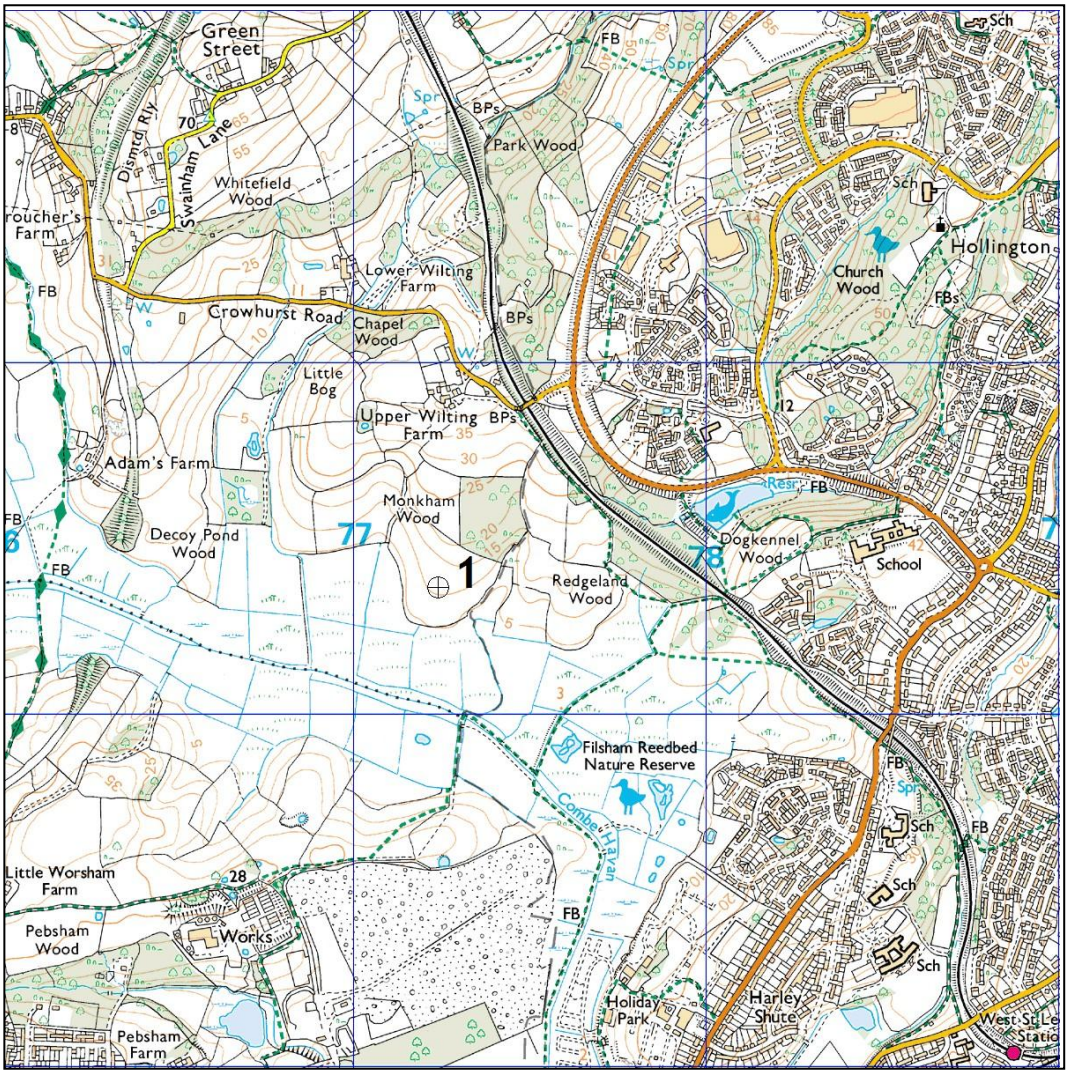


Figure 7 Layout for Option 1

This is the suggested position for a single turbine at Upper Wilting Farm. This location has been chosen because it is the furthest possible point from dwellings, although a turbine could be sited on several other points on these sites, within the constraints shown in section 2. A single turbine would have the smallest visual impact on the landscape, and would also be suitable if capital costs (initial outlay) had to be controlled.

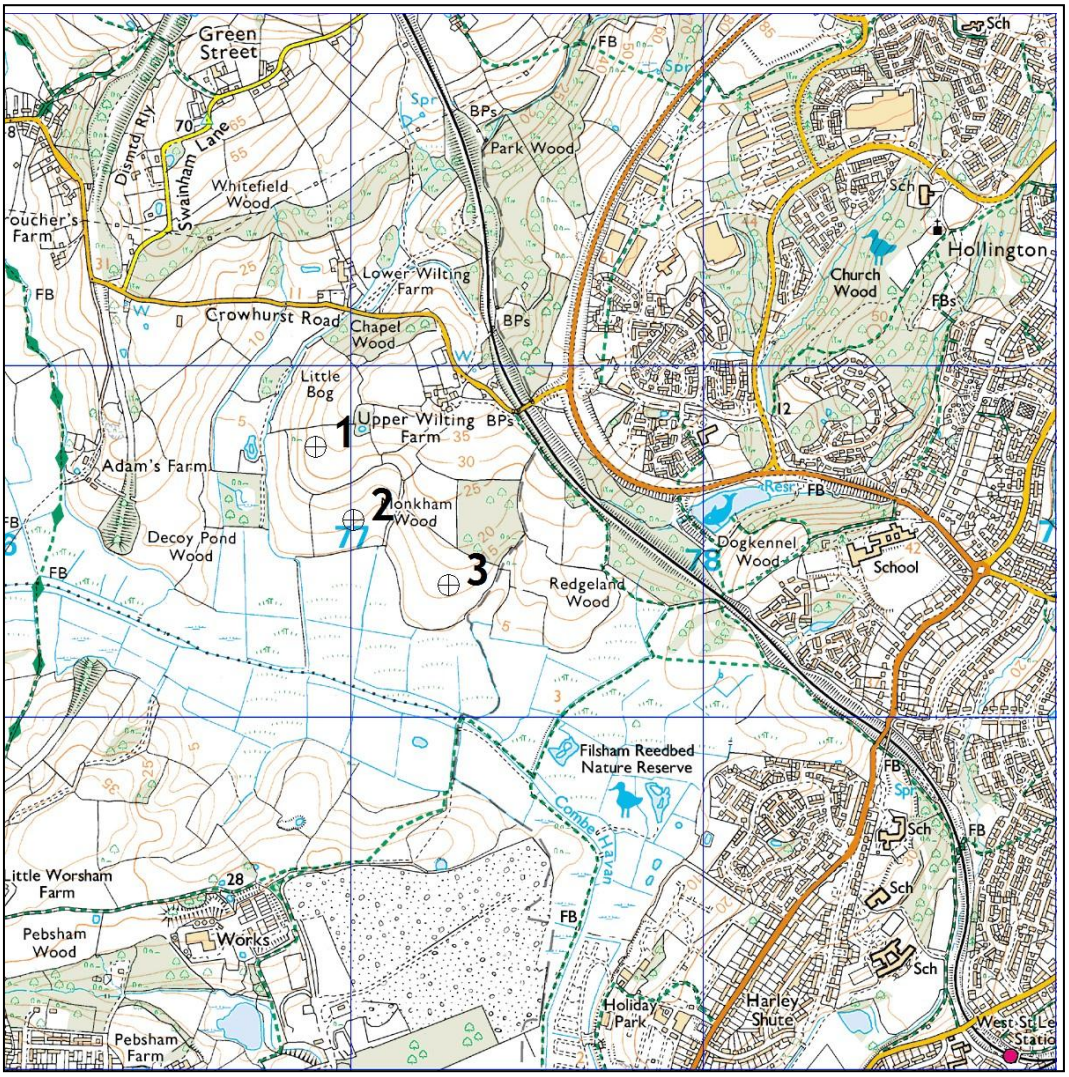


Figure 8 Layout for Options 2 and 3

The turbines shown here as 1 and 2 are slightly closer together than is ideal (turbines should be separated in order not to interfere with the wind resource available to each turbine), but not so much as to be severely detrimental to output. The 500kW turbines are suggested because 1.5MW is a banding break-point on the feed-in tariffs scheme (see section 10.2.8), and having 1.5MW installed would take advantage of this

Without using site C, turbines for Option 3 (one 500kW and one 900kW) could be placed at points 1 and 3 or 2 and 3. This option again aims to stay below the 1.5MW threshold, but only requires two turbines. As the turbines are visually the same, there would be no adverse visual impact from this arrangement. We suggest using 1 and 3, as point 1 is higher than 2, and therefore should have a slightly better wind resource.

On the basis of the BT survey commissioned by HBC, there is a strong possibility that the telecom microwave beam could be re-routed and would not constrain Site C (see Figure 2). In this case, the optimum siting would be point 1 and Site C as these are on slightly higher ground. Points 2 and 3 could be held in reserve for flexibility

