West Midland Mosses Special Area of Conservation

Evidence Pack

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Further information

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1. Site Details

From West Midland Mosses Special Area of Conservation Objectives Supplementary Advice:

Lying in the lowlands of the Shropshire, Cheshire and Staffordshire Plain National Character Area, the West Midlands Mosses Special Area of Conservation (SAC) comprises four individual sites: Clarepool Moss, Abbots Moss, Chartley Moss and Wybunbury Moss. These support large basin mires which have developed as quaking bogs, known as 'schwingmoors', together with associated hollows and pools showing various types and stages of mire development, including raised bog on solid peat at two sites. This complexity of habitats gives rise to a diverse assemblage of associated plants and invertebrates of international significance.

The underlying bedrock geology of the area is almost entirely formed of red and brown Triassic sandstones, silts and muds. Glacial activity has affected the whole plain by rounding off hard outcrops of sandstone, creating meltwater channels and lake beds and depositing a variety of materials from boulder clay to marls, sands and gravels. These deposits have in places caused the formation of a number of shallow meres and peat-filled mosses which are present today.

The component sites have been all modified by human activity to a greater or lesser extent, including drainage, peat cutting and nutrient enrichment, generally to the detriment of the natural features.

The restoration of the sites to achieve the best outcomes for the SAC features requires re-naturalisation of the hydrological processes that created them, in terms of both water quality/chemistry and the water supply mechanisms, including groundwater and surface water regimes.

2. Reasons for European Designation

The SAC is designated for the following features:

- H3160 Natural dystrophic lakes and ponds
- H7140 Transition mires and quaking bogs

Links to Conservation Advice:

- Conservation Objectives
- Conservation Objectives Supplementary Advice

3. Nutrient Pressure and Water Quality

Nutrient pressure(s) for which the following sites are unfavourable:

Wybunbury Moss:

- Nitrogen

Wybunbury Moss and Abbots Moss:

- Phosphorus

In the Conservation Objectives Supporting Advice for West Midlands Mosses SAC it states for phosphorus '**restore stable nutrient levels appropriate for lake type. Water is normally acidic and poor in available nutrients.'** And for nitrogen **'restore nitrogen concentrations to less than 1.5 mg L-1.'**

Water Quality data is reported against the relevant Site of Special Scientific Interest (SSSI) units within the SAC for Abbots Moss and Wybunbury Moss. Both Chartley Moss and Clarepool Moss are currently assessed as favourable for nutrients.

Abbots Moss

Table 1 – Abbots Moss site attribute with water quality targets

Unit name	SSSI Unit	WQ Target		WQ Monitoring Data[1]		Compliance with target – Pass/Fail	
		TP (µg/l)	TN (µg/l)	TP (µg/l)	TN (µg/l)	TP	TN
Forest Camp	1	10	1.5	All higher than 10 – see details below	All below LOD of 0.002	FAIL	PASS

[1]Water Quality monitoring data from: APEM water sampling report (October 2017 – March 2018) surface water sites

Figure 1 – Abbots Moss survey site showing sites 1-3 and 10 (outflow) for surface water sampling

