

The levels measured at Eagle Nest do not appear to follow the profile of the levels at the other three locations and show comparatively higher levels below 12ms⁻¹. As background levels were also measured at nearby Whitley House, the background profile at this location has been preferred as a proxy for nearby locations.

The polynomial background curves plotted in the preceding figures were expanded to include the wider range of wind speeds required to produce background noise levels referenced to v₁₀ wind speeds.

Table 8.12 - Tabulated background levels – Measured 10m wind speeds

Measured 10m wind speeds m/s		2	3	4	5	6	7	8	9	10	11	12	13
Annat Royd	Quiet												
	Daytime	31.2	31.8	32.6	33.5	34.5	35.7	37.0	38.5	40.0	41.8	43.6	45.7
	Night-time	25.4	26.3	27.6	29.2	31.2	33.3	35.6	37.9	40.2	42.4	44.3	46.0
Brown's Edge	Quiet												
	Daytime	29.4	30.1	31.0	32.0	33.2	34.5	36.0	37.7	39.5	41.5	43.6	45.9
	Night-time	25.0	25.9	27.3	28.9	30.8	33.0	35.3	37.7	40.3	42.8	45.3	47.8
Whitley House	Quiet												
	Daytime	30.7	31.7	32.9	34.2	35.5	37.0	38.6	40.2	42.0	43.8	45.8	47.8
	Night-time	27.1	28.5	30.1	31.8	33.6	35.5	37.4	39.3	41.2	43.1	44.9	46.6

For each amenity period, measured 10m wind speeds were standardised using the calculated exponents in **Table 8.11**, to produce v₁₀ wind speeds. Levels for integer v₁₀ wind speeds were then obtained through linear interpolation.

Table 8.13 - Tabulated background levels – Standardized (v10) wind speeds

v10 wind speeds (m/s)		3	4	5	6	7	8	9	10	11	12
Annat Royd	Quiet Daytime	31.5	32.3	33.3	34.5	36.0	37.7	39.5	41.5	43.6	45.7
	Night-time	25.7	26.7	28.4	30.5	33.0	35.7	38.4	41.2	43.7	45.7
Brown's Edge	Quiet Daytime	29.8	30.6	31.8	33.2	34.9	36.8	38.9	41.1	43.5	45.9
	Night-time	25.3	26.4	28.1	30.2	32.6	35.4	38.3	41.5	44.5	47.2
Whitley House	Quiet Daytime	31.2	32.4	33.9	35.6	37.4	39.4	41.4	43.5	45.7	47.8
	Night-time	27.5	29.1	31.0	33.0	35.2	37.5	39.8	42.1	44.3	46.2

8.5.1.1 Background Noise Profile Allocation

The background profile measured at Annat Royd was also used for Far Royd Moor 510m away.

The Whitley House background profile was also used for the cluster of locations to the south-east of the site: 3, 4 and 17, as shown in **Figure 8.1**.

The Brown's Edge profile was also used for Spicer House and for nearby Green Gate.

In the absence of relevant background levels measured at other locations, the lowest available levels were used. For the most critical wind speeds (v_{10} wind speeds of 6ms^{-1} to 9ms^{-1}), the levels measured at Browns Edge were the lowest during both quiet daytime and night-time periods.

A summary of background noise allocation is shown in the following table.

Table 8.14 - Summary of background level allocation

Location ID	Easting	Northing	Name	Background Allocation	Reason
1	421319	404955	Annat Royd	Annat Royd	Most relevant
2	420431	405746	Brown's Edge	Brown's Edge	Most relevant
3	421318	403998	Carr House	Whitley House	Most relevant
4	420948	404239	Eagle Nest	Whitley House	Most relevant
5	421786	404783	Far Royd Moor	Annat Royd	Most relevant
6	420517	403855	Flash House Farm 1	Brown's Edge	Lowest
7	420366	403847	Flash House Farm 2	Brown's Edge	Lowest
8	420742	406043	Green Gate	Brown's Edge	Lowest
9	420170	403920	Illians Corner	Brown's Edge	Lowest
10	418562	404629	Sledbrook House	Brown's Edge	Lowest
11	420679	404074	Small Shaw	Brown's Edge	Lowest
12	420481	405587	Spicer House ²¹	Brown's Edge	Most relevant
13	419980	404049	The Lanes	Brown's Edge	Lowest
14	421332	404172	Whitley House	Whitley House	Most relevant
15	419742	404155	Middle Cliff	Brown's Edge	Lowest
16	418963	405515	New Maythorn Farm	Brown's Edge	Lowest
17	421243	404288	Windmill Nursery	Whitley House	Most relevant

8.5.2 Current operating levels

The following table shows the turbine noise levels predicted to occur at all the sensitive receptors.

Table 8.15 - Predicted cumulative levels of the four operational wind farms

Existing cumulative L_{A90} levels (dB)		V_{10} wind speeds (m/s)				
Location ID	Name	6	7	8	9	10
1	Annat Royd	42.0	43.2	44.3	45.5	46.4
2	Brown's Edge	38.7	39.9	41.2	42.3	43.0
3	Carr House	39.9	40.9	42.0	43.1	44.0
4	Eagle Nest	45.7	46.8	47.8	48.9	49.8
5	Far Royd Moor	37.6	38.7	39.8	40.9	41.8
6	Flash House Farm 1	39.2	40.2	41.3	42.4	43.3

²¹ The resident at this property is financially involved in the Spicer Hill Wind Farm and the proposed extension

Existing cumulative L _{A90} levels (dB)		V ₁₀ wind speeds (m/s)				
Location ID	Name	6	7	8	9	10
7	Flash House Farm 2	38.6	39.7	40.8	41.9	42.7
8	Green Gate	35.7	36.9	38.1	39.3	40.0
9	Illians Corner	38.5	39.5	40.6	41.7	42.6
10	Sledbrook House	38.1	38.9	39.5	40.1	40.5
11	Small Shaw	42.5	43.5	44.6	45.7	46.6
12	Spicer House	40.1	41.5	42.9	44.2	44.9
13	The Lanes	38.5	39.6	40.7	41.7	42.5
14	Whitley House	42.3	43.3	44.4	45.4	46.4
15	Middle Cliff	37.9	38.9	40.0	41.0	41.7
16	New Maythorn Farm	38.3	39.1	39.8	40.4	40.9
17	Windmill Nursery	46.0	47.0	48.1	49.1	50.1

8.6 Assessment of Predicted Impacts and Effects

8.6.1 Construction phase noise assessment

For each activity, the assessment considers the nearest residential property to the activity. The results of the assessment are tabulated in the following table.

