June 22

Environmental Statement, Non-Technical Summary

Land East of Winnycroft Lane, Snow Capel, Matson, Gloucester

Prepared by Black Box Planning
on behalf of *Bromford Housing*

Black Box Planning

Bromford.

1. Non-Technical Summary

Introduction and Purpose

1.1. This is a non-technical summary of the Environmental Impact Assessment (EIA) process undertaken on behalf of Bromford Housing ('the Applicant') in support of a full planning application ('the planning application') made to Gloucester City Council ('the Local Planning Authority') in respect of residential development at Snow Capel, Matson, Gloucester ('the site') with the following description of development:

> *"Residential development of 190 no. dwellings (Class C3); vehicular, pedestrian and cycle access from Winnycroft Lane; public open space and landscaping; drainage attenuation and other associated works"* (the 'proposed development').

1.2. The Environmental Statement (ES) has been compiled by Black Box Planning (BBP) with the assessments of each environmental matter undertaken by a team of specialists. The purpose of the ES is to present the findings of the EIA process and identify the likely significant environmental effects of the proposed development during both the construction and operational phases.

Chapter 1 - Introduction

1.3. Chapter 1 – Introduction sets out the purpose and structure of the ES and explains that Black Box Planning (BBP), in coordination with Environmental Design Partnership (EDP), have undertaken an EIA on behalf of Bromford Housing in respect of their full detailed planning application for residential development land at Snow Capel Farm, Matson Gloucester. The site is defined within the ES at Appendix 3.1.

1.4. It explains that the scope of the ES was determined on the basis of a screening opinion adopted by the local planning authority in October 2017 which established that the only features of the environment which should be subject to EIA were cultural heritage and ecology.

1.5. It confirms that the planning application is submitted in full detail and therefore represents the definitive proposed development and as such is considered to represent a robust assessment of the likely significant environmental effects of the proposal.

1.6. It also confirms how one may consult and view a copy of the ES alongside the planning application documents.

Chapter 2 – Scope and Methodology

1.7. Chapter 2 – Scope and Methodology sets out the key stages of the EIA process and how the preparation of the ES complies with the current EIA Regulations.

1.8. It sets out the various assumptions made and methodologies adopted in the ES in terms of the baseline conditions, proposed development, assessment of effects, mitigation and enhancement assessment of cumulative impacts.

Chapter 3 – Site and Surrounding Area

1.9. Chapter 3 – Site and Surrounding Area describes and comprises information on the site which is subject to the planning application. It sets out the location and surrounding context to the site and includes a description of the site itself.

1.10. It also confirms the presence of any environmental designations over or on the site – such as the Scheduled Monument registered as 'Moated site at Sneedham's Green, 220m to the north east of Green Farm'.

Chapter 4 – Proposed Development, Need and Alternatives

1.11. Chapter 4 – Proposed Development, Need and Alternatives defines the proposal and provides a description of the proposed development comprising information on the design, size and other relevant features of the development.

1.12. The chapter explains that the proposal comprises the construction of 190 no. residential dwellings, providing for a mix of different house types including 22 no. 1 bedroom flats; 58 no. 2 bedroom houses (mainly houses but includes 3 no. flat over garage (FOG) units); 92 no. 3 bedroom houses and 18 no. 4 bedroom houses. All of the proposed buildings are either 2 or 2.5 storeys in height.

1.13. The chapter explains that the proposal mainly consists of terraces, semi-detached and detached houses set back from the street and comprise private rear gardens. It explains that the proposal also includes various small apartment blocks which will be set over two storeys and comprise a similar style and appearance to the houses.

1.14. The chapter explains that a new vehicular junction will built from Winnycroft Lane into the site. This will be located adjacent to the rear of property Yew Trees on Matson Lane. The junction will also provide access for pedestrians and cycles. The junction will also incorporate a new footpath delivered along Winnycroft Lane to the north to connect into the existing network on Sneedhams Road. The chapter explains that a separate emergency vehicle access will be provided from further south on Winnycroft Lane into the proposal.

1.15. It is explained that internally, the dwellings will be accessed along a central road with a variety of minor roads and private driveways accessible from it. The central road has been designed to accommodate a bus service in the future. It is also explained that each dwelling will have parking spaces allocated to it either within or adjacent to the property boundary.

1.16. It is explained that a key feature of the proposal is the connections into the existing pedestrian and cycle network of the local area. A pedestrian and cycleway connection will be made from the development site currently being built out immediately to the north (Barratt Homes). Internally to the site, new pedestrian and cycle routes are also proposed.

1.17. The chapter explains that another key feature of the proposal is a generously sized central public open space which contains the moat. This is deliberately designed to encourage public use and recreation of the area and engagement with the moat through proposed interpretation boards. The openness of the area will ensure views across Winnycroft Lane to Sneedham's Green are maintained.

1.18. The chapter also explains that the proposal will be served by a new drainage system comprising a series of underground drainage pipes and tanks.

1.19. The chapter also sets out the expected build programme and construction activities on the site.

1.20. The chapter explains the need for development which is the significant and chronic affordable housing need established across the City, historically and presently. It is explained that the Council struggles to meet its own housing needs within the city area, instead is reliant on delivering strategic development in neighbouring Tewkesbury Borough. The affordable homes delivered are not prioritised for those who have a local connection to Gloucester. This constrains the supply of affordable housing to meet the needs of people in the administrative area.

1.21. It also confirms that the proposal will also help to deliver the Matson Renewal project, a priority affordable housing led estate regeneration project in the City. This is by providing alternative accommodation opportunities for existing Matson residents to an appropriate location in their local community.

1.22. The chapter also considers the alternatives to the development. It is explained that there are very few alternatives within the Gloucester City boundary for affordable housing to delivered at scale in a suitable location. It is explained that due to the urban nature of the City, most potential locations are regeneration-led which can have significant viability issues which does not help with affordable housing delivery.

1.23. It also sets out that the design of the proposal has evolved over a period of time and several versions of the layout have been tested and the potential effects on the environment considered. The guiding design principle of the proposal has been to ensure the respectful setting of the moat and to take advantage of an opportunity in this respect.

1.24. It is confirmed that the 'do-nothing' approach is not a tenable position in consideration of the substantial and persistent shortfall of affordable housing in Gloucester.

Chapter 5 – Planning Policy Context

1.25. Chapter 5 – Planning Policy Context sets out the national and local planning policy context for the consideration of the proposal. This will ultimately guide the determination of the proposal along with any material considerations such as the significant shortfall in affordable housing across Gloucester City.

Chapter 6 – Ecology and Biodiversity

1.26. Chapter 6 – Ecology and Biodiversity sets out the considerations of the environment and the site from an ecology perspective. It assesses the potential effects of the proposal on the environment and considers the necessary measures to ensure that no unacceptable impacts are generated as a result of the proposal.

1.27. The chapter sets out the predicted likely significant effects of the proposed development on the environment (without any mitigation) and these include during the construction phase: including habitat loss due to land take upon habitats and species; indirect effects to designated sites; effects of light, noise and human disturbance to habitats and species; increased risk of collisions to species and pollution of ground water and surface water flows. These also include during the operational phase: including effects of light and noise, visual or human disturbance to designated sites, habitats and species; increased risk or collision and predation of species and alteration of surface water run-off or groundwater flow.

1.28. The chapter confirms that an Ecological Construction Method Statement (ECMS) is required to ensure no unacceptable impacts on ecology during the construction phase. This includes setting out sensitive working methodologies; use of protective fencing; daylight hour working restrictions and limited low-level artificial lighting and re-inspection of trees with wildlife potential.

1.29. The chapter also confirms that the proposal includes the provision of new hedgerow planting (60m linear) to compensate for habitat loss, combined with habitat buffering, enhancement and sensitive long-term management. The proposal will also include the enhancement of the pond and adjacent retained grassland through sensitive management.

1.30. It also confirms that an Ecological Management Plan (EMP) and landscaping scheme are required to ensure that ongoing maintenance and management of the site has no unacceptable impacts on ecology during the operational phase. This includes the long-term management of new tree, hedgerow and shrub planting in addition to grassland habitat to create strong foraging and dispersal corridors. It will also include the implementation of sensitive habitat management and monitoring; sensitive design of informal open space and footpaths to divert recreational use away from sensitive habitats; inclusion of appropriate signage, dog bins, styles and stock fencing around the pond and habitat protection through sensitive drainage and lighting strategies.

Chapter 7 – Cultural Heritage

1.31. Chapter 7 – Cultural Heritage sets out the considerations of the environment and the site from a cultural heritage perspective. It assesses the potential effects of the proposal on the environment and considers the necessary measures to ensure that no unacceptable impacts are generated as a result of the proposal.

1.32. The chapter considers the predicted likely significant effects of the proposed development on the environment and these include potential effects on the setting of the scheduled monument moated site and the presently unrecorded archaeological remains where they are well-preserved and located in the footprint of foundations and service trenches where they are likely to be entirely lost

1.33. The chapter confirms that the presence of houses and their associated infrastructure and lighting in views across the open space around the monument would reduce the degree to which its setting reflects the appearance of the countryside. Nonetheless, it is apparent that the monuments present setting contains very little quality in this regard and the surrounding field does not contain any feature or is part of a landscape that relates closely to the monuments historic setting or function. The construction of the M5 motorway is a factor in this regard.

1.34. The likely effects arising from a change within the scheduled monuments setting has been assessed and with in-built mitigation in the form of: the retention of green open space around the monument populated by enhanced grassland; the provision of shrubs, hedges and trees in that space and the reinstatement of the hedgerow respecting the course of a historic field boundary; positive management of the monument and interpretation as set out with the Heritage Management Plan (HMP) the change in setting is considered to be an acceptable impact.

1.35. The chapter also considered that moderate potential exists for archaeological remains related to Late Iron Age and Roman Period settlement and for buried remains related to Medieval agriculture to be present. However, the chapter considered that any archaeological remains are likely to have been heavily disturbed by the construction of the M5 motorway as across most of the site is a layer of made ground deposited at the time of construction. It is expected that any potential for archaeological impacts could be appropriately mitigated through a programme of archaeological recording.

St Catherine's Court
Berkeley Place
Bristol
BS8 1BQ

[redacted]

gva.co.uk

Our Ref: 07B608776

11 May 2017

Gloucester City Council
Development Control
Herbert Warehouse
The Docks
Gloucester
GL1 2EQ

Sent via email to: development.control@gloucester.gov.uk

Dear Sir/Madam

The Town and Country Planning (Environmental Impact Assessment) (England) Regulations 2011, as amended 2015 – Request for a Screening Opinion
Land at Winnycroft Lane, Matson, Gloucester

We write on behalf of our client, Edward Ware Homes, to request Gloucester City Council's opinion as to whether an Environmental Impact Assessment (EIA) is required in accordance with the Town and Country Planning (Environmental Impact Assessment) (Amendment) Regulations 2015 (The EIA Regulations) for the proposed development on land to the east of Winnycroft Lane, Matson, Gloucester.

Edward Ware Homes intend to submit an outline planning application for up to 200 residential dwellings on the site.

In accordance with the EIA regulations, the following information is provided alongside:

- A draft plan identifying the location of the development and site layout (enclosed);
- A brief description of the existing site and proposed development; and
- A description of the potential effects of the development on the environment.

Existing Site

The site extends to approximately 7.9ha as shown on the enclosed plan and is located to the south eastern edge of Gloucester City. It is located to the east of Winnycroft Lane and bordered by the M5 motorway to the east.

The site is located to the south of two other sites being promoted for residential development through the emerging Joint Core Strategy (JCS), Gloucester City Plan and outline planning applications. The site directly

adjacent to the site to the north has recently been granted planning permission at appeal.

The site currently comprises undeveloped (greenfield) land which is unallocated for the purposes of planning policy and is currently used for agricultural purposes. Located relatively centrally within the site are the remains of a moat which is designated as a Scheduled Ancient Monument (SAM).

The area surrounding the site is predominantly agricultural in nature but also includes some other uses including residential. The site is not located within a conservation area and is located within Flood Risk Zone 1 (low).

In addition to the SAM described above there are a number of other designations within the vicinity of the site to be mindful of as set out below:

- The site is located in proximity to the Range Farm Fields; Hucclecote Meadows; Robin's Hill Wood Quarry (also a Local Nature Reserve); and Cotswold Commons and Beechwoods Sites of Special Scientific Interest (SSSIs).
- The Cotswolds Commons and Beechwoods Special Area of Conservation (SAC) is located approximately 4km to the north east of the site.
- The Cotswolds Area of Outstanding Natural Beauty (AONB) is located to the east of the M5.

From the Council's online records it appears that the site itself is not the subject of any planning history that is relevant to this request. It is, however, considered necessary to note the planning history of two sites in close proximity to this site as set out below.

Barwood Application (ref.14/01063/OUT)

An application for outline planning permission for up to 420 dwellings and community space/buildings as well as associated landscaping, public open space, access, drainage, infrastructure, earthworks and other ancillary enabling works within a site area of approximately 20ha was recently allowed at appeal.

Prior to the submission of the application, the proposals were subject to a formal Screening (ref.14/00718/EIA) under the Environmental Impact Regulations. The site lies within a designated Landscape Conservation Area and within proximity of the Cotswolds AONB. The Council concluded that the proposed development did not constitute EIA development and that an Environmental Statement (ES) would not be required to accompany a subsequent planning application. The Council reasoned that the proposed development would not be likely to have significant effects on the environment by virtue of factors such as its nature, size or location.

Linden Homes Application (ref.14/01470/OUT)

An outline application for the construction of up to 250 dwellings, public open space, a primary access and emergency access from Corncroft Lane and associated infrastructure within a site area of approximately 8.8ha is currently being determined by the LPA.

Prior to the submission of the application, the proposals were subject to a formal Screening (ref.14/00486/EIA) under the Environmental Impact Regulations. The Council concluded that the proposed development also did not constitute EIA development and that an Environmental Statement (ES) would not be required to accompany a subsequent planning application. The Council reasoned that the proposed development would not be likely to have significant effects on the environment by virtue of factors such as its nature, size or location.

Further consideration is given to the cumulative effect of the proposed development in the context of the two applications below.

A pre-application request has recently been submitted to the local planning authority and discussions are ongoing.

Proposed Development

The current proposal is for an outline application comprising up to 200 residential dwellings and open space.

The location of the SAM within the site has clearly been a key consideration in the design of the proposals. This has therefore been carefully incorporated into the design with a view to enhancing both the current maintenance regime for the SAM and its setting and relationship with the wider landscape, particularly to the west where the proposals present the opportunity to 'open up' the SAM to the historic green landscape to the west of the site. Development has therefore been set back from the SAM and an area of open space is proposed surrounding this, particularly to the west, which would act as a focal point to any future development.

This open space to the west of the SAM also acts to ensure that the ecological value of the site is preserved. From initial investigations and our knowledge of the developments proposed to the north, it is understood that Great Crested Newts are likely to inhabit the pond within the SAM. There are also a number of ponds located off site to the west and it is therefore important for the relationship on land to the west of the site to be maintained for this purpose. As such, the location of open space to the west of the SAM in order to enhance its setting enables this relationship to be retained and enhanced through appropriate management. Further ecological surveys which are considered necessary will be undertaken through the relevant survey seasons and associated reports would be submitted in support of any future application.

In addition to the open space that is proposed to the west of the SAM a significant buffer of landscaped open space would be provided along the eastern boundary of the site adjacent to the M5. It is proposed that this area would incorporate an acoustic bund and fence along with landscaping in order to mitigate any noise impacts arising from the M5 on the proposed residential development. This approach is in accordance with that taken to the north of the site confirming its acceptability. Additionally, the continuation of a noise attenuation buffer within this site is likely to result in benefits in terms of noise attenuation for the sites to the north.

Whilst it is accepted that this area would be the subject of some noise arising from the adjacent motorway it would provide an area of additional recreational space. A pedestrian route is proposed within this, which would link to the development to the north. A radial route is proposed along all of the site boundaries which would utilise the existing public right of way which runs along the northern site boundary. The public right of way which currently runs broadly diagonally through the site would be relocated to allow for improved connectivity throughout the site and to link directly to the public open space which is to be created surrounding the SAM.

It is currently proposed that vehicular access would be gained to the site via Winnycroft Road within the southern half of the site. A primary route would then run into the site to the south of the SAM set back from this and the proposed open space which is to surround it. Secondary routes would then serve the remainder of the site.

Technical Survey Work

The appointed project team are currently undertaking technical survey work on the site to allow its constraints and opportunities to be fully investigated and understood in order to ensure a robust assessment of the impact of the proposed scheme. This work will be taken into account in the preparation of any application and will ensure that the proposed scheme will not result in any significant detrimental impacts on the local area. The technical surveys that have been completed to date/are underway are as follows:

- Heritage Assessment;
- Archaeological Desk Based Assessment;
- Acoustic Assessment
- Landscape and Visual Impact Assessment;
- Transport Assessment and Travel Plan;
- Flood Risk Assessment and Drainage Strategy;
- Utilities Assessment;
- Contamination Assessment; and
- Ecological Assessment.

Initial findings of assessments done to date indicate that the site's location is not considered to be of significant environmental sensitivity. Additionally, as set out above, the heritage, ecology and noise constraints presented by the site have been fully taken into account in the design of the current proposals in order to ensure that this can be fully and suitably addresses. Therefore it is considered that the impacts of development could be assessed through standalone technical reports that form part of the application package.

The cumulative impact of the proposed development will also be considered by these technical assessments. The cumulative effects of the development are not considered likely to cause any significant effects.

Screening Criteria

The EIA Regulations contain two schedules of development projects. Schedule 1 identifies where EIA is a mandatory requirement for a proposed development. The proposals do not constitute Schedule 1 development. Schedule 2 identifies where EIA may be required, if significant environmental impacts are likely to result from a proposed development.

The regulations were amended in March 2015 (implemented from the 6th April 2015) and amendments included raising the thresholds for triggering the requirement for EIA for Schedule 2 developments. The relevant extract of the regulations is set out below (Paragraph 2 of Schedule 2, Category 10 – Urban Development Projects):

(b) Urban development projects, including the construction of shopping centres and car parks, sports stadiums, leisure centres and multiplex cinemas;	(i) The development includes more than 1 hectare of urban development which is not dwellinghouse development; or (ii) The development includes more than 150 dwellings; or (iii) The overall area of the development exceeds 5 hectares.

The scheme currently proposed comprises the development of up to 200 residential dwellings within a site area of c.7.9ha. Therefore, the application proposals for this site meet the thresholds for Schedule 2 (b) (ii) and (iii) developments.

On this basis, and in accordance with the Regulations, consideration has been given to whether the site is located in a 'sensitive area' as defined by the EIA Regulations, or is otherwise likely to affect a sensitive area. The EIA Regulations define 'sensitive areas' as:

- Sites of Special Scientific Interest and European sites;
- National Parks, the Broads and Areas of Outstanding Natural Beauty; and
- World Heritage Sites and scheduled monuments.

The site is not located within or partly within any of these statutory designations and is therefore not located within a 'sensitive area' as defined by the EIA Regulations. In addition, the site does not fall

within any international biodiversity designations. Therefore, it is not considered that screening under the Habitat Regulations Assessment (HRA) is required as part of these proposals.

As the proposed development falls within the criteria set out within Schedule 2, Category 10 (b) (ii-iii), the proposals have been considered against the selection criteria for screening Schedule 2 development as set out in Schedule 3 of the Regulations. These criteria relate to the characteristics of the development, the location of the development and the characteristics of the potential impact. These are considered in further detail below:

Characteristics of development

The characteristics are identified as:

a) *The size of the development;*
b) *The culmination with other development;*
c) *The use of natural resources;*
d) *The production of waste;*
e) *Pollution and nuisances;*
f) *The risk of accidents, having regard in particular to substances or technologies used.*

The size of the development proposed is not considered to be significant. The development of the site in culmination with other surrounding developments will be fully assessed by the technical reports that are being prepared to support any future application. In addition, these schemes were not considered to constitute EIA development and comprised a significantly larger scale of development.

The proposed development of up to 200 dwellings will not result in any excessive use of natural resources; production of waste; pollution and nuisances; or increased risk of accidents.

Location of development

Schedule 3 states that the environmental sensitivity of areas likely to be affected must be considered with regard to:

a) *The existing land use;*
b) *The relative abundance, quality and regenerative capacity of natural resources in the area; and*
c) *The absorption capacity of the natural environment.*

The site is not located in a sensitive area and the proposals are for a non-intensive and non-obtrusive use in terms of natural resources and impact on the natural environment.

Characteristics of the Potential Impact

Schedule 3 states that the potential significant effects of the development must be considered in relation to criteria set out above, and must have regard to:

a) *The extent of the impact (geographical area and size of affected population);*
b) *The transfrontier nature of the impact;*
c) *The magnitude and complexity of the impact;*
d) *The probability of the impact; and*
e) *The duration, frequency and reversibility of the impact.*

The assessment above makes clear that the development will not result in any potential significant environmental effects.

Conclusion

This request seeks Gloucester City Council's consideration of the proposed development in the context of the Regulations in order to provide an opinion as to whether these proposals constitute EIA development.

The EIA Regulations set out that that Schedule 2 developments are not likely to require an EIA unless there is a likelihood of 'significant environmental effects'. Further guidance on how to assess 'significance' is provided in Planning Practice Guidance: Environmental Impact Assessment Annex Indicative screening thresholds, which accompanies the National Planning Policy Framework. This identifies:

> *"Environmental Impact Assessment is unlikely to be required for the redevelopment of land unless the new development is on a significantly greater scale than the previous use, or the types of impact are of a markedly different nature or there is a high level of contamination. Sites which have not previously been intensively developed:*
>
> *(i) area of the scheme is more than 5 hectares; or*
> *(ii) it would provide a total of more than 10,000 m2 of new commercial floorspace; or*
> *(iii) the development would have significant urbanising effects in a previously non-urbanised area (e.g. a new development of more than 1,000 dwellings)."*

Our review of the Regulations and guidance indicates that due to the scale, nature and location of the development, a formal Environmental Impact Assessment for the proposed development is not required for the following reasons:

- The proposed development (up to 200 dwellings) is significantly below the1,000 unit threshold which would indicate a significant urbanising effect, even when taken cumulatively with the adjoining development land (up to 500 dwellings and up to 200 dwellings).
- The site is not in a sensitive location in that it is not subject to any national or local ecology designations and is not of significant ecological value.
- The site is not subject to any national landscape designations and its development would not have a significant effect on the nearby designations given their distance from the site and the relatively modest scale of development proposed.
- The site is not at risk of significant flooding and associated surface water drainage can be satisfactorily managed.
- Impacts associated with the development would be limited to the immediate area.

Notwithstanding the above, we also note that the Council screened out the need for an Environmental Statement to be submitted with the applications for the two sites immediately to the north which propose a significantly greater quantum of development. On this basis, we request formal confirmation from the local authority that EIA is not required for the proposed development.

I trust that the enclosed information is sufficient to enable you to issue a screening opinion, and would be grateful if you could formally acknowledge receipt of this request.

We look forward to receiving your response within the statutory three week period, beginning on receipt of this Screening Request. Should you require any further information or have any queries regarding the proposed development please do not hesitate to contact me.

Yours sincerely

[redacted]

[redacted]
Principal Planner

[redacted]

For and on behalf of GVA Grimley Limited

Encs: Site Location Plan
Constraints and Opportunities Plan, dwg no. CP-01 Rev B
Draft Framework Plan, dwg no. FP 01 Rev A

EIA ANALYSIS AND SCREENING PROFORMA

ANALYSIS

1	Case Details	
a	Applicant Case reference	
b	LPA case reference	
	17/00533/EIA	
c	SoS case reference	
d	Site Address	
	Land at Winnycroft Lane, Matson, Gloucester	
e	Brief description of development	
	Propsed development of 200 dwellings including new vehicular access to Winnycroft Lane.	
f	Approval of reserved matters?	
	Yes	
	No	*
	Approval of conditions?	
	Yes	
	No	*
	If Yes, enter the description of development subject of the related planning permission	
g	Area of development/works/new floorspace (as appropriate)	
	200 dwellings on 7.9 hectares of land	
2	**EIA details**	
A	**Schedule 1**	
(i)	Is the proposed development Schedule 1 development as described in Schedule 1 of the EIA Regulations?	
	Yes	
	No	*
(ii)	If YES, under which description of development i.e. Nos. 1-21?	
B	**Schedule 2**	
(i)	Is the proposed development Schedule 2 development as described in Column 1 of Schedule 2 of the EIA Regulations?	
	Yes	*
	No	
(ii)	If YES, under which description of development in Column 1 i.e. Nos. 1-13?	

	10 (b) - Infrastructure projects: Urban Development projects	
(iii)	Is the development within, partly within, or near a 'sensitive area' as defined by Regulation 2 of the EIA Regulations?	
	Yes	*
	No	
(iv)	If YES, which area?	
	Scheduled monument -	
(v)	Are the applicable thresholds/criteria in Column 2 exceeded/met?	
	Yes	*
	No	
(vi)	If yes, which applicable threshold/criteria?	
	Number of dwelling proposed and size of site area	
3	**LPA/SOS Screening**	
	All applications inc reserved matters/conditions	
(i)	Has the LPA issued a Screening Opinion (SO)?	
	Yes	
	No	*
(ii)	Has the SoS (GO) issued a Screening Direction (SD)?	
	Yes	
	No	*
(iii)	If yes, is a copy of the SO/SD on the file?	
	Yes	
	No	
(iv)	If yes, is the SO/SD positive?	
	Yes	
	No	
	Reserved matters/conditions applications only	
(i)	Was original PP subject to EIA screening?	
	Yes	
	No	
(ii)	Was a SO/SD issued for the original PP?	
	Yes	
	No	
(iii)	If yes, is a copy of the SO/SD for the original PP on file?	
	Yes	
	No	
4	**Environmental Statement (ES)**	
	Has the applicant supplied an ES for the current or previous (if reserved matters or conditions) application?	
	Yes	
	No	*
Name		

Date	

SCREENING

A. CHECKLIST			
Questions to be considered		**Likely/Unlikely – briefly describe**	**Is this likely to result in a Significant effect?** **Yes/No - why?**
1	Will construction, operation or decommissioning of the Project involve actions which will cause physical changes in the locality (topography, land use, changes in waterbodies, etc)?	Likely - site is currently an agricultural field and development would result in a change in the use of the land and considerable new development.	No - Limited scale of site and development unlikely to lead to significant effects
2	Will construction or operation of the Project use natural resources such as land, water, materials or energy, especially any resources which are non-renewable or in short supply?	Likely - Use of land, water, materials, energy. Resources unlikely to be in short supply. Refer to sam	No - Limited scale of site and development unlikely to lead to significant effects.
3	Will the Project involve use, storage, transport, handling or production of substances or materials which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health?	Unlikely - Nature of existing un developend green field site and proposed uses not likely to involve such substances.	No - Given site and proposals, environmental risks unlikely.
4	Will the Project produce solid wastes during construction or operation or decommissioning?	Likely - but limited amounts typical of any construction site and residential deelopment.	No - Scale of development not significant and amount of waste unlikely to be significant.
5	Will the Project release pollutants or any hazardous, toxic or noxious substances to air?	Likely - Some arising from normal demolition/construction processes. Hazardous, toxic, noxious substances unlikely.	No - Scale of proposal not significant, pollution unlikely to be significant.
6	Will the Project cause noise and vibration or release of light, heat energy or electromagnetic radiation?	Likely - Noise, vibration likely as part of normal demolition/construction processes.	No - Limited scale of site and development unlikely to lead to significant effects.
7	Will the Project lead to risks of contamination of land or water from releases of pollutants onto the ground or into surface waters, groundwater, coastal waters or the sea?	Unlikely - but no known likely sources of pollution.	No - Any currently-unknown pollutants encountered unlikely to be significant.
8	Are there any areas on or around the location which are already subject to pollution or environmental damage e.g. where existing legal environmental standards are exceeded, which could be affected by the project?	The site lies adjacent to the M5 motorway and levels of noise across the site are likley to be high.	No - Scale of project unlikely to lead to significant impacts in EIA terms but local impacts are likely.
9	Will there be any risk of accidents during construction or operation of the Project which could affect	Likely - Some risk of accidents during construction as per normal demolition /	No - Nature of site and proposal doesn't indicate significant risk.

	human health or the environment?	construction site.	

10	Will the Project result in social changes, for example, in demography, traditional lifestyles, employment?	Likely - but limited amounts typical of any residential development.	No - Limited scale of site and development unlikely to lead to significant effects
11	Are there any areas on or around the location which are protected under international or national or local legislation for their ecological, landscape, cultural or other value, which could be affected by the project?	Likely - Significant heritage assets comprising Scheduled Monument within the site. Additionally the site lies within a locally designated Landscape Conservation Area. Land to the other side of the M5 motorway which runs along the boundary of the site, is designated AONB.	Yes- Potential to cause harm to the significance of the monument through a change in its setting. Local impacts upon lansdscape character are likely but not significant in EIA terms.
12	Are there any other areas on or around the location which are important or sensitive for reasons of their ecology e.g. wetlands, watercourses or other waterbodies, the coastal zone, mountains, forests or woodlands, which could be affected by the project?	Likely - The site lies in close proximitiy to the Cotswols Commons and Beechwoods Site of Special Scientific Interest and the Cotswolds Beechwoods Special Area of Conservation. Natural Englandl	Yes - Natural England have advised that the development of the site could have significant impacts upon the designated sites. Appropriate assessment under the Habitats Directive would be required.
13	Are there any areas on or around the location which are used by protected, important or sensitive species of fauna or flora e.g. for breeding, nesting, foraging, resting, overwintering, migration, which could be affected by the project?	Likely - The site lies in close proximitiy to the Cotswols Commons and Beechwoods Site of Special Scientific Interest and the Cotswolds Beechwoods Special Area of Conservation	Yes - Natural England have advised that the development of the site could have significant impacts upon the designated sites. Appropriate assessment under the Habitats Directive would be required.
14	Are there any inland, coastal, marine or underground waters on or around the location which could be affected by the project?	Likely - The designated Scheduled Ancient monument comprises a moat containing open water.	Yes - development around the Scheduled Monument could affect levels, water run off and drainage to the moat
15	Are there any areas or features of high landscape or scenic value on or around the location which could be affected by the project?	Likely - The site lies within a locally designated Landscape Conservation Area. Land to the other side of the M5 motorway which runs along the boundary of the site, is designated AONB.	No - Scale of project unlikely to lead to significant impacts in EIA terms but local impacts are likely particularly upon local lansdscape character and the AONB.
16	Is the project in a location where it is likely to be highly visible to many people?	Likely - Site is adjacent to the M5 motorway and a busy local road. Views into site from elevated public footpaths and public vantage points. Development of adjacent site will result in many more local residents within close vicinity of the site.	No - Scale of project unlikely to lead to significant impacts in EIA terms but local impacts are likely.
17	Are there any routes on or around the location which are used by the public for access to recreation or other facilities, which could be affected by the project?	Likely - public footpaths are located on the site	No - Detailed assessment of the impact upon the local highway network is required but given the scale of the proposal a significant impact

			in EIA terms is unlikely
18	Are there any transport routes on or around the location which are susceptible to congestion or which cause environmental problems, which could be affected by the project?	Likely - Local Highway network adjacent subject to a level of congestion and environmental impacts refer to M5.	No - Scale of project unlikely to lead to significant impacts in EIA terms but local impacts are likely.
19	Are there any areas or features of historic or cultural importance on or around the location which could be affected by the project?	Likely - significant heritage assets comprising scheduled monument within the site.	Yes - Potential to cause harm to the significance of the monument through a change in its setting
20	Is the project located in a previously undeveloped area where there will be loss of greenfield land?	Likley - site comprises an agricultrual field	No - Scale of project unlikely to lead to significant impacts in EIA terms but local impacts are likely.
21	Are there existing land uses on or around the location e.g. homes, gardens, other private property, industry, commerce, recreation, public open space, community facilities, agriculture, forestry, tourism, mining or quarrying which could be affected by the project?	Likely - There are existing residential uses within the local area. Additionally the land to the northern bounary has outline planning permission for residential development of 420 units with the immediately adjoining land proposed to be used for sports facilities.	No - Nature and scale of project unlikely to lead to signficant effects.
22	Are there any areas on or around the location which are densely populated or built-up, which could be affected by the project?	Likley - There are existing residential uses within the local area. Further residential development is popsed on the land to The site lies outside the built up area of Matson within a Site once adjoining site is deveoped.	No - Nature and scale of project unlikely to lead to signficant effects.
23	Are there any areas on, or around, the location which are occupied by sensitive land uses e.g. hospitals, schools, places of worship, community facilities, which could be affected by the project?	Unlikely	No - Nature and scale of project unlikely to lead to signficant effects.
24	Are there any areas on or around the location which contain important, high quality or scarce resources e.g. groundwater, surface waters, forestry, agriculture, fisheries, tourism, minerals, which could be affected by the project?	Likey - see comments at 11, 12, 13, 19,	See comments at 11, 12, 13, 19,
25	Is the project location susceptible to earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions e.g. temperature inversions, fogs, severe winds,	Unlikely -	No - No known issues

	which could cause the project to present environmental problems?		
26	Are there any plans for future land uses on or around the location which could be affected by the project?	Likley - the land to the northern bounary has outline planning permission for residential development of 420 units with the immediately adjoining land proposed to be used for sports facilities. -	No - No obvious significant conflict of uses. Scale and relevant issues unlikely to lead to cumulative significant effects
27	Are there any other factors which should be considered, such as consequential development which could lead to environmental effects, or the potential for cumulative impacts with other existing or planned activities in the locality?	Likley - the land to the northern boundary has outline planning permission for residential development of 420 units with the immediately adjoining land proposed to be used for sports facilities Land further north is subject to a pending planning application proposing up to 250 dewellings.	No - Scale of project unlikely to lead to significant impacts in EIA terms but local impacts are likely.

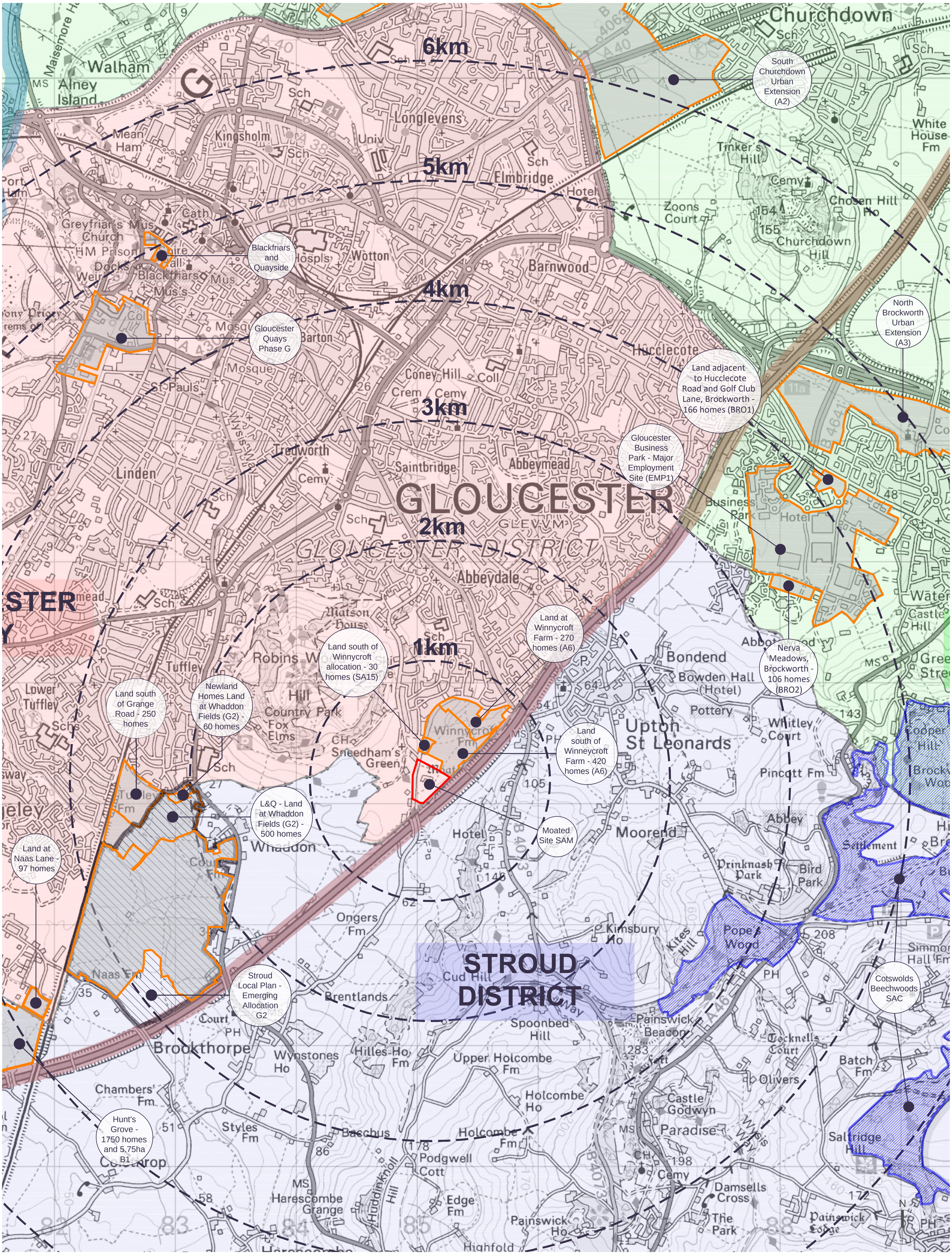
B. CONCLUSIONS		
(i)	Schedule and category of development	
(ii)	Summary of features of project and of its location	
	a	Characteristics of development
		The proposal relates to the development of the site for 200 dwellings and asociated infrastructure.
	b	Location of development
		The site lies outside the built up area of the City and is an undeveloped greenfield site that lies adjacent to the M5 motorway. The site contains the "moated site at Sneedhams Green" a designated Scheduled Monument. The site is adjacent to land with outline planning permission for residential development (420 dwellings) and a further planning application, currently under consideration, for the erection of up to 250 dwellings.
	c	Characteristics of the potential impact
		Potential to cause harm to the significance of the Scheduled Monument through a change in its setting. Heritage impacts could be permanent and irreversible. The site lies in close proximitiy to the Cotswols Commons and Beechwoods Site of Special Scientific Interest and the Cotswolds Beechwoods Special Area of Conservation. Appropriate assessment under the Habitats Directive would be required. Local impacts upon the highway network, landscape character are likely but are not considered to be significant in EIA terms.
(iii)	If a SO/SD has been provided do you agree with it?	
	Yes	
	No	
(iv)	Is it necessary to issue a SO/SD?	
	Yes	*
	No	
(v)	Is an ES required?	
	Yes	*
	No	

C. SCREENING DECISION (Indicate below which assessment applies)					
Assessment		**Action (produce model letter 'x')**	☒	**Response due from**	**Date response due**
Sch 1 development	ES required	**Issue positive or negative SO/SD**	☐		
Sch 2 development – threshold exceeded/criterion met/sensitive area and likely to have significant effects on the environment	ES required	**Issue positive or negative SO/SD**	☒	LPA	
Sch 2 development – not likely to have significant effects on the environment	ES not required	**Issue positive or negative SO/SD**	☐		
Sch 2 development but effects not clear at this stage – file to be reviewed at a later stage	N/K	**Review when appropriate – new info/case progresses**	☐		
Sch 2 but not EIA development – negative screening opinion - SoS agrees	ES not required	**No action required**	☐		

Sch 2 but not EIA development – positive screening opinion - SoS disagrees	ES not required	**Issue negative SO/SD**	☐		

Name	[redacted] Head of Place, Gloucester City Council
Date	17th October 2017

[redacted]



proj: 19-032 drg: 101 date: 25/03/2022 rev: -

ORIGIN3

23 Westfield Park,
Redland, Bristol,
BS6 6LT

[redacted]
www.origin3.co.uk
[redacted]

Snow Capel, Matson

Cumulative Sites Plan

Bromford

Sketch proposals are for illustrative purposes only & as such are subject to detailed site investigation including ground conditions/contaminants, drainage, design & planning/density negotiations. Sketch proposals may be based upon enlargements of OS sheets & visual estimations of existing site features, accuracy will therefore need to be verified by survey.

NOT TO SCALE

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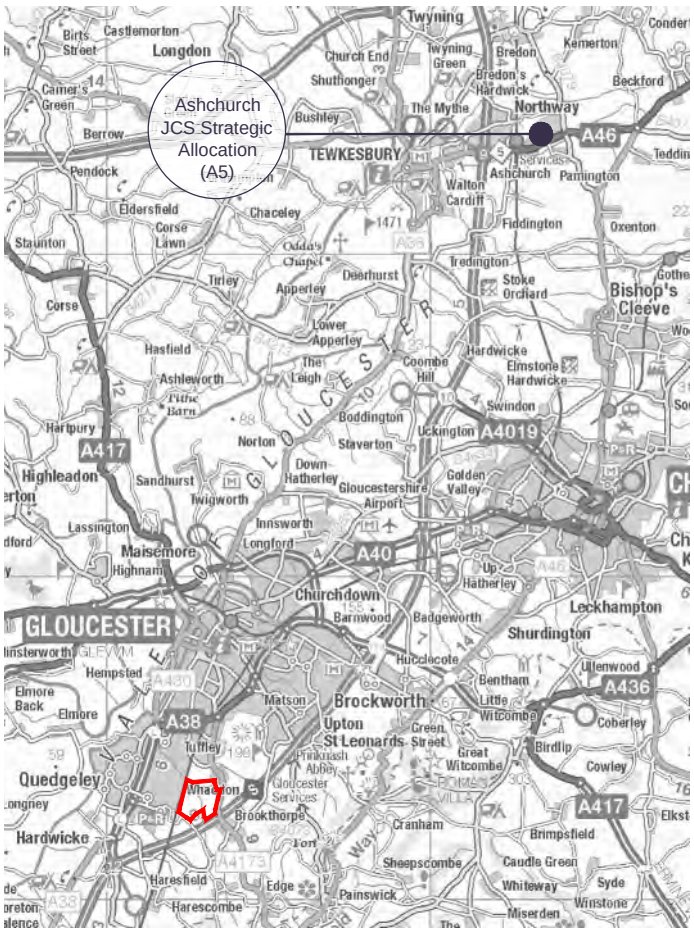

Cumulative Sites beyond Gloucester's Urban Fringe

FOREST OF DEAN DISTRICT

TEWKESBURY BOROUGH

10km

Land at Tewkesbury Road (A1)

Land north of Innsworth Lane (A1)

Land north-east of Tewkesbury Road and north of Longford (A1)

6km

South Churchdown Urban Extension (A2)

5km

Blackfriars and Quayside

Gloucester Business Park - Major Employment Site (EMP1)

Land adjacent to Hucclecote Road and Golf Club Lane, Brockworth - 166 homes (BRO1)

4km

Gloucester Quays Phase G

North Brockworth Urban Extension (A3)

3km

Land south of Grange Road - 250 homes

Land south of Winnycroft allocation - 30 homes (SA15)

Land at Winnycroft Farm - 270 homes (A6)

GLOUCESTER CITY

Newland Homes Land at Whaddon Fields (G2) - 60 homes

1km

Nerva Meadows, Brockworth - 106 homes (BRO2)

TEWKESBURY BOROUGH

South of Hardwicke - 1200 homes, local centre, school (G1)

Land at Naas Lane - 97 homes

Land south of Winnycroft Farm - 420 homes (A6)

Hunt's Grove - 1750 homes and 5.75ha B1

L&Q - Land at Whaddon Fields (G2) - 500 homes

Moated Site SAM

Whaddon Grange

Stroud Local Plan - Emerging Allocation G2

STROUD DISTRICT

Cotswolds Beechwoods SAC

Colethrop Farm, Hardwicke - 750 homes (PS30)

South of M5/J12 - 5ha employment (PS32)

Javelin Park (PS43), extension to employment site (EK14)

CHELTENHAM BOROUGH

proj: 19-032 drg: 102 date: 25/03/2022 rev: -

ORIGIN3
23 Westfield Park,
Redland, Bristol,
BS6 6LT
[redacted]
www.origin3.co.uk
[redacted]

Snow Capel, Matson

Wider Cumulative Sites Plan

Bromford

Sketch proposals are for illustrative purposes only & as such are subject to detailed site investigation including ground conditions/contaminants, drainage, design & planning/density negotiations. Sketch proposals may be based upon enlargements of OS sheets & visual estimations of existing site features, accuracy will therefore need to be verified by survey.

NOT TO SCALE

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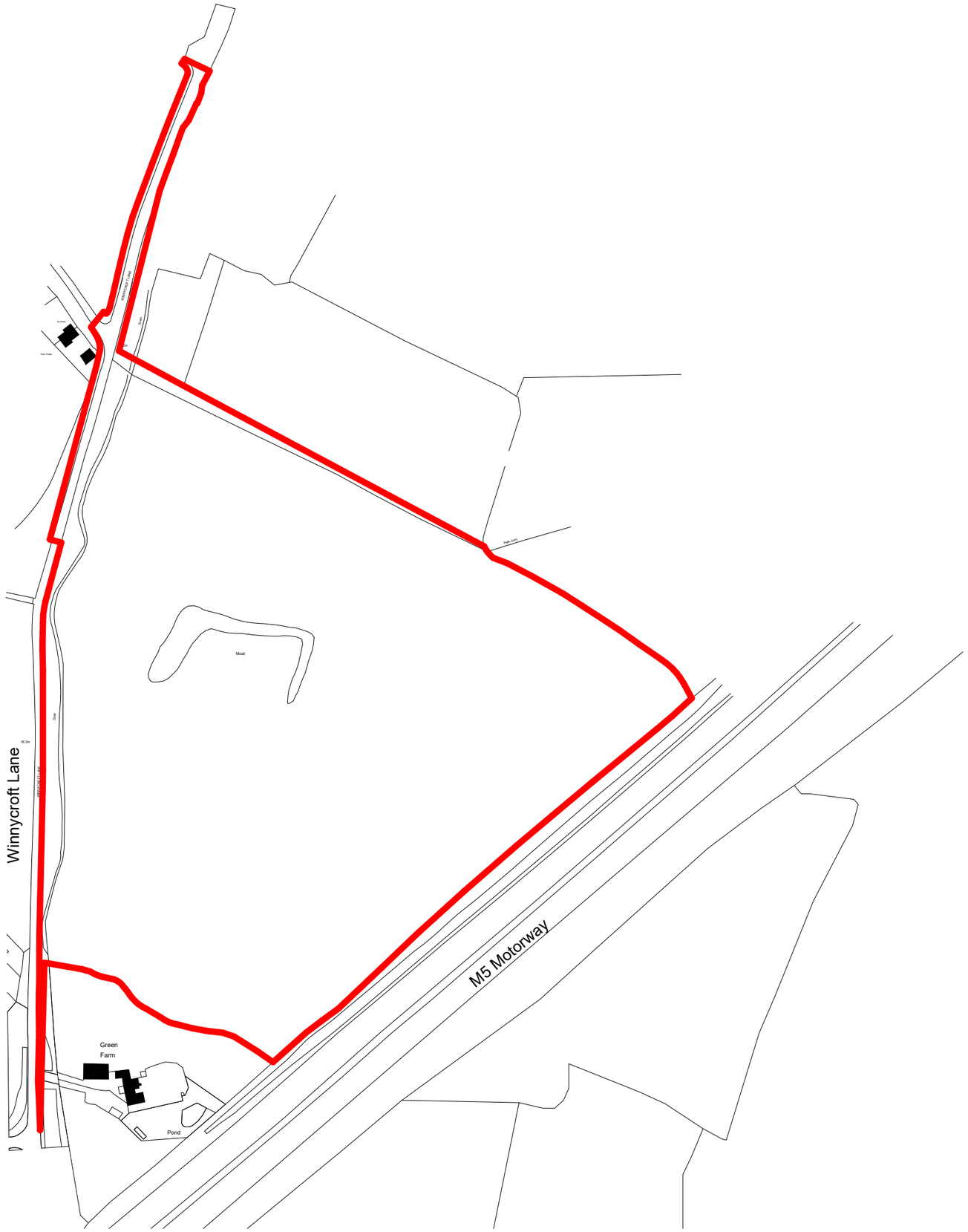

N

Rev	Revision Details	Dr	Date
P06	Pedestrian and Emergency visablity added to redline	DR	12.05.22
P05	Application Issue	DR	10.05.22
P04	Redline updated to include footpath along Winnycroft Lane	DR	09.05.22
P03	Draft Application Pack Issue	NG	01.04.22
P02	Redline updated to include common land edge	DR	29.03.22
P01	first issue		as sheet

O3S

[redacted]

RIBA Chartered Practices

Client's Name
Edward Ware Homes Ltd & Bromford

Job Title
Snow Capel Farm

Drawing Title
Site Location Plan

Scale
1 : 2500 @ A3

meters 25 50 75 100 125

Drawn	Checked	Date
NG	DR	17.05.21

Job No	Drawing No	Rev
3250	0001	P06

Status
PRELIMINARY

Sheet ID
3250-O3S-ZZ-XX-GA-A-0001-S0-P06

12/05/2022 12:44:05

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Rev	Revision Details	Dr	Date
P19	Section references updated and private drive switch to adopted surface P78	DR	26.05.22
P18	Application Issue	DR	10.05.22
P17	Draft Application Pack Issue	NG	01.04.22
P16	Layout amendments following client meeting on 9.03.22	NG	10.03.22
P15	Layout updated following client review	NG	17.01.22
P14	Layout amended following client review and DTM	NG	20.12.21
P13	Net Area's updated. Minor layout chnages following DTM	NG	19.11.21
P12	Layout revised following design meeting and comments with client	NG	26.07.21
P11	Tier 1 housing added. Southern block structure amended for masterplan	NG	02.06.21
P10	Numbers reduced in preparation for proposed Block Plan	NG	06.05.21
P09	Block structure revised to accomodate additional units as per clients instructions	NG	23.04.21
P08	PROW alignment and internal pedestrian/cycle network amended following consultant meeting	NG	30.03.21
P07	Proposed attenuation basins replaced with swales to western boundary. Extent of existing shrubbery indicate on western edge	NG	25.03.21
P06	Layout amended to test single access option from Northern junction	NG	24.03.21
P05	Unit numbers increased and layout changes following review	NG	17.03.21
P04	Layout amendments, net area and schedule updated.	NG	15.03.21
P03	Layout revised following client comments	NG	12.03.21
P02	Site area schedule added	DR	10.02.21
P01	Initial Draft	CH	18.06.20

O3S

RIBA Chartered Practice

[redacted]

Client's Name

Edward Ware Homes Ltd & Bromford

Job Title

Snow Capel Farm

Drawing Title

Proposed Site Plan

Scale

1 : 500 @ A0

metres 10 20 30 40 50 60 70

Drawn	Checked	Date
CH	DR	09.06.20

Job No	Drawing No	Rev
3250	0030	P19

Status

PRELIMINARY

Sheet ID

3250-O3S-ZZ-XX-GA-A-0030-S0-P19

26/05/2022 14:31:14

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H3B 973 V1
Plot 169

H3B 973 V2
Plot 168

H3B 973 V2
Plot 167

H3B 973 V1
Plot 166

StreetScene_ParkEdge_01
1 : 100

H3B 973 V2
Plot 93

H3B 1054
Plot 92

H4B 1263
Plot 91

H3B 973 V2
Plot 90

StreetScene_ParkEdge_04
1 : 100

H3B 973 V1
Plot 156

H3B 973 V2
Plot 155

H3B 973 V2
Plot 154

H3B 973 V2
Plot 153

H3B 973 V2
Plot 152

F 513 V1
Plot 148-151

StreetScene_ParkEdge_02
1 : 100

H4B 1263
Plot 107

H3B 973 V2
Plot 106

H3B 1054
Plot 105

H4B 1263
Plot 104

H3B 973 V2
Plot 103

StreetScene_ParkEdge_03
1 : 100

* To be updated with site levels

Drawn	Checked	Date
CH	DR	
Job No	Drawing No	Rev
3250	0040	P02

Status
PRELIMINARY

Sheet ID
3250-O3S-ZZ-XX-GA-A-0040-S0-P02

Drawing Title
Proposed Site Elevations - Park Edge

Scale
1 : 100 @ A0
metres 2 4 6 8 10

Client's Name
Edward Ware Homes Ltd & Bromford

Job Title
Snow Capel Farm

Rev	Revision Details	Dr	Date
P02	Application Issue	DR	10.05.22
P01	Draft Application Pack Issue	NG	01.04.22

O3S

RIBA Chartered Practice

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12/05/2022 12:48:21

H3B 973 V2 Plot 80 | **H4B 2363** Plot 79 | **H4B 2363** Plot 78 | **H3B 973 V2** Plot 77 | **H3B 973 V1** Plot 76

StreetScene_ParkEdge_05
1 : 100

H3B 973 V1 Plot 20 | **H3B 973 V1** Plot 19 | **H3B 899** Plot 18 | **H3B 899** Plot 17 | **H3B 973 V1** Plot 16

StreetScene_ParkEdge_06
1 : 100

H3B 973 V1 Plot 15 | **H3B 899** Plot 14 | **H3B 899** Plot 13 | **H3B 973 V1** Plot 12 | **H3B 973 V2** Plot 4 | **H3B 973 V2** Plot 3 | **H3B 899** Plot 2 | **H3B 973 V1** Plot 1

StreetScene_ParkEdge_07
1 : 100

* To be updated with site levels

Drawn	Checked	Date
CH	DR	

Job No	Drawing No	Rev
3250	0041	P02

Status: **PRELIMINARY**

Sheet ID: 3250-O3S-ZZ-XX-GA-A-0041-S0-P02

Drawing Title: Proposed Site Elevations - Park Edge

Scale: 1 : 100 @ A0

metres 2 4 6 8 10

Client's Name: Edward Ware Homes Ltd & Bromford

Job Title: Snow Capel Farm

Rev	Revision Details	Dr	Date
P02	Application Issue	DR	10.05.22
P01	Draft Application Pack Issue	NG	01.04.22

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RIBA Chartered Practice

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12/05/2022 12:50:17

H4B 1263	H3B 1054	H2B 742	H2B 742	H2B 742	H2B 742	H3B 1054
Plot 179	Plot 181	Plot 182	Plot 183	Plot 184	Plot 185	Plot 186

StreetScene_MainStreet_01
1 : 100

H3B 973 V1	FOG 70 V2	H3B 899	H3B 899	H3B 973 V1
Plot 163	Plot 178	Plot 177	Plot 176	Plot 175

StreetScene_MainStreet_02
1 : 100

H3B 973 V2	H2B 742	H2B 742	H2B 742	H2B 742	H2B 742	H2B 800
Plot 111	Plot 112	Plot 113	Plot 114	Plot 115	Plot 116	Plot 117

StreetScene_MainStreet_03
1 : 100

H3B 973 V1	H3B 899	H3B 1074	H3B 1074	H3B 1074	H3B 1074
Plot 99	Plot 98	Plot 97	Plot 96	Plot 95	Plot 94

StreetScene_MainStreet_04
1 : 100

* To be updated with site levels

Drawn	Checked	Date
CH	DR	

Job No	Drawing No	Rev
3250	0042	P02

Status: **PRELIMINARY**

Sheet ID: 3250-O3S-ZZ-XX-GA-A-0042-S0-P02

Drawing Title: Proposed Site Elevations - Main Street

Scale: 1 : 100 @ A0
metres 2 4 6 8 10

Client's Name: Edward Ware Homes Ltd & Bromford

Job Title: Snow Capel Farm

Rev	Revision Details	Dr	Date
P02	Application Issue	DR	10.05.22
P01	Draft Application Pack Issue	NG	01.04.22

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RIBA Chartered Practice

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12/05/2022 12:53:03

H3B 1074	H2B 742	H2B 742	H3B 973 V1	H3B 973 V3	H2B 742	H2B 742	H3B 973 V1
Plot 70	Plot 84	Plot 85	Plot 86	Plot 87	Plot 101	Plot 100	Plot 99

StreetScene_MainStreet_05
1 : 100

H3B 973 V1	H3B 899	H3B 973 V1	H3B 899	H3B 899	H3B 899	H3B 899	H3B 899	H3B 973 V1
Plot 31	Plot 30	Plot 29	Plot 28	Plot 27	Plot 26	Plot 25	Plot 24	Plot 23

StreetScene_MainStreet_06
1 : 100

H3B 899	H3B 899	H2B 742	H2B 742	H3B 1074	H3B 1074	H3B 1074	H3B 1074	H2B 742	H2B 742	H2B 742	H2B 742	H3B 973 V1
Plot 62	Plot 61	Plot 60	Plot 59	Plot 58	Plot 57	Plot 51	Plot 50	Plot 49	Plot 48	Plot 47	Plot 46	Plot 45

StreetScene_MainStreet_07
1 : 100

* To be updated with site levels

Drawn: CH | Checked: DR | Date:
Job No: 3250 | Drawing No: 0043 | Rev: P02
Status: **PRELIMINARY**
Sheet ID: 3250-O3S-ZZ-XX-GA-A-0043-S0-P02

Drawing Title: Proposed Site Elevations - Main Street

Scale: 1 : 100 @ A0
metres 2 4 6 8 10

Client's Name: Edward Ware Homes Ltd & Bromford

Job Title: Snow Capel Farm

Rev	Revision Details	Dr	Date
P02	Application Issue	DR	10.05.22
P01	Draft Application Pack Issue	NG	01.04.22

O3S

RIBA Chartered Practice

[redacted]

12/05/2022 12:55:55

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H3B 973 V1	H2B 742	H2B 742	H2B 742	H2B 742	H3B 899	H3B 973 V1	H3B 973 V1	H2B 742	H2B 742	H3B 973 V1
Plot 175	Plot 174	Plot 173	Plot 172	Plot 171	Plot 170	Plot 169	Plot 166	Plot 165	Plot 164	Plot 163

StreetScene_Lane_01
1 : 100

StreetScene_Lane_02
1 : 100

H4B 1072	H4B 1072	H3B 1074	H3B 1074	H3B 1074	H3B 1074	H3B 1074	WD 701 M4(3) + F 513 V1
Plot 139	Plot 138	Plot 137	Plot 136	Plot 135	Plot 134	Plot 133	Plot 127 - 132

StreetScene_Lane_03
1 : 100

H3B 973 V3	H2B 742	H2B 742	H2B 742	H2B 742	H2B 742	H2B 742	H2B 742	H3B 973 V1
Plot 118	Plot 119	Plot 120	Plot 121	Plot 122	Plot 123	Plot 124	Plot 125	Plot 126

StreetScene_Lane_04
1 : 100

* To be updated with site levels

Drawn	Checked	Date
CH	DR	
Job No	Drawing No	Rev
3250	0044	P02

Status
PRELIMINARY

Sheet ID
3250-O3S-ZZ-XX-GA-A-0044-S0-P02

Drawing Title
Proposed Site Elevations - Lane

Scale
1 : 100 @ A0
metres 2 4 6 8 10

Client's Name
Edward Ware Homes Ltd & Bromford

Job Title
Snow Capel Farm

Rev	Revision Details	Dr	Date
P02	Application Issue	DR	10.05.22
P01	Draft Application Pack Issue	NG	01.04.22

O3S

RIBA Chartered Practice

[redacted]

12/05/2022 12:58:16

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H3B 973 V1

Plot 86

H2B 742

Plot 83

H2B 742

Plot 82

H2B 742

Plot 81

H3B 973 V2

Plot 80

StreetScene_Lane_05
1 : 100

H3B 973 V1

Plot 12

H2B 742

Plot 35

H2B 742

Plot 34

H2B 742

Plot 33

H2B 742

Plot 32

H3B 973 V1

Plot 31

StreetScene_Lane_06
1 : 100

H3B 973 V1

Plot 1

H4B 1263

Plot 11

H3B 973 V1

Plot 10

StreetScene_Lane_07
1 : 100

* To be updated with site levels

Drawn	Checked	Date
CH	DR	

Job No	Drawing No	Rev
3250	0045	P02

Status: **PRELIMINARY**

Sheet ID: 3250-O3S-ZZ-XX-GA-A-0045-S0-P02

Drawing Title: Proposed Site Elevations - Lane

Scale: 1 : 100 @ A0

metres 2 4 6 8 10

Client's Name: Edward Ware Homes Ltd & Bromford

Job Title: Snow Capel Farm

Rev	Revision Details	Dr	Date
P02	Pedestrian and Emergency visability added to redline	DR	12.05.22
P01	Draft Application Pack Issue	NG	01.04.22

O3S

RIBA Chartered Practice

[redacted]

12/05/2022 13:00:36

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Bromford House Types

Dwg Ref: 3250-O3S-ZZ-XX-GA-A-0030-ProposedSitePlan-S0-P18

12/05/2022

Snow Capel Farm

Name	Code	Beds	Area (m2)	BP	total Area		Plotted Units	Mix Breakdown
					sqm	sqft		
WrenV1	F513V1	1	47.7	1B2P	763.2	8,215	16	22
1BF M4(3)GF		1	58.1	1B2P	232.4	2,502	4	
WrenV3	F513V3	1	47.7	1B2P	95.4	1,027	2	
Finch	H2B742	2	68.56	2B4P	3,565.1	38,375	52	58
FOG	O3SFOGV1	2	79.31	2B4P	237.9	2,561	3	
H2B800	H2B800	2	74.3	2B4P	222.9	2,399	3	
Sandpiper	H3B899	3	83.22	3B4P	1,664.4	17,916	20	92
Swift V1	H3B973V1	3	89.67	3B5P	2,421.1	26,061	27	
Swift V2	H3B973V2	3	89.67	3B5P	1,883.1	20,269	21	
Turnstone	H3B1060	3	96.19	3B4P	96.2	1,035	1	
Nuthatch	H3B1054	3	98.72	3B5P	592.3	6,376	6	
Waxwing	H3B1074	3	101.82	3B5P	1,730.9	18,632	17	
Chaffinch	H4B1072	4	99.14	4B6P	594.8	6,403	6	18
Kite	H4B1263	4	117.42	4B7P	1,409.0	15,167	12	
Total					**15508.84**	**166,937**	**190**	**190**

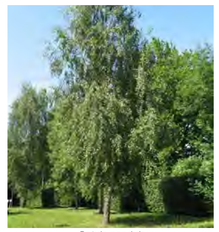
Masterplan

HERITAGE INTERPRETATION BOARD

PROPOSED LANDSCAPE AREAS

TREE PALETTE

Native Focal Trees such as Acer campestre, Betula pendula and Carpinus betulus.



Betula pendula

Street Trees such as Acer campestre "Streetwise" and Carpinus betulus "Frans Fontaine"

Acer campestre "Streetwise"

Ornamental Trees such as Pyrus calleryana "Chanticleer" and Prunus "Amanogawa"

Pyrus calleryana "Chanticleer"

KEY TO MASTERPLAN

Soft Landscape

- Existing Vegetation
- Proposed Ornamental Shrub Planting
- Proposed Ground Cover Planting
- Proposed Ornamental Hedge Planting
- Proposed Native Buffer Planting
- Proposed Native Hedge Planting
- Amenity Grass to Public Open Space Areas
- Back Garden Grass
- Plot Frontage Grass
- Mown Path
- Wildflower Meadow Grassland
- Proposed Planted Acoustic Bund
- Area of Retained Vegetation

Hard Landscape

- Tarmac Paths
- Proposed Road and Parking Space Tarmac Surfacing
- Proposed Block Paving to Shared Surfaces and Private Drives
- Timber Post and Split Rail Fencing
- Slab Paving
- 3m High Accoustic Fence

Streetscape Items

- Picnic Table
- Heritage Interpretation Board
- Finger Post
- Naturalistic Play Items

Rev.	Date	Initials	Comments
B	13.05.2022	CR	Ammended to client comments
A	10.05.2022	CR	Ammended to client comments

Site
Snow Capel, Matson, Gloucester

Drg Number
JBA 21/169- SK01

Client
Edward Ware Homes

Drawn by	Date	Scale	Rev
HNG	APRIL 2022	1:1000@A1	B

James Blake Associates Ltd.
LANDSCAPE ARCHITECTURE • LANDSCAPE PLANNING • ECOLOGY • ARBORICULTURE
[redacted]
JAMES BLAKE ASSOCIATES

Snow Capel, Matson, Gloucester

Land East of Winneycroft Lane, Snow Caple, Matson

Technical Appendix 7.1: Ecology Baseline Report

Prepared by:
The Environmental Dimension Partnership Ltd

On Behalf of:
Bromford Housing

May 2022
Report Reference
edp3746_r006a

Contents

Appendices

Plans

Plan EDP 3c	Manual Bat Transect Survey Results – September 2017 (edp3746_d019b 12 May 2022 VMS/EWi)
Plan EDP 3d	Anabat Locations 2017-2021 (edp3746_d020b 12 May 2022 VMS/EW
Plan EDP 4	Great Crested Newt Survey Results (edp3746_d021a 12 May 2022 VMS/EWi)

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	Report Ref: edp3746_r006			
	Author	**Formatted**	**Peer Review**	**Proofed by/Date**
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Executive Summary

S1 This Ecology Baseline Report has been prepared by The Environmental Dimension Partnership Ltd (EDP) on behalf of Bromford Housing (hereafter referred to as 'the Applicant') in relation to the proposed development of Land East of Winneycroft Lane, Snow Caple, Matson (hereafter referred to as 'the Application Site').