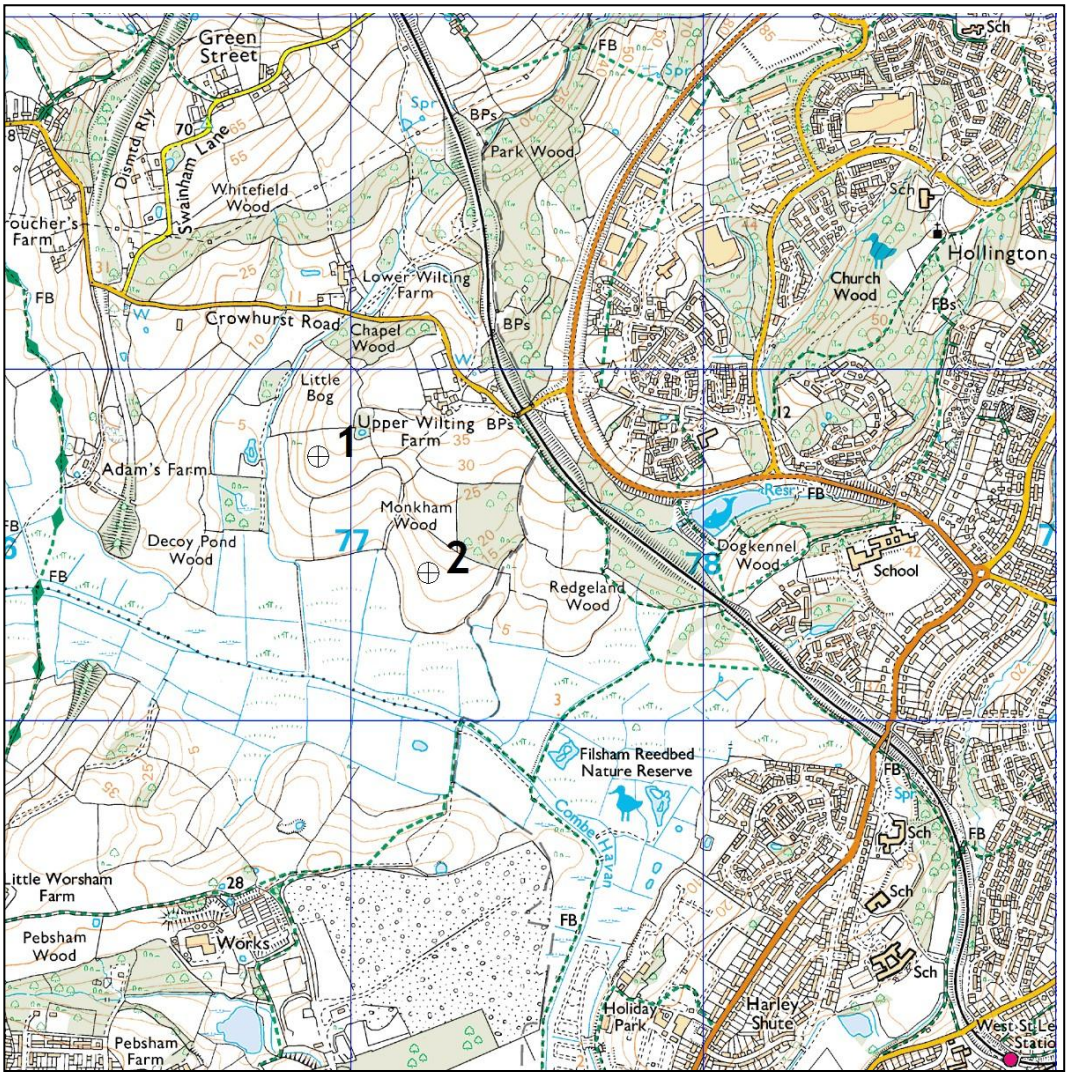


Figure 9 Layout for Options 4 and 5

Larger turbines need to be further apart than smaller ones. It is only possible to get two commercial-scale wind turbines on these sites, and they are very close to housing (400m). There is insufficient room to fit three of the larger turbines on the sites with Site C excluded. With the telecommunications issue resolved, there would be room to have enough physical space between three of the large turbines, but the small off-set to dwellings would still remain a problem for Site C. Thus only two turbines are considered here in Options 4 and 5

The two options for large scale turbines have been deliberately chosen to fall either side of the cut-off point for inclusion in the feed-in tariff scheme. Any wind farms larger than 5MW cannot claim feed-in tariffs and must instead claim support under the older Renewable Obligation Certificate (ROC) scheme, which is designed for commercial ventures. The returns are not so certain, as prices are determined by the market.

The Enercon E70 on a 74m tower, the 2.3MW turbine suggested, is really designed for sites with higher wind resource than is available at Upper Wilting. However, the E70 is used as an example of a physically smaller and less intrusive turbine (a tip height of 109m as opposed to 126m). Option 4 is two Enercon E70 on 74m towers, each turbine rated at 2.3MW.

Enercon E82s on 85m towers can be rated at either 2.3MW or 3MW and either would give a higher output than any other of the Options. To show the effect of moving into the ROC funding scheme band, two Enercon E82 on 85m towers rated at 3MW each chosen as Option 5.

Comment on turbine siting

Survey work has shown that it is possible to re-route the BT telecommunication links It was originally thought that these links effectively constrained Site C from development, but It appears that this can be resolved relatively easily and at a modest cost. So with re-routing, Site C is now useable for siting wind turbines. The only possible turbine position for Site C is shown as the easternmost green polygon on the spatial constraints map, Figure 2.

From site visits it was clear that Site C is a better site from a wind turbine perspective than sites in Site B, so some of the siting options could be modified as follows:

Option 1, the single medium scale turbine option, could be positioned at site C, however the siting (position 1 on Figure 7) would give more clearance from dwellings and not require telecom link re-routing.

Option 2 originally indicated that it would be possible to install three of the medium scale 500kW turbines on sites A and B without the need for Site C, but the turbines would be closer together than would be preferable. However, It would now be possible to spread the turbines out and a turbine could be sited in each of sites A, B and C. (i.e. positions 1 and 3 on Figure 7 and site C).

For Option 3, the two turbine (500kW + 900kW) option, one wind turbine could now be sited on Area C, with the other on site A (position 1 on Figure 8). This would position both of the turbines on slightly higher ground, and further away from each other than by using positions 2 or 3.

5 Civil and electrical engineering considerations

5.1 Site soil conditions

Ground conditions are not known, but we believe the rock to be sandstone. It is assumed that the soil has normal load bearing capacity and a water table below the foundation. Costs are for a normal concrete pad foundation. Ground conditions can only be confirmed by a site survey and this would be required before the final design and cost of the foundation can be determined. The cost of these surveys is site-specific and must be determined on a case-by-case basis.

5.2 Access for cranes and lay down area

It is likely that access for wind turbine components would have to be at the point where Crowhurst Road crosses the railway, and where the bridleway that runs parallel with the railway meets the road. There is a very tight bend as the road meets the railway bridge that over-sized loads would find difficult to navigate. Some hedgerow would have to be removed to accommodate this, and an access track built directly across the arable field from the bridge end to the track into the next field, to the west of Monkham Wood. The slope on the existing track is probably excessive for long loads and the existing track goes through two sharp right angle bends to preserve the maximum size of the arable field. New tracks would be required, but could follow the existing tractor tracks as much as possible on the rest of the sites.

Access to the sites is reasonable, via the B2092, and the rest of the trunk road network. A full transport assessment would be needed in advance of any major freight movements, and it might be necessary for some street furniture to be removed to facilitate the long loads. The cost of these surveys is site specific and must be determined on a case-by-case basis.

5.3 Grid connections

Budget cost quotes were requested from UK Power Networks, the distribution network operator (DNO) covering the site location. A number of options were provided – see Figure 10 below. In each case this would include installing a new 11kV metering ring main unit (a piece of switchgear) with a neutral voltage displacement (NVD) panel and metering unit attached. A new substation near the farm buildings would be needed to house this equipment. The following extra work would be required for different power generation options:

- Connection up to 2.5MW - an extension of the existing high voltage network to the new 11kV metering ring main unit; a distance of 800m.
- Connection up to 5.5MW – the installation of an 11kv ring main unit in the distribution network operator's primary substation, laying a new 300mm^2 (aluminium) high voltage underground cable (4.5km) to the new 11kv metering ring main unit.
- Connection up to 6MW - the installation of an 11kv ring main unit in the DNO's primary substation and laying a new 300mm^2 (copper) high voltage underground cable (4.5km) to the new 11kV metering ring main unit.

Turbine options	Budget Quote
Option 1 (1 x 500kW)	£240,000
Option 2 (3 x 500kW)	£240,000
Option 3 (900kW + 500kW)	£240,000
Option 4 (2 x 2.3MW)	£900,000
Option 5 (2 x 3 MW)	£1,200,000

Figure 10 Grid connection budget quotes

The budget assumes that underground cables can be laid within the Crowhurst Road Bridge. If a separate railway crossing is required, costs could be considerably higher. A full quotation would be needed to determine this, and they take around three months to obtain.

5.4 Cable route

Cables within a site usually run alongside the access tacks. The distribution network operator has suggested that a substation would need to be built near the existing buildings at Upper Wilting Farm. The following diagrams from the DNO show the cable route that would be necessary to connect turbines to the network.

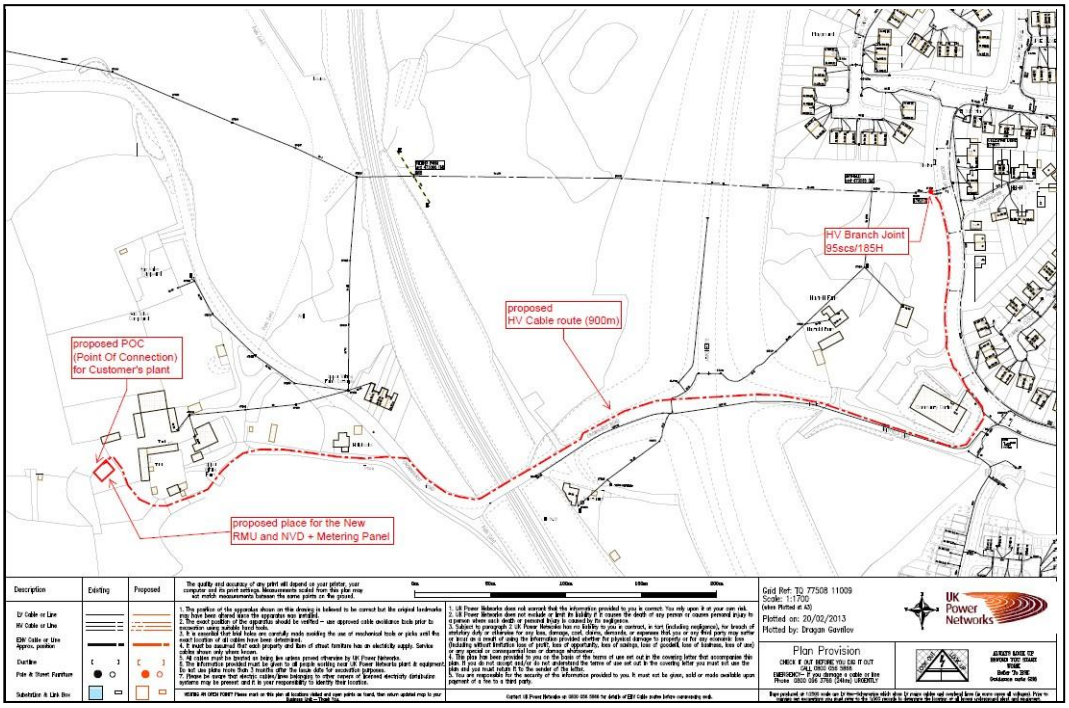


Figure 11 Cabling plan for connections up to 2.5MW (UK Power Networks)

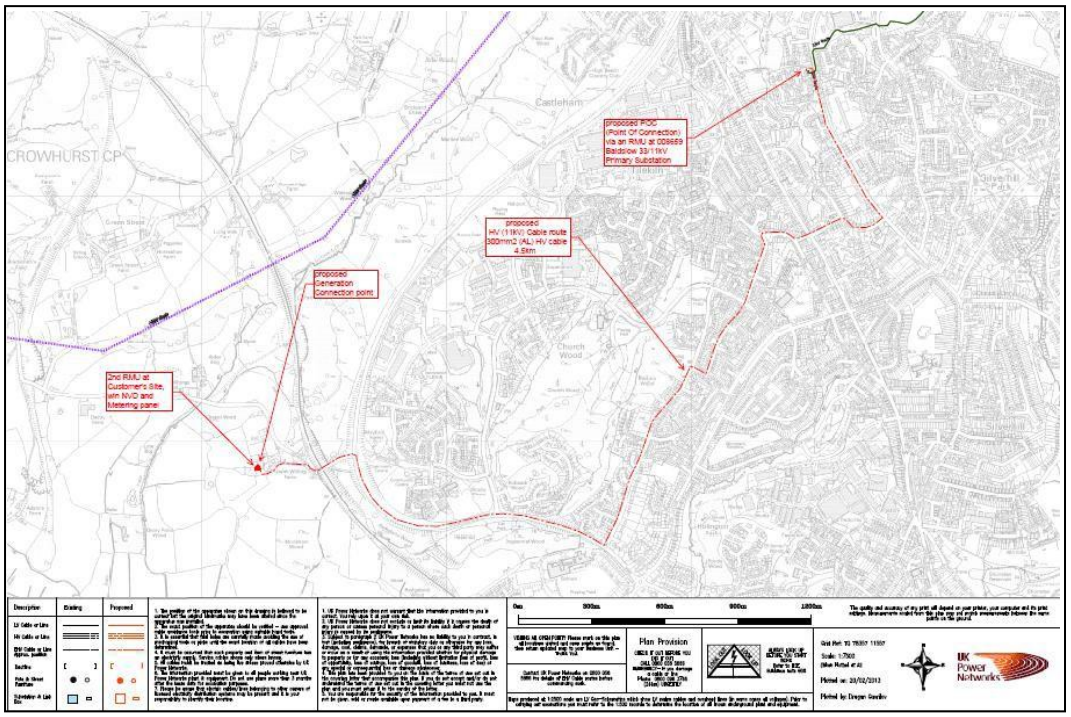


Figure 12 Cabling plan for connections up to 6MW (UK Power Networks)

6 Noise impact of project

6.1 Noise guidelines

The basic siting of the turbine or turbines on the ground is primarily influenced by noise exclusion zones to the nearest dwellings. The current guidelines concerning this are contained in *ETSU R-97:1996 The Assessment & Rating of Noise from Wind Farms*.

