



Cottage Farm, Lovedean

Report to Inform Habitats Regulations Assessment Stage 1 and Stage 2

Bargate Homes

May 2020

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Document Control

Project: Cottage Farm, Lovedean
Client: Bargate Homes
Job Number: A115966
File Origin: \\LDS-DC-VM-002\Group Ecology\Projects\Projects A115000
on\A115966 Cottage Farm\REPORTS

Issue 1	January 2020	FINAL
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Rev:	Date:	Updated by:	Verified by:	Description of changes:
1	12/05/20	J. Jackson	D. West	Updated masterplan and to use V4 of the Natural England Nutrient Assessment methodology.

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Contents

Glossary.....	3
Executive Summary.....	4
1.0 Introduction	5
1.1 Background	5
1.2 Application Site Location.....	5
1.3 Development Proposals	5
1.4 Requirements for the HRA	5
2.0 Assessment Methodology	7
2.1 Assessment Guidance.....	7
3.0 Stage 1: Screening.....	8
3.1 Step 1 – Determining whether the development proposals are directly connected with or necessary to the management of the internationally designated site(s)	8
3.2 Step 2 – Description of the development proposals, internationally designated sites that may be affected and approach taken to identifying other plans or projects that could lead to in-combination effects.....	8
3.3 Step 3 – Identifying the Potential Effects on Internationally Designated site(s)	9
3.4 Step 4 – Assessing the significance of any effects on the Natura 2000 site(s)	11
4.0 Stage 2: Appropriate Assessment	11
4.1 Nutrient Outputs during Occupation: Alone and In-combination.....	11
5.0 Summary	14
6.0 References.....	15

Figures

Figure 1: Site Location Plan in relation to sites screened into this report

Appendix A: Report Conditions

Appendix B: Site Layout

Appendix C: Qualifying Features of European Sites Screened into this Assessment

Appendix D: Nutrient Balancing Calculations Without Mitigation

Appendix E: Total Nitrogen Budget Calculations using Off-setting Land as Mitigation



Glossary

ALSE	Assessment of Likely Significant Effects
CEnv	Chartered Environmentalist
CIEEM	Chartered Institute of Ecology & Environmental Management
CJEU	Court of Justice of the European Union
EC	European Commission
Habitats Regulations	Conservation of Habitats and Species Regulations 2017
HRA	Habitats Regulations Assessment
IROPI	Imperative Reasons of Over-riding Public Interest
JNCC	Joint Nature Conservation Committee
LSE	Likely Significant Effect
MCIEEM	Member of Chartered Institute of Ecology & Environmental Management
Natura 2000 site	A European site designated for its nature conservation value
PUSH	Partnership for Urban South Hampshire
SAC	Special Area of Conservation
SANG	Suitable Alternative Natural Greenspace
SPA	Special Protection Area
TN	Total Nitrogen
WwTW	Wastewater Treatment Works



Executive Summary

Contents	Summary
Site location and description	The site is situated to the west of Lovedean in Hampshire and is centred at Ordnance Survey National Grid Reference: SU 68543 12593. The site comprises of an agricultural field with a new residential development to the north, residential streets to the east and south and agricultural fields to the west. On the south western and north western boundaries are areas of woodland. The site is an emerging allocation for a residential development of 75 to 85 dwellings within the East Hampshire Draft Local Plan. This report assesses a proposed development of up to 56 dwellings with open space, access and associated infrastructure.
Scope of this Assessment	This report assesses the pathways to likely significant effects (HRA Stage 1) of the proposed development upon relevant designated Natura 2000 sites and subsequently assesses whether these would result in an adverse effect on the integrity of such designated Natura 2000 sites (HRA Stage 2). This is a submission to inform the Competent Authority's (East Hampshire District Council) Habitats Regulations Assessment.
Results of Stage 1: Screening	The results from the Stage 1 Screening Assessment found nutrient outputs during occupation (alone and in combination) was the only pathway to likely significant effects (LSE).
Results of Stage 2: Appropriate Assessment	The detailed assessment of the effects of nutrient outputs completed at Stage 2 found that with mitigation in the form of providing land for offsetting, there would be no effect on the integrity of any European site.
Conclusion	The Competent Authority, is considered not to require further assessment under the Habitats Regulations, and the proposed development can proceed without Stage 3 and Stage 4 being completed.

1.0 Introduction

1.1 Background

WYG was commissioned by Bargate Homes in December 2019 to prepare a report to inform Stage 1: Screening and Stage 2: Appropriate Assessment of a Habitats Regulations Assessment (HRA) for a proposed development at Cottage Farm in Lovedean, Hampshire.

This report has been prepared by WYG Senior Ecologist John Simper. The conditions pertinent to the report are provided in Appendix A.

1.2 Application Site Location

The application site is 2.65 ha in size and is situated to the west of Lovedean in Hampshire and is centred at Ordnance Survey National Grid Reference: SU 68543 12593. The application site comprises of an agricultural field with a new residential development to the north, residential streets to the east and south and agricultural fields to the west. On the south western and north western boundaries are areas of woodland.

1.3 Development Proposals

The development proposals are the construction of up to 56 dwellings with associated gardens, road infrastructure and open space. The redline boundary for the application site and site layout is provided in Appendix B.

The site is included as an emerging allocation for 75 to 85 dwellings within the East Hampshire Draft Local Plan (East Hampshire District Council (EHDC), 2019). Here, the site is referred to as Site SA36 – Land at Cottage Farm, James Copse Close.

1.4 Requirements for the HRA

The requirement for an HRA is established through Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora, hereby referred to as the 'Habitats Directive', in Articles 6(3) and 6(4). The Habitats Directive is transposed into national legislation by the Conservation of Habitats and Species Regulations 2017. These are hereafter referred to as the 'Habitats Regulations'.

Under Regulation 63, any project which is likely to have a significant effect on a European site (either alone or in-combination with other projects) and is not directly connected with, or necessary for the management of the site, must be subject to an HRA to determine the implications for the site in view of its conservation objectives. This is determined during the Stage 1: Screening Assessment of an HRA (see below).

A Stage 2: Appropriate Assessment then needs to be carried out in respect of any plan or project which:



- either alone or in combination with other plans or projects would be likely to have a significant effect on a site designated within the European network; and
- is not directly connected with the management of the site for nature conservation.

The term European site is defined fully in Regulation 8 of the Habitats Regulations and includes:

- Special Areas of Conservation (SACs);
- candidate and proposed SACs;
- Special Protection Areas (SPAs);
- potential SPAs;
- proposed Wetlands of International Importance designated or proposed for their wetland features under the auspices of the Convention of Wetlands of International Importance (commonly referred to as 'Ramsar sites'); and
- sites identified for Natura 2000 compensatory measures.