S2 Detailed ecological assessments of the Application Site were previously undertaken by EDP in 2016 and 2017 to inform constraints and opportunities to development of the site. The findings of such work were updated by EDP during 2021 to determine any material changes to those habitats and protected/notable species supported and to further establish the ecological baseline for the Application Site.

S3 An Environmental Statement (ES) including Ecology and Biodiversity (Chapter 7) has been prepared by EDP on behalf of the Applicants to inform a full planning application for residential development of the Application Site. The proposals comprise the provision of up to 200 residential dwellings and open space.

S4 With respect to designated sites, the Cotswold Beechwoods Special Area of Conservation (SAC) is located 2.4km south-east of the Application Site, whilst Range Farm Site of Special Scientific Interest (SSSI) is located 700m south of the Application Site. There are several non-statutory designated sites within the zone of influence of the Application Site, the most pertinent of which include Winneycroft Farm South Potential Local Wildlife Site (pLWS) which overlaps the Application Site, and Winneycroft Farm pLWS adjacent to the northern boundary. However, neither land parcels have been formally designated in the years since they were originally assessed by the Local Planning Authority (LPA).

S5 The Application Site is dominated by improved grassland of limited ecological importance. Native hedgerows which delineate the boundaries of the Application Site are, however, of greater ecological importance and provide suitable habitat for protected and notable species including a breeding bird assemblage, foraging/commuting bats, badger (*Meles meles*), great crested newt (*Triturus cristatus*) and common reptiles. In addition, a waterbody is centrally located within the Application Site whilst additional waterbodies were identified within 500m of the Application Site. A medium great crested newt metapopulation has been identified in association with the moat and several offsite waterbodies to the south and west of the Application Site.

S6 Overall, it is considered that there are no significant 'in principle' ecological constraints that would preclude development, and which cannot be addressed by good design. A detailed assessment of the impacts of the proposed development, and proposed avoidance, mitigation and compensatory measures is set out within the Ecology and Biodiversity Chapter of the ES.

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Section 1
Introduction, Purpose and Context

1.1 This Ecology Baseline Report has been prepared by The Environmental Dimension Partnership Ltd (EDP) on behalf of Bromford Housing (hereafter referred to as 'the Applicant') in relation to the proposed development of Land East of Winneycroft Lane, Snow Capel, Matson (hereafter referred to as 'the Application Site').

1.2 EDP is an independent environmental planning consultancy with offices in Cirencester, Cheltenham and Cardiff. The practice provides advice to private and public sector clients throughout the UK in the fields of landscape, ecology, archaeology, cultural heritage, arboriculture, rights of way and masterplanning. Details of the practice can be obtained at our website www.edp-uk.co.uk.

Site Context

1.3 The Application Site measures approximately 8 hectares (ha) and is centred at approximate Ordnance Survey Grid Reference (OSGR) SO 850 142. The Application Site lies within Gloucester City Council (GCC) and is located approximately 4km south of the city of Gloucester, along its south-eastern edge. The M5 motorway and Winneycroft Lane form the Application Site's immediate boundaries to the south-east and west respectively, with a number of small field parcels occupying land to the immediate north-east, separating the Application Site from the settlement of Matson and built-up area of the city of Gloucester beyond. More generally, extensive areas of open farmland and woodland blocks occupy land to the south and east.

1.4 The Application Site consists of a single, improved grassland field currently subject to grazing. Its boundaries to the north-east, south and west are delineated by native hedgerows, with scattered scrub forming the south-eastern and southern boundaries. A large, freshwater moat is located within the centre of the field, with scattered scrub present along its banks. The extents of the Application Site are illustrated at **Plan EDP 1**.

Development Proposals

1.5 The proposals relate to a full planning application for the provision of up to 200 residential dwellings and open space. A proposed site layout for the development is provided at **Appendix EDP 1**.

1.6 The ecological sensitivities of the Application Site have influenced the final layout through an iterative design process. Thus, the final Site Plan incorporates a degree of 'inherent' mitigation to avoid or reduce the severity of potential ecological impacts.

Scope

1.7 This Ecology Baseline Report details the findings of baseline investigations undertaken by EDP between 2016 and 2022 and assesses the current ecological status of the Application Site necessary to determine/confirm potential ecological constraints to its proposed development.

1.8 The remainder of this report is structured as follows:

- **Section 2** summarises the methodology employed in assessing baseline ecological conditions within and around the Application Site (with further details provided within appendices and on plans where appropriate);

- **Section 3** summarises the baseline ecological conditions (with further details also provided within appendices and on plans where appropriate) and identifies and evaluates any pertinent ecological features/receptors that require further consideration through an Ecological Impact Assessment (EcIA); and

- **Section 4** briefly summarises the findings that are relevant to masterplanning and an ecological assessment for the proposed development.

Section 2
Methodology (Update Baseline Investigations)

2.1 This section of the Ecology Baseline Report summarises the methodologies employed in assessing the ecological baseline for the Application Site. Survey effort has been undertaken by suitably qualified ecologists using relevant best practice methodologies wherever possible. Reasons for any departure from best practice methodology are given and normally relate to the timing of EDP's commission and/or the availability of access to parts of the site or wider study area. Full details of the techniques and processes adopted are, where appropriate, provided within appendices and plans to the rear of this report.

Desk Study

2.2 The desk study is an important element of undertaking an initial ecological appraisal of a site proposed for development, enabling the initial collation and review of contextual information, such as designated sites, together with known records of protected and priority species[1].

2.3 A desk study was initially undertaken by EDP during January 2016 and updated during January 2022. The desk study involved collating biodiversity information from the following sources:

- Gloucestershire Centre for Environmental Records (GCER); and
- Multi-Agency Geographic Information for the Countryside (MAGIC) website[2].

2.4 The update desk study involved obtaining the following information:

- International statutory designations (within a 10km radius around the site);
- National statutory designations and non-statutory local sites (within a 2km radius around the site);
- Annex II bat species[3] records (within a 6km radius around the site); and
- All other protected/notable species records (within a 2km radius around the site).

2.5 The above listed search areas are considered sufficient to cover the potential zones of influence[4] of the proposed development in relation to designated sites, habitats and species.

[1] Species considered of key significance to sustain and improve biodiversity in England, as defined under Section 41 of the Natural Environment and Rural Communities (NERC) Act, 2006

[2] www.magic.gov.uk.

[3] Bat species listed in Annex II of the EC Habitats Directive, namely: greater horseshoe; lesser. horseshoe; barbastelle; and Bechstein's bat.

[4] Zone of Influence - the areas and resources that may be affected by the proposed development.

Update Extended Phase 1 Survey

2.6 An Extended Phase 1 Habitat survey was initially undertaken by EDP on 01 February 2016, during which the weather was 12ºC, dry with light wind and 100% cloud cover. This was followed by an update Extended Phase 1 Habitat survey undertaken by EDP on 28 September 2020. A further update survey was undertaken on 07 January 2022.

2.7 On both occasions, the survey technique adopted for the update habitat assessment was at a level intermediate between a standard Phase 1 survey technique[5], based on habitat mapping and description, and a Phase 2 survey, based on detailed habitat and species surveys. The survey technique is commonly known as an Extended Phase 1 survey. This level of survey does not aim to compile a complete floral and faunal inventory for the Application Site.

2.8 The level of survey involves identifying and mapping the principal habitat types and identifying the dominant plant species present in each principal habitat type. In addition, any actual or potential protected species or species of principal importance are identified and scoped. Further details are provided at **Appendix EDP 2** and **3**.

2.9 During the update survey on 07 January 2022, information was also collected on the type and condition of the existing habitats with reference to the UK Habitat Classification System (UK Hab), to inform a Biodiversity Net Gain (BNG) assessment undertaken using a standard biodiversity metric. Further details of the BNG assessment are set out in Technical Appendix 7.2 (report ref. edp3746_r007) and **Appendix EDP 4**.

Limitations

2.10 February is considered to be within the sub-optimal period for undertaking an Extended Phase 1 survey as it is outside the period where plants are in flower. However, owing to the ecological context and type of habitats present within the Application Site, the survey is considered not to have been limited by seasonal or climatic factors. Furthermore, an update assessment was undertaken in September 2020, considered to be within the optimal season for undertaking an Extended Phase 1 Habitat survey. The survey is, therefore, not considered to be constrained by climatic or seasonal factors.

2.11 The update survey was undertaken in January which is also within the sub-optimal period for Extended Phase 1 Habitat surveys, however, as this assessment was just to assess if there had been any significant changes since the previous survey, it is not considered to have been constrained by the season due to the low botanical diversity within the Application Site.

2.12 Surveys were limited to recording plant species present in both vegetative and floristic forms at the time of survey. The absence of any species recorded during the survey cannot be taken to automatically infer species' absence from the Application Site.

[5] Joint Nature Conservation Council (2010) *Handbook for Phase 1 Habitat Survey – A Technique for Environmental Audit* (reprinted with minor corrections for original Nature Conservancy Council publication).

Detailed (Phase 2) Surveys

2.13 The scope of the additional Phase 2 surveys undertaken at the Application Site was defined following the completion of the Extended Phase 1 Habitat survey and update Extended Phase 1 Habitat Survey on 01 February 2016 and 28 September 2020 respectively. The surveys 'scoped in' are summarised in turn below, with a brief explanation of those potential surveys 'scoped out' provided thereafter.

Hedgerow Survey

2.14 A detailed assessment of the hedgerow network present on site was initially undertaken on 01 February 2016 and further updated on 28 September 2020. During the survey, the value of the hedgerow resource was assessed with reference to the Wildlife and Landscape criteria provided in Part II of Schedule 1 of the Hedgerows Regulations 1997.

2.15 Further details of the methodologies employed are provided in **Appendix EDP 3**, whilst hedgerows subject to survey are illustrated at **Plan EDP 1**.

Bat Surveys

2.16 The initial and update Extended Phase 1 Habitat survey confirmed the presence of several trees with potential to support roosting bats within the Application Site. The hedgerow network and grassland habitats present across the Application Site are also considered to provide suitable foraging and commuting habitat for bats.

2.17 The following surveys for bats were therefore undertaken, with reference to national best practice guidelines[6]:

1) Bat Roosting:

    a) A ground level visual assessment of onsite trees for bat roosting potential, completed during 01 February 2016 and 28 September 2021.

2) Bat foraging/commuting activity:

    a) Manual transect surveys conducted on 15 May, 27 July and 11 September 2017;

    b) Automated detector surveys conducted in May, July and September 2017; and

    c) Further automated detector surveys conducted in September and October 2020 and May and June 2021.

2.18 Full details are provided in **Appendix EDP 5**.

[6] Collins, J. (ed.) (2016). *Bat Surveys: for Professional Ecologists: Good Practice Guidelines* (3rd edition). The Bat Conservation Trust, London

Badger Survey

2.19 Badger (*Meles meles*) activity within the Application Site was recorded during the Extended Phase 1 survey on 01 February 2016 and updated on 28 September 2020. During the survey, any signs of badger activity such as holes, latrines, trails, snuffle holes and hairs on fencing or vegetation were recorded. Where holes of a size and shape consistent with badgers were identified, the following signs of badger activity were searched for in order to determine whether they were currently in active use:

- Fresh spoil outside entrances;
- Old bedding material (typically dried grass) outside entrances;
- Holes being cleared of leaf litter;
- Badger guard hairs; and
- Fresh tracks leading to/from the holes.

2.20 Each badger sett found was examined and has been assigned to one of four categories[7], which have been used in the various National Badger Surveys[8], as detailed in **Table EDP 2.1** below. The number of holes comprising each sett is recorded and each is classified as disused, partially used or well used by badgers as described in **Table EDP 2.2**.

Table EDP 2.1: Sett Descriptions and Categories

Sett Descriptions
Main Setts: These usually have a large number of holes with large spoil heaps, and the sett generally looks well used. There will be well-used paths to and from the sett and between sett entrances. Although normally the breeding sett is in continuous use, it is possible to find a main sett that has become disused due to excessive digging or some other reason; it should be recorded as a disused main sett. The British National Badger Survey found that the average size of an active main sett is 12 holes (including all categories of use).
Annexe Setts: These are often close to the main sett, usually less than 150m away, and are usually connected to the main sett by one or more obvious, well-worn paths. They usually have several holes but may not be in use all the time even if the main sett is very active. The British National Badger Survey found that the average size of an annexe sett is five holes (including all categories of use).
Subsidiary Setts: These often only have a few holes (averaging four), are usually at least 50m from a main sett, and do not have an obvious path connecting with another sett. They are not continuously active.
Outlying Setts: These usually have only one or two holes, often have little spoil outside the hole, have no obvious path connecting with another sett and are only used sporadically. When not in use by badgers, they are often taken over by foxes or even rabbits. However, they can still be recognised as badger setts by the shape of the tunnel (not the actual entrance hole), which is usually at least 250mm in diameter, and is rounded or a flattened oval shape. Fox and rabbit tunnels are smaller and often taller than broad.

[7] Harris, S.; Cresswell, P. and Jefferies, D. (1989) *Surveying Badgers.* Mammal Society, No. 9, London.
[8] Wilson, G.; Harris, S. and McLaren, G. (1997) *Changes in the British Badger Population – 1998 to 1997*. People's Trust for Endangered Species, London; and Cresswell, P.; Harris, S. and Jefferies, D. (1990) *The History, Distribution, Status and Habitat Requirements of the Badger in Britain*. Nature Conservancy Council, Peterborough.

Table EDP 2.2: Categories of Use

Categories of Use
Well-used Holes: These are clear of any debris or vegetation, are obviously in regular use, and may or may not have been excavated recently.
Partially-used Holes: These are not in regular use and have debris such as leaves and twigs in the entrance or have moss and/or other plants growing in or around the entrance. Partially used holes could be in regular use after a minimal amount of clearance.
Disused Holes: These have not been in use for some time, are partially or completely blocked and could not be used without a considerable amount of clearance. If the hole has been disused for some time, all that may be visible is a depression in the ground where the hole used to be, and the remains of the spoil heap, which may be covered in moss or plants.

Limitations

2.21 Badger surveys can be undertaken at any time of year and are, therefore, not limited by seasonal or climatic factors.

Great Crested Newt Survey

2.22 The Application Site supports a large moat within its centre. A further 16 waterbodies were identified within 500 metres of the Application Site during the field survey and desk study assessment.

2.23 A Habitat Suitability Index (I) assessment, as developed by Oldham et al. (2000)[9], of each waterbody within 500m of the Application Site (where access was available) was initially undertaken on 11 April 2017 and further updated on 28 April 2021 by a suitably qualified, Natural England (NE) great crested newt (*Triturus cristatus*) licenced ecologist to assess their suitability to support great crested newt.

2.24 In addition, Ponds P1-5 and P7-P9 were also subject to traditional presence/absence surveys to confirm the presence or likely absence of great crested newt during spring 2017. There was no access to P6 and P10 at this time. Further update surveys of P4-5 and P7-P8 were also undertaken during spring 2021; however, no access to P1-P3, P6 and P9-P10 was available during 2021.

2.25 Full details of the survey methodologies are provided within **Appendix EDP 6**.

Surveys Scoped Out

2.26 **Table EDP 2.3** below summarises other survey types which, while commonly required as part of an ecological appraisal for development sites, were not considered necessary/appropriate in this case.

[9] Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000). *Evaluating the suitability of habitat for the Great Crested Newt* (Triturus cristatus). Herpetological Journal 10 (4), 143-155

Table EDP 2.3: Ecology Surveys Scoped Out

Survey Type	Reasons for Scoping Out
Botanical Assessment	The Application Site comprises predominantly agriculturally improved, grazed grassland exhibiting poor structural and botanical diversity. As such, no further assessment of botanical communities is considered necessary in this instance.
Breeding Birds	Suitable nesting habitat within the Application Site is limited to boundary hedgerows. Given the relatively small extent of the site and limited opportunities for a significant nesting bird assemblage, full breeding bird surveys are not considered necessary in this instance. Precautionary methods of vegetation clearance are, however, recommended to ensure no harm/injury to nesting birds potentially present.
Dormouse (*Muscardinus avellenarius*)	No records for dormouse were returned within 2km of the Application Site. Although native hedgerows delineating the boundaries of the Application Site are of some suitability for this species, the M5 motorway to the west and Winneycroft Lane to the west and further south, are considered barriers to the dispersal of dormouse between the Application Site and wider landscape. Further north, the wider landscape is dominated by residential development associated with Gloucester city which would further limited dispersal opportunities at a local scale.
Otter (*Lutra lutra*) and Water Vole (*Arvicola terrestris*)	The moat located within the centre of the Application Site is isolated from other waterbodies within the wider landscape such that colonisation of this waterbody by either species is considered unlikely. No evidence of either species was identified during the Extended Phase 1 Habitat survey.
Common Reptiles	Agricultural grassland onsite is subject to grazing by livestock and is thus considered largely unsuitable for a common reptile population. Native hedgerows and dense scrub areas along the boundaries of the Application Site are likely to provide more suitable habitat; however, such habitats are limited in extent and primarily confined to field margins. The Application Site is therefore not considered likely to support a significant common reptile population; rather, the presence of low numbers of common reptiles should be assumed.
Invertebrates	The Application Site comprises predominantly improved amenity grassland exhibiting poor structural and botanical diversity and as such is considered unlikely to support a notable invertebrate assemblage. No further survey is recommended in this instance.

Section 3
Results (Baseline Conditions)

3.1 This section of the Ecology Baseline Report summarises current ecological conditions determined through the course of field-based investigations described in **Section 2**. In particular, this section identifies and evaluates those ecological features/receptors considered within this report and which are pertinent in the context of the proposed development. Further technical details are, where appropriate, provided within appendices and on plans to the rear of this report.

Designated Sites

3.2 Information regarding designated sites was obtained during the desk study from the MAGIC website and GCER. Statutory designations (those receiving legal protection) and non-statutory designations (those receiving planning policy protection only) are discussed in turn below.

Statutory Designations

3.3 Statutory designations represent the most significant ecological receptors, being of recognised importance at an international and/or national level. International designations include Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and Ramsar Sites. National designations include Sites of Special Scientific Interest (SSSIs) and National Nature Reserves (NNRs).

3.4 No part of the Application Site is covered by any statutory designations. However, there are several such designations within the Application Site's potential zone of influence. A summary of the designations is provided within **Table EDP 3.1** and illustrated at **Plan EDP 2**.

Table EDP 3.1: Summary of Statutory Nature Conservation Designations within the Application Site Potential Zone of Influence

Designation	Distance from Application Site (approx.)	Brief Description
International Designations within 10km		
Cotswold Beechwoods SAC	2.4km south-east	The site represents the most westerly extensive blocks of *Asperulo-Fagetum* beech forest (an Annex I habitat) in the UK.
Rodborough Common SAC	9.7km south	The site is the most extensive area of semi-natural dry grasslands in the Cotswolds.
Walmore Common Ramsar Site	10km west	Walmore Common is designated under Ramsar criterion 6 for supporting wintering populations of international importance of Tundra Swan (*Cygnus columbianus bewickii*).
Walmore Common SPA	10km west	The site is considered of European importance for its populations of overwintering Tundra Swan.

Designation	Distance from Application Site (approx.)	Brief Description
Site of Special Scientific Interest (SSSI) within 2km		
Range Farm Fields SSSI	700m south	Large area of flower-rich, unimproved neutral grassland.
Robinswood Hill Quarry SSSI	770m north-west	The site is of special interest for its geological formations.

Non-statutory Designations

3.5 Non-statutory designations are also commonly referred to in planning policies as 'local sites', although in fact these designations are typically considered to be of importance at a county level. In Gloucestershire, such designations are referred to as Local Wildlife Sites (LWS) or potential LWS, the latter comprising sites previously surveyed in earlier years (2006-2010) on behalf of GCC to determine their potential for designation as an LWS but which their value remain unconfirmed and thus were never formally designated. Additional designated sites which should be considered at this level include Local Nature Reserves (LNRs) and Ancient Semi Natural Woodland (ASNW), where these are not covered by other designations.

3.6 There are several non-statutory designations within the Application Site's potential zone of influence as described in **Table EDP 3.2** and illustrated at **Appendix EDP 7**. Of particular pertinence, land comprising the Application Site was considered a potential LWS by virtue of its habitats, namely the moat, although sufficient indicator species[10] were not recorded to warrant designation at this time.

Table EDP 3.2: Non-statutory Designations within the Application Site's Potential Zone of Influence

Designation	Distance from Application Site (approx.)	Brief Description
Winneycroft Farm South Potential LWS (S081/052)	Overlapping	Semi-improved grassland, improved grassland, old pond/moat with mixed hedgerows.
Winneycroft Farm Potential LWS (S081/044)	135m north	Orchards, veteran and mature trees with invertebrate interest. Semi-improved grassland
Robinswood Hill Golf Club Potential LWS (S081/019)	370m north-west	Neutral grassland.
Matson Wood LWS (S081/019/01)	955m north-west	An area of ancient semi-natural woodland.
Robinswood Hill Country Park, LWS (S081/003) and LNR	920m north-west	Notified for semi-natural grassland habitat.
Glos Matson Lane Potential LWS (S081/074)	1.05km north	Toad patrol location (Froglife registered: GL747) and associated breeding ponds.

[10] GCER (2015). Gloucestershire Key Wildlife Sites Handbook Part 2. Available at: https://www.gloucestershirewildlifetrust.co.uk/sites/default/files/2018-03/Gloucestershire%20Key%20Wildlife%20Sites%20Handbook%20Part%202%20v4.5%20final.pdf [Accessed on 17 January 2022]

Designation	Distance from Application Site (approx.)	Brief Description
Upton St Leonards Crossing Potential LWS (S081/070)	1.1km north-east	Toad patrol location and associated breeding ponds.
Watery Lane Meadow LWS (S081/008)	1.31km south-east	Notified for semi-natural grassland habitat.
Brentlands Fields LWS (S081/012)	1.6km south-west	Notified for semi-natural grassland habitat.
Cud Hill Potential LWS (S081/021)	1.6km south-east	Rank calcareous grassland.
Whaddon Green Potential LWS (S081/002)	1.7km west	Rich semi-improved grassland.
Upton St Leonards, Cud Hill Conservation Road Verge (CRV028)	2.0km south-east	Lowland calcareous grassland.

Habitats

3.7 Information on habitats within and around the Application Site was obtained during the Extended Phase 1 survey undertaken by EDP in February 2016, September 2020 and January 2022.

3.8 The distribution of different habitat types within and adjacent to the Application Site is illustrated at **Plan EDP 1**. In addition, detailed descriptions and illustrative photographs of these habitat types are provided in **Appendix EDP 2** whilst the results of a Hedgerow Assessment with reference to the Wildlife and Landscape criteria provided in Part II of Schedule 1 of the Hedgerows Regulations 1997 is provided at **Appendix EDP 3**. A summary, and qualitative assessment, of these habitats is provided in **Table EDP 3.3**.

Table EDP 3.3: Summary of Habitats within the Application Site

Habitat/Feature	Distribution within Application Site	Intrinsic Ecological Value
Improved Grassland	Dominates the Application Site	**Site**, owing to low botanical and structural diversity.
Dense and Scattered Scrub	Predominantly along the eastern boundary of the Application Site.	**Negligible**, owing to limited extent and species diversity.
Native Hedgerows	Delineates the boundaries of the Application Site.	**Local**, owing to maturity and potential to support protected species. A priority habitat for England.
Standing Water	Large moat located within the centre of the Application Site.	**Local**, a priority habitat for England with confirmed presence of great crested newt.
Wet Ditch	Immediately offsite in association with the western hedgerow boundary.	**Site**, owing to low distinctives and limited physical and botanical diversity.

3.9 As noted within **Table EDP 3.3**, the Application Site is dominated by habitats of limited/negligible intrinsic value. Hedgrow boundaries and the central moat are, however, considered of Local importance and comprise priority habitats for England. Although the Application Site was previously considered as a potential LWS by virtue of the pond, sufficient

indicator species[11] were not identified during the Extended Phase 1 survey to qualify for designation at the time of survey.

3.10 Hedgerow **H3** in particular qualifies as 'Important' under the Wildlife criteria of the Hedgerow Regulations 1997 by virtue of its species-richness and hedgerow features. All hedgerows onsite may however be considered as Important where in use by great crested newt. This is with the exception of **H2** which appears less than 30 years old. Furthermore, habitats or other features which are of negligible intrinsic value may also require consideration in relation to their importance in maintaining populations of protected and/or notable species. This is discussed further below.

Protected and/or Notable Species

3.11 The likelihood of presence, or confirmed presence, of protected/and or notable wildlife species within the Application Site is summarised below with reference to desk study records, habitat suitability and detailed surveys. Further details are made available within appendices and plans where referenced.

3.12 Where a particular species or taxonomic group has been confirmed to be present, or presence is inferred based on habitat suitability, the ecological value or significance of the population or assemblage is assessed on a geographical scale.

Breeding Birds

3.13 Numerous bird records within 2km of the Application Site were returned during the desk study including several Schedule 1 species, as well as those listed as species of conservation concern[12]. Red listed species include mistle thrush (*Turdus viscivorus*), starling (*Sturnus vulgaris*), house sparrow (*Passer domesticus*), yellow wagtail (*Motacillia flava*), yellowhammer (*Emberiza citronellas*), woodcock (*Scolopax rusticola*), hawfinch (*Coccothraustes coccothraustes*), skylark (*Alauda arvensis*), linnet (*Linaria cannabina*), lapwing (*Vanellus vanellus*), house martin (*Delichon urbicum*) and lesser spotted woodpecker (*Dendrocopos minor*) amongst others.

3.14 Records of amber listed species include song thrush (*Turdus philomelos*), bullfinch (*Pyrrhula pyrrhula*), stock dove (*Columba oenas*), dunnock (Prunella modulairs), reed bunting (*Emberiza schoeniculus*), black-headed gull (*Chroicocephalus ridibundus*), snipe (*Galllinago gallinago*), willow warbler (*Phylloscopus trochilus*), kestrel (*Falco tinnunculus*), redstart (*Phoenicurus phoenicurus*) and mallard (*Anas platyrhynchos*).

11 GCER (2015). Gloucestershire Key Wildlife Sites Handbook Part 2. Available at: https://www.gloucestershirewildlifetrust.co.uk/sites/default/files/2018-03/Gloucestershire%20Key%20Wildlife%20Sites%20Handbook%20Part%202%20v4.5%20final.pdf [Accessed on 17 January 2022]

12 Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D., and Win I. 2021. The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. British Birds 114: 723-747. Available online at https://britishbirds. co.uk/content/status-our-bird-populations.

3.15 This is in addition to records of Schedule 1 species including fieldfare (*Turdus pilaris*), barn owl (*Tyto alba*), brambling (*Fringilla montifringilla*), goshawk (*Accipiter gentilis*), hibby (*Falco subbuteo*), red kite (*Milvus milvus*), peregrine falcon (*Falco peregrinus*), osprey (*Pandion haliaetus*) and marsh harrier (*Circus aeruginosus*).

3.16 The vegetated, hedgrow boundaries of the Application Site are considered to provide suitable breeding and foraging habitat for an assemblage of common and widespread bird species whilst the onsite moat may provide some nesting habitat for low numbers of waterfowl. Indeed, a pair of snipe were identified in association with the central moat during 2018. Although agriculutural grassland which dominates the Application Site is considered to offer an additional foraging resource for birds, such habitat is considered unsuitable for ground nesting bird species given likely disturbance from stocked cattle and the current management regime. As such, the local breeding bird assemblage supported by the Application Site is considered to be of Site level importance.

Bats

3.17 The desk study returned multiple records of bat species within 2km of the Application Site, including brown long-eared bat (*Plecotus auritus*), common pipistrelle (*Pipistrellus* pipistrellus), soprano pipistrelle (*Pipistrellus pygaemus*), noctule (*Nyctalus noctula*) and serotine (*Eptesicus serotinus*) bats. Records of Annex II species returned within 6km of the Application Site include barbastelle (*Barbastella barbastellus*), greater horseshoe (*Rhinolophus ferrumequinum*), Bechstein's (*Myotis bechsteinii*) and lesser horseshoe (*Rhinolophus hipposideros*) bats.

3.18 Records for roosts include a common pipistrelle roost circa 550m north-east of the Application Site and a soprano pipistrelle roost 1.8km east. Several records for lesser horseshoe bat roosts were also returned, the majority in association with open countryside beyond the M5 motorway with few records also associated with Robinswood Hill to the north-west. This is in addition to two records for greater horseshoe bat, the closest within circa 3.5km of the Application Site.

Investigations of Bat Roosting – Trees

3.19 A ground level assessment of the trees within the Application Site for potential to support roosting bats was undertaken by EDP in September 2020 during which eight trees with low potential to support roosting bats, three trees with moderate potential and two trees with high potential were identified. All suitable trees were recorded in association with hedgerow boundaries, particularly at the northern and southern extents of the Application Site. The remaining trees on site were assessed as having negligible potential. The findings of the tree assessment are summarised at **Appendix EDP 5** and illustrated at **Plan EDP 1**.

Investigations of Bat Foraging/Commuting Activity

3.20 The results of the update bat activity surveys comprising walked transect and automated detector surveys undertaken between May 2017 and September 2017, and update automated detector surveys undertaken between September 2020 and May 2021 are

detailed at **Appendix EDP 5**. The approximate distribution and diversity of bat species recorded during the transect surveys is illustrated on **Plans EDP 3a**-**3c** with the locations at which Anabat detectors were deployed illustrated at **Plan EDP 3d**.

3.21 At least seven species of bat (*Myotis* and *Plecotus* species were not always identified to species level) were confirmed to be foraging and/or commuting within the Application Site during surveys undertaken between May and September 2017, with nine species of bat confirmed foraging and/or commuting during surveys undertaken between September 2020 and May 2021.

3.22 During the automated detector surveys in 2017, the vast majority of this behaviour (82% of Anabat recordings) was attributed to common pipistrelle bat. Soprano pipistrelle (2.1%), noctule (1.7%) and *Myotis sp.* (13.2%) bats were recorded occasionally during surveys accounting for 17.3% of Anabat recordings. Lesser horseshoe, long-eared bat and serotine/Leisler's (*Nyctalus* sp.) bats were also recorded during the course of Anabat sampling, but their relative abundance was so low that the total proportion of calls recorded was less than 1% of the total.

3.23 The results of the Anabat detector surveys undertaken between September 2020 and May 2021 were very similar to the 2017 surveys. Common pipistrelle was again the dominant species accounting for 63% of all Anabat recordings during this period, whilst soprano pipistrelle accounted for a further 18.5% and *Myotis sp*. accounted for 12.7%. Lesser horseshoe bat was recorded each month during the sampling period accounting for 3.6% of total calls. Several rarer species were also recorded during discrete recording periods including barbastelle, Nathusius' pipistrelle and Leisler's bat during September 2020 and serotine or serotine/Leisler's bat during September 2020, October 2020 and May 2021.

3.24 Common pipistrelle were again the dominant species recorded during the manual transect surveys in 2017 with occasional occurrences of noctule, and rarely *Myotis* sp. and serotine bats. Overall, low numbers of bats were recorded during the manual transect surveys. An increase in activity recorded was, however, noted during September compared to May and July. Similarly, a high level of activity was recorded by the Anabat detectors during September 2020.

3.25 The abundance and diversity of bat species recorded on site is considered to be typical of a rural-urban edge farmland site in Gloucestershire with common and widespread generalist species such as common pipistrelle bats accounting for the vast majority of foraging and commuting activity. However, a number of rarer 'specialist' species were recorded on site including serotine and lesser horseshoe bat, albeit rarely. Activity was typically greatest during September, suggesting the Application Site is of some importance for bats commuting between their summer and winter roosts within the wider landscape. Overall, the foraging/commuting bat assemblage supported by the Application Site is considered to be of Local importance.

Badger

3.26 GCER returned several records for badger including records within circa 700m of the Application Site. Several records were related to road kills along the A4173 to the south-west.

3.27 A badger survey undertaken during the Extended Phase 1 during 2016 identified an active, outlier badger sett within a hedgerow boundary adjacent to the Application Site. The sett comprised two partially-used, north facing holes excavated out of a shallow embankment and a single disused entrance. No other badger field signs were identified during the survey although multiple mammal paths were recorded within dense scrub/hedgerows across the site which may be attributed to either badger or other mammals such as rabbit and fox (*Vulpes vulpes*).

3.28 During 2020, two additional sett entrances were identified in association with the sett. Rabbit activity was abundant. Nevertheless, two badger hairs were identified at one of the entrances to the sett confirming it was in active use at the time.

3.29 Grassland habitat which dominates the Application Site provides a potential foraging resource for badger whilst boundary hedgerows provide additional foraging opportunities and suitable habitat for excavation of setts. Owing to its abundance in the local area, badger is considered to be of Site importance only.

Dormouse

3.30 No records for dormouse were returned by GCER during the update desk study. Suitable habitat for a dormouse population is limited to native hedgerows delineating the boundaries of the Application Site. However, the M5 motorway to the east and Winneycroft Lane to the west and further south, are considered barriers to the dispersal of dormouse between the Application Site and wider landscape. Further north, the wider landscape is dominated by residential development associated with Gloucester city which would further limit dispersal opportunities at a local scale. This species is thus presumed absent from the Application Site.

Otter and Water Vole

3.31 A desk study returned two records of otter, both north of the Application Site, the closest within 1.3km. No records for water vole were returned.

3.32 There is no suitable habitat for either species onsite. A wet ditch flows along the southern half of the Application Site's western boundary adjacent to hedgerow **H1**, arising from a dry ditch offsite to the south and receiving water runoff from Winneycroft Lane and agriculutural land. The ditch comprises a relatively shallow, narrow watercourse with moderate flow and a channel substrate dominated by gravel with occasional leaf litter. The ditch is otherwise heavily shaded by overhanging hedgerow trees adjacent, with aquatic flora limited to occasional occurrences of fool's watercress (*Apium nodiflorum*).

3.33 With respect to otter, the watercourse is unlikely to provide a significant foraging resource for this species whilst there is no suitable upstream habitat such that the ditch is not considered

of any importance in maintaining connectivity between the Application Site and offsite habitats. With respect to water vole, the watercourse is considered unsuitable for this species given the shallow water depth and absence of a diverse macrophyte community of value as a foraging resource. No evidence of either species was identified during an Extended Phase 1 habitat survey during 2016 and 2020. Both species are thus presumed absent from the Application Site.

Great Crested Newt

3.34 Multiple records of great crested newt were returned within 2km of the Application Site, the vast majority in association with habitats associated with Robinswood Hill north-west of the Application Site. This is in addition to records returned from waterbodies within 500m of the Application Site and onsite. Records for common frog (*Rana temporaria*), common toad (*Bufo bufo*), palmate newt (*Lissotriton helveticus*) and smooth newt (*Lissotriton vulgaris*) were also returned within 2km of the Application Site.

3.35 A single waterbody was identified within the Application Site (**P5**) whilst an initial desk study identified a further nine (**P1**-**P4** and **P6**-**P10**) waterbodies within 500m of the Application Site, as illustrated at **Plan EDP 4**.

3.36 During 2017, a habitat suitability assessment of ponds within 500m of the Application Site (where access was available) confirmed **P5** to have excellent suitability to support great crested newt, **P1** and **P3** to be of good suitability to support great crested newt, with **P4** to have average suitability, **P2**, **P6** and **P7** to have below average suitability and **P8** and **P9** to have poor suitability. There was no access to ponds **P1**-**P4**, **P6** and **P9** during 2021. An update HSI assessment of ponds **P4**-**P5** and **P7**-**P8** on 20 April 2021 confirmed **P4** to be of average suitability, **P5** to be of good suitability and **P7** and **P8** to be of below average suitability.

3.37 Great crested newts were recorded within Ponds **P1**, **P3**, **P4**-**5** and **P8** during 2017. A peak count of 33 was recorded within **P5**, located within the Application Site. Great crested newt eggs were also recorded within ponds **P4** and **P8** confirming these water bodies as breeding ponds.

3.38 During 2021, great crested newts were recorded in all four ponds subject to survey: **P4**, **P5**, **P7** and **P8**. A peak count of 22 was recorded within **P5**, located within the Application Site. Great crested newt eggs were also recorded within ponds **P4**, **P5** and **P8** confirming these water bodies as breeding ponds. It is, therefore, considered that the Application Site supports a medium metapopulation of great crested newt.

3.39 With respect to terrestrial habitats, agriculturally managed improved grassland which dominates the Application Site is considered sub-optimal for a great crested newt population given its poor structural and botanical diversity. Nevertheless, such habitats likely facilitate some dispersal between the Application Site and breeding ponds within the wider landscape whilst hedgerow boundaries provide further opportunities for foraging and refuge. Overall, the great crested newt population supported by the Application Site is considered to be of **Local** level importance.

Reptiles

3.40 Multiple records of slow-worm (*Anguis fragilis*) and grass snake (*Natrix helvetica*) were returned by GCER during the desk study, largely associated with Robinswood Hill circa 1.4km north-west of the Application Site. This is in addition to records of common lizard (*Zootoca vivipara*) returned 1.9km north-west and 1.7km south-east respectively.

3.41 Scrub and hedgerow boundaries provide suitable habitat for the dispersal of this species, in addition to foraging habitat and refugia. The heavily grazed species-poor grassland field is, however, considered sub-optimal as a foraging resource. It is therefore considered unlikely that the Application Site supports a significant reptile population, although low numbers are likely be present, and likely confined to field margins. A common reptile population is thus considered to be of importance at the **Site Level** only.

Other Species Potentially Present

3.42 A desk study assessment returned records for European hedgehog (*Erinaceus europaeus*), all in association with the residential area of Upton St. Leonard's circa 1.25km north-east of the Application Site. Records for brown hare (*Lepus europaeus*) and polecat (*Mustela putorius*) within 2km of the Application Site were also returned. All three species are of Principle Importance in England. Whilst suitable habitats exist onsite for these species, such habitats also predominate within the wider landscape beyond. These species are therefore not considered to be significant beyond a **Site** context.

3.43 With respect to invertebrates, records for the hoverfly *Parasyrphus nigritarsis*, small heath (*Coenonympha pamphilus*), sofin (*Onobrychis viciifolia*) and Duke of burgundy (*Hamearis lucina*), all red data list species, were returned during the desk study. This is in addition to records for small blue (*Cupido minimus*) and white-letter hairstreak (*Satyrium w-album*), both listed under Schedule 5 of the *Wildlife and Countryside Act 1981 (as amended)*. Records of additional notable species include the beetle *Orchesia micans*, Adonis ladybird (*Hippodamia variegate*), the beetle *Anaglyptus mysticus*, brown tree ant (*Lasius brunneus*) and small square-spot moth (*Diarsia rubi*). Such records were largely in association with LWSs within the wider landscape including Robinswood Hill. The agricultural land of limited botanical and structural diversity which dominates the Application Site is considered unlikely to support a notable assemblage. A terrestrial invertebrate assemblage is, therefore, considered to be of **Negligible** importance in the context of the Application Site.

3.44 With respect to notable plant species, records are limited to bluebell (*Hyacinthoides non-scripta*) listed under Schedule 8 of the *Wildlife and Countryside Act 1981 (as amended)* and recorded in association with hedgerow habitat to the north of the Application Site. No notable plant species were recorded during the Extended Phase 1 Habitat survey, and the habitats present within the Application Site, comprising agriculturally improved grassland, are likely to support common and widespread species only.

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Section 4
Summary of Findings

4.1 Based on the baseline investigations described above, the Important Ecological Features pertinent to an EcIA in respect of the proposed development at the Application Site are identified in **Table EDP 4.1**. This is in addition to any protected species of Site level importance which also require consideration given their legal status.

Table EDP 4.1: Important Ecological Features to be considered within an EcIA

Important Ecological Feature	Key Attributes	Nature Conservation Value
Statutory/Non-statutory Designated Sites		
Cotswold Beechwoods SAC	The site represents the most westerly extensive blocks of *Asperulo-Fagetum* beech forest (an Annex I habitat) in the UK.	European
Range Farm Fields SSSI	Large area of flower-rich, unimproved neutral grassland.	National
Winneycroft Farm South Potential LWS	Semi-improved grassland, improved grassland, old pond/moat with mixed hedgerows.	County
Winneycroft Farm Potential LWS	Orchards, veteran and mature trees with invertebrate interest. Semi-improved grassland.	County
Robinswood Hill Country Park, LNR and LWS	Notified for semi-natural grassland habitat.	County
Habitats		
Native Hedgerows	Delineates the boundaries of the Application Site.	Local
Standing Water	Large moat located within the centre of the Application Site.	Local
Species		
Breeding Bird Assemblage	Habitats likely to support an assemblage of common and widespread bird species utilising the Application Site for nesting and foraging.	Site
Foraging/Commuting Bat Assemblage	Seven bat species/species groups (myotis bat species were not identified to species level) in low numbers typical for the locality, with an assemblage dominated by common pipistrelle.	Local
Badger	Suitable foraging habitat present onsite whilst boundary hedgerows offer suitable cover and set building opportunities.	Site
Great Crested Newt	Onsite pond supports a medium metapopulation of great crested newt.	Local
Common Reptiles	Habitats likely to support low numbers of common reptiles only.	Site

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Appendix EDP 1
Masterplan
(Drg Number JBA 21/169-SK01, Rev A, Date 10.05.2022)

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Masterplan

HERITAGE INTERPRETATION BOARD

PROPOSED LANDSCAPE AREAS

TREE PALETTE

Native Focal Trees such as Acer campestre, Betula pendula and Carpinus betulus.

Betula pendula

Street Trees such as Acer campestre "Streetwise" and Carpinus betulus "Frans Fontaine"

Acer campestre "Streetwise"

Ornamental Trees such as Pyrus calleryana "Chanticleer" and Prunus "Amanogawa"

Pyrus calleryana "Chanticleer"

KEY TO MASTERPLAN

- Red Line Boundary

Soft Landscape

- Existing Vegetation
- Proposed Ornamental Shrub Planting
- Proposed Ground Cover Planting
- Proposed Ornamental Hedge Planting
- Proposed Native Buffer Planting
- Proposed Native Hedge Planting
- Amenity Grass to Public Open Space Areas
- Back Garden Grass
- Plot Frontage Grass
- Mown Path
- Wildflower Meadow Grassland
- Proposed Planted Acoustic Bund
- Area of Retained Vegetation

Hard Landscape

- Tarmac Paths
- Proposed Road and Parking Space Tarmac Surfacing
- Proposed Block Paving to Shared Surfaces and Private Drives
- Timber Post and Split Rail Fencing
- Slab Paving
- 3m High Accoustic Fence

Streetscape Items

- Picnic Table
- Heritage Interpretation Board
- Finger Post
- Naturalistic Play Items

Rev.	Date	Initials	Comments
A	10.05.2022	CR	Ammended to client comments

Site
Snow Capel, Matson, Gloucester

Drg Number
JBA 21/169- SK01

Client
Edward Ware Homes

Drawn by	Date	Scale	Rev
HNG	APRIL 2022	1:1000@A1	-

JAMES BLAKE ASSOCIATES

Appendix EDP 2
Habitat Descriptions

A2.1 The principal habitats within the Application Site together with their dominant/characteristic plant species were identified during the Extended Phase 1 survey. The Extended Phase 1 Habitat survey was initially undertaken on 01 February 2016 and updated on 28 September 2020 by a suitably experienced ecologist. A further update survey was undertaken on 07 January 2022.

A2.2 The survey technique adopted for the initial habitat assessment was at a level intermediate between a standard Phase 1 survey technique[13], based on habitat mapping and description, and a Phase 2 survey, based on detailed habitat and species surveys. The survey technique is commonly known as an Extended Phase 1 survey. This level of survey does not aim to compile a complete floral and faunal inventory for the Application Site.

A2.3 The level of survey involves identifying and mapping the principal habitat types and identifying the dominant plant species present in each principal habitat type. In addition, any actual or potential protected species or species of principal importance are identified and scoped.

A2.4 During the update survey on 07 January 2022, information was also collected on the type and condition of the existing habitats with reference to the UK Habitat Classification System (UK Hab), to inform a BNG assessment undertaken using a standard biodiversity metric. Further details of the BNG assessment are set out in Technical Appendix 7.2 (report ref. edp3746_r007).

Limitations

A2.5 February is considered to be within the sub-optimal period for undertaking an Extended Phase 1 survey as it is outside the period where plants are in flower. However, owing to the ecological context and type of habitats present within the Application Site, the survey is considered not to have been limited by seasonal or climatic factors. Furthermore, an update assessment was undertaken in September 2020, considered to be within the optimal season for undertaking an Extended Phase 1 Habitat survey. The survey is, therefore, not considered to be constrained by climatic or seasonal factors.

A2.6 The update survey was undertaken in January which is also within the sub-optimal period for Extended Phase 1 Habitat surveys, however, as this assessment was just to assess if there had been any significant changes since the previous survey, it is not considered to have been constrained by the season due to the low botanical diversity within the Application Site.

[13] Joint Nature Conservation Council (2010) *Handbook for Phase 1 Habitat Survey – A Technique for Environmental Audit* (reprinted with minor corrections for original Nature Conservancy Council publication).

A2.7 Surveys were limited to recording plant species present in both vegetative and floristic forms at the time of survey. The absence of any species recorded during the survey cannot be taken to automatically infer species' absence from the Application Site.

Results

Improved Grassland

A2.8 The Application Site is dominated by improved grassland heavily grazed by cattle and as such is characterised by a relatively short sward (approximately 10cm height) as shown in **Image EDP A2.1**. A grassland community characterised by false oat-grass (*Arrhenatherum elatius*), cock's foot (*Dactylis golmerata*), perennial rye-grass (*Lolium perenne*), white clover (*Trifolium repens*) and creeping buttercup (*Ranunculus repens*), with occasional scattered occurrences of creeping thistle (*Cirsium arvense*), daisy (*Bellis perenne*), broad-leaved dock (*Rumex* obtusifolius) and rarely bristly oxtongue (*Helminthoides echioides*).

A2.9 The field's margins have been heavily poached by cattle and thus are of limited diversity. Given its low botanical diversity and limited structure, improved grassland which dominates the Application Site is considered to be of **Site** Importance.

Image EDP A2.1: Improved grassland dominates the Application Site.

Dense and Scattered Scrub

A2.10 The south-eastern boundary aligning the M5 motorway comprises a post and rail fence predominately colonised by bramble (*Rubus fruticosa*). Scattered trees comprising

hawthorn (*Crataegus monogynea*), semi-mature ash (*Fraxinus excelsior*) and semi-mature pedunculate oak (*Quercus robur*) were often recorded in association with this boundary. In addition, scattered scrub characterised by blackthorn (*Prunus spinosa*) and bramble were also recorded along the pond margins. Given the limited extent and botanical diversity dense, scattered scrub is considered to be of **Negligible** importance.

Hedgerows

A2.11 The western boundary is delineated by a native species-poor, relatively unmanaged hedgerow (**H1**) approximately 3m high and 2m wide as shown in **Image EDP A2.2**. The hedgerow is dominated by hawthorn and blackthorn (*Prunus spinosa*). Bramble is abundant whilst immature willow (*Salix* sp.) and elder (*Sambruca nigra*) are also present. Ground flora is typically limited and characterised by scattered patches of common nettle (*Urticia dioica*) and common cleaver (*Galium* aparine), likely further reduced due to poaching and browsing by livestock. Indeed, the northernmost sections of this hedgerow are relatively degraded as a result of this damage. Scattered trees within this hedgerow largely comprise semi-mature ash and willow. **H1** has further been subject to minimal management works, including the coppicing of semi-mature trees. Log and brash piles were, therefore, frequently recorded at the base of this hedgerow.

Image EDP A2.2: View of **H1** looking east from offsite.

A2.12 The north-western hedgerow (**H2**) is relatively young and likely planted in the last 10 years. Approximately 3m high and 1.5m wide, it is dominated by hawthorn and blackthorn with no associated ground flora. This connects to a dense, mature species-rich hedgerow (**H3**) comprising elder, blackthorn and hawthorn with occasional patches of bramble. Mature and semi-mature crack willow (*Salix fragilis*) and pedunculate oak, and semi-mature field maple (*Acer campestre*) and ash are also present.

A2.13 The southern boundary comprises a former, defunct hedgerow (**H4**) located upon an earthen bank. This feature is dominated by encroaching bramble with scattered trees including mature crack willow, hawthorn, ash and field maple with an understory characterised by elder, hazel (*Corylus avellana*) and willow saplings. Ground flora comprises scattered common ivy (*Hedera helix*) and common nettle. Lords-and-Ladies (*Arum maculatum*) occurs rarely. The northern extend of this ditch is wet and feeds into a small pond (**P9**).

A2.14 Of the native hedgerows recorded on site, only one (**H3**) is considered to qualify as important under the Hedgerow Regulations by virtue of its diversity (Refer to **Appendix EDP 4**). A habitat of Principal Importance, hedgerows are considered to be of **Local** level importance.

Standing Water

A2.15 A large waterbody comprising a former moat (**P5**) is located within the centre of the field and enclosed within stock-proof fencing. The moat supports shallow, grassy banks, albeit with dense bramble and hawthorn scrub encroaching its eastern corner. Bulrush (*Typha* sp.) dominates the centre of this feature, with hard rush (*Juncus effusus*) present along the bankside as shown in **Image EDP A2.3**. Submerged species include brooklime (*Veronica beccabunga*), water forget-me-not (*Myosotis scorpioides*), floating sweet-grass (*Glyceria fluitans*), fool's water cress (*Apium nodiflorum*) and water starwort (*Callitriche stagnalis*).

Image EDP A2.3: Onsite moat (**P5**).

A2.16 A second waterbody (**P9**) is located offsite within the south-western scrub/hedgerow boundary and comprises a heavily shaded pond with a substrate dominated by silt and detritus and no visible aquatic vegetation.

A2.17 A habitat of Principal Importance, standing waterbodies are considered to be of **Local** level importance.

Wet Ditch

A2.18 A wet ditch is present along the southern half of the Application Site's western boundary adjacent to hedgerow **H1**, connecting to ditches offsite to the south. The watercourse is subject to bankside cutting. The ditch itself comprises a relatively shallow, narrow watercourse with moderate flow and a channel substrate dominated by gravel with occasional leaf litter as shown in **Image EDP A2.4**. The ditch is otherwise heavily shaded by overhanging hedgerow trees adjacent, with aquatic flora limited to occasional occurrences of fool's water-cress. Given its managed nature combined with a limited macrophyte assemblage and flow diversity, this feature is considered to be of **Site** importance.

Image EDP A2.4: Wet ditch along part of western boundary.

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Appendix EDP 3
Hedgerow Assessment Results

Methodology

A3.1 Hedgerows on site were assessed by a suitably qualified ecologist for their importance following the Wildlife and Landscape criteria provided in Part II of Schedule 1 of the Hedgerows Regulations 1997 on 16 February 2017 and further updated on 28 September 2020. This was followed by a condition assessment of the hedgerow resource on 07 January 2022 to inform a BNG assessment, further details of which are provided in **Appendix EDP 4**.

A3.2 The aims of the hedgerow assessment were to:

(i) Identify hedgerows that are classified as 'important' under the Wildlife and Landscape criteria of the Hedgerows Regulations 1997; and

(ii) Identify hedgerows that, although not deemed 'important' under the ecological criteria of the Hedgerow Regulations 1997 have ecological value in terms of species diversity or as potential wildlife corridors.

A3.3 A total of four hedgerows (**H1** - **H4**, as illustrated on **Plan EDP 1**) located within the Application Site were surveyed, these hedgerows qualifying for assessment by being assessed to be greater than 30 years of age, being located adjacent to land in agricultural/horticultural use and exceeding 20m in length or by being connected at both ends to another hedgerow of any length.

A3.4 The middle 30m of all hedgerows up to 100m in length were surveyed, whilst two 30m sections were surveyed for hedgerows up to 200m in length where access was possible. For hedgerows exceeding 200m in length, three 30m sections were surveyed.

A3.5 Hedgerows are considered important should the hedgerow be referred to in a record held by a biological records centre as containing protected plants (within 10 years) or birds and animals (within five years), contain species listed in Schedule 5 (animals) and 8 (plants) of the *Wildlife and Countryside Act 1981 (as amended)*, birds categorised as declining breeders[14], or any species categorised as 'endangered', 'extinct', 'rare' or 'vulnerable' by any of the British Red Data Books, or contain one of the following per average 30m section surveyed:

- Seven Schedule 3 species;
- Six Schedule 3 species and three listed features (see below);

[14] Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D., and Win I. 2021. The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. British Birds 114: 723-747. Available online at https://britishbirds. co.uk/content/status-our-bird-populations.

- Schedule 3 species, including one of the following: black poplar (*Populus nigra subsp. betulifolia*), large-leaved lime (*Tilia platyphyllos*), small-leaved lime (*Tilia cordata*) or wild service-tree (*Sorbus torminalis*);

- Five Schedule 3 species and four listed features; or

- Four Schedule 3 species, two listed features and lying adjacent to a bridleway or footpath.

A3.6 Listed features include:

- A bank or wall which supports the hedgerow along at least half of its length;

- Gaps which together do not exceed 10% of the length of the hedgerow;

- At least one standard tree per 50m of hedge;

- At least three Schedule 2 woodland species within the hedgerow;

- A ditch along at least one half of the length of the hedgerow;

- Connections scoring 4 points or more (1 point per connection of the hedgerow with another and 2 points per connection of the hedgerow to a pond or broad-leaved woodland); or

- A parallel hedge within 15m of the hedgerow.

A3.7 It is recognised that, with reference to the Hedgerow Regulations 1997, certain species of bird or animals listed in the *Wildlife and Countryside Act (as amended)* or by the Joint Nature Conservation Committee (JNCC), that could result in a hedgerow being recognised as 'important', may have gone unrecorded due to the timing and nature of the survey. Indeed, the use of the hedgerow by such species may be seasonal or at particular periods during the day. Data gained through the relevant Phase 2 surveys have therefore been included within this assessment.

Results

A3.8 The full results of the hedgerow assessment for the Application Site are provided in **Table EDP A3.1** on the following pages.

Table EDP A3.1: Hedgerow Survey Results 2020

Criteria	Hedgerow ID											
	H1			H2			H3		H4			
Hedgerow Length (approx.)	330m			210m			140m		130m			
Hedgerow Notes	Species-poor, unmanaged, 3m high, 2m wide.			Relatively young hedgerow, species-poor hedgerow, 3m high, 1.5m wide, unfirm height.			Species-rich, unmanaged with outgrowths, fronted by dense bramble in places. 6m high, 4m wide.		Unmanaged, defunct, gappy hedge, 6m high, 3m wide.			
Schedule 3 Woody Species Noted	Blackthorn, hawthorn, elder.	Blackthorn, hawthorn, elder, elm, willow.	Blackthorn, hawthorn, elm, dog-rose.	Hawthorn.	Hawthorn.	Blackthorn.	Blackthorn, field maple, pear sp., ash, hawthorn.	Blackthorn, field maple, hawthorn, elm, oak, elder.	Blackthorn, hawthorn, hazel, elder, field maple.	Ash, hawthorn, elder, field maple, willow.		
Average Number of Schedule 3 Woody Species	4			1			5.5		5			
Black-poplar, Wild Service-tree, Large-leaved Lime or Small-leaved Lime?	N			N			N		N			
Schedule 2 Woodland Species	-			-			Lords-and-Ladies, hart's-tongue.		Lords-and-Ladies.			
3 Woodland Species?	N			N			N		N			
Other Ground Flora Species Present	Common cleaver, common nettle, dock, burdock (*Arctium sp.*), white-dead nettle (*Lamium album*).			Common nettle, bramble.			Common ivy, common nettle, bramble.		Common Ivy, Common nettle, bramble.			
Supporting Bank/Wall along at least 50% of Hedgerow?	N			N			Y		N			

Criteria	**Hedgerow ID**			
Ditch along at least 50% of Hedgerow?	Y	N	N	Y
Total Proportion of Gaps in Hedgerow less than 10% of Hedgerow Length?	Y	Y	Y	N
At Least one Standard Tree per 50 of Hedgerow?	Y	N	Y	Y
Parallel Hedge Present?	N	N	N	N
Hedgerow Adjacent to a Bridleway/Footpath/ Byway?	N	Y	Y	N
Number of Connection Points?	2	0	1	0
Hedgerow 'Important'?	N	N	**Y**	N

Appendix EDP 4
Habitat Condition Assessment

A4.1 **Tables EDP A4.1** to **A4.4** summarise the results of the habitat condition assessment undertaken on 07 January 2022.

Table EDP A4.1: Modified Grassland Condition Assessment

Condition	Condition Achieved	Notes
There must be 6-8 species per m^2. If a grassland has 9 or more species per m^2 it should be classified as a medium distinctiveness grassland habitat type. NB – this criterion is essential for achieving moderate condition.	No	Average of 5 species per m^2.
Sward height is varied (at least 20% of the sward is less than 7cm and at least 20% is more than 7cm) creating microclimates which provide opportunities for insects, birds and small mammals to live and breed.	Yes	
Some scattered scrub (including bramble) may be present, but scrub accounts for less than 20% of total grassland area. Note - patches of shrubs with continuous (more than 90%) cover should be classified as the relevant scrub habitat type.	Yes	
Physical damage is evident in less than 5% of total grassland area. Examples of physical damage include excessive poaching, damage from machinery use or storage, erosion caused by high levels of access, or any other damaging management activities.	No	Damage from walkers and vehicle tracks within the grassland.
Cover of bare ground is between 1% and 10%, including localised areas (for example, a concentration of rabbit warrens).	Yes	
Cover of bracken less than 20%.	Yes	
There is an absence of invasive non-native species (as listed on Schedule 9 of *Wildlife and Countryside Act, 1981*).	Yes	
Condition	**Poor**	

Table EDP A4.2: Scrub Condition Assessment

Condition	Condition Achieved	Notes
Habitat is representative of UK Hab description (where in its natural range). There are at least three woody species, with no one species comprising more than 75% of the cover (except common juniper (*Juniperus communis*), sea buckthorn (*Hippophae rhamnoides*) or box (*Buxus sp.*), which can be up to 100% cover).	No	Bramble scrub.

Condition	Condition Achieved	Notes
There is a good age range – all of the following are present: seedlings, young shrubs and mature shrubs.	No	Scrub all a similar age.
There is an absence of invasive non-native species (as listed on Schedule 9 of *Wildlife and Countryside Act, 1981*) and species indicative of sub-optimal condition make up less than 5% of ground cover.	Yes	
The scrub has a well-developed edge with scattered scrub and tall grassland and/or herbs present between the scrub and adjacent habitat(s).	No	Edge of scrub lacks herb species.
There are clearings, glades or rides present within the scrub, providing sheltered edges.	No	
Condition	**Poor**	

Table EDP A4.3: Pond Condition Assessment

Condition	Condition Achieved	Notes
The pond is of good water quality, with clear water (low turbidity) indicating no obvious signs of pollution. Turbidity is acceptable if the pond is grazed by livestock.	No	Water quality has been impacted by runoff from the field.
There is semi-natural habitat (i.e., moderate distinctiveness or above) for at least 10m from the pond edge.	No	Grassland field around the pond is managed.
Less than 10% of the pond is covered with duckweed or filamentous algae.	No	
The pond is not artificially connected to other waterbodies, either via streams, ditches or artificial pipework.	Yes	
Pond water levels should be able to fluctuate naturally throughout the year. No obvious dams, pumps or pipework.	Yes	
There is an absence of non-native plant and animal species.	Yes	
The pond is not artificially stocked with fish. If the pond naturally contains fish, it is a native fish assemblage at low densities.	Yes	
Condition	**Moderate**	

Table EDP A4.4: Hedgerow Condition Assessment

Condition	Hedgerow			
	H1	H2	H3	H4
>1.5m average along length.	Y	Y	Y	Y
>1.5m average along length.	Y	Y	Y	Y
Gap between ground and base of canopy <0.5m for >90% of length (unless 'line of trees').	Y	Y	Y	N
Gaps make up <10% of total length and no canopy gaps >5m.	N	Y	Y	N

Condition	**Hedgerow**			
	H1	**H2**	**H3**	**H4**
>1 m width of undisturbed ground with perennial herbaceous vegetation for >90% of length: - measured from outer edge of hedgerow, and -is present on one side of the hedge (at least).	N	Y	Y	Y
Plant species indicative of nutrient enrichment of soils dominate <20% cover of the area of undisturbed ground.	N	Y	Y	N
>90% of the hedgerow and undisturbed ground is free of invasive non-native and neophyte species.	Y	Y	Y	Y
>90% of the hedgerow or undisturbed ground is free of damage caused by human activities.	N	Y	Y	Y
Condition	**Poor**	**Good**	**Good**	**Poor**

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Appendix EDP 5
Bat Survey Results

Methodology

A5.1 The initial and update Extended Phase 1 Habitat survey confirmed the presence of several trees with potential to support roosting bats within the Application Site. The hedgerow network, and grassland habitats present across the Application Site are also considered to provide suitable foraging and commuting habitat for bats.

A5.2 The following surveys for bats were therefore undertaken, with reference to national best practice guidelines[15]:

1) Bat Roosting:

   a) Ground level visual assessment of onsite trees for bat roosting potential, completed on 01 February 2016 and 28 September 2020.

2) Bat foraging/commuting activity:

   a) Manual transect surveys conducted on 15 May, 27 July and 11 September 2017;

   b) Automated detector surveys conducted in May, July and September 2017; and

   c) Further automated detector surveys conducted in September and October 2020 and May and June 2021.

Investigations of Bat Roosting – Trees

A5.3 To determine the potential impacts of the proposed development on bats potentially roosting within trees across the Application Site, all suitable trees were subject to a visual assessment with reference to current best practice guidance[16].

A5.4 A visual assessment was initially undertaken on 01 February 2016 during which the trees were searched as thoroughly as possible from ground level, with the use of binoculars where necessary, on all elevations, where accessibility allowed. An update assessment was undertaken on 28 September 2020. On each occasion the survey was completed by a suitably qualified ecologist and in accordance with best practice guidelines. All trees subject to survey are illustrated at **Plan EDP 1**.

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15 Collins, J. (ed.) (2016). *Bat Surveys: for Professional Ecologists: Good Practice Guidelines* (3rd edition). The Bat Conservation Trust, London

16 Collins, J. (ed.) (2016). *Bat Surveys: for Professional Ecologists: Good Practice Guidelines* (3rd edition). The Bat Conservation Trust, London

A5.5 Suitable features for roosting bats sought for during the assessment included:

- Loss/peeling/fissured bark;
- Natural holes e.g., rot holes and holes from fallen limbs;
- Woodpecker holes;
- Cracks/splits or hollow tree trunks/limbs; and
- Thick-stemmed ivy.

A5.6 Signs of roosting bats sought for included:

- Bat/s roosting *in-situ*;
- Bat droppings within or beneath a feature;
- Staining around or beneath a feature;
- Oily marks (staining) around roost access points;
- Audible squeaking from the roost;
- Large/regularly used roosts or regularly used sites may produce an odour; and
- Flies around the roost, attracted by the smell of guano.

A5.7 Based upon the results of the visual assessment and features/evidence identified, the following ratings for trees were used during the assessment:

- **Known or confirmed roost** – European Protected Species (EPS) licence required for works to tree to be completed lawfully;
- **High potential** – Tree supports one or more features that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time;
- **Moderate potential** – Tree supports one or more features that could be used by bats but are unlikely to support a roost type of high conservation status;
- **Low potential** – Tree supports one or more features that could be used by individual bats opportunistically, or is of sufficient size and age to contain such features; and
- **Negligible potential** – Negligible features likely to support roosting bats.

Limitations

A5.8 Visual assessments for roosting bats can be undertaken at any time of year and this assessment was not limited by seasonal or climatic factors.

Investigations of Bat Foraging/Commuting Activity

Manual Transect Surveys

A5.9 Manual transect surveys were undertaken across the Application Site to identify areas of bat foraging activity and commuting routes used by bats with surveys completed in May, July and September 2017. Full details including the survey type, date, timing, and weather conditions during each of the transect surveys undertaken during 2017 is given in **Table EDP A5.1**. Weather conditions were largely optimum for bat surveys, being relatively warm with light winds and no rain.