This defines levels of noise which are considered to be acceptable for the siting of wind turbines. It uses a method of avoiding disturbance to neighbouring dwellings.

Generally in "low noise environments" this is a night time noise level of below 43dB(A)$_{LA90,10min}$ night time[2], and a day time noise level within the range 35 and 40dB(A)$_{LA90,10min}$.

In a higher noise environment, then wind turbine noise levels should be limited to less than +5dB(A)$_{LA90,10min}$ above background level.

Source of sound	Sound level in decibels
Threshold of sound	0
Whispering	20
Background noise at home	40
Normal talking	60
Noise pollution level	90
Pneumatic drill – 5m away	100
Disco – 1m from loudspeaker	120
Threshold of pain	140

Figure 13 Examples of sound levels

6.2 Noise considerations for these sites

The nature of these sites is such that the background noise levels would be considered reasonably high. There is the noise from activity at the landfill site, and the new Bexhill to Hastings Link Road will create a considerable amount of background noise. This means that these sites might be more tolerant to additional noise than some other rural areas.

The maps below show noise contours for the stated options overlaid on a quiet background. It would be important to carry out detailed noise monitoring and modelling with the chosen model of turbine(s) to ensure that noise regulations were met. Noise monitoring costs is are included in planning costs in the vibility analysis..

[2] dB(A)$_{LA90,10min}$ refers to the A-weighted noise level which is exceeded for 90% of a 10 minute sample period.

