Site:	Land at Longcopse Lane, Emsworth, Havant
Client:	Land and Partners Ltd.
Job Number:	A115474
Report Type(s):	Nutrient Balancing Assessment
File Location:	\\LDS-DC-VM-002\Group Ecology\Projects\Projects A115000 on\A115290 Land at Longcopse Lane Emsworth\REPORTS

INTRODUCTION

WYG were appointed by Land and Partners Ltd. in October 2019 to calculate the change in nutrient outputs from existing to future use associated with the proposed development at Long Copse Lane, Emsworth, Havant in Hampshire (National Grid Ref. SU 74998 08115).

At present assessments are being undertaken to support an outline planning application for development comprising the masterplan as shown in Appendix A. This includes:

- 210 residential dwellings;
- The new urban area would comprise 8.1 hectares; and
- The provision of 6.5 hectares of Public Open Space.

The calculations are required in response to recent consultation with Natural England on residential projects in the vicinity of the Solent following the findings of the Integrated Water Management Study for South Hampshire, published by the Partnership for Urban South Hampshire (PUSH, 2018)[1].

Due to the uncertainty over whether new development can be accommodated by existing wastewater treatment infrastructure without causing harm to coastal European sites, Natural England advise that all residential development should achieve nitrogen neutrality (Natural England, 2020)[2].

METHODOLOGY

To make the assessment, Natural England's *advice on Nutrient Neutrality for New Development in the Stour Catchment in Relation to Stodmarsh Designated Sites* for calculating nitrogen budgets was used.

ASSUMPTIONS

The assumptions relevant to this this project in addition to those included in the Natural England methodology are provided in Table 1.

Table 1: Project Assumptions

Number of proposed units:	210
The total site area:	14.6 ha

[1] PUSH, (2018), *Integrated Water Management Study*, [online] Available at https://www.push.gov.uk/wp-content/uploads/2018/07/IWMS-Appendix-1.pdf, Accessed April 2020.
[2] Natural England, (2020), *Advice on Achieving Nutrient Neutrality for New Development in the Solent Region for Local Planning Authorities.*

The current land uses are:	12.2 ha lowland grazing; 2.4 ha no current use.
The future land uses will be:	8.1 ha urban; 6.5 ha open space[1]
The waste water from the site will be treated at this wastewater treatment works (WwTW):	Thornham
The consent limit for the WwWT is:	10 mg/l

[1]Areas taken from Open Space and Green Infrastructure Parameters Plan (A141 LA05).

RESULTS

The results using the method for determining the TP budget for the proposals are provided in Table 2. The full workings are shown in Appendix B.

Table 2: Summary of the results

Calculating Total Load From Development Wastewater	Calculating Load From Current Land Use	Calculating Load From Future Land Uses	Calculating Net Change in From the Development	Apply 20% Buffer
141.649 Kg/TN/yr	170.600 Kg/TN/yr	148.330 Kg/TN/yr	119.379 Kg/TN/yr	143.255 Kg/TN/yr

The calculations show that taking into account the existing accommodation on site, the development would result in a net increase in TN of 143.255 Kg/TN/yr.

In the absence of mitigation there is the potential for the development proposals to result in an adverse effect on the integrity of the Chichester and Langstone Harbours SPA.

MITIGATION

It is proposed that the SuDS drainage network for the site is designed to remove nitrogen from surface water runoff from the site. This will partially offset the TN output from the development.

A detailed study of wetlands was completed by Land et al. in 2016[3], covering 5853 records (this is referenced in Natural England's March 2020 methodology). This study concludes a mean nitrogen removal efficiency of 37% and nitrogen removal rate of 181 g/m2/yr. An inlet TN concentration of 3.0 mg/l is assumed in accordance with Appendix 4 of the Natural England guidance.

The annual average flow rate has been calculated from the annual average rainfall (SAAR) of 782 mm (1961-1990) and the urban catchment areas determined by WSP as part of the flood risk assessment.

The flow rates, wetland areas and calculations to predict the annual nitrogen removal performed by the features is shown in Table 3 below.

[3] Land, M., Graneli, W., Grimvall, A., Hoffmann, C. C., Mitsch, W. J., Tonderski, K. S., and Verhoeven, J. T. A., (2016), *How effective are created or restored freshwater wetlands for nitrogen and phosphorus removal? A systematic review.* Environmental Evidence (2016) 5:9.