Table EDP A5.1: Date, Timing and Weather Conditions of Bat Activity Surveys

Survey Date	Dusk/ Dawn	Survey Time	Sunrise/ Sunset Time	Weather Conditions			
				Temp (°C)	Cloud (%)	Rain	Wind (Beaufort Scale)
15.05.17	Dusk	20:50-22:50	20:50	16.1-16.3	100	Spitting for 5 mins at start of survey.	3-4
27.07.17	Dusk	21:07-23:07	21:07	14.0-14.6	40-60	None.	3-4
11.09.17	Dusk	19:32-21:32	19:32	12.0-14.0	20-40	None.	2

A5.10 Manual transect surveys were completed by experienced bat surveyors across one transect survey route designed to provide a representative cover of potential foraging or commuting habitats onsite; namely hedgerow boundaries and the central moat. Each transect route was walked at a slow and steady pace. All bats were recorded, and their behaviour marked on survey maps in order to characterise the value of the Application Site and its component habitats to foraging and commuting bats. **Plans EDP 3a – 3c** illustrate the transect route walked during the surveys.

A5.11 Activity surveys were conducted using EM3 and Walkabout bat detectors, with observations of the time, location, and activity of all bats seen or heard recorded. Bats were identified on the basis of their characteristic echolocation calls, which were recorded where appropriate and analysed using computer sonogram analysis (Analook) to confirm species identification. Species of Myotis bat (*Myotis sp.*) and long-eared bat (*Plecotus sp.*) are difficult to tell apart solely from their echolocation calls and were therefore grouped as such.

Automated Detector Surveys

A5.12 To supplement the bat transect survey data and to provide a more robust assessment of activity by horseshoe bat species (which are often under-recorded by transect surveys), bat activity within the Application Site was also sampled using static bat detectors which automatically trigger and record bat echolocation calls. Anabat Express detectors (hereafter referred to as 'Anabats') were deployed at two locations within the Application Site, as shown on **Plan EDP 3d**.

A5.13 A single Anabat was deployed in the illustrated locations for five consecutive nights during May, July and September 2017. To update the ecological baseline, two automated detectors were also deployed onsite for 5 consecutive nights during September 2020, October 2020 and May 2021.

A5.14 On each occasion, the Anabats were fixed securely in their location, with an external microphone attached 1.0-2.0m above ground and directed away from the tree/branch to maximise detection sensitivity. Minimum night time air temperatures were recorded by a nearby local weather station. **Table EDP A5.2** gives the sampling dates and microphone details for the Anabats deployed during the sampling periods.

Table EDP A5.2: Anabat Sampling Dates and Microphone Details

Sampling Period	Location Number	Microphone	
		Height (m)	Direction
15-20 May 2017	1	1.5m	South-east
11-17 July 2017	1	1.7m	South-east
11-16 September 2017	1	2.0m	South-east
16-21 September 2020	1	1.5m	South-west
	2	1.6m	South
02-07 October 2020	1	1.5m	East
	2	1.5m	South
23-28 October 2020	1	2	South
	2	1.5	North-east
26-31 May 2021	1	1.7	South
	2	1.8	East

A5.15 The sound files recorded by the Anabats were filtered for each of the UK's bat species/species groups using Analook software's filter function. The parameters for the species filters are based on those proposed by Chris Corben and Kim Livengood[17] and have been fine-tuned using known call parameters for each of the species. All files

[17] Taken from Analook W training course and workshop, September 2013

passing the various filters were checked manually using sonogram analysis in accordance with published guides[18] to confirm the species identification of each bat call.

Limitations

A5.16 Due to climatic and environmental factors in the immediate vicinity of each of the Anabat locations, the sensitivity of each Anabat had to be adjusted and was therefore not consistent across all locations. This can affect the number of bat calls recorded by each detector and has been taken into account when describing bat activity levels in the results section.

A5.17 In addition, the identification of calls and species using Analook software is dependent upon the quality of the recording made which can be influenced by the following factors, which may limit levels of activity and species recorded:

- Weather conditions – rainfall and wind;
- Distance of bat from Anabat;
- Presence of obstructions through which the noise must pass i.e., trees; and
- Proximity of other noise sources such as roads.

A5.18 The Anabat deployed at Position 2 during September 2020 failed such that no data was recorded during the deployment. In consideration of results obtained to date, this is not considered to have affected an assessment of the Application Site, particularly given its small size with one Anabat at Position 1 considered sufficient to record and assess bat activity.

A5.19 The Anabat deployment at Position 2 during October 2020 failed after the second night such that no further data was recorded during the deployment. As such, two Anabats were re-deployed during late October to supplement the data; however, bat activity would naturally be suppressed at this time of year.

Results

Investigations of Bat Roosting – Trees

A5.20 A ground level assessment of the trees within the Application Site for potential to support roosting bats was undertaken by EDP in September 2020 during which eight trees with low potential to support roosting bats, three trees with moderate potential and two trees with high potential was identified (see **Plan EDP 1**). All suitable trees were recorded in association with hedgerow boundaries, particularly at the northern and southern extents of the Application Site. The remaining trees on site were assessed as having negligible

[18] Russ (2012). *British Bat Calls, a guide to species identification*. Pelagic Publishing, Exeter

potential. The findings of the ground level tree assessments are summarised in **Table EDP A5.3**:

Table EDP A5.3: Ground Level Tree Inspection Results, September 2021

Tree ID	Species	Description of Key Features	Bat Roost Potential
T1	Ash (*Fraxinus excelsior*)	Semi-mature tree with single woodpecker hole and tear.	Moderate
T2	Ash (*Fraxinus excelsior*)	Potential roosting features limited to knot holes with potential cavity likely to support single bats only.	Low
T3	Ash (*Fraxinus excelsior*)	Mature tree with decaying trunk likely to support potential cavities. Rot in outer limbs.	High
T4	Ash (*Fraxinus excelsior*)	Mature tree with decaying trunk likely to support potential cavities and weld.	Moderate
T5	Field maple (*Acer campestre*)	Several rot holes in main trunk. Appear hollow.	High
T6	Ash (*Fraxinus excelsior*)	Semi-mature tree with dense ivy cover.	Low
T7	Willow (Salix sp.)	Only stump remaining with flaking bark. Potential to support single bats only.	Low
T8	Field maple (*Acer campestre*)	Small tear out with shallow cavity.	Low
T9	Willow (*Salix* sp.)	Mature willow with dense ivy cover and some rot in upper branches.	Low
T10	Willow (*Salix* sp.)	Mature willow with dense ivy cover rot holes.	Low
T11	Ash (*Fraxinus excelsior*)	Mature ash with several rot holes.	Moderate
T12	Hawthorn (Crataegus monogynea)	Mature shrub with dense ivy cover.	Low
T13	Field maple (*Acer campestre*)	Dense ivy cover.	Low

Investigations of Bat Foraging/Commuting Activity

A5.21 Bat foraging and commuting activity recorded during the transect and automated detector surveys undertaken during 2017, 2020 and 2021 is summarised by species/genus below and illustrated on **Plans EDP 3a** – **3c**. The following should be read in conjunction with these plans and automated detector survey results in **Tables EDP A5.4**-**A5.10**.

Species Diversity and Abundance

A5.22 Over seven species of bat (*Myotis* and *Plecotus* species were not always identified to species level) were confirmed to be foraging and/or commuting within the Application Site during surveys undertaken between May and September 2017, with nine species of bat confirmed foraging and/or commuting during surveys undertaken between September 2020 and May 2021.

A5.23 During the automated detector surveys in 2017, the vast majority of this behaviour (82% of Anabat recordings) was attributed to common pipistrelle bat. Soprano pipistrelle (2.1%), noctule (1.7%), *Myotis sp.* (13.2%) bats were recorded occasionally during surveys accounting for 17.3% of Anabat recordings. Lesser horseshoe, long-eared bat, serotine/Leisler's (*Nyctalus* sp.) bats were also recorded during the course of Anabat sampling, but their relative abundance was so low that the total proportion of calls recorded was less than 1% of the total. The relative abundance and distribution of each species recorded is discussed further below.

A5.24 This is similar to the results of Anabat detector surveys undertaken between September 2020 and May 2021. Common pipistrelle was again the dominant species accounting for 63% of all Anabat recordings during this period whilst soprano pipistrelle accounted for a further 18.5% and *Myotis sp.* Accounted for 12.7%. Lesser horseshoe bat, an Annex II species, was recorded each month during the sampling period accounting for 3.6% of total calls. Several rarer species were also recorded during discrete recording periods including barbastelle, Nathusius' pipistrelle and Leisler's bat during September 2020 and serotine or serotine/Leisler's bat during September 2020, October 2020 and May 2021.

A5.25 Common pipistrelle were again the dominant species recorded during the manual transect surveys in 2017 with occasional occurrences of noctule and rarely *Myotis* sp. And serotine bats. Overall, low numbers of bats were recorded during the manual transect surveys. An increase in activity recorded was, however, noted during September compared to May and July. Similarly, a high level of activity was recorded by the Anabat detectors during September 2020.

Evaluation

A5.26 An evaluation of the bat assemblage at the Application Site is provided below, with reference to the relative abundance and distribution of each bat species (with reference to the most up-to-date information on local and national species distribution[19] and population trends[20] available at the time of writing).

A5.27 Common pipistrelle bats are common and widespread across the UK, representing the most and second most abundant species in the UK respectively. Whilst having suffered significant historic declines, national population monitoring[21] indicates that common pipistrelle bats are stable nationally and increasing. Common pipistrelle bat was found to be the dominant species utilising the Application Site. Common pipistrelle bats using the Application Site are, therefore, considered to be of Local importance.

[19] Battersby. J. (Ed) & Tracking Mammals Partnership. (2005) *UK Mammals Species Status and Population Trends*. First Report by the Tracking Mammals Partnership. JNCC/Tracking Mammals Partnership, Peterborough

[20] Bat Conservation Trust, 2021. The National Bat Monitoring Programme Annual Report 2020. Bat Conservation Trust, London. Available at www.bats.org.uk/our-work/national-bat-monitoringprogramme/reports/nbmp-annual-report.

[21] Bat Conservation Trust, 2021. The National Bat Monitoring Programme Annual Report 2020. Bat Conservation Trust, London. Available at www.bats.org.uk/our-work/national-bat-monitoringprogramme/reports/nbmp-annual-report.

A5.28 Myotis bat species occur throughout most of the UK, their populations considered to be either stable or increasing in most cases[22]. Individual Myotis bats were infrequently recorded during automated detector and manual transect surveys. Based upon this data, the use of the Application Site by Myotis bat species is likely to be of no more than Site importance.

A5.29 Noctule bats are widespread across the UK, with its population and range considered to remain stable in the UK[23]. Only low numbers of noctule bats were recorded by surveyors and static detectors during 2017. Noctule bats using the Application Site are therefore considered to be of Site level importance.

A5.30 Soprano pipistrelle bats are widely distributed across the UK, and whilst populations declined dramatically in the twentieth century, field survey data shows statistically significant population increases[24]. Soprano pipistrelle bats were infrequently recorded during survey effort. Soprano pipistrelle bats supported by the Application Site are therefore considered to be of Site importance.

A5.31 Brown long-eared bats are considered to be widespread and common across the UK with national populations considered stable. In contrast, populations of grey-long eared bat (*Plecotus austriacus*) are largely limited to the south coast of England although this species is under recorded. Brown long-eared bat was rarely recorded during the Anabat detector surveys although this species is likely to be underrepresented given it's not often picked up by bat detectors. The population of long-eared bat species supported by the Application Site is considered to be of Site importance.

A5.32 Serotine bats are restricted to southern England and Wales where they are widespread, but scarce, albeit populations are stable nationally. Serotine bat was recorded on a single occasion during the manual transect surveys. *Nyctalus/Eptiscus* sp. Was also recorded by Anabat detectors in September 2017 and October 2020, whilst serotine was recorded during September 2020 and May 2021. Given its rarity, serotine bat is considered to be of Local importance whilst Leisler's bat is of Site importance.

A5.33 Lesser horseshoe bat is listed in Annex II of the EC Habitats Directive and are considered to be rare nationally, with a range restricted to south Wales and south-west England, although populations of these species are considered to have increased in the UK since 1999.

A5.34 Lesser horseshoe bats were recorded only occasionally during automated detector surveys, albeit regularly so, throughout the survey period.

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22 Bat Conservation Trust, 2021. The National Bat Monitoring Programme Annual Report 2020. Bat Conservation Trust, London. Available at www.bats.org.uk/our-work/national-bat-monitoringprogramme/reports/nbmp-annual-report.

23 Bat Conservation Trust, 2021. The National Bat Monitoring Programme Annual Report 2020. Bat Conservation Trust, London. Available at www.bats.org.uk/our-work/national-bat-monitoringprogramme/reports/nbmp-annual-report.

24 Bat Conservation Trust, 2021. The National Bat Monitoring Programme Annual Report 2020. Bat Conservation Trust, London. Available at www.bats.org.uk/our-work/national-bat-monitoringprogramme/reports/nbmp-annual-report.

A5.35 Habitats onsite are considered to offer limited foraging opportunities for this species, but hedgerow boundaries are likely to provide a suitable wildlife corridor for bats dispersing between their roosts and foraging grounds within the wider landscape. The Application Site is considered to be of Local Importance to lesser horseshoe bats.

A5.36 With respect to Nathusius' pipistrelle, insufficient data is available to understand their current population trend. Overall, this species is considered rare in the UK but may be under recorded. Nathusius' pipistrelle was recorded during the automated bat detector survey on one occasion only during September 2020. This species is considered to be no more than Site level importance.

A5.37 Barbastelle bats are very rare but found in southern and central England and Wales. Barbastelle bats forage over a wide area, mainly in woodland and near water. The moat is likely to offer a limited foraging resource for this species, whilst hedgerow boundaries facilitates dispersal between their roosts and foraging grounds in the wider landscape.

A5.38 The abundance and diversity of bat species recorded on site is considered to be typical of a rural-urban edge farmland site in Gloucestershire with common and widespread generalist species such as common pipistrelle bats accounting for the vast majority of foraging and commuting activity. However, a number of rarer 'specialist' species were recorded on site including serotine and lesser horseshoe bat, albeit rarely. Activity was typically greatest during September, suggesting the Application Site is of some importance for bats commuting between their summer and winter roosts within the wider landscape. Overall, the foraging/commuting bat assemblage supported by the Application Site is considered to be of **Local** importance.

Table EDP A5.4: Automated Detector Survey Results May 2017. (*Less than 1%)

Position	Bat Species	Number of Bat Passes Recorded per Night					Total	% of Total
		15 May	16 May	17 May	18 May	19 May		
1	Common pipistrelle	0	7	1	40	32	80	82
	Lesser horseshoe	0	0	0	1	0	1	1
	Myotis sp.	0	1	0	2	4	7	7
	Noctule	1	3	0	4	1	9	9
	Soprano pipistrelle	0	0	0	0	1	1	1
	Total	**1**	**11**	**1**	**47**	**38**	**98**	**100**

Table EDP A5.5: Automated Detector Survey Results July 2017. (*Less than 1%)

Position	Bat Species	Number of Bat Passes Recorded per Night					Total	% of Total
		11 July	12 July	13 July	14 July	15 July		
1	Common pipistrelle	31	62	128	74	0	295	87
	Long-eared	0	1	0	0	0	1	*
	Lesser horseshoe	1	1	0	0	0	2	*
	Myotis sp.	21	4	0	5	0	30	9
	Noctule	0	0	1	2	0	3	*
	Soprano pipistrelle	0	2	7	1	0	10	3
	Total	**53**	**70**	**136**	**82**	**0**	**341**	**100**

Table EDP A5.6: Automated Detector Survey Results September 2017. (*Less than 1%)

Position	Bat Species	Number of Bat Passes Recorded per Night					Total	% of Total
		11 Sep	12 Sep	13 Sep	14 Sep	15 Sep		
1	Common pipistrelle	46	0	82	50	74	252	78
	Lesser horseshoe	0	0	0	0	1	1	*
	Myotis sp.	6	0	27	11	20	64	20
	Noctule	0	0	1	1	0	2	*
	Leisler's/Serotine	0	0	0	0	2	2	*
	Soprano pipistrelle	2	0	0	0	3	5	2
	Total	**54**	**0**	**110**	**62**	**100**	**326**	**100**

Table EDP A5.7: Automated Detector Survey Results September 2020. (*Less than 1%)

Position	Bat Species	Number of Bat Passes Recorded per Night					Total	% of Total
		16 Sep	17 Sep	18 Sep	19 Sep	20 Sep		
1	Barbastelle	0	0	3	2	1	6	*
	Common pipistrelle	1742	127	564	1031	141	3605	63
	Leisler	0	0	0	1	0	1	*
	Lesser horseshoe	93	7	39	49	27	215	4
	Myotis sp.	298	32	114	237	21	702	12
	Nathusius	1	0	0	1	0	2	*
	Noctule	33	4	12	2	17	68	1
	Soprano pipistrelle	597	12	150	351	28	1138	20
	Serotine	3	0	0	0	0	3	*
	Total	**2767**	**182**	**882**	**1674**	**235**	**5740**	**100**

Table EDP A5.8: Automated Detector Survey Results early October 2020. (*Less than 1%)

Position	Bat Species	Number of Bat Passes Recorded per Night					Total	% of Total
		02 Oct	03 Oct	04 Oct	05 Oct	06 Oct		
1	Common pipistrelle	39	0	17	52	21	129	51
	Lesser Horseshoe	1	0	4	3	3	11	4
	Myotis sp	55	1	5	9	6	76	30
	Noctule	0	0	0	1	0	1	*
	Serotine/Leisler's	0	0	4	1	0	5	2
	Soprano pipistrelle	19	3	1	3	3	29	12
	Total	**114**	**4**	**31**	**69**	**33**	**251**	**100**
2	Barbastelle	Failed Detector			2	2	4	2
	Common pipistrelle				87	60	147	63
	Lesser Horseshoe				1	1	2	1
	Myotis sp.				24	12	36	15
	Noctule				1	1	2	1
	Serotine/Leisler's				1	3	4	2
	Soprano pipistrelle				8	30	38	16
	Total				**124**	**109**	**233**	**100**

Table EDP A5.9: Automated Detector Survey Results late October 2020. (*Less than 1%)

Position	Bat Species	Number of Bat Passes Recorded per Night					Total	% of Total
		23 Oct	24 Oct	25 Oct	26 Oct	27 Oct		
1	Common pipistrelle	3	1	3	0	1	8	53
	Myotis sp.	4	0	2	1	0	7	47
	Total	**7**	**1**	**5**	**1**	**1**	**15**	**100**
2	Common pipistrelle	1	2	1	0	0	4	22
	Myotis sp.	1	2	4	4	1	12	67
	Soprano pipistrelle	1	0	1	0	0	2	11
	Total	**3**	**4**	**6**	**4**	**1**	**18**	**100**

Table EDP A5.10: Automated Detector Survey Results May 2021. (*Less than 1%)

Position	Bat Species	Number of Bat Passes Recorded per Night					Total	% of Total
		26 May	27 May	28 May	29 May	30 May		
1	Common pipistrelle	0	6	42	16	17	81	68
	Lesser horseshoe	0	0	0	1	0	1	1
	Myotis sp	0	0	0	8	6	14	12
	Noctule	0	2	0	2	3	7	6
	Serotine	0	0	1	2	0	3	3
	Soprano pipistrelle	2	0	8	0	3	13	11
	Total	**2**	**8**	**51**	**29**	**29**	**119**	**100**
2	Common pipistrelle	3	27	159	15	11	215	69
	Lesser horseshoe	1	9	3	3	1	17	5
	Myotis sp.	0	1	1	1	0	3	1
	Noctule	7	9	17	11	7	51	16
	Serotine	0	0	0	1	0	1	*
	Soprano pipistrelle	3	1	7	14	1	26	8
	Total	**14**	**47**	**187**	**45**	**20**	**313**	**100**

Appendix EDP 6
Great Crested Newt Survey Results

Methodology

A6.1 A single waterbody was identified within the Application Site (**P5**) whilst an initial desk study identified a further nine (**P1**-**P4** and **P6**-**P10**) waterbodies within 500m of the Application Site, as illustrated at **Plan EDP 4**.

Habitat Suitability Index Assessment

A6.2 An HSI assessment, as developed by Oldham et al. (2000)[25], of each waterbody within 500m of the Application Site (where access was available) was initially undertaken on 11 April 2017 and further updated on 28 April 2021 by a suitably qualified ecologist to assess their suitability to support great crested newt.

A6.3 The HSI assessment follows a standardised assessment criteria using habitat features such as water quality, fish/waterfowl presence and surrounding terrestrial habitat quality to derive a suitability score, or 'index'. Water bodies with high scores are considered more likely to support great crested newt compared to those with lower scores. HSI scores and the inferred suitability of the ponds assessed to support great crested newt are described within **Table EDP A6.1**.

Table EDP A6.1: HSI Scores and Inferred Pond Suitability

HSI Score	Pond Suitability to Support Great Crested Newts
<0.5	Poor suitability.
0.5–0.59	Below average suitability.
0.6–0.69	Average suitability.
0.7–0.79	Good suitability.
>0.8	Excellent suitability.

Presence/Absence Surveys and Population Size Assessment

A6.4 Ponds **P1**-**5** and **P7**-**P9** were also subject to traditional presence/absence surveys to confirm the presence or likely absence of great crested newt during spring 2017. There was no access to **P6** and **P10** at this time. Further update surveys of **P4**-**5** and **P7**-**P8** were also undertaken during spring 2021; however, no access to **P1**-**P3**, **P6** and **P9**-**P10** was available during 2021. The dates of the survey visits and the conditions during the 2017 and 2021 surveys are summarised in **Table EDP A6.2** and **A6.3** respectively.

[25] Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000). *Evaluating the suitability of habitat for the Great Crested Newt* (Triturus cristatus). Herpetological Journal 10 (4), 143-155

Table EDP A6.2: Dates, Timings and Conditions for the Great Crested Newt Surveys – 2017

Visit	Date (evening)	Min Overnight Air Temp. (°C)
1	11.04.17	8
2	27.04.17	12
3	04.05.17	10
4	15.05.17	13
5	23.05.17	14
6	30.05.17	16

Table EDP A6.3: Dates, Timings and Conditions for the Great Crested Newt Surveys – 2017

Visit	Date (evening)	Min Overnight Air Temp. (°C)
1	28.04.21	1
2	05.05.21	4
3	12.05.21	9
4	19.05.21	11
5	02.06.21	12
6	10.06.21	17

A6.5 Survey visits were undertaken with reference to the survey methodology set out in the English Nature Guidelines[26] by a holder of an NE great crested newt survey licence and an assistant. In accordance with the guidelines, the following three preferred survey techniques were employed to determine the presence/absence of great crested newt onsite:

- Torching – this involves searching water bodies by torchlight between dusk and midnight and is an effective means of detecting adult newts. Each surveyor used a 1,000,000 candle power torch during this part of the survey;

- Bottle Trapping – this involves the use of funnel traps (made from 2-litre plastic bottles) that are inserted into the water along the margin of the water bodies during the evening and checked the following morning. Access permitting, the traps are spaced at roughly 2m intervals around the margins of the ponds; and

- Egg Searching – a search of any suitable aquatic vegetation to check for great crested newt eggs.

A6.6 A fourth method (daytime visual count, in place of netting) was also used where the other survey techniques were unsuitable due to the nature of the waterbodies and the unnecessary disturbance it could potentially cause to these ecosystems.

A6.7 The standard survey procedure involved a minimum of four survey visits to each pond to confirm the presence/likely absence of great crested newt, with a further two visits completed should evidence be confirmed, necessary to allow for an estimation of population size. As great crested newts were recorded within ponds **P1**, **P4**-**5** and **P8**

[26] English Nature (2001). Great Crested Newt Mitigation Guidelines, English Nature, Peterborough

during the first four survey visits in 2017, an additional two surveys were undertaken in these ponds. During 2021, all ponds (**P4**-**P5** and **P7**-**P8**) were surveyed on six occasions.

Limitations

A6.8 The timing and conditions during the surveys are generally in line with those set out in the English Nature Great Crested Newt Mitigation Guidelines and as such, it is not considered that they were limited by seasonal or climatic factors.

A6.9 No access was granted to ponds **P6** and **P10** by the relevant landowners during 2017. As such, there is no survey data for these waterbodies in this year.

A6.10 No access was granted to ponds **P1**, **P6** and **P10** by the relevant landowners during 2021. In addition, there was no access to ponds **P2**-**P3** and **P9** associated with Green Farm, this property being vacant.

A6.11 High turbidity and/or vegetation limited visibility in some water bodies during the torchlight surveys and may have resulted in great crested newts being undetected; however, the survey design, which includes other survey techniques, is specifically intended to reduce the significance of this limitation.

A6.12 Cold overnight temperatures were recorded during the first and second update survey visits on 28 April and 05 May 2021 respectively such that great crested newt activity may have been suppressed with netting undertaken *in lieu* of bottle trapping during the first site visit. Cold overnight temperatures did, however, follow an extended period of warm nights during early April. Combined with relatively warm water temperatures (circa 12°C) it is considered that great crested newt would have been active during survey visits.

Results

Habitat Suitability Assessment

A6.13 A description of those ponds surveyed is provided within **Table EDP A6.4** with the detailed results of the habitat suitability assessment provided within **Table EDP A6.5**.

A6.14 During 2017, the habitat suitability assessment confirmed **P5** to have excellent suitability to support great crested newt, **P1** and **P3** to be of good suitability to support great crested newt, with **P4** to have average suitability, **P2**, **P6** and **P7** to have below average suitability, and **P8** and **P9** to have poor suitability. There was no access to ponds **P1**-**P4**, **P6** and **P9** during 2021.

A6.15 An update HSI assessment of ponds **P4**-**P5** and **P7**-**P8** on 20 April 2021 confirmed **P4** to be of average suitability, **P5** to be of good suitability, and **P7** and **P8** to be of below average suitability.

Table EDP A6.4: Habitat Suitability of Ponds **P1**– **P11** to Support Great Crested Newt

Pond No.	Pond Description and Illustrative Photograph	HSI Score and Suitability
P1	 Medium-sized pond adjacent to residential property but separated from garden by a dense hedgerow/line of outgrowth shrubs. Scrub surrounds the full perimeter of the pond. Pond has limited depth and regularly dries out in the summer months. Water's surface is dominated by emergent fool's water cress.	2017: 0.77 (Good) No access during 2021.
P2	Small pond at side of access road/driveway into residential property. Very shallow and subject to dry, shaded by adjacent dense scrub vegetation and overhanging trees. Bank side characterised by brick rubble. Water's surface is entirely covered with duckweed.	2017: 0.54 (Below Average) No access during 2021.
P3	Medium-sized pond to rear of a residential property. Steep banksides predominantly colonised by scrub with occasional semi-mature trees. Yellow flag iris (*Iris pseudacorus*) and rush (*Juncus sp.*) present along pond margins whilst pond weed is relatively abundant across the pond surface. Surrounding habitat is characterised by amenity grassland, scrub and hardstanding with boundaries of residential garden comprising outgrown hedgerows and tree lines.	2017: 0.74 (Good) No access during 2021.

Pond No.	Pond Description and Illustrative Photograph	HSI Score and Suitability
P4	 Relatively small pond located in residential garden surrounded by improved/amenity grassland. The pond banks are gently sloping edges colonised by pendulous sedge (*Carex pendula*), yellow flag iris and lesser pond sedge (*Carex acutiformis*). Emergent vegetation is dominated by floating sweet grass (*Glyceria fluitans*). Mature trees are present around the pond with scattered specimens also present within the wider garden. Suitable hibernacula identified at pond edge. The pond itself is relatively turbid as a result of occasional inflow from a drain/tap.	2017: 0.64 (Average) 2021: 0.60 (Average)
P5	 Old historic moat located centrally within an improved grassland field grazed by cattle. Eastern half steep sided with bare clay bank and occasional rush and bramble/willow scrub. Western half shallow sided and dominated by bulrush. Submerged macrophytes recorded include water starwort (*Callitriche sp.*) and pondweed. Pond is fenced although	2017: 0.91 (Excellent) 2021: 0.78 (Good)

Pond No.	Pond Description and Illustrative Photograph	HSI Score and Suitability
	this is broken in some places such that poaching by cattle was evident.	
P6	 No access. Only part of waterbody visible from adajcent public land. Pond located in residential property at edge of storage yard bordered by bramble scrub.	No access.
P7	 Flowing wet ditch adjacent to vehicle track bordered by a line of trees and hedgerow with steep sided earth banks and a silt substrate. In channel vegetation is limited to a small patch of willowherb (*Epilobium hirsutum*), fool's water cress and brooklime. Improved, sheep grazed grassland lies adjacent to the ditch and track eastwards.	2017: 0.59 (Below Average) 2021: 0.61 (Average)

Pond No.	Pond Description and Illustrative Photograph	HSI Score and Suitability
P8	 Medium-sized pond located adjacent to public footpath on edge of grassland and scrub field with shallow sloping banks. Scattered mature trees overhang the pond whilst marginal vegetation comprises rush. Macrophyte vegetation dominated by duckweed (*Lemnoideae sp.*). Some log piles/brash providing potential hibernacula.	2017: 0.48 (Poor) 2021: 0.54 (Below Average)
P9	Small pond contiguous with a field ditch which remains dry for majority of year. Pond ephemeral in nature and only wet during winter and ealry spring months. Located adajcent to hedgrow marking the southern boundary of the Application Site with an adjacent grassland field in the ownership of Greenfield Farm. Vegetation largely limited to terrestrial species with some floating sweet grass.	Average: 0.49 (Poor)

Table EDP A6.5: Pond Habitat Suitability Assessment of Surveyed Waterbodies **P1-P9** – 2017 to 2021

Suitability Index	Criteria	Definition	Possible Score	P1 (2017)	P2 (2017)	P3 (2017)	P4 (2021)	P5 (2021)	P6 (2017)	P7 (2021)	P8 (2021)	P9 (2017)
SI_1	Geographic Location	Zone A - Optimal	1	1	1	1	1	1	1	1	1	1
		Zone B - Marginal	0.5									
		Zone C - Unsuitable	0.01									
SI_2	Pond Area	Pond Surface Area to the nearest 50m²	*[27]	0.2	0.05	0.2	0.05	1	0.1	0.8	0.1	0.05
SI_3	Permanence	Never Dries	0.9	1	0.5	0.9	0.5	0.9	1	0.1	0.5	0.1
		Rarely Dries (Dries no more than 2/10 years or in drought only)	1									
		Sometimes Dries (Dries between 3/10 years to most years)	0.5									
		Dries Annually	0.1									

[27] Score extrapolated from graphs within Oldham et al. (2000). *Evaluating the suitability of habitat for the Great Crested Newt (Triturus cristatus)*. Herpetological Journal 10 (4), 143-155

Suitability Index	Criteria	Definition	Possible Score	P1 (2017)	P2 (2017)	P3 (2017)	P4 (2021)	P5 (2021)	P6 (2017)	P7 (2021)	P8 (2021)	P9 (2017)
SI_4	Water Quality	Good (abundant and diverse invertebrate community)	1	0.67	0.67	0.67	0.67	1	0.33	0.33	0.33	0.33
		Moderate (moderate invertebrate community)	0.67									
		Poor (low invertebrate diversity, few submerged plants)	0.33									
		Bad (clearly polluted, pollutant tolerant invertebrates present, no submerged plants)	0.01									
SI_5	Shade	% Shade of Pond Perimeter to at least 1m from the Shore	*	0.6	0.4	0.6	1	1	0.6	1	1	0.2
SI_6	Waterfowl	Absent (no evidence of waterfowl, excluding moorhen)	1	1	1	1	0.67	0.67	1	1	0.67	1
		Minor (waterfowl present, though little impact)	0.67									
		Major (severe impact of waterfowl)	0.01									

Suitability Index	Criteria	Definition	Possible Score	P1 (2017)	P2 (2017)	P3 (2017)	P4 (2021)	P5 (2021)	P6 (2017)	P7 (2021)	P8 (2021)	P9 (2017)
SI_7	Fish	Absent (no records of fish stocking and no fish seen during survey)	1	1	1	1	0.67	0.33	0.67	0.67	1	1
		Possible (no evidence of fish, but conditions suggest presence)	0.67									
		Minor (small numbers of crucian carp, goldfish or stickleback)	0.33									
		Major (dense populations of fish present)	0.01									
SI_8	Pond Count	No. Ponds within 1km of Survey Pond Not Separated by Major Barriers and Divided by 3.14	*	1	1	1	1	1	1	1	1	1
SI_9	Terrestrial	Good (extensive habitat offering good opportunities for foraging and shelter surrounding pond)	1	1	1	1	1	1	1	1	1	1
		Moderate (habitat offering opportunities for foraging and shelter, but not extensive and does not completely surround pond)	0.67									
		Poor (habitat with poor structure, offering limited opportunities for foraging and shelter)	0.33									
		None (No suitable habitat around pond)	0.01									

Suitability Index	Criteria	Definition	Possible Score	P1 (2017)	P2 (2017)	P3 (2017)	P4 (2021)	P5 (2021)	P6 (2017)	P7 (2021)	P8 (2021)	P9 (2017)
SI_{10}	Macrophytes	% pond surface area occupied by macrophyte cover (excluding duckweed) and submerged plants reaching the surface.	*	0.9	0.3	0.7	0.8	0.4	0.3	0.4	0.2	0.9
HSI Score = $(SI_1*SI_2*SI_3*SI_4*SI_5*SI_6*SI_7*SI_8*SI_9*SI_{10})^{1/10}$				**0.77**	**0.54**	**0.74**	**0.60**	**0.78**	**0.58**	**0.61**	**0.54**	**0.56**
Pond Suitability (<0.5 = poor; 0.5-0.59 = below average; 0.6-0.69 = average; 0.7-0.79 = good; >0.8 = excellent)				Good	Below Average	Good	Average	Good	Below Average	Below Average	Below Average	Below Average

Presence/Absence Surveys and Population Size Assessment

A6.16 Full details of the great crested newt survey undertaken in 2017 are provided within **Table EDP A6.6** - **A6.13** whilst the results of the 2021 surveys are provided within **Table EDP A6.14** - **A6.17**.

A6.17 Great crested newts were recorded within Ponds **P1**, **P3**, **P4**-**5** and **P8** during 2017. A peak count of 33 was recorded within **P5**, located within the Application Site. Great crested newt eggs were also recorded within ponds **P4** and **P8** confirming these water bodies as breeding ponds.

A6.18 During 2021, great crested newts were recorded in all 4 ponds subject to survey: **P4**, **P5**, **P7** and **P8**. A peak count of 22 was recorded within **P5**, located within the Application Site. Great crested newt eggs were also recorded within ponds **P4**, **P5** and **P8** confirming these water bodies as breeding ponds. It is, therefore, considered that the Application Site supports a medium metapopulation of great crested newt.

A6.19 With respect to terrestrial habitats, agriculturally managed improved grassland which dominates the Application Site is considered sub-optimal for a great crested newt population given its more structural and botanical diversity. Nevertheless, such habitats likely facilitate some dispersal between the Application Site and breeding ponds within the wider landscape whilst hedgerow boundaries provide further opportunities for foraging and refuge whilst functioning as potential wildlife corridors for this species. Overall, the great crested newt population supported by the Application Site is considered to be of Local level importance.

Table EDP A6.6: Great Crested Newt Traditional Presence/Absence Survey Results 2017 – **P1**

Great Crested Newt Pond														
Method	**Torch:**				**Bottle-trap (4-10)**				**Net**				**Egg Search**	**Larvae**
Date	**Male**	**Female**	**Imm**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Eggs found?**	**Larvae found?**
11/04/2017	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
27/04/2017	0	0	0	**0**	2	2	0	**4**	n/a	n/a	n/a	n/a	N	N
04/05/2017	3	2	0	**5**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
15/05/2017	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
23/05/2015	0	0	0	**0**	0	1	0	**1**	n/a	n/a	n/a	n/a	N	N
30/05/2017	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
Smooth Newt														
Method	**Torch:**				**Bottle-trap (4-10)**				**Net**				**Egg Search**	**Larvae**
Date	**Male**	**Female**	**Imm**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Eggs found?**	**Larvae found?**
11/04/2017	5	0	0	**5**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
27/04/2017	4	1	0	**5**	1	1	0	**2**	n/a	n/a	n/a	n/a	N	N
04/05/2017	11	10	0	**21**	0	1	0	**1**	n/a	n/a	n/a	n/a	N	N
15/05/2017	0	0	0	**0**	1	1	0	**2**	n/a	n/a	n/a	n/a	N	N
23/05/2015	0	0	0	**0**	0	1	0	**1**	n/a	n/a	n/a	n/a	N	N
30/05/2017	0	0	0	**0**	0	4	0	**4**	n/a	n/a	n/a	n/a	N	N

Table EDP A6.7: Great Crested Newt Traditional Presence/Absence Survey Results 2017 – **P2**

Great Crested Newt														
Method	**Torch:**				**Bottle-trap (5)**				**Net**				**Egg Search**	**Larvae**
Date	**Male**	**Female**	**Imm**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Eggs found?**	**Larvae found?**
11/04/2017	n/a	n/a	n/a	**n/a**	0	0	0	**0**	0	0	0	0	N	N
27/04/2017	n/a	n/a	n/a	**n/a**	0	0	0	**0**	0	0	0	0	N	N
04/05/2017	0	0	0	**0**	n/a	n/a	n/a	**n/a**	n/a	n/a	n/a	n/a	N	N
15/05/2017	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
Smooth Newt														
Method	**Torch:**				**Bottle-trap (5)**				**Net**				**Egg Search**	**Larvae**
Date	**Male**	**Female**	**Imm**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Eggs found?**	**Larvae found?**
11/04/2017	n/a	n/a	n/a	**n/a**	0	0	0	**0**	0	0	0	0	N	N
27/04/2017	n/a	n/a	n/a	**n/a**	0	0	0	**0**	0	0	0	0	N	N
04/05/2017	0	0	0	**0**	n/a	n/a	n/a	**n/a**	n/a	n/a	n/a	n/a	N	N
15/05/2017	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N

Table EDP A6.8: Great Crested Newt Traditional Presence/Absence Survey Results 2017 – **P3**

Great Crested Newt														
Method	**Torch:**				**Bottle-trap (10-14)**				**Net**				**Egg Search**	**Larvae**
Date	**Male**	**Female**	**Imm**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Eggs found?**	**Larvae found?**
11/04/2017	0	0	0	**0**	3	2	0	**5**	n/a	n/a	n/a	n/a	N	N
27/04/2017	n/a	n/a	n/a	**n/a**	0	1	0	**1**	0	0	0	0	N	N
04/05/2017	0	0	0	**0**	0	1	0	**1**	n/a	n/a	n/a	n/a	N	N
15/05/2017	0	0	0	**0**	1	3	0	**4**	n/a	n/a	n/a	n/a	N	N
23/05/2015	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
30/05/2017	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
Smooth Newt														
Method	**Torch:**				**Bottle-trap (10-14)**				**Net**				**Egg Search**	**Larvae**
Date	**Male**	**Female**	**Imm**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Eggs found?**	**Larvae found?**
11/04/2017	0	0	0	**0**	1	2	0	**3**	**n/a**	**n/a**	**n/a**	n/a	N	N
27/04/2017	n/a	n/a	n/a	**n/a**	1	0	0	**1**	0	0	0	0	N	N
04/05/2017	1	2	0	**3**	7	0	0	**7**	n/a	n/a	n/a	n/a	N	N
15/05/2017	0	0	0	**0**	11	5	0	**16**	n/a	n/a	n/a	n/a	N	N
23/05/2015	0	0	0	**0**	3	0	0	**3**	n/a	n/a	n/a	n/a	N	N
30/05/2017	0	0	0	**0**	0	1	0	**1**	n/a	n/a	n/a	n/a	N	N

Palmate Newt														
Method	**Torch:**				**Bottle-trap (10-14)**				**Net**				**Egg Search**	**Larvae**
Date	**Male**	**Female**	**Imm**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Eggs found?**	**Larvae found?**
11/04/2017	0	0	0	**0**	0	0	0	**0**	**n/a**	**n/a**	**n/a**	n/a	N	N
27/04/2017	n/a	n/a	n/a	**n/a**	0	0	0	**0**	0	0	0	0	N	N
04/05/2017	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
15/05/2017	0	0	0	**0**	0	1	0	**1**	n/a	n/a	n/a	n/a	N	N
23/05/2015	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
30/05/2017	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N

Table EDP A6.9: Great Crested Newt Traditional Presence/Absence Survey Results 2017– **P4**

Great Crested Newt														
Method	**Torch:**				**Bottle-trap (5-11)**				**Net**				**Egg Search**	**Larvae**
Date	**Male**	**Female**	**Imm**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Eggs found?**	**Larvae found?**
11/04/2017	1	0	0	**1**	4	2	0	**6**	n/a	n/a	n/a	n/a	N	N
27/04/2017	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	Y	N
04/05/2017	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	n/a	N
15/05/2017	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	n/a	N
23/05/2015	0	0	0	**0**	0	1	0	**1**	n/a	n/a	n/a	n/a	n/a	N
30/05/2017	n/a	n/a	n/a	**n/a**	0	0	0	**0**	0	0	0	n/a	n/a	N
Smooth Newt														
Method	**Torch:**				**Bottle-trap (5-11)**				**Net**				**Egg Search**	**Larvae**
Date	**Male**	**Female**	**Imm**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Eggs found?**	**Larvae found?**
11/04/2017	0	1	0	**1**	4	1	0	**5**	n/a	n/a	n/a	n/a	N	N
27/04/2017	1	0	0	**1**	1	2	0	**3**	n/a	n/a	n/a	n/a	N	N
04/05/2017	0	0	0	**0**	3	1	0	**4**	n/a	n/a	n/a	n/a	n/a	N
15/05/2017	0	0	0	**0**	4	1	0	**5**	n/a	n/a	n/a	n/a	n/a	N
23/05/2015	0	1	0	**1**	4	1	0	**5**	n/a	n/a	n/a	n/a	n/a	N
30/05/2017	n/a	n/a	n/a	**n/a**	6	1	0	**7**	0	0	0	n/a	n/a	N

Table EDP A6.10: Great Crested Newt Traditional Presence/Absence Survey Results 2017 – **P5**

Great Crested Newt														
Method	**Torch:**				**Bottle-trap (40-61)**				**Net**				**Egg Search**	**Larvae**
Date	**Male**	**Female**	**Imm**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Eggs found?**	**Larvae found?**
11/04/2017	20	13	0	**33**	4	3	0	**7**	n/a	n/a	n/a	n/a	Y	N
27/04/2017	1	2	0	**3**	0	2	0	**2**	n/a	n/a	n/a	n/a	n/a	N
04/05/2017	3	8	0	**11**	0	0	0	**0**	n/a	n/a	n/a	n/a	n/a	N
15/05/2017	0	0	0	**0**	1	6	0	**7**	n/a	n/a	n/a	n/a	n/a	N
23/05/2015	0	0	0	**0**	2	1	0	**3**	n/a	n/a	n/a	n/a	n/a	N
30/05/2017	0	0	0	**0**	0	2	0	**2**	n/a	n/a	n/a	n/a	n/a	N
Smooth Newt														
Method	**Torch:**				**Bottle-trap (40-61)**				**Net**				**Egg Search**	**Larvae**
Date	**Male**	**Female**	**Imm**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Eggs found?**	**Larvae found?**
11/04/2017	4	35	0	**39**	13	5	0	**18**	n/a	n/a	n/a	n/a	N	N
27/04/2017	18	4	0	**22**	12	27	0	**39**	n/a	n/a	n/a	n/a	n/a	N
04/05/2017	9	25	0	**34**	11	9	0	**20**	n/a	n/a	n/a	n/a	n/a	N
15/05/2017	0	2	0	**2**	4	7	0	**11**	n/a	n/a	n/a	n/a	n/a	N
23/05/2015	0	3	0	**3**	1	1	0	**2**	n/a	n/a	n/a	n/a	n/a	N
30/05/2017	1	3	0	**4**	0	2	0	**2**	n/a	n/a	n/a	n/a	n/a	N

Palmate Newt														
Method	**Torch:**				**Bottle-trap (10-14)**				**Net**				**Egg Search**	**Larvae**
Date	**Male**	**Female**	**Imm**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Eggs found?**	**Larvae found?**
11/04/2017	0	0	0	**0**	0	0	0	**0**	**n/a**	**n/a**	**n/a**	n/a	N	N
27/04/2017	n/a	n/a	n/a	**n/a**	0	0	0	**0**	0	0	0	0	N	N
04/05/2017	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
15/05/2017	0	0	0	**0**	0	1	0	**1**	n/a	n/a	n/a	n/a	N	N
23/05/2015	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
30/05/2017	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N

Table EDP A6.11: Great Crested Newt Traditional Presence/Absence Survey Results 2017 – **P7**

Great Crested Newt														
Method	**Torch:**				**Bottle-trap (6-10)**				**Net**				**Egg Search**	**Larvae**
Date	**Male**	**Female**	**Imm**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Eggs found?**	**Larvae found?**
11/04/2017	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
27/04/2017	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
04/05/2017	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
15/05/2017	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
Smooth Newt														
Method	**Torch:**				**Bottle-trap (6-10)**				**Net**				**Egg Search**	**Larvae**
Date	**Male**	**Female**	**Imm**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Eggs found?**	**Larvae found?**
11/04/2017	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
27/04/2017	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
04/05/2017	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
15/05/2017	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N

Table EDP A6.12: Great Crested Newt Traditional Presence/Absence Survey Results 2017 – **P8**

Great Crested Newt														
Method	**Torch:**				**Bottle-trap (8-25)**				**Net**				**Egg Search**	**Larvae**
Date	**Male**	**Female**	**Imm**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Eggs found?**	**Larvae found?**
11/04/2017	10	0	0	**10**	0	0	0	**0**	n/a	n/a	n/a	n/a	Y	N
27/04/2017	2	2	0	**4**	1	1	0	**2**	n/a	n/a	n/a	n/a	n/a	N
04/05/2017	8	4	0	**12**	0	4	0	**4**	n/a	n/a	n/a	n/a	n/a	N
15/05/2017	0	0	0	**0**	2	1	0	**3**	n/a	n/a	n/a	n/a	n/a	N
23/05/2015	0	0	0	**0**	3	2	0	**5**	n/a	n/a	n/a	n/a	n/a	N
30/05/2017	0	2	0	**2**	2	2	0	**4**	n/a	n/a	n/a	n/a	n/a	N
Method	**Torch:**				**Bottle-trap (8-25)**				**Net**				**Egg Search**	**Larvae**
Date	**Male**	**Female**	**Imm**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Eggs found?**	**Larvae found?**
11/04/2017	0	1	0	**1**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
27/04/2017	0	0	0	**0**	0	1	0	**1**	n/a	n/a	n/a	n/a	n/a	N
04/05/2017	0	4	0	**4**	0	0	0	**0**	n/a	n/a	n/a	n/a	n/a	N
15/05/2017	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	n/a	N
23/05/2015	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	n/a	N
30/05/2017	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	n/a	N

Table EDP A6.13: Great Crested Newt Traditional Presence/Absence Survey Results 2017 – **P9**

Great Crested Newt														
Method	**Torch:**				**Bottle-trap (4)**				**Net**				**Egg Search**	**Larvae**
Date	**Male**	**Female**	**Imm**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Eggs found?**	**Larvae found?**
11/04/2017	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
27/04/2017	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
04/05/2017	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
15/05/2017	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Smooth Newt														
Method	**Torch:**				**Bottle-trap (4-10)**				**Net**				**Egg Search**	**Larvae**
Date	**Male**	**Female**	**Imm**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Eggs found?**	**Larvae found?**
11/04/2017	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
27/04/2017	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
04/05/2017	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
15/05/2017	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Table EDP A6.14: Great Crested Newt Traditional Presence/Absence Survey Results 2021 – **P4**

Great Crested Newt														
Method	**Torch:**				**Bottle-trap (10-15)**				**Net**				**Egg Search**	**Larvae**
Date	**Male**	**Female**	**Imm**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Eggs found?**	**Larvae found?**
28.04.21	0	1	0	**1**	n/a	n/a	n/a	**n/a**	0	0	0	**0**	Y	N
05.05.21	3	3	0	**6**	6	7	0	**13**	n/a	n/a	n/a	**n/a**	n/a	n/a
12.05.21	5	1	0	**6**	6	1	0	**7**	n/a	n/a	n/a	**n/a**	n/a	n/a
19.05.21	0	7	0	**7**	0	2	0	**2**	n/a	n/a	n/a	**n/a**	n/a	n/a
02.06.21	1	4	0	**5**	3	2	0	**5**	n/a	n/a	n/a	**n/a**	n/a	n/a
10.06.21	0	2	0	**2**	2	2	0	**4**	n/a	n/a	n/a	**n/a**	n/a	n/a
Smooth/Palmate Newt														
Method	**Torch:**				**Bottle-trap (10-15)**				**Net**				**Egg Search**	**Larvae**
Date	**Male**	**Female**	**Imm**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Eggs found?**	**Larvae found?**
28.04.21	0	7	0	**7**	n/a	n/a	n/a	**n/a**	0	0	0	**0**	N	N
05.05.21	1	6	0	**7**	3	7	0	**10**	n/a	n/a	n/a	**n/a**	n/a	n/a
12.05.21	1	10	0	**11**	1	2	0	**3**	n/a	n/a	n/a	**n/a**	n/a	n/a
19.05.21	1	1	0	**2**	3	1	0	**4**	n/a	n/a	n/a	**n/a**	n/a	n/a
02.06.21	6	6	0	**12**	3	8	0	**11**	n/a	n/a	n/a	**n/a**	n/a	n/a
10.06.21	3	8	0	**11**	0	3	0	**3**	n/a	n/a	n/a	**n/a**	n/a	n/a

Table EDP A6.15: Great Crested Newt Traditional Presence/Absence Survey Results 2021 – **P5**

Great Crested Newt														
Method	**Torch:**				**Bottle-trap (30-46)**				**Net**				**Egg Search**	**Larvae**
Date	**Male**	**Female**	**Imm**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Eggs found?**	**Larvae found?**
28.04.21	n/a	n/a	n/a	**n/a**	0	0	0	**0**	0	0	0	0	N	N
05.05.21	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
12.05.21	2	1	0	**3**	2	2	0	**4**	n/a	n/a	n/a	**n/a**	N	N
19.05.21	12	10	0	**22**	1	4	0	**5**	n/a	n/a	n/a	**n/a**	Y	N
02.06.21	2	3	0	**5**	1	2	0	**3**	n/a	n/a	n/a	**n/a**	n/a	n/a
10.06.21	5	3	0	**8**	1	2	0	**3**	n/a	n/a	n/a	**n/a**	n/a	n/a
Smooth/Palmate Newt														
Method	**Torch:**				**Bottle-trap (30-35)**				**Net**				**Egg Search**	**Larvae**
Date	**Male**	**Female**	**Imm**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Eggs found?**	**Larvae found?**
28.04.21	n/a	n/a	n/a	**n/a**	0	0	0	**0**	0	0	0	**0**	N	N
05.05.21	0	4	0	**4**	0	3	0	**3**	n/a	n/a	n/a	**n/a**	N	N
12.05.21	1	5	0	**6**	1	5	0	**6**	n/a	n/a	n/a	**n/a**	N	N
19.05.21	33	18	0	**51**	3	3	0	**6**	n/a	n/a	n/a	**n/a**	N	N
02.06.21	6	12	0	**18**	2	1	0	**3**	n/a	n/a	n/a	**n/a**	N	N
10.06.21	7	18	0	**25**	0	0	0	**0**	n/a	n/a	n/a	**n/a**	N	N

Table EDP A6.16: Great Crested Newt Traditional Presence/Absence Survey Results 2021 – **P7**

Great Crested Newt														
Method	**Torch:**				**Bottle-trap (5)**				**Net**				**Egg Search**	**Larvae**
Date	**Male**	**Female**	**Imm**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Eggs found?**	**Larvae found?**
28.04.21	0	0	0	**0**	n/a	n/a	n/a	n/a	0	0	0	0	N	N
05.05.21	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
12.05.21	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
19.05.21	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
02.06.21	0	0	0	**0**	0	2	0	**2**	n/a	n/a	n/a	n/a	N	N
10.06.21	0	1	0	**1**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
Smooth/Palmate Newt														
Method	**Torch:**				**Bottle-trap (5)**				**Net**				**Egg Search**	**Larvae**
Date	**Male**	**Female**	**Imm**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Eggs found?**	**Larvae found?**
28.04.21	0	0	0	**0**	n/a	n/a	n/a	n/a	0	0	0	0	N	N
05.05.21	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
12.05.21	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
19.05.21	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
02.06.21	1	2	0	**3**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N
10.06.21	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	n/a	N	N

Table EDP A6.17: Great Crested Newt Traditional Presence/Absence Survey Results 2021 – **P8**

Great Crested Newt														
Method	**Torch:**				**Bottle-trap (15-25)**				**Net**				**Egg Search**	**Larvae**
Date	**Male**	**Female**	**Imm**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Eggs found?**	**Larvae found?**
28.04.21	0	3	0	**3**	n/a	n/a	n/a	**n/a**	0	0	0	0	Y	N
05.05.21	0	0	0	**0**	0	1	0	**1**	n/a	n/a	n/a	**n/a**	n/a	n/a
12.05.21	8	7	0	**15**	6	5	0	**11**	n/a	n/a	n/a	**n/a**	n/a	n/a
19.05.21	4	5	0	**9**	0	1	0	**1**	n/a	n/a	n/a	**n/a**	n/a	n/a
02.06.21	2	2	0	**4**	0	2	0	**2**	n/a	n/a	n/a	**n/a**	n/a	n/a
10.06.21	1	2	0	**3**	1	3	0	**4**	n/a	n/a	n/a	**n/a**	n/a	n/a
Method	**Torch:**				**Bottle-trap (17-25)**				**Net**				**Egg Search**	**Larvae**
Date	**Male**	**Female**	**Imm**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Male**	**Female**	**Imm.**	**Peak Count**	**Eggs found?**	**Larvae found?**
28.04.21	0	3	0	**3**	n/a	n/a	n/a	**n/a**	0	0	0	0	N	N
05.05.21	0	0	0	**0**	0	2	0	**2**	n/a	n/a	n/a	**n/a**	n/a	n/a
12.05.21	0	0	0	**0**	0	0	0	**0**	n/a	n/a	n/a	**n/a**	n/a	n/a
19.05.21	3	2	0	**5**	1	0	0	**1**	n/a	n/a	n/a	**n/a**	n/a	n/a
02.06.21	1	2	0	**3**	2	1	0	**3**	n/a	n/a	n/a	**n/a**	n/a	n/a
10.06.21	0	1	0	**1**	0	1	0	**1**	n/a	n/a	n/a	**n/a**	n/a	n/a

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Appendix EDP 7
Non-statutory Designations

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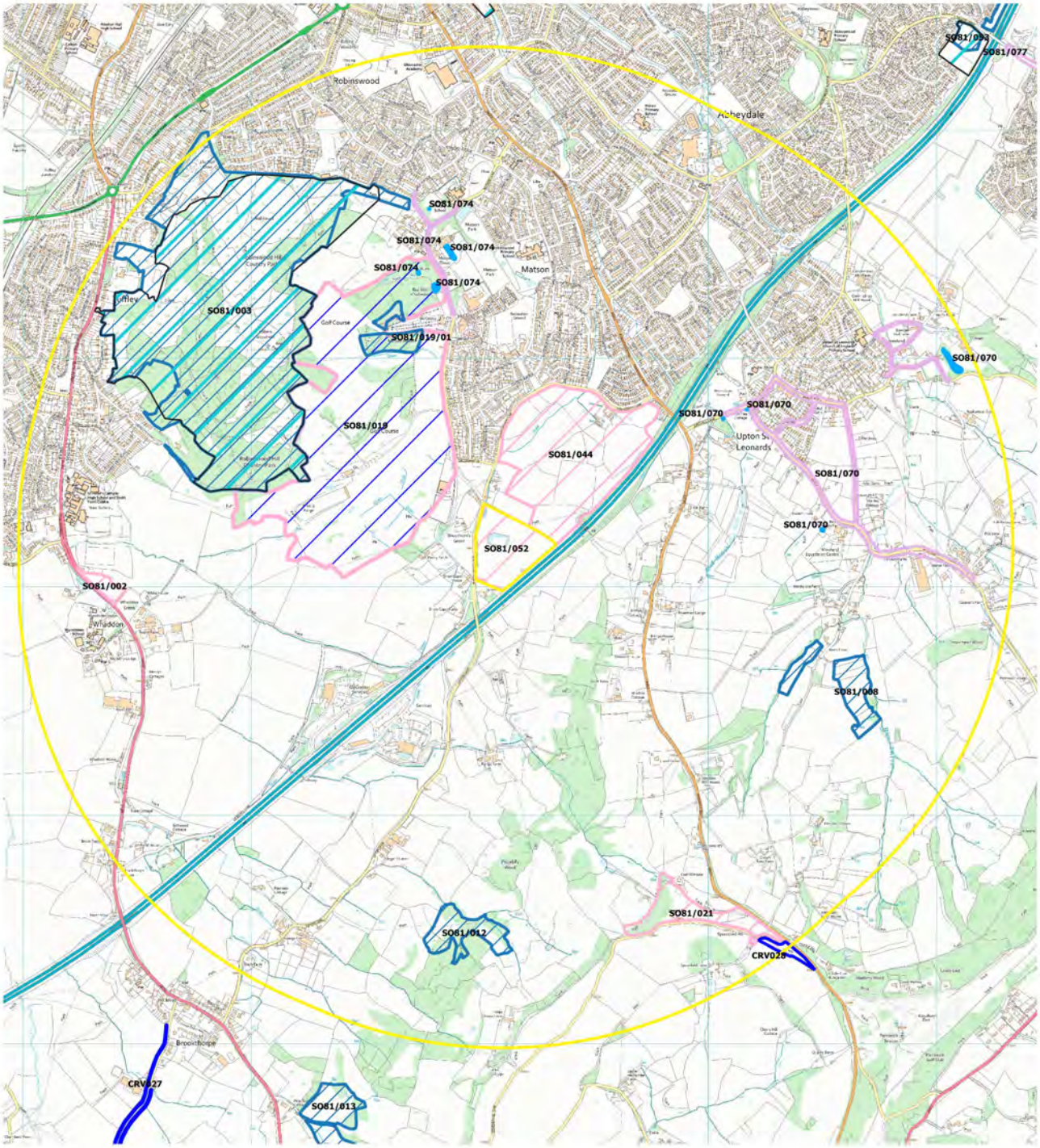
Overview of sites mapped within 2km



Zoom in for more detail

GCER
Gloucestershire Centre for Environmental Records

Plans

Plan EDP 1	Phase 1 Habitat Plan (edp3746_d007c 12 May 2022 VMS/EWi)
Plan EDP 2	Statutory Designations (edp3746_d006b 12 May 2022 VMS/EWi)
Plan EDP 3a	Manual Bat Transect Survey Results – May 2017 (edp3746_d017b 12 May 2022 VMS/EWi)
Plan EDP 3b	Manual Bat Transect Survey Results – July 2017 (edp3746_d018b 12 May 2022 VMS/EWi)
Plan EDP 3c	Manual Bat Transect Survey Results – September 2017 (edp3746_d019b 12 May 2022 VMS/EWi)
Plan EDP 3d	Anabat Locations 2017-2021 (edp3746_d020b 12 May 2022 VMS/EW
Plan EDP 4	Great Crested Newt Survey Results (edp3746_d021a 12 May 2022 VMS/EWi)

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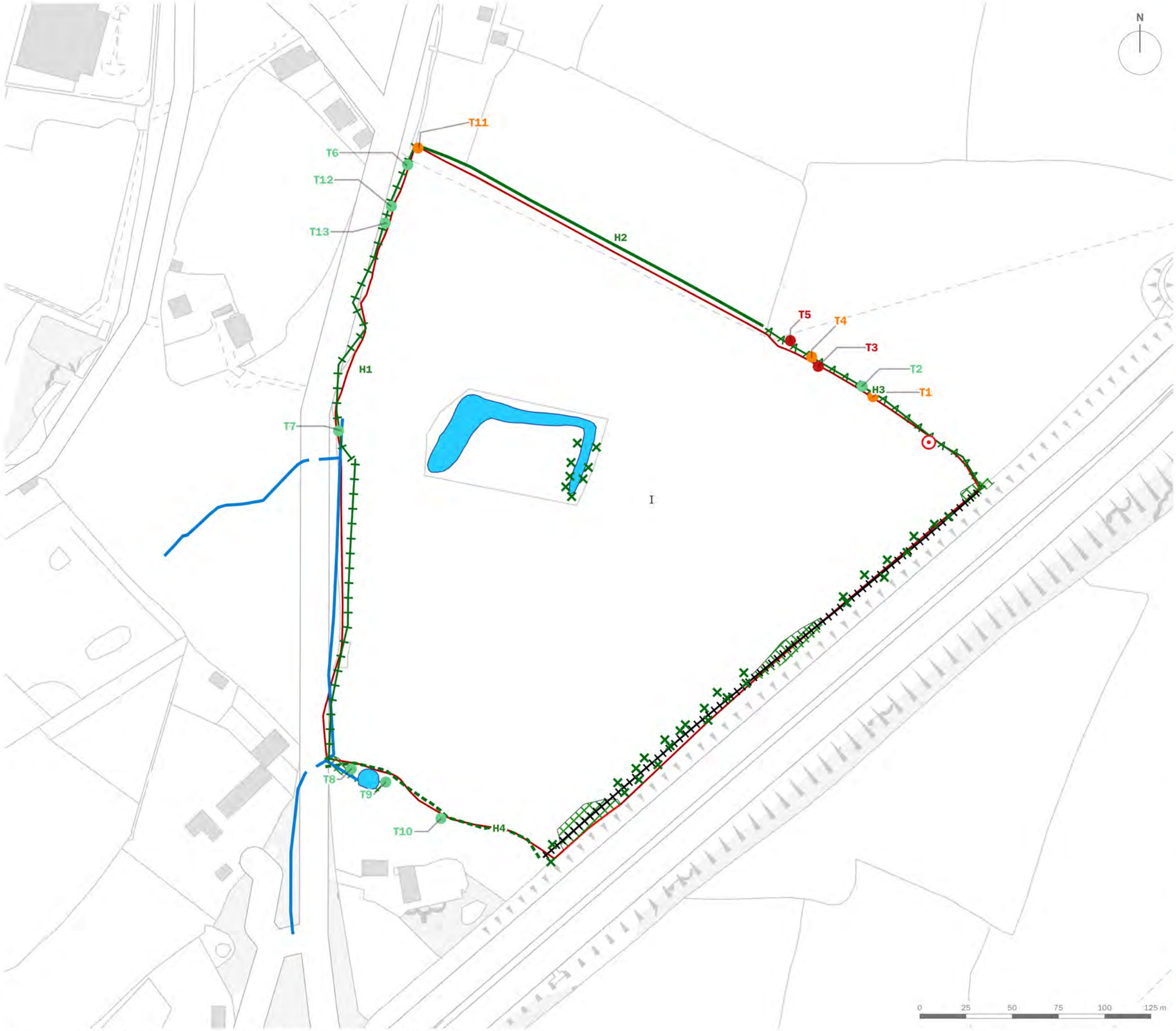