6.3 Noise maps

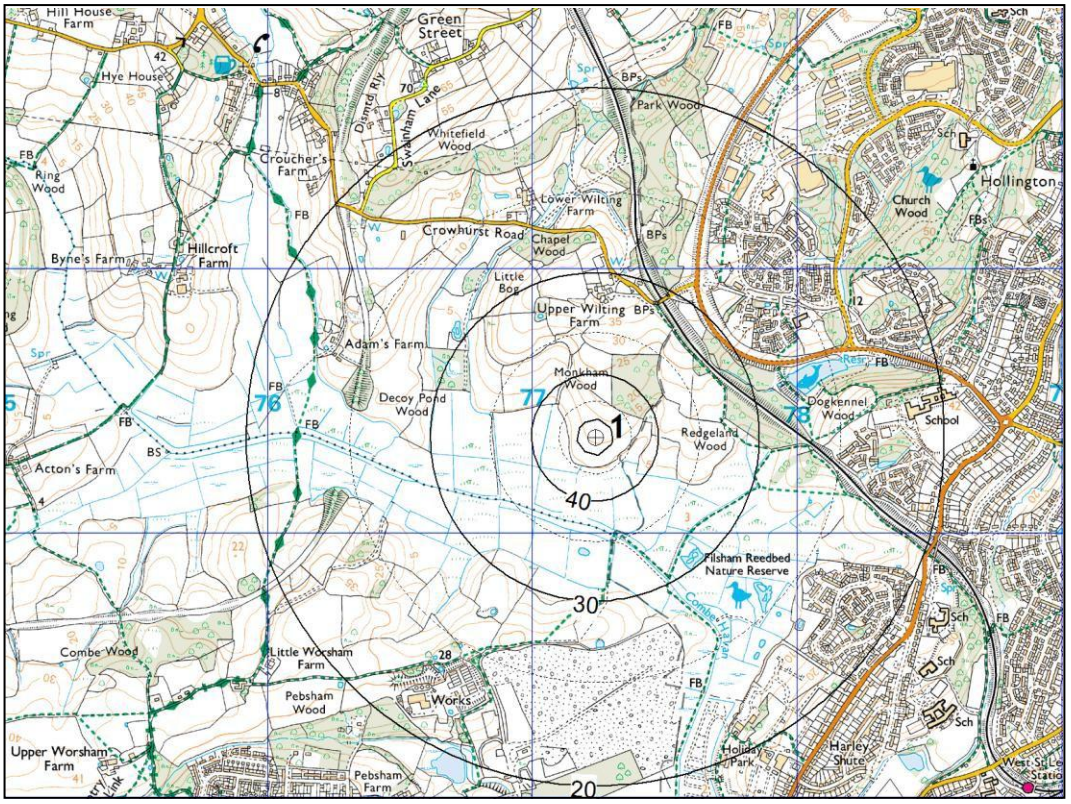


Figure 14 Option 1 noise – one 500kW turbine

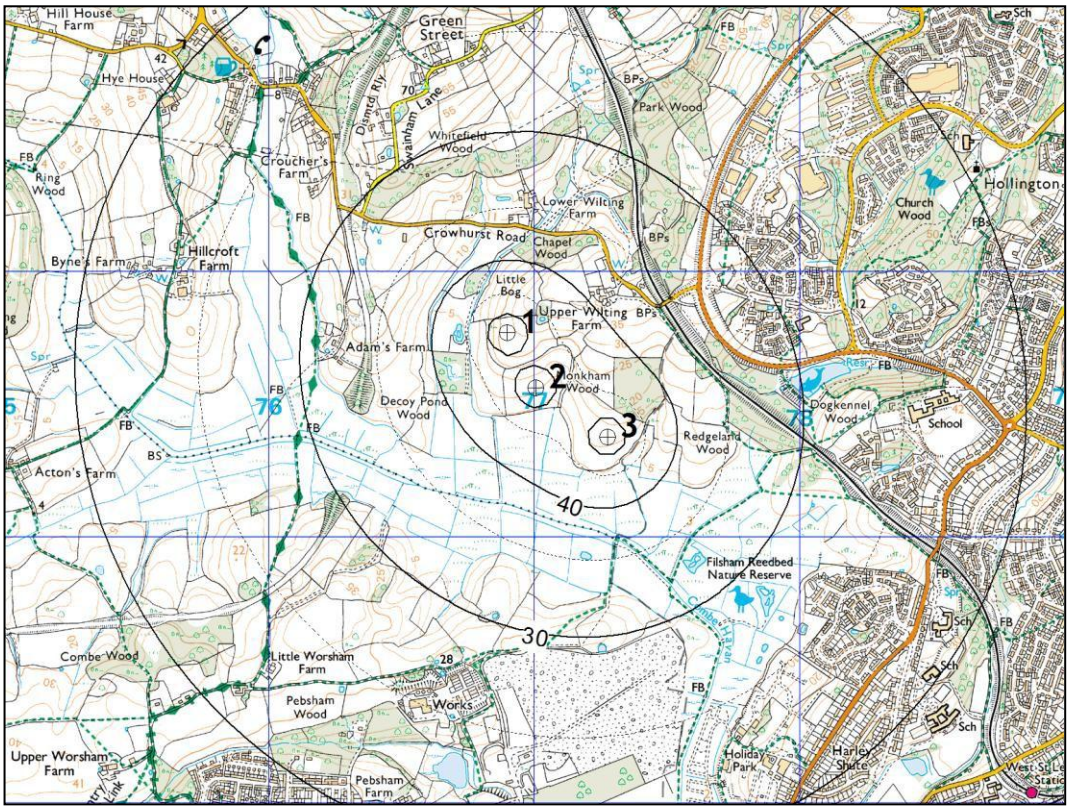


Figure 15 Option 2 noise – three 500kW turbines

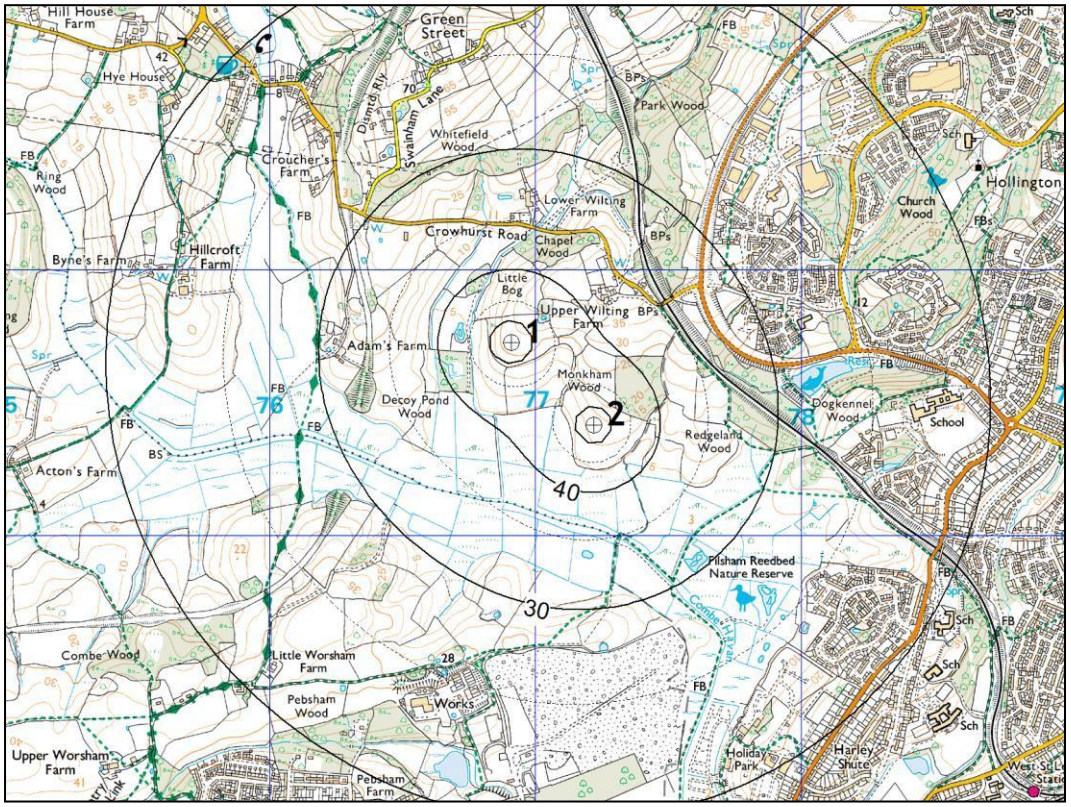


Figure 16 Option 3 noise – one 500kW turbine and one 900kw turbine

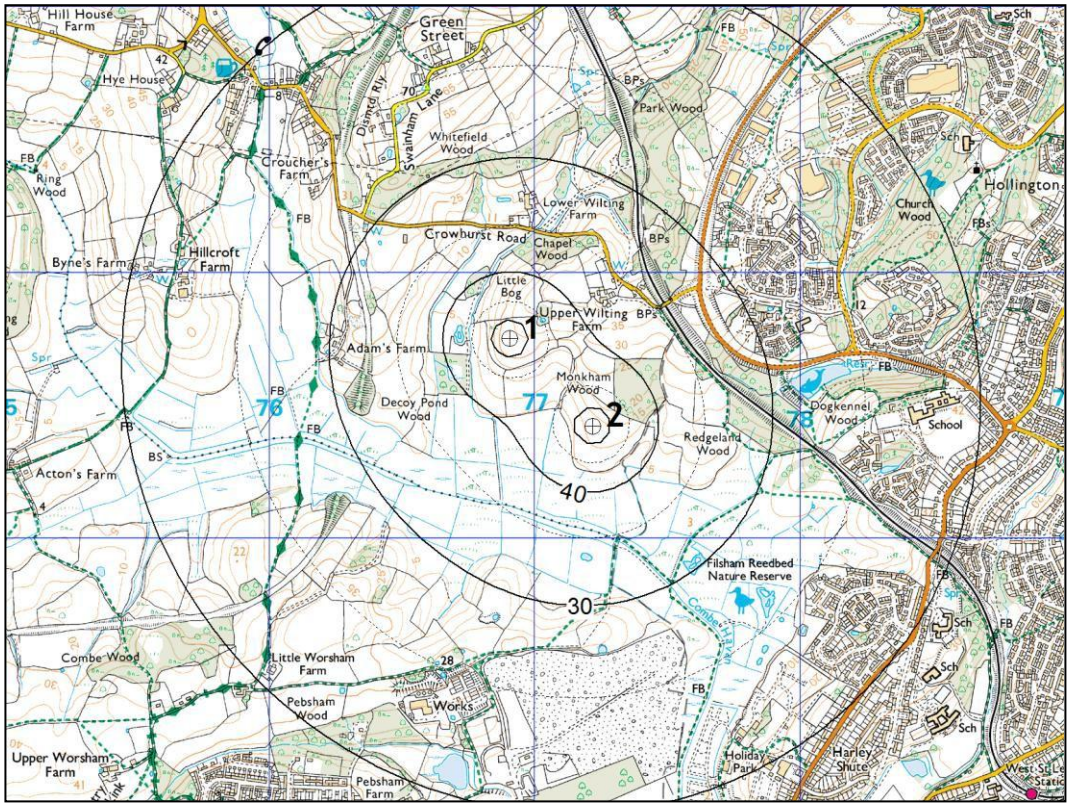


Figure 17 Option 4 noise – two 2.3MW turbines

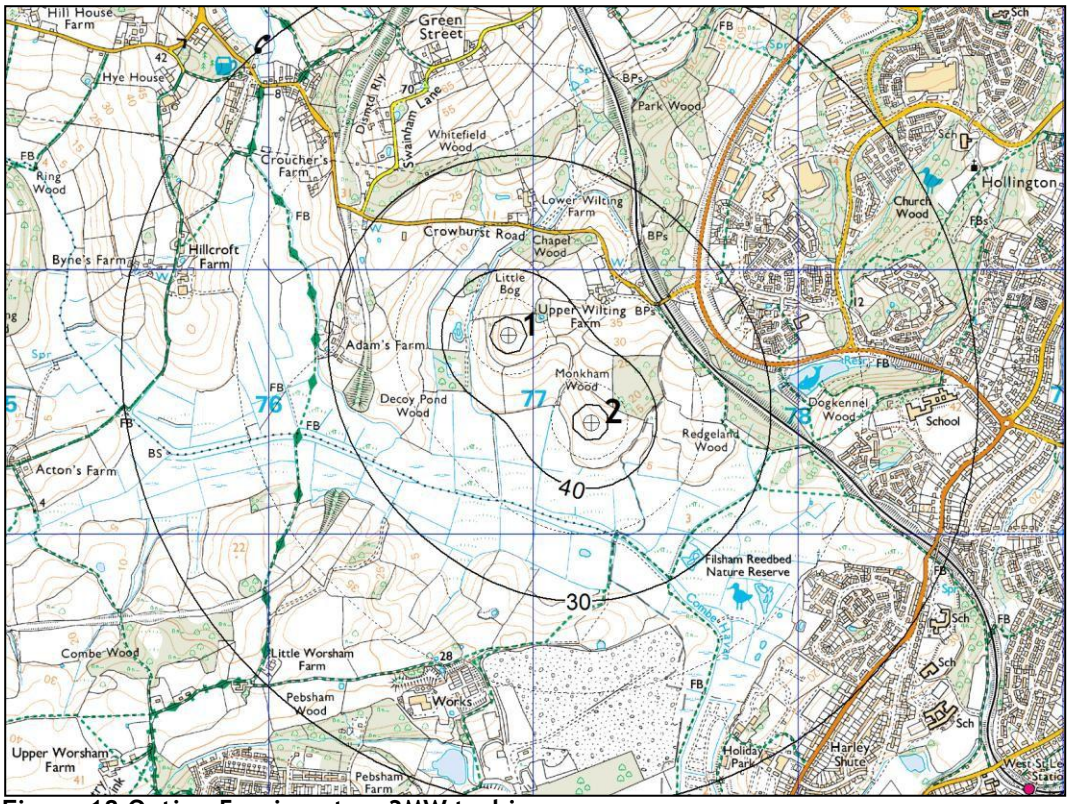
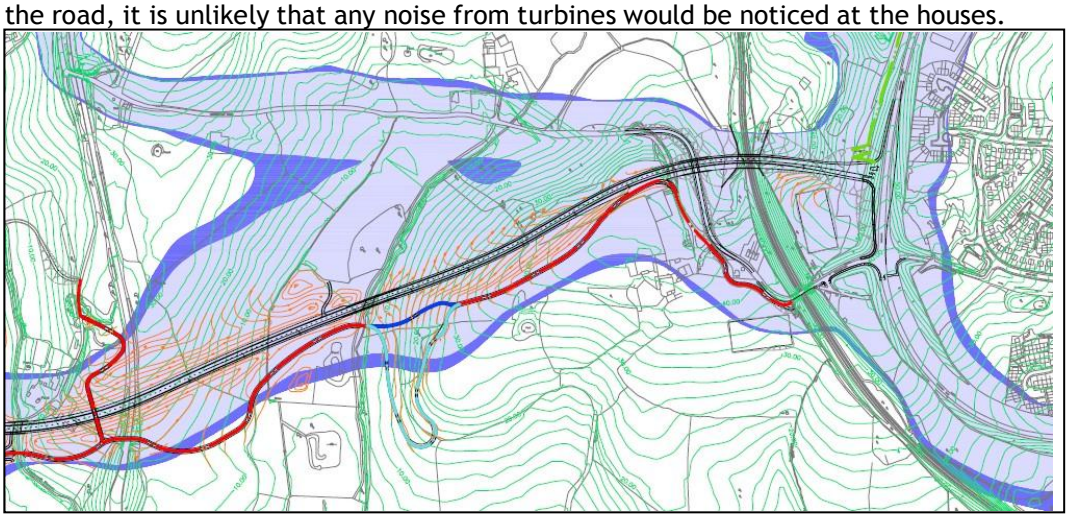


Figure 18 Option 5 noise - two 3MW turbines

6.4 Implications for dwellings

We do not anticipate that there will be any noise impacts on dwellings over and above what is allowed in the guidelines, *ETSU-R-97*. The noise maps here show that the turbines comply with the 35 to 40dB(A) limit on the quiet background maps. These sites are not quiet sites, particularly once the new Bexhill to Hastings Link Road is in operation. The map below shows the predicted noise impact of the new road. The light blue lines show the anticipated 50dB contour in 2010 and the dark blue the anticipated 50dB contour in 2025. As all the nearest dwellings are either within or on the other side of this noise area created by the road, it is unlikely that any noise from turbines would be noticed at the houses.



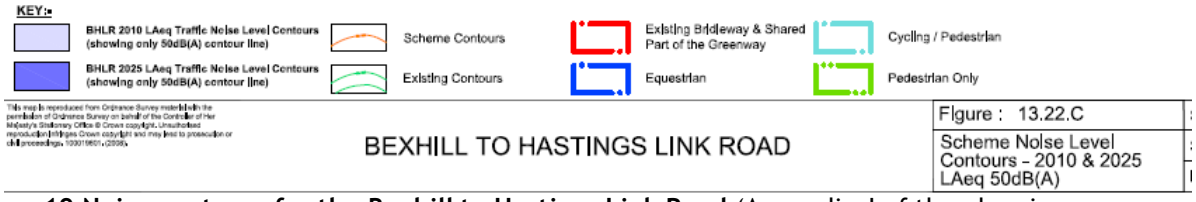


Figure 19 Noise contours for the Bexhill to Hastings Link Road (Appendix J of the planning

application)

Comment on site C

If Site C is to be considered for siting a wind turbine, the noise mapping would need to be refined to inform the planning process. A few more properties are likely to be affected but for options 1, 2 and 3 this is unlikely to take noise levels beyond the acceptable levels outlined in the noise guidelines referenced in Section 6.1.

7 Aeronautical issues

7.1 Wind turbines and aircraft activities

There are three ways in which a wind turbine development can affect aircraft activities:

- By becoming an obstacle to take off and landing by penetrating the "obstacle free zone"
- By becoming an obstacle to military low flying and helicopter activities by intruding into military air traffic zones
- By affecting radar signals used either for aircraft take-off and landing, aircraft navigation, or air defence (target spotting).

7.2 Aerodrome safeguarding – obstacle limitation surfaces

An obstacle limitation surface means that certain height limits have to be adhered to in order to avoid the possibility aircraft collisions with tall objects. The guidance on the heights of obstacles is given in *Civil Aviation Authority CAA - CAP 168 Licensing of Aerodromes - Chapter 4, The Assessment and Treatment of Obstacles*.

An initial risk report (see Appendix 1) identifies no licensed or unlicensed airfields near Upper Wilting Farm, so the sites will not be covered by an obstacle limitation surface.

7.3 Military aerodrome traffic zone

The sites do not appear to be close to any operating RAF station, or within a low flying area.

7.4 Radar

If rotating wind turbine blades are within or close to the "radar line of sight", which is different from the optical line of sight, then the bulk of the wind turbine structure might reflect sufficient energy to hide any aircraft in the same area, thus making it difficult to detect the aircraft by radar.

In addition, where there is more than one turbine, the traces they create on the air traffic controllers' screens can be mistaken for a moving aircraft.

North Energy commissioned an initial risk report from Pager Power, communication and aviation consultants (see Appendix 1). This showed that turbines at Upper Wilting Farm would be unlikely to be seen by any radar systems, including the primary surveillance radar at Pease Pottage, as the 'view' is blocked by intervening topography. As such, it would be unlikely for National Air Traffic Services to raise any objections to turbines on these sites. Any developer taking this project forward should consult NATS at a cost of £1,250 + VAT.