Table 8.16 - Construction phase noise

Task	Plant/ equipment	Sound Power Level [dB(A)]	BS 5228- 1:2009 Ref	Total SPL for task [dB(A)]	to nearest 5dB(A)	Distance to nearest property	Equivalent noise level at nearest property L _{Aeq,T} [dB(A)]
Construction of access tracks	Dozers	116	Table D3- 67	118	120	490	52
	Tipper	113	Table D3- 112				
	Vibrating rollers	106	Table D3- 116				
	Excavator	105	Table D3- 97				
	Dumper	102	Table D3- 110				
Construct crane hard-standing	Excavator	105	Table D3- 97	115	115	460	47
	Concrete mixer	108	Table D5- 11				
	Batching plant	112	Table D5- 12				
	Dumper	102	Table D3- 110				
	Roller	106	Table D3- 116				

Task	Plant/ equipment	Sound Power Level [dB(A)]	BS 5228- 1:2009 Ref	Total SPL for task [dB(A)]	to nearest 5dB(A)	Distance to nearest property	Equivalent noise level at nearest property $L_{Aeq,T}$ [dB(A)]
Construct turbine foundations	Excavator	105	Table D3- 97	118	120	440	53
	Tipper	113	Table D3- 112				
	Concrete mixer	108	Table D5- 11				
	Batching plant	112	Table D5- 12				
	Compressor	100	Table D6- 19				
	Water pumps	109	Table D7- 71				
	Vibratory pokers	102	Table D6- 20				
Excavate and lay site cable	Excavator	105	Table D3- 97	107	105	440	38
	Dumper	102	Table D3- 110				
Erect turbines	Cranes	110	Table D7- 117	112	110	440	43
	Generators	108	Table D7- 60				

The calculated noise levels meet the criteria for both daytimes and evenings. Turbine erection activities, should they happen at night, are shown to meet the lower 45dB(A) limit.

8.6.2 Operational Noise

8.6.2.1 Cumulative turbine noise levels

The following table shows predicted cumulative L_{A90} levels at all locations. The levels include contributions from Spicer Hill, Blackstone Edge, Hazlehead and the proposed Spicer Hill extension turbines.

Table 8.17 - Predicted cumulative turbine noise levels

Cumulative	LA90 (dB)	Standardised 10m wind speeds (m/s)									
House ID	Name	3	4	5	6	7	8	9	10	11	12
1	Annat Royd	30.2	32.6	34.8	37.0	39.0	41.0	42.6	43.3	43.3	43.3
2	Brown's Edge	31.0	33.9	36.3	38.4	39.9	41.5	42.9	43.5	43.5	43.5
3	Carr House	25.5	28.0	30.3	32.5	34.3	36.1	37.6	38.2	38.2	38.2
4	Eagle Nest	29.4	31.9	34.1	36.3	38.2	40.1	41.8	42.4	42.4	42.4
5	Far Royd Moor	25.2	27.7	30.0	32.2	34.0	35.8	37.4	38.0	38.0	38.0
6	Flash House Farm 1	26.6	29.3	31.6	33.8	35.5	37.1	38.5	39.1	39.1	39.1
7	Flash House Farm 2	26.6	29.3	31.7	33.9	35.5	37.0	38.5	39.0	39.0	39.1
8	Green Gate	27.2	30.1	32.5	34.6	36.2	37.7	39.1	39.7	39.7	39.7
9	Illians Corner	27.1	29.9	32.3	34.5	36.0	37.5	38.9	39.4	39.5	39.5
10	Sledbrook House	30.8	33.7	36.4	39.1	39.9	40.1	40.3	40.5	40.9	41.2
11	Small Shaw	28.3	30.8	33.2	35.3	37.1	38.9	40.5	41.0	41.1	41.1
12	Spicer House	32.7	35.4	37.7	39.9	41.6	43.3	44.9	45.5	45.5	45.5
13	The Lanes	28.0	30.8	33.2	35.4	36.9	38.3	39.6	40.2	40.2	40.2
14	Whitley House	26.6	29.1	31.4	33.6	35.4	37.2	38.8	39.4	39.4	39.4
15	Middle Cliff	28.4	31.4	33.8	36.0	37.4	38.6	39.9	40.4	40.4	40.5
16	New Maythorn Farm	30.1	33.7	36.2	38.4	39.3	40.0	40.7	41.1	41.2	41.2
17	Windmill Nursery	28.1	30.6	32.9	35.1	37.0	38.8	40.5	41.1	41.1	41.1

8.6.2.2 Impact assessment at the nearest representative locations

The following set of results show tabulated levels from each of the four contributing projects, logarithmically summed to give cumulative totals at each integer wind speed. The totals are exclusive of levels from Royd Moor Wind Farm. These totals are then compared with background derived criteria for each location giving exceedence of criteria in each case; rounded to one decimal place. Negative values for exceedence indicate that cumulative levels are below the derived limits. Where locations are clustered in a group (defined when background noise profiles were allocated), the tabulated results focus on the location where worst case predicted levels are highest; impacts at the other locations are reported at a later stage.

Location 12: Spicer House

Spicer House is the nearest of the three properties lying to the north of the site and is owned by the developer; the 45dB(A) limit, therefore, applies at this location.

Table 8.18 - Impact assessment at Spicer House

LA90 (dB)	Standardised 10m wind speeds (m/s)									
	3	4	5	6	7	8	9	10	11	12
Spicer Hill	28.9	31.1	33.3	35.5	37.6	39.8	41.5	42.2	42.2	42.2
Blackstone	26.5	30.5	33.0	35.0	35.7	36.2	36.7	37.0	37.0	37.0
Hazlehead	14.9	17.7	20.5	23.3	24.1	24.0	23.8	23.9	24.5	24.9
Proposed	27.9	30.1	32.3	34.5	36.7	38.8	40.6	41.3	41.3	41.3
Cumulative	32.7	35.4	37.7	39.9	41.6	43.3	44.9	45.5	45.5	45.5
Quiet daytime periods										
Criteria	45.0	45.0	45.0	45.0	45.0	45.0	45.0	46.1	48.5	50.9
Exceedence	-12.3	-9.6	-7.3	-5.1	-3.4	-1.7	-0.1	-0.7	-3.0	-5.4
Night-time periods										
Criteria	45.0	45.0	45.0	45.0	45.0	45.0	45.0	46.5	49.5	52.2
Exceedence	-12.3	-9.6	-7.3	-5.1	-3.4	-1.7	-0.1	-1.0	-4.0	-6.8

The results above show that the criteria are met at all wind speeds. The most sensitive wind speed appears to be 9ms^{-1} when worst case levels are predicted to come close to the 45dB(A) criterion, the overwhelming proportion of which is predicted to be attributable to the six Spicer Hill turbines - 44.1dB(A) of 44.9dB(A).

Location 2: Browns Edge

Browns Edge is the nearest of the three properties to the north of the site that are not financially involved in any of the wind farms.

Table 8.19 - Impact assessment at Browns Edge

LA90 (dB)	Standardised 10m wind speeds (m/s)									
	3	4	5	6	7	8	9	10	11	12
Spicer Hill	26.3	28.5	30.7	32.9	35.0	37.1	38.9	39.5	39.5	39.5
Blackstone	26.2	30.2	32.7	34.7	35.4	35.9	36.4	36.7	36.7	36.7
Hazlehead	14.7	17.5	20.3	23.1	23.9	23.8	23.6	23.7	24.3	24.8
Proposed	26.0	28.2	30.4	32.6	34.8	36.9	38.7	39.3	39.3	39.3
Cumulative	31.0	33.9	36.3	38.4	39.9	41.5	42.9	43.5	43.5	43.5
Quiet daytime periods										
Criteria	40.0	40.0	40.0	40.0	40.0	41.8	43.9	46.1	48.5	50.9
Exceedence	-9.0	-6.1	-3.7	-1.6	-0.1	-0.3	-1.0	-2.6	-5.0	-7.4
Night-time periods										
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.3	46.5	49.5	52.2
Exceedence	-12.0	-9.1	-6.7	-4.6	-3.1	-1.5	-0.4	-3.0	-6.0	-8.7

The criteria are met in all cases. During quiet daytime periods, the most sensitive wind speeds are 7ms^{-1} and 8ms^{-1} when predicted levels are within half a decibel of the derived limits. During night-time periods this is also true at 9ms^{-1} . Otherwise cumulative levels are a decibel or more below the criteria.