Site Boundary

Dense Continuous Scrub

I Improved Grassland

Standing Water

Intact Species-rich Hedgerow

Intact Species-poor Hedgerow and Trees

Intact Species-poor Hedgerow

Defunct Species-poor Hedgerow

Running Water

Fence

Scattered Scrub

TN1 Target Note

Trees with Bat RoostPotential

High

Moderate

Low

client

Bromford Housing

project title

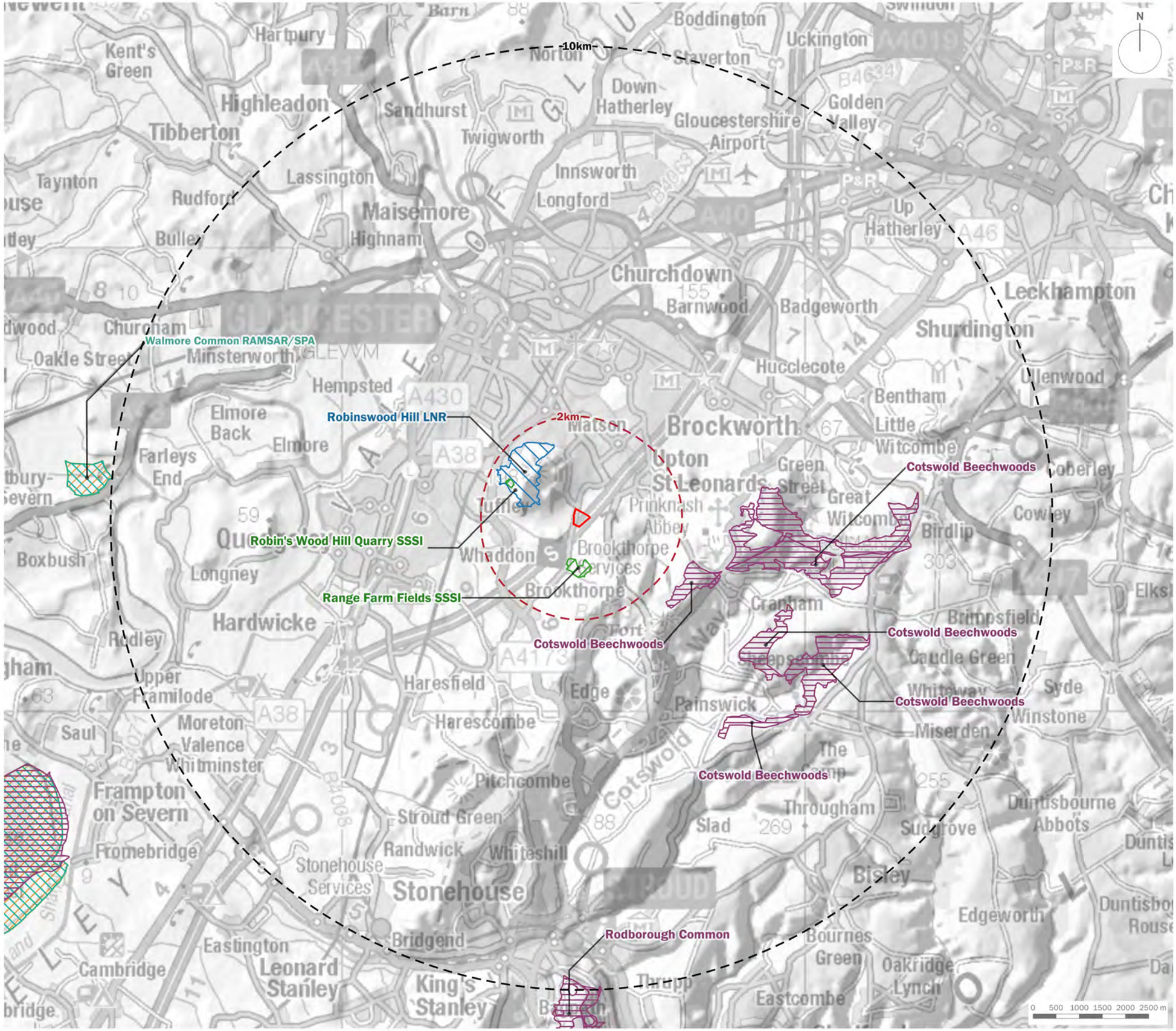
Land East of Winneycroft Lane, Snow Caple, Matson

drawing title

Plan EDP 1: Phase 1 Habitat Plan

date	**12 MAY 2022**	drawn by	**VMS**
drawing number	**edp3746_d007c**	checked	**EWI**
scale	**1:2,000 @ A3**	QA	**JTF**

edp the environmental dimension partnership



Site Boundary

Range Rings (at 1km intervals)

2km Detailed Study Area

Statutory Designations

Sites of Special Scientific Interest (SSSI)

Special Protection Areas (SPA)

Special Area Conservation (SAC)

RAMSAR Wetlands

Non-statutory Designation

Local Nature Reserves (LNR) Non-statutory Designation

client

Bromford Housing

project title

Land East of Winneycroft Lane, Snow Caple, Matson

drawing title

Plan EDP 2: Statutory Designations

date	**12 MAY 2022**	drawn by	**VMS**
drawing number	**edp3746_d006b**	checked	**EWi**
scale	**1:80,000 @ A3**	QA	**JTF**

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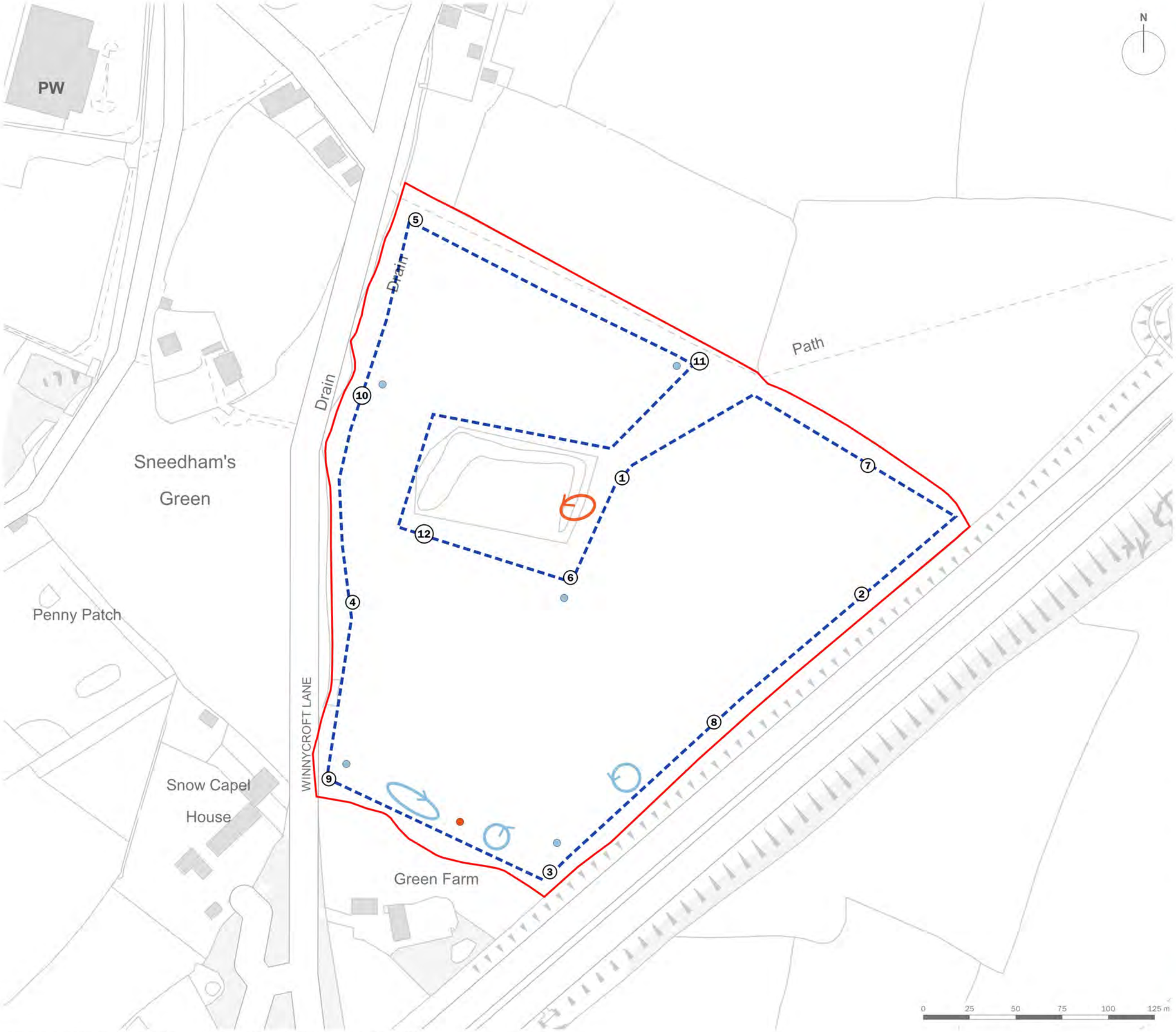


Site Boundary

Transect Route

1 Listening Points

Bat Species

Common Pipistrelle

Noctule

Bat Activity (Colour Denotes Species)

Foraging Behaviour

client

Bromford Housing

project title

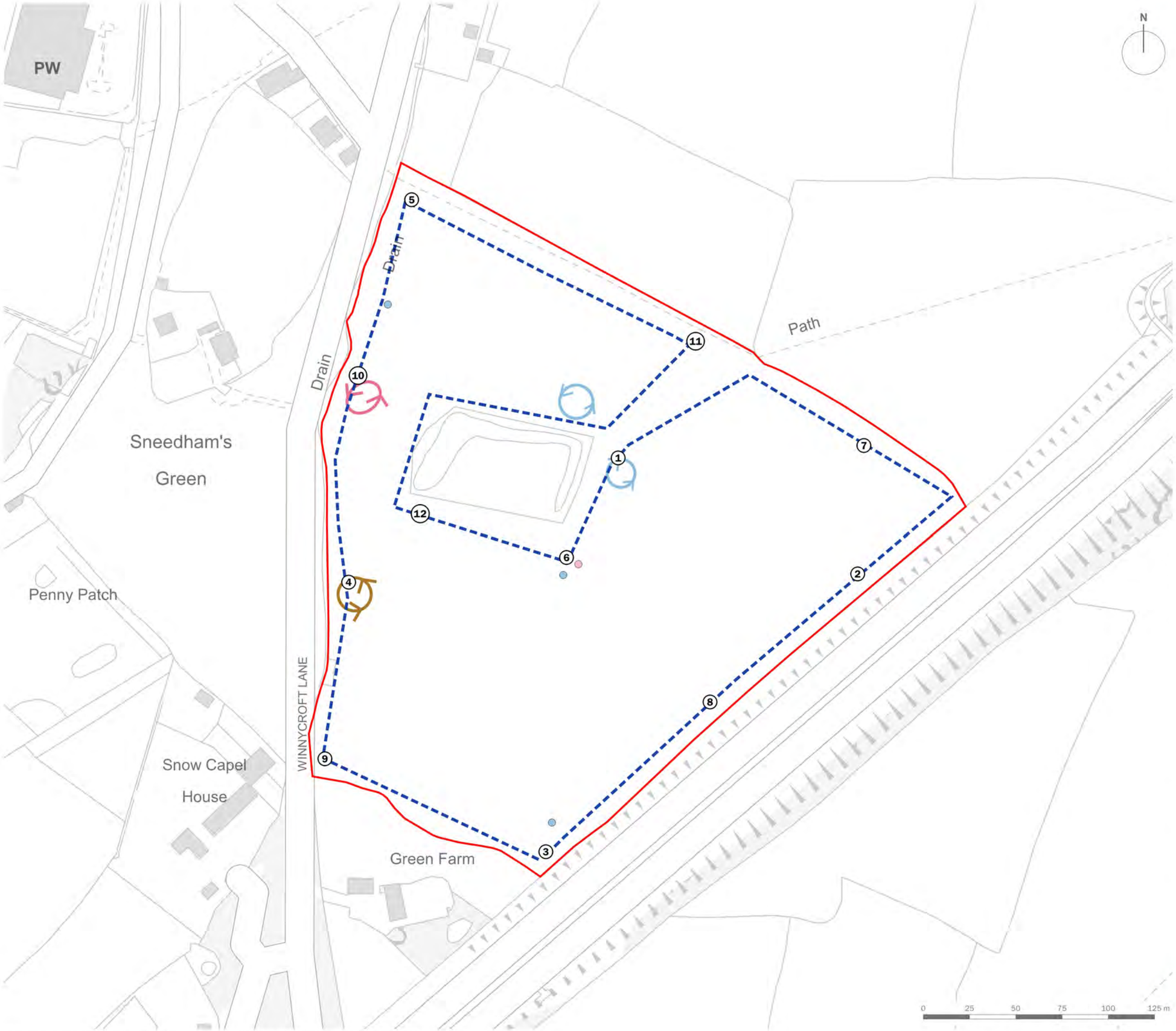
Land East of Winneycroft Lane, Snow Caple, Matson

drawing title

Plan EDP 3a: Manual Bat Transect Survey Results - May 2017

date	**12 MAY 2022**	drawn by	**VMS**
drawing number	**edp3746_d017b**	checked	**EWi**
scale	**1:2,000 @ A3**	QA	**RB**

edp the environmental dimension partnership



Site Boundary

Transect Route

1 Listening Points

Bat Species

Common Pipistrelle

Myotis Sp.

Serotine

Bat Activity (Colour Denotes Species)

Foraging Behaviour

client

Bromford Housing

project title

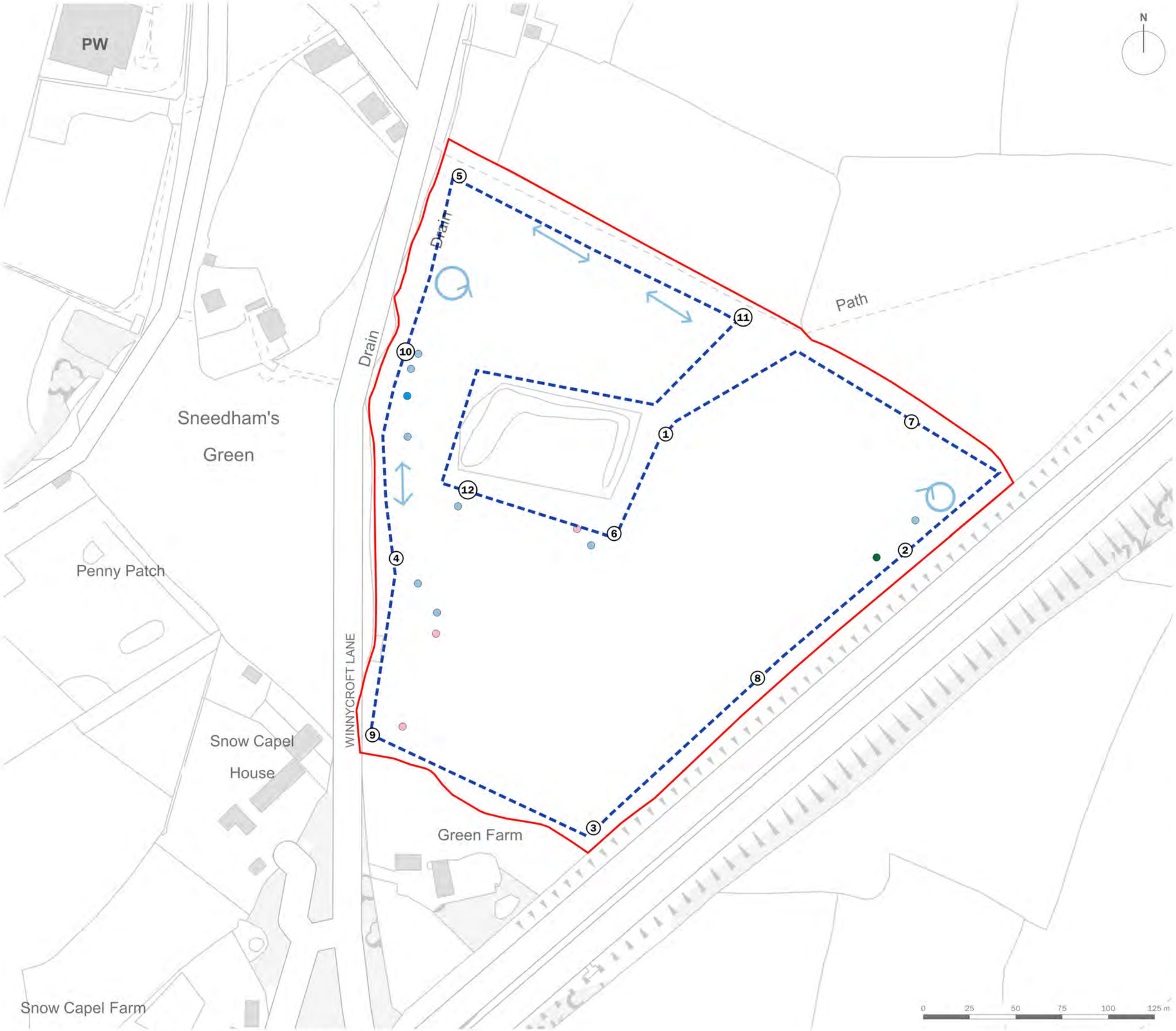
Land East of Winneycroft Lane, Snow Caple, Matson

drawing title

Plan EDP 3b: Manual Bat Transect Survey Results - July 2017

date	**12 MAY 2022**	drawn by	**VMS**
drawing number	**edp3746_d018b**	checked	**EWi**
scale	**1:2,000 @ A3**	QA	**RB**

edp the environmental dimension partnership



Site Boundary

Transect Route

Listening Points

Bat Species

Common Pipistrelle

Soprano Pipistrelle

Myotis Sp.

Lesser Horseshoe

Bat Activity (Colour Denotes Species)

Foraging Behaviour

Foraging Behaviour

client

Bromford Housing

project title

Land East of Winneycroft Lane, Snow Caple, Matson

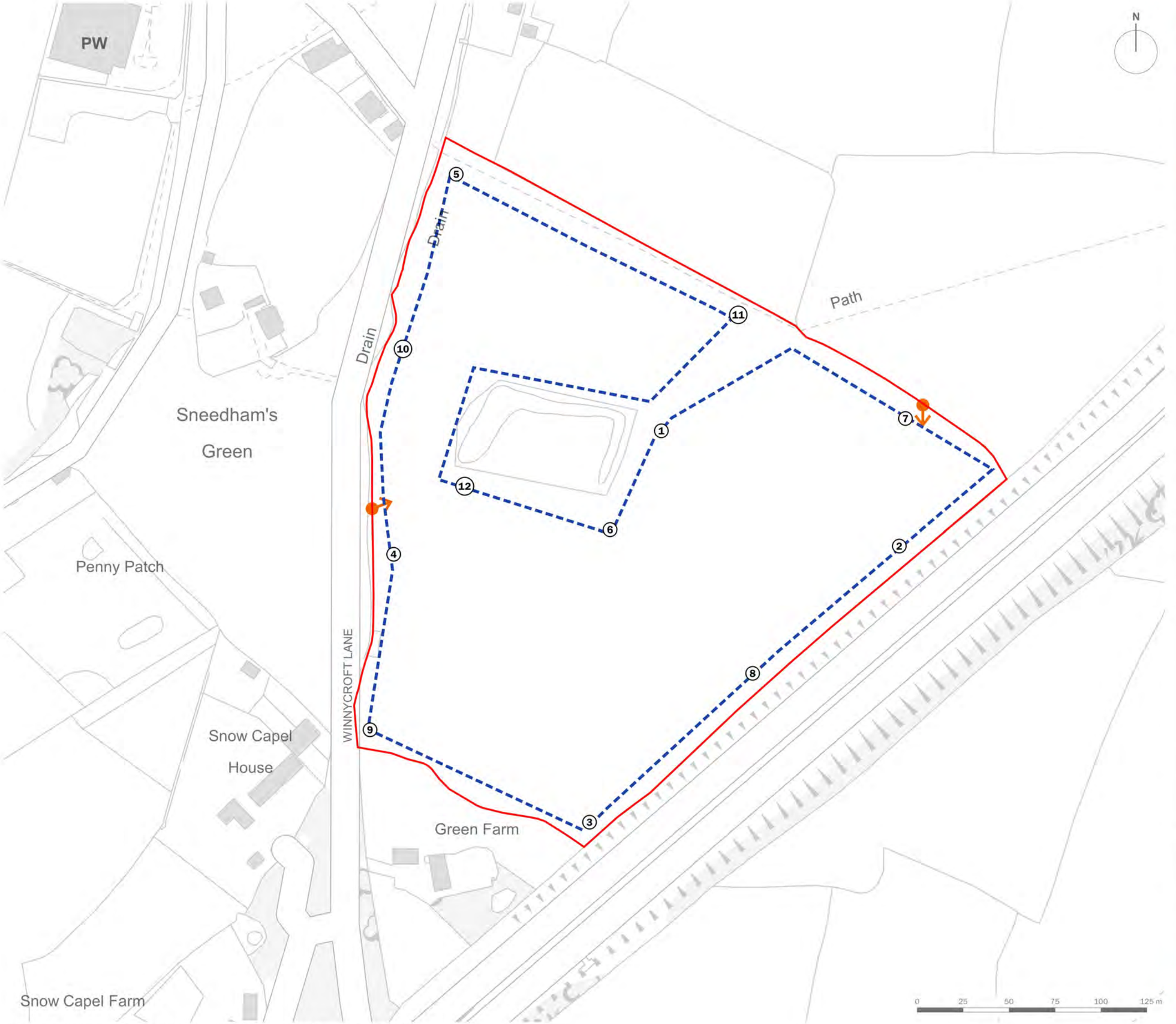
drawing title

Plan EDP 3c: Manual Bat Transect Survey Results - September 2017

date	**12 MAY 2022**	drawn by	**VMS**
drawing number	**edp3746_d019b**	checked	**EWi**
scale	**1:2,000 @ A3**	QA	**RB**

edp the environmental dimension partnership

[redacted]



client

Bromford Housing

project title

Land East of Winneycroft Lane, Snow Caple, Matson

drawing title

Plan EDP 3d: Anabat Locations 2017-2021

date	**12 MAY 2022**	drawn by	**VMS**
drawing number	**edp3746_d020b**	checked	**EW**
scale	**1:2,000 @ A3**	QA	**RB**

edp the environmental dimension partnership

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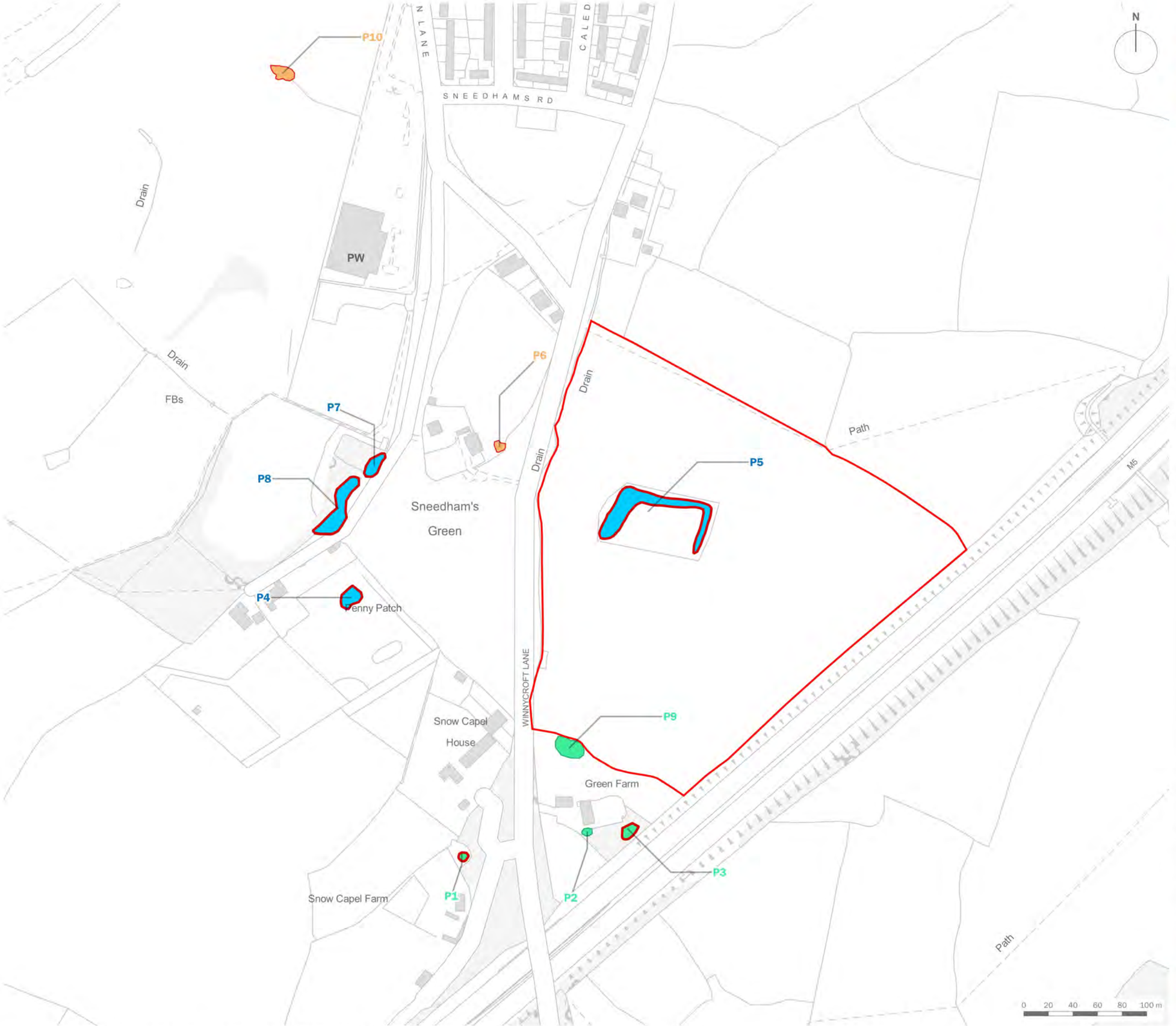

Site Boundary

Pond surveyed during 2021: GCN Present

Ponds surveyed during 2021: No GCN

Pond surveyed during 2017: GCN Present

Pond surveyed during 2017: No GCN

Pond not surveyed due to access limitations

client

Bromford Housing

project title

Land East of Winneycroft Lane, Snow Caple, Matson

drawing title

Plan EDP 4: Great Crested Newt Survey Results

date	**12 MAY 2022**	drawn by	**VMS**
drawing number	**edp3746_d021a**	checked	**EWi**
scale	**1:3,000 @ A3**	QA	**JTF**

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[redacted]

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IEMA Transforming the world to sustainability

Landscape Institute
Registered practice

Land at Snow Capel Farm, Matson, Gloucester
Technical Appendix 7.2: Biodiversity Net Gain Calculations
edp3746_r007a

1. Introduction

1.1 This Biodiversity Net Gain (BNG) Assessment has been prepared by The Environmental Dimension Partnership Ltd (EDP) on behalf of Edward Ware Homes and Bromford Developments Ltd (hereafter referred to as 'the Applicants'). This document presents the Biodiversity Net Gain (BNG) Calculations (**Annex EDP 1**) for proposed residential development of Land at Snow Capel Farm, Matson, Gloucester (hereafter referred to as 'the Application Site').

1.2 EDP is an independent environmental planning consultancy with offices in Cirencester, Cardiff and Cheltenham. The practice provides advice to private and public sector clients throughout the UK in the fields of landscape, ecology, archaeology, cultural heritage, arboriculture, rights of way and masterplanning. Details of the practice can be obtained at our website www.edp-uk.co.uk.

2. Background Information and Site Context

2.1 The Application Site measures approximately 7.9 hectares (ha) and is centred at approximate Ordnance Survey Grid Reference (OSGR) SO 850 142. The Application Site lies within Gloucester City Council and is located approximately 4km south of the city of Gloucester, along its south-eastern edge. The M5 motorway and Winnycroft Lane form the Application Site's immediate boundaries to the south-east and west respectively, with a number of small field parcels occupying land to the immediate north-east, separating the Application Site from the settlement of Matson and built-up area of the city of Gloucester beyond. More generally, extensive areas of open farmland and woodland blocks occupy land to the south and east.

2.2 The Application Site consists of a single, improved grassland field currently subject to grazing. Its boundaries to the north-east, south and west are delineated by native hedgerows, with scrub forming the south-eastern and southern boundaries. A large, freshwater moat is located within the centre of the field, with scattered scrub present along its banks. The location and extents of the Application Site are illustrated at **Plan EDP 1**.

2.3 The proposals relate to a detailed planning application for residential development of the Application Site. In brief, proposals concern the provision of up to 200 residential dwellings and open space. A Proposed Site Layout for the development is provided at **Annex EDP 2**.

2.4 To inform a planning submission and Environmental Statement (ES), detailed ecological assessments of the Application Site were previously undertaken by EDP in 2016 and 2017 to inform constraints and opportunities to development of the site. The findings of such work were

updated by EDP during 2021 to determine any material changes to those habitats and protected/notable species supported and to further establish the ecological baseline for the Application Site. Survey effort comprises a desk study, Extended Phase 1 Habitat survey and further detailed surveys with respect to bats, badger (*Meles meles*) and great crested newt (*Triturus cristatus*). The results of survey effort are provided within an Ecological Baseline Report (report reference: edp3746_r006).

2.5 To inform a planning submission, a BNG assessment is required to inform the proposed change in biodiversity of the Application Site following completion of construction. This report, therefore, provides the results of a BNG assessment alongside details of the methodologies adopted and any assumptions and limitations.

3. Methodology

3.1 The BNG assessment has been undertaken using the 'DEFRA Biodiversity Metric 3.0' (JP039)[1] by an experienced Ecological Consultant that is proficient in the use of such calculators.

3.2 The assessment has been based on the Extended Phase 1 Habitat survey by EDP on 28 September 2021 and further update survey and condition assessment on 07 January 2022.

3.3 GIS software has been used to calculate approximate areas of habitat to be lost, retained, enhanced and/or created. Calculations are based on the Proposed Site Plan provided at **Annex EDP 2**.

3.4 The condition of all habitats has been assessed using the condition assessment criteria provided within the 'Technical Supplement' and 'Habitat Condition Assessment Sheets' published alongside the Biodiversity Metric 3.0, where available, using professional judgement to interpret such criteria. The following should be read in conjunction with the detailed BNG calculations provided in **Annex EDP 1**, along with the Phase 1 Habitat Plan (baseline habitats) included at **Plan EDP 1**.

Limitations and Assumptions

3.5 Various assumptions have been made for the purposes of the calculations, with the key assumptions being:

- Existing grassland is of 'poor' condition due to its low species diversity, with less than six species per m^2, and agricultural improvement;
- The grassland immediately surrounding the moat is to remain in situ and be undisturbed to protect the heritage feature of significance;

[1] http://publications.naturalengland.org.uk/publication/6049804846366720

- The grassland over the heritage feature of significance is to be retained and enhanced through topping, harrowing and sowing with wildflower seed mix;
- The remaining grassland within the central area is to be lost through development activities but a wildflower grassland will be instated;
- It is presumed that areas of open space within the main development footprint will comprise lower quality grassland for amenity and recreational use;
- It is assumed that all retained hedgerows/lines of trees of poor-moderate condition will be enhanced through infill plug planting and sensitive long-term management to maximise benefits to wildlife; and
- The BNG calculations do not account for other protected species enhancement measures such as the provision of bird and bat boxes and hibernacula, nor does it account for the additional value of habitat resources important to specific species groups, which may not score highly within the calculator. Compensatory habitat will therefore need to take into account protected species issues in addition to creating sufficient biodiversity units to achieve a net gain.

4. Results

4.1 The BNG calculations pertaining to habitat areas are provided in **Annex EDP 1**. Overall, the biodiversity impact habitat area score of the proposed development has been calculated as follows:

- Total net unit change = +2.86
- Total net percentage change = +16.63%

4.2 With respect to the biodiversity impact score of the proposed development for hedgerows specifically, this has been calculated as follows:

- Total net unit change = +3.89
- Total net percentage change = +31.33%

5. Discussion and Conclusions

5.1 The Application Site is largely dominated by improved grassland of limited ecological value. The moat and scrub of higher value is to be retained within the proposals.

5.2 With respect to linear features, there will be minor loss of hedgerows to facilitate construction. However, new hedgerow planting is proposed within the centre of the Application Site, whilst retained hedgerows will be enhanced through new shrub planting.

5.3 Habitat establishment and management details included within an Ecological Management Plan can be secured via planning condition to ensure that the target habitat conditions required for the assessment will be achieved.

Annex EDP 1
Biodiversity Net Gain Calculations

Headline Results

Return to results menu

On-site baseline	*Habitat units*	17.22
	Hedgerow units	12.42
	River units	0.00
On-site post-intervention (Including habitat retention, creation & enhancement)	*Habitat units*	20.08
	Hedgerow units	16.31
	River units	0.00
On-site net % change (Including habitat retention, creation & enhancement)	*Habitat units*	16.63%
	Hedgerow units	31.33%
	River units	0.00%
Off-site baseline	*Habitat units*	0.00
	Hedgerow units	0.00
	River units	0.00
Off-site post-intervention (Including habitat retention, creation & enhancement)	*Habitat units*	0.00
	Hedgerow units	0.00
	River units	0.00
Total net unit change (including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	2.86
	Hedgerow units	3.89
	River units	0.00
Total on-site net % change plus off-site surplus (including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	16.63%
	Hedgerow units	31.33%
	River units	0.00%
Trading rules Satisfied?		Yes

A-1 Site Habitat Baseline

Condense / Show Columns | Condense / Show Rows | Main Menu | Instructions

	Habitats and areas			Distinctiveness	Condition	Strategic significance	Suggested action to address habitat losses	Ecological baseline	Retention category biodiversity value						Bespoke compensation agreed for unacceptable losses	Comments	
Ref	Broad habitat	Habitat type	Area (hectares)	Distinctiveness	Condition	Strategic significance		Total habitat units	Area retained	Area enhanced	Baseline units retained	Baseline units enhanced	Area lost	Units lost		Assessor comments	Reviewer comments
1	Grassland	Modified grassland	7.71	Low	Poor	Area/compensation not in local strategy/ no local strategy	Same distinctiveness or better habitat required	15.42	0.32	0.31	0.64	0.62	7.08	14.16		Grassland contains a low diversity of species of less than 6 per m2. Therefore the grassland is of low value.	
2	Heathland and shrub	Bramble scrub	0.06	Medium	Poor	Area/compensation not in local strategy/ no local strategy	Same broad habitat or a higher distinctiveness habitat required	0.24		0.06	0.00	0.24	0.00	0.00		Scrub along boundaries - assume retained in association with fence lines and hedgerows and enahanced	
3	Lakes	Ponds (Priority Habitat)	0.13	High	Moderate	Area/compensation not in local strategy/ no local strategy	Same habitat required	1.56	0.13		1.56	0.00	0.00	0.00		Retained in full	
4																	
5																	
			7.90					17.22	0.45	0.37	2.20	0.86	7.08	14.16			

A-2 Site Habitat Creation

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Note; Habitat selected has a time to target condition greater than 30 years. Non standard agreement may be required.

Post development/ post intervention habitats

Broad Habitat	Proposed habitat	Area (hectares)	Distinctiveness		Condition		Strategic significance			Temporal multiplier					Difficulty multipliers				Habitat units delivered	Comments	
			Distinctiveness	Score	Condition	Score	Strategic significance	Strategic significance	Strategic position multiplier	Standard time to target condition/years	Habitat created in advance/years	Delay in starting habitat creation/years	Standard or adjusted time to target condition	Final time to target condition/years	Final time to target multiplier	Standard difficulty of creation	Applied difficulty multiplier	Final difficulty of creation	Difficulty multiplier applied		Assessor comments	Reviewer comments
Grassland	Modified grassland	0.61	Low	2	Poor	1	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	1			Standard time to target condition applied	1	0.965	Low	Standard difficulty applied	Low	1	1.18		
Grassland	Other neutral grassland	1.46	Medium	4	Moderate	2	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	5	0	0	Standard time to target condition applied	5	0.837	Low	Standard difficulty applied	Low	1	9.77		
Urban	Introduced shrub	0.15	Low	2	Poor	1	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	1			Standard time to target condition applied	1	0.965	Low	Standard difficulty applied	Low	1	0.29		
Urban	Developed land; sealed surface	3.31	V.Low	0	N/A - Other	0	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	0	0	0	Standard time to target condition applied	0	1.000	Low	Standard difficulty applied	Medium	0.67	0.00		
Urban	Vegetated garden	1.2	Low	2	Poor	1	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	1	0	0	Standard time to target condition applied	1	0.965	Low	Standard difficulty applied	Low	1	2.32		
Woodland and forest	Other woodland; broadleaved	0.18	Medium	4	Good	3	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	30+	0	0	Standard time to target condition applied	30+	0.320	Low	Standard difficulty applied	Low	1	0.69		
Heathland and shrub	Mixed scrub	0.17	Medium	4	Moderate	2	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	5			Standard time to target condition applied	5	0.837	Low	Standard difficulty applied	Low	1	1.14		
	Total area	7.06																Total Units	15.39		

A-3 Site Habitat Enhancement

Condense / Show Columns | Condense / Show Rows

Main Menu | Instructions

											Post development/ post intervention habitats																								
	Baseline habitats										Proposed Habitat (Pre-Populated but can be overridden)		Change in distinctiveness and condition							Strategic significance			Temporal risk multiplier						Difficulty risk multipliers					Comments	
Baseline ref	Baseline habitat	Total habitat area	Baseline distinctiveness band	Baseline distinctiveness score	Baseline condition category	Baseline condition score	Baseline strategic significance category	Baseline strategic significance score	Baseline habitat units	Suggested action to address habitat losses	Proposed Broad Habitat	Proposed habitat	Distinctiveness change	Condition change	Area (hectares)	Distinctiveness	Score	Condition	Score	Strategic significance	Strategic significance	Strategic position multiplier	Standard time to target condition/years	Habitat enhanced in advance/years	Delay in starting habitat enhancement/years	Standard or adjusted time to target condition	Final time to target condition/years	Final time to target multiplier	Standard difficulty of enhancement	Applied difficulty multiplier	Final difficulty of enhancement	Difficulty multiplier applied	Habitat units delivered	Assessor comments	Reviewer comments
1	Grassland - Modified grassland	7.71	Low	2	Poor	1	Low Strategic Significance	1	15.42	Same distinctiveness or better habitat required	Grassland	Other neutral grassland	Low - Medium	Lower Distinctiveness Habitat - Moderate	0.31	Medium	4	Moderate	2	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	10	0	0	Standard time to target condition applied	10	0.700	Low	Standard difficulty applied	Low	1	1.92		
2	Heathland and shrub - Bramble scrub	0.06	Medium	4	Poor	1	Low Strategic Significance	1	0.24	Same broad habitat or a higher distinctiveness habitat required	Heathland and shrub	Mixed scrub	Medium - Medium	Poor - Good	0.06	Medium	4	Good	3	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	10	0	0	Standard time to target condition applied	10	0.700	Low	Standard difficulty applied	Low	1	0.58		
															0.37																		2.50		

B-1 Site Hedge Baseline

Condense / Show Columns | Condense / Show Rows | Main Menu | Instructions

	UK Habitats - existing habitats			Habitat distinctiveness		Habitat condition		Strategic significance			Suggested action to address habitat losses	Ecological baseline	Retention category biodiversity value						Comments	
Baseline ref	Hedge number	Hedgerow type	Length KM	Distinctiveness	Score	Condition	Score	Strategic significance	Strategic significance	Strategic position multiplier		Total hedgerow units	Length retained	Length enhanced	Units retained	Units enhanced	Length lost	Units lost	Assessor comments	Reviewer comments
1	H1	Native Hedgerow with trees - Associated with bank or ditch	0.35	High	6	Poor	1	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	Like for like or better	2.10		0.32	0.00	1.92	0.03	0.18		
2	H2	Native Hedgerow	0.21	Low	2	Good	3	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	Same distinctiveness band or better	1.26	0.21		1.26	0.00	0.00	0.00		
3	H3	Native Species Rich Hedgerow with trees	0.46	High	6	Good	3	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	Like for like or better	8.28	0.45		8.10	0.00	0.01	0.18		
4	H4	Native Hedgerow with trees - Associated with bank or ditch	0.13	High	6	Poor	1	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	Like for like or better	0.78		0.13	0.00	0.78	0.00	0.00		
5																				
6																				
7																				
8																				
9																				
			1.15									12.42	0.66	0.45	9.36	2.70	0.04	0.36		

B-2 Site Hedge Creation

Condense / Show Columns | Condense / Show Rows | Main Menu | Instructions

		Proposed habitats		Habitat distinctiveness		Habitat condition		Strategic significance			Temporal multiplier						Difficulty risk multipliers				Hedge units delivered	Comments	
Baseline ref	New hedge number	Habitat type	Length km	Distinctiveness	Score	Condition	Score	Strategic significance	Strategic significance	Strategic position multiplier	Standard Time to target condition/years	Habitat created in advance/years	Delay in starting habitat creation/years	Standard or adjusted time to target condition	Final time to target condition/years	Final Time to target multiplier	Standard difficulty of creation	Applied difficulty multiplier	Final difficulty of creation	Difficulty multiplier applied		Assessor comments	Reviewer comments
1		Native Species Rich Hedgerow	0.06	Medium	4	Good	3	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	12	0	0	Standard time to target condition applied	12	0.652	Low	Standard difficulty applied	Low	1	0.47	Creation of hedgerow within central open space.	
2																							
3																							
4																							
5																							
6																							
			0.06																		0.47		

B-3 Site Hedge Enhancement

Condense / Show Columns | Condense / Show Rows | Main Menu | Instructions

Baseline Habitats											Post development/ post intervention habitats																								Hedge units delivered	Comments	
												Change in distinctiveness and condition			Distinctiveness		Condition		Strategic significance			Temporal multiplier						Difficulty risk multipliers									
Baseline ref	Baseline habitat	Length KM	Baseline distinctiveness band	Baseline distinctiveness score	Baseline condition category	Baseline condition score	Baseline strategic significance category	Baseline strategic significance score	Baseline habitat units	Suggested action	Proposed (Pre-Populated but can be overridden)	Distinctiveness movement	Condition movement	Length KM	Distinctiveness	Score	Condition	Score	Strategic significance	Strategic significance	Strategic position multiplier	Standard Time to target condition/years	Habitat enhanced in advance/years	Delay in starting habitat enhancement/years	Standard or adjusted time to target condition	Final time to target condition/years	Final Time to target multiplier	Standard difficulty of enhancement	Applied difficulty multiplier	Final difficulty of enhancement	Difficulty multiplier applied		Assessor comments	Reviewer comments
1	Native Hedgerow with trees - Associated with bank or ditch	0.35	High	6	Poor	1	Low Strategic Significance	1	2.1	Like for like or better	Native Hedgerow with trees - Associated with bank or ditch	High - High	Poor - Good	0.32	High	6	Good	3	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	10	0	0	Standard time to target condition applied	10	0.700	Low	Standard difficulty applied	Low	1	4.61		
4	Native Hedgerow with trees - Associated with bank or ditch	0.13	High	6	Poor	1	Low Strategic Significance	1	0.78	Like for like or better	Native Hedgerow with trees - Associated with bank or ditch	High - High	Poor - Good	0.13	High	6	Good	3	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	10	0	0	Standard time to target condition applied	10	0.700	Low	Standard difficulty applied	Low	1	1.87		
														0.45																			6.48		

Annex EDP 2
Proposed Site Plan
(Drawing No: 0030, Revision: P16, Date: 09.06.20)

Yew Trees

existing overhead power line to be relocated

Assumed area for forming junction on common land (hatched)

138.5 sqm

potential substation location A

Existing extent of shrubbery to Western boundary as shown on Topo survey - opportunites to enhance/create glimpsed views

PROW footpath to adjoin with approved path in Northern development (subject to approval)

Pitches proposed as part of adjacent development

Path (um)

Cycle/Pedestrian Link

attenuation tanks

45m

Cycle/Pedestrian Link - with ability to be used for emergency access if required

Moat

Proposed Acoustic Barrier (3m total)

- 3m acoustic fence

see section B-B

Existing extent of shrubbery to Western boundary as shown on Topo survey - opportunites to enhance/create glimpsed views

Cycle/Pedestrian Link - with ability to be used for emergency access if required

attenuation tanks

Drain

55.5m

WINNYCROFT LANE

existing PROW across common land

Assumed area for forming Emergency Access junction on common land (hatched)

41.5 sqm

potential substation location B

Proposed Acoustic Barrier (3m total)

- 1.5m bund
- 1.5m acoustic fence

see section A-A

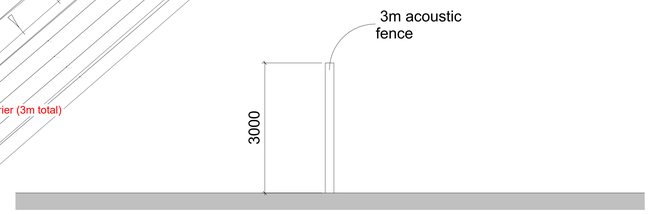
M5

Green Farm

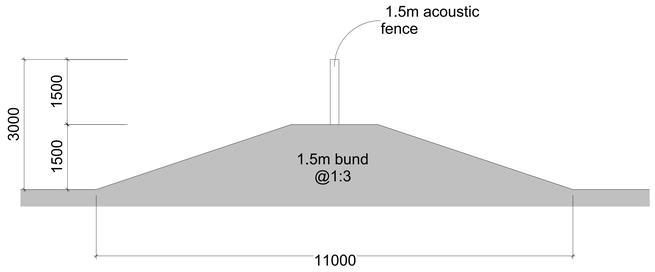
Proposed Acoustic Barrier (3m total)

- 3m acoustic fence

see section B-B



Acoustic Barrier - Section B-B



Acoustic Barrier - Section A-A

Rev	Revision Details	Dr	Date
P16	Layout amendments following client meeting on 9.03.22	NG	10.03.22
P15	Layout updated following client review	NG	17.01.22
P14	Layout amended following client review and DTM	NG	20.12.21
P13	Net Area's updated. Minor layout chnages following DTM	NG	19.11.21
P12	Layout revised following design meeting and comments with client	NG	26.07.21
P11	Tier 1 housing added. Southern block structure amended for masterplan	NG	02.06.21
P10	Numbers reduced in preparation for proposed Block Plan	NG	06.05.21
P09	Block structure revised to accomodate additional units as per clients instructions	NG	23.04.21
P08	PROW alignment and internal pedestrian/cycle network amended following consultant meeting	NG	30.03.21
P07	Proposed attenuation basins replaced with swales to western boundary. Extent of existing shrubbery indicate on western edge	NG	25.03.21
P06	Layout amended to test single access option from Northern junction	NG	24.03.21
P05	Unit numbers increased and layout changes following review	NG	17.03.21
P04	Layout amendments, net area and schedule updated.	NG	15.03.21
P03	Layout revised following client comments	NG	12.03.21
P02	Site area schedule added	DR	10.02.21
P01	Initial Draft	CH	18.06.20

O3S

RIBA Chartered Practice

[redacted]

Client's Name

Edward Ware Homes Ltd & Bromford

Job Title

Snow Capel Farm

Drawing Title

Proposed Site Plan

Scale

As indicated @ A0

Drawn	Checked	Date
CH	DR	09.06.20

Job No	Drawing No	Rev
3250	0030	P16

Status

PRELIMINARY

Sheet ID

3250-O3S-ZZ-XX-GA-A-0030-S0-P16

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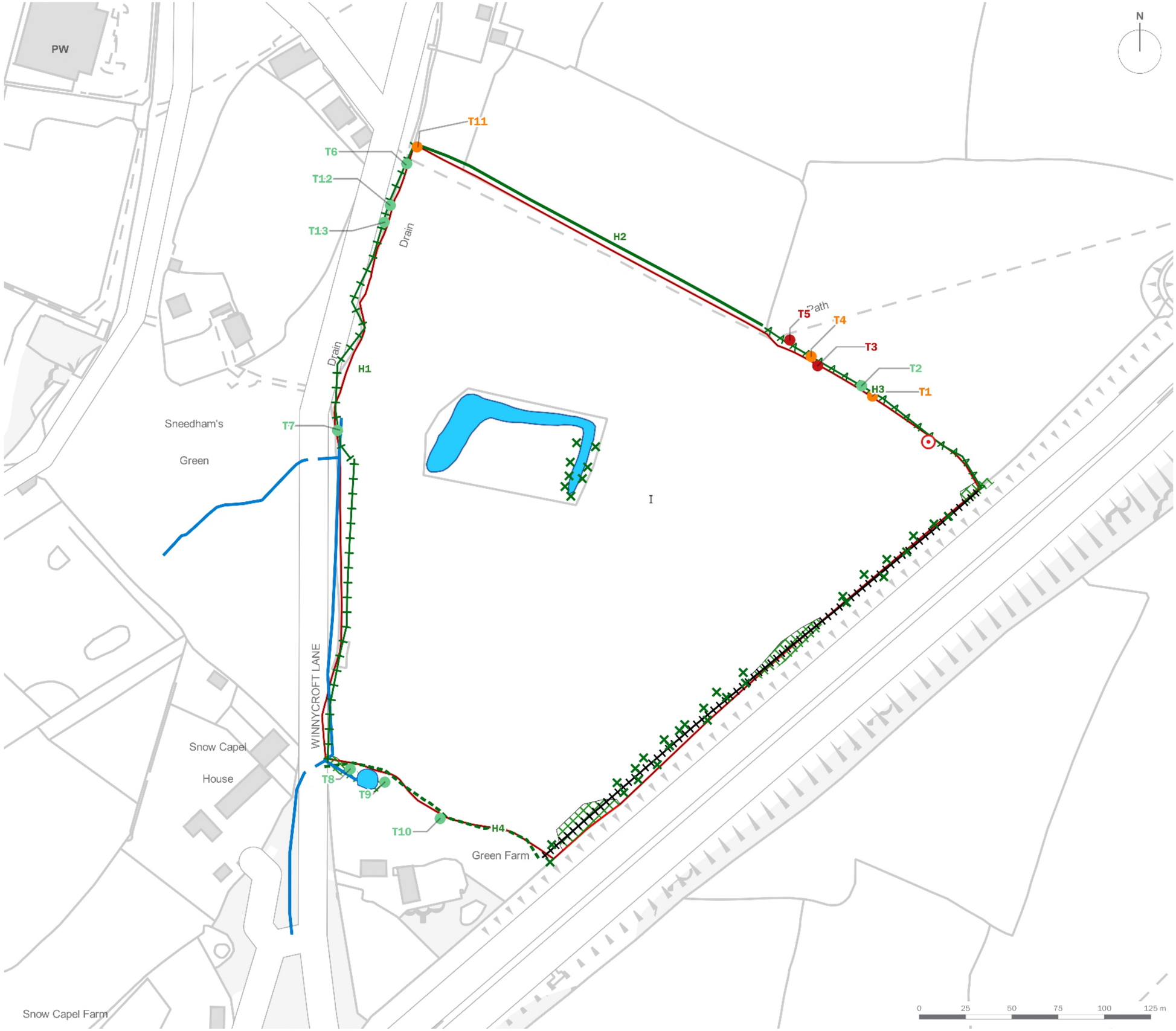
Plan EDP 1
Phase 1 Habitat Plan
(edp3746_d007b 01 April 2022 VMS/EWi)



Site Boundary

Dense Continuous Scrub

I — Improved Grassland

Standing Water

Intact Species-rich Hedgerow

Intact Species-poor Hedgerow and Trees

Intact Species-poor Hedgerow

Defunct Species-poor Hedgerow

Running Water

Fence

Scattered Scrub

TN1 — Target Note

Trees with Bat RoostPotential

- High
- Moderate
- Low

client
Edward Ware Homes and Bromford Developments Ltd

project title
Land at Snow Capel Farm, Matson, Gloucester

drawing title
Plan EDP 1: Phase 1 Habitat Plan

date	**01 APRIL 2022**	drawn by	**VMS**
drawing number	**edp3746_d007b**	checked	**EWi**
scale	**1:2,000 @ A3**	QA	**JTF**

edp the environmental dimension partnership

Land to the East of Winneycroft Lane, Snow Caple, Matson
Briefing Note: Information to Inform a Habitat Regulations Assessment
edp3746_r008a

1. Introduction

1.1 This Briefing Note has been prepared by The Environmental Dimension Partnership Ltd (EDP) on behalf of Bromford Housing (hereafter referred to as 'the Applicant') in relation to the proposed development of Land East of Winneycroft Lane, Snow Caple, Matson (hereafter referred to as 'the Application Site').

1.2 In brief, proposals relate to a full planning application for the provision of up to 190 residential dwellings and open space. A Proposed Site Layout for the development is provided at **Appendix EDP 1**.

1.3 EDP is an independent environmental planning consultancy with offices in Cirencester, Cardiff and Cheltenham. The practice provides advice to private and public sector clients throughout the UK in the fields of landscape, ecology, archaeology, cultural heritage, arboriculture, rights of way and masterplanning. Details of the practice can be obtained at our website (www.edp-uk.co.uk).

Site Context

1.4 The Application Site measures approximately 8 hectares (ha) and is centred at approximately Ordnance Survey Grid Reference (OSGR) SO 850 142. The Application Site lies within Gloucester City Council and is located approximately 4km south of the city of Gloucester, along its south-eastern edge. The M5 motorway and Winnycroft Lane form the Application Site's immediate boundaries to the south-east and west respectively, with a number of small field parcels occupying land to the immediate north-east, separating the Application Site from the settlement of Matson and the built-up area of the city of Gloucester beyond. More generally, extensive areas of open farmland and woodland blocks occupy land to the south and east.

1.5 The Application Site consists of a single, poor semi-improved grassland field currently subject to grazing. Its boundaries to the north-east, south and west are delineated by native hedgerows, with scattered scrub forming the south-eastern and southern boundaries. A large, freshwater moat is located within the centre of the field, with scattered scrub present along its banks.

2. Background and Scope

2.1 Of pertinence to the Application Site, the Cotswold Beechwoods Special Area of Conservation (SAC) and Special Site of Scientific Interest (SSSI) lies 2.4km south-east. Given its proximity to

the Application Site, there is the potential for development to give rise to significant negative impacts upon qualifying features of this designation.

2.2 In accordance with Part 6 of the Conservation of Habitats and Species Regulations 2017 (as amended), a Habitat Regulations Assessment (HRA) is required where a plan or project may give rise to significant effects upon any European site designated to conserve natural habitats and species that are rare, endangered, vulnerable or endemic within the European Community. This includes SACs designated for their habitats and/or species of European importance, and Special Protection Areas (SPA) classified for rare, vulnerable and regularly occurring migratory bird species. Such requirements also apply to those sites going through the formal designation process, including candidate SACs (cSAC) and Sites of Community Importance (SCI). Additionally, Government policy, as set out within the National Planning Policy Framework[1], also affords the same level of protection to internationally important wetlands (Ramsar sites), potential SPA (pSPA), possible SACs (pSAC) and proposed Ramsar Sites, requiring such sites to also be treated as European sites for planning purposes.

2.3 An HRA comprises several stages of assessment, commencing with a formal screening stage for any likely significant effects (either alone or in combination with other plans or projects) upon the European site or its qualifying features (HRA stage 1). Where likely significant effects cannot be excluded, then such effects require assessment in greater detail through an appropriate assessment to determine whether any adverse effects on the integrity of the European site can be ruled out (HRA stage 2). Providing it can be demonstrated that with appropriate mitigation measures, the plan or project would not give rise to an adverse effect on the integrity of a European site, the plan or project can proceed. Where this cannot be demonstrated, however, or where uncertainty remains, a further stage requires consideration as to whether alternative solutions can be identified (HRA stage 3). Should this not be possible, then the final stage of the HRA requires consideration of any imperative reasons of over-riding public interest and whether all necessary compensatory measures can be secured before determining whether a plan or project can lawfully go ahead (HRA stage 4).

2.4 The Conservation of Habitats and Species Regulations 2017 (as amended) states that:

"a competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which (a) is likely to have a significant effect on a European site or a European offshore marine site (either alone or in combination with other plans or projects), and (b) is not directly connected with or necessary to the management of that site, must make an appropriate assessment of the implications of the plan or project for that site in view of that site's conservation objectives".

2.5 This Briefing Note has been prepared to summarise pertinent baseline information and planning policy with respect to the proposed development and likely significant effects arising upon the Cotswold Beechwoods SAC. In so doing, this Briefing Note seeks to provide pertinent information

[1] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/810197/NPPF_Feb_2019_revised.pdf

to Gloucester City Council as the competent authority, to inform an HRA (Screening) and/or appropriate assessment process; and establish, through consultation, an appropriate mitigation strategy to ensure development of Land East of Winneycroft Lane, Snow Caple, Matson does not preclude the achievement of conservation objectives for the SAC.

3. Background to Pertinent International/European Designations

3.1 The Cotswold Beechwoods SAC covers an area of approximately 586 hectares (ha) and comprises several woodland blocks located to the south-east of Gloucester. The woodland is located on the sloping edge of the Cotswold escarpment.

3.2 The SAC is designated due to the following primary reason[2]:

- Annex I Habitat: *Asperulo-Fagetum* beech forest – noted for its floristic diversity and diverse mollusc fauna.

3.3 In addition, the SAC also supports the following qualifying feature, which is not a primary reason for site selection:

- Annex I Habitat: Semi-natural dry grassland and scrubland facies: on calcareous substrates (*Festuco-Brometalia)* – covers 1.5% of the site.

3.4 Conservation Objectives for the Cotswold Beechwoods SAC as defined by Natural England are to "*ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;*

- *The extent and distribution of qualifying natural habitats;*
- *The structure and function (including typical species) of qualifying natural habitats, and*
- *The supporting processes on which qualifying natural habitats rely".*

3.5 The Cotswold Beechwoods component SSSI, is subdivided into 26 management units of which 44.2% is in 'favourable condition' and 55.8% in 'unfavourable - recovering'. Management issues affecting the Cotswold Beechwoods SAC include: grazing pressure from deer, spread of invasive species and disease, air pollution impacts and public disturbance[3].

[2] JNCC (2014). Available at: http://publications.naturalengland.org.uk/publication/6200815333146624. [Accessed on 24 January 2022].)

[3] Site Improvement Plan. Cotswold Beechwoods. Available at: http://publications.naturalengland.org.uk/file/5734985984114688 [Accessed on 24 January 2022]

3.6 In particular, it is noted that the Cotswold Beechwoods SAC is vulnerable to damage/disturbance as a result of recreation and increased nitrogen disposition upon nutrient sensitive habitats. As such, any development, which results in an increase in residential units is likely to give rise to recreational and air quality impacts following an increase in the resident population and traffic.

4. Habitats Regulation Assessment - Screening (HRA Stage 1)

4.1 To ensure no adverse impact on SAC and to meet the requirements of the Conservation of Habitats and Species Regulations 2017 (as amended), the Joint Core Strategy (2017) for Gloucester City Council, Cheltenham Borough Council and Tewkesbury Borough Council was subjected to an HRA Screening and subsequent Appropriate Assessment[4] with the initial screen exercise first commencing in 2011 based on earlier drafts of the Joint Core Strategy.[5] This exercise considered the potential for significant negative impacts arising from the implementation of polices/proposals, including housing allocations, inherent within the Joint Core Strategy to occur.

4.2 A brief summary of the pertinent conclusions of the HRA in relation to the Joint Core Strategy (with reference to the screening criteria referenced therein) is provided within **Table EDP 4.1**. Included also, is a summary of the conclusions of a shadow HRA screening exercise (stage 1) for the Application Site undertaken by EDP during January 2022, in respect of the potential for likely significant effects to arise upon qualifying features of the Cotswold Beechwoods SAC. In brief, likely significant adverse effects specific to this designation can be attributed to one of more of the following:

4.3 Potential significant adverse effects on this statutory site are attributed to:

- Physical loss and/or damage;
- Non-physical disturbance (e.g. noise, light, human presence);
- Changes in air quality; and
- Changes in water levels.

4.4 As detailed within **Table EDP 4.1** it is considered that no likely significant effects upon the qualifying features of the Cotswold Beechwoods SAC are likely to arise from the development

[4] Enfusion (May, 2014). Pre-Submission Draft Joint Core Strategy. Habitat Regulations Assessment Report. Available at: https://jointcorestrategy-my.sharepoint.com/:b:/g/personal/website_jointcorestrategy_onmicrosoft_com/EV-J4g5M9zFMphkMtVLrBGQB8u8xzb-PHXiXgfyEH7cwQA?e=Wb2Us3 [Accessed on 24 January 2022]

[5] LUC (2011). Habitats Regulation Assessment Screening of Gloucester, Cheltenham, Tewkesbury Joint Core Strategy 'Developing the Preferred Option Consultation Document.' Available: https://jointcorestrategymy.sharepoint.com/:b:/g/personal/website_jointcorestrategy_onmicrosoft_com/EYD4VwAZtf9MmpnzTd6SuY8BB_ayXuOQTE_Iz_TXxGndPQ?e=1k7wfM[Accessed on 24 January 2022]

proposals as a result of changing water levels/water quality and physical habitat loss/damage/recreation given the Application Site's distance from the SAC. Furthermore, there is no hydrological connection between the Application Site and SAC, which would give rise to water quality impacts whilst no abstraction is proposed to facilitate development.

4.5 In the absence of mitigation there does, however, remain the potential for likely significant effects to arise upon qualifying features of the Cotswold Beechwoods SAC as a result of changes in air quality and recreational pressures generated from an additional 190 houses within the zone of influence of the SAC, following occupation of proposed residential development.

4.6 Particularly in respect of air quality. The Cotswold Beechwoods SAC lies within 200m of the A46. The 'Air Pollution Information Service' (APIS) website (www.apis.ac.uk) indicates that the SAC currently exceeds its critical loads and levels for nutrient nitrogen. Natural England have therefore advised that development proposals that may generate additional traffic along this route should take account of Guidance Note NEA001[6].

[6] Natural England (2018). Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations. Available at: Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations [Accessed on 04 February 2022]

Table EDP 4.1: Summary of a Shadow Habitat Regulations (Screening) Assessment for the Application Site

Effect	Description	JCS HRA Conclusion – Screening Assessment	Project Specific HRA Conclusion	Likely Significant Effect (LSE)?
Direct Habitat Loss/Damage/Fragmentation	Direct land take; removal of green/connecting corridors/supporting habitat; introduction of invasive species	No development lies within or adjacent to the SAC such that no likely significant effects through habitat loss/damage/fragmentation have been identified.	The Application Site is sufficiently distant from the SAC (c.2.4km), such that no direct impacts arising from physical habitat loss/damage/fragmentation will occur.	No
Disturbance	Increased recreational activity (population increase); noise and light pollution (from development and increased traffic).	Uncertainty identified with regards to the potential for effects arising from increased recreational pressure upon the SAC.	The development is sufficiently distant from the SAC, such that no impacts arising from elevated noise/lighting/vibration from development will arise. An increase in residential units and potentially population does, however, have the potential to increase recreational use of the SAC with subsequent damage/degradation of qualifying features.	No
Air Pollution	Increased traffic movements; increased emissions from buildings.	The HRA considered significant effects are likely with the A46 located within 200m of the Cotswold Beechwoods SAC. Impacts were attributed to two large urban expansions (Policy A4 and A6) that could potentially result in significant increase in traffic along this road.	In consultation with the local authority, traffic surveys were not requested along the A46 as it was not deemed that significant levels of traffic would be using this road from the Application Site.	No

Effect	Description	JCS HRA Conclusion – Screening Assessment	Project Specific HRA Conclusion	Likely Significant Effect (LSE)?
Water Levels	Increased abstraction levels; Increased hard standing non-permeable surfaces/accelerated run-off; Increase in run-off/ pollutants from non-permeable surfaces (roads, built areas); increased air pollution (eutrophication) (traffic housing); Increased volume of discharges (consented); Increased traffic movements.	HRA considered there to be potential for in combination effects on the SAC arising from reduced water levels as a result of over abstraction.	There is no hydrological connectivity between the Application Site and SAC such that no impacts associated with changes in water quality and changes in water levels from surface water runoff is likely to occur. Similarly, no abstractions are proposed. Where abstraction is required by third parties (i.e. water service providers) it is anticipated that such impacts will be assessed as a plan-specific HRA for relevant abstraction permits.	No

5. Appropriate Assessment (HRA Stage 2)

5.1 An HRA Screening exercise has identified the potential for likely significant effects to occur as a result of changes in air quality and recreational pressures generated from an additional 190 houses within the zone of influence of the SAC, following occupation of the residential development.

5.2 An Appropriate Assessment of the implications of the development proposals on those qualifying features of the Cotswold Beechwoods SAC, in view of the European site's structure, function and conservation objectives, is necessary to determine whether adverse effects upon its integrity will arise as a result of recreational and air quality issues.

5.3 The 'integrity' of a European site is considered to be "*the coherence of its ecological structure and function, across its whole area, which enables it to sustain the habitat, complex of habitats and/or populations of species for which the site has been classified*"[7].

5.4 Natural England's Habitats Regulations Guidance Note 1[8] further describes an adverse effect on integrity as one that is likely to prevent the Application Site from making the same contribution to favourable conservation status for the relevant features as it did at the time of its designation.

5.5 In relation to the Joint Core Strategy, an Appropriate Assessment similarly considered the air quality and recreational impacts upon qualifying features of the Cotswold Beechwoods SAC arising from local planning policy following the initial screening assessment. There was potential for impacts mainly due to two large urban extensions outlined in Policy SA1 (allocations A4 and A6), in addition to in-combination effects with other plans.