8 Shadow flicker

8.1 Perception of shadow flicker

Shadow flicker is the passing of shadows of the turbine blades across windows in occupied rooms. It affects properties up to ten rotor diameters from the turbine. It is worst in low sun conditions in the mornings and evenings, usually in spring and autumn. It usually affects properties to the west or north-west (mornings) or the east or north-east (evenings). The times when the shadows could pass across windows are entirely predictable. The weather, however, is much less predictable and so the actual times when this will occur will depend on sunshine at the 'right' time.

8.2 Shadow flicker prediction

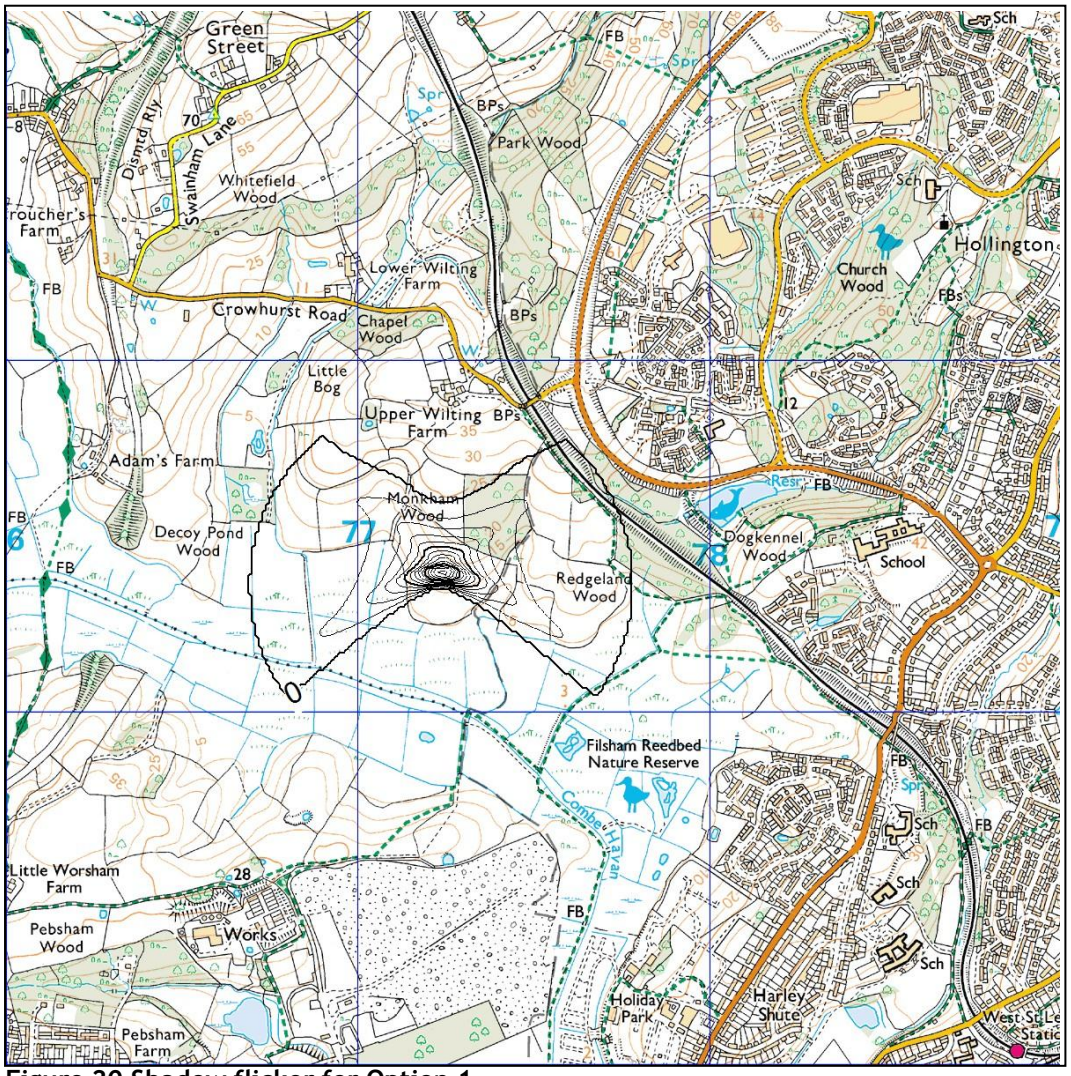


Figure 20 Shadow flicker for Option 1

It is clear from this map that Option 1 would not cause shadow flicker at any dwelling.

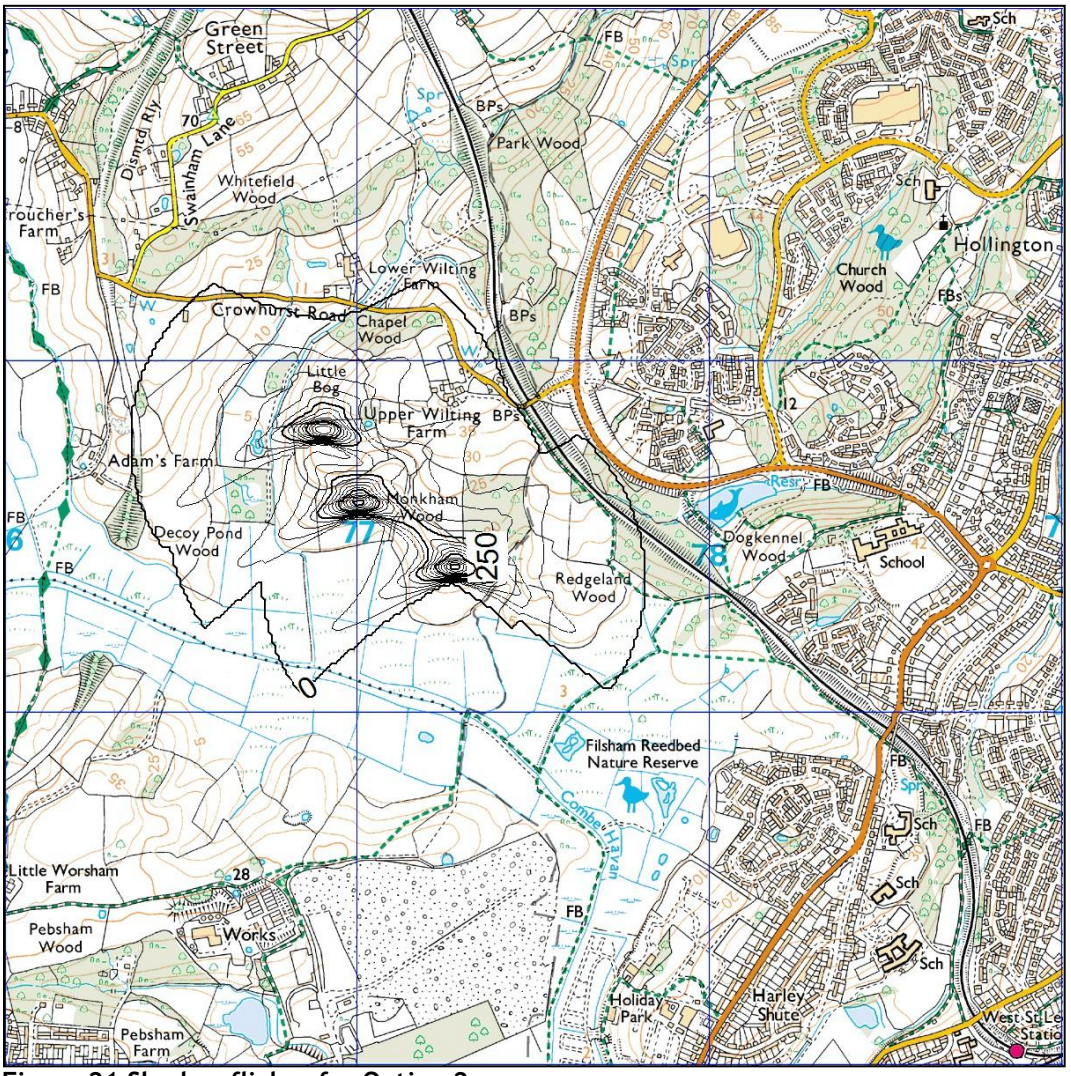


Figure 21 Shadow flicker for Option 2

Again, Option 2 would cause very little shadow flicker at dwellings. Upper Wilting Farm might get a few hours depending on the exact orientation of the windows. The maximum total would be around eighteen to twenty hours per year, but actual incidence is usually around a third of the theoretical maximum. Further work taking into account the size and direction of the windows would be able to predict the exact hours in the year when shadow flicker would occur. As the farm is north east of the turbines, shadow flicker would occur in the afternoons / evenings. The cost of this work is included in the estimated costs of gaining planning permission in the financial viability section of this report.