Table 3 Nitrogen Removal Calculations

Catchment	Impermeable Surface Area (ha)	SAAR (mm)	Average Annual Volume m3/yr	Runoff TN (mg/l)	TN (kg/yr)	TN Removal Efficiency (%)	TN Removed (kg/yr)	Removal Rate (g/m2)	Minimum Area (m2)
A	3.47	782	27,135.40	3.0	81.41	37	30.12	181	166.41
B	0.70	782	5,474.00	3.0	16.42	37	6.08	181	33.60
C	1.40	782	10,948.00	3.0	32.84	37	12.15	181	67.13

Proposed enhancements to be basins will be designed to deliver suitable wetland vegetation for TN removal in the form of reedbeds and mixed marginal vegetation to meet the target TN removal rate of 37%. The design of the proposed SuDS features on site will achieve a combined removal of 48.35 kg/yr of Total Nitrogen from the surface water entering the Chichester and Langstone Harbours SPA. Table 3 also demonstrates that there are sufficient levels of nitrogen passing through the features to have confidence in the predicted nitrogen removal performance.

This leaves a remainder of 94.905 kg/yr of TN requiring offsetting. It is proposed that this is achieved through the conversion of cereal crop land to woodland planting within the Stanstead Estate, to the north of the site. The agreement for this offset land is included in Appendix D, and covers an area of 8.0ha. Natural England have been consulted on the proposed mitigation and have agreed that the proposed location is acceptable. Although the land is located some way to the north of the site, it lies within the surface water catchment for the River Lavant, the mouth of which is located to the south east of Langstone, where Chichester and Langstone Harbours meet. The proposed mitigation will therefore impact the same European site as foul and surface water flows. The existing land use at Stanstead Park is cereal cropping, with a leachate rate of 31.2 kg/TN/ha. This will be planted as woodland with a leachate rate of 5.0 kg/TN/ha, achieving a reduction of 26.2 kg/TN/ha. A minimum area of 3.65 ha will be converted to mitigate this application, resulting in a decrease of 95.63 kg/TN/yr. The remaining capacity at Stanstead Park provides flexibility for this application to mitigate more of its water quality impacts off-site as well as serving other application in the vicinity including the remainder of the housing allocation H8 (an additional 50 dwellings are anticipated beyond the currrent application).

When both mitigation options are combined they will achieve a net reduction of 0.725 kg/TN/yr and avoid an adverse effect on Chichester and Langstone Harbours SPA.

Document Control				
Version:	**3**	**Status:**	**Final**	
Date:	23rd July 2021			
Prepared by: Emma Taylor		**Checked by** David West CEnv MCIEEM		**Approved By:** David West CEnv MCIEEM

APPENDIX A: REPORT CONDITIONS

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The report refers, within the limitations stated, to the environment of the site in the context of the surrounding area at the time of the inspections. Environmental conditions can vary, and no warranty is given as to the possibility of changes in the environment of the site and surrounding area at differing times. No investigative method can eliminate the possibility of obtaining partially imprecise, incomplete or not fully representative information. Any monitoring or survey work undertaken as part of the commission will have been subject to limitations, including for example timescale, seasonal and weather-related conditions. Actual environmental conditions are typically more complex and variable than the investigative, predictive and modelling approaches indicate in practice, and the output of such approaches cannot be relied upon as a comprehensive or accurate indicator of future conditions. The "shelf life" of the Report will be determined by a number of factors including its original purpose, the Client's instructions, passage of time, advances in technology and techniques, changes in legislation etc. and therefore may require future re-assessment.

The whole of the report must be read as other sections of the report may contain information which puts into context the findings in any executive summary.

The performance of environmental protection measures and of buildings and other structures in relation to acoustics, vibration, noise mitigation and other environmental issues is influenced to a large extent by the degree to which the relevant environmental considerations are incorporated into the final design and specifications and the quality of workmanship and compliance with the specifications on site during construction. Tetra Tech accept no liability for issues with performance arising from such factors.