5.6 Further to adoption of the Joint Core Strategy, Gloucester City Council is currently preparing a development framework to guide the City's growth up to 2031. As of yet, the Gloucester City Plan has not been formally adopted albeit submitted to the Planning Inspectorate for public examination in November 2020. Of pertinence to the Cotswold Beechwoods SAC Policy P8 of the City Plan states:

"Development will not be permitted where it would be likely to lead directly or indirectly to an adverse effect upon the integrity of the Cotswold Beechwoods Special Area of Conservation (SAC) (alone or in combination), and the effects cannot be mitigated. In order to retain the integrity of the SAC, and to provide protection from recreational pressure, all development that results in a net increase in dwellings will be subject to Habitats Regulations Assessment for likely significant effects. Any development that has the potential to lead to an increase in recreational pressure on the SAC will be required to identify any potential adverse effects and

[7] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/7692 /147570.pdf [Accessed on 14 January 2020]
[8] English Nature (1997). The Appropriate Assessment (Regulation 48) The Conservation (Natural Habitats &c) Regulations 1994. Habitat Regulations Guidance Note 1. English Nature, Peterborough

provide appropriate mitigation. This will be in accordance with the SAC mitigation and implementation strategy or through a Habitats Regulations Assessment. Development which is likely to generate road traffic emissions to air, which are capable of affecting the SAC, will be screened against the Habitats Regulations Assessment Framework in line with Natural England's guidance 'Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations (NEA001)', or any future iteration."

Potential Adverse Effects Requiring Consideration

Recreational Impacts

5.7 It is noted that the HRA completed for the Joint Core Strategy concluded that there is uncertainty with regard to the potential for likely significant effects at the Cotswold Beechwoods SAC through increased recreational activity. This was namely attributed to proposed urban extensions outlined in Policy SA1 of the Joint Core Strategy (Allocations A3 and A6). However, this uncertainty was addressed within the Joint Core Strategy through further mitigation provided by Policies INF7 (Infrastructure Delivery) and Policy INF8 (Developer Contributions), the latter providing a mechanism for the delivery of development through receipt of financial contributions from developers that would contribute to the management of the Cotswold Beechwoods SAC. As such, an Appropriate Assessment considered it to be unlikely that there would be a significant effect on the SAC given the mitigation provided within the Joint Core Strategy policies.

5.8 Of further consideration, an addendum to the HRA was prepared during 2015 to provide further detail on the potential recreational impacts of allocated development on the Cotswold Beechwoods SAC. This addendum considered the results of an assessment undertaken by an independent ecological consultant in relation to a planning application (reference 12/01256/OUT) for construction of 1,500 dwellings on the North Brockworth Strategic Allocation (A3), the nearest Joint Core Strategy allocation to the Cotswold Beechwoods SAC.

5.9 To support a planning submission, the consultant team undertook a Visitor Survey at the SAC to form a better understanding of current user trends and pressures, and to predict the likely trends of new residents. In accordance with advice from Natural England to Gloucester City Council dated 22 August 2019, it was concluded that the results of the Visitor Survey gathered for the planning application should be used as an interim approach to aid decision-making under the Habitats Regulation 2017 (as amended), until such time as more up to date Visitor Survey data becomes available. The most pertinent findings/conclusions of the Visitor Survey are summarised below with further details submitted with the planning application (reference 12/01256/OUT):

- The assessment estimated that, for new residents from the Brockworth strategic development (A3), approximately 7 persons per 1,000 residents would visit the SAC. Thus, the number of visitors relative to the population is low and only a small proportion of residents living in proposed new housing sites would be expected to add to the recreational

pressure exerted on the SAC. It was subsequently concluded that the low number of visitors that would be likely from the North Brockworth development would not result in any significant detrimental effects on the SAC;

- Where recreational opportunities exist in close proximity to new residential development, which offer similar opportunities to that of the European Site, people are less likely to travel to the SAC. Thus, the North Brockworth planning proposal included a significant area of public open space with a network of paths and cycle ways; and

- In addition and having assessed the alternative recreational opportunities present in close proximity to the North Brockworth proposed development, it was considered that the majority of new residents would not be likely access the SAC on a regular basis. This conclusion was supported by Natural England.

5.10 As such, an addendum to the HRA concluded that the mitigation provided through Joint Core Strategy policies and available at the project level will be able to address the potential for adverse effects on the Cotswold Beechwoods SAC. It was considered that through opportunities for the provision of significant areas of public open space at strategic allocation sites proposed in the Joint Core Strategy, recreational impacts on the SAC will be mitigated. The addendum does acknowledge that, in the case of smaller development sites, it is less likely that significant areas of on-site Green Infrastructure will be able to be provided. In this instance, the addendum looks to the existing network of Green Infrastructure and public open spaces to provide necessary facilities for recreational activity that reduces the pressure on more ecologically sensitive sites, with financial contributions sought for the enhancement of these facilities where required.

5.11 Further to this and to inform the HRA of Gloucester City Council's emerging City Plan an update Visitor Survey was commissioned by the local planning authorities in the vicinity of the Cotswold Beechwoods: Tewkesbury, Cotswold, Stroud, Cheltenham and Gloucester City Councils (and the Highway Authority); and completed during summer 2019. In a statement submitted to the Planning Inspectorate in June 2021 it is understood that the results of the Visitor Survey have informed preparation of a Draft Recreational Mitigation Strategy for the Cotswold Beechwoods SAC outlining a Strategic Access Management and Monitoring Scheme (SAMM) and/or provision of Suitable Alternative Natural Greenspace (SANG) payable into by developers to mitigation recreational pressure generated by development, thereby introducing a mechanism for delivery of mitigation where significant effects arising from development are identified. Key findings of the update Visitor Survey include:

- The SAC services a large catchment with most visitors living within 15.4km of the SAC from multiple local planning authorities;

- Long-distance walkers have a large footprint on the SAC, but typically confined to marked trails whereas short distance, frequent visitors have a year-round impact and are less confined to a marked trail; and

- Mountain biking is a particular cause for concern to erosion and numbers are proportionally lower than walkers.

5.12 Overall and in the absence of mitigation, it is considered that proposed residential development of the Application Site, alone, will likely give rise to impacts upon the SAC, arising from an increase in recreational pressure generated from an increase in housing provision. The SAC is located circa 2.4km from the Cotswold Beechwoods SAC and, therefore, within the visitor catchment for this designation. Such impacts are, however, reduced to some extent given the spatial separation of the Application Site from the SAC and limitations to access as follows:

- The proposals do not include any new recreational links to the designated woodland or the provision for any recreational activities, which would utilise the designated woodland;

- Access to the SAC from the Application Site on foot, e.g. for dog walking representing the greater proportion of all visitors in recent visitor surveys, would likely be minimal owing to the requirement to travel circa 3.5km via the most direct public footpath. Connecting footpaths include significant uphill sections required to reach the top of the Cotswold Escarpment. Such routes are thus not considered a likely and/or frequent choice for future residents; and

- Access to the SAC from the Application Site by car is considered more likely, requiring a travel distance of circa 3.9km to the boundary of the SAC at its closest point. However, designated car parking facilitates are limited in size.

5.13 To mitigate for likely significant effects upon the Cotswold Beechwoods arising from increased recreational presses, the following avoidance/mitigation measures have been embedded within the Proposed Site Plan for the Application Site and provided at **Appendix EDP 1**:

- The provision of circa 1.71ha grassland habitat centrally within the EIA site to be delivered for amenity and wildlife, which aims to reduce casual footfall on surrounding sites by providing recreational opportunities immediately adjacent to the proposed housing;

- The inclusion of new habitat features within the development including shrub, tree and grassland planting to enhance new residents' connection with nature whilst delivering biodiversity benefits; and

- The maintenance of a public right of way within the development footprint itself with such routes extending beyond the development footprint to utilise existing public rights of way across land to the north, south east and west.

5.14 Of particular, pertinence, the Application Site lies directly south of allocated strategic development A6, which is in receipt of outline planning consent. Strategic development here will deliver extensive areas of open green space including parkland, community orchards and sports and recreation facilities, which can be directly accessed from the Application Site via an existing

public right of way to be enhanced, and will provide a range of alternative recreational opportunities. The Application Site is also located in close proximity to several areas of public open spaces as well as a network of public footpaths within open countryside which provide alternative recreational opportunities, thus reducing footfall within the SAC and other sensitive sites. These include, but are not limited to, the following facilities:

- Matson Park 550m from the Application Site via Winnycroft Lane and Matson Avenue;
- Robins Wood Hill Country Park, SSSI and LNR comprises 100ha of parkland managed for people as well as wildlife and as such, offers an extensive network of footpaths and nature trails giving extensive views of the surrounding countryside. Located 1.4km by foot or by car from the Application Site, the Country Park provides relatively large parking facilities;
- Sneedhams Green directly adjacent to the Application Site; and
- Range Farm Fields SSSI connected by footpath links between Winneycroft Lane, c.700km south-east.

5.15 In light of the provision of Green Infrastructure within the Application Site, combined with the maintenance of footpath links connecting the Application Site with public rights of way and open green space in the immediate landscape, it is considered that significant effects arising upon the Cotswold Beechwoods SAC as a result of increased recreational can be adequately mitigated. It is further recommended that an information pack is provided to every new home, detailing the location and sensitivities of the Cotswold Beechwoods SAC, guidelines and recommendation of how to avoid impacts and promoting alternative locations for recreational activities the latter detailed in brief above.

Air Quality Considerations

5.16 It is understood that the Appropriate Assessment completed for the Joint Core Strategy concluded that air emissions are unlikely to have any significant effect on the SAC subject to of relevant planning policies which include Policies INF (Infrastructure Delivery) and Policy INF8 (Developer Contributions).

5.17 The only road within 200m of the SAC is Painswick Road, which runs alongside and through parts of the SAC. The HRA for the draft Joint Core Strategy concluded that residents predominantly commute for work between the three main settlements of Gloucester City, Cheltenham Town and Tewkesbury Town. Therefore, much of the traffic that may increase on the A46 as a result of certain Allocation Policies is unlikely to travel near to the site [SAC], with the SAC located south of the three main settlements.

5.18 Of some relevance here, an HRA/Appropriate Assessment of housing allocation A6, located adjacent to the Application Site, was undertaken during determination of an outline planning application 14/01470/OUT for its residential development. Baseline investigations submitted

with the planning application considered air quality impacts on the SAC from changes in traffic flow on roads within 200m of the SAC arising from the development both alone or in combination with other plans and projects. In brief and based on a worst-case scenario in which all additional traffic generated by strategic development would travel within 200m of the SAC, modelling indicated that changes to traffic volume along this road would be imperceptible with changes in N and NOx inputs to amount to <1% of the critical load such that the potential for significant effects upon the SAC arising as a result of atmospheric pollution was considered negligible.

5.19 In addition to the above, a Traffic Assessment was also undertaken by Transport Planning Limited during 2013 in relation to an outline planning application for strategic allocation A3 (North Brockworth, planning reference: 12/01256/OUT) circa 2km from the Cotswold Beechwoods SAC. This assessment considered the effects of all committed development which would result in a significant increase in traffic flow on Painswick Road (A46) at that time, with daily traffic flows estimated at 2043 AADT. Despite this, a subsequent air quality assessment accounting for such changes in traffic flow concluded that any effect on air quality would be of negligible significance when assessed either alone or in combination with results indicating no change to the baseline N deposition rate affecting the SAC, and no material change to NOx and NO2 concentrations.

5.20 With reference to best practice guidance[9][10], air quality impacts are not considered significant where a change in daily traffic flow equated to less than 1,000 AADT and a change in HGV flow equated to less than 200 AADT. As such, no impacts to the SAC arising from the Application Site alone are considered likely. Similarly, and with reference to the findings of an assessment in respect of strategic development within the wider landscape, no significant impacts in combination with the development is considered likely.

6. Summary and Conclusions

6.1 In consideration of the nature and scale of proposed development and the potential for likely significant effects upon qualifying features of the Cotswold Beechwoods SAC, an HRA will be required in accordance with the Conservation of Habitat and Species Regulations 2017 (as amended) prior to determination of a full planning application, to be undertaken by the Competent Authority.

6.2 An HRA screening and subsequent Appropriate Assessment of the Joint Core Strategy has concluded that no significant impacts to European Sites will arise, through implementation of policies/proposals set out within the Joint Core Strategy. These set out mitigation measures developed during the preparation of the plan. An addendum to the HRA also provides additional

9 Department for Transport (2007). Design Manual for Roads and Bridges. Volume 11, Section 3, Part 1.

10 Natural England (2018). Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations. Available at: Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations [Accessed on 04 February 2022]

information in respect of baseline data for potential recreational impacts on the SAC. Of further consideration, however, is Policy P8 of the emerging Gloucester City Plan.

6.3 At the site level and given the distance and the spatial separation of the Application Site from each designation, combined with the nature and size of development and specific sensitivities of each designation, no likely significant effects upon the qualifying features of the Cotswold Beechwoods SAC are likely to arise from the proposed development as a result of habitat loss/damage/fragmentation and changes to water levels/water quality.

6.4 There remains, however, the potential for development to give rise to significant effects as a result of changes in recreational pressures generated from an additional 190 houses within the zone of influence of the SAC. As such, these potential impacts will require further consideration within an Appropriate Assessment prepared by the Competent Authority.

6.5 The development has, therefore, been designed to provide suitable open space and play areas, as far as possible, within the design. However, given the small size of the proposed development, significant informal open space cannot be provided. Nevertheless, inherent within the proposals is the enhancement of public rights of way across the Application Site connecting to public open space and countryside walks in the wider landscape including extensive areas of open green space associated with outline consented strategic development immediately adjacent to the Application Site.

6.6 Overall, therefore, and subject to implementation of development in accordance with the above, it is considered that the proposed development of the Application Site will not adversely affect the integrity of the Cotswold Beechwoods SAC. As such, the scheme is capable of complying with the requirements.

Appendix EDP 1
Proposed Site Layout
(Drawing No 0030, Rev P19, 09.06.20)

N

Rev	Revision Details	Dr	Date
P19	Section references updated and private drive switch to adopted surface P76	DR	26.05.22
P18	Application Issue	DR	10.05.22
P17	Draft Application Pack Issue	NG	01.04.22
P16	Layout amendments following client meeting on 9.03.22	NG	10.03.22
P15	Layout updated following client review	NG	17.01.22
P14	Layout amended following client review and DTM	NG	20.12.21
P13	Net Area's updated. Minor layout chnages following DTM	NG	19.11.21
P12	Layout revised following design meeting and comments with client	NG	26.07.21
P11	Tier 1 housing added. Southern block structure amended for masterplan	NG	02.06.21
P10	Numbers reduced in preparation for proposed Block Plan	NG	06.05.21
P09	Block structure revised to accomodate additional units as per clients instructions	NG	23.04.21
P08	PROW alignment and internal pedestrian/cycle network amended following consultant meeting	NG	30.03.21
P07	Proposed attenuation basins replaced with swales to western boundary. Extent of existing shrubbery indicate on western edge	NG	25.03.21
P06	Layout amended to test single access option from Northern junction	NG	24.03.21
P05	Unit numbers increased and layout changes following review	NG	17.03.21
P04	Layout amendments, net area and schedule updated.	NG	15.03.21
P03	Layout revised following client comments	NG	12.03.21
P02	Site area schedule added	DR	10.02.21
P01	Initial Draft	CH	18.06.20

O3S

[redacted]

RIBA Chartered Practice

Client's Name
Edward Ware Homes Ltd & Bromford

Job Title
Snow Capel Farm

Drawing Title
Proposed Site Plan

Scale
1 : 500 @ A0
metres 10 20 30 40 50 60 70

Drawn	Checked	Date
CH	DR	09.06.20

Job No	Drawing No	Rev
3250	0030	P19

Status
PRELIMINARY

Sheet ID
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Land at Snow Capel Farm, Matson, Gloucester

Archaeological and Heritage Assessment

Prepared by:
The Environmental Dimension Partnership Ltd

On behalf of:
Edward Ware Homes and Bromford Developments Ltd

April 2022
Report Reference:
edp3736_r005b

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(edp3746_d014a 14 May 2021 MH/RS)

Plan EDP 5 Aerial photographs
(edp3746_d015a 14 May 2021 MH/RS)

This version is intended for electronic viewing only

	Report Ref: edp3746_r005			
	Author	**Formatted**	**Peer Review**	**Proofed by/Date**
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005a	RS	-	-	FJ 140521
005b	RS	-	-	-

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Non-technical Summary

S1 This report has been prepared by The Environmental Dimension Partnership Ltd (EDP), on behalf of Edward Ware Homes and Bromford Developments Ltd and is an archaeological and heritage assessment of land at Land at Snow Capel Farm, Matson, Gloucester in support of a planning application for residential development.

S2 This archaeological and heritage assessment concludes that there will be only very minimal direct effects on the scheduled monument *Moated site at Sneedham's Green, 220m north east of Green Farm* (**1019399**) which is located within the site, restricted to the digging of postholes for a new fence.

S3 This assessment includes consideration of potential impacts on waterlogged archaeological remains located within the scheduled moat located within the site due to a reduction in water levels. The results of a Water Environment Assessment indicate that water levels within the moat can be successfully managed and maintained through drainage design and the project includes a sophisticate response that ensures that moat water levels will be subject to the same water inputs as they are at present.

S4 Potential impacts upon the settings of designated heritage assets have been considered in accordance with Historic England guidance: *Historic Environment Good Practice Advice in Planning Note 3: The Setting of Heritage Assets* (HE 2017 Second Edition) concluding that the site only forms a part of the setting of the scheduled monument, *Moated site at Sneedham's Green, 220m north east of Green Farm* (**1019399**) which is located within the site, and no other heritage assets.

S5 In summary, the assessment concludes that the proposed development, in its current iteration, will change the setting of the monument resulting in both negative and positive effects and identifies, overall, only a very low degree of harm to its significance. This harm would be at the lower end of the spectrum of 'less than substantial harm' and, in accordance with Paragraph 196 of National Planning Policy Framework (NPPF, DCLG, 2019), should be '*weighed against the public benefits of the proposal including, where appropriate, securing its optimum viable use.'*

S6 There is considered to be a moderate potential for a small part of the site to contain buried archaeological remains of low or moderate significance dating to the Late Iron Age or Roman period remains and the medieval period. However, the desk-based assessment, geotechnical data, geophysical survey and trial trenching has identified that, in the late 1960s early 1970s, the ground surface across at least c. 90% of the site, including the scheduled monument, was disturbed during the construction of the M5.

S7 This activity destroyed any upstanding archaeological features in the site and probably also resulted in at least the partial destruction of any previously unrecorded buried archaeological remains, in all but perhaps the north-western edge of the site. As such, it is considered that there is only a low potential for any well-preserved archaeological remains to survive in the site.

S8 Development design would use piled foundations and thus should archaeological remains be present in the site, impact would be limited to the footprint of piles aside from in the north-western part of the site where made ground is of less thickness or not present at all. As such a moderate potential for harm to unrecorded buried archaeological remains is assessed.

S9 In conclusion, the assessment has not identified any reason why the development as proposed would conflict with historic environment legislation or planning policy and it is anticipated that the proposals will be looked upon favourably regarding the historic environment.

Section 1
Introduction

1.1 This report has been prepared by the Environmental Dimension Partnership Ltd (EDP), on behalf of Edward Ware Homes and Bromford Developments Ltd, to inform planning proposals for a residential development on land at Snow Capel Farm, Matson, Gloucester.

1.2 The first aim of this assessment is to consider the available historical and archaeological resources for the site and to establish its likely potential in accordance with the requirements of the NPPF and local planning policy.

1.3 The second aim of this assessment is to identify and assess possible changes to the settings of designated heritage assets as a result of the proposed development, and to determine whether, and to what extent, those changes will affect their heritage significance.

1.4 In accordance good practice and guidance, desktop sources have been augmented through the completion of walkover surveys, undertaken in February 2017 and December 2020.

Location, Boundaries and Current Land Use

1.5 The application site is located on the southern outskirts of the city of Gloucester, the centre of which lies c. 4km to the north-west. The settlement at Matson is located c. 1km to the north. The site measures c. 8 hectares (ha) in area and is centred on National Grid Reference (NGR) 385116 214169 (**Plan EDP 1**).

1.6 The site boundaries are defined by the M5 motorway to the south-east, farmland to the north-east and by a hedgerow and stream, The Sud Brook, beyond which is small settlement of the edge of a grassed common at Sneedham's Green to the west. The site consists of a single field of pasture is enclosed by dense mature hedgerows on the south, west and east sides and a thin hedgerow on the north side.

1.7 The site's boundary to the north-east is against a single adjacent rectangular field and further farmland that is a consented development site, Land South of Winneycroft Farm (with reserved matters consented in October 2018; 18/01141/REM). The rectangular field comprises grassed agricultural land and, whilst presently occupied by further agricultural fields, the Winneycroft Farm site will become a housing development with the part adjacent to the site being converted to sports pitches with related infrastructure.

1.8 The whole site consists of a single field of pasture currently in use for grazing animals. Located roughly west of centre is a fenced off area containing a large C-shaped pond and related scrub vegetation. This pond, and the area partly enclosed by it, is part of a former moat related to the Scheduled Monument *Moated site at Sneedham's Green, 220m*

north east of Green Farm (NHLE **1019399**). The boundary of the scheduled monument is illustrated on **Plan EDP 1**.

Topography and Geology

1.9 The land at the site slopes gently to the west, with a high point of c. 60m above Ordnance Datum (aOD) on the eastern boundary and a low point of c. 55m aOD in the north-west corner.

1.10 The British Geological Survey records the underlying solid geology at the application site as being mudstone of the Blue Lias Formation and Charmouth Formation.

1.11 No superficial deposits are recorded across the site; however much of the site is covered by a layer of made ground deposited during the construction of the M5 motorway.

1.12 Whilst the presence of the made ground layer at the site is apparent from aerial photographs, LiDAR data, topographic survey and observations made during the site visit (which are discussed in **Section 4**), geotechnical evidence for the made ground is apparent in borehole records.

1.13 Boreholes have been dug at the site as part of the geotechnical investigations. This has comprised two phases, in May 2017 (Integrale) and November 2017 (T and P) which also included some trial pits. Further boreholes were dug in March 2021.

1.14 The borehole records indicate a layer of made ground across all parts of the site that were subject to borehole survey. The layer is situated beneath topsoil and generally comprises two deposits of re-deposited natural soils comprising firm to stiff, bluish grey, mottled, orangish brown gravelly clay layered above soft, firm and stiff dark grey clay with organic material. The material varies in its basal depth between 0.3 and 4.6 m Below ground Level (BGL). The records (and the appearance of the landform) indicates that the deposit is thickest towards the eastern end of the site and tappers out to the west, with the least deposit in the north-west corner.

1.15 The site has been subject to a limited archaeological evaluation (Headland Archaeology, 2020 - details in **Section 4** below). This comprised three trenches all of which also identified made ground deposits equivalent to those identified in the geotechnical work.

1.16 The geotechnical work also identified a possible buried topsoil deposit comprising dark brown and black clay in some of the boreholes. This deposit was also located in some of the trial trenches, the evidence suggesting that this layer, if representing a buried topsoil remnant, is only present in patches across the site, suggesting partial removal of topsoil when the M5 was constructed.

1.17 The geotechnical works and trial trenches indicate that the ground surface (topsoil) at the site was probably partially removed during the construction of the M5 motorway including the loss of surface features such as earthworks and field boundaries. The trenching targeted a former field boundary ditch finding only a disturbed, dark-brown area of clay and part of a tree in its location, suggesting that the ditch and boundary had been graded and backfilled as part of this operation, as others across the site are likely to have been. The majority of the site was then used for soil deposition which probably comprises arisings from the adjacent section of the motorway. It is possible that the scouring of the ground surface and partial removal of topsoil resulted from the use of bulldozers to grade and then form and compact the surface of this material creating the present landform at the site.

1.18 The made ground within the site and the impact of the M5 works is discussed below in **Section 4** in relation to the site's archaeological potential.

Proposed Development

1.19 The proposed development is for a residential led scheme with associated access roads, landscaping and infrastructure. The Proposed Site Plan is included at **Appendix EDP 1**.

1.20 The design has been influenced by the archaeological assessment and settings assessment presented in this current report as well as the results of the Water Environment Assessment (JBA, 2021). The proposal includes an open area around the Scheduled Monument with the moated remains at the centre of this area. This area is open to the west to maintain a visual link with the historically related Sneedham's Green.

Consultation

1.21 As an aspect of work carried out to promote the site for inclusion within the Joint Core Strategy (JCS; coordinated by Gloucester City Council in tandem with Tewkesbury Borough Council and Cheltenham Borough Council and adopted on 11 December 2017), EDP consulted with Historic England regarding the appropriate approach to be employed in respect of the scheduled monument located within the site. The monument was highlighted by the Council's evidence base for the JCS as warranting and needing improved management but, that the presence of the monument means that the site is inappropriate to allocate for development.

1.22 The consultation process took place in two phases (spring-summer 2017 and autumn 2017) and the most relevant correspondence from the second phase of consultation with Historic England (HE) is reproduced here at **Appendix EDP 2**. This comprises an exchange of emails and letters with Melanie Barge, Inspector of Ancient Monuments at Historic England, between 05 September and 24 November 2017 and where the contribution that the existing setting of the scheduled monument makes to its heritage significance was the main area of debate. In this respect, HE expressed that '*housing close to and surrounding the moated area would in our opinion cause harm to the*

significance of the monument, by removing the connection with its rural landscape and setting'. In this respect, HE stated that they would not support the proposal in its iteration at that time.

1.23 A meeting was held with Andrew Armstrong, the Gloucester City Archaeologist, in September 2020. At this meeting it was requested that any application would have to be accompanied by a Water Environment Assessment in accordance with Historic England's guidance *Preserving Archaeological Remains Appendix 3 – Water Environment Assessment Techniques* (2016). An archaeological evaluation of the site was also requested as well as evidence to demonstrate that the site no longer contains any archaeological earthworks. A limited evaluation was carried out in December 2020 which tested the site's disturbance as well as the thickness of made ground (detailed in **Section 4**).

1.24 Once the Water Environment Assessment and archaeological evaluation were completed, a protracted discussion via email was carried out regarding whether the development proposals would be likely to affect the moat's water supply mechanism and therefore risk impacting upon any waterlogged remains located within it. These emails are included at **Appendix EDP 2**. Whilst a drainage system has been designed which intends to maintain moat water levels the Gloucester City Archaeologist and Historic England have insisted on further geoarchaeological information on the moat ditch fills so as to be able to understand the nature and significance of the moat deposits.

1.25 In January 2022 a Written Scheme of Investigation was agreed with the Gloucester City Archaeologist (ARCA, 2021) setting out a programme of geoarchaeological work. Once completed a report on this survey will be submitted as additional information in support of the application.

Section 2
Legislation and Planning Guidance

2.1 The following section summarises the key legislative and planning policy context, relating to the proposed development of the site, at both national and local levels.

Current Legislation

2.2 In terms of '*effects on the historic environment'*, the following paragraphs summarise the principal legislative instruments and planning policy framework.

2.3 The relevant legislation concerning the treatment of scheduled monuments is the *Ancient Monuments and Archaeological Areas Act 1979* (HMSO 1979). This act details the designation, care, and management of scheduled monuments, as well as detailing the procedures needed to obtain permission for works which would directly impact upon their preservation. The act does not confer any statutory protection on the setting of scheduled monuments although this is considered as a policy matter in Paragraph 193 of the NPPF.

2.4 Sections 66(1) and 72(1) of the *Planning (Listed Buildings and Conservation Areas) Act 1990* set out the duties of Local Planning Authorities in respect of the treatment of listed buildings and conservation areas through the planning process.

2.5 Section 66(1) of the 1990 Act sets out the statutory duty of the decision-maker, where proposed development would affect a listed building or its setting.

2.6 The '*special regard'* duty of the 1990 Act has been tested in the Courts and confirmed to require that '*considerable importance and weight*' is afforded by the decision maker to the desirability of preserving a listed building along with its setting. The relevant judgement is referenced as Barnwell Manor Wind Energy Ltd v East Northants DC, English Heritage and National Trust [2014] EWCA Civ 137.

2.7 However, it must be recognised that Section 66(1) of the 1990 Act does not identify that the local authority or the Secretary of State *must* preserve a listed building or its setting; and neither does it indicate that a development that does not preserve them is unacceptable and should therefore be refused.

2.8 This point is made very clearly in Paragraph 54 of the High Court judgement in respect of *Forest of Dean DC v Secretary of State for Communities and Local Government [2013] EWHC 4052 (Admin)*, which sets out that:

'*...Section 66 (1) did not oblige the inspector to reject the proposal because he found it would cause some harm to the setting of the listed buildings. The duty is directed to 'the desirability of preserving' the setting of listed buildings. One sees there the basic purpose of the 'special regard' duty. It does not rule out acceptable change. It gives the decision-maker an extra task to perform, which is to judge whether the change proposed is*

acceptable. But it does not prescribe the outcome. It does not dictate the refusal of planning permission if the proposed development is found likely to alter or even to harm the setting of a listed building.'

2.9 In other words, it is up to the decision maker (such as a local authority) to assess whether the proposal which is before them would result in '*acceptable change*'. However, whilst this is the case, the decision maker does need to give '*considerable importance and weight*' to the desirability of preserving a listed building or its setting (as per the Barnwell Manor judgement outlined above).

2.10 Paragraph 200 of the NPPF transposes Section 66(1) and Section 72(1) of the 1990 Act into national planning policy.

2.11 The balancing exercise to be performed – between the harm arising from a proposal and the benefits which would accrue from its implementation – is then subsequently presented in Paragraphs 201 and 202 of the NPPF.

National Planning Policy

2.12 The revised NPPF was published in 2021 and Section 16 sets out the government's approach to the conservation and management of the historic environment, including both listed buildings and conservation areas, through the planning process. The opening paragraph, 189 recognises that heritage assets are an irreplaceable resource, and should be conserved in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life of existing and future generations.

2.13 Paragraph 194 concerns planning applications, stating that:

'In determining applications, local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance. As a minimum the relevant historic environment record should have been consulted and the heritage assets assessed using appropriate expertise where necessary. Where a site on which development is proposed includes, or has the potential to include, heritage assets with archaeological interest, local planning authorities should require developers to submit an appropriate desk-based assessment and, where necessary, a field evaluation.'

2.14 Paragraph 199 considers the weighting given within the planning decision with regard to impacts on designated heritage assets, stating that:

'When considering the impact of a proposed development on the significance of a designated heritage asset, great weight should be given to the asset's conservation (and the more important the asset, the greater the weight should be). This is irrespective of

whether any potential harm amounts to substantial harm, total loss or less than substantial harm to its significance.'

2.15 Paragraph 200 considers the level of harmful effects on designated heritage assets and states that:

'Any harm to, or loss of, the significance of a designated heritage asset (from its alteration or destruction, or from development within its setting), should require clear and convincing justification. Substantial harm to or loss of:

a) grade II listed buildings, or grade II registered parks or gardens, should be exceptional; and

b) assets of the highest significance, notably scheduled monuments, protected wreck sites, registered battlefields, grade I and II listed buildings, grade I and II* registered parks and gardens, and World Heritage Sites, should be wholly exceptional.'*

2.16 With regard to the decision making process, paragraphs 201 and 202 are of relevance. Paragraph 201 states that:

'Where a proposed development will lead to substantial harm to (or total loss of significance of) a designated heritage asset, local planning authorities should refuse consent, unless it can be demonstrated that the substantial harm or total loss is necessary to achieve substantial public benefits that outweigh that harm or loss, or all of the following apply:

a) the nature of the heritage asset prevents all reasonable uses of the site;

b) no viable use of the heritage asset itself can be found in the medium term through appropriate marketing that will enable its conservation;

c) conservation by grant-funding or some form of not for profit, charitable or public ownership is demonstrably not possible; and

d) the harm or loss is outweighed by the benefit of bringing the site back into use.'

2.17 Paragraph 202 states that: *'Where a development proposal will lead to less than substantial harm to the significance of a designated heritage asset, this harm should be weighed against the public benefits of the proposal including, where appropriate, securing its optimum viable use'.*

2.18 The threshold between substantial and less than substantial harm has been clarified in the courts. Whilst the judgement relates specifically to the impact of development proposals on a listed building, Paragraphs 24 and 25 of *Bedford BC v Secretary of State for Communities and Local Government [2013] EWHC 2847* remain of relevance here in the way they outline the assessment of 'harm' for heritage assets:

'What the inspector was saying was that for harm to be substantial, the impact on significance was required to be serious such that very much, if not all, of the significance was drained away.

Plainly in the context of physical harm, this would apply in the case of demolition or destruction, being a case of total loss. It would also apply to a case of serious damage to the structure of the building. In the context of non-physical or indirect harm, the yardstick was effectively the same. One was looking for an impact which would have such a serious impact on the significance of the asset that its significance was either vitiated altogether [i.e. destroyed] or very much reduced.'

2.19 In other words, for the 'harm' to be 'substantial' – and therefore require consideration against the more stringent requirements of Paragraph 201 of the NPPF compared with Paragraph 202; the proposal would need to result in the asset's significance either being *'vitiated altogether or very much reduced'*. Quite evidently, this represents a very high threshold to be reached.

2.20 With regard to non-designated heritage assets, Paragraph 203 states that:

'The effect of an application on the significance of a non-designated heritage asset should be taken into account in determining the application. In weighing applications that directly or indirectly affect non-designated heritage assets, a balanced judgement will be required having regard to the scale of any harm or loss and the significance of the heritage asset.'

Local Planning Policy

2.21 Local planning policy within Gloucester City comprises the adopted Local Plan made up of the Joint Core Strategy (adopted in 2017 between Gloucester City Council, Cheltenham Borough Council and Tewkesbury Borough Council) and the saved policies of the Gloucester Local Plan (1983). Local planning decision making also refers to the Second Stage Deposit Local Plan 2002 which was adopted for development control purposes in 2002. The policies of the Second Stage Deposit Local Plan have been reviewed following the adoption of the Joint Core Strategy and the NPPF with certain policies deemed relevant and other partially relevant.

2.22 This document will be replaced by the emerging Gloucester City Plan. The City Plan was submitted to the Planning Inspectorate in November 2020 and is not yet adopted.

2.23 The historic environment is considered in *Chapter 4 – Built Environment*, within the Second Stage Deposit Local Plan. However, none of these policies are listed as relevant or partially relevant.

2.24 Policy SD8 of the Joint Core Strategy is concerned with the historic environment, within the three areas covered by the Plan. It states:

Policy SD8: Historic Environment

'1. The built, natural and cultural heritage of Gloucester City, Cheltenham town, Tewkesbury town, smaller historic settlements and the wider countryside will continue to be valued and promoted for their important contribution to local identity, quality of life and the economy;

2. Development should make a positive contribution to local character and distinctiveness, having regard to valued and distinctive elements of the historic environment;

3. Designated and undesignated heritage assets and their settings will be conserved and enhanced as appropriate to their significance, and for their important contribution to local character, distinctiveness and sense of place. Consideration will also be given to the contribution made by heritage assets to supporting sustainable communities and the local economy. Development should aim to sustain and enhance the significance of heritage assets and put them to viable uses consistent with their conservation whilst improving accessibility where appropriate;

4. Proposals that will secure the future conservation and maintenance of heritage assets and their settings that are at risk through neglect, decay or other threats will be encouraged. Proposals that will bring vacant or derelict heritage assets back into appropriate use will also be encouraged; and

5. Development proposals at Strategic Allocations must have regard to the findings and recommendations of the JCS Historic Environment Assessment (or any subsequent revision) demonstrating that the potential impacts on heritage assets and appropriate mitigation measures have been addressed.'

2.25 Within the emerging City Plan, in its current draft section E is concerned with the historic environment. Of relevance to the current application are Polices E1 and E2 although at present the City Plan is not adopted and these polices carry no formal weight.

'Policy E1: Historic environment development management

The City Council will support development that conserves the significance of designated and non-designated heritage assets including archaeological remains and locally listed buildings.

Great weight will be given to the conservation of the City's heritage assets. New development affecting a designated or non-designated heritage asset or its setting, including alterations and additions, will be expected to make a positive contribution to its character, appearance and significance.

Proposals affecting designated and undesignated heritage assets and their settings should demonstrate that they meet the following guidance:

- *The use of traditional, local materials and adherence to local building techniques and details, where appropriate;*

- *The conservation of features and elements that contribute to the special interest of a heritage asset, including structures forming part of the curtilage, in particular the structural integrity and historic plan-form of listed buildings and historic building groups;*

- *Appropriate use of the heritage asset that is compatible with the conservation of its significance;*

- *The location, form, scale, massing, density, height, layout, roofscape, landscaping, use and external appearance of developments within conservation areas should conserve and enhance the special historic and architectural interest of the conservation area;*

- *Development involving substantial harm to or loss of designated heritage assets will only be granted in exceptional circumstances (wholly exceptional circumstances for designated assets of the highest significance);*

- *Proposals affecting a non-designated heritage asset (including where identified through the planning process) should not harm its special interest and development involving substantial harm will be resisted unless significant public benefit has been clearly and convincingly demonstrated in accordance with the requirements of the NPPF;*

- *When determining applications, nationally important archaeological remains which are currently non-designated will be considered subject to polices applying to Scheduled Monuments;*

- *The condition of an historic building resulting from deliberate damage and neglect will not -be taken into account in any decision; and*

- *The City Council will support applications that make provision for the preservation in situ of archaeological remains.*

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Policy E2: Recording and advancing understanding of heritage assets

Where development will result in the loss (wholly or in part) of a heritage asset, the City Council will require developers to record and advance understanding of the significance of that asset prior to or during development. The appropriate form of mitigation employed will be dependent on the nature of the impact but may include:

- *Historic building recording;*

- *Archaeological watching brief;*

- *Archaeological evaluation;*
- *Archaeological excavation; and*
- *Preservation in situ by design.'*

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Section 3
Methodology

Assessment and Data Collection Methodology

3.1 This report has been produced in accordance with the *Standard and Guidance for Historic Environment Desk-Based Assessment* issued by the Chartered Institute for Archaeologists (ClfA, 2020). These guidelines provide a national standard for the completion of desk-based assessments.

3.2 The assessment involved consultation of readily available archaeological and historical information from documentary and cartographic sources. The major repositories of information comprised:

- Information held by the Gloucester City Historic Environment Record (HER) on known archaeological sites, monuments and findspots, within 500m of the site;
- Maps and documents held online;
- The National Heritage List for England curated by Historic England;
- LiDAR data acquired from the Environment Agency (data.gov.uk);
- Aerial photographs held by the Historic England Archive (HEA); and
- Records made during site visits in February 2017 and December 2020.

3.3 Under normal circumstances the report would have also considered any relevant documentary sources (such as historic maps) held by the Gloucestershire Archives. However, for the duration of the more recent phase of research the archive has been closed due to Covid-19 restrictions and therefore has not been accessible. If necessary, or possible, it is envisaged that this archive could be consulted in the future when it reopens.

3.4 This report provides a synthesis of relevant information for the site derived from a search area extending up to 500m from its boundary, hereafter known as the 'study area', to allow for additional contextual information regarding its archaeological interest and/or potential to be gathered.

3.5 The information gathered from the repositories and sources identified above was checked and augmented through the completion of two site walkovers. The walkovers considered the nature and significance of known and/or potential archaeological assets within the site, identified visible historic features and assessed possible factors which may affect the survival or condition of known or potential assets.

3.6 This report thereafter concludes with an assessment of the site's likely archaeological potential, made with regard to current best practice guidelines.

Setting Assessment

3.7 In addition, this report also considers the nature and significance of any effects arising beyond the boundary of the site, i.e. in terms of the settings of heritage assets, as defined in Annex 2 of the NPPF.

3.8 In that regard, the site walkover considered, where appropriate, the contribution (if any) made by the land within the site to the settings of heritage assets situated within its wider zone of influence.

3.9 The setting assessment process employed current Historic England guidance which is set out in: *Historic Environment Good Practice Advice in Planning Note 3: The Setting of Heritage Assets* (HE 2017 Second Edition). This provides best practice guidance for the identification and assessment of potential setting issues in the historic environment.

3.10 When assessing the impact of proposals on heritage assets, it is not a question of whether there would be a direct physical impact on that asset, but instead whether change within its '*setting*' would lead to a loss of '*significance*'.

3.11 In simple terms, setting is defined as '*the surroundings in which a heritage asset is experienced*'. It must be recognised from the outset that '*setting*' is not a heritage asset and cannot itself be harmed. Its importance relates to the contribution it makes to the significance of the designated heritage asset.

3.12 Historic England guidance identifies that '*change to heritage assets is inevitable, but it is only harmful when significance is damaged*' (HE, 2017).

3.13 In that regard, '*significance*' is defined in Annex 2 of the NPPF as '*the value of a heritage asset to this and future generations because of its heritage interest. That interest may be archaeological, architectural, artistic or historic*'.

3.14 As such, when assessing the impact of proposals on heritage assets beyond the boundary of a development site, it is not a question of whether setting would be affected, but rather a question of whether change within an asset's '*setting*' would lead to a loss of '*significance*' based on the above 'heritage interest' as defined in the NPPF.

3.15 Set within this context, where the objective is to determine the impact of proposals on heritage assets beyond the boundary of a development site, it is necessary to first define the significance of the asset in question - and the contribution made to that significance by its '*setting*', in order to establish whether there would be a loss, and therefore harm. The guidance identifies that change within a heritage asset's setting need not necessarily cause harm to that asset - it can be positive, negative or neutral.

3.16 In light of the above, the assessment of potential setting effects, arising from the proposed scheme, has followed the guidance set out in *Historic Environment Good Practice Advice in Planning Note 3: The Setting of Heritage Assets* published by Historic England in 2017. This guidance observes that: '*The NPPF makes it clear that the extent of the setting of a heritage asset 'is not fixed and may change as the asset and its surroundings evolve',* and that *'Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate the significance or may be neutral*' (HE, 2017).

3.17 The guidance states that the importance of setting '*lies in what it contributes to the significance of the heritage asset or to the ability to appreciate that significance*'.

3.18 It goes on to note:

'*All heritage assets have significance, some of which have particular significance and are designated. The contribution made by their setting to their significance also varies. Although many settings may be enhanced by development, not all settings have the same capacity to accommodate change without harm to the significance of the heritage asset or the ability to appreciate it*.'

3.19 Whilst identifying that elements of an asset's setting can make an important contribution to its significance, the guidance states that: '*Setting is not itself a heritage asset, nor a heritage designation, although land comprising a setting may itself be designated*'. It continues by adding that: '*Conserving or enhancing heritage assets by taking their settings into account need not prevent change; indeed change may be positive…*'.

3.20 On a practical level, the HE guidance (2017) identifies an approach to assessing setting in relation to development management which is based on a five-step procedure; i.e.:

- **Step 1**: Identify which heritage assets and their settings are affected;
- **Step 2**: Assess the degree to which these settings make a contribution to the significance of the heritage asset(s) or allow significance to be appreciated;
- **Step 3**: Assess the effects of the proposed development, whether beneficial or harmful, on that significance or the ability to appreciate it;
- **Step 4**: Explore ways of maximising enhancement and avoid or minimise harm; and
- **Step 5**: Make and document the decision and monitor outcomes.

3.21 As far as Step 2 is concerned, the guidance makes the following observations:

'*The second stage of any analysis is to assess whether the setting of a heritage asset makes a contribution to its significance and the extent and/or nature of that*

contribution…this assessment should first address the key attributes of the heritage asset itself and then consider:

- *The physical surroundings of the asset, including its relationship with other heritage assets;*
- *The asset's intangible associations with its surroundings, and patterns of use;*
- *The contribution made by noises, smells, etc to significance; and*
- *The way views allow the significance of the asset to be appreciated.*'

3.22 Thereafter, the guidance notes that: '*This assessment of the contribution to significance made by setting will provide the baseline for establishing the effects of a proposed development on significance, as set out in 'Step 3' below*'.

3.23 Having established the baseline, the following guidance is provided in respect of an assessment of the effect upon '*setting*'; i.e.:

'In general…the assessment should address the attributes of the proposed development in terms of its:

- *Location and siting;*
- *Form and appearance;*
- *Wider effects; and*
- *Permanence.'*

3.24 In light of the above, the assessment of potential setting effects, employed in the preparation of this baseline report, focused on Steps 1, 2 and 3. The assessment therefore concentrated on the following three main areas:

- Identifying those heritage assets that could potentially be affected by the proposed scheme (Step 1);
- Defining the degree to which the settings of these heritage assets make a contribution to their significance or allow their significance to be appreciated (Step 2);
- Assessing whether the site forms a part of their setting, and if so, whether it also contributes to their significance (part of Step 2); and

- Assessing whether the site's development as proposed is likely to result in a change to that contribution, such that the development is either beneficial or harmful to the significance of the asset in question (Step 3).

3.25 Step 4 is considered in so much as the proposed development includes built-in design mitigation intended to respond to the setting of heritage assets and thus reduce or negate any harmful impact upon them.

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Section 4
Existing Information

Introduction

4.1 The application site contains a scheduled monument, *Moated site at Sneedham's Green, 220m north east of Green Farm* (shown on **Plan EDP 1**). Planning policy dictates that there would be a presumption in favour of the physical retention or preservation *in situ* of the monument's designated area and against development of the land that it occupies within the site. The monument is described below.

4.2 The site does not contain any listed buildings, historic parks and gardens or registered battlefields and, apart from the scheduled monument noted above, there are no designated heritage assets of any kind within the 500m study area.

4.3 The Gloucester HER contains three records within the site (one of which refers to the moated site). Numerous records are located within the 500m study area, which are discussed in context within the period-based sections in the section below. All HER records within the site and study area are shown on **Plan EDP 2**.

Designated Heritage Assets

Scheduled Monument: Moated site at Sneedham's Green, 220m north east of Green Farm (1019399)

4.4 The monument consists of the known extent of a moated site dating from the medieval period; a sub-rectangular or trapezoidal moat enclosing an island. Only the northern side and parts of the western and eastern sides of the moat are extant, enclosing an area c. 66m by 42m that is open on the south side (**Images EDP 1** and **2**).

4.5 The scheduling extends beyond the extant part of the monument to the south, encompassing the former entirety of the moat and a 2m buffer around it. Evidence derived from historic mapping and aerial photographs (discussed fully in the relevant sections below) suggests that the original site measured approximately 66m by 80m with a causewayed entrance on the east side and possibly another entrance on the west side. Historic maps (i.e. **Plan EDP 3**) illustrate that prior to 1960s the southern arm of the moat was incorporated into a field boundary ditch which crossed the site from east to west. This ditch was probably a later feature of the post-medieval agricultural landscape.

4.6 The above-ground, field boundary bank and ditch/former moat of the southern extent of the monument were covered over with redeposited spoil and probably damaged during the construction of the M5 motorway in the late 1960s/early 1970s. It is possible that this work also affected and disturbed the moated site's interior. The 2020 trial trenching demonstrated that the remains of the field boundary ditch to the immediate west of the scheduled monument have been heavily disturbed by this activity with a total loss of the

cut form of the feature, and with its fill deposits mixed into the surrounding subsoils and redeposited soils that were laid down across it. This level of disturbance suggests that the southern ditch of the moat and any associated archaeological remains, that are now buried, were probably equally damaged.

4.7 The extant moat is c. 14m at its widest point, c. 8m at its narrowest and, at present is up to 0.9m deep (as measured in a depth survey carried out by JBA in 2021). It is water-filled and may represent a source of waterlogged archaeological deposits. Waterlogged deposits have the potential to include materials that would otherwise have decayed such as wood or textiles and therefore potentially have a high degree of archaeological significance.

4.8 A Water Environment Assessment has been conducted in line with Historic England Guidance (Preserving Archaeological Remains – Appendix 3 Water Environment Assessment techniques, HE, 2016). This study produced a Water Environment Baseline for the moat concluding that the most likely water supply mechanism to the moat is a combination of direct rainfall, surface runoff, and some shallow groundwater seepage/interflow. Anecdotal evidence suggests that the moat is water filled all year although the Water Environment Assessment did not identify conclusive evidence for the moat to be fed by a spring and its constituent water is demonstrably mostly comprised of run-off from the surrounding fields. As such, whilst the moat may well contain unrecorded waterlogged archaeological remains there is no evidence that its water levels are truly perennial, and it is possible that at times in its history it may have dried out. Episodes of drying would reduce the potential for the moat to contain well-preserved waterlogged material of high archaeological significance.

4.9 It is anticipated that the forthcoming programme of geoarchaeological work will provide conclusive evidence as to whether the deposits within the moat are archaeologically significant.

4.10 Notwithstanding the likelihood for 20th century disturbance, the archaeological potential of the interior of the moat is not known although the HER records stonework within it, suggesting the presence of buried building remains. A 19th century antiquarian author suggests that the moated site was the site of a manor house of the De Snedham family who are mentioned in the records of St Peter's Abbey, Gloucester in the 12th and 13th centuries AD (Bazeley, 1878) as well as in other medieval documents. It is presumed that the family gave their name to the nearby Sneedham's Green settlement to the west, a small hamlet on the edge of an area of Common land that may have originated as grazing land associated with the manor. The settlement is discussed further in the 'Medieval' section below.

4.11 The monument is located within the site and represents its greatest source of known archaeological potential. It is possible that additional archaeological remains might exist within the site, outside of the scheduled area, which are related to the moated site, such as extra-mural buildings, or other buried features. Evidence for such remains is potentially derived from aerial photographs and is discussed below.

4.12 The scheduled monument derives its significance primarily from its archaeological interest as defined by the extant moat, the deposits within it and any buried archaeological remains within the scheduled area that are related to the moated site. The monument also has a degree of historic interest as it illustrates the nature and appearance of the medieval landscape in the locality and is associated with the history of the De Sneedham family, the history of settlement at Sneedham and with the general history of the medieval aristocracy of Gloucester.

4.13 In accordance with Step 1 of the Historic England Settings Assessment Methodology (HE, 2015a), it is deemed likely that development of the site would result in change to the setting of the scheduled monument. As such the asset is identified for detailed setting assessment (Steps 2 – 4 of the Historic England methodology) which is discussed in **Section 5**.

Listed Buildings

4.14 There are no listed buildings located within 500m of the site boundary. The nearest listed building is the Grade II listed Thatch Cottage (NHLE: **1155001**), located c. 520m to the east. Another group of listed buildings are located at Winneycroft Farm, c. 600m to the north-east (NHLE: **1245086**, **1245087**, **1245088**).

4.15 All of these listed buildings are separated from the site by intervening fields bounded by hedgerows with Thatch Cottage also separated from the site by the M5 motorway and its tree-covered verges. Furthermore, following the development of Land at Winneycroft Farm the site would be separated from the listed building at the farm by modern houses. As such there is no visual link between the land at the site and any of these assets, and the site is not experienced from them or in conjunction with them.

4.16 The land at the site was historically part of the landholding associated with Snow Capel Farm, which lies to the south-west and so has no historical association with Winneycroft Farm or with any other listed buildings. Consequently, the land at the site makes no contribution to the significance of any listed buildings located within the wider countryside and these are not considered any further within this assessment.

Non-designated Heritage Assets

Records within the site

4.17 As noted above, one of the HER records within the site (HER: **425**) refers to the moated site that is a Scheduled Monument and described above.

4.18 One of the records refers to part of a wider record that records the survival of ridge and furrow earthworks across part of the locality including part of the site and adjacent fields (HER: **51203**). The record was derived from the analysis of aerial photography and LiDAR data. Such earthworks represent the remnants of field drainage systems that may date from the use of the land in the medieval period for open-field arable agriculture. Where

preserved, it is because the land later reverted to pastoral use and the earthworks were preserved within grassed fields.

4.19 According to the HER record, formerly such earthworks were recorded within the site both to the north-west and south of the moated site and may have been contemporary with the monument, reflecting its location within arable agricultural land in the hinterland of Gloucester. The earthworks were destroyed when the land was scoured, and spoil deposited across it during the construction of the M5 motorway in the late 1960s/early 1970s. The appearance of the earthworks and the later appearance of the field after their loss is illustrated in aerial photographs which are described in the relevant section below.

4.20 The third HER record relates to the extent of the geophysical survey that was carried out across the site in 2017 (GSB). The results of this survey are described in the relevant section below.

Paleolithic – Bronze Age (c. 1,000,000 – 800 BC)

4.21 There are no Palaeolithic–Bronze Age records on the Gloucester City HER within the site. A single record is located within the wider 500m radius study area.

4.22 In June 2014 an archaeological evaluation at Winneycroft Farm, Gloucester recorded a single piece of worked flint (HER **751**) found in an unstratified context. This find was undated and, on its own does not indicate the presence of an archaeological site.

4.23 Although it is likely that the locality was populated to a degree during these periods, the general lack of evidence suggests that either remains have not survived, have escaped detection or that populations were of a low density, and activity infrequent. Although the presence of remains from these periods occurring within the site cannot be ruled out, the lack of evidence in the study area suggests that the potential for remains is very low.

Iron Age - Roman (800BC – AD 410)

4.24 There are no Iron Age or Roman period records on the Gloucester City HER within the site, although a number of records have been recorded within the wider 500m radius study area.

4.25 A 'small quantity' of abraded Roman pot sherds were recorded from immediately adjacent to the site to the south-east at the foot of St Edmund's Hill (HER: **3822**). The pottery was found during the construction of the M5 motorway, and lead to an examination of the hillside above for any trace of settlement. This investigation did not identify any archaeological sites.

4.26 In June 2014 an archaeological evaluation at Winneycroft Farm (HER: **751**), across land to the immediate north-east of the site, recorded a series of buried infilled ditches and

pits containing pottery dating from the Late Iron Age and Roman periods. The archaeological features corresponded to a series of circular and rectangular anomalies previously identified by geophysical survey and have been interpreted as a small rural settlement site of the 1st and 2nd centuries AD consisting of a group of roundhouses associated with agricultural enclosures (HER: **752**). The settlement remains are located c. 40m from the north-eastern edge of the site.

4.27 The date range of the recorded pottery suggests that the settlement was contemporary with an increasingly large group of farmsteads known from the hinterland of Gloucester all of which were active in the 1st to 2nd centuries AD. However, based on pottery analysis, it remains undetermined whether the site was occupied from the late pre-Roman Iron Age or whether it was newly established in the immediate post-conquest period.

4.28 Residual Roman pottery was also recorded within the ditch fills of a group of medieval features (HER: 12908) recorded during an archaeological evaluation on land at Winneycroft Farm. Although part of the evaluated area is within the study area, the archaeological features were at the north end, c.640m from the site.

4.29 Roman period archaeological remains are common in the hinterland of Gloucester, which was a Roman *Colonia*. Given the frequency of finds in the locality and the recorded remains located 40m to the north-east, there is considered to be a moderate potential for Late Iron Age or Roman period remains to be present, as buried deposits within the site. Such remains would most likely consist of buried infilled ditches or pits, associated with agriculture, and would potentially be related to the farmstead identified to the north. Remains of this nature would be of low or moderate significance.

4.30 It should be considered that such remains, if present, would be buried beneath the deep deposit of made ground known to cover most of the site. It is also possible that archaeological features would have been disturbed by the scouring of the site that occurred when the land was degraded during the construction of the M5. Features found at Winneycroft Farm were between 0.2m and 0.5m BGL beneath topsoil and subsoil. Evidence from geotechnical work and trial trenching suggests that topsoil within the site is only partially preserved and therefore in areas where it was removed archaeological features, especially those at a shallow depth may have been disturbed or destroyed.

Early Medieval (AD 410-1066)

4.31 There are no early medieval records on the Gloucester City HER within the site or within the 500m radius study area.

4.32 The site was situated within the medieval manor of Sneedham. Sneedham was located within a complex boundary area between the parishes of Upton St Leonard and Matson. Neither Sneedham or Matson are mentioned in documentary sources before the 12th and 13th centuries and so are likely to have been established after the Norman Conquest. Upton St Leonards however was mentioned in the Domesday Survey, suggesting that the parish, as a territory, dated from the Anglo-Saxon period.

4.33 It is not known what the land at the site would have been used for during the early-medieval period. There is no evidence that it was in the immediate hinterland of any settlement and it may have been waste or woodland prior to the establishment of the Sneedham manor in the medieval period. Given the lack of evidence for archaeological remains from the early medieval period in the study area there is a very low possibility of remains being present within the site.

Medieval (AD 1066-1485)

4.34 There are two records from the medieval period recorded on the Gloucester City HER within the site, and five of this date are recorded within the 500m radius study area.

4.35 The moat and former ridge and furrow earthworks located within the site have been discussed above.

4.36 As previously noted, the moated site is thought to have been occupied by a manor house, from the 12th and 13th centuries with documentary evidence suggesting that it was the residence of the Norman nobles the 'De Sneedhams' who gave their name of the manor of Sneedham. Based on sources considered in this assessment, the history of the manor is not well understood. It probably included the present common land at Sneedham's Green, located to the west of the site.

4.37 Whilst the Green is not of a definitive medieval origin it is depicted on the Tithe Map of Upton St Leonard's Parish dating from 1840 (**Plan EDP 3**) with several farms and other dwellings set around it and on an 'island' of land at its centre, comprising the small manorial hamlet of Sneedham's Green. The Green appears to have formed at the confluence of four local routes between villages and was probably used for grazing animals being driven along these routes, forming a central feature with the small settlement.

4.38 The moated manor house is adjacent to the Green and it is likely that the settlement developed in the vicinity of the manor, probably as a group of farmsteads and cottages that served it and farmed the land around it. It is probable therefore that the 19th century settlement pattern of scattered dwellings around the edge of the Green, with the former manor house to the east, evolved from a similar settlement pattern established in the medieval period, albeit within a more open landscape defined by broad open agricultural fields. It is not currently known whether there are medieval remains located at or around the Green and the area has not been subject to archaeological investigation.

4.39 The two archaeological trenched evaluations at Winneycroft Farm, as mentioned above, both recorded buried remains of a medieval date. The evaluation trenches to the immediate north of the site (HER **751**) recorded buried infilled furrows, evidence of medieval arable agriculture across this area.

4.40 The evaluation trenches carried out across the north part of Winneycroft Farm recorded, at the northern end of the evaluated area, buried infilled ditches and pits thought to

represent the remains of a small medieval settlement (HER: **796**) c. 640m to the north-east from the site, reflecting a pre-cursor to the later farm at Winneycroft. The features contained pottery, animal bone and nails and were dated through the analysis of these finds to the medieval period.

4.41 Another archaeological evaluation at Gloucester Golf Club, c. 320m to the north-west of the site recorded buried archaeological remains related to a ditched enclosure (HER: **12647**), dated to the medieval period, within a former extent of ridge and furrow earthworks (HER **50559**).

4.42 Part of a medieval trackway is located within the study area that was possibly aligned on the settlement remains at Winneycroft Farm (HER: **48535**). The track has been partially obscured by the M5 motorway but traces of it are present as archaeological earthworks in a field to the east of the motorway. There is no indication that the track crossed the site or related to any other track across the site.

4.43 Cutting across the far eastern extent of the study area are the remains of a medieval road (HER: **9665**). The road is projected between Gloucester and Cirencester and in places consists of an extant hollow way, although much of its route is obscured by modern roads. The section within the study area follows the route of a modern road.

4.44 The HER also maps extensive areas of former ridge and furrow earthworks across much of the landscape surrounding the site (HER: **50112**, **51203** and **50559**). These areas are based on evidence (where available) from archaeological investigation as well as historic aerial photographs. In only a few areas are ridge and furrow earthworks still extant features within fields. The presence of these remains suggests that the site was located within an area that was, in the medieval period, dominated by arable agriculture within large open fields.

4.45 Due to the presence of the moated manor and, due to evidence for the site having formerly contained ridge and furrow earthworks, there is a moderate potential that the site contains related, unrecorded buried medieval archaeological features. Such remains would almost certainly relate to medieval agricultural activity and possibly remains of settlement activity associated with the manor. These could potentially be of moderate significance, although are most likely to comprise agricultural remains (such as infilled furrows) of low or very low significance.

4.46 As for Iron Age and Roman archaeology, medieval archaeological remains, if present, would be buried beneath the deep deposit of made ground known to cover most of the site. They would also be likely to have been subject to disturbance when the site was scoured during the construction of the M5 motorway and archaeological features, especially those at a shallow depth may have been disturbed or destroyed.

Post-Medieval (AD 1485 – 1837)

4.47 There are no records from the post-medieval period on the Gloucester City HER within the

site. Within the wider study area is a single post-medieval asset, a post-medieval ditch recorded during the 2014 evaluation at Winneycroft Farm (HER **751**).

4.48 The buried infilled ditch was located c.220m north of the site and was found to correlate with a ditch shown on the 1841 Tithe Map of Upton St Leonards.

4.49 During the post-medieval period, it is not known when the moated site went out of use, although it is apparent that this happened before the mid-19th century as it is not depicted on the 1840 tithe map, with the southern part of the moat incorporated into a field boundary. Likewise, it is not known if the settlement at Sneedham contracted or expanded during this period. It is assumed that, as there are no deserted settlement remains recorded at Sneedham, that the settlement remained of a similar size to that as depicted on the earliest maps dating from the mid-19th century, with a dispersed pattern of farms and cottages set around the green.

4.50 The site is known to contain the buried remains of ditched boundaries, that are apparent on historic maps. The archaeological evaluation targeted one of these known to have been adjoined to the southern part of the moat. As detailed below, it was found to be entirely disturbed and to have lost all of its cut form as an archaeological feature. It is expected that other post-medieval boundary ditches within the site are also similarly disturbed, having been infilled when the site was scoured prior to spoil deposition when the M5 was built. Such features would possess no remaining archaeological interest.

Victorian and Modern (AD 1837 - present)

4.51 There are no records from these two periods on the Gloucester City HER within the site. Within the 500m study area four assets are recorded that date from the modern period.

4.52 The study area appears relatively unchanged throughout the Victorian period, remaining predominantly agricultural and seemingly unaffected by industrialisation. The section below on Cartographic Sources describes the site and its hinterland with reference to historic maps produced during this period.

4.53 All of the records on the HER relate to the early – mid 20th century and are military in character. The earliest is a record of an early 20th century rifle range, The Gloucester Rifle Range, located c. 170 m to the south of the site (HER: **46617**). The range was operational between 1920 and 1926.

4.54 Three HER records relate to Second World War military activity. A military depot was located at Sneedham's Green (HER: **48391**). The depot occupied two sites, either side of Homestead Farm (which occupies the central 'island' on the green). Both sites were of a similar size and were occupied by Nissen type huts. The depots were thought to have been used as a dispersal or overflow site for either of two nearby military camps, RAF Quedgley or an army camp on Robin Wood Hill. Remains of the huts are notable, seen on aerial photographs as cropmarks on the green.

4.55 The other Second World War sites are both related to the defence of the city of Gloucester, which would have been a target for German bombing. A search light battery was located at Sneedham's Green, adjacent to Snow Capel Farm, c. 110 m south-west from the site (HER: **27069**).

4.56 The battery (no. 349 CL08 B2) is likely to have comprised a small ring-ditch to provide the crew with shelter during an air raid, a predictor emplacement for calculating the height and range of targets, a light anti-aircraft machine gun pit, a generator and hutted accommodation for the crew. The HER notes the earthwork remains of a circular ditch and a hut platform although these remains are now thought to have since been ploughed and probably no longer exist.

4.57 The final record relates to a Heavy Anti-Aircraft battery located on land at Croft Farm, c.450m to the south-east of the site, of which only a small part is located within the study area (HER: **43040**). The battery was a fairly large installation with a command centre (the extant remains of which are a Grade II listed building), a camp housing 400 troops and four, gun emplacements. The listed structure is located outside of the study area, c. 700 m from the site and would not be sensitive to the proposed development.

4.58 Although Second World War remains are present near the site there is no evidence to suggest that any of this activity extend to within it. As such there is very little potential for buried remain or other remains from this period occurring within the site.

Previous Archaeological Investigation

4.59 The following paragraphs provide a summary of the previous archaeological investigations recorded by the HER within the study area. HER Event records are reproduced on **Plan EDP 2**.

4.60 Of all of the HER records, 19 relate to archaeological events. Of these, 14 relate to either geophysical survey or intrusive archaeological investigations that might provide information relevant to the assessment of the site's archaeological potential. The other records all relate to non-intrusive activity such as desk-based assessment, building survey, field survey or conservation reports and thus are of little relevance to understanding the site's archaeological potential. These types of records are not considered any further.

4.61 The record located within the site (HER: **1274**), that relates to geophysical survey has been discussed already above.

4.62 Four of the records (HER: **751**, **745**, **742** and **10264**) relate to geophysical survey and two phases of archaeological evaluation that took place on land around Winneycroft Farm to the immediate north-east of the site. The aspects of this work that identified archaeological remains have been discussed within the period sections above.