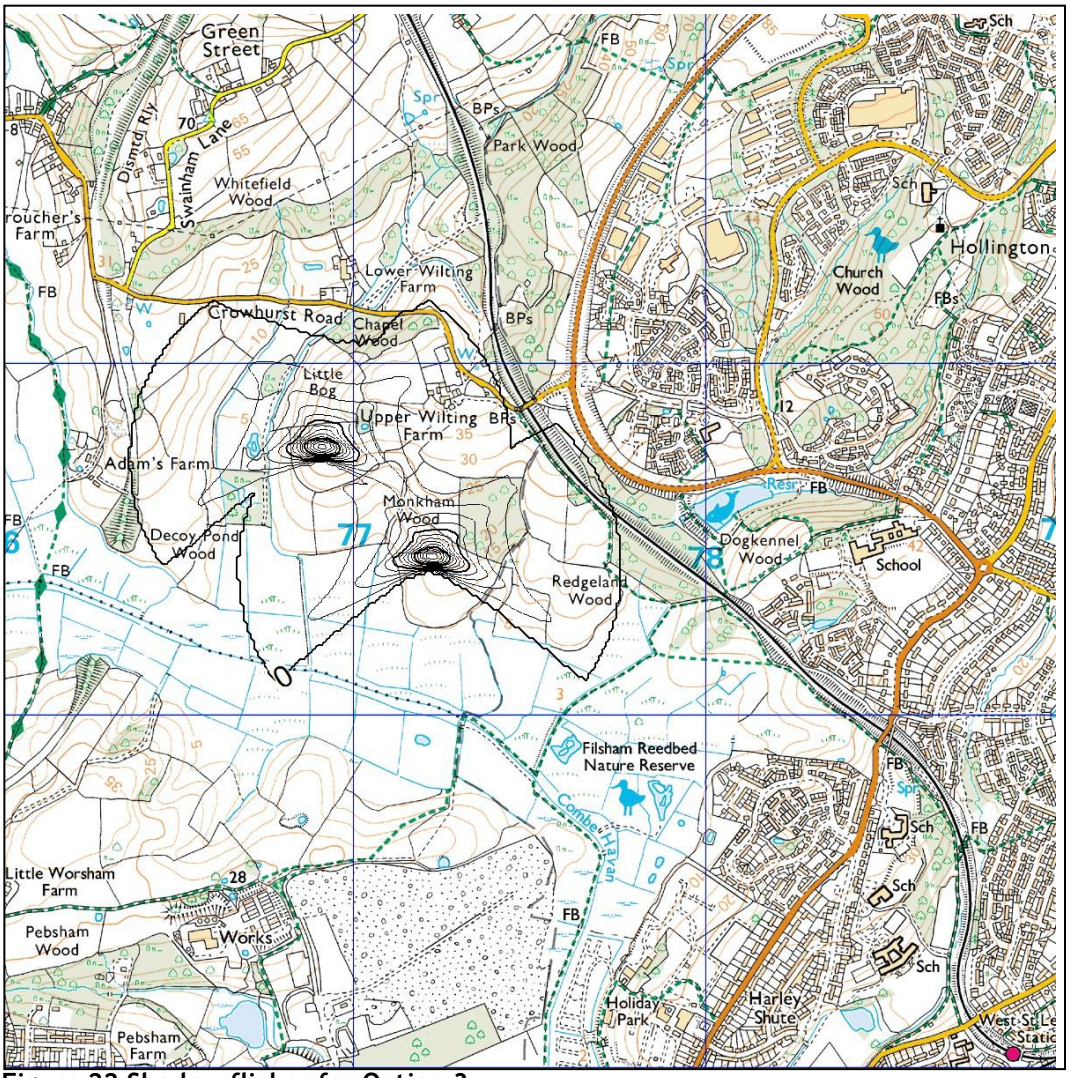


Figure 22 Shadow flicker for Option 3

The shadow flicker impact for Option 3 is very similar to Option 2, covering a slightly smaller area, as there are two turbines with this option as opposed to three. The comments above regarding Upper Wilting Farm also apply here.

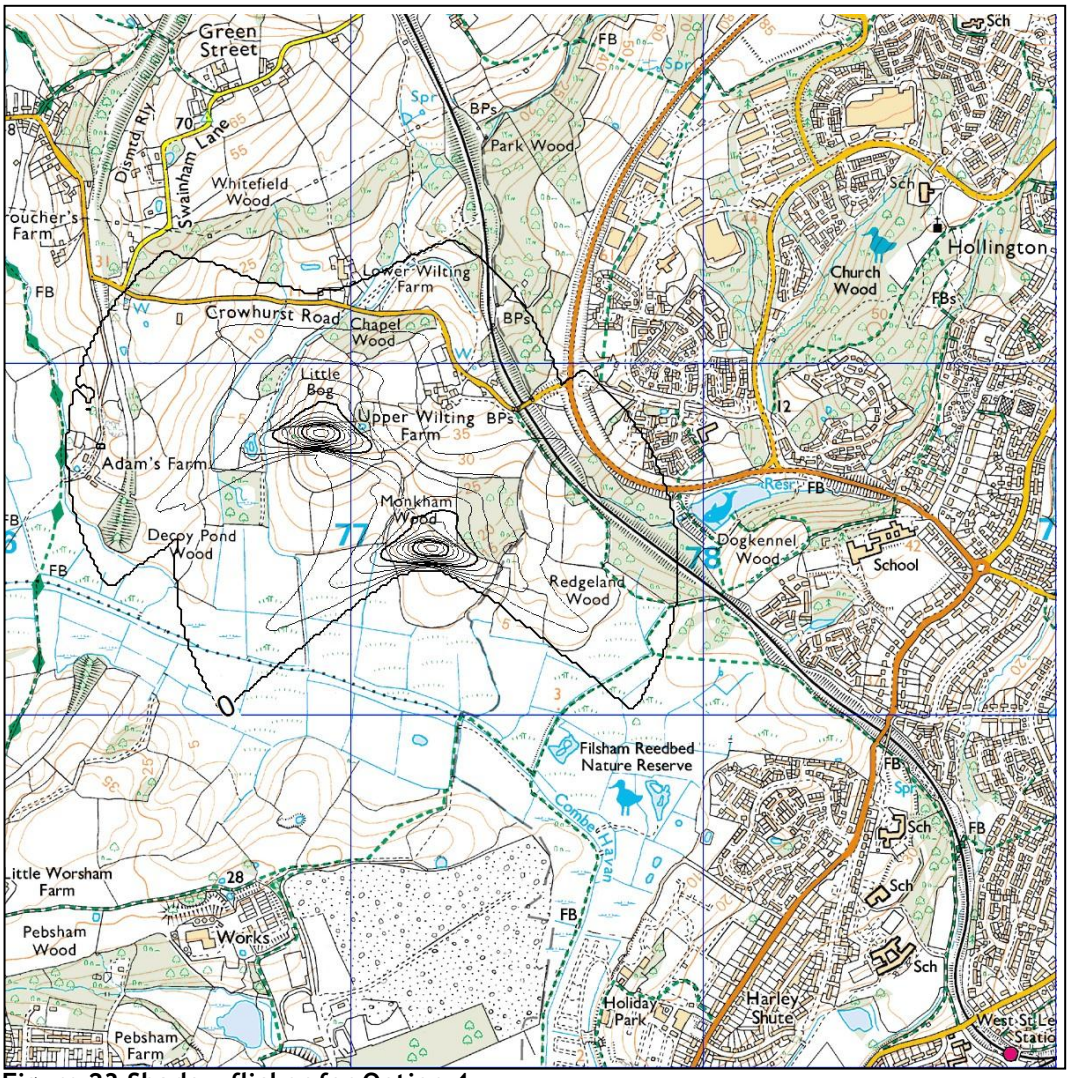


Figure 23 Shadow flicker for Option 4

The shadow flicker for these larger turbines might affect some dwellings, although the outside contour (0 hours) skirts round most properties, and the number affected would be very small. With such a low number of potentially effected houses, fitting blinds to effected windows (if they do not already have them) would most likely be the most cost-effective mitigation measure.

The larger turbines used in Option 5 (85m tower, 126m tip height) are shown affecting more houses on the other side of the B2092, than do the smaller ones used in Option 4. However, the maximum hours affected for the houses on the estate is around 15 per year, meaning the likely incidence is approximately five hours per year. Shadow flicker could occur in the late afternoons, just before sunset, in late February and late October, and would likely occur for no more than about half an hour per day.

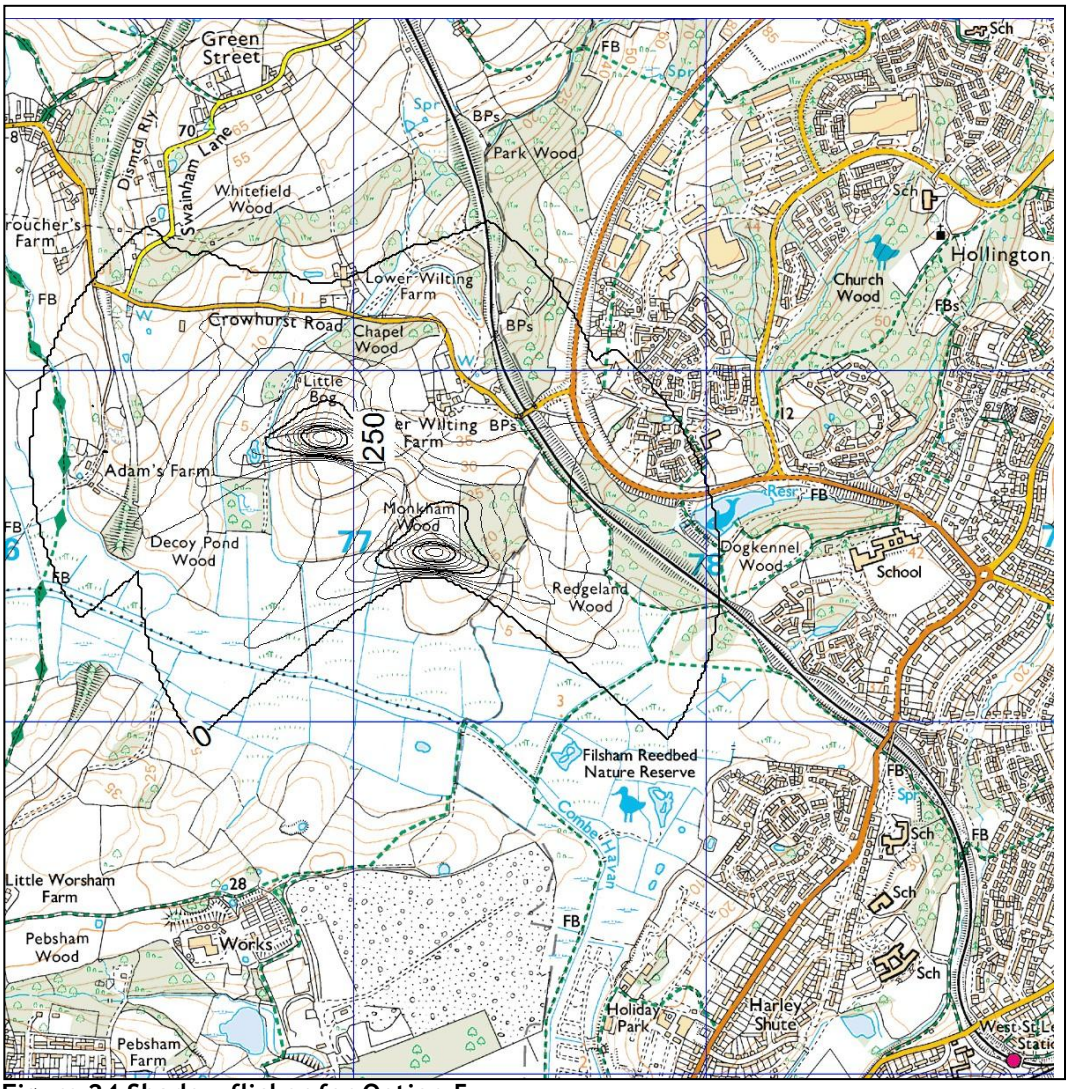


Figure 24 Shadow flicker for Option 5

8.3 Mitigation

It should be remembered that shadow flicker is an inconvenience, not a hazard. As the blades rotate relatively slowly, shadow flicker is not considered a threat to people that suffer from sensitivity to flashing lights.

The times that shadow flicker might occur are entirely predictable, and several mitigation measures are possible. The simplest of these is to install blinds at affected windows. The best solution is to install a system that detects wind direction and sunlight and shuts the turbine down automatically if shadow flicker occurs, and restarts the turbine once the effect has passed. This has the advantage over a simple timer shutdown that downtime on the turbine is reduced to a minimum. Several wind turbine manufacturers now include this as part of the optional extras for their turbines.

Mitigation costs are minimal in terms of a wind turbine and project, and are unlikely to affect payback times.

Comment

If Site C is e considered for siting a wind turbine, the shadow flicker assessment work would need to be refined to inform the planning process. However mitigation techniques would be the same as before.

9 Planning permission

9.1 The need for planning permission

The installation of a wind turbine on site would require planning permission from the local planning authority. When considering a planning application, the council have to ensure that the proposal is in line with planning policy.