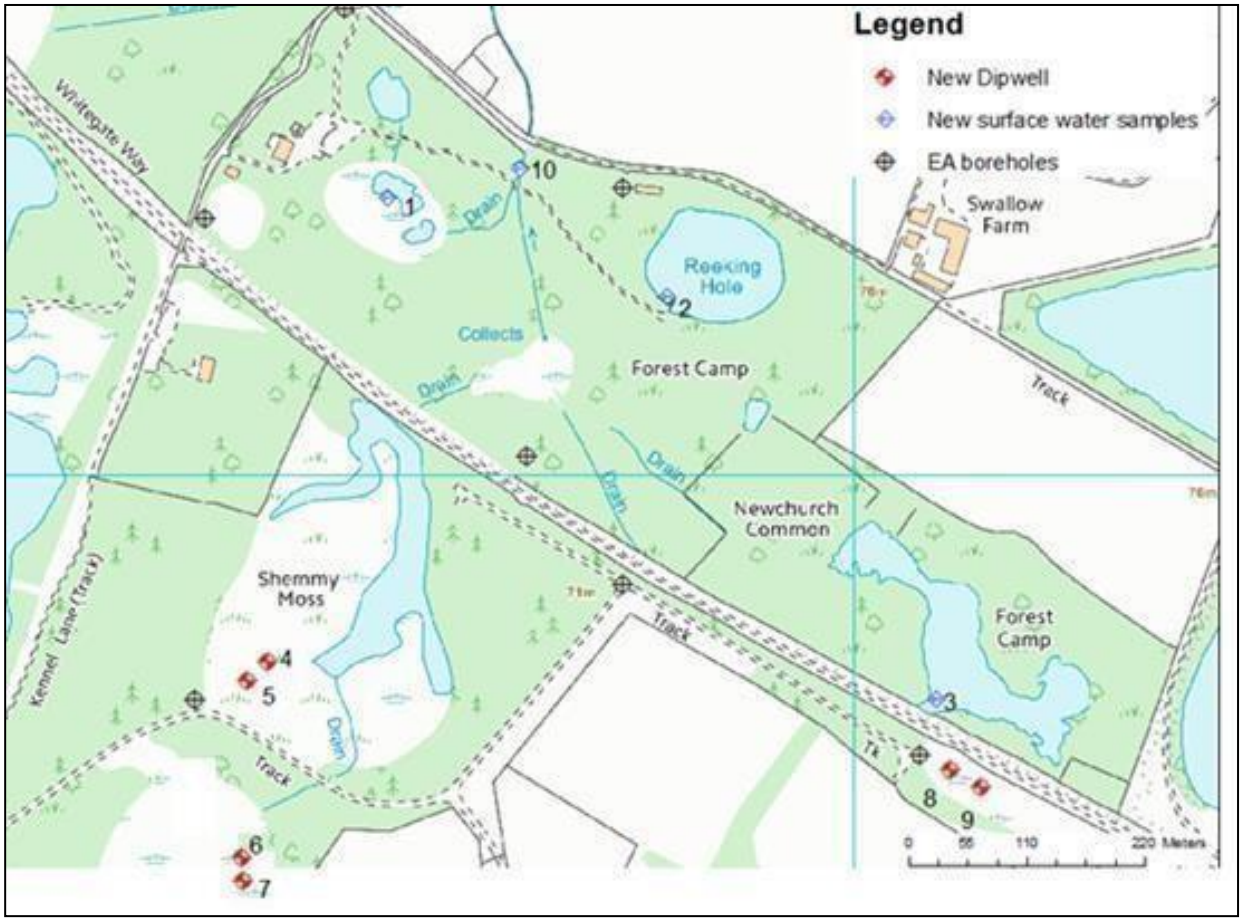
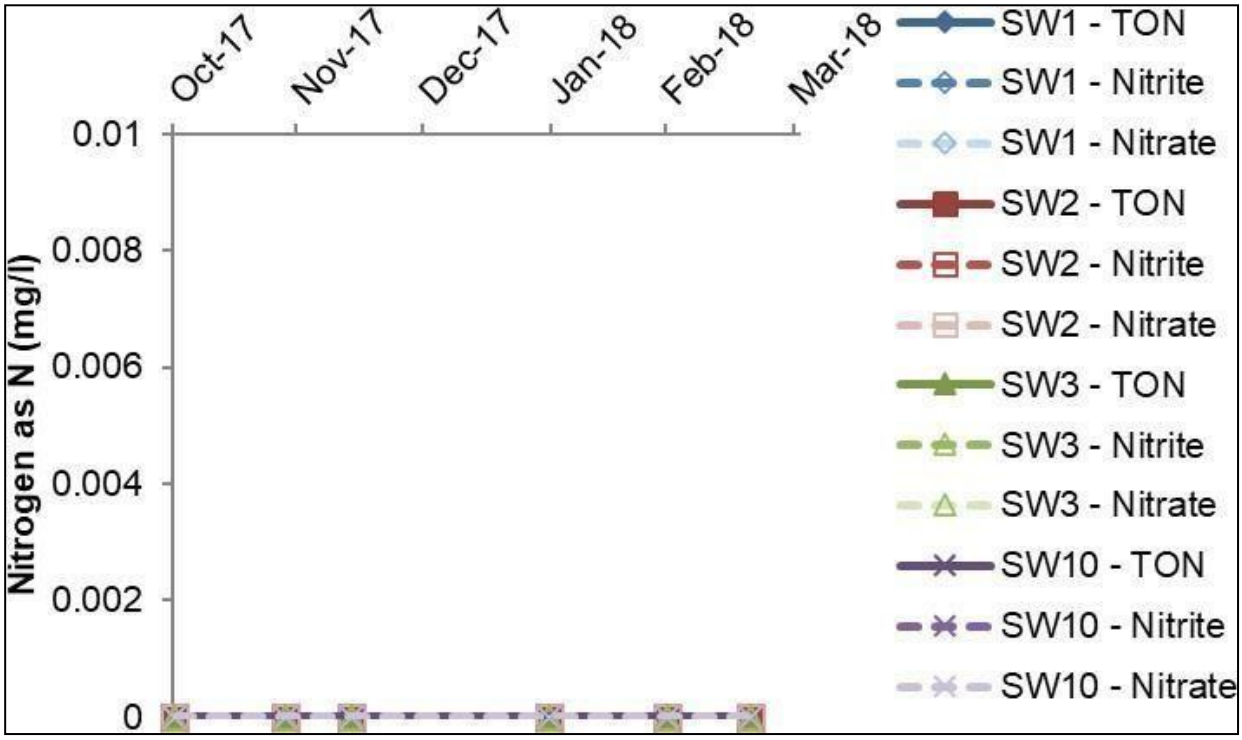