4.63 Likewise, archaeological evaluation at Gloucester Golf Club (HER: **12646**), which identified medieval remains has also been discussed above.

4.64 Three of the records (HER: **33928**, **34284** and **50109**) relate to geophysical survey, archaeological evaluation and excavation that took place on land to the north and south of the M5 motorway as part of the Gloucester Gateway project. The area of investigation was at its closest point c. 490m to the south-west of the site. the excavations identified two rectilinear enclosure ditches and a trackway, all of Roman period date.

4.65 Four of the records relate to small scale archaeological works that did not record any archaeological remains. For example, a single trench evaluation (HER: **878**) carried out at Bazeley road in Matson, Watching briefs (HER **1232** and **1233**) at Hillview Cottage and The Villa, both at Sneedham's Green and, an archaeological evaluation (HER: **1234**) carried out at a small site on Matson Lane, c. 500m to the north-west of the site.

4.66 The archaeological work in the study area supports the assessment above that the site has a moderate potential to contain Roman period and medieval archaeological remains. As noted previously, it is possible that such remains might not survive given the treatment of the site when the M5 was constructed in the 1960s/1970s.

Cartographic Sources

4.67 The earliest available map to depict the site is the Tithe Map of Upton St Leonard's parish dated to 1840 (**Plan EDP 3**). The map shows the land at the site situated across three large, irregular fields. The moated site is not illustrated although, as part of the field boundary, the ditch that follows its southern part is. The field name of the field in the northern part of the site is given kin the Tithe Apportionment that accompanies the map as 'Day House Mead' a possible indication of the former manor house that would have once been in the field or possibly a reference to a dairy house having been present in this location.

4.68 The fields are irregular with some curved and right-angled boundaries. Coupled with the evidence for former ridge and furrow earthworks at the site, this suggests that the boundaries enclosed furlongs within a medieval open field.

4.69 The site is next depicted on the First Edition Ordnance Survey map of 1884 (**Plan EDP 3**). This map shows a similar field layout to the tithe map. It also shows the moated site in full, with an indication of an earthwork aspect to the southern return that is incorporated into the field boundary.

4.70 Later ordnance survey maps show a similar layout with little change at the site until the late 1960s/early 1970s when the M5 motorway was built. This period in the site's history is better documented by aerial photographs which are discussed below.

4.71 The historic maps consulted do not indicate the potential for any archaeological remains not otherwise known about from other sources.

Aerial Photographs and LiDAR

4.72 A total of 44 vertical and 7 oblique aerial photographs, covering the site and its immediate environs, were identified within the collection maintained by the Historic England Archive in Swindon. Extracts from two of these images are reproduced at **Plan EDP 6**.

4.73 The available images span the period from April 1946 to June 2008 and add detail to the land use and development sequence shown on historic maps.

4.74 The images from 1946 (**Plan EDP 6**) were taken with low light levels and pick out clearly earthwork features within the site that have since been destroyed. Ridge and furrow earthworks are clearly visible to the north, north-east and possibly to the west of the moat. The land to the south and east of the moat does not appear to have such earthworks although drainage ditches are present that do not have the same form and are probably much later.

4.75 Field boundary ditches are also present, some of which are lined with hedgerows and trees although some, to the north-east of the moat only survive at this time as ditches. Within the enclosure of the moat, although obscured by shadows appear to be other narrow linear ditches. These are likely to be drainage features and it is doubted that they had any relevance to the moat's medieval archaeology. These ditches are no longer present in the area enclosed by the moat.

4.76 Later aerial photographs do not illustrate archaeological earthwork features quite so clearly. An image from 1955 (An extract is at **Figure EDP 1**) shows well the water bodies associated with the moat. The northern part (which is extant) is slightly larger than at present with an extended part at its north-west corner. It may be that originally the moat was at this width along its entire northern return but had since silted up and reduced in width. The southern part of the moat is represented by a widening of the field boundary ditch which runs into the former moat from the east. To the west, this wider ditch then remains broad until it meets the brook that runs along the western edge of the site. This difference in character between the ditch to the west and those to the east of the moated site may suggest that this western ditch could have been established at a different time and it may have been associated with the function of the original moat, draining its water to the west into the brook.

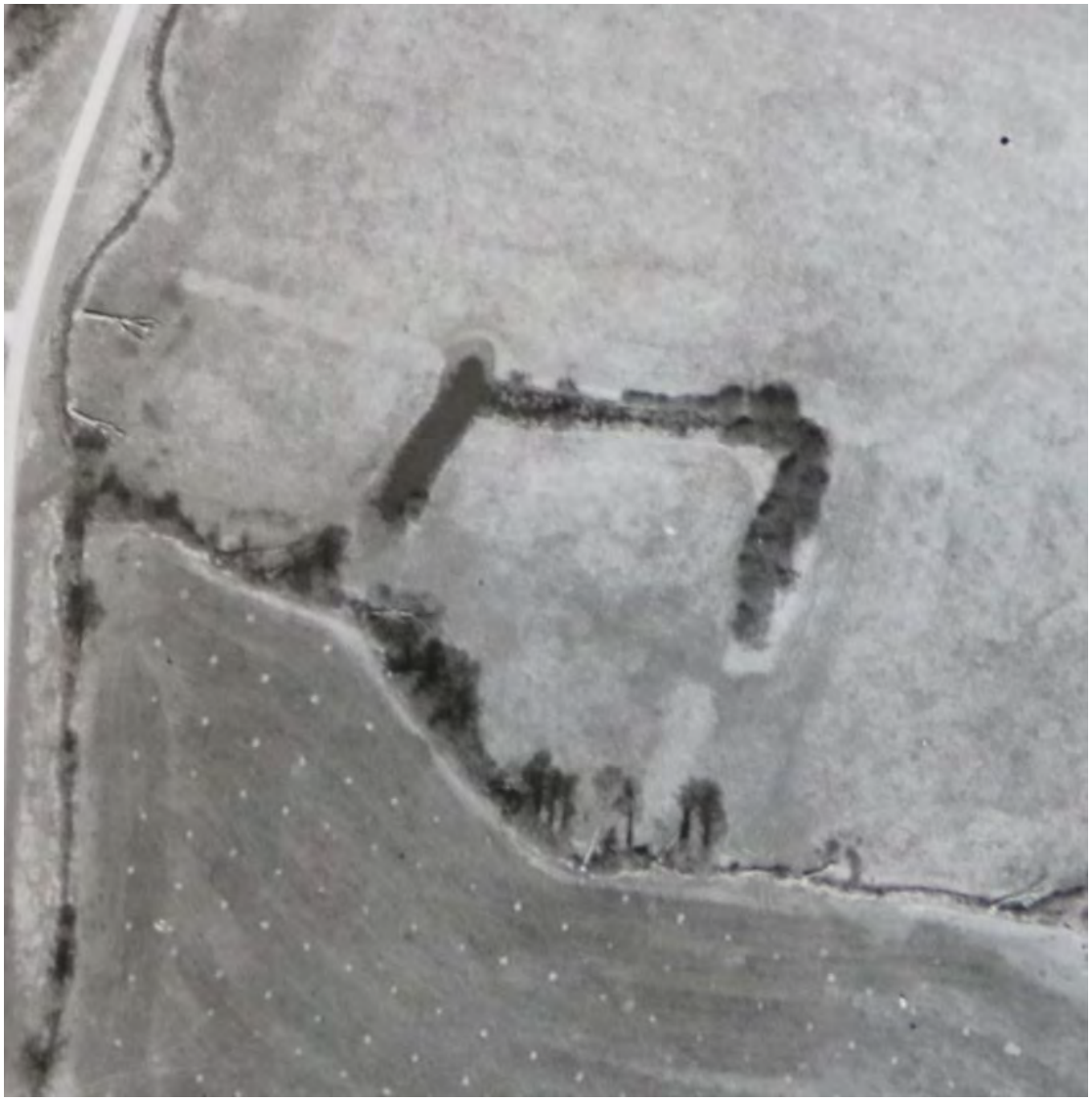

Figure EDP 1: Extract from aerial photograph taken 15 April 1955 (RAF/82/1152) showing a close up of the moated site.

4.77 On the western side of the moat, at the point where the southern and northern parts of the moat almost meet, the southern part is wider, protruding to the north, towards the south-western end of the western return. This may suggest that the two terminal ends once met at this point or, it may be that a narrow causeway between the two ends was always present, representing a western entrance to the enclosure. An entrance on this side would have allowed direct access to the Green, its road network and any settlement that might have once been located there.

4.78 The image also shows a light-coloured cropmark that relates to the eastern part of the southern return of the moat where its former course diverged northwards from the later field boundary. Evidently this part had been infilled by 1955. The image clearly shows a causeway between the two terminal ends of the moat on this side that was probably an entrance on the eastern side the moat. An entrance on this side of the moat may have linked, via a track, to the medieval road, c. 650m to the east that is recorded by the HER

(HER: 9665) running between Gloucester and Cirencester, allowing direct access to the road from the manor.

4.79 Another light colour cropmark is present as a straight, linear mark running from the north-western corner of the moat west to the brook. It is likely that this may have been a ditch (of uncertain date) designed to drain the northern part of the moat that had been infilled by this time. Remains related to this ditch and any tracks leading from the moat might be expected to be buried within the site although, as for any unrecorded archaeological remains, they are likely to have been disturbed when the M5 was constructed.

4.80 The 1955 image also has vague, dark marks within the moated enclosure that might reflect cropmarks of its former buildings. However, these are indistinct and cannot be taken as evidence of buried archaeological remains.

4.81 An image from 1970 (**Plan EDP 6**) presents clear evidence for the site's disturbance during the construction of the M5 motorway. The image shows the motorway under construction with direct entrances from the site to the strip in which the motorway is being built. The images appear to show the site and the small field to the north-west scraped and scoured across its entirety including the interior of the moated enclosure. This action clearly removed all of the earthworks present within the site that are detailed in the 1946 image including the field boundaries. Only a strip on the north-west edge of the site appears to be relatively undisturbed. It is presumed that this action was to prepare the ground for the deposition of spoil which evidently then occurred.

4.82 LiDAR data was processed, and a multiple-hill shades model was deemed the best for appraising the site. The LiDAR image (**Plan EDP 5**) shows quite clearly an even and smoothly finished, flat mound of earth across most of the site (and the small field to the north-west) that makes the land at the site stand out against the lower ground surface of surrounding land. There is strong contrast between the well-preserved ridge and furrow earthworks present across the land to the north-east and the land at the site that is devoid of such features. The remains of the moat are illustrated set within a dip in the landscape, having been spared the infill and deposition that occurred across the southern part of the moat remains.

4.83 The aerial photographs and LiDAR data document well the history of the site, and of the moated site within it, over the course of the second half of the 20th century. It is clear that the site has lost a considerable amount of its archaeological interest and that its landscape character was altered when it was used for spoil deposition during the construction of the M5 motorway. Prior to this episode, the site contained ridge and furrow earthworks, and the remains of the southern part of the moat, that reflected its medieval history. Its later post-medieval development was preserved in the field boundaries that crossed it and which evidently related to the form of the medieval landscape in which they were created, incorporating part of the moat.

4.84 All of this historic character and its evidential archaeological interest was removed when the site's upstanding features were levelled and graded, and the site used for spoil

storage, during the construction of the M5 motorway, which raised its ground surface by up to 4.6m in the eastern part of the site. Only the northern part of the moat remains as a remnant of this historic landscape albeit now located in an artificial setting within a basin within the spoil tip. The influence of this setting on the significance of the moat is discussed further in **Section 5**.

Site Walkover

4.85 The site was visited in in February 2017 and December 2020 to assess the current ground conditions and topography within it, as well as to confirm the continuing survival of any known archaeological remains and to identify any hitherto unknown remains of significance.

4.86 No evidence for archaeological remains was noted within the site and it was observed that the site is clearly capped across most of its area by made ground. No previously unrecorded archaeological earthworks were noted.

Geophysical Survey

4.87 A geophysical survey (magnetometry) was carried out across the whole site including the interior of the moat enclosure (GSB, 2017; **Appendix EDP 3**).

4.88 The survey did not record any anomalies of definite archaeological origins. It did record the former field boundary ditch that is illustrated on historic maps and was infilled when the M5 was constructed. It also recorded some uncertain curvilinear forms and ferrous responses.

4.89 As it picked up the former boundary, it is evident that the survey was able to detect responses from below the deposit of spoil that lies across the site, at least for substantial features such as the former boundary ditch/moat. The ferrous and other uncertain magnetic responses are probably due to modern materials within that spoil. If archaeological remains are still present within the site, they are evidently not magnetically responsive enough to be picked up by the geophysical survey being beneath the layer of spoil which is several metres thick in places.

4.90 Given ground conditions at the site, the survey results are therefore inconclusive demonstrating only the existence of the buried remains of a former boundary ditch and no other archaeological features.

Trial Trenching

4.91 Following discussion with Andrew Armstrong of GCC it was agreed to undertake a limited archaeological evaluation of the site. The objectives of this work were set out in a Written Scheme of Investigation (WSI: Headland Archaeology, 2020). It was agreed to dig three

exploratory trenches that would be positioned so as to assess the extent of made ground (spoil) deposited across the site and the level of disturbance that occurred during the construction of the M5.

4.92 Two of the trenches (Trenches 2 and 3) were positioned to test the presence of made ground on the north-western side of the site. A third (Trench 1) was positioned across the former boundary ditch to the west of the moat in order to test the state of preservation of this feature and, if possible to sample its deposits which might be expected to be directly related to the southern side of the former moat.

4.93 The results of the trial trench evaluation are in a report at **Appendix EDP 4** (Headland Archaeology, 2021). In summary the trenching concluded:

- No features of archaeological interest were identified;
- In all of the areas trenched there was a layer of overburden (from the construction of the M5) at between 1 and 2m in thickness. Trench 3 could not extend to the edge of the overburden (which is anticipated to be in the north-west corner of the site) due to the presence of a buried service;
- Trench 1 was targeted on the ditch to the west of the moat but only identified this feature as a dark mass of redeposited clay and part of a buried tree. The cut of the ditch was not found and, it was concluded that feature had been dug out and backfilled during the M5 construction works; and
- A possible buried topsoil layer was identified in some locations however it was not present in all the trenches suggesting a patchy survival across the site by which parts of the topsoil had been removed. This is consistent with the 1970 aerial image (**Plan EDP 6**) which shows the site scoured but with dark patches (that are probably topsoil).

4.94 In conclusion, the trial trenches confirmed the likely treatment of the site suggested by the geotechnical data and aerial imagery in the late 1960s early 1970s when the ground surface was disturbed during the construction of the M5. This disturbance evidently resulted in the levelling of upstanding features, the backfill of former field boundary ditches and the partial removal of topsoil (presumably by bulldozers levelling and grading the land surface to prepare it for spoil deposition). Subsequently a deposit of spoil (upcast from the motorway cutting) was made across most of the site (although possibly not the far north-western side).

4.95 This activity certainly destroyed any understanding features in the site including the remains of the southern part of the moat, which are likely to have been treated in the same way as the ditch that was evaluated and have probably lost much if not all of their archaeological, evidential interest. It probably also resulted in some truncation and partial destruction (at least) of any buried archaeological remains, in all but perhaps the north-western edge of the site, particularly those located at shallow depths.

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Section 5
Assessment

5.1 The following section provides an assessment for both physical (direct) impacts and effects on the settings of heritage assets based on the development proposals. The masterplan is included at **Appendix EDP 1**.

Physical (Direct) Impact Assessment

Designated Heritage Assets

5.2 The proposals would result in direct physical impacts upon the Scheduled Monument *Moated site at Sneedham's Green, 220m north east of Green Farm* (**1019399**).

5.3 For biodiversity enhancement purposes, the part of the monument that is located outside of the fenced area, will be seeded with a wildflower and grass mix. Preparation for this seeding will require the use of a rotavator to break up the surface of the topsoil. Typically, this will be down to c. 20cm. the rotavator will only be applied to the part of the monument that is covered with made ground and so the action of the rotovator will not disturb any unrecorded archaeological features related to the monument's archaeological interest which would be buried beneath.

5.4 The fence that encloses part of the scheduled monument will be replaced with a wooden post and split rail fence. The installation of the fence will require additional post holes to be dug within the scheduled monument area. These would be c. 60cm deep and c. 40cm in diameter. Whilst Scheduled Monument Consent will be required for this work the potential for archaeological impacts would be very minimal and the fence will improve the appearance of the monument's setting (discussed below).

5.5 This very minimal impact to the ground within the scheduled monument would result in a very low degree of harm to its significance.

Potential for hydrological impacts

5.6 The Water Environment Assessment (JBA, 2021) has identified potential for the development of the site to result in a reduction in water inputs to the moat. These could potentially occur due to decreased surface water runoff, due to installation of site drainage, and reduced groundwater seepage, due to the excavation of surface material as part of the foundation design.

5.7 Whilst this could result in the drying of the moat water body, the Water Environment Assessment found no evidence for the current supply of the moat by a groundwater spring source beneath its base and thus no concerns were identified regarding the hydrochemical signature of the water, which indicates that it is mostly derived from surface run-off. As such, a supplementary water supply can be incorporated into the

development's drainage design which can facilitate the maintenance of a continuous water level in much the same way as surface run-off presently does.

5.8 The Water Environment Assessment recommends the ongoing monitoring of the moat water levels prior to, during and post construction alongside development of an appropriate drainage strategy to support the long-term preservation of the moat water body.

5.9 The proposed development includes a surface drainage strategy that accommodates the moat's present surface drainage catchment (Drainage Strategy, DDP, 2022, 3880-200) The system will utilise cellular storage tanks to receive the surface run off water that would be located c. 10m to the north-east of the scheduled monument and at their deepest c. 1.7m Below Ground Level. As run off from an impermeable surface (such as bult development) is quicker than the current impermeable situation the system would include a flow control chamber with a sump so as to restrict discharge rate in line with the existing field's run off rate.

5.10 The system is designed to discharge water towards the moat from the north at a headwall set back from the northern edge of the scheduled monument by c. 10m. The headwall would have a cobbled, stone finish so as to ensure a naturalistic look, it would have a flow separator to minimise downstream erosion and outflow into a splayed, grassed area set with stone boulders in order to disperse the flow of water. The system would utilise Sustainable Drainage features (SuDs) designed to remove contaminants from the water such as swales and, would be managed and maintained by an approved management company.

5.11 Near-surface groundwater seepage, which is a minimal contributor to the moat's water would not be affected by the proposed development, as much of that seepage would come from the surface water catchment described above that is factored into the drainage scheme. As such this water would be captured and issued back to the moat. Furthermore, as no foundations would be dug within c.50m of the moat the open space to the south and east of the moat will still provide an opportunity for localised near surface water seepage into the moat.

5.12 With this system in place DPP, the project's drainage engineers state that the moat will continue to be supplied with surface water as it is at present and of at least the same quality. The status quo will be maintained with the moat water subject to the same environmental factors as at present, i.e. as susceptible to drought as it is at present, albeit with the risk of flooding controlled. As such, preserved archaeological deposits within the moat will not be subject to any additional risk or impact as a result in the change in the moat's water supply mechanism.

Non-Designated Heritage Assets

5.13 The impact of development on non-designated heritage assets would be restricted to impacts on below ground archaeological remains within the footprint of the development.

5.14 Given the site's previous disturbance during the construction of the M5 it is likely that archaeological remains within the site are probably disturbed and any such remains would mainly be located beneath a thick layer of made ground in all but perhaps the north-western part of the site.

5.15 Building Foundations would comprise piles which would extend into the natural subsoil beneath the made ground with 1m depth foundations and service trenches above which for most of the site would not penetrate below the made ground.

5.16 As such, impacts would be restricted to the limited footprint of piling across most of the site but would be more complete in the north-western part of the site where made ground is known to be thinner.

5.17 In conclusion, there is no known archaeology within the site other than the course of a post-medieval ditch which is known to be heavily disturbed. Unrecorded remains (such as Iron Age or Roman period remains related to the known adjacent archaeological remains to the north-east) could potentially be affected by foundation design and there it is concluded that there is a moderate potential for unrecorded remains within the site to be subject to harm from the development, should they exist.

Settings Assessment

5.18 In accordance with Paragraph 194 of the NPPF, this section describes the significance of those heritage assets deemed to be capable of being affected by the development, including any contribution made by their setting.

5.19 Having identified heritage assets with the potential for their settings to be affected by the site's development, Step 2 of the HE settings assessment process examines these assets in greater detail, defining their settings, and identifying the degree to which these settings make a contribution to the significance of the assets, or allow their significance to be appreciated.

5.20 This includes an understanding of whether the site forms a part of the asset's setting, and if it does, whether and to what degree it contributes to the significance of the asset in question.

5.21 Step 3 then assesses whether the development as proposed (see **Section 1** for description) would be likely to result in a change to that contribution, such that the development is either beneficial or harmful to the significance of the asset in question.

Designated Heritage Assets

5.22 With reference to the baseline position as presented in **Section 4**, only a single heritage asset is considered as being sensitive to effects on its setting from the proposed development. All other assets have been scoped out of the assessment.

Scheduled Monument, Moated site at Sneedham's Green, 220m north east of Green Farm (1019399)

Description

5.23 The scheduled monument, its significance and its historic development has been described at **Section 4** above and is not repeated here.

Setting and Contribution made to Significance

5.24 Whilst the majority of the monument's significance is derived from its physical remains, a smaller proportion is derived from its setting.

5.25 The remains of the Moated site at Sneedham's Green are located within an enclosure defined by a post and wire fence roughly at the centre of a field of pasture utilised for grazing livestock (**Images EDP 1** and **2**). Being as setting is defined as '*the surroundings in which a heritage asset is experienced*', the primary experience of the monument is as a linear pond, lined with and containing reeds and with scrub vegetation and trees at its eastern end located within a grassed field.

5.26 As described already, the field in its current form originated in the late 1960s/early 1970s, following the amalgamation of several fields, and loss of former boundaries during the construction of the M5 motorway. The fields that were amalgamated originated in the post-medieval period, as enclosures of agricultural land, with their form based on the prior medieval agricultural pattern.

5.27 A considerable proportion of the field (c. 90%), excluding a strip on its north-west side, and extending across most of it, is covered by a levelled and graded 'cap' of spoil deposited during the construction of the M5. The spoil causes the field's ground level to rise to the east and, adjacent to the monument, the edge of this layer is apparent as a gentle scarp looping around the moat, which then appears to sit within a shallow basin that is open to the west. This edge is clearly visible on LiDAR visualisation (**Plan EDP 6**; **Images EDP 2** and **3**).

5.28 The wider surroundings, beyond the site consist mainly of farmland defined by hedgerows, although the southern extent of the Gloucester conurbation at Matson is located only c. 180m to the north and houses at the urban edge as well as a light industrial building can be seen from the monument (**Images EDP 4** and **5**). The consented development, Land South of Winneycroft Farm, (part of the *Strategic Allocation A6 – Winneycroft* in the JCS), will result in the loss of most of the farmland to the north and north-east of the site with housing c. 80m to the north-east, as well as sports pitches across the field to the immediate north-east of the site. In this respect the monument's setting to the north will lose its rurality and the site will adjoin the southern edge of Gloucester at Matson once the residential development of the former Winneycroft Farm site is completed.

5.29 This change to the monument's setting was acknowledged in Gloucester City Council's evidence base for the JCS Examination which related how the moat's setting is no longer 'rural' and is now better described as 'urban edge' (**Image EDP 5**).

5.30 To the west is a field boundary and the Sud Brook, beyond which is the road Winneycroft Lane, and the open grassed land and adjacent houses at Sneedham's Green. As noted previously, the Green is an area of common land consisting of open, marshy grassland. Several dwellings are located on the edge of the green including some within an 'island' plot located within the centre of the green most of which is occupied by Homesteads Farm.

5.31 To the south-west of the site are the farmsteads, fields and outbuildings of Green Farm and Snow Capel Farm which are separated from the site by hedgerows. The field's south-east boundary is defined by the M5 motorway which is set within a cutting. The sound of traffic on the motorway is present across the site.

5.32 Topographically, the moated site is situated within a gap between two steep sided hills, Robins Wood Hill to the north-west and Cud Hill to the south-east. Both hillsides are visible from the site, with their wooded slopes, fields and scatted dwellings adding to the rural aspect of the scene.

5.33 In understanding how the setting of the monument contributes to its significance it should be considered that HE previously stated that '*The setting of moated sites consists of their rural location; most were supported by the rich farmland around them. That link to the countryside provides a substantial part of the monument's significance.'*

5.34 Given the encroachment of the urban edge of the town from the north and the imposition of the M5 motorway, and the changes to the landform around and across the monument that accompanied the motorway, there is little remaining within the setting of the moat that reflects its historic setting of rich farmland, and thus has a historical or functional association with it. However, the landscape does contain features that do retain an historical association with it.

5.35 As described previously, the levelling that occurred during the construction of the M5 and the subsequent deposition of spoil around the moat removed earthworks, ditches and field boundaries from the field around the monument that had an association with it. With these features gone, there are no remaining earthworks or hedgerows within the field that reflect the character and appearance of the monument's historic setting. Ridge and furrow earthworks are preserved in the fields to the north-east which reflect remnants of the medieval agricultural landscape within which the moat was built. These will also be removed by the consented development on Land South of Winneycroft Farm, along with any contribution that they make to the monument's significance.

5.36 A key survival in the landscape which does retain an historic association with the moated site is the settlement and open land at Sneedham's Green, along with the brook that runs along the site's western boundary. The brook appears on historic maps and may once have taken water from the moat. As described in **Section 4**, the settlement is likely to

have been associated with the manor house enclosed by the moat, developing around a Green at the junction of several roads. A possible, causewayed entrance on the western side of the moat may have been designed for access between the manor house and the settlement.

5.37 Nowadays, the settlement at Sneedham's Green does not contain any medieval dwellings, indeed its northern edge is defined by modern development but, on account of its status as common land the Green has retained its historic form and its openness (**Image EDP 6**). The Green is not easily experienced from the remains of the moat, with views for the most part screened and filtered by the hedgerow that separates the Green from the site (**Image EDP 7**). As such, the association is not readily experienced and is of a historic and spatial nature, rather than because of any direct visual relationship. Consequently, the presence of the Green and the historic settlement pattern that it reflects, makes only a low contribution to the significance of the moat.

5.38 The field in which the monument lies (the site) has lost its historical earthworks and boundary features and the changes to its topography from 20th century spoil deposition damaged the moated monument and have resulted in the remains of the moat being located within a depression. This topographic situation gives a false impression of the monument's setting, given that, historically the surrounding field was at a different ground level. The open grassed aspect of the field is the only aspect that has any positive relation to the moat, simply on account of the openness allowing for the monument to be seen from a grassed space, reminiscent of the pastoral nature of the field before its modification. Nevertheless, this experience, although facilitated by the field's openness is of the monument, now only partial, within a setting in which the ground levels have been artificially raised and so bears little relevance to its history and historic function.

5.39 On this account the surrounding field in which the remains of the monument are located and seen from are neutral in terms of its significance, neither harming it, as the monument remains can still be appreciated, but not enhancing it, as the experience givens a false impression of its historic setting and reflects none of its historic function.

5.40 Beyond the field surrounding the monument, due to the hedgerows which bound the site, the monument is not readily experienced and the main aspects of the wider landscape that contribute positively to its significance are those elements that have a demonstrable historic association with the monument, and therefore contribute to its historic interest, such as the Sneedham's Green settlement.

5.41 As noted above, the moated site was built within a rural location. Aspects of the wider landscape reflect that rurality, such as the site's hedgerow boundaries, the Sud Brook, the farm buildings and farmland at and around Snow Capel and Green Farm to the south-east and the countryside backdrop provided by the adjacent hillsides. All are aspects of the monument's setting that are experienced in views across it, and with it, and which retain a degree of countryside character in the monument's setting.

5.42 However, these features are the products of the post-medieval and modern period and reflect little of the monument's original, medieval countryside setting which would have

mostly comprised open fields defined by ridge and furrow with the settlement at Sneedham's Green to the west. The moated manor was probably linked to the surrounding landscape with tracks to the west and to the Gloucester-Cirencester road to the east however these have been entirely lost and the monument is now isolated in a landscape that overwhelmingly reflects later periods in its character. As such, these post-medieval and modern 'rural' elements of the moated site's setting contribute to its significance to only a very low degree.

5.43 Modern elements of the wider landscape are generally negative in their influence on the monument's significance. The encroachment of the urban edge to the north, has resulted in the degradation of the monument' s rural setting to the north, including the loss of ridge and furrow earthworks in its wider setting. This 'urbanisation' has caused a low degree of harm to the monument's significance.

5.44 The M5 motorway is also considered to represent a negative aspect of the monument's setting. Although set within a cutting, and thus not visible form the monument, the presence of the motorway is apparent from across the site as traffic using it creates a constant noise that disrupts the tranquillity of the countryside in this area. This noise further degrades the 'rural' quality of the monument's setting, distracting from any impression of the monument as being set within an undisturbed countryside setting. The presence of the motorway detracts from the monument's significance to a moderate degree.

Impact of the Proposed development

5.45 The proposed development would result in change to the setting of the scheduled monument. A more detailed assessment of the impact of the proposed development upon the setting of the scheduled monument is given in the Cultural Heritage ES Chapter.

5.46 With reference to the plan at **Appendix EDP 1**, the monument would be located within a green, open space with the moat remains at its centre. Houses would be located on the northern, eastern and southern side of the site, approximately 45m from the moat itself. The scheduled monument boundary would, at its closest point, be c. 5m from the houses at its southern tip; a part of the monument that is underneath the spoil cap.

5.47 The houses would be set on cul de sacs with access to Winneycroft Lane at the north-western edges of the site and an emergency access to the south-west. Those positioned on the inner edges would face towards the monument and have a high-quality design. These would be fronted by a walking route around the perimeter of the open space. A walking route would also be created running along the western edge of the site.

5.48 To the east of the scheduled monument on ground that is higher than the moat and from where a perceptive view across it can be had a space is proposed for heritage interpretation. This will include an information board which would be positioned to describe what the viewer is seeing as they look across the moat with Sneedham's Green in the background.

5.49 Within the open space surrounding the moat occasional trees and shrubs are proposed (outside of the scheduled monument area) as well as a hedgerow following the course of the former field boundary that once crossed the site. This feature would run along the south-west side of the scheduled monument (but outside of the scheduled monument) effectively marking its location in the landscape. The hedgerow on the site's western boundary would be thinned out to provide glimpsed views to the west towards Sneedham's Green from the site's interior.

5.50 As noted above, the monument is already located close to the urban edge, a process that is set to increase with the development of neighbouring land. Following the site's development, the monument would be within this urban environment, all be it still close to the edge of the conurbation.

5.51 Nonetheless, with the site's development, the proposed houses and related infrastructure would not result in the loss of any upstanding remains related to the monument and would be constructed across a 'false' land surface that is already demonstrably out of character with the moated site's original setting. A degree of the field's present quality of openness would be retained around the monument, which would be perceptible in the field and occupy a prominent position at its centre. The monument would continue to be experienced within a grassed open space but with a backdrop to the north, east and south defined by the presence of houses.

5.52 In order to accentuate the historic connection in the landscape between the monument and the settlement at Sneedham's Green to the west, the western aspect of the monument would remain open and, it is proposed to reduce the density of the field boundary hedgerow on the western edge of the site in order to open up views between the monument and the Green. This appreciation would be particularly apparent from the walking route that would run along the site's western edge, and from the interpretation area posited on it, from which both the monument and Green would be experienced together.

5.53 An additional benefit for the monument will be the provision of a Heritage Management Plan in order to protect and conserve its remaining fabric moving forwards, including its water levels.

5.54 Whilst the presence of houses in the monument's setting would reduce the degree to which it is experienced within a countryside setting, it is apparent that this present setting contains very little quality in this regard and the surrounding field does not contain any features or is part of a landscape that relates closely to the monument's historic setting or historic function. The field in which it lies, in its current form and appearance, is largely a product of changes made in the 20th century when the M5 was constructed.

5.55 The development would also seek to strengthen the spatial and visual connection between the monument and Sneedham's Green which is the key, surviving tangible feature of the surrounding landscape with which the monument has a historic association. This association is currently hard to appreciate, and it is the development's intention to create a more visible connection between the monument and its historic

neighbour, which would be presented through interpretation. The interpretation would highlight the location, history and importance of the monument where, presently, a lay visitor might not be able to appreciate what they are seeing.

5.56 As such, whilst the monument's setting would lose some elements that reflect a countryside character, resulting in a loss of significance, the loss would be of post medieval and modern elements of its setting that contribute little to its significance anyway and, given the offset from the houses, the monument's above ground remains would continue to be appreciable within an open space defined by grassland. Notwithstanding this effect, the development will increase the strength of the contribution made to the monument's significance by the adjacent Green, enhancing its historic value through a better illustration of the association between the two features that both originated in the medieval landscape. As such, this benefit would temper the adverse effect of the change in character to the monument's wider setting and, overall, only a very low degree of harm to its significance is assessed.

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Section 6
Conclusions

6.1 This archaeological and heritage assessment concludes that there will be only very minimal direct effects on the scheduled monument *Moated site at Sneedham's Green, 220m north east of Green Farm* (**1019399**) which is located within the site, restricted to the digging of postholes for a new fence.

6.2 This assessment includes consideration of potential impacts on waterlogged archaeological remains located within the scheduled moat located within the site due to a reduction in water levels. The results of a Water Environment Assessment indicate that water levels within the moat can be successfully managed and maintained through drainage design and the project includes a sophisticate response that ensures that moat water levels will be subject to the same water inputs as they are at present.

6.3 Potential impacts upon the settings of designated heritage assets have been considered in accordance with Historic England guidance: *Historic Environment Good Practice Advice in Planning Note 3: The Setting of Heritage Assets* (HE 2017 Second Edition). All designated heritage assets located within the site's wider zone of influence were assessed in order to understand whether their settings have potential to be changed by the site's development.

6.4 The assessment concludes that the site only forms a part of the setting of the scheduled monument, *Moated site at Sneedham's Green, 220m north east of Green Farm* (**1019399**) which is located within the site, and no other heritage assets, either designated or non-designated.

6.5 Whilst the land at the site is a grassed open space from where the monument can be experienced, the field's form, appearance and ground levels are a result of modification carried out when the M5 motorway was constructed in the late 1960s/early 1970s and therefore is not representative of the monument's historic setting. Equally, whilst the monument is experienced in a location with elements that convey a 'rural' character, this character is being increasingly eroded by the southward expansion of the conurbation of Gloucester, a process set to expand with the development of the adjacent site, Land South of Winneycroft Farm. In this respect, and in line with observation made by the Council, the site is now better described as at the 'urban edge' than in the countryside.

6.6 The field in which the monument lies (the site) is neutral in terms of its contribution to its significance, neither harming it, as the monument remains can still be appreciated, but not enhancing it, as the experience givens a false impression of its historic setting and has little relevance to its historic function. Whilst most historically related elements of the surrounding landscape have been lost, there remains a historic association between the monument and the adjacent brook and common land at Sneedham's Green to the west. However, due to the intervening hedgerow, this relationship is not easily appreciated visually from the monument or Green.

6.7 The proposed development, in its current iteration, will change the setting of the monument which will lose some of its remaining countryside setting. However, the monument will remain within an open area of grassed land and so will still be appreciable. The connection between it and Sneedham's Green is reflected in the proposals, with the monument's setting open to the west and a reduction in the hedgerow density to the west, which will allow a stronger visual connection between the site, monument and the Green. Walking routes around the space in which the monument lies will allow for an appreciation of it and interpretation panels will serve to identify the monument, illustrate its history and make the connection with the historic settlement at the Green. Presently the monument has no interpretative aspect nor is it under a management plan. Development will change this situation in allowing the monument to be better appreciated by the public and its conservation will be governed by the development of a management plan.

6.8 Overall, given the respect for the surviving historic connection in the landscape with Sneedham's Green and, as the surrounding post-medieval and modern countryside elements only make a limited contribution to the monument's significance, the assessment identifies overall only a very low degree of harm to its significance. This harm would be at the far lower end of the spectrum of 'less than substantial harm' and, in accordance with Paragraph 196 of NPPF, should be '*weighed against the public benefits of the proposal including, where appropriate, securing its optimum viable use.'*

6.9 In terms of the site's archaeology, whilst there is considered to be a moderate potential for the site to contain buried remains of low or moderate significance dating to the Late Iron Age or Roman period remains and the medieval period, the desk-based assessment, geotechnical data, geophysical survey and trial trenching has identified that, in the late 1960s early 1970s the ground surface across at least c. 90% of the site, including the scheduled monument, was disturbed during the construction of the M5.

6.10 This disturbance comprised the levelling of upstanding earthwork features such as ridge and furrow, the backfill of former field boundary ditches and the partial removal of topsoil. Subsequently a deposit of spoil (upcast from the motorway cutting) was made across most of the site raising the ground level by up to 4.6m at its highest, eastern side but possibly excluding the far north-western side (which is otherwise crossed by services).

6.11 This activity destroyed any upstanding archaeological features in the site including the remains of the southern part of the moat, which are likely to have been graded and infilled, losing most if not all of their archaeological, evidential interest. It probably also resulted in some truncation and partial destruction (at least) of any previously unrecorded buried archaeological remains, in all but perhaps the north-western edge of the site, particularly those located at shallow depths. As such, it is considered that there is only a low potential for any well-preserved archaeological remains to survive in the site, and such remains would be buried beneath redeposited spoil up to 4.6m in depth.

6.12 Development design would use piled foundations and thus should archaeological remains be present in the site, impact would be limited to the footprint of piles aside from in the north-western part of the site where made ground is of less thickness or not

present at all. As such a moderate potential for harm to unrecorded buried archaeological remains is assessed.

6.13 In conclusion, the assessment has not identified any reason why the development as proposed would conflict with historic environment legislation or planning policy and it is anticipated that the proposals will be looked upon favourably regarding the historic environment.

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Section 7
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Appendix EDP 1
Proposed Site Plan

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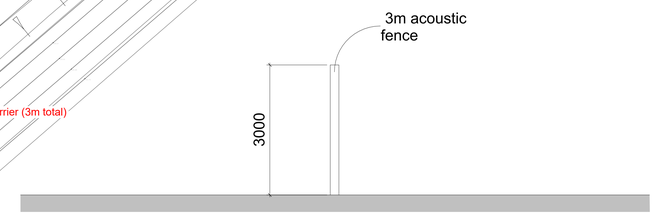
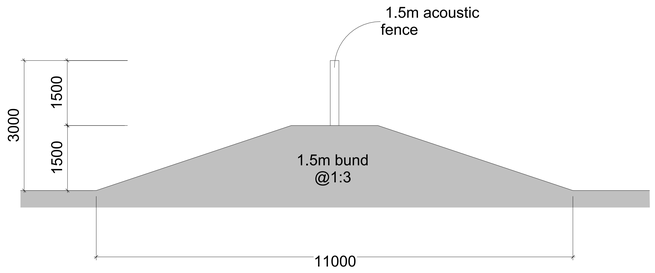


Acoustic Barrier - Section B-B



Acoustic Barrier - Section A-A

Rev	Revision Details	Dr	Date
P16	Layout amendments following client meeting on 9.03.22	NG	10.03.22
P15	Layout updated following client review	NG	17.01.22
P14	Layout amended following client review and DTM	NG	20.12.21
P13	Net Area's updated. Minor layout chnages following DTM	NG	19.11.21
P12	Layout revised following design meeting and comments with client	NG	26.07.21
P11	Tier 1 housing added. Southern block structure amended for masterplan	NG	02.06.21
P10	Numbers reduced in preparation for proposed Block Plan	NG	06.05.21
P09	Block structure revised to accomodate additional units as per clients instructions	NG	23.04.21
P08	PROW alignment and internal pedestrian/cycle network amended following consultant meeting	NG	30.03.21
P07	Proposed attenuation basins replaced with swales to western boundary. Extent of existing shrubbery indicate on western edge	NG	25.03.21
P06	Layout amended to test single access option from Northern junction	NG	24.03.21
P05	Unit numbers increased and layout changes following review	NG	17.03.21
P04	Layout amendments, net area and schedule updated.	NG	15.03.21
P03	Layout revised following client comments	NG	12.03.21
P02	Site area schedule added	DR	10.02.21
P01	Initial Draft	CH	18.06.20

O3S

RIBA Chartered Practice

[redacted]

Client's Name
Edward Ware Homes Ltd & Bromford

Job Title
Snow Capel Farm

Drawing Title
Proposed Site Plan

Scale
As indicated @ A0

Drawn	Checked	Date
CH	DR	09.06.20

Job No	Drawing No	Rev
3250	0030	P16

Status
PRELIMINARY

Sheet ID
3250-O3S-ZZ-XX-GA-A-0030-S0-P16

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Appendix EDP 2
Consultation with Historic England

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From: [redacted]
Sent: 19 September 2017 16:16
To: [redacted]
Subject: RE: Land at Snow Caple, Matson (Gloucester)

Dear [redacted]

Thank you for your e-mail and hope you are well too.

We have now changed our pre-application advice process, as Hugh told you, but it is still a formal process. Previously an applicant was given 15 hours free before we charged for our services. We have now replaced this with a free cycle of advice: to cover a meeting/ site visit, assessment of proposal, discussion and a single letter. After that we will charge for any additional or extended advice. An application will be logged on to our system and then allocated to the relevant Inspector.

I am not as familiar with the Gloucester City Evidence base as you are and so I am not clear as to where the quote you provide comes from. Please can you provide a reference so I can locate it.

I am more familiar with the conclusions of the JCS Examination (JCS Summary Comments, pp2-3) which states that:
There was also discussion around an omission site to the south of the Winnycroft allocation. The site is the location of a Scheduled Monument (SM) and other potential heritage assets. The JCS authorities view is that the presence of the SM represents a significant constraint to development and it would therefore be inappropriate to allocate the site for development. (JCS Summary Comments, pp2-3). http://www.gct-jcs.org/Documents/New-Evidence-Base-and-Associated-Documents/Main-Modifications-Examination-Document-Library/MM35-JCS-ExaminationSummary-Note-10082017.pdf

From this statement it is clear that the Joint Authorities feel the site is inappropriate for development.

However if you can provide me with a master plan proposal for the site I would be happy to provide formal comments on the proposal. We have a minimum requirement for information to allow us to log and then respond to a pre-application inquiry. For us to provide advice we do need to see plans of the proposed development. This allows us to properly assess any impacts and respond accordingly. I understand there is a draft master plan already prepared and this can form the basis of any formal comments I make on development at this site. Once you have sent a master plan the application can be logged and I can provide a considered response.

I am very familiar with the site and do not feel a meeting at this stage will be useful.

I look forward to hearing from you.

[redacted]
Inspector of Ancient Monuments
Planning Group
29 Queen Square, Bristol, BS1 4ND
[redacted]

https://historicengland.org.uk/southwest

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From: [redacted]
Sent: 05 September 2017 12:01
To: [redacted]
Subject: Land at Snow Caple, Matson (Gloucester)

[redacted]

Snow Caple, Matson

Good morning, I hope you are well. I understand that my colleague, Rob Skinner, exchanged emails with you in the spring/summer regarding the above site and the presence of the *Moated Site at Sneedham's Green Scheduled Monument* [Ref. 1019399], in order to ascertain Historic England's informal view in respect of development proposals.

I understand that the exchange concluded on 20 June with a recommendation to *'send me a copy of the proposed outline masterplan [so] I can provide a more considered response through our formal pre-application process. You can then share this with Gloucester City Council'*.

At this stage, there is no fixed masterplan for the proposals and that remains a work in progress, but in light of the Inspector's question regarding the proposed extension of the draft Winnycroft allocation (to include the site) at the most recent session of the Joint Core Strategy; and more particularly in light of the answer which Gloucester City Council gave to that question on the day in Cheltenham; my client is keen to open a formal dialogue with the Council regarding the site's promotion for development.

As you will be aware, the Council's own evidence base, prepared for the JCS, concludes that:

'development [at Winnycroft] should seek to create a positive relationship with the scheduled moated site at Sneedham's Green, such that it becomes a borrowed landscape in order to reduce the risk of it becoming side-lined and neglected as a result of the development's [presumably the Barwood site] proximity. Consideration should be given to the provision of an interpretation panel on [the] footpath network'

This is clearly a very laudable aspiration, and one which my client's land interest has the potential to bring forward and deliver. However, the Council have advised them that, in order for them to engage in pre-application discussions, it is first necessary for us to have opened a formal pre-application process with Historic England with regard to the scheduled monument.

To that end, I have spoken with Hugh Beamish in the Bristol Office; and from that I understand there is no longer a 'formal' pre-application process for consultation with Historic England, and that pre-application discussions have reverted back to direct contact with the relevant Inspector for the particular area in question. Therefore, whilst you have previously provided Rob with Historic England's informal position in respect of the moated site at Sneedham's Green, I would be grateful if you could now set out a formal opinion so that we can move forward with GCC.

Within that context, I note that the Ecus report, commissioned by and for the Council (to inform the JCS), identifies that *'the proximity of modern development to the north, and the noise and visual interference of the M5, intrude on the tranquillity and sense of remoteness such that the over-riding character of the area is one of land on the urban-fringe'*; and that was written before the Barwood site to the north was approved, let alone built.

So, in short, we believe that a sensitively designed residential development at the site, which '*creates a positive relationship*' with the scheduled moat by utilising it as a '*borrowed landscape*', could address GCC's shortfall in housing numbers and safeguard the asset for future generations through the creation and implementation of a long term management regime, including the promotion of public access to (and enjoyment of) this feature. Therefore we believe there is merit in engagement in dialogue with the Council and Historic England as part of the promotion.

In a similar vein, I believe it may well be desirable to meet and have a look at the moat/site together, particularly in light of the length of time that has elapsed since the Barwood scheme was being considered. Subject to your availability, I could get something in the diary fairly quickly.

Please give me a call if you would like to discuss the above further, or if you would like additional information. However, in the meantime, I look forward to hearing from you shortly.

Kind regards.

Yours sincerely,

[redacted]

[redacted]
Director

the environmental dimension partnership

The Environmental Dimension Partnership Ltd
First Floor, The Bonded Warehouse, Atlantic Wharf, Cardiff CF10 4HF
[redacted]

LANDSCAPE • ECOLOGY • HERITAGE • MASTERPLANNING • ARBORICULTURE • EXPERT WITNESS

Historic England

SOUTH WEST OFFICE

[redacted] [redacted]

The Environmental Dimension Partnership (EDP)

14 Inner Courtyard

Whiteway Farmhouse

Cirencester

Gloucestershire

GL7 7BA

Our ref: PA00585868

17 October 2017

Dear [redacted]

Pre-application Advice

LAND AT SNOW CAPLE, MATSON, GLOUCESTER

Thank you for sending us further information about your clients proposed development at Land at Snow Caple. I understand that the master plan you have provided is indicative and is still being worked on. It does however provide me with enough information to understand the potential impacts of any development on the scheduled monument of Sneedham's Moat.

Advice

Sneedham's Moat is a moated site with about half of its moat surviving as a water filled feature. It was added to the scheduled of Ancient Monument's in 1951 to preserve it, as far as possible, in the state in which it has come down to us today. (Paragraph 6, DCMS Scheduled Monument and Non Designated Nationally Significant Archaeology Policy, October 2013).

Around 6,000 moated sites are known in England, with about 200 in Gloucestershire. Specifically around Gloucester there are a number of these moated sites, which includes Sneedham's Green, within a short (3 mile) distance of the Medieval City. These may represent the country houses/estates of wealthy and influential men from Gloucester. At the time of their construction Gloucester was a powerful and important city in Medieval Europe. Moated sites were located in rural locations as they were supported by the surrounding farmland and formed an administrative centre of large estates. That link to the countryside contributes to the monuments significance.

There is little known about the history of Sneedham's Green moated site and few documentary sources have been located referring to it. It current lies within a rural landscape which has been altered in recent times by the construction of the M5 motorway to the east of the site. The motorway does sit within a cutting as it passes the site and spoil from the construction was spread on the field around the moat, raising the ground level. This means that the motorway is not clearly visible from the site and as you look eastwards the cutting mostly hides the motorway from view, though it is still audible. The land to the east and west rises up and is either farmland or wooded.

The proposed housing close to and surrounding the moated area would in our opinion cause harm to the significance of the monument, by removing the connection with its rural landscape and setting. The level of harm would be high and further assessment of the proposals may place that harm at Substantial.

The National Planning Policy Framework clearly states that substantial harm to designated heritage assets of the highest significance, which includes scheduled monuments, should be wholly exceptional (paragraph 132). If there are no substantial public benefits to the scheme the Local Planning Authority should refuse consent (Paragraph 133).

Even if further assessment identified the harm as less than substantial that harm would need clear and convincing justification and (NPPF 132) and public benefits (NPPF 134) to outweigh that harm.

In your previous correspondence you quote text from the Councils evidence base for the JCS with regards to Winnycroft, which mentions Sneedham's Green. I have still not managed to locate that quote. Could you please provide a link or reference to the location of that paper please?

As I have already stated I am more familiar with the conclusions of the JCS Examination (JCS Summary Comments, pp2-3) which states that:

There was also discussion around an omission site to the south of the Winnycroft allocation. The site is the location of a Scheduled Monument (SM) and other potential heritage assets. The JCS authorities view is that the presence of the SM represents a significant constraint to development and it would therefore be inappropriate to allocate the site for development. (JCS Summary Comments, pp2-3). <http://www.gct-jcs.org/Documents/New-Evidence-Base-and-Associated-Documents/Main-Modifications-Examination-Document-Library/MM35-JCS-ExaminationSummary-Note-10082017.pdf>

From this statement it is clear that the Joint Authorities feel the site is inappropriate for development. If you can provide evidence contrary to this conclusion I would be pleased to review it.

We feel that this proposal will cause harm to the significance of the highly designated heritage asset. This is through a change in its setting which contributes to its significance. The level of harm in our opinion is high and further, more detailed, assessment may place that harm at substantial.

Thank you for involving us at the pre-application stage. Your current proposal does not

address our concerns, as set out above, and so is unlikely to receive our support if submitted for statutory approval.

Yours sincerely

the environmental dimension partnership

LANDSCAPE
ECOLOGY
HERITAGE
MASTERPLANNING
ARBORICULTURE
EXPERT WITNESS

24 November 2017 Our Ref: **L**/EDP3746/AC/fj

Sent by Email: [redacted]

Melanie Barge
Inspector of Ancient Monuments
Historic England
29 Queen Square
Bristol
BS1 4ND

Dear [redacted]

Land at Snow Caple, Matson, Gloucester

Thank you for your comments, in respect of the above site, dated 17 October 2017 [PA00585868], which presents Historic England's position in respect of Edward Ware Homes' proposal to bring forward residential development on land around the scheduled moated site at Sneedham's Green, south of Matson, in Gloucestershire.

Your letter of 17 October 2017 makes a number of points about this monument's significance and its setting, to which I respond in the following paragraphs.

In terms of 'advice', it is stated that "*Sneedham's Moat is a moated site with about half of its moat surviving as a water filled feature. It was added to the schedule of Ancient Monuments in 1951 to preserve it, as far as possible, in the state in which it has come down to us today*".

It is subsequently identified that 'it currently lies within a rural landscape which has been altered in recent times by the construction of the M5 motorway to the east of the site. The motorway does sit within a cutting as it passes the site and spoil from the construction was spread on the field around the moat, raising the ground level. This means that the motorway is not clearly visible from the site and as you look eastwards the cutting mostly hides the motorway from view, though it is still audible. The land to the east and west rises up and is either farmland or wooded'.

First and foremost, historic Ordnance Survey maps illustrate that, at the time of its first designation in 1951, the moat existed as a polygonal enclosure with an opening on the east side and a linear earthwork in the south which ran alongside the field boundary.

In contrast (today), the moat survives as the northern and western 'arms' of the enclosure, as well as the northern end of the eastern arm, whereas the southern portion

CIRENCESTER
Tithe Barn,
Barnsley Park Estate,
Barnsley, Cirencester,
Gloucestershire GL7 5EG
[redacted]

CARDIFF
First Floor,
The Bonded Warehouse,
Atlantic Wharf,
Cardiff CF10 4HF
[redacted]

SHREWSBURY
The Stables,
Sansaw Business Park,
Hadnall, Shrewsbury,
Shropshire SY4 4AS
[redacted]

[redacted]
www.edp-uk.co.uk

of the monument has been erased as an earthwork feature (along with the adjoining field boundary).

It is not known for certain when the southern portion of the moat was lost as a landscape feature, but it is understood to have coincided with the construction of the M5 motorway on land adjoining the eastern boundary of the Snow Caple site. In any event, it is clear that the moated enclosure no longer survives in the form in which it was recognised as being of 'national importance', with there being evidence that the M5 construction works that changed its surrounding landscape were also responsible for the direct, physical change to the monument's appearance and condition.

In that regard, it is very clear that the construction of the M5 motorway has had a profound impact on not only the appearance and survival of the Sneedham's Green moated enclosure, but also on the 'surroundings in which it is experienced'. This is clearly downplayed in your comments above, but more accurately captured in Paragraphs 5.25 and 5.26 of the Ecus Environmental Consultants report for the Gloucester, Cheltenham and Tewkesbury Joint Core Strategy, which was prepared in September 2016 and provides the 'Additional Site Assessments':

"*The construction of moated sites during this period is believed to have been as much a symbol of wealth and prestige as a defensive feature, and would most likely have been intended to be visible. The present situation of the monument has been adversely effected by the raising of ground levels around it with arisings from the construction of the M5 cutting, such that the moated site now appears to lie within a topographic hollow. The position of the monument within a field bounded with hedgerows also restricts visual access, such that the character of the monuments setting is now isolated and enclosed. Public footpaths do cross within the vicinity of the site, from where its physical remains can be viewed, although the loss of its southern ditch and the lack of any interpretation limit understanding of its function.*

Whilst the fieldscape and distant views of the undeveloped Robinshood Hill and Cotswolds preserve a good sense of the former rural character of the area, the proximity of modern development to the north, and the noise and visual interference of the M5, intrude on the tranquillity and sense of remoteness such that the overriding character of the area is one of land on the urban-fringe. The open views available from adjacent to the monument of the surrounding area do however afford understanding of the topographic situation of the monument and a sense of its former agricultural economy".

I have included a copy of the Ecus report for your information, as I understand that you remain unaware of its conclusions and advice, but clearly the assessment on the monument's setting is of interest when it identifies that (even before the adjacent Barwood application was consented) the "*the proximity of modern development to the north, and the noise and visual interference of the M5, intrude on the tranquillity and sense of remoteness such that the overriding character of the area is one of land on the urban-fringe*". If that was the situation prior to the adjoining Barwood land being developed, it surely must be accepted that the setting of the scheduled enclosure is no longer 'rural' in the manner which your 17 October commentary identifies.

More pointedly, the Ecus assessment for the Joint Core Strategy is clear in recognising that setting can be influenced and affected by non-visual factors; a position outlined in current Historic England

guidance (GPA3, 2015) and since endorsed by Justice Lang in the High Court judgement regarding the Kedleston Road site in Derbyshire.

Whilst the M5 motorway may be carried in a slight 'cut' to the east of the Snow Caple site, it would be wholly disingenuous to suggest that it does not have a significant bearing on the surroundings in which the scheduled monument are 'experienced' nevertheless. Whilst the vehicles are to some extent screened from view from the moat, it is abundantly clear that the passing motorway traffic fundamentally alters the experience in terms of noise and ambience, especially given its position just beyond the running-in lane from the northbound Gloucester Services to the south. Hence, the Ecus report is unambiguous in dismissing this asset's setting as being 'rural'.

It is worth noting that, in providing written evidence ahead of the most recent of the JCS Hearings, Gloucester City Council relied on heritage reports prepared by EDP for the Barwood site to the north and made no reference to the commentary or advice contained in its own evidence base. Clearly the reports prepared by EDP refer to a different site, for a different proposal and to inform/support the submission and then determination of an outline planning application, rather than to consider whether this specific site is of such 'sensitivity' that development should be prevented or restricted because of its heritage impact. In that respect, their relevance and usefulness for the Snow Caple site currently before us are considered to be limited in the extreme.

It is therefore worth repeating that Paragraph 5.1.9 (on Page 34) provides the following advice to the Local Authorities under the heading 'Maximising Enhancements and Avoiding Harm', when it considers the scheduled monument; i.e.:

"*Development should seek to create a positive relationship with the scheduled moated site at Sneedham's Green, such that it becomes a borrowed landscape – in order to reduce the risk of it becoming side-lined and neglected as a result of the development's proximity. Consideration should be given to the provision of an interpretation panel on footpath network*".

The use of the term 'borrowed landscape' is clearly relevant here – because it infers that the moat should actually be brought into the developed area '*in order to reduce the risk of it becoming side-lined and neglected as a result of the [Barwood] development's proximity [to the north]*'. Given that Barwood never had any means to deliver improvements to the monument; either in terms of the footpath network or the provision of an interpretation panel; and there is certainly no requirement for them to do so within their consent; it is clearly difficult to understand how the current situation within the Winnycroft allocation will not run counter to this laudable aspiration.

Based on its present extent, the Winnycroft allocation does not 'create a positive relationship with the scheduled moated site at Sneedham's Green'; similarly, it does nothing to 'reduce the risk of it becoming side-lined and neglected'; two objectives which can only realistically be delivered by the sensitive development of the land at Snow Caple controlled by Edward Ware Homes.

In view of current Case Law, where 'substantial harm' (NPPF Para 133) is assessed as comprising an impact so serious that the significance of the asset is 'vitiated altogether or very much reduced'; it would be surprising for a sensitively designed development on this site to generate an impact of such

[redacted]

Subject: RE: Historic England and Gloucester City Council response to the submitted hydrological assessment:
Date: 16 November 2021 10:40:40

Dear [redacted]

I've now discussed this with HE and colleagues. With regard to heritage any forthcoming planning application would need to be supported by:

1. A geo-archaeological borehole survey; and
2. A setting assessment of the scheduled monument.

This would be required in order to describe the significance of heritage assets which could be affected by the development. The moat is nationally important site, so we need to give great weight to its protection as part of the planning process. We can't do that without the appropriate information.

At this stage there really isn't much else to say with regard to heritage.
Kind regards,

[redacted]

[redacted]

Subject: FW: Historic England and Gloucester City Council response to the submitted hydrological assessment:

Dear [redacted],

Since your email below we have progressed several inputs with regard to the additional items that you have requested. These comprise:

- The development of an attenuation scheme by the project's engineers that would deliver run off surface water to the moat, and
- Consultation with geoarchaeologists at Headland Archaeology, Cotswold Archaeology and Keith Wilkinson at Winchester University in order to understand what sort of methodology might be required to generate the data that you request below.

I address these two matters in turn below.

Attenuation

The attached email from Chris Williams sets out the attenuation scheme and a PDF plan related to this is also attached. In summary, the scheme would achieve the following:

- Maximum possible water catchment area within the site based on the present topography that would mimic the present water catchment area (i.e.) topographically the same land area would continue to drain surface water into the moat as at present.
- In providing this it would ensure that the potential water level drop identified in the hydrological report would not occur as surface drainage to the moat would be retained.
- The system would maintain water quality through the provision of SuDs features to remove contaminants.

We understand that you have concerns regarding the maintenance of this system, for your information, the attached PDF reproduces maintenance guidelines for SuDs which will apply to the methods being proposed.

With these provisions in place, it is arguable that the moat has a better, more controlled system for maintaining its water levels than it does at present. The fact is that presently there is no control over the moat water, with it being subject to changes to surface run off levels from farming practices and also some contaminants used in farming such as fertilisers and, just as susceptible to drought conditions, as it would be under an attenuation system. If you are content with the present situation then why wouldn't you also be content with the attenuation solution that we are proposing?

Geoarchaeological survey

The geoarchaeologists have all suggested a similar approach. In summary this comprises:

- Auger survey using Russian augers points in transects in three locations across the moat
- Preferably auguring on foot from within the moat if this is practical and safe to do based on water levels being low and the stability of the moat bed
- If not, auguring from a platform such as from a pontoon or raft that is moored within the moat or possibly a scaffold platform constructed across the moat.

Whilst this work may produce the desired data, there are some issues or impacts that will arise:

Direct physical impacts to the scheduled monument from both the augers themselves, from

platform construction such as support poles being driven into the ground, or if auguring from a floating pontoon, physical impacts from an anchoring system. In this respect the work would result in a minor direct impact upon the fabric of the scheduled monument

The moat contains Greater Crested Newts and the attached email from the project's ecologist outlines how the methodology could be problematic especially if conditions dictate that we can't auger on foot, advising that ' Given the complexity of the ecology constraints and risk of causing an offence under wildlife legislation, I would certainly look to negotiate a less invasive archaeological investigation'.

Conclusion

With reference to previous emails below, we question again whether there is any need to generate the data that you have requested in order to determine the application and therefore whether this work is a worthwhile exercise at this stage.

As demonstrated previously, the baseline conditions within the moat are either adequate for preservation of waterlogged deposits or, derogated due to present and historic site conditions. In this respect, maintaining a surface run-off supply to the moat, using an attenuation system that will not break down, that maintains its present condition regarding its water supply and content, surely does not change this situation and therefore there is no need to define whether the moat actually contains significant remains or not? By developing the attenuation system we have assumed a worst case scenario and are treating the monument as if it does contain water logged archaeological remains of significance. As such, with this assumption in place, the additional work and data that it produces should not be necessary. In essence, we are already taking a precautionary approach.

With an effective attenuation system in place, the risk of physical effects (drying out of deposits) from loss of water will be no different to how they are at present, as the system will replicate current conditions. We are not proposing any intrusive works within the scheduled area and thus there will be nothing in the development design that results in a direct physical impact upon the material that makes up the scheduled monument or a greater risk from drying out than there is presently within the field. If we carry out the intrusive work that has been requested there will be, however slight, a physical impact upon the monument. Surely, it is preferable to avoid any impact, especially if the data produced by such work is not absolutely necessary in understanding whether there will be any development impacts on the monument's significance?

We would appreciate if you could consider the above and reflect on whether you do actually need to see an intrusive programme of work at this stage?

Kind regards,

[redacted]
Principal Archaeology and Heritage Consultant
[redacted]
w www.edp-uk.co.uk

[redacted]

Subject: RE: Historic England and Gloucester City Council response to the submitted hydrological assessment:

Hi [redacted],

Having discussed this with Sylvia – the feeling is that a number of methods could be used. What matters is what we need to know, which is:

- What deposits are present;
- What condition they're in;
- What range of palaeo environmental materials are present; and
- What date they are.

We would suggest you approach an appropriately qualified specialist (geoarchaeologist) who could outline the most cost effective approach to this. If the specialist wishes to contact the science adviser to discuss further they would be welcome.

Kind regards,

[redacted]

[redacted]

Subject: RE: Historic England and Gloucester City Council response to the submitted hydrological assessment:

Dea[redacted],

Just a quick email to see if you have had a chance to give this methodology any consideration yet. Our clients are keen to understand what the cost implications could potentially be.

Kind regards

[redacted]

[redacted]
Principal Archaeology and Heritage Consultant

[redacted]
w www.edp-uk.co.uk

[redacted]

Subject: RE: Historic England and Gloucester City Council response to the submitted hydrological assessment:

Thanks for this [redacted]nd I will discuss and get back to you.
Kind regards,

[redacted]

[redacted]

Subject: RE: Historic England and Gloucester City Council response to the submitted hydrological assessment:

Hi [redacted],

Thank you for your response. In terms of the physical investigation, what methodology would you recommend? If it is possible, could we auger the deposits within the water? And then attempt to date the samples?

Kind regards

[redacted]

[redacted]
Principal Archaeology and Heritage Consultant

[redacted]
w www.edp-uk.co.uk

[redacted]

Subject: RE: Historic England and Gloucester City Council response to the submitted hydrological assessment:

Dear [redacted]

Thankyou for this, very helpful and noted re: mains water.

I suppose the issue for me is that we are moving from a situation in which the water level in the moat has existed without human maintenance, certainly since the 1950s, to a system which will be reliant on a functional and maintained attenuation system going forward. It would, in future, require management – whereas it currently does not (unless the attenuation system supplying the moat will require no maintenance?). If significant organic or palaeo-environmental remains survive within the moat – this puts them at risk in the event maintenance fails. Now, it may be that this could be addressed by a management plan or similar – but it's still a potential impact, and my feeling is that informed discussion of this requires us to understand the significance of heritage assets of archaeological interest within the moat. As such my advice will be that physical investigation of the moat should be required prior to the validation of any forthcoming application. I think it would also be helpful if your client could demonstrate, at least in principle, how attenuation would work – and what kind of maintenance would be required.