There has been a strengthening of planning legislation over the past few years to enhance the role that planning, and development plans in particular, can have in combating climate change. In particular, the *UK Renewable Energy Strategy* states that "applicants for renewable energy should no longer be questioned about the energy need of their project either in general or in particular locations."[3]

This implies that the planning system is to give weight to the wider benefits of renewables even if there are no immediately apparent local benefits.

9.2 Environmental Impact Assessment

One of the issues that the local planning authority will consider is whether the proposal requires an Environmental Impact Assessment (EIA). This describes a procedure which sets out the likely significant effects of a project. This helps to ensure that the importance of the predicted effects, and the scope for reducing them, are properly understood by the public and the planning authority before it makes its decision.

In relation to wind energy, the guidance states that an EIA might be required for wind energy, although in cases where there are fewer than five turbines or less than 5MW generating capacity, it will not always be necessary. The guidance goes on to state that, if a development is proposed within or close to designated sites which are classed as "sensitive", then the thresholds cited above will not apply, and the developments must be screened for the need for an EIA.

Sensitive sites include special protection areas, Ramsar sites (wetlands of international importance designated under the Ramsar convention), national nature reserves and sites of special scientific interest (one of which is adjacent to these sites).

9.3 Consultation with planning officers

We recommend that before making an application, contact is made with planning officers to ascertain and identify any additional information and / or surveys they might require before they can process the application. Such contact should help determine the scope of work and planning documents required.

[3] DECC (2009): *The UK Renewable Energy Strategy*, 4.23

10 Economic feasibility of suggested wind turbine options

10.1 Wind turbine market conditions

The availability of wind turbines is sensitive to the world-wide demand and the manufacturing capacity. The situation is subject to significant changes from one year to the next in this expanding sector.

The final costs and incomes of a wind turbine project are highly dependent on various factors which are as yet unknown, such as ground conditions, and aspects outside the developer's control, such as pound / euro exchange rates, and interest rates. Projects also tend to change and develop as the planning process progresses and any engineering issues become clearer.

10.2 Economic feasibility

10.2.1 *Capital cost*

At this stage budget estimates have been made for the various options.

10.2.2 *Pre-development costs*

This covers items such as wind monitoring, required surveys, gaining planning permission, public information etc.

For gaining planning permission, a figure of £100,000 has been allowed for here for the single turbine option, and £125,000 for the others. If planning consent is gained in the most straightforward manner, the cost could be less. However, should the matter be taken to appeal or public inquiry, the costs could be considerably more.

The following three costs have been included:

Wind monitoring costs for one year have been estimated as £25,000 for the medium turbines (77m to tip) and £30,000 for the large turbines (109m or 126m to tip).

Archaeology costs are estimated by ESCC to be in the range £250,000 to £750,000. For this financial viability study, a single figure of £500,000 is used for all options except the single turbine case, where a lower figure of £250,000 is used in order to reflect on the smaller footprint of the works involved. It is recommended that, in the next stage of the project, more work is done to refine these costs to a more specific figure to enable the project budget to be firmed up.

Ecological surveys are estimated to be likely to cost between £20,000 and £30,000. A mid range of £25,000 has been used here for all options.

10.2.3 *Grid connection costs*

These are costs that have been supplied to us by the distribution network operator in the South-East, UK Power Networks. They are budget costs, which means that the DNO only looked very briefly at the requirements for the connection. It is possible to get a firmer price, which involves the DNO doing detailed survey work and cost analysis, but these typically take three months. However, they are an indication of the prices involved.

The figures used here are £240,000 for Options 1, 2 and 3, £900,000 for Option 4 and £1,200,000 for Option 5 (see also section Figure 10).

10.2.4 *Maintenance costs*

Running costs include planned and unplanned maintenance. Most manufacturers, including EWT and Enercon, run service and maintenance programmes for their turbines, which cover all maintenance and servicing. Costs are usually based on electricity generated.

10.2.5 *Other annual costs*

The project will need to pay business rates and insurance costs.

The Valuation Office Agency no longer attaches a fixed rating per megawatt installed, but assesses each installation separately. The rateable value given depends on the expected outputs. A rough rule of thumb appears to be that rateable value equates to £10/MWh output. The current rate of business tax (2012/13) is 45.8p per pound of rateable value.

Insurance is likely to be in the region of £5,000 to £10,000 per annum, depending on levels of cover, excess payments etc.

As the assumption is that the turbines would be owned by Hastings Borough Council, and all profits would be returned to the council, no community contribution has been included in the calculations. Likewise, as the council owns the land, no allowance has been made for rent.

10.2.6 *Value of electricity output*

The value of electricity output is a combination of:

- the value of electricity used on-site which is displaced by the turbine output
- the value of electricity exported off-site onto the grid
- the benefits accruing from the feed-in tariff (which are based on energy output of the turbine) and any other minor electricity-related benefits resulting from the wind turbine.

On these sites it is assumed that all the electricity is exported to the grid. However, if a use could be found for the electricity, it would add considerably to its value.

10.2.7 *Value of exported electricity*

Under the feed-in tariff, generators have a choice – they can either fix the export price at 4.5p/kWh (to rise only in line with inflation), or they can sell the electricity on the open market. Selling on the open market carries more risks, but also has potentially higher returns, especially if electricity prices should rise in future, over and above inflation.

In this model we have assumed that the more reliable fixed price option would be chosen, except for the 6MW Option 5, which could not be included under the feed-in tariff scheme (see below).

10.2.8 *Feed-in tariff payment*

Currently (March 2013) the feed-in tariff payment for the >100kW to 500kW band is 17.5p/kWh. The payment for the >500kW to 1,500kW installed band is 9.5p/kWh, and the payment for >1,500kW to 5MW is 4.48p/kWh.

10.2.9 *Renewable Obligation Certificates*

Renewable Obligation Certificates (ROCs) are a much older form of support for renewable energy than feed-in tariffs, and it is still the only system of support for wind farms with installed capacities over 5MW. ROCs are a certificate to show that a generator has produced 1MW of renewable energy. Electricity companies are obliged to show that a certain amount of their electricity was generated by renewable technologies, and any shortfall in their own generation is met by buying other people's- in the form of ROCs. ROCs float on the open market, so their value varies, but there is a floor price beneath which they cannot fall (currently £42.02/MWh). This is the value we have attached to ROCs for the purposes of this exercise. The electricity is also sold on the open market. The wholesale price of electricity fluctuates widely from day to day. We have used a rough average of 5p/kWh.

10.3 Sensitivity to variation of these figures

As with any projected cost, there is an amount of variability in the estimates, some are outside the control of the project. Some of the key possible variations of the project are given here:

- Long term annual mean wind speeds – the wind speed database is based on 1km grid squares, and there are variations within that. Energy output might vary +/- 15% from estimated
- Annual wind speeds - the energy output variation year on year can be +/- 15% of the long term mean, due to annual fluctuations
- Pre-development costs: +/- 30%
- Capital costs (excluding exchange rate variation): +/- 15%
- Foreign currency exchange rate variation: +/- 30%
- Feed-in tariff: +0% / - 25%
- Electricity values: guaranteed at a certain level under the feed-in tariff, currently 4.5p/kWh, or floating market prices are very uncertain.

Clearly the project's economic viability is highly dependent on outside factors such as electricity prices and foreign currency exchange rate on imported wind turbines (the imported element makes up a proportion of about 70% of project capital costs).

10.4 Economic viability

The assessment of economic viability is based on a simple straight payback. The interest charges on capital are not included at this stage. This is done in order to make the comparisons between options straightforward and keep the variables and options to a manageable number. In later stages of the project, more detail will be available and some of the variability noted in the section above can be reduced. The table on the next page summarises the economic viability of the different turbine options. It is clear that Options 1 has the swiftest payback time of just over 6 years as this takes advantage of the higher feed-in tariff band up to 500kW. Options 2 and 3 are next, taking advantage of the under 1.5MW feed-in tariff and the low grid connection charge. However with the larger turbines, Options 4 and 5, although the payback periods are much longer (around ten and a half years), due in part to the much higher grid connection charges, they bring in a much higher annual revenue. They also produce the most electricity and therefore help offset the most carbon emissions.

Upper Wilting Farm Options

	Option 1	Option 2	Option 3	Option 4	Option 5
Turbine size	500kW	3 x 500kW	500kW + 900kW	2 x 2.3MW	2 x 3MW
Electricity generated kWh/yr	1,540,045	4,620,135	3,401,000	8,276,780	10,771,290
Capital costs					
Planning & legal costs	£100,000	£125,000	£125,000	£125,000	£125,000
Archaeology (mid range)	£500,000	£500,000	£500,000	£500,000	£500,000
Ecology surveys (mid range)	£25,000	£25,000	£25,000	£25,000	£25,000
Wind monitoring cost (estimate)	£25,000	£25,000	£25,000	£30,000	£30,000
BT microwave rerouting (budget quote)	£0	£7,000	£7,000	£0	£0
Purchase, installation & commissioning	£1,000,000	£3,000,000	£2,000,000	£5,063,000	£7,110,800
Grid connection (budget quote)	£240,000	£240,000	£240,000	£900,000	£1,200,000
Total capital costs	£1,890,000	£3,922,000	£2,922,000	£6,643,000	£8,990,800
Running costs per annum					
Maintenance, insurance etc	£25,500	£62,442	£47,012	£76,809	£99,958
Rates	£7,053	£21,160	£15,577	£37,908	£49,333
Total annual running costs	£32,553	£83,602	£62,589	£114,716	£149,290
Income per annum					
Income from feed-in tariff / ROC payment**	£269,508	£438,913	£323,095	£370,800	£452,610
Income from export	£69,302	£207,906	£153,045	£372,455	£538,565
Total gross income	£338,810	£646,819	£476,140	£743,255	£991,174
Net income per annum	£306,256	£563,217	£413,551	£628,539	£841,884
Payback in years	6.17	6.96	7.07	10.57	10.68
CO_2 Savings ($kgCO_{2e}$)*	842,435	2,527,306	1,860,415	4,527,564	5,892,111

*Grid rolling ave ($kgCO_{2e}$/kWh) 0.5470 2012 Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting

** up to 5MW - FiT, over 5MW - ROC payment

11 Conclusions

The identified sites are suitable for wind turbines, although the wind resource cannot be considered particularly high. The sites will also suffer from turbulence due to the surrounding hills and trees, which will affect the output of any turbines. Wind monitoring is advisable, firstly to confirm the estimated energy outputs and secondly to help the turbine manufacturer give assurances that the wind turbulence is within turbine design limits.

The available locations for turbines are constrained, mainly because the fields are tree-lined, leaving only small areas in the middle of the fields sufficiently far from the trees to satisfy wildlife off-sets of 75m. In addition, site C is crossed by two microwave links. Links can be affected by turbines, and considering the wildlife constraints it is not possible to use site C for turbines without re-routing the links. However, a survey by BT Open Reach commissioned by Hasting Borough Council has shown that the BT links could be re-routed at a modest cost.

A gas pipeline runs near the sites and the utility would need to be consulted at the next stage to assess if the project's construction would affect this pipeline.