Figure 2 – Surface water Nitrate levels at Abbots Moss Site 1-3 and 10 (outflow)



All surface waters failed the 0.01 mg/l total phosphorus target.

Lilly Pool (sample point 1) had an average total P concentration of 0.88 mg/l (Figure 3). However, this result is somewhat skewed by a very high data point (27/11/17) of 5.16 mg/l. It was reported that this sample was taken after a heavy rainfall event and the sample was very turbid. After this event levels declined to around 0.02 mg/l by the end of March 2018.

Both Round Pool (sample point 2) and Gull Pool (sample point 3) had consistently high total P concentrations with an average of 0.09 mg/l at Round Pool and 0.15 mg/l at Gull Pool.

The outflow stream (sample point 10) from the site had very high total P concentrations over 1.5 mg/l up to December 2017 followed by a decline down to 0.02 mg/l by the end of March 2018.

- Both Gull Pool (site 3) and Round Pool (site 2) show signs of eutrophication with loss of Sphagnum moss from the pool margins and significant blooms of algae. The moderately elevated levels of TP and the very high TP levels recorded after heavy rain highlight Lilly Pool as being at risk of eutrophication and the eventual loss of the remaining areas of dystrophic water at Abbots moss.
- Phosphorus is the key nutrient with respect to the degradation in the habitat quality within the open waters at Abbots moss.

Any nutrients entering the catchment upstream of the locations which are exceeding their nutrient targets have the potential to further add to the current exceedance. Therefore, the whole catchment of Abbots Moss is included within the catchment map.

Wynbunbury Moss

Table 2 – Wynbunbury Moss site water quality targets

Water quality pollutant	**SSSI objective/target**	**Compliance** (using WQ monitoring data and/or modelling)	**Evidence used to support assessment**
Phosphate	The Common Standards Monitoring (2015) standing water habitat phosphorus target for deep dystrophic peak lakes such as the open water at Wynbunbury is 10µg/l (0.01mg/l)	Fails to meet target Total phosphorous concentrations ranged from 0.0209 to 6.51 mg/l. Levels above 1 mg/l were recorded at 5 sites (out of 20 sampled) at the Moss.	Bill Bellamy Associates, 2015. Analysis of Surface Water Quality Samples from Wybunbury Moss NNR. APEM, 2016. Water Quality Monitoring of

	total phosphorus (soluble + particulate phosphorus)	Concentrations of orthophosphate were above the detection limit of 0.01 mg/l or 10 µg/l in 11 of the 20 samples taken. In a separate six month study, APEM found Total Phosphate concentrations were highly variable ranging from 0.01 mg/l to 1.68 mg/l. See tables below.	Cheshire Meres and Mosses
Nitrogen	The Water Framework Directive (WFD) Groundwater Dependent Terrestrial Ecosystem (GWDTE) threshold value for Wybunbury.Moss is 2mg/l N.	Fails to meet target Observations of nitrate concentration (nitrate-N, mg/l) in the sands and gravels to the north of Wybunbury Moss vary on average between 0.10 mg-N/l and 41.44 mg-N/l In a six month study, APEM found surface water Nitrogen concentrations at Wybunbury Moss ranged from 0.21 mg/l to 14.20 mg/l. An increase in concentrations at most sites occurred during the wetter period between November and February. See tables below.	Environment Agency, 2017. Nitrate Modelling of Wybunbury Moss SSSI wetland catchment SC160010/R. APEM, 2016. Water Quality monitoring of Cheshire Meres and Mosses

The 2012 Natural England CSM assessment concluded unfavourable condition due to presence of negative indicators indicative of enrichment or drying out (*Typha latifolia*); cover of trees / scrub; cover of *Molinia caerulea*; Sphagnum species distribution.