The final two categories are afforded the same level of protection as SACs and SPAs as a matter of Government policy, and the assessment provisions of the Habitats Regulations are applied to them (Natural England, 2017).

2.0 Assessment Methodology

2.1 Assessment Guidance

The Habitats Directive and Regulations do not specify how assessment should be undertaken. In undertaking this HRA, the process we have adopted is that recommended in official European Council (EC) guidance (EC, 2001). In this report, our Stage 1: Screening found that LSE were possible and so a Stage 2: Appropriate Assessment was required. These two stages form the first of four HRA stages, as described below:

- **Stage 1: Screening** – the process which identifies the likely impacts upon a Natura 2000 site of a project or plan, either alone or in combination with other projects or plans and considers whether these impacts are likely to be significant. This is also known as an 'assessment of likely significant affects (ALSE)';
- **Stage 2: Appropriate assessment** – the consideration of the impact on the integrity of the Natura 2000 site of the project or plan, either alone or in-combination with other projects or plans, with respect to the site's structure and function and its conservation objectives. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts (in accordance with guidance following the recent decision by the CJEU; *People Over Wind and Sweetman v Coillte Teoranta* (C-323/17) regarding application of embedded mitigation at Stage 1 or Stage 2 of an HRA (Freeths, 2018);
- **Stage 3: Assessment of alternative solutions** – the process which examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the Natura 2000 site; and
- **Stage 4: Assessment where no alternative solutions exist and where adverse impacts remain** – an assessment of compensatory measures where, in the light of an assessment of Imperative Reasons of Over-riding Public Interest (IROPI), it is deemed that the project or plan should proceed (it is important to note that this guidance does not deal with the assessment of IROPI).

The Stage 1 Screening Assessment comprises four steps, as described below:

- **Step 1.** Determining whether the project or plan is directly connected with or necessary to the management of the Natura 2000 site(s);
- **Step 2.** Describing the project or plan and the description and characterisation of other projects or plans that in-combination have the potential for having significant effects on the Natura 2000 site(s);
- **Step 3.** Identifying the potential effects on the Natura 2000 site(s); and
- **Step 4.** Assessing the significance of any effects on the Natura 2000 site(s).

The Stage 2: Appropriate Assessment should identify the effects of those plans or projects on qualifying features of the European sites in relation to the Conservation Objectives of those sites and determine whether these effects will result in an adverse effect on the integrity of the designated site. Only where the decision maker (the Competent Authority – in this case East Hampshire District Council), is satisfied that there will be no adverse effect on integrity, or where there are imperative reasons of overriding public interest, can the plan or project be approved.



3.0 Stage 1: Screening

Projects may have spatial implications which can have further reaching effects than those predicted to fall within the development footprint. Specifically, it is recognised that the distance between a proposed development and a designated site is not a definitive determinant as to the likelihood or severity of an impact occurring. Site variables such as prevailing wind conditions, surface and groundwater flow direction will all have an influence on the relative distance at which an impact can occur.

Additionally, the mobile nature of qualifying interest bird species must also be considered. This is because adverse effect on the qualifying species of a site, can occur even if they are not present within the application site. For instance, birds may forage in one area but roost at another, but both may not be within a site for which they are designated.

3.1 Step 1 – Determining whether the development proposals are directly connected with or necessary to the management of the internationally designated site(s)

The development proposals are not connected with and are not necessary for the management of any internationally designated sites, although they do have the potential to affect them.

3.2 Step 2 – Description of the development proposals, internationally designated sites that may be affected and approach taken to identifying other plans or projects that could lead to in-combination effects

3.2.1 Description of the Development Proposals

The site is an emerging allocation for a residential development of 75 to 85 dwellings within the East Hampshire Draft Local Plan. This report assesses a proposed development of up to 56 dwellings with open space, access and associated infrastructure.

3.2.2 List of the Internationally Designated Sites that may be Affected by the Development Proposals

The *Habitats Regulations Assessment of East Hampshire's Regulation 18 Local Plan* (AECOM, 2018) was the primary source used to identify internationally designated sites that may be affected by the proposals. This report screened in the following sites, as shown in Figure 1 and listed below. The qualifying features of these site are provided in Appendix C.

- Butser Hill SAC;
- East Hampshire Hangers SAC;
- Shortheath Common SAC;
- Portsmouth Harbour Ramsar;
- Portsmouth Harbour SPA;
- Solent Maritime SAC;
- Chichester and Langstone Harbours SPA;

- Chichester and Langstone Harbours Ramsar;
- Solent and Southampton Water SPA;
- Solent and Southampton Water Ramsar)
- Solent and Isle of Wight Lagoons SAC;
- Solent and Dorset Coast Potential SPA;
- Thames Basin Heaths SPA;
- Thursley, Hankley & Frensham Commons (Wealden Heaths Phase 1) SPA;
- Thursley, Ash, Pirbright & Chobham SAC;
- Thursley & Ockley Bogs Ramsar site;
- Wealden Heaths Phase II SPA; and
- Woolmer Forest SAC.

3.2.3 Approach taken to identifying Other Plans or Projects that could lead to In-combination Effects

Establishing whether project level effect can act in-combination is dependent on whether the effect is still possible following the application of mitigation. For example, a drainage strategy may completely eliminate the potential for surface water run-off from affecting any nearby watercourses, in which case it cannot contribute to any effect in-combination. There may also be mitigation strategies in place which are designed to mitigate both alone and in-combination effects e.g. payments to strategic recreation mitigation strategies.

In Step 3, increases in nutrient outputs from wastewater was the only potential pathway to LSE identified. In order for this pathway to pass Stage 2: Appropriate Assessment, it must be demonstrated that the plan or project will not result in any increase in nutrients reaching the Solent, otherwise an effect on integrity cannot be ruled out.

With mitigation, it was found that there would be a net decrease in nutrient output and as such, this pathway has no potential to act in-combination with any plan or project and an in-combination assessment was not required.

3.3 Step 3 – Identifying the Potential Effects on Internationally Designated site(s)

The potential pathways to LSE were identified following a review of the following:

- The *Habitats Regulations Assessment of East Hampshire Local Plan Local Plan* (AECOM, 2018);
- The qualifying features of SACs and SPAs (see Appendix C);
- The conservation objectives for SACs and SPAs;
- The threats to SPAs;
- The Ramsar criteria (see Appendix C); and
- Site Improvement Plans for SACs and SPAs

Following this review, the following the only potential pathway to LSE was considered to be relevant to the development proposals based on the likely activities during construction and occupation:

- Increases in nutrient outputs from changing the use of the site as a former agricultural land to residential use.

Other potential pathways to LSE for Site SA36 – Land at Cottage Farm, James Copse Close were screened out within the East Hampshire Local Plan HRA (AECOM 2018) due to the site being more than 6 km away from any internationally designated sites.

The potential pathway to LSE via increases in nutrient outputs is discussed in the following section.