The identified sites are also constricted by proximity to dwellings. The Element Energy study identified a 400m off-set to dwellings, but this is considered to be extremely tight for the large-scale commercial turbines. Although the noise from such turbines would be unlikely to cause a disturbance, particularly in light of potential increased background noise from traffic using the new Bexhill to Hastings Link Road, turbines such as those used in Options 4 and 5 can be over-bearing so close to houses. Using this 400m off-set, it would be possible to install two large-scale turbines, but 600m to 700m from dwellings would be more desirable. The medium-scale turbines suggested in Options 1 to 3 are considered to be more suited to the identified sites.

Access to the identified sites is reasonable, although new site tracks would have to be built, possibly cutting across land which is currently used for arable purposes.

Because of the archaeological sensitivity of the area, archaeological surveys for the proposed development would be needed at a mid-range cost estimate of £500,000. These costs would significantly affect the viability of Options 1-3 with paybacks in the range of 6 to 7 years.

Grid connection of turbines to the local network by the local distribution network operator, UK Power Networks, would be possible. For Options 1 to 3, the cost would be in the region of £240,000. For Options 4 and 5, the costs would be approximately £900,000 and £1,200,000 respectively. This is because the higher power rating and generation output of Options 4 and 5 would require a connection back to a primary substation some distance from the sites.

It is not anticipated that there will be objections from aviation interests, as the identified sites for turbines are not believed to be within line of site of radar facilities.

Shadow flicker (particularly from Options 4 and 5) might affect some houses – but only for a few hours per year. Shadow flicker is something that can easily be mitigated by an inexpensive technical fix on the wind turbines should the need arise. It should not affect the chances of a project being approved.

Economically, Options 4 and 5 bring in a much bigger revenue stream than Options 1 to 3, once capital expenditure was repaid. However, the former would also require a much larger capital investment than the latter, and take much longer to achieve 'simple payback' (i.e. taking no account of interest payments) – in the region of ten years, as opposed to between 6 and 7 years.

This is due in part to the high capital (including a more expensive grid connection) and running costs of the larger machines, but is also because of the way the financial support system for wind turbines currently works in the UK. This has two parts – the generation tariff and the export tariff. For the identified sites, it is assumed that all electricity would be exported – but if a use for the electricity could be found, it would improve profitability.

The feed-in tariff has different bands of support, with higher generation tariffs for smaller installations. Options 1 to 3 take advantage of the 500kW to 1,500kW band, which pays 9.5p/kWh. Over 1,500kW, the tariff is only 4.48p/kWh, which means that turbines have to generate at least twice as much as the smaller installations to receive the same level of generation tariff income. Over 5MW (Option 5), an installation is not eligible to receive the feed-in tariff, and must receive support through Renewable Obligation Certificates and the open market, where prices are not fixed, although are similar to the feed-in tariff 1,500kW to 5MW band. This is why Options 4 and 5 would take so much longer to payback than Options 1 to 3.

Of the first three options, the most economic option is Option 1, because of the high tariff payments. Options 2 and 3 have similar payback periods of around 7 years. Option 3 would be preferable, because it only involves two turbines (less capital cost), whilst still reaching nearly the maximum installed capacity allowed under the feed-in tariff band.

Whilst any of the options considered would, in theory, be possible, and Option 1 has the best payback, it is recommended that Option 3 would be preferable, in terms of reasonable payback, low capital cost (including a low grid connection charge) and reasonable annual net income, and also in terms of the spatial constraints affecting the identified sites, and the size of turbines that can reasonably be accommodated.

Subject to re-routing the two microwave links that cross site C, it would be possible to locate one of the turbines under Option 3 on site C (within Hastings Borough). In line with the technical siting advice set out in this viability assessment, the other turbine should be located on site A (within Rother District).

Appendix 1 Aviation Risk Report

Risk Report - NORTH ENERGY ASSOCIATES LIMITED - UPPER WILTING

Introduction

This Risk Report has been produced concerning the Upper Wilting development (site location 577200E, 110500N)

This is not a scoping report, but a basic overview of the proposed development and details the most significant aviation issues from the Pager Power database. This includes UK civil and military radar (Air Traffic Control, Air Defence, Meteorological, and NATS/NERL), licensed aerodromes, unlicensed airfields and radio navigation aids. It does not currently include Military Low Flying. Best endeavours are undertaken to keep this database up to date and free of errors, however, such information is both volatile and in some cases of subjective nature.

Therefore if the proposed Upper Wilting development is taken forward then it is recommended that a full scoping report is undertaken to both confirm and investigate in more detail this report's results.

Key Aviation Issues

The following list of aviation sites have been identified as potential issues for the proposed Upper Wilting site.

Site Name	Site Type	Approximate Distance (km)
Pease Pottage PSR (NATS)	NERL PSR	56.72

This is not intended to be an exhaustive list, rather it details the most significant potential aviation issues found in the Pager Power database.

Radar Analysis

For each radar identified as potentially at issue, line of sight analysis has been undertaken using a bare earth 50m post spacing .ordnance survey DTM Analysis has been undertaken to the Upper Wilting to provide an initial guide as to the likelihood of each radar causing longer term issues for the proposed location development.

Pease Pottage PSR (NATS)

Based on preliminary analysis an intial objection is considered unlikely from the operator of Pease Pottage PSR (NATS) for a 125m turbine placed at the site centre as radar line-of-site passes 13m above such aturbine. Appendix[A] illustrates this result.

If the developer decides to take this development forward it is recommended that this analysis is checked for the entire site. If it does hold true then it is unlikely that Pease Pottage PSR (NATS) will be an issue for the proposed development.

Other Aviation Issues

Larger airports are listed in the preceding sections, the following additional aviation sites may also have issues with the proposed test site:

Licensed Airfields

No licensed airfields were identified in the Pager Power database within 20km of the proposed site centre.

Unlicensed Airfields

No unlicensed airfields were identified in the Pager Power database within 7km of the proposed site centre.

Terminology

Term	Description
MOD	Ministry of Defence
PSR	Primary Surveillance Radar
CAA	Civil Aviation Authority
NATS	National Air Traffic Services
PAR	Precision Approach Radar
ATC	Air Traffic Control
SSR	Secondary Surveillance Radar
CTA	Control Area (often associated with an airport)

Summay of Issues

An objection from the operator Pease Pottage PSR (NATS) is considered unlikely.

Recommendations

This report identifies issues which may affect the proposed wind development. The exact assessment of each radar and airport operator cannot be predicted, however. A Pager Power Commentary Report for this site would contain an expert assessment of the overall risk to the site from aviation and radar issues.

If the development is taken forward then Pager Power has the following recommendations:

For those radar within line-of-sight it is recommended that an assessment is made to determine whether any additional factors such as positioning of turbines, size of turbines, buildings and trees may help to further shield turbines. For borderline turbines or radars at significant distance radar detectability analysis could be undertaken. If none of these are successful then consultation with operators and technical mitigation should be considered.

For those licensed airfields identified it is recommended that an initial assessment is made to determine whether protected surfaces may be an issue. If they could then full assessment should be made to determine any constraint to the proposed development.

Consultation with identified civil aviation stakeholders and the MoD is recommended. Full consultation with those airfields (both licensed and unlicensed) identified should be made to confirm if they have anyfurther concerns.

The report considers aviation issues only, full Ofcom and link operator consultation will be required to identify and calculate any constraints relating to communication links. TV interference may require further analysis and will be of most concern to those developments with large population centres within 5-10km.

This online risk report was generated on 13 Feb 2013.

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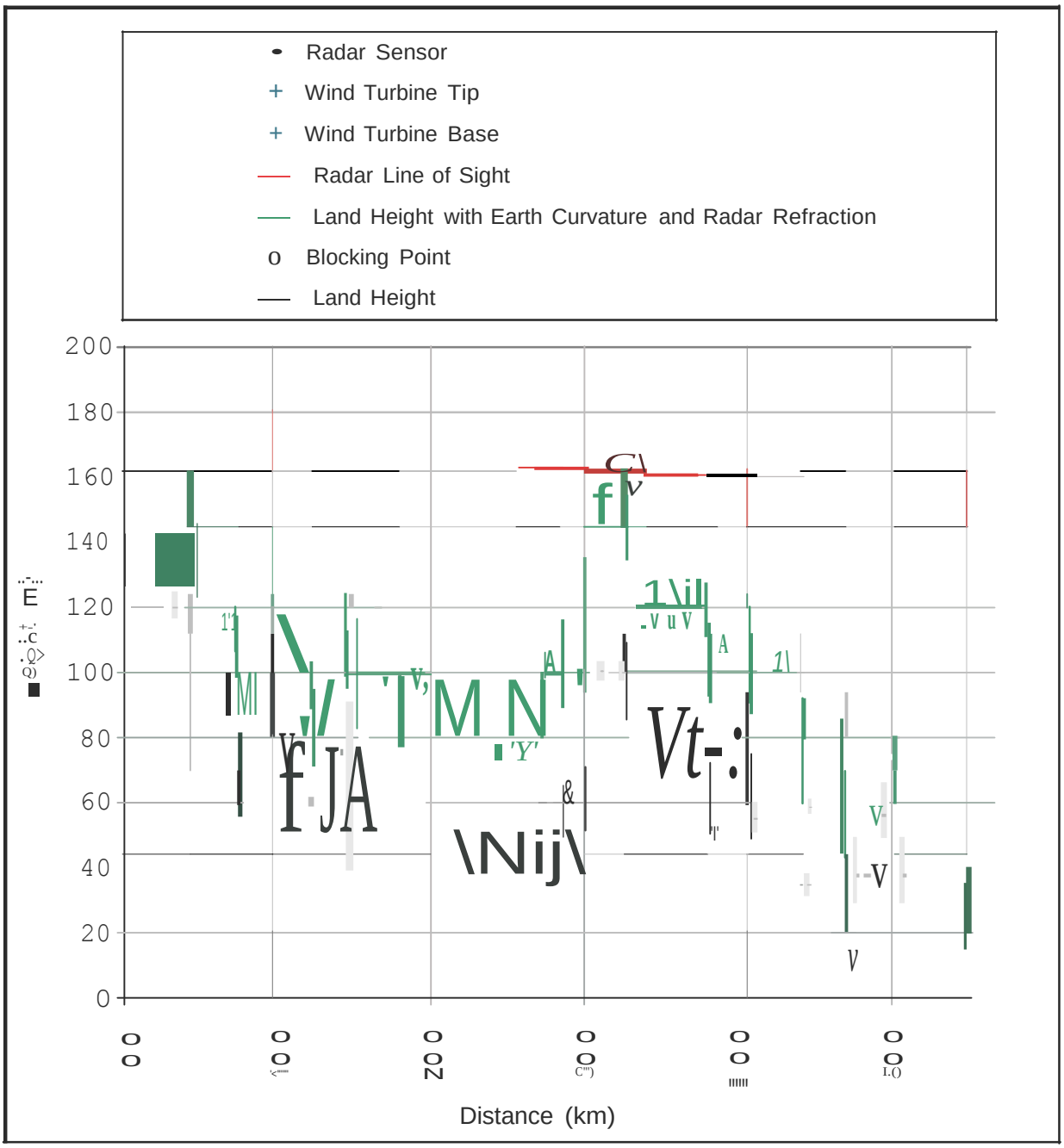
APPENDIX A LINE-OF-SIGHT CHART FOR PEASE POTTAGE PSR (NATS)



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