APPENDIX B: MASTERPLAN

1:1000 0 10 20 40 70 100 M

Drawn by: Checked by:

Date:

Revisions

Rev	Date	Drawn	Checked

Project:
LAND NORTH OF LONG COPSE LANE
EMSWORTH

Drawing Title:
SKETCH MASTERPLAN

LAND & PARTNERS

carlton
design partnership
Selwen House, 33a Castle Way, Southampton, SO14 2AW
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Scale: 1:1000 @ A1

Drg No: 170116/SL/SK1 Rev N

X:\CURRENT PROJECTS\LAND AND PARTNERS\LONG COPSE LANE EMSWORTH\SITE LAYOUT\LAYOUT 28

APPENDIX C: NUTRIENT BALANCING CALCULATIONS

Table 4: Calculating Total Nitrogen (TN) Load From Current Wastewater (Stage 1a)

Step	Measurement	Value	Unit	Explanation
Development proposal	Development types that would increase the population served by a wastewater system	210.000	Dwellings + rooms	Number of dwellings
1	Additional population	504.000	Persons	Uses an average household size of 2.4 x number of dwellings
2	Wastewater volume generated by development	55440.000	L/day	Persons x 110 litres/day. Where relevant, deduct wastewater volume of population displaced by the proposed development.
3	Waste Water Treatment Works (WwTW) environmental limit for TN	10.000	mg/l TN	Local WWTW limit
4	Deduct acceptable TN loading (@ 2 mg/l TN)	7.000		90% of Local WWTW limit (step3) - 2 mg/l TN
5	TN discharged after WWTW	388080.000	mg/TN/day	Step 2 x Step 4
6	Convert mg/TN to kg/TN per day	0.388	Kg/TN/day	Divide by 1,000,000
7	Convert kg/TN per day to kg/TN per year	141.649	Kg/TN/yr	x365 days
Total TN load from wastewater: 141.649 Kg/TN/yr				

Table 5: Calculating TN Load From Current Land use (Stage 2)

Step	Measurement	Land use	Value	Unit	Explanation
1	Area of existing Land Use Type	Urban No use	12.20 2.40	ha	Area of land lost to development
2	Leachate value for Land Use Type	Urban No use	13.00 5.00	Kg/TN/ha/yr	-
3	Leachate value for area of Land use Type	Urban No use	158.60 12.00	Kg/TN/ha/yr	Step 1a x Step 2a
Total TN Leachate value for current land use: 170.600 Kg/TN/yr					

Table 6: Calculating TN Load From Future Land Uses (Stage 3)

Step	Measurement	Value	Unit	Explanation
1	New urban land use area	8.100	ha	Area of development that will change to urban land use
2	Leachate value from new urban area	115.830	Kg/TN/yr	Step 1 x 14.3 Kg/TN/yr
3	New / retained PoS or SANG	6.500	ha	Area of development that will be woodland, PoS or SANG
4	Leachate value from Pos / SANG area	32.500	Kg/TN/yr	Step 3 x 5.0 Kg/TN/yr
5	Combined leachate values from future land uses	148.330	Kg/TN/yr	Step 2 + Step 4
Total TN Leachate value for future land use: 0.149 Kg/TN/yr				

Table 7: Calculating TN Budget for the Development Proposals (Stage 4)

Step	Measurement	Value	Unit	Explanation
1	Calculate the net change in loads from wastewater	141.649	Kg/TN/yr	Stage 1b – Stage 1a
2	Calculate the net change in leachate value due to land use change	22.270	Kg/TN/yr	Stage 3 – Stage 2
3	Determine budget	119.379	Kg/TN/yr	Step 1 – Step 2
4	Where budget is positive add 20% precautionary buffer	143.255	Kg/TN/yr	Step 3 + 20%
Total TN Budget 143.255 Kg/TN/yr				

APPENDIX D: STANSTEAD ESTATE MITIGATION

STANSTED PARK FOUNDATION

STANSTED PARK, ROWLANDS CASTLE, HAMPSHIRE, PO9 6DX
Tel: 023 9241 2265 E-mail: enquiry@stanstedpark.co.uk Website: www.stanstedpark.co.uk

To whom it may concern

Development at Long Copse Lane Emsworth : Nitrogen Neutrality and Beckstein Bat Habitat

On behalf of the Stansted Park Foundation, we are pleased to support the proposal by Land & Partners to fund and deliver nitrogen neutrality and provide new bat habitat within our charitable estate, relating to their development north of Long Copse Lane in Emsworth.