Location 1: Annat Royd

Annat Royd is the nearer of the two properties lying to the east of the site, the other being Far Royd Moor. Normal ETSU limits are deemed applicable at this property.

Table 8.20 - Impact assessment at Annat Royd

LA90 (dB)	Standardised 10m wind speeds (m/s)									
	3	4	5	6	7	8	9	10	11	12
Spicer Hill	26.0	28.2	30.4	32.6	34.8	36.9	38.7	39.3	39.3	39.3
Blackstone	19.6	23.6	26.1	28.1	28.8	29.3	29.8	30.1	30.1	30.1
Hazlehead	12.8	15.6	18.4	21.2	22.0	21.9	21.7	21.8	22.4	22.9
Proposed	27.3	29.5	31.7	33.9	36.1	38.2	40.0	40.6	40.6	40.6
Cumulative	30.2	32.6	34.8	37.0	39.0	41.0	42.6	43.3	43.3	43.3
Quiet daytime periods										
Criteria	40.0	40.0	40.0	40.0	41.0	42.7	44.5	46.5	48.6	50.7
Exceedence	-9.8	-7.4	-5.2	-3.0	-2.0	-1.7	-1.9	-3.2	-5.3	-7.4
Night-time periods										
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.4	46.2	48.7	50.7
Exceedence	-12.8	-10.4	-8.2	-6.0	-4.0	-2.0	-0.8	-3.0	-5.4	-7.4

Cumulative turbine levels are 1.7dB or more below the derived criteria in all but one case; at 9ms⁻¹ during night-time periods when the level is 0.8dB below the criteria.

Location 4: Eagle Nest

This location is the nearest of the four properties lying to the southeast of the site, accessible from Whitley Road.

Table 8.21 - Impact assessment at Eagle Nest

LA90 (dB)	Standardised 10m wind speeds (m/s)									
	3	4	5	6	7	8	9	10	11	12
Spicer Hill	25.3	27.5	29.7	31.9	34.1	36.2	38.0	38.6	38.6	38.6
Blackstone	19.8	23.8	26.3	28.3	29.0	29.5	30.0	30.3	30.3	30.3
Hazlehead	14.5	17.3	20.1	22.9	23.7	23.6	23.4	23.5	24.1	24.5
Proposed	26.1	28.3	30.5	32.7	34.9	37.0	38.8	39.4	39.4	39.4
Cumulative	29.4	31.9	34.1	36.3	38.2	40.1	41.8	42.4	42.4	42.4
Quiet daytime periods										
Criteria	40.0	40.0	40.0	40.6	42.4	44.4	46.4	48.5	50.7	52.8
Exceedence	-10.6	-8.1	-5.9	-4.2	-4.2	-4.2	-4.7	-6.1	-8.3	-10.4
Night-time periods										
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	44.8	47.1	49.3	51.2
Exceedence	-13.6	-11.1	-8.9	-6.7	-4.8	-2.9	-3.0	-4.8	-6.9	-8.8

Noise criteria are comfortably met at Eagles Nest, while using the more challenging limits derived from background levels measured at Whitley House.

Location 15: Middle Cliff

Of the six locations lying to the south of the site and accessible via the B6106, predicted levels at Middle Cliff were the highest.

Table 8.22 - Impact assessment at Middle Cliff

LA90 (dB)	Standardised 10m wind speeds (m/s)									
	3	4	5	6	7	8	9	10	11	12
Spicer Hill	21.9	24.1	26.3	28.5	30.7	32.8	34.5	35.2	35.2	35.2
Blackstone	23.5	27.5	30.0	32.0	32.7	33.2	33.7	34.0	34.0	34.0
Hazlehead	20.8	23.6	26.4	29.2	30.0	29.9	29.7	29.8	30.4	30.8
Proposed	22.9	25.1	27.3	29.5	31.6	33.7	35.5	36.1	36.1	36.1
Cumulative	28.4	31.4	33.8	36.0	37.4	38.6	39.9	40.4	40.4	40.5
Quiet daytime periods										
Criteria	40.0	40.0	40.0	40.0	40.0	41.8	43.9	46.1	48.5	50.9
Exceedence	-11.6	-8.6	-6.2	-4.0	-2.6	-3.2	-4.1	-5.8	-8.1	-10.4
Night-time periods										
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.3	46.5	49.5	52.2
Exceedence	-14.6	-11.6	-9.2	-7.0	-5.6	-4.4	-3.5	-6.1	-9.1	-11.8

Noise criteria are comfortably met. Turbine levels are likely to be less than predicted at the six locations as they will rarely be downwind²² of all turbines simultaneously.

Location 10: Sledbrook House

Sledbrook House is representative of the properties on the A616 that lie between the Hazlehead and Blackstone Edge wind farms.

Table 8.23 - Impact assessment at Sledbrook House

LA90 (dB)	Standardised 10m wind speeds (m/s)									
	3	4	5	6	7	8	9	10	11	12
Spicer Hill	15.9	18.1	20.3	22.5	24.6	26.7	28.5	29.1	29.1	29.1
Blackstone	22.3	26.3	28.8	30.8	31.5	32.0	32.5	32.8	32.8	32.8
Hazlehead	29.7	32.5	35.3	38.1	38.9	38.8	38.6	38.7	39.3	39.7
Proposed	17.2	19.4	21.6	23.8	25.9	28.0	29.8	30.4	30.4	30.4
Cumulative	30.8	33.7	36.4	39.1	39.9	40.1	40.3	40.5	40.9	41.2
Quiet daytime periods										
Criteria	40.0	40.0	40.0	40.0	40.0	41.8	43.9	46.1	48.5	50.9
Exceedence	-9.2	-6.3	-3.6	-0.9	-0.1	-1.7	-3.6	-5.6	-7.6	-9.7
Night-time periods										
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.3	46.5	49.5	52.2
Exceedence	-12.2	-9.3	-6.6	-3.9	-3.1	-2.9	-3.1	-6.0	-8.6	-11.0

The criteria are met in all cases and, due to the property's location, there a number of factors that suggest practical turbine noise levels could be substantially less than predicted.

The first is that the background noise profile is likely to be louder here than at Browns Edge given the number of adjacent properties, noise from the A616 and proximity to the industrial site to the south. This would result in higher criteria than those derived from the Browns Edge profile used for the assessment.

²² Downwind being defined as $\pm 80^\circ$ from a line between turbine and receptor

Secondly, properties near this location will not be downwind of all turbines simultaneously therefore cumulative levels are likely to be a minimum of 2dB lower than predicted²³.

Thirdly, this location is closest to the Nordex and REPower turbines whose sound power levels are marginally overstated²⁴ for wind speeds up to 10ms⁻¹.

Location 16: New Maythorn Farm

This location represents properties lying to the west of the site. Turbine noise reaching this location will be predominantly that from Blackstone Edge Wind Farm.