3.3.1 Nutrient outputs during occupation: Alone and in-combination

In June 2018, an Integrated Water Management Study for South Hampshire was published by the Partnership for Urban South Hampshire (PUSH) (2018) has identified that there is uncertainty in some locations as to whether there will be sufficient capacity to accommodate new housing growth, and the potential for adverse effects upon coastal SPAs (including Solent and Southampton Water SPA) as a result of nitrogen discharge.

Natural England have identified that there is the potential for nutrients arising from increased wastewater from residential development to affect the qualifying features of European designated sites in the Solent (Natural England, 2019: 2020).

This effect has been identified as having the potential to promote algal growth that can affect aquatic vegetation and increase turbidity, thereby affecting foraging efficacy of fish-eating birds. These effects could ultimately impact all aspects of the functioning of European designated sites in an interconnected manner.

Included within this guidance, Natural England have provided a calculator for establishing the change in nutrient (nitrogen) levels in water arising from the site pre- and post-development. This includes calculating the change in nutrients in groundwater as a result of a change in land use, and from wastewater that is discharged into the Solent with consent from Budds Farm Wastewater Treatment Works (WwTW) (and eventually reaches the Solent).

Wastewater from the development proposals will be treated at the Southern Water Budds Farm WwTW, but ultimately water will discharge to the sea and may contribute to background nitrogen levels within the Solent.

The development therefore has the potential to result in LSE on Solent SACs, SPAs and Ramsars due effects of increased in nutrients and therefore this pathway cannot be screened out at Stage 1 and Stage 2 Appropriate Assessment is required.

This is considered to apply both alone and in-combination, but due to the proposed mitigation delivering nutrient neutrality, it is not necessary to specifically identify all projects within the Solent catchment that could result in an increase in nutrient discharge into the Solent.

This pathway has therefore been taken forward to Stage 2: Appropriate Assessment.

3.4 Step 4 – Assessing the significance of any effects on the Natura 2000 site(s)

The Stage 1: Screening Assessment found that nutrient outputs during occupation acting alone and in-combination does have the potential to have a significant effect on sites screened into this assessment.

4.0 Stage 2: Appropriate Assessment

The following section discusses the pathway to LSE that could result in impacts on the integrity of the European sites identified during Stage 1: Screening.

4.1 Nutrient Outputs during Occupation: Alone and In-combination

4.1.1 Background to Calculating Nutrient Outputs

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, 2019: 2020).

To make the assessment, Natural England have created a calculator for establishing the nitrogen budget of a site pre- and post-development (Natural England, 2019:2020). The calculator requires the following information to be known:

- The number of residential units that that development will support;
- The wastewater treatment works (WwTW) that the development proposals will connect to;
- The consent limit of Total Nitrogen (TN) in wastewater for the WwTW;
- The land-use for the existing site (pre-construction); and
- The land-use for the proposed site (post-construction), e.g. future urban land and open space.

The calculator also relies on a number of assumptions. These include: the average numbers of people per household, the predicted levels of water by each householder and levels of TN lost from each land-use type. These were all used in accordance with the Natural England Guidance.

In summary, the calculator uses the following six steps:

1. Converting the number of proposed units into number of occupants.
2. Calculating the quantity and TN content of wastewater that the number of occupants will produce.
3. Using land area measurements and TN levels provided by Natural England to establish what quantity of TN will leach from the site pre-development.
4. Using land area measurements and TN levels provided by Natural England to establish what quantity of TN will leach from the site post-development.
5. Establishing the difference between the pre-development land-use TN leaching level (Step 3) and the combined total of the TN from wastewater (Step 2) and post-development land-use TN leaching level (Step 4).

6. Adding a 20% precautionary buffer to the result of Step 5, if a net increase in TN is determined.

At the Cottage Farm site, the pre-construction area is currently all grazing land for horses (as detailed within the Cottage Farm, Lovedean Lane Ecological Survey, Ecosupport Ltd. (2019)). This is classified as lowland grazing land and in accordance with Natural England guidance, this would have a nitrogen leaching level of 13.0 kg/TN/yr per hectare.

The post-construction site would be a mixture of urban land and open space resulting in a change in leaching levels. Both the urban land and open space have been given a leachate level of 14.3 kg/ha/yr as all areas of open space are below 0.5 ha. This is in accordance with Natural England guidance (2020), whereby any areas proposed as SANG / Public Open Space must be larger than 0.5 ha in order to qualify for a leachate value of 0.5 kg/ha/yr.

4.1.2 Calculating TN Budget without Mitigation

The calculations used to establish the TN budget for the development proposals in the absence of mitigation are provided in Appendix D and are summarised in Table 1.

Table 1: Summary of TN budget without mitigation

Option	Current Land Use TN Load (A)	Wastewater from Future Land Use TN Load (B)	Future Land Use TN Load (C)	Change (B+C-A)	Apply 20% Buffer
56 units	34.450 Kg/TN/yr	36.316 Kg/TN/yr	37.895 Kg/TN/yr	39.761 Kg/TN/yr	47.713 Kg/TN/yr

Table 2 shows that the development would result in an increase in TN of 47.713 Kg/TN/yr. Mitigation is therefore required for the development to be nutrient neutral.

East Hampshire District Council have adopted a Position Statement on Nutrient Neutrality (East Hampshire District Council, 2019). This states that Grampian Conditions will be used to make sure an avoidance and mitigation scheme is provided prior to occupation of residential units. The adopted condition wording states:

"The development hereby permitted shall not be occupied until:

a) A water efficiency calculation in accordance with the Government's National Calculation Methodology for assessing water efficiency in new dwellings has been undertaken which demonstrates that no more than 110 litres of water per person per day shall be consumed within the development, and this calculation has been submitted to, and approved in writing by, the Local Planning Authority; all measures necessary to meet the agreed water efficiency calculation must be installed before first occupation and retained thereafter;

b) A mitigation package addressing the additional nutrient input arising from the development has been submitted to, and approved in writing by, the Local Planning Authority. Such mitigation package shall address all of the additional nutrient load imposed on protected European Sites by the development when fully occupied and shall allow the Local Planning Authority to ascertain on the basis of the best available scientific evidence that such additional nutrient loading will not have an adverse effect on the integrity of the protected European Sites, having regard to the conservation objectives for those sites; and

c) All measures forming part of that mitigation package have been provided to the Local Planning Authority."

4.1.3 TN Budget with Mitigation

In order to fulfil the requirements of the Grampian Condition it will be necessary for a mitigation package to be delivered which demonstrates the development to be nutrient neutral. A suitable, deliverable mitigation package would be offsetting. This is achieved by removing an additional area of land from agricultural use, with the subsequent reduction in nitrogen leachate offsetting the increase from wastewater discharge.