The site was previously very species-rich with records for a large number of rare species notably Rannoch rush (*Scheuzeria palustris*) and the mosses *Dicranum bergeri* and species characteristic of oligotrophic base-rich groundwater fed fen vegetation. All of these species now believed to be extinct, with major losses of those species characteristic of very low nutrient conditions (EA 2010).

Loss of bryophytes characteristic of low nutrient conditions, particularly from the base-rich areas, and spread of mosses of higher nutrient conditions. Presence of species indicative of nutrient enrichment or pollution as shown in Wheeler et al. (2016).

Any nutrients entering the groundwater or surface water catchment upstream of the locations which are exceeding their nutrient targets have the potential to further add to the current exceedance. Therefore, the whole catchment of Wybunbury Moss is included within the catchment map.

Figure 3 – Total surface water nitrogen and phosphorus (mg/l) concentrations at Wynbunbury Moss between August 2015 and January 2016 (APEM 2016)

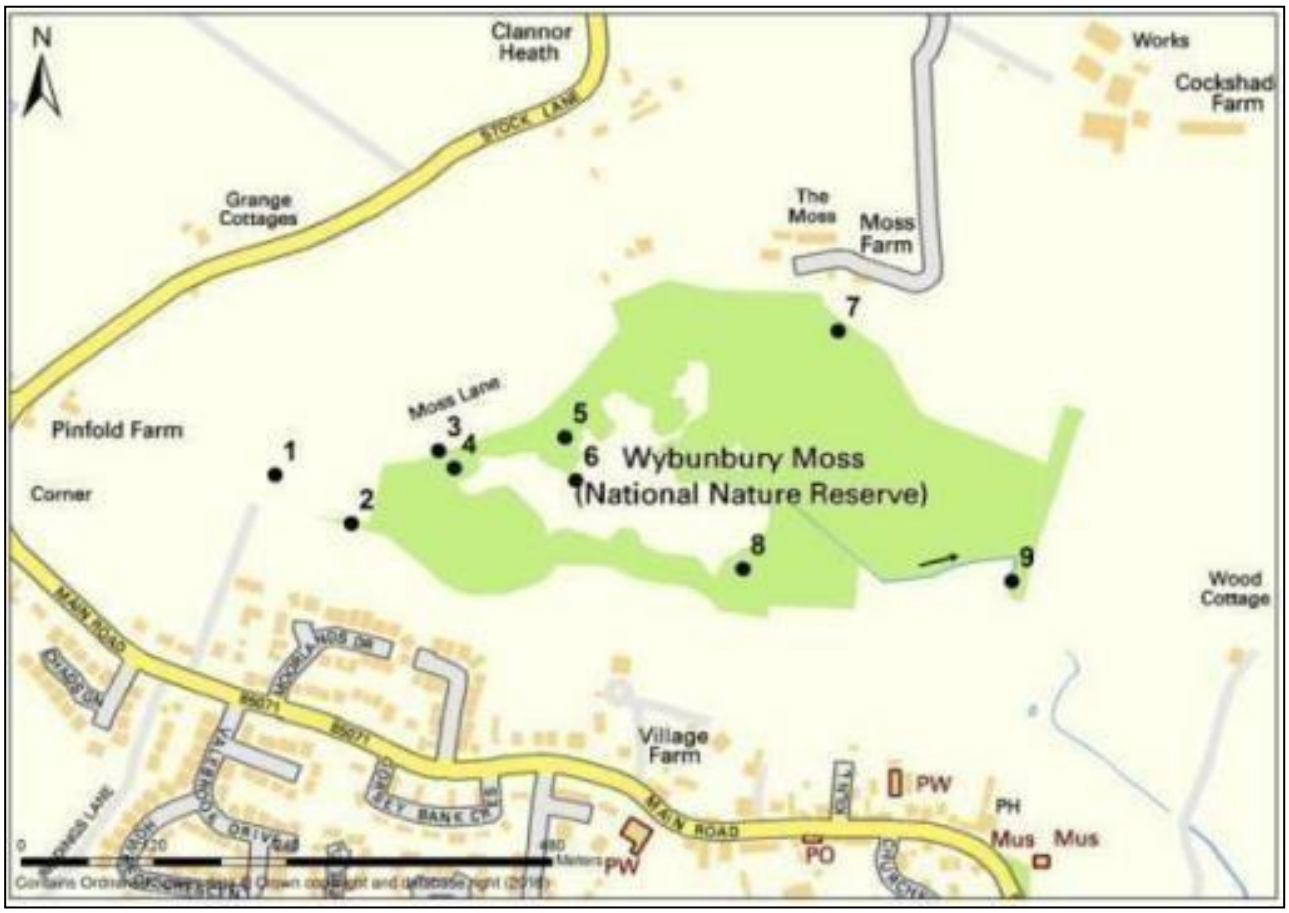


Table 3 – Wynbunbury Moss total nitrogen (mg/l) concentrations

Sample point	First sample	Last sample	Min (mg-N/l)	Max (mg-N/l)	Average (mg-N/l)
1	27/08/2015	14/01/2016	4.77	14.20	7.04
2	27/08/2015	14/01/2016	1.31	3.09	2.16
3	27/08/2015	14/01/2016	1.09	4.83	2.74
4	27/08/2015	14/01/2016	0.84	1.14	0.96
5	27/08/2015	14/01/2016	1.25	1.93	1.48
6	27/08/2015	14/01/2016	0.43	2.11	1.26
7	27/08/2015	14/01/2016	0.21	3.92	2.62
8	27/08/2015	14/01/2016	1.31	1.59	1.50
9	27/08/2015	14/01/2016	1.64	2.14	1.85

Table 4 – Wynbunbury Moss total phosphorus (mg/l) concentrations

Sample point	First sample	Last sample	Min (mg-P/l)	Max (mg-P/l)	Average (mg-P/l)
1	27/08/2015	14/01/2016	0.052	1.680	0.467
2	27/08/2015	14/01/2016	0.112	0.844	0.423
3	27/08/2015	14/01/2016	0.060	0.439	0.221
4	27/08/2015	14/01/2016	0.01	0.028	0.016
5	27/08/2015	14/01/2016	0.016	0.041	0.025
6	27/08/2015	14/01/2016	0.01	0.106	0.049
7	27/08/2015	14/01/2016	0.01	0.961	0.409

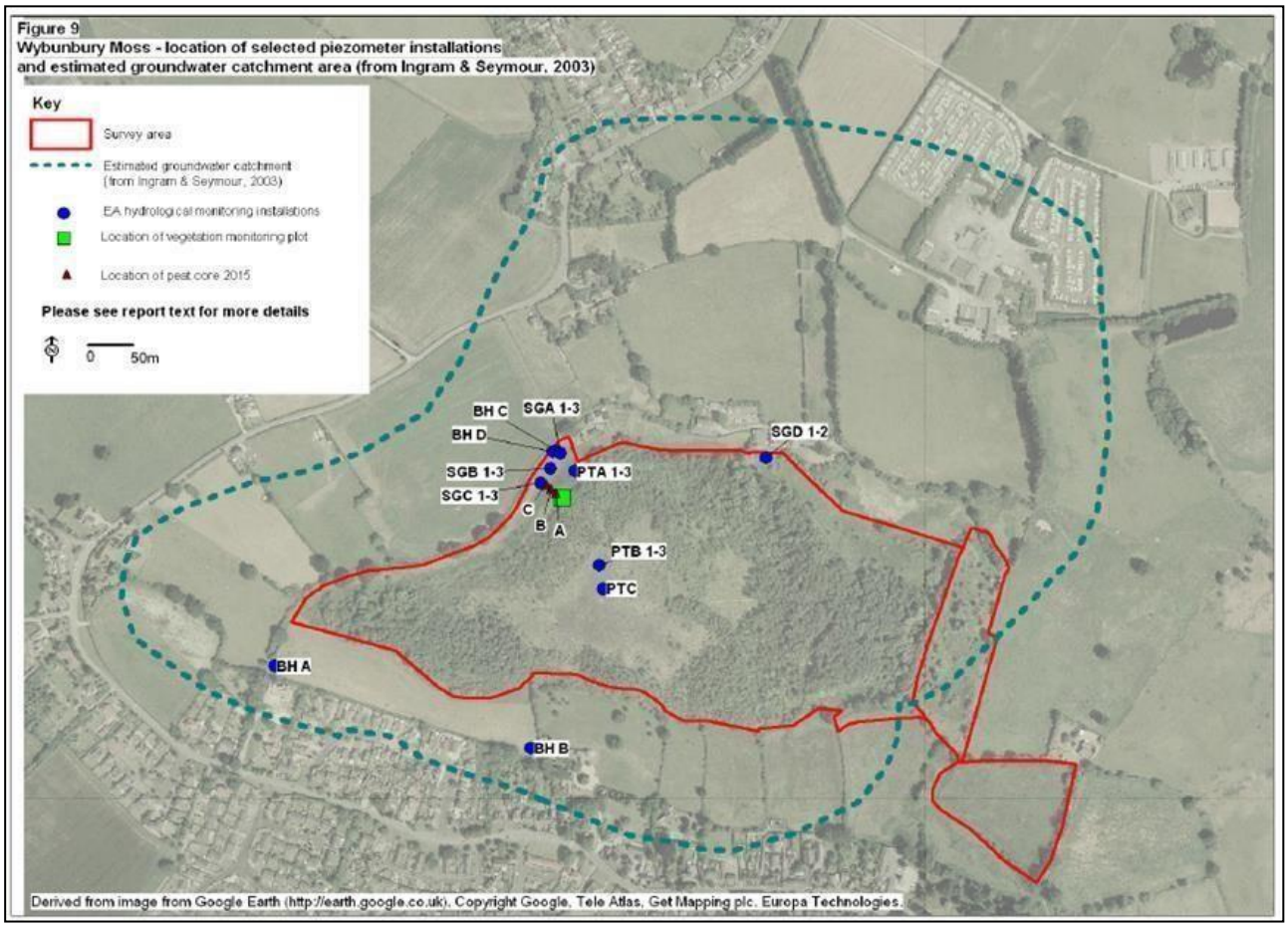
8	27/08/2015	14/01/2016	0.093	0.146	0.115
9	27/08/2015	14/01/2016	0.166	0.429	0.316