Table 8.24 - Impact assessment at New Maythorn Farm

LA90 (dB)	Standardised 10m wind speeds (m/s)									
	3	4	5	6	7	8	9	10	11	12
Spicer Hill	17.9	20.1	22.3	24.5	26.6	28.7	30.4	31.1	31.1	31.1
Blackstone	28.6	32.6	35.1	37.1	37.8	38.3	38.8	39.1	39.1	39.1
Hazlehead	21.2	24.0	26.8	29.6	30.4	30.3	30.1	30.2	30.8	31.2
Proposed	20.7	22.9	25.1	27.3	29.5	31.5	33.3	33.9	33.9	33.9
Cumulative	30.1	33.7	36.2	38.4	39.3	40.0	40.7	41.1	41.2	41.2
Quiet daytime periods										
Criteria	40.0	40.0	40.0	40.0	40.0	41.8	43.9	46.1	48.5	50.9
Exceedence	-9.9	-6.3	-3.8	-1.6	-0.7	-1.8	-3.2	-5.0	-7.3	-9.7
Night-time periods										
Criteria	43.0	43.0	43.0	43.0	43.0	43.0	43.3	46.5	49.5	52.2
Exceedence	-12.9	-9.3	-6.8	-4.6	-3.7	-3.0	-2.6	-5.4	-8.3	-11.0

The criteria are met in all cases. The most sensitive wind speed is 7ms⁻¹ where, during quiet daytime periods, predicted levels will be 0.7dB below the criterion. Criteria are comfortably met during night-time periods. This location will rarely be downwind of all turbines simultaneously therefore cumulative levels are likely to be lower than predicted.

Exceedence calculations for all seventeen locations are tabulated in the following sections.

²³ Institute of Acoustics, "A good practice guide to the application of ETSU-R-97 for the assessment and rating of wind turbine noise",p22, 4.4.2; 2013

²⁴ See 'Sound power data for taller hub heights' page 10

8.6.3 Quiet Daytime Exceedence

Table 8.25 - Exceedence for quiet daytime periods

Exceedence	(dB)	Standardised 10m wind speeds (m/s)									
House ID	Name	3	4	5	6	7	8	9	10	11	12
1	Annat Royd	-9.8	-7.4	-5.2	-3.0	-2.0	-1.7	-1.9	-3.2	-5.3	-7.4
2	Brown's Edge	-9.0	-6.1	-3.7	-1.6	-0.1	-0.3	-1.0	-2.6	-5.0	-7.4
3	Carr House	-14.5	-12.0	-9.7	-8.0	-8.1	-8.3	-8.8	-10.3	-12.5	-14.6
4	Eagle Nest	-10.6	-8.1	-5.9	-4.2	-4.2	-4.2	-4.7	-6.1	-8.3	-10.4
5	Far Royd Moor	-14.8	-12.3	-10.0	-7.8	-7.0	-6.9	-7.1	-8.5	-10.6	-12.6
6	Flash House Farm 1	-13.4	-10.7	-8.4	-6.2	-4.5	-4.8	-5.4	-7.0	-9.4	-11.7
7	Flash House Farm 2	-13.4	-10.7	-8.3	-6.1	-4.5	-4.8	-5.5	-7.1	-9.5	-11.8
8	Green Gate	-12.8	-9.9	-7.5	-5.4	-3.8	-4.1	-4.8	-6.4	-8.8	-11.2
9	Illians Corner	-12.9	-10.1	-7.7	-5.5	-4.0	-4.3	-5.0	-6.7	-9.0	-11.4
10	Sledbrook House	-9.2	-6.3	-3.6	-0.9	-0.1	-1.7	-3.6	-5.6	-7.6	-9.7
11	Small Shaw	-11.7	-9.2	-6.8	-4.7	-2.9	-2.9	-3.5	-5.1	-7.4	-9.8
12	Spicer House	-12.3	-9.6	-7.3	-5.1	-3.4	-1.7	-0.1	-0.7	-3.0	-5.4
13	The Lanes	-12.0	-9.2	-6.8	-4.6	-3.1	-3.5	-4.3	-6.0	-8.3	-10.6
14	Whitley House	-13.4	-10.9	-8.6	-7.0	-7.0	-7.1	-7.6	-9.1	-11.3	-13.4
15	Middle Cliff	-11.6	-8.6	-6.2	-4.0	-2.6	-3.2	-4.1	-5.8	-8.1	-10.4
16	New Maythorn Farm	-9.9	-6.3	-3.8	-1.6	-0.7	-1.8	-3.2	-5.0	-7.3	-9.7
17	Windmill Nursery	-11.9	-9.4	-7.1	-5.5	-5.5	-5.5	-5.9	-7.4	-9.6	-11.7

8.6.4 Night-time Exceedence

Table 8.26 - Exceedence for night-time periods

Exceedence	(dB)	Standardised 10m wind speeds (m/s)									
House ID	Name	3	4	5	6	7	8	9	10	11	12
1	Annat Royd	-12.8	-10.4	-8.2	-6.0	-4.0	-2.0	-0.8	-3.0	-5.4	-7.4
2	Brown's Edge	-12.0	-9.1	-6.7	-4.6	-3.1	-1.5	-0.4	-3.0	-6.0	-8.7
3	Carr House	-17.5	-15.0	-12.7	-10.5	-8.7	-6.9	-7.2	-8.9	-11.1	-13.0
4	Eagle Nest	-13.6	-11.1	-8.9	-6.7	-4.8	-2.9	-3.0	-4.8	-6.9	-8.8
5	Far Royd Moor	-17.8	-15.3	-13.0	-10.8	-9.0	-7.2	-6.0	-8.2	-10.7	-12.6
6	Flash House Farm 1	-16.4	-13.7	-11.4	-9.2	-7.5	-5.9	-4.8	-7.4	-10.4	-13.1
7	Flash House Farm 2	-16.4	-13.7	-11.3	-9.1	-7.5	-6.0	-4.9	-7.5	-10.4	-13.2
8	Green Gate	-15.8	-12.9	-10.5	-8.4	-6.8	-5.3	-4.2	-6.8	-9.8	-12.5
9	Illians Corner	-15.9	-13.1	-10.7	-8.5	-7.0	-5.5	-4.4	-7.0	-10.0	-12.7
10	Sledbrook House	-12.2	-9.3	-6.6	-3.9	-3.1	-2.9	-3.1	-6.0	-8.6	-11.0
11	Small Shaw	-14.7	-12.2	-9.8	-7.7	-5.9	-4.1	-2.9	-5.4	-8.4	-11.2
12	Spicer House	-12.3	-9.6	-7.3	-5.1	-3.4	-1.7	-0.1	-1.0	-4.0	-6.8
13	The Lanes	-15.0	-12.2	-9.8	-7.6	-6.1	-4.7	-3.7	-6.3	-9.3	-12.0
14	Whitley House	-16.4	-13.9	-11.6	-9.4	-7.6	-5.8	-6.0	-7.7	-9.9	-11.8
15	Middle Cliff	-14.6	-11.6	-9.2	-7.0	-5.6	-4.4	-3.5	-6.1	-9.1	-11.8
16	New Maythorn Farm	-12.9	-9.3	-6.8	-4.6	-3.7	-3.0	-2.6	-5.4	-8.3	-11.0
17	Windmill Nursery	-14.9	-12.4	-10.1	-7.9	-6.0	-4.2	-4.3	-6.1	-8.2	-10.1

8.6.5 Predicted change in level at NSRs

This part of the impact assessment considers how the substitution of the thirteen smaller turbines with three larger ones is likely to be perceived at each NSR location. The logarithmic nature of noise results in the requirement of about a 3dB change for a

change to be perceived. A 10dB reduction would be perceived as a noise source appearing to be half as loud.