Suitable offsetting land in proximity to the site currently comprises further lowland grazing land which would be converted to open space. Using the rates from the Natural England calculator, the TN leaching will reduce from 13 kg/ha/yr for lowland grazing to 5 kg/ha/yr for new SANG / Public Open Space. Therefore, the Natural England calculator has been used to determine how much offsetting land will be required to offset the 47.713 Kg/TN/yr generated by the development proposals. These calculations are summarised in Table 2 with full calculations shown in Appendix F.

Table 2: Summary of TN budget with mitigation

Area of off-setting land required	Current Land Use TN Load at off-setting area (lowland grazing) (A)	Future Land Use TN Load at off-setting area (open space) (B)	Change at offsetting area A-B = (C)	Wastewater from Future Land Use TN Load (D)	Net project TN budget Change C-D = (E)
6 ha	78.000 Kg/TN/yr	30.000 Kg/TN/yr	48.000 Kg/TN/yr	47.713 Kg/TN/yr	-0.287 Kg/TN/yr

The calculations show that with 6 ha area of offsetting land, the development (comprising 56 units) will result in a net decrease in nitrogen load of 0.287 Kg/TN/yr.

With the application of a Grampian Condition, as per the East Hampshire District Council Position Statement on Nitrogen Neutrality, and the subsequent submission and approval of a mitigation package (which Section 4.1.3 shows is deliverable), there will be a decrease in TN discharge and therefore there is no potential for nutrient inputs to affect the integrity of the Solent European sites either alone or in-combination.



5.0 Summary

The Stage 2: Appropriate Assessment found that with the application of mitigation for nutrient outputs, there is no potential for these pathways identified at Stage 1 to affect the integrity of any European site.

As such, it is considered that the 'Competent Authority' can permit the proposed development and does not require Stage 3 or Stage 4 assessments to be undertaken.

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Figures

Figure 1: Site Location Plan in relation to sites screened into this report



Rev	Date	Notes
A	06/05/20	Initial map production

Legend

- Site boundary (2.65ha)
- Urban area (1.94ha)
- Open space area (0.71ha)

0 10 20 40 Metres



Urban and Open Space Areas

Cottage Farm Bargate Homes

Scale at A3: 1:1,000	Project No: A115966	Drawing No: Figure 1	Revision: A
Drawn by: Ben Blowers	Drawn date: 06/05/2020	Approved by: Jonathan Jackson	

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Appendix A: Report Conditions



REPORT CONDITIONS

This Report has been prepared using reasonable skill and care for the sole benefit of Bargate Homes ("the Client") for the proposed uses stated in the report by WYG Environment Planning Transport Limited ("WYG"). WYG exclude all liability for any other uses and to any other party. The report must not be relied on or reproduced in whole or in part by any other party without the copyright holder's permission.

No liability is accepted or warranty given for; unconfirmed data, third party documents and information supplied to WYG or for the performance, reliability, standing etc of any products, services, organisations or companies referred to in this report. WYG does not purport to provide specialist legal, tax or accounting advice.

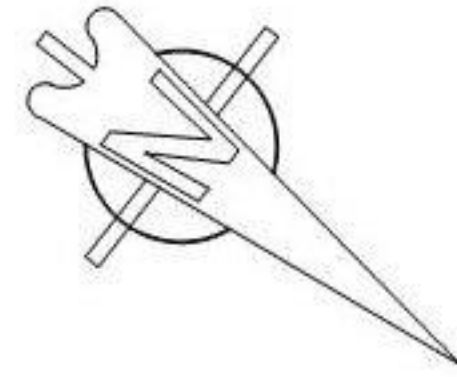
The report refers, within the limitations stated, to the environment of the site in the context of the surrounding area at the time of the inspections'. Environmental conditions can vary and no warranty is given as to the possibility of changes in the environment of the site and surrounding area at differing 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. WYG accept no liability for issues with performance arising from such factors.



Appendix B: Site Layout



KEY

- SITE BOUNDARY
- LOCAL AUTHORITY BOUNDARY
- ILLUSTRATIVE DWELLINGS
- ILLUSTRATIVE PLANTING
- ILLUSTRATIVE ROAD
- EXISTING PLANTING



3 areas total 4469 sqm



Rev.	Date	Description	DGP	DGP
C	29-04-20	Amended to revised proposals.	DGP	DGP
B	14-02-20	Key added.	DGP	DGP
A	24-01-20	Red line amended at site entrance.	DGP	DGP

Client
BARGATE
HOMES
Project
Cottage Farm, Lovedean Lane,
Waterlooville PO8 9RW
Drawing Title
Illustrative Masterplan

Scale 1:500 @ A1 Drawn DGP Checked DGP
Date December 2019 File P1638 Masterplan Drawing Status
Orig.No. P1638.01 Rev. C PLANNING

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Appendix C: Qualifying Features of European Sites Screened into this Assessment

Butser Hill SAC (JNCC, 2015a)

Annex I habitats that are a primary reason for selection of this site

- Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia).
- *Taxus baccata* woods of the British Isles.

East Hampshire Hangers SAC (JNCC, 2015b)

Annex I habitats that are a primary reason for selection of this site

9130 Asperulo-Fagetum beech forests

East Hampshire Hangers represents Asperulo-Fagetum beech forests in south-east England. The site is extremely rich in terms of vascular plants, including white helleborine *Cephalanthera damasonium*, violet helleborine *Epipactis purpurata*, green-flowered helleborine *E. phyllanthus* and Italian lords-and-ladies *Arum italicum*. The woods include areas with old pollards on former wood-pasture as well as high forest. There are also transitions to 9180 Tilio-Acerion forests of slopes, screes and ravines.

9180 Tilio-Acerion forests of slopes, screes and ravines * Priority feature

East Hampshire Hangers, with Rook Clift, represents an unusual occurrence of Tilio-Acerion forests in the south of England. It has areas of small-leaved lime *Tilia cordata* on the steepest parts of the Upper Greensand scarp, associated with low sandstone cliffs and scree slopes, which are locally calcareous. The bryophyte flora is richer than on the chalk examples and includes several species that are rare in the lowlands, such as *Campylostelium saxicola*, which has its strongest population in England here. The site is ecologically similar to sites selected in the Welsh Borders, despite its geographic location.

Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site

6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)

91J0 *Taxus baccata* woods of the British Isles * Priority feature

Annex II species present as a qualifying feature, but not a primary reason for site selection

1654 Early gentian *Gentianella anglica*

Shortheath Common SAC (JNCC, 2015c)

Annex I habitats that are a primary reason for selection of this site

7140 Transition mires and quaking bogs

A valley mire forms the focal point of this site in the western Weald which also embraces a wide range of heathland habitats and woodland. The northern strip of the mire is the most mesotrophic and has much grey willow *Salix cinerea* but also a rich ground-flora with abundant sedges *Carex curta* and *C. rostrata*, soft rush *Juncus effusus*, marsh cinquefoil *Potentilla palustris* and the bog-

moss *Sphagnum recurvum*. An oligotrophic area to the south is dominated by *S. recurvum* with cross-leaved heath *Erica tetralix*, common cottongrass *Eriophorum angustifolium*, purple moor-grass *Molinia caerulea* and round-leaved sundew *Drosera rotundifolia*. It is notable for its high cover of cranberry *Vaccinium oxycoccos*. Other bog-mosses such as *Sphagnum capillifolium* and *S. papillosum* are also present, and the whole forms a floating raft over much of the mire.

Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site

4030 European dry heaths

91D0 Bog woodland * Priority feature

Portsmouth Harbour Ramsar (JNCC, 1995)

Ramsar criterion 3

The intertidal mudflat areas possess extensive beds of eelgrass *Zostera angustifolia* and *Zostera noltii* which support the grazing dark-bellied brent geese populations. The mud-snail *Hydrobia ulvae* is found at extremely high densities, which helps to support the wading bird interest of the site. Common cord-grass *Spartina anglica* dominates large areas of the saltmarsh and there are also extensive areas of green algae *Enteromorpha* spp. and sea lettuce *Ulva lactuca*. More locally the saltmarsh is dominated by sea purslane *Halimione portulacoides* which gradates to more varied communities at the higher shore levels. The site also includes a number of saline lagoons hosting nationally important species.

Ramsar criterion 6

Dark-bellied brent goose, *Branta bernicla bernicla*, 2105 individuals, representing an average of 2.1% of the GB population (5-year peak mean 1998/9-2002/3).

Portsmouth Harbour SPA (JNCC, 2001a)

Over winter

Dark-bellied Brent Goose *Branta bernicla*, 2,847 individuals representing at least 0.9% of the wintering Western Siberia/Western Europe population (5-year peak mean 1991/2 - 1995/6).

Solent Maritime SAC (JNCC, 2015d)

Annex I habitats that are a primary reason for selection of this site

1130 Estuaries

The Solent encompasses a major estuarine system on the south coast of England with four coastal plain estuaries (Yar, Medina, King's Quay Shore, Hamble) and four bar-built **estuaries** (Newtown Harbour, Beaulieu, Langstone Harbour, Chichester Harbour). The site is the only one in the series to contain more than one physiographic sub-type of estuary and is the only cluster site. The Solent and its inlets are unique in Britain and Europe for their hydrographic regime of four tides each day, and for the complexity of the marine and estuarine habitats present within the area. Sediment habitats within the estuaries include extensive estuarine flats, often with intertidal areas supporting eelgrass *Zostera* spp. and green algae, sand and shingle spits, and natural shoreline transitions. The mudflats range from low and variable salinity in the upper reaches of the estuaries to very sheltered

almost fully marine muds in Chichester and Langstone Harbours. Unusual features include the presence of very rare sponges in the Yar estuary and a sandy 'reef' of the polychaete *Sabellaria spinulosa* on the steep eastern side of the entrance to Chichester Harbour.

1320 *Spartina* swards (*Spartinion maritimae*)

Solent Maritime is the only site for smooth cord-grass *Spartina alterniflora* in the UK and is one of only two sites where significant amounts of small cord-grass *S. maritima* are found. It is also one of the few remaining sites for Townsend's cord-grass *S. x townsendii* and holds extensive areas of common cord-grass *Spartina anglica*, all four taxa thus occurring here in close proximity. It has additional historical and scientific interest as the site where *S. alterniflora* was first recorded in the UK (1829) and where *S. x townsendii* and, later, *S. anglica* first occurred.

1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)

The Solent contains the second-largest aggregation of **Atlantic salt meadows** in south and south-west England. Solent Maritime is a composite site composed of a large number of separate areas of saltmarsh. In contrast to the Severn estuary, the salt meadows at this site are notable as being representative of the ungrazed type and support a different range of communities dominated by sea-purslane *Atriplex portulacoides*, common sea-lavender *Limonium vulgare* and thrift *Armeria maritima*. As a whole the site is less truncated by man-made features than other parts of the south coast and shows rare and unusual transitions to freshwater reedswamp and alluvial woodland as well as coastal grassland. Typical Atlantic salt meadow is still widespread in this site, despite a long history of colonisation by cord-grass *Spartina* spp.

Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site

- 1110 Sandbanks which are slightly covered by sea water all the time
- 1140 Mudflats and sandflats not covered by seawater at low tide
- 1150 Coastal lagoons * Priority feature
- 1210 Annual vegetation of drift lines
- 1220 Perennial vegetation of stony banks
- 1310 Salicornia and other annuals colonizing mud and sand
- 2120 "Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes")"

Annex II species present as a qualifying feature, but not a primary reason for site selection

- 1016 Desmoulin's whorl snail *Vertigo moulinsiana*

Chichester and Langstone Harbours SPA (JNCC, 2015e)

During the breeding season:

Little tern *Sterna albifrons*, 100 pairs representing up to 4.2% of the breeding population in Great Britain (5-year mean, 1992-1996); and,

Sandwich tern *Sterna sandvicensis*, 158 pairs representing up to 1.1% of the breeding population in Great Britain (1998).

On passage:

Little egret *Egretta garzetta*, 137 individuals representing up to 17.1% of the population in Great Britain (Count as at 1998).



Over winter:

Bar-tailed godwit *Limosa lapponica*, 1,692 individuals representing up to 3.2% of the wintering population in Great Britain (5-year peak mean 1991/2 - 1995/6); and,

Little egret *Egretta garzetta*, 100 individuals representing up to 20.0% of the wintering population in Great Britain (Count as at 1998).

This site also qualifies under **Article 4.2** of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species:

On passage:

Ringed plover *Charadrius hiaticula*, 2,471 individuals representing up to 4.9% of the Europe/Northern Africa - wintering population (5-year peak mean 1991/2 - 1995/6).

Over winter:

Black-tailed godwit *Limosa limosa islandica*, 1,003 individuals representing up to 1.4% of the wintering Iceland - breeding population (5-year peak mean 1991/2 - 1995/6);

Dark-bellied brent goose *Branta bernicla bernicla*, 17,119 individuals representing up to 5.7% of the wintering Western Siberia/Western Europe population (5-year peak mean 1991/2 - 1995/6);

Dunlin *Calidris alpina alpina*, 44,294 individuals representing up to 3.2% of the wintering Northern Siberia/Europe/Western Africa population (5-year peak mean 1991/2 - 1995/6);

Grey plover *Pluvialis squatarola*, 3,825 individuals representing up to 2.5% of the wintering Eastern Atlantic - wintering population (5-year peak mean 1991/2 - 1995/6);

Redshank *Tringa totanus*, 1,788 individuals representing up to 1.2% of the wintering Eastern Atlantic - wintering population (5-year peak mean 1991/2 - 1995/6); and,

Ringed plover *Charadrius hiaticula*, 846 individuals representing up to 1.7% of the wintering Europe/Northern Africa - wintering population (5-year peak mean 1991/2 - 1995/6).