Table 5 – Observations of nitrate concentration (nitrate-N, mg/l) in the sands and gravels to the north of Wynbunbury Moss (from Wheeler et al, 2016)

Sample point	First sample	Last sample	Min (mg-N/l)	Max (mg-N/l)	Average (mg-N/l)	n
Wynbunbury Moss – SGA2	03/06/2009	20/01/2010	23.70	28.30	24.86	5
Wynbunbury Moss – SGA3	03/06/2009	10/03/2016	15.50	21.40	18.66	14
Wynbunbury Moss – SGB2	03/06/2009	20/01/2010	37.10	46.00	41.44	5
Wynbunbury Moss – SGB3	03/06/2009	20/01/2010	30.10	36.70	32.44	5
Wynbunbury Moss – SGC2	04/06/2009	20/01/2010	35.20	39.30	37.96	5
Wynbunbury Moss – SGC3	04/06/2009	20/01/2010	0.22	3.88	1.14	5
Wynbunbury Moss – SGD2	04/06/2009	20/01/2010	3.09	9.75	6.71	5
Wynbunbury Moss C 5J65/24	07/07/2003	15/11/2007	13.50	29.30	20.90	4

Wynbunbury Moss Borehole D SJ65/25	10/03/2008	16/08/2016	10.90	39.30	21.10	22
Wynbunbury Moss Lag Fen	06/11/2015	10/03/2016	0.10	0.10	0.10	3

Figure 4 – Location of water quality monitoring sites (from Wheeler et al, 2016)



4. Additional Information

Habitat type impacted by nutrients – Standing Waters

The West Midlands Mosses SAC is legally underpinned by multiple SSSIs. The SSSIs being considered here area Abbots Moss SSSI and Wybunbury Moss SSSI.

Abbots Moss

SSSI Interest Features include:

- Basin fen (lowland)
- Dystrophic lakes
- Oligotrophic lakes
- Outstanding dragonfly assemblage
- Standing waters

Wynbunbury Moss

SSSI Interest Features:

- Basin fen (lowland) FB
- Quaternary of the Pennines and adjacent areas
- Invert. assemblage W3 permanent wet mire
- IS - Quaternary of the Pennines and adjacent areas

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Appendices

Annex 1 – Component SSSIs of West Midlands Mosses SAC (Abbots Moss)

Map of component SSSIs of West Midlands Mosses SAC (Abbots Moss)