Table 8.27 - Subjective perception of a reduction in noise level

Subjective Awareness	Reduction (dB)
Insignificant	1
Just perceptible	3
Clearly noticeable	5
Half as loud	10

The following table lists the predicted change in level across the most sensitive wind speeds and how that change may be perceived subjectively; the average change in level is also given. In cases where turbine noise is currently largely inaudible, reductions in turbine noise may not be perceived.

Table 8.28 - Predicted change net level and resulting subjective perception

Change in SPL (dB)		Standardised 10m wind speeds (m/s)						Overall Perception
House ID	Name	6	7	8	9	10	Average reduction	
1	Annat Royd	-5.0	-4.2	-3.4	-2.8	-3.1	4	Small reduction
2	Brown's Edge	-0.3	0.0	0.4	0.6	0.5	0	No change
3	Carr House	-7.3	-6.6	-6.0	-5.4	-5.8	6	Significant reduction
4	Eagle Nest	-9.4	-8.5	-7.7	-7.1	-7.4	8	Significant reduction
5	Far Royd Moor	-5.4	-4.7	-4.0	-3.5	-3.8	4	Small reduction
6	Flash House Farm 1	-5.4	-4.8	-4.3	-3.9	-4.2	5	Small reduction
7	Flash House Farm 2	-4.7	-4.2	-3.8	-3.4	-3.7	4	Small reduction
8	Green Gate	-1.1	-0.8	-0.4	-0.2	-0.3	1	No change
9	Illians Corner	-4.0	-3.6	-3.1	-2.8	-3.1	3	Small reduction
10	Sledbrook House	-0.2	-0.1	-0.1	-0.1	-0.1	0	No change
11	Small Shaw	-7.1	-6.4	-5.8	-5.3	-5.6	6	Significant reduction
12	Spicer House	-0.3	0.1	0.5	0.7	0.6	0	No change
13	The Lanes	-3.2	-2.8	-2.4	-2.1	-2.4	3	Small reduction
14	Whitley House	-8.7	-7.9	-7.1	-6.6	-6.9	7	Significant reduction
15	Middle Cliff	-2.0	-1.7	-1.4	-1.2	-1.4	2	Marginal reduction
16	New Maythorn Farm	-0.1	0.0	0.1	0.3	0.3	0	No change
17	Windmill Nursery	-10.9	-10.1	-9.2	-8.6	-9.0	10	About half as loud

The largest predicted increase in level is at Spicer House; at 0.7dB this change is not predicted to be perceptible. In total, five locations show broadly similar levels of turbine noise, while the remaining twelve locations show varying degrees of reduction.

8.7 Mitigation

8.7.1 Construction

With the possible exception of the erection of the turbines themselves, construction phase activities would only operate during daytime periods: Monday to Friday

(07.00–19.00) and Saturdays (07.00–13.00), with a requirement to agree other times with the Council.

Three wind farms of the same scale have been constructed near the site within the last decade. Barnsley Council (Environmental Health) was contacted to explore whether any noise issues had arisen due to construction activities during the construction phase of these projects. The Council indicated that they were not aware of any noise issues having been reported.

8.7.2 Operation

IoA guidance on the use of the ISO 9613:2 propagation model was updated during 2013 and is now more conservative, requiring that: octave band levels be used where available, and that an overall increase in the noise level to account for measurement uncertainty must be included within the calculations. This has resulted in an increase in the level of turbine noise attributed to each of the operational developments considered when compared to that submitted within their respective (pre-2013) Environmental Statements, therefore the current noise assessment is conservative by comparison.

For both the stated operational and proposed layout configurations, the ISO 9613:2 propagation model is likely to over predict the contribution of noise from the more distant turbines at any given location, due to the increase in the variation of topography and wind regime likely to be encountered between turbine and receptor. This added complexity is likely to disrupt the propagation of noise at relatively large distances; there are more than 50 instances of a turbine being more than 2km from a receptor, an average of three turbines per receptor.

Properties lying between the proposed development and the Hazlehead Wind Farm (Locations: H6,7,9,10,13,15 and 16) will experience lower levels than predicted, for the most part, as worst case turbine levels will be limited to a small range of downwind directions; crosswind and upwind directions can be expected to be quieter.

Nevertheless, it has been demonstrated that the proposed development would meet the derived criteria in all cases without mitigation; therefore no specific mitigation is proposed.

8.8 Summary of Predicted Impacts and Effects

8.8.1 Construction

The assessment indicates that construction noise will be considerably lower than the limits stated in BS 5228-1:2009 for the relevant periods.

8.8.2 ETSU-R-97 Assessment

Background derived criterion are met in all cases. The highest turbine levels are predicted at Spicer House whose resident is involved in the proposed development.

8.8.3 Net level change

Small increases (typically 0.3dB) over current turbine noise levels were predicted for Spicer House and Browns Edge. Similar or marginally reduced levels were predicted at Green Gate, Sledbrook House, Middle Cliff and New Maythorn Farm. Changes in net level at these six locations are therefore unlikely to be perceived. The other eleven nearest noise sensitive locations show varying degrees of net level reduction; the locations in the vicinity of the Royd Moor turbines are the most likely to notice a reduction in turbine noise.

8.9 Conclusion

Construction phase noise is not predicted to be significant and can, in any event, be controlled via the use of standard planning conditions limiting the hours of construction activities.

Using predicted worst case turbine noise levels, an assessment of the cumulative noise produced by the turbines at Spicer Hill, Blackstone Edge, Hazlehead and the proposed turbines has been made following guidance set out in ETSU-R-97 and updated by the IoA. It has been demonstrated that noise constraints derived from measured background noise data can be met at all the nearby locations considered.

The net effect of substituting an operational wind project, nearing the end of its service life, with the proposed three turbine development is expected to result in either no change or a lowering of the perception of turbine noise at the seventeen noise sensitive locations assessed. It is therefore recommended that a cumulative noise condition based on the submitted background levels is used as the basis for a planning condition, should the project gain consent.

9 CULTURAL HERITAGE

9.1 Introduction

This chapter assesses the potential for direct and indirect impacts on cultural heritage features as a result of the Spicer Hill Extension turbines.

9.2 Guidance

The following guidance is relevant to the study:

- NPPF – Conserving and Enhancing the Historic Environment;
- PPS 5 – Planning for the Historic Environment;
- Wind Energy and the Historic Environment (2005); and
- The Setting of Heritage Assets (2011).

9.3 Consultation

9.3.1 Responses to the existing Spicer Hill Wind Farm application

English Heritage was consulted as part of the formal planning application of the now operational Spicer Hill Wind Farm. English Heritage did not object to the original Spicer Hill planning application and deferred any decision to the local planning authority. A similar approach was taken by English Heritage with regards to their response to the Blackstone Edge Wind Farm.

9.3.2 Proposed Spicer Hill Extension

English Heritage (EH) was consulted with regards to the proposed extension. In their response dated the 4th of August 2014 they highlighted the potential indirect visual impacts of the proposed extension upon Castle Hill, a Scheduled Monument (SM). EH requested that a photomontage indicating both the current and expected view with the Spicer Hill extension be produced. The requested photomontage was taken from a minor road to the north-west of Castle Hill and is shown in **Figure 9.1** in **Volume III**.

EH also requested that the cumulative impact of nearby wind developments on this monument should also be assessed. There are currently three operational wind developments in close proximity to the proposed extension:

- Spicer Hill: three wind turbines of 93.5m to tip located between Whitley Road and Spicer House Lane;
- Royd Moor: thirteen 53m wind turbines aligned in two rows to the south-east of the Spicer Hill development; and
- Blackstone Edge: three wind turbines of 100m to tip located to the west of Spicer Hill.