Assemblage qualification: A wetland of international importance.

The area qualifies under **Article 4.2** of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl.

Over winter, the area regularly supports 93,142 individual waterfowl (5 year peak mean 1991/2 - 1995/6) including: wigeon *Anas penelope*, bar-tailed godwit *Limosa lapponica*, dark-bellied brent goose *Branta bernicla bernicla*, ringed plover *Charadrius hiaticula*, grey plover *Pluvialis squatarola*, dunlin *Calidris alpina alpina*, black-tailed godwit *Limosa limosa islandica*, redshank *Tringa totanus*, little grebe *Tachybaptus ruficollis*, little egret *Egretta garzetta*, shelduck *Tadorna tadorna*, curlew *Numenius arquata*, teal *Anas crecca*, pintail *Anas acuta*, shoveler *Anas clypeata*, red-breasted merganser *Mergus serrator*, oystercatcher *Haematopus ostralegus*, lapwing *Vanellus vanellus*, knot *Calidris canutus*, sanderling *Calidris alba*, cormorant *Phalacrocorax carbo* and whimbrel *Numenius phaeopus*.

Solent and Southampton Water SPA (JNCC, 2001b)

This site qualifies under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

- During the breeding season;
 - Common tern *Sterna hirundo*, 267 pairs representing at least 2.2% of the breeding population in Great Britain (5-year peak mean, 1993-1997);
 - Little tern *Sterna albifrons*, 49 pairs representing at least 2.0% of the breeding population in Great Britain (5-year peak mean, 1993-1997);
 - Mediterranean gull *Larus melanocephalus*, 2 pairs representing at least 20.0% of the breeding population in Great Britain (5-year peak mean, 1994-1998);
 - Roseate tern *Sterna dougallii*, 2 pairs representing at least 3.3% of the breeding population in Great Britain (5-year peak mean, 1993-1997); and
 - Sandwich tern *Sterna sandvicensis*, 231 pairs representing at least 1.7% of the breeding population in Great Britain (5-year peak mean, 1993-1997).

This site also qualifies under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species:

- Over winter;
 - Black-tailed godwit *Limosa limosa islandica*, 1,125 individuals representing at least 1.6% of the wintering Iceland - breeding population (5-year peak mean, 1992/3-1996/7);
 - Dark-bellied brent goose *Branta bernicla bernicla*, 7,506 individuals representing at least 2.5% of the wintering Western Siberia/Western Europe population (5-year peak mean, 1992/3-1996/7);
 - Ringed plover *Charadrius hiaticula*, 552 individuals representing at least 1.1% of the wintering Europe/Northern Africa - wintering population (5-year peak mean, 1992/3-1996/7); and
 - Teal *Anas crecca*, 4,400 individuals representing at least 1.1% of the wintering Northwestern Europe population (5-year peak mean, 1992/3-1996/7).

The area also qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl:

Over winter, the area regularly supports 53,948 individual waterfowl (5 year peak mean 1991/2 - 1995/6) including: gadwall *Anas strepera*, teal, ringed plover, black-tailed godwit, little grebe *Tachybaptus ruficollis*, great crested grebe *Podiceps cristatus*, cormorant *Phalacrocorax carbo*, dark-bellied brent goose *Branta bernicla bernicla*, wigeon *Anas penelope*, redshank *Tringa tetanus*, pintail *Anas acuta*, shoveler *Anas clypeata*, red-breasted merganser *Mergus serrator*, grey plover *Pluvialis squatarola*, lapwing *Vanellus vanellus*, dunlin *Calidris alpina alpina*, curlew *Numenius arquata* and shelduck *Tadorna tadorna*.

Chichester and Langstone Harbours Ramsar (JNCC, 1987)

Ramsar criterion 5

Assemblages of international importance: Species with peak counts in winter: 76480 waterfowl (5-year peak mean 1998/99-2002/2003)



Ramsar criterion 6 – Species/populations occurring at levels of international importance.

Qualifying Species/populations (as identified at designation):

Species with peak counts in spring/autumn:

- Ringed plover *Charadrius hiaticula*, Europe / Northwest Africa 853 individuals, representing an average of 1.1% of the population (5-year peak mean 1998/9- 2002/3);
- Black-tailed godwit *Limosa limosa islandica*, Iceland/W Europe 906 individuals, representing an average of 2.5% of the population (5-year peak mean 1998/9- 2002/3); and
- Common redshank *Tringa totanus totanus*, 2577 individuals, representing an average of 1% of the population (5-year peak mean 1998/9- 2002/3).

Species with peak counts in winter:

- Dark-bellied brent goose *Branta bernicla bernicla*, 12987 individuals, representing an average of 6% of the population (5-year peak mean 1998/9- 2002/3);
- Common shelduck *Tadorna tadorna*, NW Europe 1468 individuals, representing an average of 1.8% of the GB population (5-year peak mean 1998/9-2002/3);
- Grey plover, E Atlantic/W Africa -wintering 3043 individuals, representing an average of 1.2% of *Pluvialis squatarola* the population (5-year peak mean 1998/9-2002/3); and
- Dunlin *Calidris alpina alpina*, W Siberia/W Europe 33436 individuals, representing an average of 2.5% of the population (5-year peak mean 1998/9-2002/3).

Species/populations identified subsequent to designation for possible future consideration under criterion 6. Species regularly supported during the breeding season:

Little tern *Sterna albifrons albifrons*, W Europe 130 apparently occupied nests, representing an average of 1.1% of the breeding population.

Solent and Southampton Water Ramsar Sites (JNCC, 1998)

Ramsar Criterion 1

Two large estuarine basins linked by the channel which divides Hayling Island from the main Hampshire coastline. The site includes intertidal mudflats, saltmarsh, sand and shingle spits and sand dunes.

Ramsar Criterion 5

Assemblages of international importance. Species with peak counts in winter: 76480 waterfowl (5-year peak mean 1998/99-2002/2003).

Ramsar Criterion 6

Species/populations occurring at levels of international importance.

Qualifying Species/populations (as identified at designation):

Species with peak counts in spring / autumn

Ringed plover *Charadrius hiaticula*, Europe/Northwest Africa 853 individuals, representing an average of 1.1% of the population (5-year peak mean 1998/9-2002/3);



Black-tailed godwit *Limosa limosa islandica*, Iceland/W Europe 906 individuals, representing an average of 2.5% of the population (5-year peak mean 1998/9-2002/3); and
Common redshank *Tringa totanus totanus*, 2577 individuals, representing an average of 1% of the population (5-year peak mean 1998/9-2002/3).