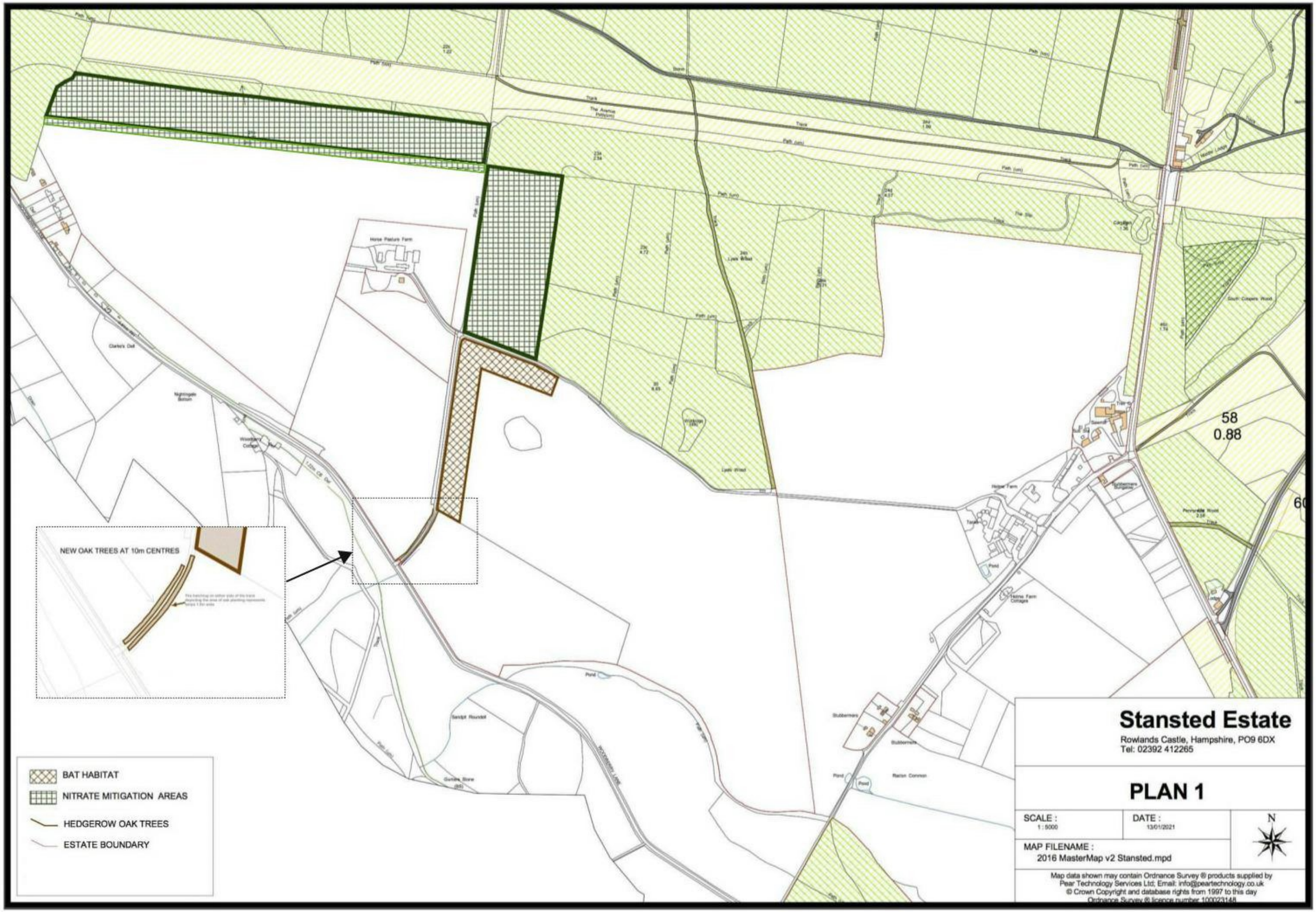
As a charity with deep links within the community, we rely on revenue generated from activities on the estate as well as private donations and gifts. We receive no public subsidy or outside funding. One of our key goals is to carry out extensive tree planting and restore habitats. The funding generated from the Long Copse Lane development will provide a significant uplift to achieving this ambition.

The land to be planted with trees as part of our agreed arrangement to provide mitigation for the development will provide direct ecological benefits, but also wider positive benefits.

Our Charitable Objects mandate the Foundation to preserve the buildings and their grounds and surrounding parkland, farmland and forest for the benefit of the public. The funding that this programme will generate will allow the Foundation to improve the recreational and educational facilities for the general public as well as assist in the necessary preservation of the fabric of an historic Estate.

[redacted]

D M Bennett
Director of the Foundation


NEW OAK TREES AT 10m CENTRES
BAT HABITAT
NITRATE MITIGATION AREAS
HEDGEROW OAK TREES
ESTATE BOUNDARY
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