The proposed extension would fill in the current gap between the existing Blackstone Edge Wind Farm to the west and the operational Spicer Hill Wind Farm to the east.

The operational 3 x 100m to tip Hazlehead Wind Farm is located ~3.5km to the south-west of Castle Hill, to the south of the Crow Edge settlement. All of these developments have been considered within the assessment.

The South Yorkshire Archaeology Service was consulted on the 11th July 2014 and has yet to respond. The potential direct impacts of the proposed wind cluster have been considered within this assessment.

9.4 Methodology

In the preparation of this assessment, a range of historical and technical data was collected and analysed. It is becoming normal practice to include a review of other potential issues that fall under the umbrella term of cultural heritage, such as historic buildings and landscapes, in addition to purely archaeological factors. The following sources were consulted:

- Historic Environment Record (HER) via www.heritagegateway.org.uk;
- National Monuments Record (HER) via www.pastscape.org.uk;
- Listed Buildings Online;
- Historic Environment Local Management (HELM); and
- National Mapping Programme.

Zone of theoretical visibility (ZTV) maps, a photomontage and other wirelines were used to assess what the potential indirect visual impact of the wind turbines may be on the Castle Hill SM.

9.4.1 Assessment Criteria

The following criteria outlined in **Tables 9.1** and **9.2** below have been used in the assessment of significance of any direct or indirect impact on any site of cultural heritage importance.

Table 9.1 – Sensitivity of built and cultural heritage features

Sensitivity	Definition
High	Grade I listed building Scheduled Monument Non-statutory List of sites likely to be of national importance Registered Parks and Gardens World Heritage Sites
Medium	Grade II listed buildings Archaeological sites on the National Monuments Record (of regional and local importance) Conservation Areas
Low	Archaeological sites of lesser importance

Table 9.2 - Magnitude of built and cultural heritage effects

Magnitude	Definition
High	Any number of wind turbines and/or ancillary development that would result in: - the removal or partial removal of key features, areas or evidence important to the historic character and integrity of the site, which could result in the substantial loss of physical integrity; and/or - a substantial obstruction of existing view by the addition of uncharacteristic elements dominating the view, significantly altering the quality of the setting or the visual amenity of the site both to and from. <i>where the noise intrusion (mechanical or aerodynamic) is likely to detract from the amenity of a built or cultural heritage site</i>
Medium	Any number of wind turbines and/or ancillary development that would result in: - the removal of one or more key features, parts of the designated site, or evidence at the secondary or peripheral level, but are not features fundamental to its historic character and integrity; and/or - a partial obstruction of existing view by the addition of uncharacteristic elements which, although not affecting the key visual and physical relationships, could be an important feature in the views, and significantly alter the quality of the setting or visual amenity of the site both to and from. <i>where the noise intrusion (mechanical or aerodynamic) may detract from the amenity of a built or cultural heritage site</i>
Low	Any number of wind turbines or ancillary developments that may result in: - a partial removal/minor loss, and/or alteration to one or more peripheral and/or secondary elements/features, but not significantly affecting the historic integrity of the site or affect the key features of the site; and/or - an introduction of elements that could be intrusive in views, and could alter to a small degree the quality of the setting or visual amenity of the site both to and from. <i>where the noise intrusion (mechanical or aerodynamic) is unlikely to detract from the amenity of a built or cultural heritage site</i>

Negligible	Any number of wind turbines or ancillary developments that may result in: • a relatively small removal, and/or alteration to small, peripheral and/or unimportant elements/features, but not affect the historic integrity of the site or the quality of the surviving evidence; and/or • an introduction of elements that could be visible but not intrusive in views, and the overall quality of the setting or visual amenity of the site would not be affected both to and from. • where the noise intrusion (mechanical or aerodynamic) will not detract from the amenity of a built or cultural heritage site
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The level of an effect is determined by the combination of sensitivity and magnitude of change. The following matrix has been used to determine the overall significance of effect.

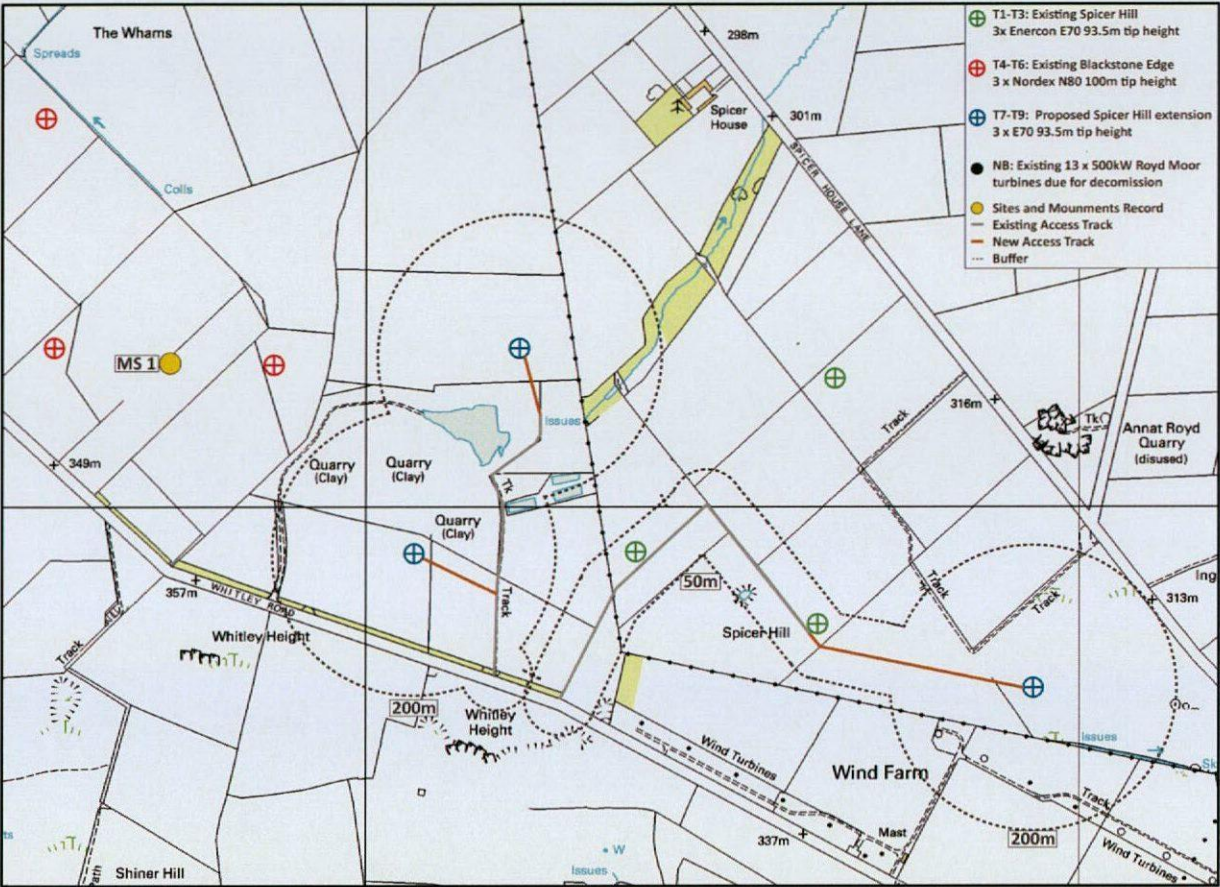
Table 9.3 – Significance of impact matrix