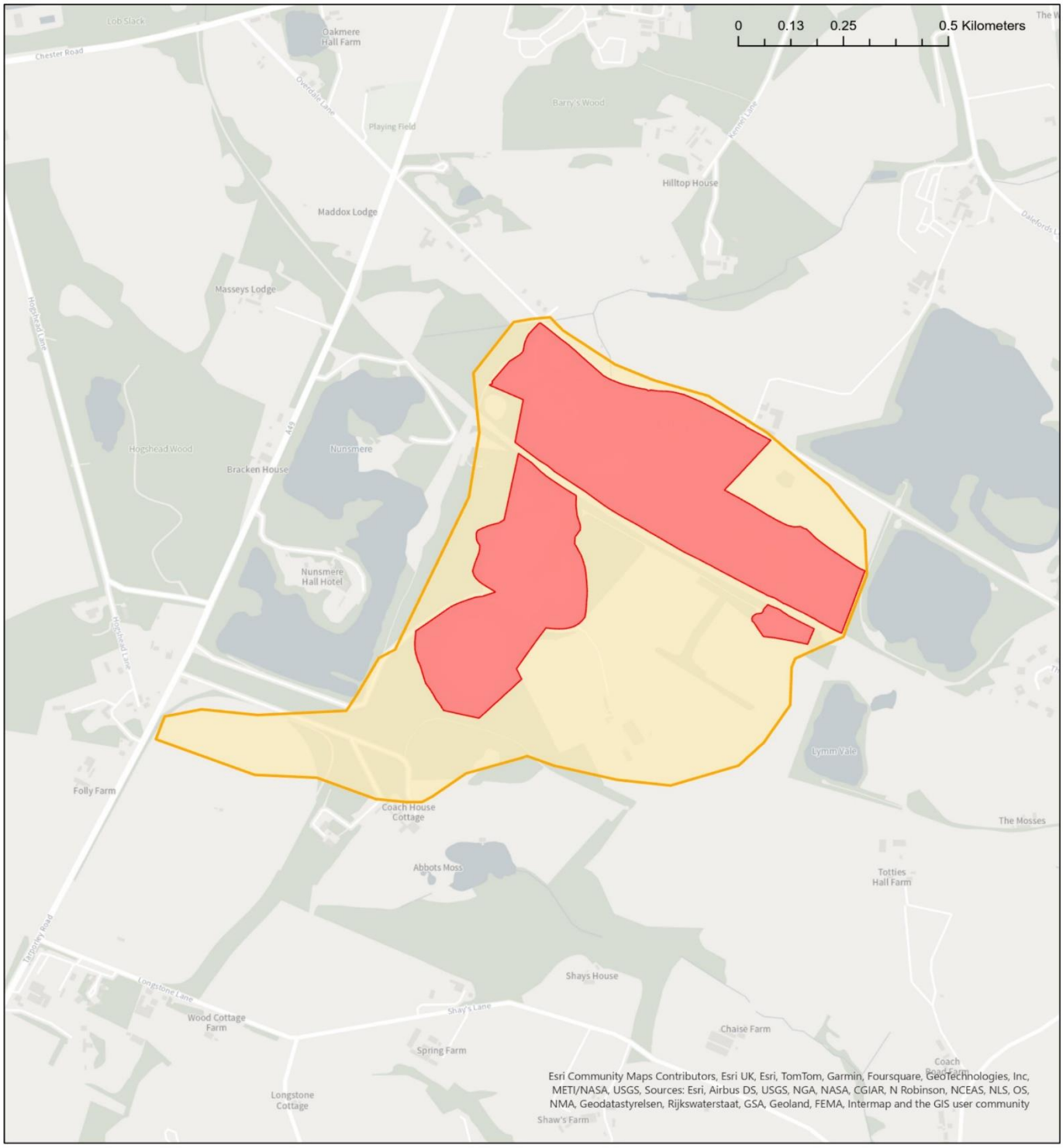
Catchment Area Update (2024)

Natural England has undertaken a review of all the Nutrient Neutrality catchment areas. This review has considered updated surface water catchment data and evidence held by both Natural England and the Environment Agency. Consideration has also been given to data and evidence provided by other parties such as Local Planning Authorities. The information below summarises changes.

The catchment remains unchanged following review.

Publishing of catchment area data

The Geographic Information Systems (GIS) data is available on Defra Data Services Platform.



Area where Natural England's Nutrient Neutrality advice applies for West Midlands Mosses SAC (Abbots Moss)

European protected sites requiring nutrient neutrality strategic solutions

- Component SSSIs of impacted designated site
- Surface water catchment area of relevant designated site due to nutrient pollution

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Annex 2 – Component SSSIs of West Midland Mosses SAC (Wybunbury Moss)

Map of component SSSIs of West Midland Mosses SAC (Wybunbury Moss)