Kind regards,

[redacted]

Place
Gloucester City Council
Shire Hall
Westgate Street
Gloucester, GL1 2TG

[redacted]
[redacted]
www.gloucester.gov.uk

[redacted]

Subject: RE: Historic England and Gloucester City Council response to the submitted hydrological assessment:

Dear [redacted]

Thank you for your email below, I have been chasing up some technical information from our hydrologist and from the development's drainage engineers DPP, in order to address your concerns below. Two emails are attached in this regard.

Taking your points below in turn:

The DPP email outlines the technicalities of maintaining water levels in the moat. In this they address ways of ensuring that run off is consistent with current levels and that the water can be cleaned of its hydrocarbon content through standard means. They also conclude that this can be achieved without recourse to any works within the scheduled monument area itself. Evidently any above ground drainage features in the moat's setting would have to be considered along with other setting changes but would certainly be designed with minimal visual impact to blend in with the surrounding green field.

Regarding changes to groundwater input, the hydrologist has, in a separate correspondence stated:

'We have previously highlighted that there is not a strong hydraulic connectivity between the moat and the subsoils, given that they are generally of low permeability. Whilst some groundwater input cannot be ruled out, we have concluded that there is not sufficient evidence that groundwater (including seepage) constitutes the primary input. In this case, even if any perched localised groundwater levels are lowered as a result of the development, we would anticipate that it is unlikely that water top-up to the moat would be 'lost' (e.g. out the base of the moat) faster than it could be maintained.'

As such, even if groundwater contribution to the moat is changed by the development, a system that feeds run-off to the moat would be sufficient to maintain the moat's water levels.

You suggest that the monument (being its water content and levels) are completely stable however farming practices in the surrounding field do also have the potential to create pollutants from grazing animal and fertilisers as well as increased topsoil/silt runoff. As such, controlled and cleaned discharge from the development, and from the surrounding grassed open spaces will, if anything represent a better controlled scenario over the type of water entering the moat than the present situation. SuDs systems would be maintained via the local water authority and standard management practices, they would not be allowed to degrade for obvious reason as this would cause major problems for the houses and the people living there.

For the second issue, DPP illustrate the risk of hydrocarbons in the water and present standard methodologies for cleaning this run off, so this factor wouldn't be an issue. No one has suggested using mains water to feed the moat, which is confirmed in the email from the hydrologist (Eleanor).

Eleanor's email confirms that the survey did not identify any clear signal as to the source of the water, suggesting a mix of surface and ground water, as such there would be no difference in maintaining the levels through surface water run off as they are at present, provided mitigation and control of the type suggested by DPP is instigated.

In relation to the suggested intrusive investigations of the moat, Eleanor's email summarises the baseline situation of any such remains (whether they are present or not) in relation to the water, in that conditions are either adequate or, derogated due to present and historic site conditions. In this respect, maintaining a run-off supply to the moat that maintains its present condition surely does not change this situation and therefore there is no need to define whether the moat actually

contains significant remains or not when we are treating it as if it does? As the proposed water quantity and quality would not be any different to that of the moat's current situation?

Please let me know if you have any further comments on the above, and I look forward to your reply,

Kind regards

[redacted]

[redacted]
Principal Archaeology and Heritage Consultant

[redacted]
w www.edp-uk.co.uk

[redacted]

Historic England and Gloucester City Council response to the submitted hydrological assessment:

Dear [redacted],

Historic England and Gloucester City Council response to the submitted hydrological assessment:

Having discussed this with Sylvia Warman (Science Adviser) and Melanie Barge (Inspector of Ancient Monuments) we have the following comments:

Firstly the assessment seems thorough and produced to an appropriate standard – which we welcome. Regarding its conclusions we would highlight these points:

1. In summary, the assessment concludes that the proposed residential development could result in a fall in the water level in the moat, potentially resulting in the drying out of the moat and a negative impact upon the significance of the scheduled monument.
2. The potential for a reduction in water inputs to the moat from the proposed development includes decreased surface water runoff, due to the installation of site drainage such that runoff may no longer reach the moat, and reduced groundwater seepage, due to the excavation of ground surface material, depending on the engineering approach to foundation design. This could result in the drying of the moat water body unless a supplementary water supply is incorporated into the development design which can permit maintenance of current moat water levels.

In essence then any potential scheme could cause the monument to dry out - harming its

significance. This could only be mitigated by design and ongoing management. This moves the monument from a point where it is completely stable and requiring no special management regime to a position where it will need to be artificially maintained by drainage or SUDs schemes that themselves may degrade over time. In short, we would move to a position where the monument will, going forward, need to be managed in perpetuity. This causes us some concern and certainly fails the NPPF test of enhancing the significance of the monument.

The second issue we would highlight is the nature of the water which would now be used to keep the monument water-logged. In the past the 'catchment' (I guess you'd call it) for the monument is the surrounding grassland. We note that section 4.7 mentions motorway runoff through made ground as well. The concern we have is that a new development would affect the water in the moat in two possible ways:

1. Water derived from the proposed development would include potentially increased levels of hydrocarbons from carparking and roads and potentially other contaminants; and/or
2. Mains water piped in to maintain the water level of the monument would be chemically different to the water that has, historically, fed the moat – the impact of this would be unknown.

With regard to the hydrology of the site it is becoming increasingly clear that we need to understand the presence/absence and significance of any waterlogged remains within the moat before we can reach a judgment on the potential impact of any proposed development. We therefore feel that an intrusive investigation into the moat is required to establish the significance of the fill of the moat, so as to provide for an informed judgment with regard to the likely impact of the scheme. We feel that it would be necessary to investigate a dry section of the moat and a currently waterlogged section – to check for differential preservation. We would imagine that a borehole survey undertaken by appropriately qualified environmental specialists incorporating off-site analysis of cores would be the appropriate approach, but are happy to discuss in more detail.

Kind regards,

[redacted]

Place
Gloucester City Council
Shire Hall
Westgate Street
Gloucester, GL1 2TG

[redacted]

[redacted]

www.gloucester.gov.uk

Appendix EDP 3
Geophysical Survey Report

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GEOPHYSICAL SURVEY REPORT G16119

Land at Snow Capel Farm, Matson, Gloucester

Client:

edp the environmental dimension partnership

On Behalf Of:

edwardwarehomes
Because boxes are for shoes

GSB PROSPECTION Ltd

Celebrating over 30 years at the forefront of Archaeological Geophysics

sumo Survey Services

GEOPHYSICAL SURVEY REPORT

Project name:	Land at Snow Capel Farm, Matson, Gloucester
Job ref:	G16119
Client:	Environmental Dimension Partnership Ltd
Survey dates:	16 December 2016
Report date:	10 January 2017
Field Co-ordinator:	[redacted]
Field team:	
Report written by:	
CAD illustrations by:	
Report approved by:	
Project Director:	
Version number and issue date:	V1: 11 January/2017

GSB Prospection Ltd
Cowburn Farm 21 Market Street Thornton Bradford
West Yorkshire BD13 3HW

SUMO Survey Services
SUMO Group Member

[redacted]
www.gsbprospection.com

TABLE OF CONTENTS

LIST OF FIGURES

APPENDICES

DIGITAL CONTENT (CD)

- Minimally Processed Greyscale Images and XY Trace Plots in DWG format
- DWG Viewer
- Digital Copies of Report Text and Figures (both PDF and native formats)

1 SUMMARY OF RESULTS

No anomalies of archaeological interest were detected. A number of weak trends of uncertain origin and an old field and boundary were identified. There is a large number of ferrous anomalies to the east of the moated site and whilst they appear modern, an association with the former cannot be ruled out.

2 INTRODUCTION

2.1 Background synopsis

GSB Prospection Ltd. was commissioned to undertake a geophysical survey of an area proposed for residential development. This survey forms part of an archaeological investigation being undertaken by **Environmental Dimension Partnership Ltd** on behalf of **Edward Ware Homes**.

2.2 Site Details

NGR / Postcode	SO 850 142 / GL4 6EQ
Location	The site is located on the south-eastern edge of Gloucester, and is bounded to the south-east by the M5 motorway and to the west by Winnycroft Lane
HER/SMR	Gloucestershire
District	Gloucester
Parish	Matson
Topography	Flat
Current Land Use	Livestock
Soils	Soils are Martock (711d) association slowly permeable seasonally waterlogged stoneless silty over clayey and clayey soils over siltstone or shale. Some similar soils with slowly permeable subsoils and slight waterlogging (SSEW 1983).
Geology	Bedrock geology within the survey area consists of Blue Lias Formation and Charmouth Mudstone Formation (BGS 2017).
Archaeology	There is a scheduled ancient monument located on site (monument number 1019399: moated site at Sneedham's Green).
Survey Methods	Detailed magnetometer survey (fluxgate gradiometer)
Study Area	7.8ha

2.3 Aims and objectives

To locate and characterise any anomalies of possible archaeological interest within the study area.

3 METHODS, PROCESSING & PRESENTATION

3.1 Standards & Guidance

This report and all fieldwork have been conducted in accordance with the latest guidance documents issued by Historic England (EH 2008) (then English Heritage) and the Chartered Institute for Archaeologists (IfA 2002 & CIfA 2014).

3.2 Survey methods

Detailed magnetic survey was chosen as an efficient and effective method of locating archaeological anomalies.

Technique	Instrument	Traverse Interval	Sample Interval
Magnetometer	Bartington Grad 601-2	1m	0.25m

More information regarding this technique is included in Appendix A

This project was carried out in accordance with a Written Scheme of Investigation submitted to and approved by Gloucestershire CC

3.3 Data Processing

The following schedule shows the basic processing carried out on the data used in this report:

1. *De-stripe*
2. *De-stagger*

3.4 Presentation of results and interpretation

The presentation of the data for each site involves a greyscale plot of processed data. Magnetic anomalies have been identified, interpreted and plotted onto the 'Interpretation' drawings. The minimally processed data are provided as a greyscale image on the CD together with an XY trace plot in CAD format. A CAD viewer is also provided.

When interpreting the results several factors are taken into consideration, including the nature of archaeological features being investigated and the local conditions at the site (geology, pedology, topography etc.). Anomalies are categorised by their potential origin. Where responses can be related to very specific known features documented in other sources, this is done (for example: Abbey Wall, Roman Road). For the generic categories levels of confidence are indicated, for example: probable, or possible archaeology. The former is used for a confident interpretation, based on anomaly definition and/or other corroborative data such as cropmarks. Poor anomaly definition, a lack of clear patterns to the responses and an absence of other supporting data reduces confidence, hence the classification "possible".

4 RESULTS

4.1 No anomalies of archaeological interest were detected.

4.2 An intermittent, linear anomaly is visible within the dataset. This feature corresponds with a field division recorded on an 1884 Ordnance Survey map, and has therefore been assigned to the category *Former Field Boundary*.

4.3 There are a couple of poorly defined curvilinear trends in the data; these are probably simply ploughing effects but, in the context of the known Scheduled Monument, they are assigned to the category *Uncertain Origin*.

4.4 A scatter of ferrous responses to the east of the moat are typical of those due to relatively modern debris, but the close proximity of the scheduled site might suggest a greater antiquity for the recorded anomalies.

4.5 A large area of magnetic disturbance was recorded in the south-east edge of the survey area and possibly construction debris from the building of the M5 motorway.

4.6 A pipe traverses the site on north-south alignment, located on the western edge of the site.

4.7 Ferrous responses adjacent to boundaries are due to fences and gates. Smaller scale ferrous anomalies ("iron spikes") are present throughout the data and their form is best illustrated in the XY trace plots. These responses are characteristic of small pieces of ferrous debris in the topsoil and are commonly assigned a modern origin. The most prominent of these are highlighted on the interpretation diagram.

5 DATA APPRAISAL & CONFIDENCE ASSESSMENT

5.1 Historic England (then English Heritage) Guidelines (EH 2008) Table 4 states that the magnetic response over Mudstone is poor. Given that former boundaries were detected in this survey, the results suggest that the magnetic survey has been effective.

6 CONCLUSION

6.1 The survey did not identify any anomalies of archaeological potential.

6.2 A former field boundary was located.

6.3 A number of weak trends of uncertain origin were detected; they are likely to be due to agricultural or natural effects.

6.4 Ferrous responses are probably modern in origin but there is a possibility that they are associated with the moated site.

7 REFERENCES

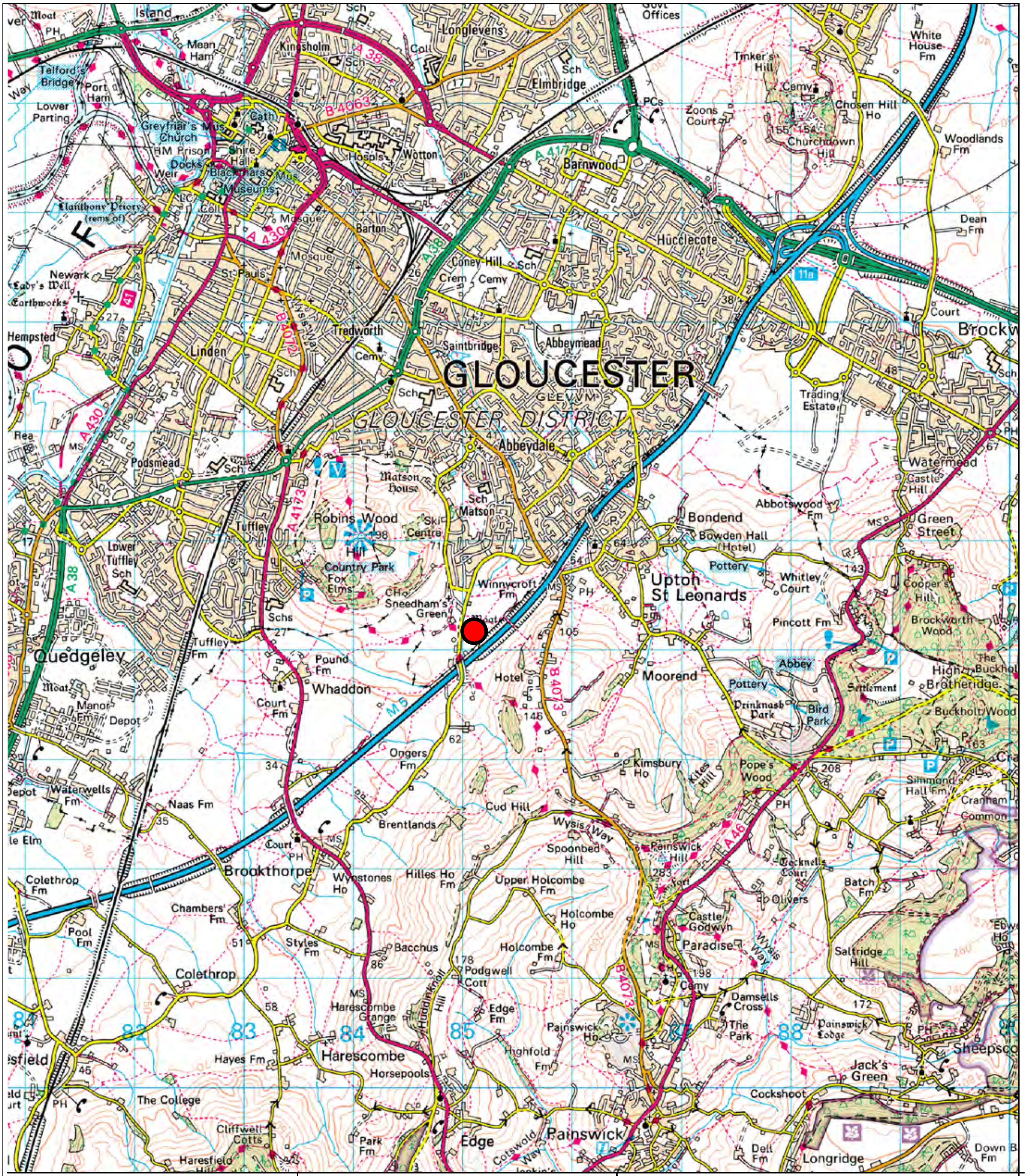
BGS 2017 British Geological Survey *website*: (http://www.bgs.ac.uk/opengeoscience/home.html?Accordion1=1#maps) Geology of Britain viewer. [Accessed 10/01/2017]

CIfA 2014 *Standard and Guidance for Archaeological Geophysical Survey.* Amended 2016. CIfA Guidance note. Chartered Institute for Archaeologists, Reading http://www.archaeologists.net/sites/default/files/CIfAS%26GGeophysics_2.pdf

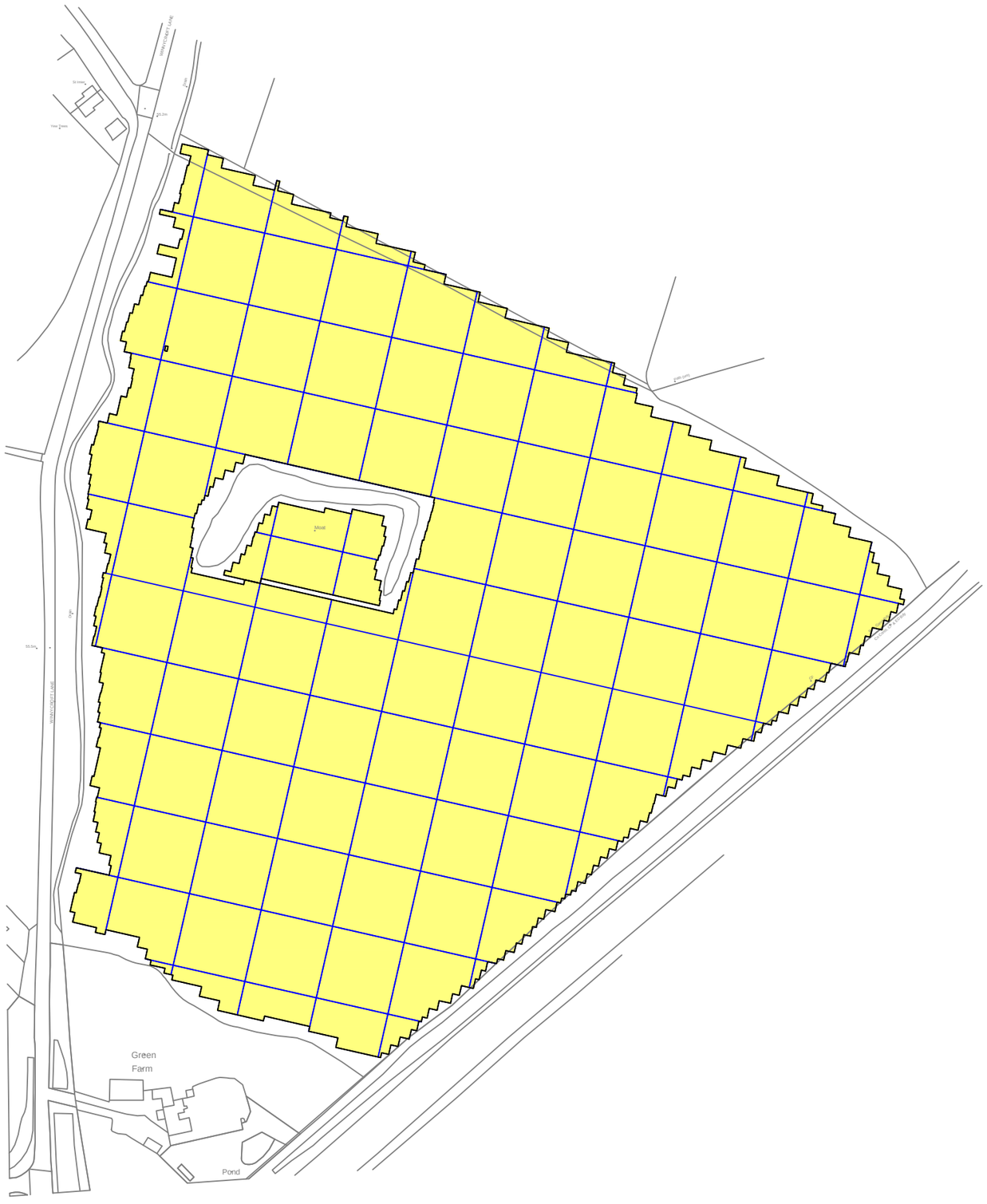
EH 2008 *Geophysical Survey in Archaeological Field Evaluation.* English Heritage, Swindon https://content.historicengland.org.uk/images-books/publications/geophysical-survey-in-archaeological-field-evaluation/geophysics-guidelines.pdf/

IfA 2002 *The Use of Geophysical Techniques in Archaeological Evaluations*, IFA Paper No 6, C. Gaffney, J. Gater and S. Ovenden. Institute for Archaeology, Reading

SSEW 1983 *Soils of England and Wales. Sheet 5, South-West England*. Soil Survey of England and Wales, Harpenden.



Site Location	N Title: Site Location Diagram	GSB PROSPECTION Ltd sumo Survey Services GSB Prospection Ltd [redacted]
	Client: Environmental Dimension Partnership	
	Project: G16119 Land at Snow Capel Farm, Gloucester	Scale: 0 metres 2000 1:50000 @ A4
		Fig No: 1



Magnetometer Survey Area
Showing 30m Grids

GSB PROSPECTION Ltd

GSB Prospection Ltd

Title:
Magnetometer Survey
Location of Survey Area

Client:
Environmental Dimension Partnership

Project:
G16119 Land at Snow Capel Farm,
Gloucester

Scale:
0 metres 80
1:2000 @ A3

Fig No:
2

GSB PROSPECTION Ltd

GSB Prospection Ltd

[redacted]

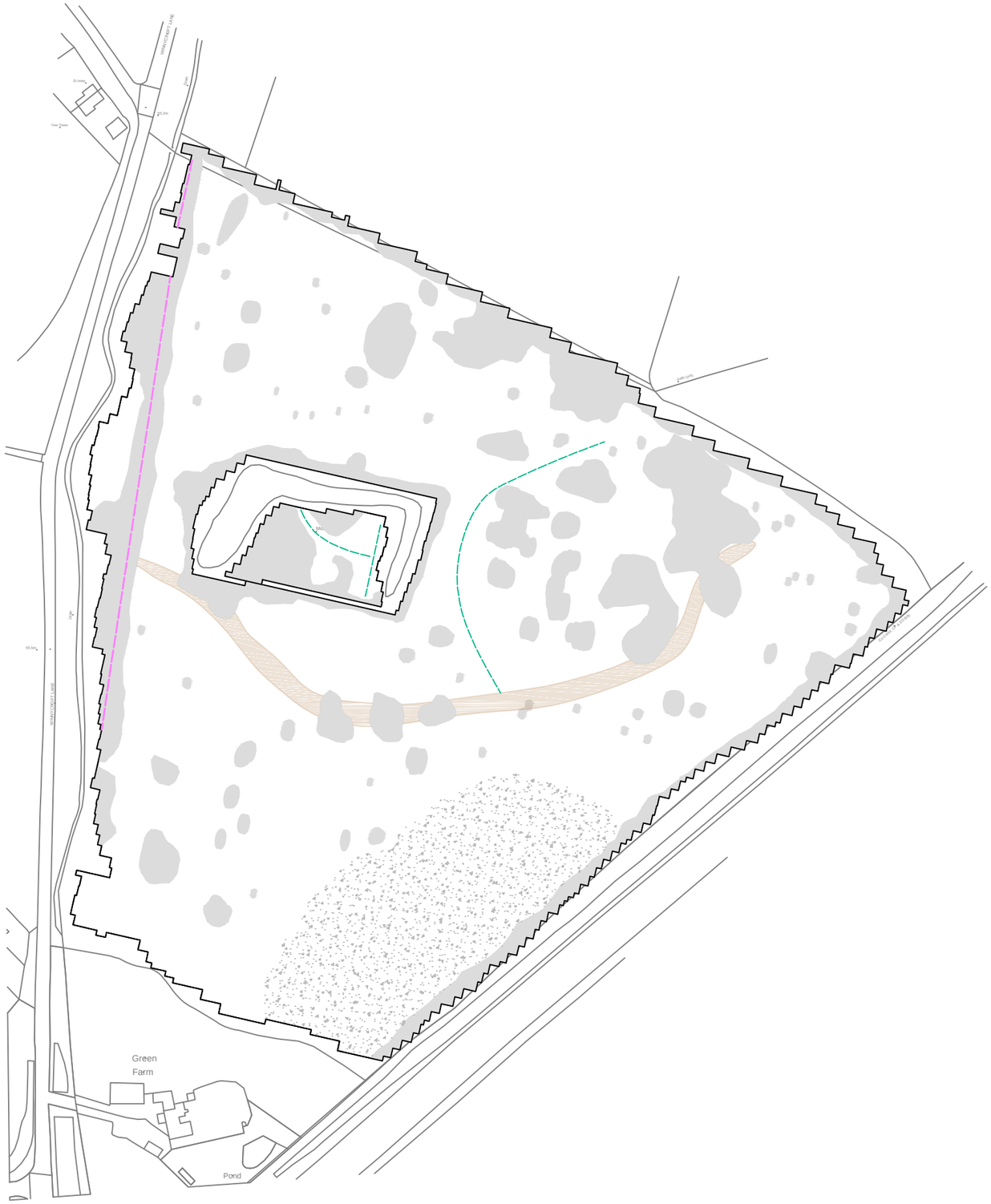
Title:
Magnetometer Survey
Greyscale Plot

Client:
Environmental Dimension Partnership

Project:
G16119 Land at Snow Capel Farm,
Gloucester

Scale:
0 metres 80
1:2000 @ A3

Fig No:
3



Uncertain Origin
(discrete anomaly / trend)

Former field boundary
(corroborated)

Pipe

Magnetic disturbance

Ferrous

GSB
PROSPECTION Ltd

GSB Prospection Ltd

Title:
Magnetometer Survey
Interpretation

Client:
Environmental Dimension Partnership

Project:
G16119 Land at Snow Capel Farm,
Gloucester

Scale:
0 metres 80
1:2000 @ A3

Fig No:
4

Appendix A - Technical Information: Magnetometer Survey Method

Grid Positioning
For hand held gradiometers the location of the survey grids has been plotted together with the referencing information. Grids were set out using a Trimble R8 Real Time Kinematic (RTK) VRS Now GNSS GPS system.

For CARTEASY^{N} collected data each data point had its position recorded using a Trimble R10 Real Time Kinematic (RTK) VRS Now GNSS GPS system. The geophysical survey area is georeferenced relative to the Ordnance Survey National Grid.

An RTK GPS (Real-time Kinematic Global Positioning System) can locate a point on the ground to a far greater accuracy than a standard GPS unit. A standard GPS suffers from errors created by satellite orbit errors, clock errors and atmospheric interference, resulting in an accuracy of 5m-10m. An RTK system uses a single base station receiver and a number of mobile units. The base station re-broadcasts the phase of the carrier it measured, and the mobile units compare their own phase measurements with those they received from the base station. This results in an accuracy of around 0.01m.

Technique	Instrument	Traverse Interval	Sample Interval
Magnetometer	Bartington Grad 601-2	1m	0.25m
Magnetometer	CartEasy^{N} cart system (Bartington Grad 601 sensors)	0.75m	0.125m

Instrumentation: Bartington *Grad*601-2 / GSB CARTEASY^{N} Cart system
Both the Bartington and CARTEASY^{N} instruments operate in a gradiometer configuration which comprises fluxgate sensors mounted vertically, set 1.0m apart. The fluxgate gradiometer suppresses any diurnal or regional effects. The instruments are carried, or cart mounted, with the bottom sensor approximately 0.1-0.3m from the ground surface. At each survey station, the difference in the magnetic field between the two fluxgates is measured in nanoTesla (nT). The sensitivity of the instrument can be adjusted; for most archaeological surveys the most sensitive range (0.1nT) is used. Generally, features up to 1m deep may be detected by this method, though strongly magnetic objects may be visible at greater depths. The Bartington instrument can collect two lines of data per traverse with gradiometer units mounted laterally with a separation of 1.0m. The CARTEASY^{N} system has four gradiometer units mounted at 0.75m intervals across its frame – rather than working in grids, the cart uses an on-board survey grade GNSS for positioning. The cart system allows for the collection of topographic data in addition to the magnetic field measurements.

The readings are logged consecutively into the data logger which in turn is daily down- loaded into a portable computer whilst on site. At the end of each site survey, data is transferred to the office for processing and presentation.

Data Processing

Zero Mean Traverse	This process sets the background mean of each traverse within each grid to zero. The operation removes striping effects and edge discontinuities over the whole of the data set.
Step Correction (Destagger)	When gradiometer data are collected in 'zig-zag' fashion, stepping errors can sometimes arise. These occur because of a slight difference in the speed of walking on the forward and reverse traverses. The result is a staggered effect in the data, which is particularly noticeable on linear anomalies. This process corrects these errors.
Interpolation	When geophysical data are presented as a greyscale, each data point is represented as a small square. The resulting plot can sometimes have a 'blocky' appearance. The interpolation process calculates and inserts additional values between existing data points. The process can be carried out with points along a traverse (the x axis) and/or between traverses (the y axis) and results in a smoother greyscale image.

Display

XY Trace Plot	This involves a line representation of the data. Each successive row of data is equally incremented in the Y axis, to produce a stacked profile effect. This display may incorporate a hidden-line removal algorithm, which blocks out lines behind the major peaks and can aid interpretation. The advantages of this type of display are that it allows the full range of the data to be viewed and shows the shape of the individual anomalies. The display may also be changed by altering the horizontal viewing angle and the angle above the plane.
Greyscale Plot	This format divides a given range of readings into a set number of classes. Each class is represented by a specific shade of grey, the intensity increasing with value. All values above the given range are allocated the same shade (maximum intensity); similarly all values below the given range are represented by the minimum intensity shade.

Interpretation Categories

In certain circumstances (usually when there is corroborative evidence from desk based or excavation data) very specific interpretations can be assigned to magnetic anomalies (for example, *Roman Road, Wall,* etc.) and where appropriate, such interpretations will be applied. The list below outlines the generic categories commonly used in the interpretation of the results.

Probable Archaeology	This term is used when the form, nature and pattern of the response are clearly or very probably archaeological and /or if corroborative evidence is available. These anomalies, whilst considered anthropogenic, could be of any age.
Possible Archaeology	These anomalies exhibit either weak signal strength and / or poor definition, or form incomplete archaeological patterns, thereby reducing the level of confidence in the interpretation. Although the archaeological interpretation is favoured, they may be the result of variable soil depth, plough damage or even aliasing as a result of data collection orientation.
Industrial / Burnt-Fired	Strong magnetic anomalies that, due to their shape and form or the context in which they are found, suggest the presence of kilns, ovens, corn dryers, metal-working areas or hearths. It should be noted that in many instances modern ferrous material can produce similar magnetic anomalies.
Former Field Boundary (probable & possible)	Anomalies that correspond to former boundaries indicated on historic mapping, or which are clearly a continuation of existing land divisions. Possible denotes less confidence where the anomaly may not be shown on historic mapping but nevertheless the anomaly displays all the characteristics of a field boundary.
Ridge & Furrow	Parallel linear anomalies whose broad spacing suggests ridge and furrow cultivation. In some cases the response may be the result of more recent agricultural activity.
Agriculture (ploughing)	Parallel linear anomalies or trends with a narrower spacing, sometimes aligned with existing boundaries, indicating more recent cultivation regimes.
Land Drain	Weakly magnetic linear anomalies, quite often appearing in series forming parallel and herringbone patterns. Smaller drains will often lead and empty into larger diameter pipes and which in turn usually lead to local streams and ponds. These are indicative of clay fired land drains.
Natural	These responses form clear patterns in geographical zones where natural variations are known to produce significant magnetic distortions.
Magnetic Disturbance	Broad zones of strong dipolar anomalies, commonly found in places where modern ferrous or fired materials (e.g. brick rubble) are present. They are presumed to be modern.
Service	Magnetically strong anomalies usually forming linear features indicative of ferrous pipes/cables. Sometimes other materials (e.g. pvc) cause weaker magnetic responses and can be identified from their uniform linearity crossing large expanses.
Ferrous	This type of response is associated with ferrous material and may result from small items in the topsoil, larger buried objects such as pipes, or above ground features such as fence lines or pylons. Ferrous responses are usually regarded as modern. Individual burnt stones, fired bricks or igneous rocks can produce responses similar to ferrous material.
Uncertain Origin	Anomalies which stand out from the background magnetic variation, yet whose form and lack of patterning gives little clue as to their origin. Often the characteristics and distribution of the responses straddle the categories of *Possible Archaeology* and *Possible Natural* or (in the case of linear responses) *Possible Archaeology* and *Possible Agriculture*; occasionally they are simply of an unusual form.

Where appropriate some anomalies will be further classified according to their form (positive or negative) and relative strength and coherence (trend: weak and poorly defined).

Appendix B - Technical Information: Magnetic Theory

Detailed magnetic survey can be used to effectively define areas of past human activity by mapping spatial variation and contrast in the magnetic properties of soil, subsoil and bedrock. Although the changes in the magnetic field resulting from differing features in the soil are usually weak, changes as small as 0.2 nanoTeslas (nT) in an overall field strength of 48,000nT, can be accurately detected.

Weakly magnetic iron minerals are always present within the soil and areas of enhancement relate to increases in *magnetic susceptibility* and permanently magnetised *thermoremanent* material.

Magnetic susceptibility relates to the induced magnetism of a material when in the presence of a magnetic field. This magnetism can be considered as effectively permanent as it exists within the Earth's magnetic field. Magnetic susceptibility can become enhanced due to burning and complex biological or fermentation processes.

Thermoremanence is a permanent magnetism acquired by iron minerals that, after heating to a specific temperature known as the Curie Point, are effectively demagnetised followed by re-magnetisation by the Earth's magnetic field on cooling. Thermoremanent archaeological features can include hearths and kilns and material such as brick and tile may be magnetised through the same process.

Silting and deliberate infilling of ditches and pits with magnetically enhanced soil creates a relative contrast against the much lower levels of magnetism within the subsoil into which the feature is cut. Systematic mapping of magnetic anomalies will produce linear and discrete areas of enhancement allowing assessment and characterisation of subsurface features. Material such as subsoil and non-magnetic bedrock used to create former earthworks and walls may be mapped as areas of lower enhancement compared to surrounding soils.

Magnetic survey is carried out using a fluxgate gradiometer which is a passive instrument consisting of two sensors mounted vertically 1m apart. The instrument is carried about 30cm above the ground surface and the top sensor measures the Earth's magnetic field whilst the lower sensor measures the same field but is also more affected by any localised buried field. The difference between the two sensors will relate to the strength of a magnetic field created by a buried feature, if no field is present the difference will be close to zero as the magnetic field measured by both sensors will be the same.

Factors affecting the magnetic survey may include soil type, local geology, previous human activity, disturbance from modern services etc.

GSB PROSPECTION Ltd

Celebrating over 25 years at the
forefront of archaeological geophysics

sumo Survey Services

[redacted]

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Registered Office: Unit 8 Hayward Business Centre, New Lane, Havant, Hampshire, PO9 2NL

Appendix EDP 4
Trial Trench Evaluation Report

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SCMG20

SNOW CAPEL, MATSON, GLOUCESTERSHIRE

ARCHAEOLOGICAL TRIAL TRENCHING

commissioned by Edward Ware Homes and Bromford Developments Ltd

January 2021

HEADLAND ARCHAEOLOGY

REGISTERED ORGANISATION CIfA

SNOW CAPEL, MATSON, GLOUCESTERSHIRE

ARCHAEOLOGICAL TRIAL TRENCHING

commissioned by Edward Ware Homes and Bromford Developments Ltd

January 2021

This report adheres to the quality standard of ISO 9001:2015

PROJECT INFO:

HA Project Code **SCMG20** / NGR **SO 8500 1420** / Parish **Matson** / Local Authority **Gloucestershire County Council** / OASIS Ref. **headland4-411065** / Archive Repository **Gloucester City Museum**

[redacted]

[redacted]

HEADLAND ARCHAEOLOGY

part of the RSK Group

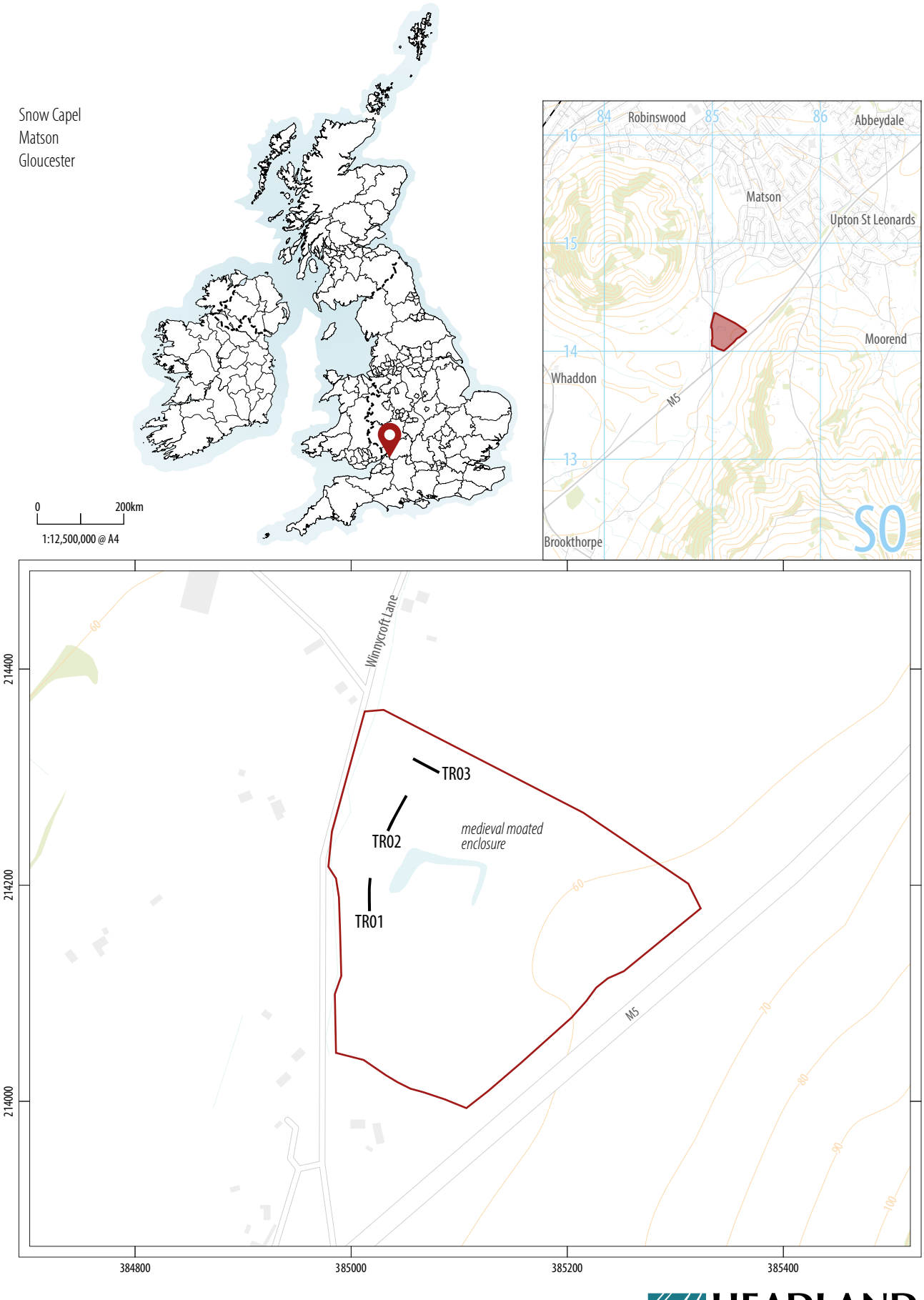
REGISTERED ORGANISATION CIfA

PROJECT SUMMARY

Headland Archaeology (UK) Ltd conducted a trial trench evaluation on land at Snow Capel, Matson, Gloucestershire. This evaluation, conducted between 14th December to 15th December 2020, was commissioned by Edward Ware Homes and Bromford Developments Ltd to assess the potential for any archaeological remains related to the Medieval Moated Enclosure, the extent of the made ground deposited during the M5 construction works and to investigate a boundary ditch, visible on Ordnance survey maps and as a geophysical anomaly. Three trenches were excavated; all of which were archaeologically sterile and uncovered several layers of made ground and redeposited natural. Made ground and a tree were believed to be in the location of the ditch, suggesting that it had been filled during the M5 construction.

CONTENTS

LIST OF ILLUSTRATIONS



HEADLAND ARCHAEOLOGY

[redacted]

ILLUS 1 Site location

SNOW CAPEL, MATSON, GLOUCESTERSHIRE

ARCHAEOLOGICAL TRIAL TRENCHING

1 INTRODUCTION

Headland Archaeology was commissioned by Edward Ware Homes and Bromford Developments Ltd (the client) to carry out the required archaeological works on land at Snow Capel, Matson, Gloucestershire. The evaluation was to assess the potential for the survival of any archaeological remains related to the Medieval Moated Enclosure, the extent of the made ground deposited during the M5 construction works and to investigate a boundary ditch, visible on Ordnance survey maps and as a geophysical anomaly. The trial trenching, conducted between 14th December to 15th December 2020, comprised the excavation of three trenches. The nature of the evaluation was agreed between EDP, the clients consultant and Gloucestershire County Council Archaeology Service (GCCAS) (Written Scheme of Investigation (WSI), 2020).

1.1 SITE LOCATION AND DESCRIPTION

Underlying geology consists of Blue Lias Formation and Charmouth Mudstone Formation. There were no superficial deposits recorded (BGS, 2020).

1.2 ARCHAEOLOGICAL BACKGROUND

An undated moated site (Sneedham's Green) is located within the site boundary. The moated site is designated a scheduled monument (monument number 1019399).

The monument includes the known extent of the Sneedham's Green moated site situated on low lying ground approximately 2km south east of the centre of Gloucester. It includes a sub rectangular moat enclosing an island which measures 66m by 42m, and which may originally have been as large as 66m by 80m, orientated north-south. The moat is 14m wide at its widest point, 8m at its narrowest and up to 1.5m deep. Cropmarks on aerial photographs indicate that the east arm of the moat formerly extended a further 42m south and incorporated a causeway in the centre of the arm.

Earthworks on the island represent agricultural features, however it is possible that the foundations of structures survive as buried features. The date at which the moated site was constructed is not clear, although it is likely to have been built during the main period of moat building, between 1250 and 1350.

Aerial photos taken in 1969 during the construction of the M5 motorway show that the entire site, including the moated site, was disturbed. It was during this period that the modern field layout was created, by amalgamating earlier fields into one. Modern material from the construction was also spread across the development site, forming a thick deposit. Ridge and furrow and other earthworks were once present in the site, as depicted on aerial photographs of the 1950s and 1960s. these were evidently removed when the site was disturbed during the M5 construction.

A geophysical survey (GSB, 2017) was undertaken on the site in January 2017. No anomalies of archaeological interest were identified. A number of weak trends of uncertain origin and an old field boundary were identified. The boundary ditch recorded on the geophysical survey, was linked to the Moat ditch. Therefore high potential was noted for palaeoenvironmental deposits relating to the Moat use. There were a large number of ferrous anomalies to the east of the moated site and whilst they appear modern, an association with the former cannot be ruled out.

Geotechnical investigations undertaken in 2017, found evidence for made ground to approx. 2m below current ground level across most of the site, surrounding the moated enclosure. This appears to comprise construction phase material from the M5 excavation in the 1960's, overlying buried topsoil.

ILLUS 2–3 East facing section of Trench 1, area of boundary ditch

1.3 AIMS AND OBJECTIVES

The objectives of the evaluation are as follows:

- To establish the location, extent, nature and date of archaeological features or deposits that may be present within the areas proposed to be disturbed during the development;
- To establish the integrity and state of preservation of archaeological features or deposits that may be present within the areas proposed to be disturbed during the development;
- To investigate the linear boundary identified on the Geophysical survey and to investigate the potential for and preservation of palaeoenvironmental remains; To inform the planning authority;
- To assist in developing a mitigation strategy should remains of significance be present on the site; and
- To produce and deposit a satisfactory archive and disseminate the results of the work via grey-literature reporting and publication as appropriate.

ILLUS 4 North facing shot of Trench 1, area of boundary ditch

2 METHODOLOGY

2.1 SITE WORKS

The three trenches were set out using a Trimble Global Navigation Satellite System equipped for Real Time Kinematic Survey. A Cable Avoidance Tool (CAT) was used to scan the trenches in advance of opening. As per the Written Scheme of Investigation (Headland Archaeology, 2020) all works were conducted with an 8-tonne tracked excavator, fitted with a flat-bladed ditching bucket. The machine excavation was directed under archaeological supervision down to the top level of the natural geology within the trenches or a maximum depth of 2m.

2.2 RECORDING

All recording followed CIfA Standards and Guidance for Conducting Archaeological Evaluations (2020) and methodology outlined in the WSI. The excavated contexts were recorded in plan and section with details of location, composition, and dimensions documented using the Headland Archaeology pro forma paper sheets. All contexts were given unique numbers. Digital images were taken with a camera using a graduated metric scale. An overall site plan, including post-excavation plans of each trench with spot heights, was recorded digitally using differential GPS using standard Headland Archaeology methodology. The site plan is accurately linked to the National Grid.

2.3 REPORTING AND ARCHIVES

All aspects of reporting and archive will be undertaken in accordance with guidelines published by the CIfA on behalf of the Archaeological Archives Forum (July 2007). Final report contents and format will be in line with CIfA and Gloucestershire County Council Archaeology Service (GCCAS) requirements. Copies of the report will be sent to the client for onward transmission to the local planning authority; copies (paper & electronic) will also be submitted to the HER Manager, to be uploaded to OASIS.

3 RESULTS

Three trenches measuring 30mx2m (TR1), 50mx2m (TR2) and 30mx2m (TR3) were excavated in the north-west of a single pasture field (Illus 1). The trenches were located to the west and north-west of a medieval moated enclosure. The field generally sloped from east to west, with an obvious rise of approximately 2m between the moated enclosure and M5 fencing. The enclosure measured approximately90m by 50m.

Trench 3 was moved 27m to the north west from its original location due to the raised area of the field, suggesting a large depth of made ground. In order to locate undisturbed ground, the trench was moved to a lower area and excavated until a depth of 2m of made ground was reached.

ILLUS 5 South-east facing section of Trench 2 **ILLUS 6** South facing section of Trench 3

A layer of mid reddish brown silty clay topsoil was present across all three trenches, measuring 0.25m in Trench 1, 0.22m in Trench 2 and 0.20m in Trench 3.

The stratigraphy of Trench 1 comprised a 0.20m thick layer of dark grey silty clay etc (0102), which overlay 0.45m of light yellow grey clay. These deposits overlay 0.10m of dark grey brown silty clay (0104). This layer appeared to be the relict topsoil identified by the geotechnical investigations, suggesting the overlying layers were redeposited natural deposits.

Approximately 12m from the south end of the trench, there was a deposit of dark brown grey silty clay, which measured over 2m wide and more than 1m deep. A large tree and root system was noted in this area, along with CBM and land drain fragments. This deposit did not appear to fill a cut; however it was located in the area identified as the boundary ditch. Given the tree and modern finds in this area, it is likely that the ditch was graded and backfilled during the works on the M5.

Trench 2 comprised a 0.30m thick layer of mid red brown silty clay topsoil, which directly overlay a 0.50m thick layer of dark grey silty clay. A layer of light yellow grey silt clay was recorded below this, representing 0.33m of redeposited natural. The underlying geology of this trench comprised light grey yellow clay, continuing from 10.5m below ground level. There was no evidence for a buried topsoil layer within this trench, therefore it is possible this was removed before the deposition of the made ground.

Trench 3 was moved to the west and shortened due to the presence of Overhead Power Lines and underground services. On the advice of the County Archaeologist and the Consultant it was agreed that the trench would be extended to identify the western extent of the made ground to a depth of 1.2m. Topsoil (0301) comprised the same mid red brown silty clay as the rest of the trenches and measured 0.20m thick. A 0.30m thick, dark grey silty clay was observed below the topsoil and overlay made ground deposits. A mid orange brown silty clay (0303) was observed across the trench, measuring between 0.60m and 0.85m to the east. This deposit overlay an intermittent, 0.10m thick layer of dark grey brown silty clay, which may represent the possible buried topsoil layer found in the test pits. This layer was not present across the eastern half of the trench, where a mottled and mixed grey yellow and dark grey blue clay layer was recorded. This deposit continued below 2m by the eastern end of the trench and overlay the natural geology. This deposit likely represents the bulk of the made ground deposits, which have created the raised ground to he north and west of the moated site.

4 CONCLUSION

The results of the evaluation at Snow Capel, Matson, demonstrated the extent of the deposition of made ground during the construction of the M5 in the 1960's. The overburden measured between 1m and more than 2m across the site, deepening in the area of raised ground to the north.

Previous geotechnical investigations had suggested areas of potential undisturbed ground to the west of the moated enclosure, however Trench 1 found that this was not the case. The redeposited clay and tree in Trench 1 were found in the same location as the boundary ditch. It is likely that this was dug out and backfilled during the works, the tree included a full root system so is likely to have been levelled during the works. There was no evidence of any earlier ditch deposits, or original boundary ditch cut.

The possible buried topsoil was not present across the whole site. It is possible that this layer, identified during the borehole survey, was another redeposited layer. However if it this layer represented a buried topsoil, it may have been removed prior to the deposition of the made ground. In Trenches 1, 2 and the western half of Trench 3, where natural deposits were reached, there was no evidence of archaeological features.

5 REFERENCES

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6 APPENDICES

APPENDIX 1 SITE & CONTEXT REGISTERS

Appendix 1.1 Trench/Area register

TR01	L (M)	W (M)	MIN D (M)	MAX D (M)
	30	2	0.5	1.25
Context	Description			*D BGL (m)
0101	Topsoil - Mid reddish brown silty clay			0.00–0.25
0102	Made ground - Dark grey silty clay with CBM, wood, Fe			0.25–0.45
0103	Redeposited Natural - Light yellow grey clay.			0.45–0.90
0104	Buried Topsoil - Dark brownish grey silty clay			0.90–1.00
0105	Natural - Light orange and dark blue clay			1.00–>1.10
0106	Made ground - Dark grey silty clay with CBM and a tree stump with radiating roots.			0.25–1.25
Summary: No archaeology present.				

TR02	L (M)	W (M)	MIN D (M)	MAX D (M)
	50	2	0.95	1.55
Context	Description			*D BGL (m)
0201	Topsoil - Mid reddish brown silty clay			0.00–0.22
0202	Made ground - Dark grey silty clay			0.22–0.72
0203	Redeposited Natural - Light yellow grey clay.			0.72–1.05
0204	Natural - Light yellowish grey clay			1.05–>1.10
Summary: No archaeology present.				

TR03	L (M)	W (M)	MIN D (M)	MAX D (M)
	30	2	1.08	1.87
Context	Description			*D BGL (m)
0301	Topsoil - Mid reddish brown silty clay			0.00–0.20
0302	Made ground - Dark grey silty clay			0.20–0.50
0303	Redeposited natural - Mid orange grey clay.			0.50–1.35
0304	Buried Topsoil - Dark brownish grey silty clay			1.35–1.45
0305	Natural - Light yellowish grey clay			1.45–>1.67
0306	Redeposited Natural - Light orange and dark blue clay			1.67–>1.87
Summary: No archaeology present.				

Appendix 1.2 Photo register

PHOTO	FACING	SHOWING	DESCRIPTION
001	–	–	ID shot
002	N	TR01	TR01 pre ex
003	S	TR02	S facing shot of trench
004	W	TR03	E facing section of trench
005	W	TR04	E facing section of trench
006	N	TR05	N facing section of trench
007	W	TR06	Overhead shot of 'ditch' and tree
008	N	TR07	Overhead shot of 'ditch' and tree
009	NE	TR02	TR02 pre ex
010	E	TR03	TR03 pre ex- original position
011	N	TR04	S facing section of trench
012	NE	TR02	NE facing shot of trench
013	SW	TR03	SW facing shot of trench
014	SE	TR04	NW facing section of trench
015	NW	TR05	SE facing section of trench
016	N	TR03	S facing section of trench
017	E	TR03	E facing shot of trench
018	W	TR03	W facing shot of trench
019	X	TR03	VOID
020	S	TR03	N facing section of trench
021	N	TR03	S facing section of trench
022	N	TR03	S facing section of trench
023	N	TR03	S facing section of trench
024	N	TR03	S facing section of trench
025	S	TR03	N facing section of trench
026	N	TR02	N facing shot of land drain
027	S	TR03	S facing section of trench- collapse
028	NE	TR02	NE facing shot of trench
029	SE	TR01	Shot of backfill
030	NE	TR02	Shot of backfill
031	W	TR01	E facing section of tree

APPENDIX 2 OASIS DATA COLLECTION FORM: ENGLAND

OASIS ID: headland4-411065

PROJECT DETAILS	
Project name	Snow Caple, Matson, Gloucester
Short description of the project	Three trenches to investigate an anomaly on the geophysical survey, thought to be a ditch next to a moated enclosure.
Project dates	Start: 14-12-2020 End: 15-12-2020
Previous/future work	Yes / Not known
Type of project	Field evaluation
Site status	None
Current Land use	Cultivated Land 3 - Operations to a depth more than 0.25m
Monument type	moated enclosure medieval
PROJECT LOCATION	
Country	England
Site location	Gloucestershire Gloucester, Gloucester Snow Capel, Matson, Gloucestershire
Postcode	GL4 6EQ
Site coordinates	SO 8493 1426 51.826286–2.2187639 51 49 34 N 002 13 07 W Point
Height OD / Depth	Min: 1.25m Max: 1.87m
PROJECT CREATORS	
Name of Organisation	Headland Archaeology (UK) Ltd
Project brief originator	The Environmental Dimension Partnership Ltd
Project design originator	Headland Archaeology (UK) Ltd
Project director/manager	Ailsa Westgarth
Project supervisor	Beth Doyle
PROJECT ARCHIVES	
Digital Archive recipient	Gloucester City Museum
Digital Media available	"Survey"
Paper Archive recipient	Gloucestershire
Paper Media available	"Photograph","Plan","Report","Survey"

HEADLAND
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[redacted]

Images

Image EDP 1: View to the north across the western end of the moat illustrating its setting including the presence of modern houses to the north-west.

Image EDP 2: View to the north-east across the eastern end of the moat across the site illustrating the difference in ground level between the land at the moat and that to the east.

Image EDP 3: View south-west across the moat from the higher ground to the east illustrating how the moat is set within a gentle basin within the site and also its more 'rural' setting to the south.

Image EDP 4: View to the north-west across the moat illustrating its setting, notably the presence of nearby houses and Robin Hill.

Image EDP 5: View to the north-west across the northern part of the site illustrating how it is located close to houses and light industrial development at the urban edge.

Image EDP 6: View west across the common land at Sneedham's Green illustrating its appearance.

Image EDP 7: View east to the site from Sneedham's Green with only a partially screened view to the moat possible and the historic connection between it and Green only slightly appreciable.

Plans

Plan EDP 1 Designated Heritage Assets
(edp3746_d011a 14 May 2021 MH/RS)

Plan EDP 2 HER Records
(edp3746_d012a 14 May 2021 MH/RS)

Plan EDP 3 Historic Maps
(edp3746_d013a 14 May 2021 MH/RS)

Plan EDP 4 LiDAR Data
(edp3746_d014a 14 May 2021 MH/RS)

Plan EDP 5 Aerial photographs
(edp3746_d015a 14 May 2021 MH/RS)

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Site Boundary

500m Detailed Study Area

Grade I Listed Building

Grade II Listed Building

Grade II* Listed Building

Scheduled Monument

N

1245088

1245087

1245086

1408513

1447092

1019399

1090748

1155001

1407932

500m

Golf Course

Recreation Ground

Sneedham's Green

Penny Patch

Snow Capel House

Green Farm

Snow Capel Farm

Hill Farm

Brimps Cottage

Rosemary Lodge

Hotel

Brimps House

Belmont House

Croft Farm

Windsor Cottage

Range

Gloucester Services

Services

Sud Brook

RED WELL ROAD

MATSON AVENUE

BEACON RD

BAZELEY ROAD

BIRCHALL AVE

HILL HAY RD

HAYCROFT DRIVE

ASHCROFT CL

BARLEYCROFT CL

PAINSWICK ROAD

FERN LAWN

THE LAWNS

CORNCROFT LANE

BIRCHALL LANE

RANCE LANE

UPTON HILL

B4073

SNEEDHAMS RD

MATSON LANE

CALEDONIAN ROAD

WINNYCROFT LANE

UPTON LANE

M5

Track

Path

Drain

FB

FBs

CH

PW

Iss

Sks

0 100 200 300 400 500 m

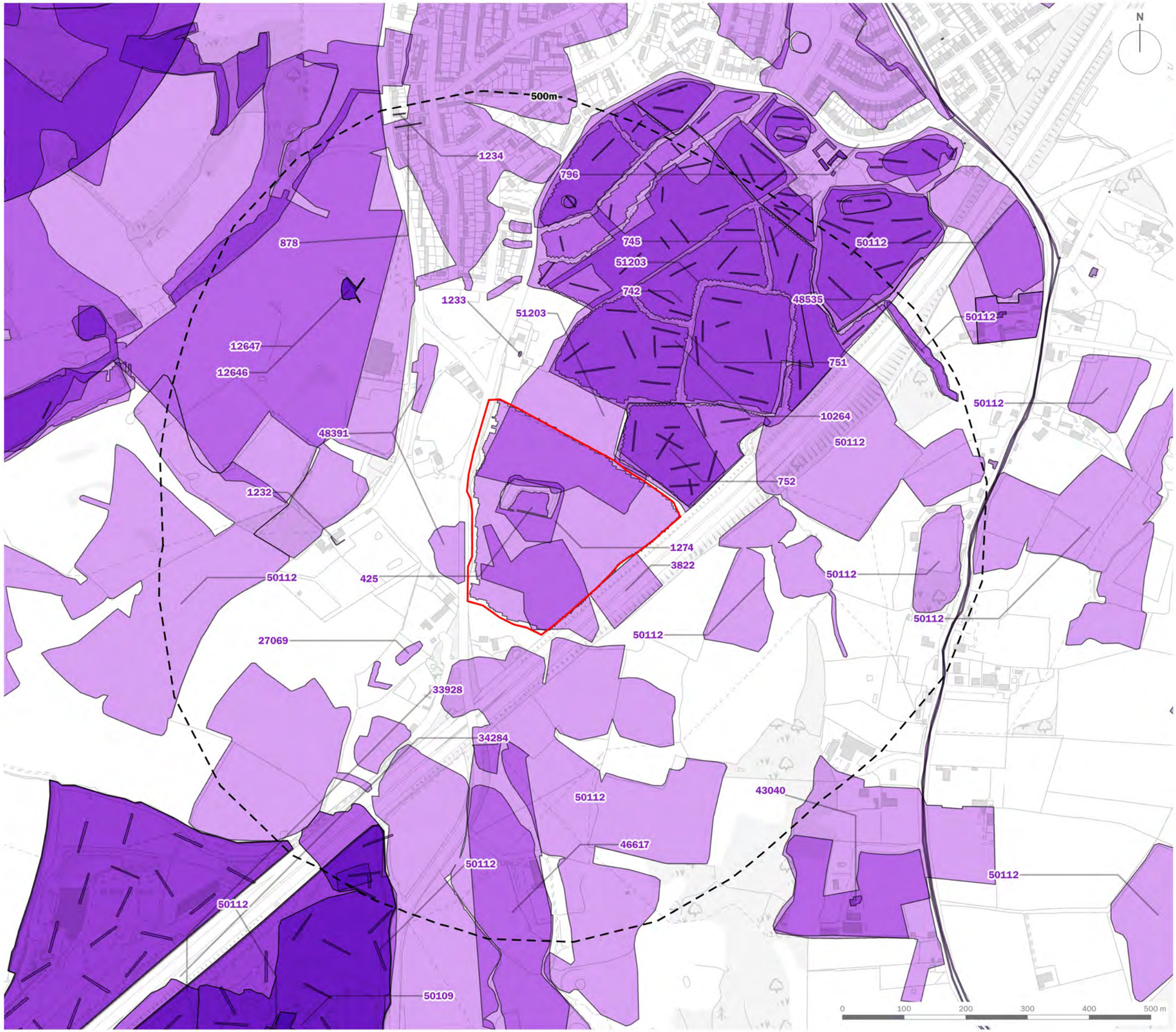
client
Edward Ware Homes and Bromford Developments Ltd

project title
Land at Snow Capel Farm, Matson, Gloucester

drawing title
Plan EDP 1: Designated Heritage Assets

date	**14 MAY 2021**	drawn by	**MH**
drawing number	**edp3746_d011a**	checked	**RS**
scale	**1:6,000 @ A3**	QA	**RB**

the environmental dimension partnership



Site Boundary

500m Detailed Study Area

HER Data

client
Edward Ware Homes and Bromford Developments Ltd

project title
Land at Snow Capel Farm, Matson, Gloucester

drawing title
Plan EDP 2: HER Records

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drawing number	edp3746_d012a	checked	RS
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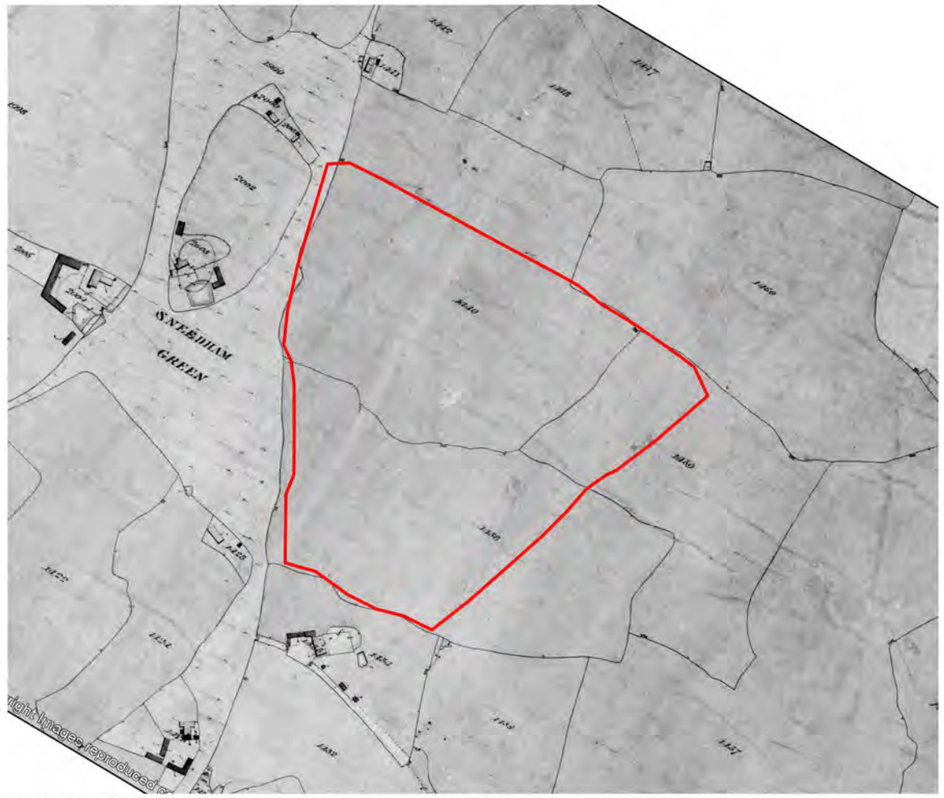
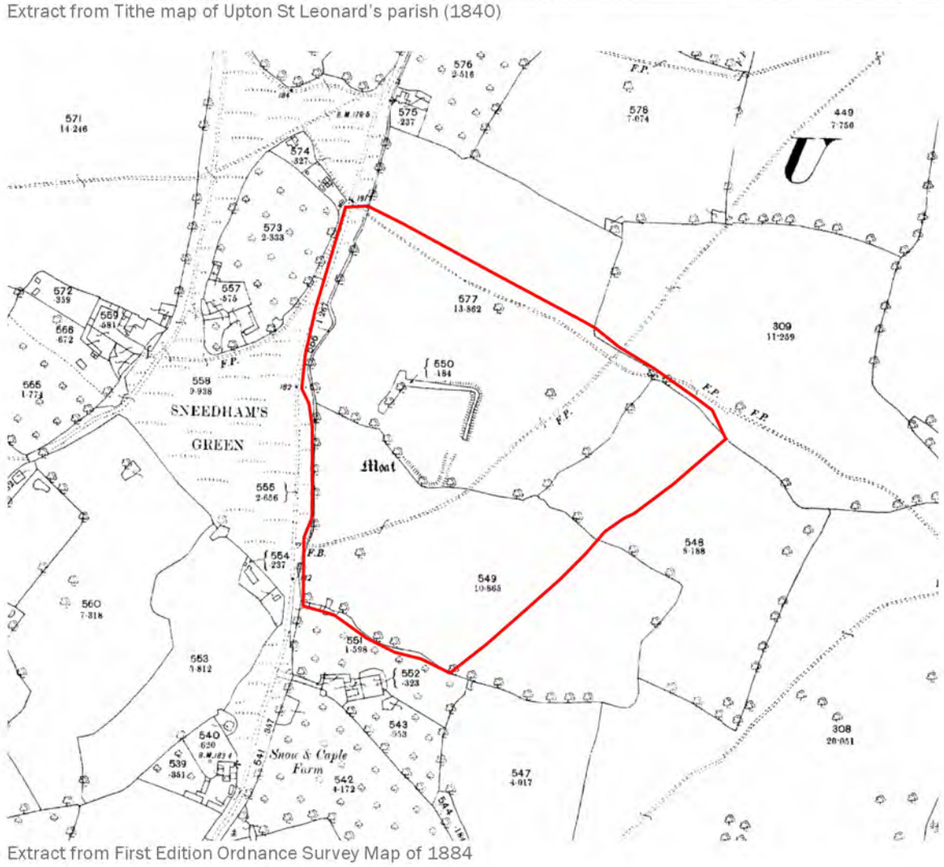
edp the environmental dimension partnership



Extract from Tithe map of Upton St Leonard's parish (1840)



Extract from First Edition Ordnance Survey Map of 1884

0 50 100 150 200 250 m

Approximate Site Boundary

N

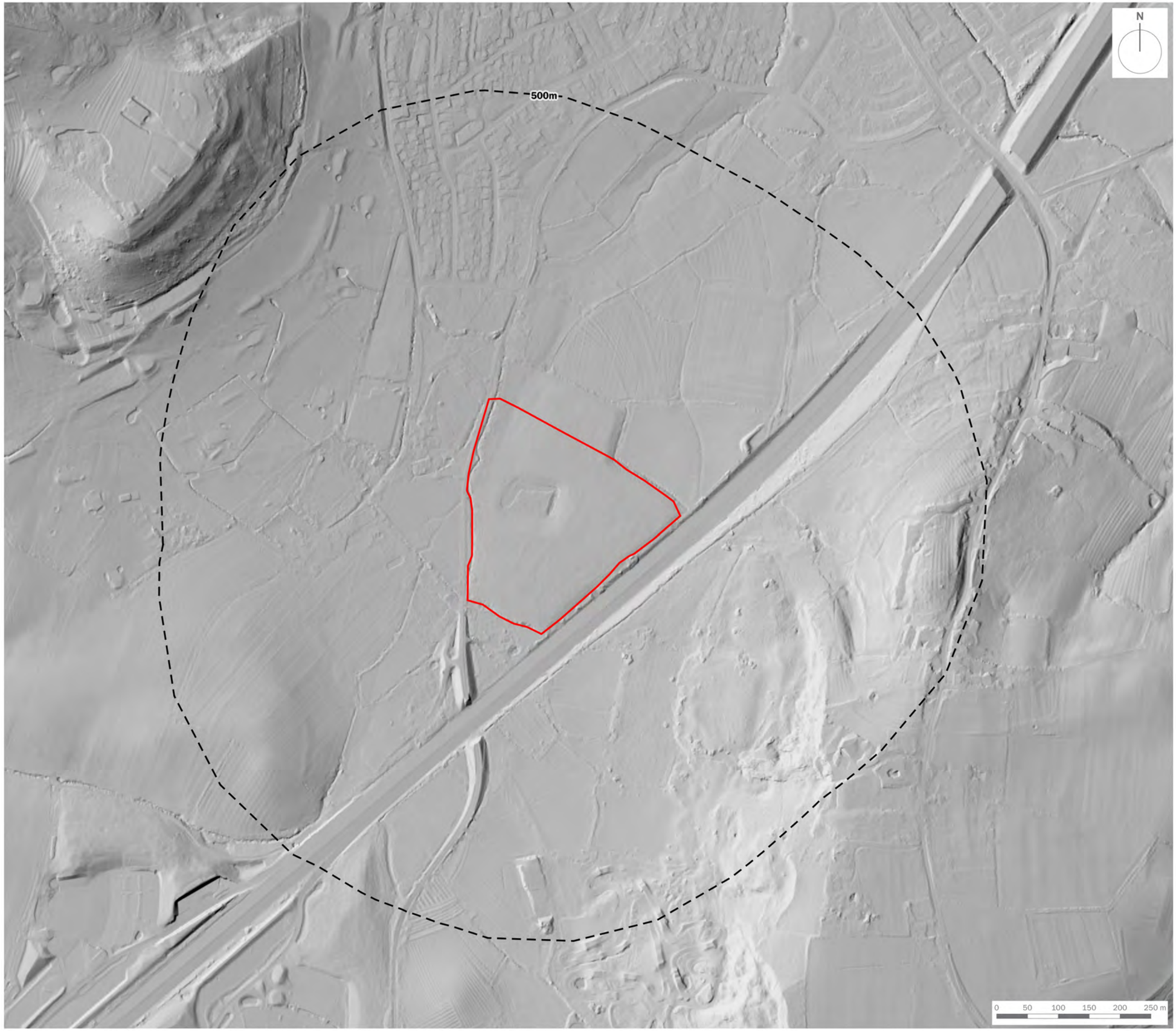
client
Edward Ware Homes and Bromford Developments Ltd

project title
Land at Snow Capel Farm, Matson, Gloucester

drawing title
Plan 3: Historic Maps

date	**14 MAY 2021**	drawn by	**MH**
drawing number	**edp3746_d013a**	checked	**RS**
scale	**1:5,000 @ A3**	QA	**RB**

the environmental dimension partnership



Site Boundary

500m Detailed Study Area

LiDAR 1m DTM Multidirectional Hill Shade

client
Edward Ware Homes and Bromford Developments Ltd

project title
Land at Snow Capel Farm, Matson, Gloucester

drawing title
Plan EDP 4: LiDAR Data

date	**14 MAY 2021**	drawn by	**MH**
drawing number	**edp3746_d014a**	checked	**RS**
scale	**1:6,000 @ A3**	QA	**RB**

edp the environmental dimension partnership

Extract from Aerial photograph taken 12 Dec 1946 (RAF/CPE/UK/1897)

Extract from Aerial photograph taken 09 April 1969 (OS/69097)

0 50 100 150 200 250 m

Approximate Site Boundary

N

client
Edward Ware Homes and Bromford Developments Ltd

project title
Land at Snow Capel Farm, Matson, Gloucester

drawing title
Plan EDP 5: Aerial Photographs

date	**14 MAY 2021**	drawn by	**MH**
drawing number	**edp3746_d015a**	checked	**RS**
scale	**1:6,000 @ A3**	QA	**RB**

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Snow Capel, Matson Water Environment Assessment: Tier 2

Final Report

May 2021

www.jbaconsulting.com

edwardwareHomes

JBA Project Manager

[redacted]
Salts Mill
Victoria Road
Shipley BD18 3LF

Revision History

Revision Ref/Date	Amendments	Issued to
15/03/2021	Draft Interim Report	[redacted]
14/05/2021	Final Report	

Contract/

This report describes work commissioned by Finlay Jenkins, on behalf of Edward Ware Homes Limited, by an email dated November 12th, 2020. Eleanor Williams and Michael McDonald of JBA Consulting carried out this work.