Sensitivity	Magnitude of Change			
	High	Medium	Low	Negligible
High	Major	Major/Moderate	Moderate	Moderate/Minor
Medium	Major/Moderate	Moderate	Moderate/Minor	Minor
Low	Moderate	Moderate/Minor	Minor	Minor/Negligible
Key:	Significant in terms of the EIA Regulations			
	Not Significant			

9.5 Baseline Data

9.5.1 Direct Impact

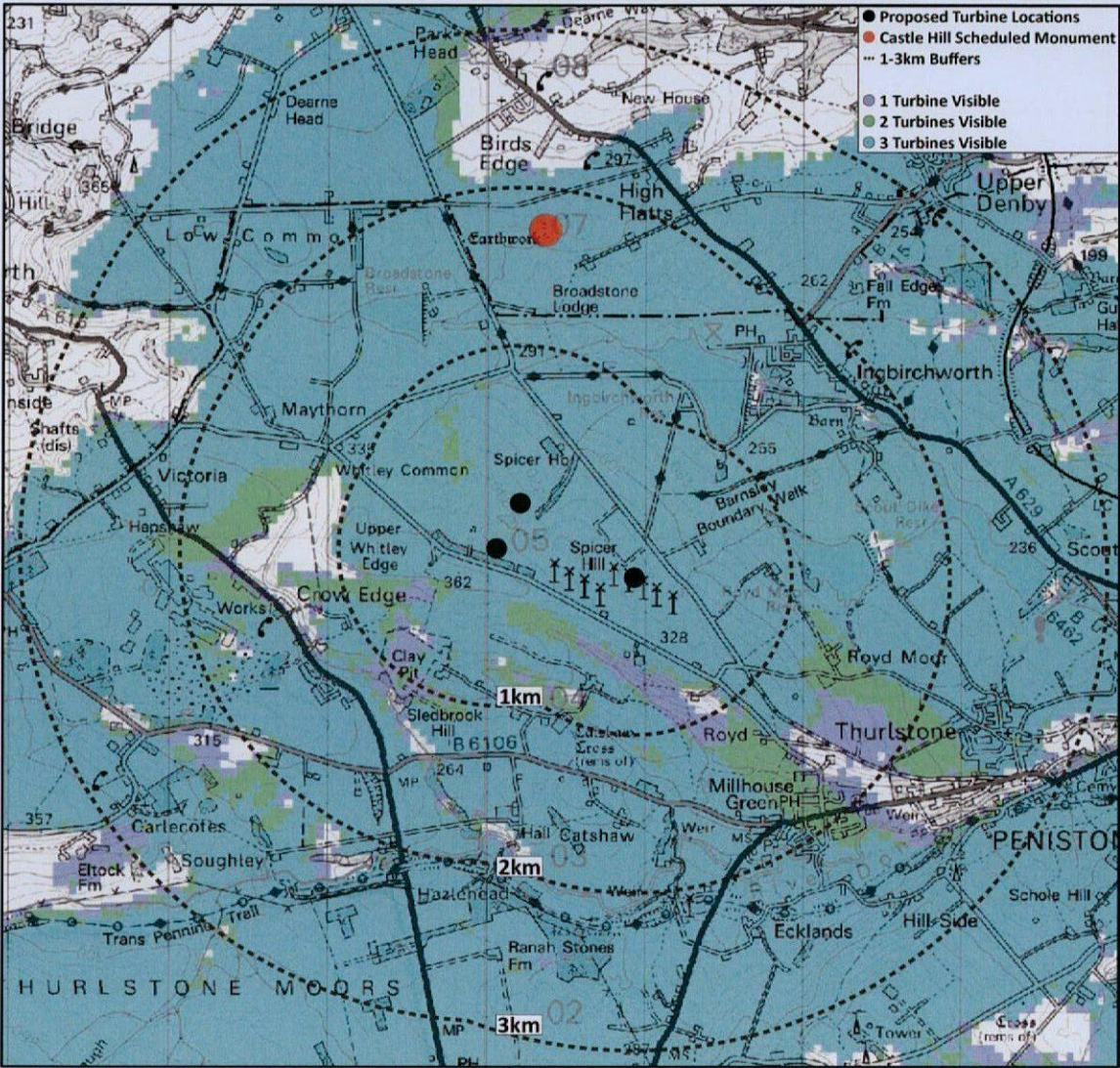
Figure 9.2 - Showing the proposed site in the context of the existing wind turbines



As shown in **Figure 9.2**, there are no known features of historical significance within 200m of the proposed wind turbines or within 50m of the associated access tracks. The closest known historic feature to the proposed development is MS 1 primary index '4727'. MS 1 has been recorded as a World War II bombing star and is located ~400m to the west of the nearest proposed wind turbine.

9.5.2 Indirect visual Impact – Castle Hill, Scheduled Monument

Figure 9.3– Location of Castle Hill, showing Spicer Hill extensions ZTV



The location of Castle Hill is shown in **Figure 9.3** above and a description of the Scheduled Monument is given within **Table 9.4** below.

Table 9.4 – Description of Castle Hill, Scheduled Monument

Monument ID.	Distance	Name	Listing & Description
31503	~1.7km	Castle Hill, Prehistoric enclosed settlement	The monument includes a late prehistoric enclosed settlement, situated on Denby Common, on the south side of Windmill Lane, at the south edge of a plateau. The enclosure survives as an upstanding earthwork on the south west and west sides. [...] The upstanding remains of the rest of the enclosure have been flattened by ploughing in the past, but the edges of the enclosure are just traceable as a slight break of slope on the north side and a very faint bank on the east side.

The current setting of Castle Hill is within a modern agricultural field. The historic records suggest that the Castle Hill earth work has been subject to ploughing and is considerably damaged. The surrounding landscape provides little screening, consequently there is potential for long distance views from the monument in all directions. Views to the south are more expansive, as the land to the north of the monument rises gently towards Windmill Lane. Castle Hill itself is not a prominent feature in the landscape.

9.6 Evaluation of Effects

9.6.1 Indirect Effects

The indirect visual impacts of the proposed Spicer Hill extension in line with the operational wind developments in the vicinity are assessed within **Table 9.5** below.

Table 9.5- Effects and Evaluation of Significance: Indirect Effects

Name	Castle Hill, Prehistoric Settlement
Distance	~1.7km (north)
Sensitivity	High
Magnitude	Low
Significance	Moderate
Comment	Figure 9.1 (in Volume III) was taken from a minor road (Windmill Lane) to the north-west of Castle Hill. The photomontage represents views to the south of Castle Hill in the direction of the proposed wind farm extension. As shown in Figure 9.1 both the original Spicer Hill Wind Farm and the adjacent Blackstone Edge Wind Farm are fully visible in views to the south of Castle Hill. In the same viewing direction Royd Moor Wind Farm is visible to the rear of the existing Spicer Hill Wind Farm. This would be decommissioned before the Spicer Hill extension turbines are constructed. As shown by Figure 9.1 the Royd Moor Wind Farm is of differing design and scale to both the existing Spicer Hill and Blackstone Edge wind turbines.