Species with peak counts in winter

Dark-bellied brent goose *Branta bernicla bernicla*, 12987 individuals, representing an average of 6% of the population (5-year peak mean 1998/9-2002/3);

Common shelduck *Tadorna tadorna*, NW Europe 1468 individuals, representing an average of 1.8% of the GB population (5-year peak mean 1998/9-2002/3);

Grey plover *Pluvialis squatarola*, E Atlantic/W Africa -wintering 3043 individuals, representing an average of 1.2% of the population (5-year peak mean 1998/9-2002/3); and

Dunlin *Calidris alpina alpina*, W Siberia/W Europe 33436 individuals, representing an average of 2.5% of the population (5-year peak mean 1998/9-2002/3).

Solent and Isle of Wight Lagoons SAC (JNCC, 2015f)

Annex I habitats that are a primary reason for selection of this site

1150 Coastal lagoons *Priority feature

The Solent on the south coast of England encompasses a series of coastal lagoons, including percolation, isolated and sluiced lagoons. The site includes a number of lagoons in the marshes in the Keyhaven – Pennington area, at Farlington Marshes in Chichester Harbour, behind the sea-wall at Bembridge Harbour and at Gilkicker, near Gosport. The lagoons show a range of salinities and substrates, ranging from soft mud to muddy sand with a high proportion of shingle, which support a diverse fauna including large populations of three notable species: the nationally rare foxtail stonewort *Lamprothamnium papulosum*, the nationally scarce lagoon sand shrimp *Gammarus insensibilis*, and the nationally scarce starlet sea anemone *Nematostella vectensis*. The lagoons in Keyhaven – Pennington Marshes are part of a network of ditches and ponds within the saltmarsh behind a sea-wall. Farlington Marshes is an isolated lagoon in marsh pasture that, although separated from the sea by a sea-wall, receives sea water during spring tides. The lagoon holds a well-developed low-medium salinity insect-dominated fauna. Gilkicker Lagoon is a sluiced lagoon with marked seasonal salinity fluctuation and supports a high species diversity. The lagoons at Bembridge Harbour have formed in a depression behind the sea-wall and sea water enters by percolation. Species diversity in these lagoons is high and the fauna includes very high densities of *N. vectensis*.

Solent and Dorset Coast Potential SPA (Natural England, 2016)

Summary of qualifying ornithological interest in Solent and Dorset Coast pSPA

- Sandwich tern *Sterna sandvicensis*, 441 pairs (882 breeding adults) (2008 – 2014)
- Common tern *Sterna hirundo*, 492 pairs (984 breeding adults) (2009 – 2014)
- Little tern *Sternula albifrons*, 63 pairs (126 breeding adults) (2009 – 2014)

Thames Basin Heaths SPA (JNCC, 2001c)

During the breeding season;

- Dartford warbler *Sylvia undata*, 445 pairs representing at least 27.8% of the breeding population in Great Britain (Count as at 1999)
- Nightjar *Caprimulgus europaeus*, 264 pairs representing at least 7.8% of the breeding population in Great Britain (Count mean (1998-99))

- Woodlark *Lullula arborea*, 149 pairs representing at least 9.9% of the breeding population in Great Britain (Count as at 1997)

Thursley, Hankley & Frensham Commons (Wealden Heaths Phase 1) SPA (JNCC, 2001d)

JNCC, (2001a), *SPA Description: Wealden Heaths*, [online] Available at <http://jncc.defra.gov.uk/page-2049-theme=default>, Accessed September 2018.

During the breeding season:

- Dartford warbler *Sylvia undata*, 123 pairs representing at least 7.7% of the breeding population in Great Britain
- Nightjar *Caprimulgus europaeus*, 103 pairs representing at least 3.0% of the breeding population in Great Britain
- Woodlark *Lullula arborea*, 105 pairs representing at least 7.0% of the breeding population in Great Britain

Thursley, Ash, Pirbright and Chobham SAC (JNCC, 2015g)

Annex I habitats that are a primary reason for selection of this site

4010 Northern Atlantic wet heaths with *Erica tetralix*

This site represents lowland northern Atlantic wet heaths in south-east England. The wet heath at Thursley is NVC type M16 *Erica tetralix* – *Sphagnum compactum* and contains several rare plants, including great sundew *Drosera anglica*, bog hair-grass *Deschampsia setacea*, bog orchid *Hammarbya paludosa* and brown beak-sedge *Rhynchospora fusca*. There are transitions to valley bog and dry heath. Thursley Common is an important site for invertebrates, including the nationally rare white-faced darter *Leucorrhinia dubia*.

4030 European dry heaths

This south-east England site contains a series of large fragments of once-continuous heathland. It is selected as a key representative of NVC type H2 *Calluna vulgaris* – *Ulex minor* dry heathland. This heath type has a marked south-eastern and southern distribution. There are transitions to wet heath and valley mire, scrub, woodland and acid grassland, including types rich in annual plants. The European dry heaths support an important assemblage of animal species, including numerous rare and local invertebrate species, European nightjar *Caprimulgus europaeus*, Dartford warbler *Sylvia undata*, sand lizard *Lacerta agilis* and smooth snake *Coronella austriaca*.

7150 Depressions on peat substrates of the Rhynchosporion

This site contains examples of Depressions on peat substrates of the Rhynchosporion in south-east England, where it occurs as part of a mosaic associated with valley bog and wet heath. The vegetation is found in natural bog pools of patterned valley mire and in disturbed peat of trackways and former peat-cuttings.

Thursley & Ockley Bogs Ramsar site (JNCC, 1994)

Ramsar criterion 2: Supports an appreciable assemblage and number of rare wetland invertebrate species including notable numbers of breeding dragonflies.

Ramsar criterion 3: To maintain the ecological diversity of the area as it is one of few sites in Britain to support all six native reptile species. The site also supports nationally important breeding populations of nightjar *Caprimulgus europaeus* and woodlark *Lullula arborea*.

Wealden Heaths Phase II SPA (JNCC, 2015h)

During the breeding season:

- Dartford warbler *Sylvia undata*, 16 pairs representing 1.7% of GB population
- Nightjar *Caprimulgus europaeus*, 43 pairs representing 1.4% of GB population
- Woodlark *Lullula arborea*, 15 pairs representing 4.3% of GB population

Woolmer Forest SAC (JNCC, 2015i)

Annex I habitats that are a primary reason for selection of this site

3160 Natural dystrophic lakes and ponds

Within Woolmer Forest, Cranmer Pond is a southern example of a dystrophic pond in an area of 4010 Northern Atlantic wet heaths with *Erica tetralix* and 7150 Depressions on peat substrates of the Rhynchosporion. The 8 ha pond is thought to originate from peat-cutting, and has an average depth of 1 m. The aquatic flora is comprised of bulbous rush *Juncus bulbosus* var. *fluitans*, which grows submerged and forms dense mats at the margins, and bog-mosses *Sphagnum* spp. which grow in shallower areas. To the north and south of Cranmer Pond are areas of 7140 Transition mires and quaking bogs.