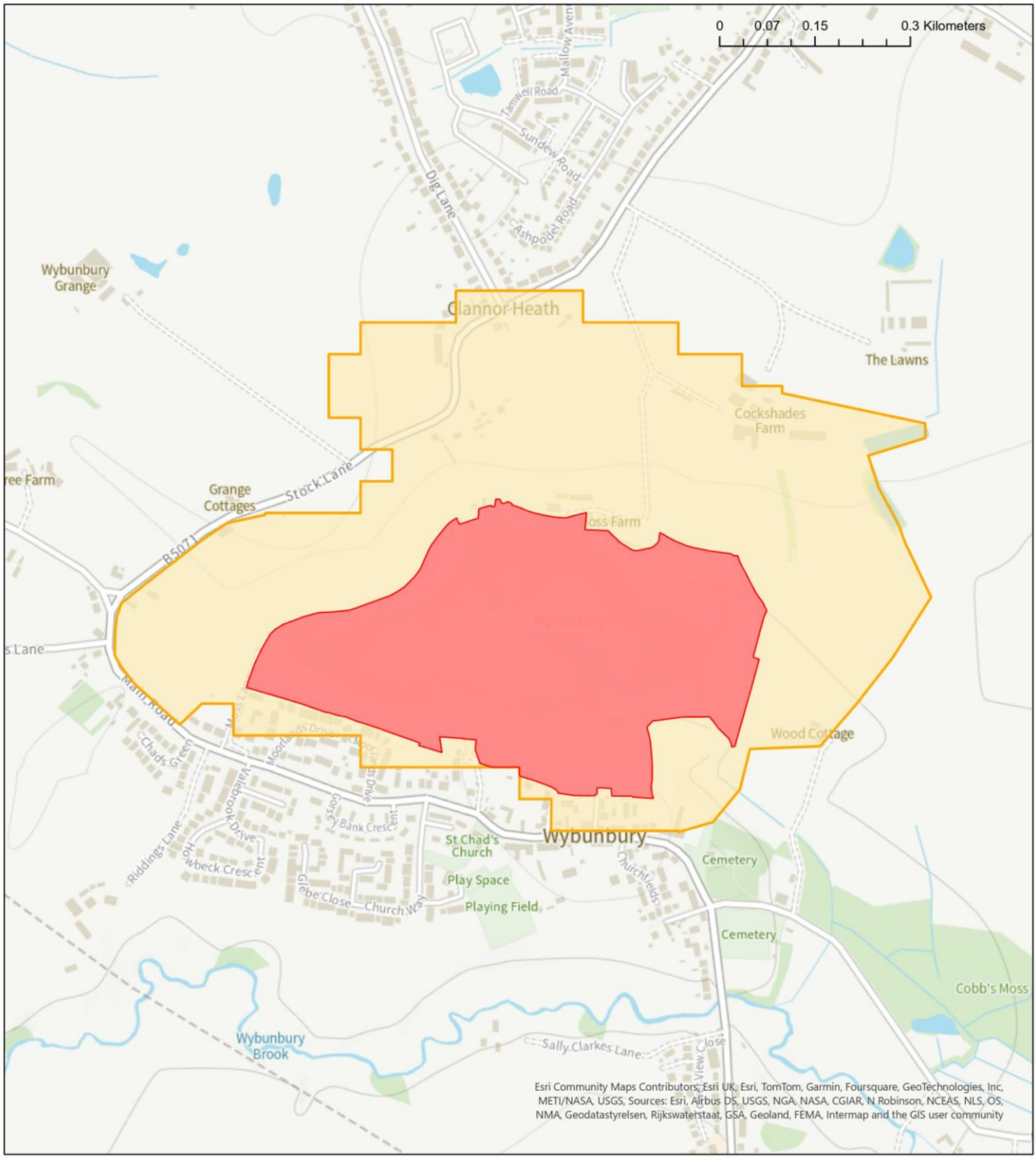
Catchment Area Update (2024)

Natural England has undertaken a review of all the Nutrient Neutrality catchment areas. This review has considered updated surface water catchment data and evidence held by both Natural England and the Environment Agency. Consideration has also been given to data and evidence provided by other parties such as Local Planning Authorities. The below information summarises changes.

The catchment remains unchanged following review.

Publishing of catchment area data

The Geographic Information Systems (GIS) data will be available on MAGIC from the 31st July, 2024.



Area where Natural England's Nutrient Neutrality advice applies for West Midlands Mosses SAC (Wybunbury Moss)

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List of abbreviations

GWDTE – Groundwater Dependent Terrestrial Ecosystem

SAC – Special Area of Conservation

SSSI – Site of Special Scientific Interest

N – Nitrogen

P – Phosphate

TN – Total Nitrogen

TP – Total Phosphate

WFD – Water Framework Directive

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