	The Hazlehead Wind Farm is visible in views to the south-west of Castle Hill, ~2.2km to the east of the operational Spicer Hill, Blackstone Edge and proposed Spicer Hill developments. As the Hazlehead Wind Farm is operational it forms part of the current cumulative baseline and therefore contributes to the current setting of Castle Hill. As the proposed turbines for the Spicer Hill extension are the same height as the existing Spicer Hill Wind Farm and a similar scale to the Blackstone Edge Wind Farm, the additional turbines would not create visual clutter. Figure 9.1 indicates that the proposed Spicer Hill extension would close the visual gap between the existing Spicer Hill and Blackstone Edge wind farms and would allow the three projects to appear as one coherent wind farm. Consequently, it is not predicted that the proposed Spicer Hill extension would have a significant adverse impact upon the current setting of Castle Hill prehistoric settlement.
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9.7 Mitigation Incorporated into the Proposed Development

Planning guidance states that it is Government policy to protect and preserve archaeological sites and monuments *in situ* wherever feasible. Where preservation *in situ* is not possible planning authorities should ensure that an appropriate level of excavation, recording, analysis, publication and archiving is carried out before and/or during development.

9.7.1 Permanent Land-take and Operation

Current proposals indicate that the turbine locations, road route and other aspects of development avoid the locations of known features of cultural heritage interest and as such no direct impact has been identified. While this assessment has found no indication of the survival of any archaeological features or deposits that are not visible above ground level, it is nevertheless possible that such features do exist within the application area. In the event that archaeological features are encountered, a suitable programme of archaeological works will be implemented to the satisfaction of the Planning Authority.

9.7.2 Restoration

No restoration measures are currently proposed.

9.8 Summary of Predicted Impacts and Effects

9.8.1 Direct Impact

According to current proposals, no direct impact on any known features of cultural heritage interest has been identified.

9.8.2 Indirect Impact

In line with the pre-application consultation with English Heritage this assessment has focused on the indirect visual impacts of the proposed Spicer Hill extension on Castle Hill. As is evident from **Figure 9.1** there are a number of existing wind farms in the same viewing direction as the proposed extension. The proposed Spicer Hill extension would be visible in views to the south of Castle Hill, and would close a visual gap between Spicer Hill and Blackstone Edge, with the three developments appearing as one coherent whole.

Although the proposed Spicer Hill extension would be fully visible from Castle Hill it would appear in a view that already contains operational wind turbines of the same scale. The overall magnitude of change is assessed to be **low**, resulting in a **moderate** significance of impact.

9.9 Conclusion

No direct effect has been identified on any known features of cultural heritage interest according to current proposals. The potential for development to encounter previously unrecorded features is considered to be low being limited by the small extent of intrusive works associated with the proposed development.

The assessment has found that the additional indirect 'visual' impact of the proposed Spicer Hill extension upon Castle Hill prehistoric settlement would not add to the current indirect visual impact of the existing wind developments in views to the south of Castle Hill. In conclusion the overall indirect visual impact of the proposed Spicer Hill extension has been assessed as **moderate**.

10 HYDROLOGY AND HYDROGEOLOGY

10.1 Introduction

This chapter presents the impact assessment of the proposed development on the water environment. The assessment has considered the development impacts on water quality, drainage and flood risk.

Understanding surface and groundwater environments is critically important to designing a successful project. Surface water includes watercourses, water bodies and runoff. Surface water provides important water resources for potable and other supply, amenity, aesthetic value, conservation, ecological environments and recharge to groundwater systems. Groundwater includes all water stored in permeable underground strata (or aquifers). Groundwater is also an important resource, providing more than a third of the potable water supply in the UK. In addition it provides essential baseflow to rivers and wetland areas, often supporting important ecological systems.

Although hydrological issues are likely to be relatively minor at this site, the risk of pollution or disruption of watercourses, groundwater bodies and private water sources within or near the site needs to be assessed and appropriately mitigated where necessary.

10.2 Guidance

Statutory, general, national and local guidance consulted during this assessment is listed as follows:

- EA Groundwater protection: Principles and practice (GP3) (November 2012)
- EA General guide to the prevention of pollution: PPG 1, May 2001;
 - Works and maintenance in or near water: PPG 5;
 - Above ground oil storage tanks: PPG 2, August 2011;
 - Concrete bunds for oil tanks - Environment Agency/Construction Industry Research and Information Association (CIRIA) Joint Guidelines;
 - Pollution incident response planning: PPG 21, March 2009;
 - Dealing with spills: PPG 22, April 2011;
- Water Quality Compliance Document Map;
- CIRIA Report C502: Environmental Good Practice on Site; and
- CIRIA Report C532: Control of Water Pollution from Construction Sites.

10.3 Consultation

Barnsley Council was consulted regarding locating private water supplies within the area surrounding the site.

10.4 Methodology

The method adopted to assess the impact on the water environment was:

- Determination of the baseline hydrological conditions and the sensitivity of the site and adjacent receptors;
- Review of the proposed development to determine the predicted impacts posed by the development itself; and
- Evaluation of the significance of predicted impacts, taking into account impact magnitude (before and after mitigation) and baseline environmental sensitivity.

The assessment is based on:

- A desk-based study using information from published material:
 - Ordnance survey 1:10,000 map data;
 - Geological Maps, 1:10,560 and 1:1,000;
 - EA Groundwater Vulnerability Zones Map
- Consultations with statutory bodies, principally the Environment Agency (EA) and the Local Planning Authority;
- The landowner's own knowledge of the site; and
- A site walkover undertaken by a suitably qualified engineer to support these findings and to check for any hydrological features on site that may be missing from the desk-based study.

Given the scale of the development, a conservative study boundary of 1.2km radius around the turbines, has been used for this assessment. All sensitive receptors within this 1.2km study boundary, which can be seen in **Figure 10.1**, have been identified and the impacts assessed.

The analysis of the significance of each impact is based on its magnitude, scale and the likelihood of occurrence. A significance rating of '*High*', '*Medium*', '*Low*' or '*Negligible*' is then given to each impact. By conducting this analysis before and after mitigating factors are taken into account, the significance of the predicted impact and the residual impact is determined.

10.5 Baseline

This section presents an overview of the baseline water environment at the site, including: the location and quality of surface and groundwater resources, drainage, and flood risk. **Figure 10.1 in Volume III** shows the local context of the site.

10.5.1 Terrain description

The site is in an undulating inland location approximately 4km north-west of Penistone, near Barnsley. The land around the site comprises of grazing land. The summit of Upper Whitley Edge lies 350m south-west of Turbine 1, at approximately 360m above sea level it is the highest point in the area. The track and turbines lie at elevations of between approximately 295m and 340m above sea level. There are slopes down from the site of up to 9% to the north-east and 14% to the south-west.

10.5.2 Hydrology

Any runoff generated by rainfall on the proposed track hard standing areas currently tends to flow downhill to the north-east, as can be seen in the runoff catchment area shown on **Figure 10.1**.

Runoff generated by rainfall on the proposed track and hard-standing areas currently tends to shed eastwards towards Ingbirchworth Reservoir, Scout Dike Reservoir and Royd Moor Reservoir, or into one of a number of field drains that form tributaries to the reservoirs. The reservoirs feed into the River Don, which lies approximately 1.75km south of the site.

During the site walkover in July 2014 the west of the site was dry and firm underfoot. The area around Turbine 1 has the potential to become wet and boggy as a field drain runs along the northern border of the field. Turbines 2 and 3 are unlikely to face similar issues. The dormant Greenley Carr Quarry and three unused settlement lagoons are located adjacent to the proposed site area.

From the OS 1:10,000 map data, and through discussions with the landowner and the local council, a number of wells and springs were identified within the study boundary. These are shown on **Figure 10.1**, and their nature of use given in **Table 10.1**.