4030 European dry heaths

Woolmer Forest contains the largest and most diverse area of lowland heathland in Hampshire, outside the New Forest, representing a transition between this and the Surrey heaths. Dry heaths in Woolmer Forest include examples of NVC type H1b *Calluna vulgaris* – *Festuca ovina* heath, *Hypogymnia physodes* – *Cladonia impexa* sub-community, dominated by heather *Calluna vulgaris* and *Cladonia* lichens. Most of the dry heath is H2 *Calluna vulgaris* – *Ulex minor*, characterised by dwarf gorse *Ulex minor*. Woolmer Forest is the only site in Britain that supports all six native reptiles (including the Annex IV species sand lizard *Lacerta agilis* and smooth snake *Coronella austriaca*) and all six native amphibians (including 1166 great crested newt *Triturus cristatus*). It also supports an outstanding invertebrate fauna and bird assemblage, including European nightjar *Caprimulgus europaeus*, wood lark *Lullula arborea*, Dartford warbler *Sylvia undata*, Eurasian hobby *Falco subbuteo*, hen harrier *Circus cyaneus* and merlin *Falco columbarius*.

7150 Depressions on peat substrates of the Rhynchosporion

In this west Wealden site, seepage mires and other waterlogged areas are a minor feature amongst predominantly wet heath habitat. Seepages are fed from a mix of acidic and calcareous sources, and give rise to a series of pool and hummock structures within the mire. The *Rhynchospora alba* occurs within NVC type M21 *Narthecium ossifragum* – *Sphagnum papillosum* mire. It includes a range of bog-mosses *Sphagnum* spp., cottongrasses *Eriophorum angustifolium* and *E. vaginatum*, bog asphodel *Narthecium ossifragum*, cranberry *Vaccinium oxycoccos* and the rare marsh clubmoss *Lycopodiella inundata*.



Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site

4010 Northern Atlantic wet heaths with *Erica tetralix*

7140 Transition mires and quaking bogs



Appendix D: Nutrient Balancing Calculations Without Mitigation

Nutrient Balancing Assessment



Table 3: Calculating Total Nitrogen (TN) Load from Development Wastewater (Stage 1)

Step	Measurement	Value	Unit	Explanation
Development proposal	Development types that would increase the population served by a wastewater system	56.000	Residential dwellings	Number of units
1	Additional population	134.400	Persons	Uses an average household size of 2.4 people
2	Wastewater volume generated by development	14784.000	L/day	Persons x 110 litres / day. Where relevant, deduct wastewater volume of population displaced by the proposed development
3a	Waste Water Treatment Works (WwTW) environmental limit for TN	9.700	mg/l TN	Budds Farm WwTW limit
3b	Receiving WwTW environmental TN permit limit. Assume discharge to be at 90% of consent limit.	8.730	mg/l TN	90% of the consent limit
4	Deduct acceptable TN loading (@ 2 mg/l TN) (as defined in paragraph 4.40 of Natural England guidance ²)	6.730	mg/l TN	Step 3b – 2mg/l TN
5	TN discharged after WwTW	99496.320	mg/TN/day	Step 2 x Step 4
6	Convert mg/TN to kg/TN per day	0.099	Kg/TN/day	Divide by 1,000,000
7	Convert kg/TN per day to kg/TN per year	36.316	Kg/TN/yr	x365 days
TN Load Wastewater 36.316 Kg/TN/yr				

Nutrient Balancing Assessment



Table 4: Calculating TN Load from Current Land use (Stage 2)

Step	Measurement	Farm type	Value	Unit	Explanation
1	Total area of existing agricultural land	Lowland grazing	2.650	ha	Area of land needed for development (2.65 ha)
2	Farm type nitrate loss	Lowland grazing	13.000	Kg/ha/yr	Land-use comprises lowland grazing
3	Multiply total area by farm type nitrate loss	Lowland grazing	34.450	Kg/TN/yr	Area x nitrate loss
TN Load Current Land Use 34.450 Kg/TN/yr					

Table 5: Calculating TN Load from Future Land Uses (Stage 3)

Step	Measurement	Value	Unit	Explanation
1	Future urban land	1.940	ha	Area of development that will change from agricultural land to urban land use
2	Total nitrogen load from future urban area	27.742	Kg/TN/yr	Area (ha) x 14.3 Kg/TN/yr (nitrogen leaching from urban land each year)
3	New open space	0.710	ha	Area of development that will change to Open space (all areas below 0.5 ha so still classed as urban land)
4	TN load from Open space	10.153	Kg/TN/yr	Area (ha) x 14.3 Kg/TN/yr (nitrogen leaching from Open space each year)
5	Combine TN load from future land uses	37.895	Kg/TN/yr	Step 2 + Step 4
TN Load Future Land Use 37.895 Kg/TN/yr				

Nutrient Balancing Assessment



Table 6: Calculating Net Change in TN from The Development (Stage 4)

Step	Measurement	Value	Unit	Explanation
1	Identify TN loads from wastewater	36.316	Kg/TN/yr	Stage 1
2	Calculate TN from land use – subtract TN load from future land uses (Stage 3) from existing land uses (Stage 2)	-3.445	Kg/TN/yr	Stage 2 – Stage 3
3	Determine nitrogen budget – the difference between the TN load for the proposed development and the existing uses	39.761	Kg/TN/yr	Step 1 – Step 2
4	Calculate and include 20% buffer	47.713	Kg/TN/yr	Step 3 + (Step 3 / 5)
TN Budget 47.713 Kg/TN/yr				



Appendix E: Total Nitrogen Budget Calculations using Off-setting Land as Mitigation

Nutrient Balancing Assessment



Table 3: Calculating TN Load From Current Land Use of Off-setting Land (Stage 2)

Step	Measurement	Farm type	Value	Unit	Explanation
1	Total area of off-setting land – Current use	Lowland grazing	6.000	ha	Area of land to be used as off-setting
	Total area of off-setting land – Proposed use	SANG / Public Open Space (equivalent)	6.000	ha	
2	Farm type nitrate loss	Lowland Grazing	13.00	Kg/ha/yr	The existing land use levels
		SANG / Public Open Space (equivalent)	5.00	Kg/ha/yr	
3	Multiply total area by farm type nitrate loss	Lowland Grazing	78.000	Kg/TN/yr	Area x nitrate loss
		SANG / Public Open Space (equivalent)	30.000	Kg/TN/yr	
4	Change calculated for turning lowland grazing into open space	N/A	-48.000	Kg/TN/yr	Open space – Lowland grazing
TN Load Current Land Use -48.000 Kg/TN/yr					



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