Prepared by ..... [redacted]

Senior Chartered Hydrogeologist

..... [redacted]

Hydrogeologist

Reviewed by [redacted]

Technical Director

Purpose

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Executive Summary

This report has been prepared by JBA Consulting, on behalf of Edward Ware Homes and Bromford Developments Ltd and is a Tier 2 water environment assessment of the moat associated with the scheduled monument, Moated site at Sneedham's Green, 220 m north east of Green Farm (Historic England ref. 1019399) located at Land at Snow Capel Farm, Matson, Gloucester in support of a planning application for residential development.

The potential for impacts upon the significance of the scheduled monument have been considered in accordance with Historic England guidance: Preserving Archaeological Remains – Decision-taking for Sites under Development (HE, 2016) and, in particular, adopting the tiered assessment approach set out in Appendix 3 of th regarding the moat's water environment.

In summary, the assessment concludes that the proposed residential development could result in a fall in the water level in the moat, potentially resulting in the drying out of the moat and a negative impact upon the significance of the scheduled monument.

The desk-based review, alongside an evaluation of site-specific data, indicates that the moat is supported by a combination of surface water inputs, comprising direct rainfall and rainfall-runoff, and shallow groundwater inputs, most likely comprising near-surface seepage.

The potential for a reduction in water inputs to the moat from the proposed development includes decreased surface water runoff, due to the installation of site drainage such that runoff may no longer reach the moat, and reduced groundwater seepage, due to the excavation of ground surface material, depending on the engineering approach to foundation des e drying of the moat water body unless a supplementary water supply is incorporated into the development design which can permit maintenance of current moat water levels.

Nonetheless, given the lack of clear evidence for the current supply of the moat by a groundwater s hydrochemical signature of the water that might be used in future to maintain moat water levels and, therefore, whether the top up source is derived from surface water or groundwater.

In conclusion, the assessment has not identified any reason why potential effects on the moat water level from the proposed development could not be appropriately mitigated to safeguard the continued existence of the moat water body.

Contents

1 Introduction

1.1 Background

[redacted] Snow Capel comprises a site for a proposed residential development which incorporates a Scheduled Monument, "Moated Site at Sneedham's Green". The monument consists of the extant remains of a medieval moated site which is water filled and may potentially represent a source of waterlogged archaeological deposits. It is a designated heritage asset in planning terms and, therefore, any impacts should be considered in the context of the relevant statutory provisions and as set out in the National Planning Policy Framework (NPPF). This report forms part of the assessment of any potential impacts on the Scheduled Monument and will inform the development proposals for the surrounding area in the future. It should be read alongside the Archaeological and Heritage Assessment (Environmental Dimension Partnership (EDP), 2021[1]).

1.2 Aims

Historic England's (HE's) guidance document for sites under development[2] includes a specific evaluation methodology in relation to water environment assessment techniques in Appendix 3[3]. This adopts a tiered approach to assessment, the need for which depends on the likely scale and significance of the potential risks involved.

This report constitutes a Tier 2 water environment assessment in accordance with the HE assessment guidance which provides:

"a basic qualitative assessment of water balance to identify groundwater levels, flow directions and identify key potential influences on the groundwater system".

The report first presents the details of the Moated Site (Section 2) and the approach adopted for the HE Tier 2 assessment (Section 3). Baseline data for the Moated Site in terms of the hydrological and hydrogeological setting are given in Section 4. This is supplemented by monitoring from ground investigation data to consider the inputs to and outputs from the groundwater system, and the likely water supply mechanism to the Moated Site. A conceptual understanding of the Moated Site is presented in Section 5 based upon the findings of this investigation, which provides an evaluation in the context of the [redacted] Section 6.

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[1] EDP, 2021. Lane at Snow Capel Farm, Matson Gloucester. Archaeological and Heritage Assessment. April 2021.

[2] https://historicengland.org.uk/images-books/publications/preserving-archaeological-remains/

[3] https://historicengland.org.uk/images-books/publications/preserving-archaeological-remains/heag100d-appendix3-water-environment-assessment-techniques/

2 Site Information

2.1 Moat Details

[redacted] Site at Sneedham's Green consists of the known extent of a medieval moated site; a sub-rectangular or trapezoidal moat enclosing an island. The northern side and parts of the western and eastern sides of the moat are extant, enclosing an area c. 66 m by 42 m which is open on the south side. The extant moat is c. 14 m at its widest point, c. 8 m at its narrowest (EDP, 2021) and c. 1 m deep. It is water-filled and may contain waterlogged archaeological deposits, potential related to its medieval history and usage.

As a scheduled monument the moated site is of the 'highest significance' in terms of NPPF. A detailed description of the moat and its history is set out in the accompanying Archaeological and Heritage Assessment (EDP, 2021). In terms of the asset's significance [redacted] the EDP assessment states that:

'The scheduled monument derives its significance primarily from its archaeological interest as defined by the extant moat, the deposits within it and any buried archaeological remains within the scheduled area that are related to the moated site. The monument also has a degree of historic interest as it illustrates the nature and appearance of the medieval landscape in the locality and is associated with the history of the De Sneedham family, the history of settlement at Sneedham and with the general history of the medieval aristocracy of Gloucester.'

Details of the historic and current archaeological mapping for the site are set out in the EDP (2021) report.

Figure 1 - Moated Site at Sneedham's Green [redacted]

The moat remains lie within a 'bowl' in the landscape formed by placement of material from the construction of the adjacent M5 motorway, and its edges are overgrown with vegetation. Fluctuating water levels have, at times, flooded the surrounding area, and have resulted in a recent drainage ditch being cut west towards the lane-side ditch to alleviate this.

The scheduled area extends beyond the extant part of the monument to the south, encompassing the former entirety of the moat and a 2 metre buffer around it.

The southern extent of the former moated enclosure is located underneath a layer of overburden deposited during the construction of the M5 motorway, although it is understood that this section of the moat had already been incorporated into a later post-medieval field system that crossed the site and which was infilled when the site was cleared prior to the construction of the M5 (EDP, 2021; Figure 4).

Within this area, the archaeological and heritage assessme s only a low potential for any well-preserved archaeological remains r southern arm of the moat (EDP, 2021), and it is apparent from aerial photography that the monument was disturbed during the motorway's construction. The ground surface was clearly scoured, both within the moated enclosure and around it, which is likely to have impacted upon buried remains. Further detail on the treatment of the moat during the 20th century is given in the Archaeological and Heritage Assessment (EDP, 2021).

This report will form part of a tranche of assessments which will help to inform and enable consideration of the potential for development to impact on the significance of the Scheduled Monument. It will be considered alongside other specific heritage assessments, including archaeological trial t ent of the setting of the heritage asset (EDP, 2021).

2.2 Proposed Development

The proposal is for a residential led scheme with associated access road, landscaping and infrastructure. The proposed site plan is not yet fixed although is being influenced by both this study and the archaeological assessment (EDP, 2021).

3 Historic England Assessment Tiered Approach

3.1 Introduction

[redacted]n sets out the main requirements of the HE tiered approach and the responses to the key questions posed by each tier of assessment.

3.2 Tier 1 Assessment

Where the future preservation of the Moated Site is being considered for the long-term sustainability of the retention of the features, the HE Tier 1 Assessment aims to address the following questions:

- *"Are the deposits, in which significant waterlogged archaeological remains are located, hydraulically connected to the wider groundwa[redacted]*
- *"Are these remains likely to be located under the water[redacted] the past?"*

The information which supports this evaluation comprises:

- A review of published maps (geology, heritage boundaries/elevations, watercourse elevations, drainage features) and borehole logs; and
- On-site observations and measurements about channel depths and vegetation growth.

This review enables the completion of an initial conceptual model of the water environment at the Moated Site, including [redacted] The conceptual model is presented in Section 5 and addresses the questions above.

With regards to the first question above, it is not currently known if there are significant waterlogged archaeological remains in the base of the moat, since no intrusive surveys have been carried out in this area. It is the existence of the moat itself that is of significance, but the risk cannot be taken that significant waterlogged remains do not exist and, therefore, it is important that the current hydrological conditions of the Moated Site are not derogated by the proposed development. Nonetheless, the moat is likely to have been a waterlogged feature for some or most of its history, assuming that a natural water supp[redacted]ily[redacted]ecent anecdotal information also indicates that it has been inundated in recent years.

The HE guidance also states:

"To appreciate whether such levels are likely to be sustained, an assessment of annual rainfall versus annual evaporation for the area is needed (data that are available on the Meteorological Office website). This indicates whether an area has a net positive effective rainfall that can infiltrate and feed into the local water system, or is an area of negative effective rainfall, where there is little water available to infiltrate into the local groundwater system"

An assessment of net effective rainfall is made in Section 4.4.

The outcomes of the Tier 1 assessment within this document, below, identified that more, site-specific, data are required, as part of a Tier 2 assessment.

3.3 Tier 2 Assessment

The aim of a Tier 2 assessment is to refine the first conceptual model with site-specific data, and to ask some more detailed assessment questions at minimal cost. The Tier 2 assessment aims to address the following questions:

- *"Will the deposits in which significant waterlogged archaeological remains are located be underwater all year?"*; and

- *"If not, what variation can be expected and what is influencing the variation (anthropogenic or natural)? And are these variations short-term or long-term / permanent?"*.

[redacted]only anecdotal information exists with regards to the first question, because site-specific monitoring data are only available for the Moated Site between December 2020 and April 2021. It is understood from anecdotal evidence that the remains are waterlogged year-round. A full annual cycle of monitoring data would be required to fully satisfy this question.

The monitoring data obtained to date are evaluated in Section 4 to review potential controls on groundwater levels and their variations, although these are limited to short-term data.

In addition, the available data are used to allow estimation of a qualitative review of water inputs for the Moated Site. This evaluation has helped to id[redacted]ferent mechanisms for water supply to the moat, outlined in Secti[redacted]

[redacted]

[redacted]

[redacted]

4 Water Environment Baseline

4.1 Introduction

[redacted]n sets out information about the baseline hydrological and hydrogeological conditions at the Moated Site.

4.2 Site Location, Topography and Land Use

The site is located on the southern edge of Gloucester, between Sneedham's Green to the west and the M5 to the south east (Map 1; Appendix A) and is centred on National Grid Reference (NGR) 385116 214169.

The current land use of the site is a pasture field which has also historically been the case according to historic mapping (back to 1888-1913). The bi[redacted]e locally was the construction of the M5 motorway in this area in 19[redacted]eld layout was created following the amalgamation of several f[redacted]tion of the motorway.

A topographic survey was carried out in January 2021 (Appendix B) by K.J. Hall Surveyors. Spot heights indicate that the moat edge itself lies close to 56.1-56.3 mAOD (above ordnance datum) and the land in the centre of the moat rises to ~56.7 mAOD.

The land is raised around the moat on the north, and southern sides to ~57.7 mAOD and is highest on the eastern side ~61.8 mAOD such that the moat is in a slight hollow. Overall, the site slopes down from the east to ~55.3 mAOD in the northwest, and the land falls away slightly to the northeast in the direction of surface water drainage. To the north west of the site, the land rises up to [redacted].

An estimate of moat depth of 1.5 m has previously been made from the archaeological interpretation, which indicates that the base of the moat lies at ~54.7 mAOD. In April 2021 a bathymetric survey of the moat was carried out by JBA Consulting (Appendix B), using a dipper approach to su[redacted]s across the water body without any disturbance to the moat bed, so as to avoid potential impacts to any unknown archaeological features which may preside at the base of the moat. In summary, the deepest part of the moat occurred in the southwestern arm, at 55.34 mAOD, somewhat shal[redacted]where across the moat. Heavy silting and vegetation may disguise the likely original depths.

4.3 Site Catchment and Hydrology

The site lies within the headwaters of the Sud Brook, a lower catchment tributary of the River Severn, which emerges close to the road at Snow Capel Farm, immediately southwest of the moat (Figure 1). This ditch flows northeast around the north (downgradient) side of the moat to join another tributary of the Sud Brook (NGR 385550 215300) before flowing north through Gloucester to join the Severn close to the intersection of the Severn with the Gloucester and Sharpness Canal.

There are numerous other mapped surface water features to the west of the Moated Site, at Sneedham's Green (Figure 1). The Ordnance Survey (OS) 25 Inch (1892-1914) mapping indicates these ponds have existed for many years. However, these lie outwith the surface water catchment for the moat as drainage from these areas is from the north/west of the drainage ditch to the Sud Brook. In addition, catchment delineation data from the Flood Estimation Handbook (FEH) suggests that these Sneedham's Green ponds drain to the west.

The site inspection, undertaken by JBA on February 17th, 2021, followed several weeks of wet winter conditions. The Sneedham's Green ponds contained water close to ground level. Water in the Sud Brook close to the Moated Site was flowing to the north east. In addition, the whole field containing the Moated Site was very wet underfoot, and there was a flow in

the small drainage 'channel' exiting the moat on its west side, which flows to join the roadside drainage ditch of the Sud Brook. This flow was estimated by eye at ~4 l/s.

In the Sud Brook, water levels were noted at 54.85 mAOD in February 2017 [redacted] 2017). Recent topographic survey mapping (T&P, 2020) indicates that Sud Brook water levels are similar, at ~55 mAOD, whilst water levels in the moat at the time were ~56.2 mAOD.

The water level within the moat has also been recorded at 56.166 mAOD (T&P, January 2021) and 55.97 mAOD (JBA, April 2021). From GIS analysis, the surface area of the water body is estimated to be ~1,946 m^2, and the surface water catchment area around the moat is ~25,400 m^2.

Catchment information has been accessed from the Flood Estimation Handbook (FEH) and, using the most applicable catchment outline for the site, th[redacted] here is estimated to be 0.356, which indicates that groundwater m[redacted]nt of surface water flow.

River levels near the site are monitored at Bondend Road on the River Twyver, 1.9 km north east of the site[4] (Figure 1) and at Cheyney Close Level on the Sud Brook[5] and indicate a rapid, flashy response to rainfall events.

There is no surface water flood risk indicated for the site by the EA flood mapping[6].

4.4 Climate

The Flood Estimation Handbook (FEH) CD-ROM includes long-term average rainfall data for catchments in the UK. For the catchment comprising the site the Standard Annual Average Rainfall (SAAR) is 697 mm/yr for the period 1961 - 1990 (CEH, 2009).

Average annual rainfall (1961-1990) from a nearby gauging station (Chelt at Slate Mill) is 685 mm[7]. Other climatic data are available online e.g. rainfall data from Gloucester Weather[8]. In 2019, annual rainfall total was 681.4 mm whilst for 2020 was 1126.4 mm. Precipitation levels in January 2021, prior to the site inspection, were particularly wet, at 134.7 mm (roughly 20% of average annual total rainfall).

Values for potential evapotranspiration (PE) for 2009 are given for certain MORECS[9] squares across the UK. For the square closest to the Moated Site[10]), PE was 610-649 mm whilst actual evapotranspiration (AE) was 550-569 mm.

Comparing an approximate long-term average annual rainfall value of ~690 mm and an annual AE rate of ~550 mm, the net effective annual rainfall is ~140 mm. A net positive effective rainfall is therefore indicated, although it should be considered that this balance may not be positive in prolonged dry weather, or drought years.

4.5 Site Geology

The bedrock geology[11] underlying the Moated Site comprises strata of the Jurassic age Lias Group (Charmouth Formation), which consists of dark grey laminated shales, and dark,

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[4] https://riverlevels.uk/gloucestershire-upton-st-leonards-bond-end-road-lvl#.X6pfzGc3bcc

[5] https://www.gaugemap.co.uk/#!Map/Summary/16545/12273

[6] https://flood-map-for-planning.service.gov.uk/confirm-location?easting=383697&northing=218521&placeOrPostcode=gloucester

[7] https://nrfa.ceh.ac.uk/data/station/spatial/54026

[8] https://www.glosweather.com/climate

[9] https://www.metoffice.gov.uk/services/industry/data/specialist-datasets

[10] http://nora.nerc.ac.uk/id/eprint/6357/1/Hydrological_Review_2006.pdf

[11] http://mapapps2.bgs.ac.uk/geoindex/home.html

pale and bluish grey mudstones. There are no mapped geological faults close to the Moated Site. There are also no mapped superficial geological deposits at the Moated Site. Geology mapped for the Moated Site is illustrated in the Groundsure report (Intégrale, 2017).

To the north west of the site, on Robins Wood Hill, the conical-shaped hill comprises strata of the Whitby Mudstone Formation, Marlstone Rock Formation and the Dyrham Formation. To the south of the site, and east of the M5, lies limestone, argillaceous rocks and subordinate sandstones of the Lias Group and Inferior Oolite Group.

Soils at the Moated Site are mapped as slowly permeable, seasonally wet, slightly acid but base-rich loamy and clayey soils with impeded drainage and are of the Martock Association (GSB Prospection Ltd, 2017).

The nearest online borehole record (SO81SE20) is east of t with the M5 motorway[12] and indicates 0.3 m of Made Ground (g mestone gravel), overlying a silty clay, above the bedrock mudstone level (mbgl). Further along the M5 to the south west, another borehole log[13] indicates a much thicker extent of Made Ground, up to 10 m deep, comprising concrete clasts and limestone gravel.

An aerial photograph taken in 1970 (during the motorway construction works) shows the extent of disturbance, illustrating that the entire site area, including the area of the scheduled monument, was disturbed (EPD, 2017). The M5 works resulted in the infilling of part of the former moat (that had been incorporated into a post-medieval field boundary) and also associated earthworks. Some of the remains are likely to be capped by this modern overburden. It is ther re referred to as Made Ground, they are largely re-worked overburden of predominantly natural clay materials.

Other boreholes from previous ground investigations on the site (Appendix C) indicate the presence of 1-3.5 m thick gra lised soft clayey Alluvium, and a continuous stratum of variably weathered soft through to stiff to very stiff Lower Lias clay (Intégrale, 2017[14]). The Made Ground appears to thicken to the south of the Moated Site, in line with the understanding that additional material was placed here during the construction of the M5.

Additional boreholes were installed in 2018 (T&P, 2018) (Figure 2). WS101 south of the moat indicates that Made Ground exists to 2.4 mbgl (55.46 mAOD), and WS102 shows 3.1 m thickness of Made Ground (also to 55.46 mAOD). To the northeast of the moat, WS8 indicates 1.6 m thickness of Made Ground, down to 55.90 mAOD.

A more recent site ground investigation (December, 2020) (T&P) indicates similar thickness and composition of Made Ground, with the Mudstone Bedrock encountered below clay-dominated Made Ground, with rock head occurring in some boreholes, typically 56 mAOD south of the moat (WS203, WS206 and WS207), 54.6 mAOD north of the moat and 55 mAOD west of the moat. The boreholes are completed with a cap within the piezometer and a cap flush to the ground surface.

Two further boreholes have more recently been drilled on the south and east sides of the moat (March, 2021; T&P), where Made Ground deposits are at their thickest. They indicate that, here, rock head is at ~57.5 mAOD.

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[12] http://scans.bgs.ac.uk/sobi_scans/boreholes/19329370/images/19328817.html

[13] https://webservices.bgs.ac.uk/GWBV/viewborehole?loca_id=2020020409474538549

[14] Intégrale, 2017. Geotechnical and Phase II Contamination Report. Proposed Development Snow Capel.

Overall, although unmapped, the presence of Made Ground (associated with the motorway construction and typically comprising re-worked cohesive soils) at and surrounding the Moated Site is persistent.

[redacted]ological trial trenching report (Headland Archaeology, 2021[15]) identifies in more detail evidence for buried topsoil, which was possibly removed in some areas prior to deposition of the Made Ground. Nonetheless, due to the reworking and similarity in lithology between natural deposits and redeposited material as Made Ground, it is difficult to discern between the two across the Moated Site and, indeed between the superficial deposits and the top of the weathered upper part of the bedrock.

4.6 Hydrogeology

4.6.1 Aquifer Classification

The geological strata have been assessed for their hydroge[redacted] Lias Group bedrock strata underlying the site are classified as a Secondary undifferentiated aquifer. As rocks with essentially no groundwater, the BGS mapping describes the Lias group as comprising a largely mudstone sequence with limestone and marlstone Rock forming local aquifers, yielding small supplies. The Dyrham Formation to the north west is classified as a Secondary A aquifer, whilst the oolite strata to the south of the site is a Principal Aquifer.

4.6.2 Groundwater Levels and Flows

Given the clayey nature of both the superficial and bedrock strata underlying the Moated Site, it is unlikely that there is [redacted] hydraulic continuity between the groundwater and the local surface water drainage features.

Topographical control on the groundwater flow direction is likely and is, therefore, anticipated to be in the direction SE to NW locally within the Moated Site, and more broadly towards the north, following the direction of surface water drainage from the site.

This is supported by spot observations of groundwater levels on the Moated Site. From previous ground investigations, groundwater stands at 1.5-2.5 mbgl locally where old drainage ditches or the Moat occur (Intégrale, 2017). It is likely that this groundwater com[redacted] bedrock groundwater table may occur at some depth (e.g. 5-10 mbgl).

Groundwater was not encountered during drilling by T&P in 2018. Groundwater dip levels were subsequently recorded during gas monitoring visits between 54.8 and 61.9 mAOD. Saturated ground was encountered during several monitoring visits, with surface water also observed within the moat area. This included some of the monitoring wells being flooded from surface water.

Similarly, groundwater was not encountered during drilling the T&P in December 2020-January 2021. Interim spot water levels are given in Table 1.

[15] Headland, 2021. Snow Capel, Matson, Gloucestershire: Archaeological Trial Trenching.

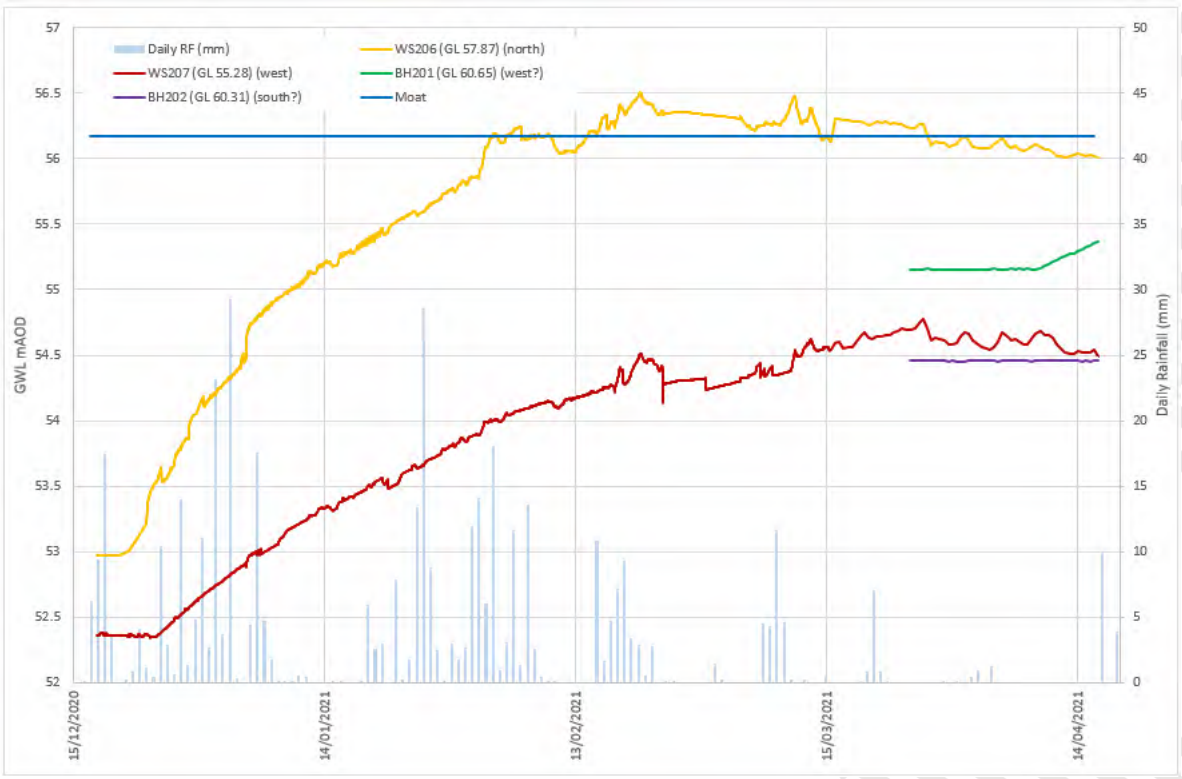
Table 1 - Groundwater Level Monitoring

BH ID	GL mAOD	Depth m	Monitoring	GWL mAOD 21/01/21	GWL mAOD 17/02/21
WS201	58.03	3	MG	55.59	56.03
WS202	58.22	3	MG	57.44	58.02
WS203	58.78	3	MG/bedrock	58.74	58.76
WS204	59.05	3	MG	58.05	58.25
WS205	58.57	3	MG	57.69	57.59
WS206	57.87	5	MG/bedrock	55.32	56.04
WS207	55.28	3	bedrock	54.45	54.48

Boreholes WS201-WS205 are all close together on the south[redacted]ndicate a water level range of 2.73 m even in such close proximity, with a gradient falling from east to west. The highest water level occurs in the borehole which has been completed into the top of bedrock. Water levels fall to the north and west and are lowest in the area to the west of the moat, in the area of lowest elevations. In some cases, the groundwater level is extremely close to the ground surface and there is potential, given the boreholes did not encounter groundwater at the time of drilling, that the water within the boreholes is rainwater fill. In the latest boreholes, BH201 and BH202, groundwater was also not encountered during drilling.

Continuous data are available [redacted]d BH202, and for the moat. For the moat, WS206 and WS207, data extend from December 17th 2020 to April 16th 2021. For BH201 and BH202, data extend from March 25th to April 16th. The data provided by T&P are provided in Appendix D and are summarised for comparison in Figure 2.

Figure 2 - Groundwater Level Continuous Monitoring Data



Data from the Gloucester rain gauge record[16] are also included. All borehole records show an initially steady water level. However, in the shallow boreholes (WS206/WS207), levels rise over time following wet winter weather. Although the dataset for the newer boreholes is shorter, there is less evidence for water level rise of the same order of magnitude, and less variability in the steady water levels observed compared to those in WS206/WS207.

It is possible that the water level variability in boreholes WS206 and WS207 reflect ingress of rainfall/runoff directly into the piezometer tubing, given that the boreholes are completed flush to ground level, while the long-term trend is likely indicative of the water table within the clay.

There are no nearby regional groundwater monitoring boreholes available[17][18]. A licenced groundwater abstraction well is noted within the southern corner of the Moated Site (18/54/20/0193, issued 1966 for general farming and domestic use; Intégrale, 2017). It is not known whether this abstraction is currently operational [redacted] not evident during the site inspection.

4.7 Moat Water Quality

To explore the source of water to the moat, seven water samples were collected from a range of locations across the moat, and a further sample from the nearest other pond at Sneedham's Green for comparison on April 26th 2021 by JBA Consulting. The aim of the analysis was to investigate whether there was evidence for a groundwater signature within the water chemistry. Given that the M5 lies upgradient of the site, the selected determinands also aimed to detect whether runoff from the M5 motorway makes its way along any potential groundwater pathways e.g. between the base of the Made Ground and/or within the top weathered surface of the mudstone bedrock.

The presence of elements such as metals and polycyclic aromatic hydrocarbons (PAH) would help to determine whether a groundwater pathway exists between the adjacent motorway runoff, through the Made Ground to the base of the moat. The samples were analysed at an accredited environmental laboratory for a range of parameters, including major ions (Na, Ca, Mg, HCO3, Cl, SO4, NO3, heavy metals (Cd, Cu, Zn and Pb) and PAH compounds). Given the 2021 winter conditions and likelihood of salts within the motorway runoff, it is considered that evidence of such parameters should be likely to be observed if inde[redacted]

By spreading the samples across the moat, any spatial variability may provide an indication into the location where a spring source may be entering.

The results are presented in Appendix E. Overall, the composition of the moat appears fairly consistent with no obvious spatial variability indicating a spring source location which would have been evidenced by being strongly mineralised e.g. strongly sulphate signal. The most notable features are elevated chromium in the south-east sample, and presence of naphthalene in the north west sample, both of which could be associated with motorway run-off, although are not persistent across all samples. Zinc in all samples could also be linked to motorway run-off, although the low values are well below environmental quality standards (EQS)[19], and do not provide clear cut evidence in themselves.

---

[16] https://www.glosweather.com/climate

[17] https://www.gaugemap.co.uk/#!Map

[18] https://eip.ceh.ac.uk/hydrology/water-resources/

[19] https://www.gov.uk/guidance/surface-water-pollution-risk-assessment-for-your-environmental-permit

Overall, a similar chemical signature to the moat is seen at Sneedham's Pond. As such, in light of the above observations, a definitive groundwater signal is not observed in the moat from the water quality sampling.

4.8 Moat Water Balance

In order to provide further evaluation of the source of water to the moat, a preliminary water balance can be used to determine the likelihood of the ability of the surface water catchment to support moat water volumes through direct rainfall and rainfall-runoff. By estimating the volume of water in the moat and comparing this to an estimate of the volume of rainfall-runoff generated within the surface water catchment to the moat, an assessment can be made as to whether the moat can likely be supported by surface water inputs alone.

The annual volume of water required to support the moat a[redacted] can be estimated from the approximate surface area (1,946 m^2) a[redacted]s, which are estimated at 0.55 m (determined in the earlier review of climate data). On this basis, the water volume required is ~1,070 m^3/year.

From the earlier review of climate data, the effective annual rainfall is 140 mm. From a review of the site topographic data, the surface water catchment to the moat is ~25,400 m^2 extending to the east of the moat. On this basis, the available water volume from rainfall and surface runoff which could support the moat is ~3,560 m^3/y. This is likely to be a conservative figure as it does not account for rapid runoff to the moat during heavy rainfall/flood events that would bypass some evapotranspiration accounted for in the effective rainfall calculation across the catchment. This suggests that the surface water catchment area is sufficient to top up the moat and overcome evaporative losses of ~1,070 m^3/y. A proportion of the rainfall within this catchment will likely reach the moat as groundwater flow/baseflow where water can infiltrate to the water table. The groundwater flow is likely to mimic surface flow routes due to the topography. There may be some leakage from the moat to the [redacted]oat. This is likely to be minimal due to the low permeability nature of the surrounding clay soils but would require hydraulic testing of the surrounding clay to ascertain groundwater flow rates from the moat.

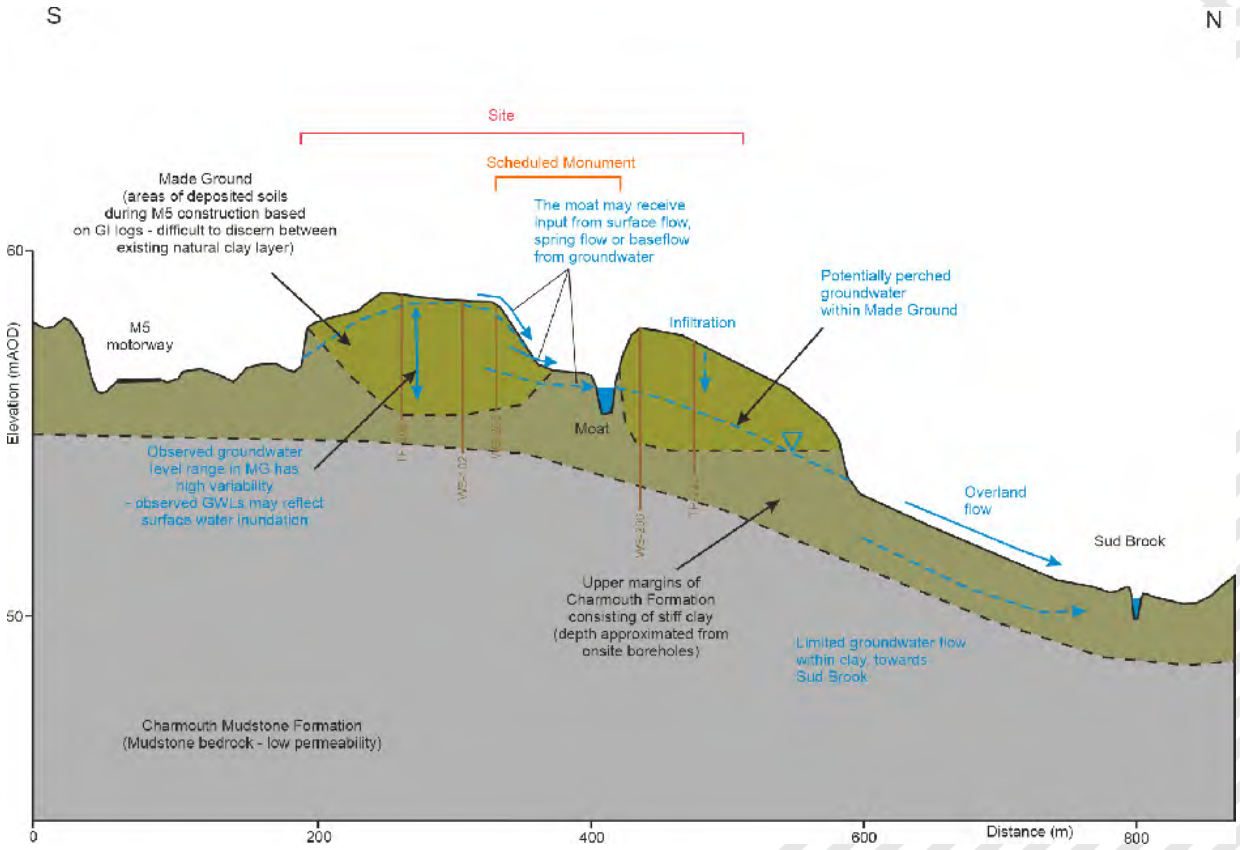
The above estimates have made several assumptions, including that the only water losses of th[redacted]po[redacted]moat bed to ground. In addition, some of the rainfall on the surface water catchment area may also be lost to ground. In addition, the effective rainfall may be higher for open water than the estimate value, and so more water than indicated may be required to support the current moat water levels.

5 Hydrogeological Conceptual Model

The EA defines a conceptual model as "a description of how a hydrogeological system is believed to behave" and its development as "an iterative or cyclical process of development [redacted] in which new observations are used to evaluate and improve the model."

A preliminary conceptual model for the Moated Site and surrounding environment has been developed based on the information available, and is outlined in Figure 3, which has been constructed based upon the topography for the Moated Site and the site-specific data regarding depth of Made Ground and water levels.

Figure 3 - Conceptual Cross Section



The conceptual understanding is described as follows:

- The Lias Group mudstone bedrock, a low permeability formation, is largely unconfined at and near the Moated Site, with the outcrop recharge area occurring at the highest elevations of Robins Wood Hill to the north west of the site (up to ~198 mAOD). The upper surface of the bedrock illustrates evidence for weathering;
- Across part of the Moated Site are Made Ground deposits, located as a result of the construction of the adjacent M5 motorway. The deposits comprise slightly gravelly, slightly silty clays, and are relocated natural deposits. It is therefore difficult to differentiate between existing site material and that artificially placed here, such that the available site investigation data may overestimate the depth of the reworked soils. Nonetheless, it is anticipated that the natural material is likely to comprise the lower part of the subsoil profile;
- Observed groundwater levels at the Moated Site are between ~54 and ~59 mAOD within Made Ground deposits, and are locally variable although

largely emulating topography. Groundwater levels are likely to be perched within the generally low permeability deposits, targeting zones of higher permeability material lenses. However, there is potential that the observed water levels in fact reflect rainwater ingress and not a true groundwater level. Water level in the underlying bedrock are limited, but it does not appear that the moat is intrinsically hydraulically connected to the wider groundwater system. Furthermore, these remains are not likely to be located under a regional water table, or have been so in the past;

- Water levels in the closest surface watercourse, the Sud Brook to the west of the Moated Site, may not be in hydraulic connectivity with those in the moat. Those in the moat are ~1 m higher, although precise contemporaneous survey data for the ditch, nearest borehole (WS207) and the moat are not yet available;
- At this site, it does not seem likely that groundwater lev by abstractions due to their absence locally;
- There are several options considered with regards to the likely water supply mechanism for the moat. The first is that groundwater is perched within the gravelly clay deposits and seeps laterally into the sides of the hollow in which the moat sits. Nonetheless, given that the boreholes were dry when drilled and only subsequently have an observed water level, it is possible that water supply to the moat is instead largely from direct rainfall input and surface runoff;
- The water supply mechanism to the moat may to be different now to when it was constructed, and different again since the construction of the motorway. A further water supply mechanism is that the construction of the motorway, and any associated drainage measures, has increased surface runoff rates locally, and that this water finds its way through the Made Ground, or at rockhead, towards the moat. However, water quality analysis has not indicated that this is the primary source of wate
- One further consideration is that anecdotal information from the local farmer indicates that the moat is thought to be fed by a spring. Evidence for this is that the moat never truly dries out during prolonged dry weather, in contrast to dry conditions observed at the Spaadham's Green ponds. Due to the age of the moat (Medieval), all the historic mapping available illustrates the existence of the moat and does not, therefore, afford the opportunity to observe if a spring was previously mapped, although it is possible that the existence of a spring prompted the selection of the site for the moat. There is no surface evidence of a spring emerging at the site. If a spring supply is the primary mechanism for maintaining water within the moat then it is more likely that the spring is sourced within the underlying low permeability bedrock. However, water quality analysis has not indicated that this is the case. It is likely that any spring that may have previously existed could have been since silted up and no longer functioning as it once did; and
- If local hydrological conditions have altered since the moat was constructed, it is useful to consider the likely conditions under which the moat was installed. With the exception of the deposition of Made Ground at the Moated Site during construction of the M5 the inherent geological conditions at the Moated Site are unlikely to have changed. As such, a lack of mapped permeable superficial deposits overlying a low permeability bedrock would suggest that water in the moat is sustained by runoff, perhaps from the historic southern ditch, unless a shallow groundwater source within weathered bedrock happened to persist at this location. It is possible that, prior to development of the area, that some runoff could have been derived from Robin's Wood Hill area, but this would seem unlikely at the present day meaning that the moat would be more vulnerable to

drying out in drier periods. This study has indicated that there is potential for some water to be supplied by near-surface seepage of shallow groundwater.

In summary, following an evaluation of the available information, it is concluded that the [redacted] water supply mechanism to the moat is a combination of direct rainfall, surface runoff, and shallow groundwater seepage/interflow.

[redacted]

[redacted]

[redacted]

[redacted]

6 Conclusions

An initial understanding of the water environment at the site has been developed with respect to the moat, in determining the likely water supply mechanisms to the site. [redacted]te-specific datasets have been analysed to address the questions posed by the HE Tier 2 water environment assessment requirements. In summary, the most likely water supply mechanism to the site appears to be a combination of surface water run-off and shallow groundwater inputs.

In summary, the assessment concludes that the proposed residential development could result in a fall in the water level in the moat, potentially resulting in the drying out of archaeological deposits and a negative impact upon the significance of the scheduled monument, for the reasons below.

The potential for a reduction in water inputs to the moat fr[redacted]ment includes decreased surface water runoff, due to installation[redacted]ight no longer reach the moat, and reduced groundwater seepage, [redacted]und surface material depending on the engineering approach to foundation design. This could result in the drying of the moat water body unless a supplementary water supply is incorporated into the development design which can permit maintenance of current moat water levels.

Nonetheless, given the lack of clear or indirect evidence for the current supply of the moat from a deeper groundwater spring source beneath its base, there are no concerns regarding the hydrochemical signature of the water used in future to maintain moat water levels and, therefore, whether the top up source is derived from surface water or groundwater. [redacted]

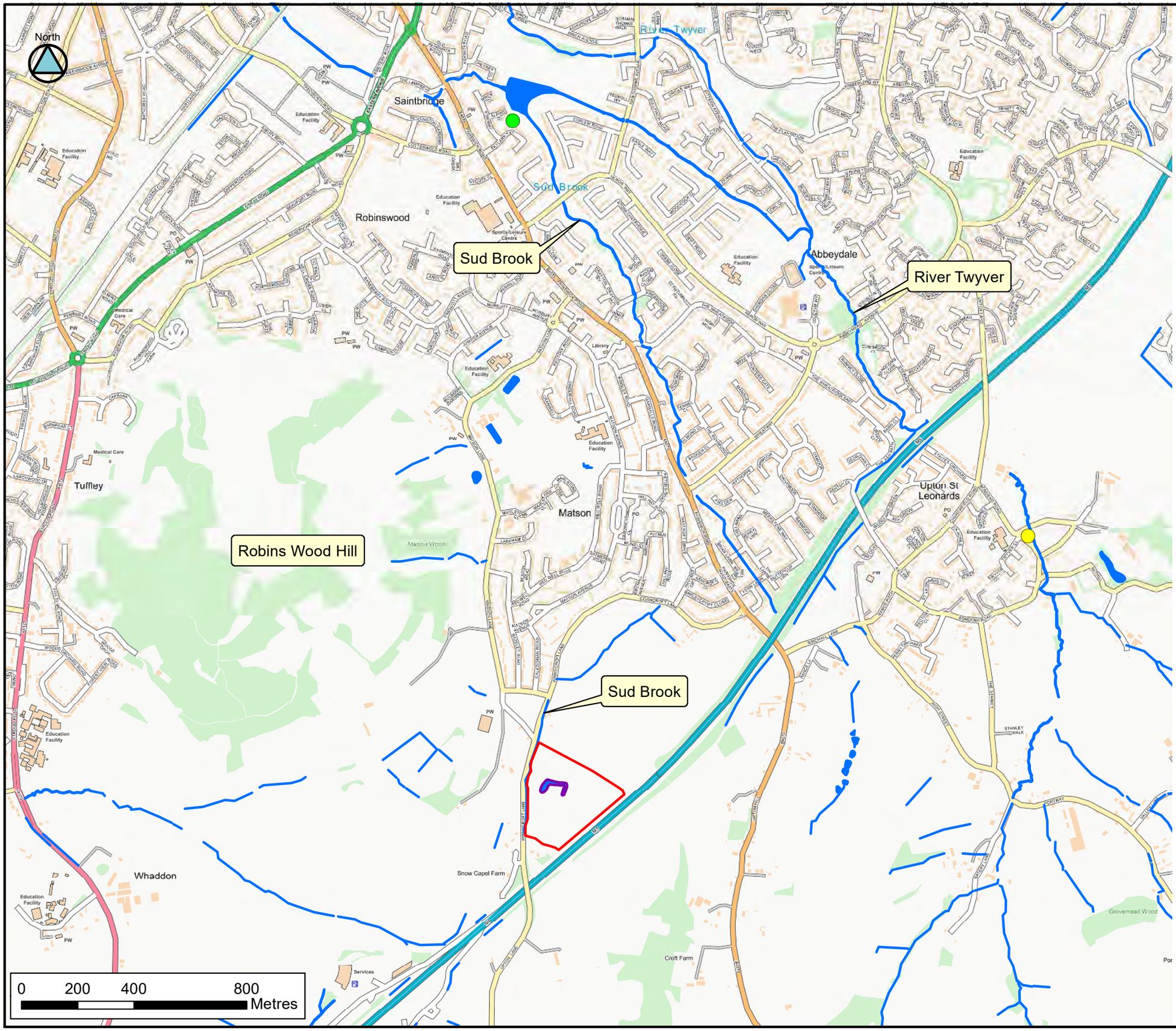
As such, ongoing monitoring of the moat water levels prior to, during and post construction would be recommended alongside development of an appropriate drainage strategy to support the long-term preservation of the moat water body. Further monitoring would be not be considered to impact th[redacted]cation submission.

In conclusion, the assessment has not identified any reason why potential effects on the moat water level from the proposed development could not be appropriately mitigated to safeguard the continued existence of the moat water body.

[redacted]

Appendices

A Maps



LEGEND

- Site boundary
- Moat
- Cheyney Close Gauge (Sud Brook)
- Bondend Road Gauge (River Twyver)
- Surface water

JBA consulting

MAP 1: Surface Water Features

North

Sud Brook

WINNYCROFT LANE

M5

WS8

WS206

WS207

BH201

WS202

WS203

WS201

WS205

WS204

WS101

WS102

BH202

0 20 40 80 Metres

LEGEND

- Cross-section line
- Site boundary
- Scheduled Monument
- Moat
- Surface water runoff catchment to moat (approx.)
- Shallow ditch
- Abstraction BH
- GW Monitoring Locations

JBA consulting

MAP 2: Site Hydrogeological Features

B Site Topography and Moat Depths

[redacted]

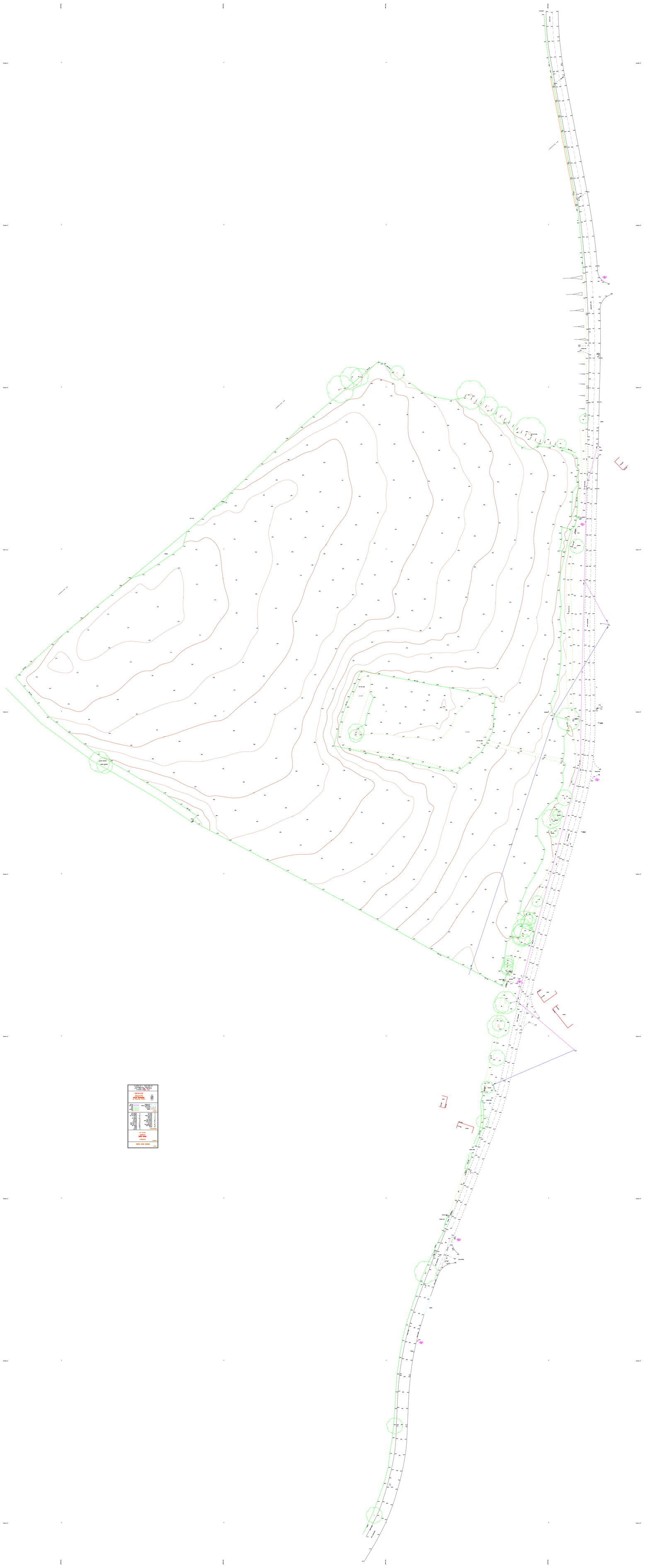
[redacted]

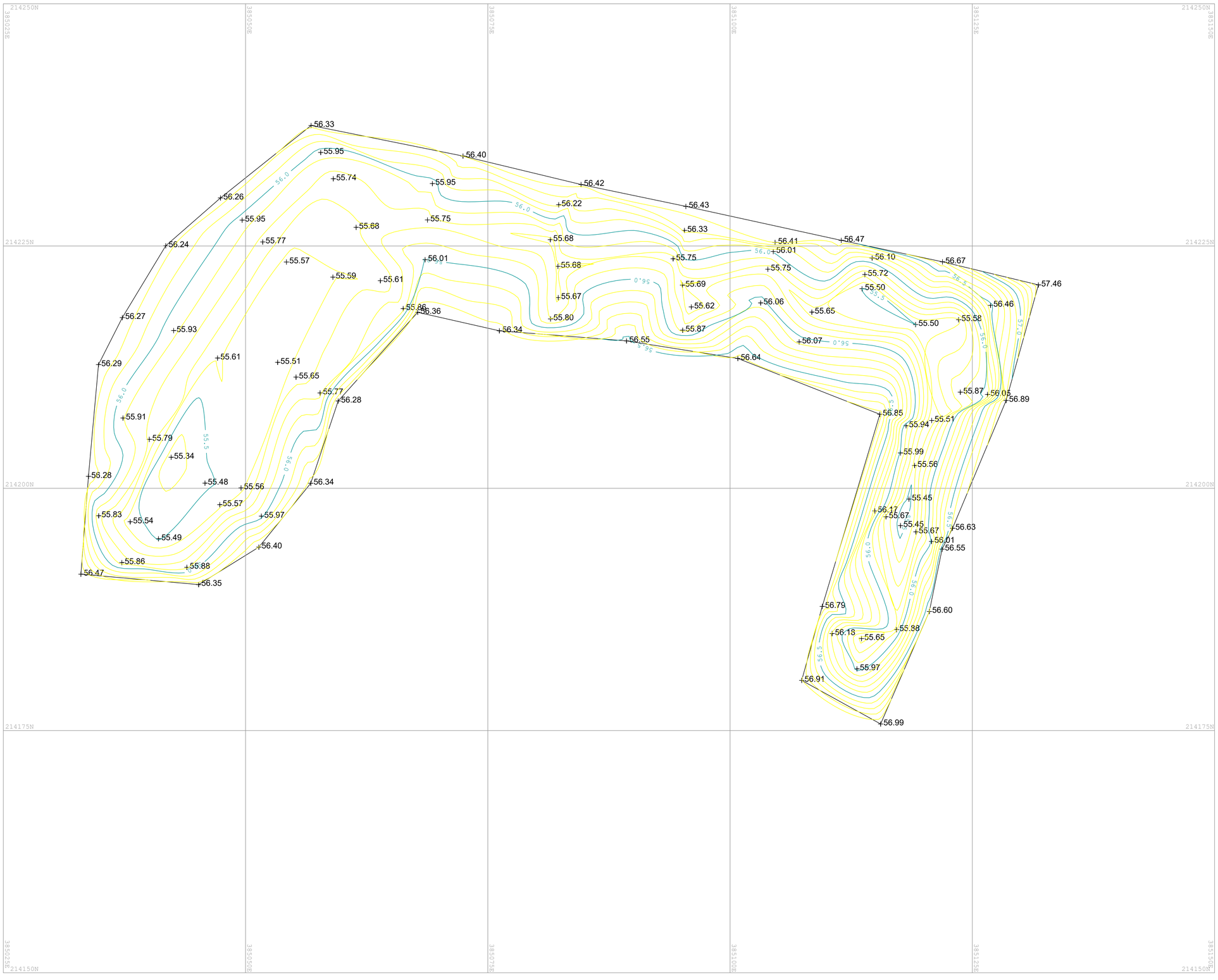
[redacted]

[redacted]

[redacted]

[redacted]





General Notes

1. All dimensions shown are in (metres) unless otherwise stated and levels in metres to Ordnance Datum.
2. Do not scale from this drawing. All dimensions must be checked/verified on site.
3. Any discrepancies noted on site are to be reported to the Engineer immediately.
4. All works in watercourses will be carried out with care to minimise the risk of pollution adhering to Pollution Prevention Guidelines.
5. The electronic model of this drawing is not to be used for setting out.

Rev.	Modifications	Date	Drawn	Designed	Checked	Approved

8a Castle Street
WALLINGFORD
Oxfordshire
OX10 8DL
United Kingdom
www.jbaconsulting.com
[redacted]

Offices at Coleshill, Doncaster, Dublin, Edinburgh, Exeter, Glasgow, Haywards Heath, Isle of Man, Leeds, Limerick, Newcastle, Newport, Peterborough, Saltaire, Skipton, Tadcaster, Thirsk, Wallingford and Warrington

for

2020s1556

Snow Capel Moat
Topographic Survey

Scale: 1:200 @ A1	Drawn:J Gaskell
	Designed:J Gaskell
	Checked:J Gaskell
	Approved:J Gaskell

Digital File Name:

Drawing Number:	Rev.:	Sheet No.:	Status:
		1 of 1	

C Borehole Logs

T&P Regen
www.tandpregeneration.co.uk

Contract Name:	Client:	Borehole ID:
Snow Capel	Edward Ware Homes	WS201

Contract Number:	Date Started:	Logged By:	Checked By:	Status:	Sheet 1 of 1
CS-J-0828	14/12/2020	SH		DRAFT	

Windowless Sample Borehole Log	Easting:	Northing:	Ground Level:	Plant Used:	Scale:
	385051.65	214139.61	58.03mOD	Competitor Dart	1:25

Weather: Overcast | Termination: Engineer instructed

Samples & In Situ Testing				Strata Details				Groundwater	
Depth	Sample ID	Windowless Sample Recovery	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill / Installation
		0.00 - 1.00 = 100%		57.93	0.10		MADE GROUND: Brown slightly gravelly silty CLAY. Gravel is subrounded and rounded fine to medium of mixed lithology. (TOPSOIL)		
0.50 - 0.60	ES1						MADE GROUND: Orangish brown mottled grey slightly gravelly silty CLAY. Gravel is subrounded fine and medium of limestone and rare brick.		
		1.00 - 2.00 = 100%			(2.40)				
1.50 - 1.60	D2								
		2.00 - 3.00 = 100%							
2.50 - 2.60	ES3			55.53	2.50		MADE GROUND: Dark grey silty CLAY.		
				55.38	2.65		MADE GROUND: Light grey mottled brown slightly gravelly CLAY with rare oraganic content and wood fragments. Gravel is subrounded fine and medium of limestone.		
2.80 - 3.00	D4				(0.35)				
				55.03	3.00		End of Borehole at 3.00m		

Sample Key: B = Bulk Disturbed D = Small Disturbed U = Undisturbed Open-Drive W = Water G = Gas ES = Environmental Soil EW = Environmental Water

Start & End of Shift Observations

Date	Time	Depth (m)	Casing (m)	Water (m)

Borehole Diameter

Depth (m)	Dia (mm)

Casing Diameter

Depth	Dia (mm)

Remarks:
Groundwater not encountered.

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Installation

Top (m)	Base (m)	Type	Dia (mm)
0.00	1.00	PLAIN	50
1.00	3.00	SLOTTED	50

T&P Regen
www.tandpregeneration.co.uk

Contract Name:		Client:			Borehole ID:
Snow Capel		Edward Ware Homes			WS202
Contract Number:	Date Started:	Logged By:	Checked By:	Status:	Sheet 1 of 1
CS-J-0828	14/12/2020	SH		DRAFT	
Windowless Sample Borehole Log	Easting: 385065.17	Northing: 214153.38	Ground Level: 58.22mOD	Plant Used: Competitor Dart	Scale: 1:25
Weather: Overcast	Termination: Engineer instructed				

Samples & In Situ Testing				Strata Details				Groundwater	
Depth	Sample ID	Windowless Sample Recovery	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill / Installation
		0.00 - 1.00 = 100%		58.12	0.10		MADE GROUND: Brown slightly gravelly silty CLAY. Gravel is subrounded and rounded fine to medium of mixed lithology. (TOPSOIL)		
0.50 - 0.60	ES1				(1.40)		MADE GROUND: Orangish brown mottled grey slightly gravelly silty CLAY. Gravel is subrounded fine and medium of limestone and rare brick.		
		1.00 - 2.00 = 100%							
1.20	D2								
				56.72	1.50		MADE GROUND: Dark grey silty CLAY.		
		2.00 - 3.00 = 100%			(1.00)				
				55.72	2.50		MADE GROUND: Light grey mottled brown slightly gravelly CLAY with rare oraganic content and wood fragments. Gravel is subrounded fine and medium of limestone.		
2.60 - 2.70	ES3				(0.50)				
				55.22	3.00		End of Borehole at 3.00m		

1 2 3 4 5

Sample Key: B = Bulk Disturbed D = Small Disturbed U = Undisturbed Open-Drive W = Water G = Gas ES = Environmental Soil EW = Environmental Water

Start & End of Shift Observations

Date	Time	Depth (m)	Casing (m)	Water (m)

Borehole Diameter

Depth (m)	Dia (mm)

Casing Diameter

Depth	Dia (mm)

Remarks:
Groundwater not encountered.

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Installation

Top (m)	Base (m)	Type	Dia (mm)
0.00	1.00	PLAIN	50
1.00	3.00	SLOTTED	50

T&P Regen
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Contract Name:	Client:	Borehole ID:
Snow Capel	Edward Ware Homes	WS203

Contract Number:	Date Started:	Logged By:	Checked By:	Status:	Sheet 1 of 1
CS-J-0828	14/12/2020	SH		DRAFT	

Windowless Sample Borehole Log	Easting:	Northing:	Ground Level:	Plant Used:	Scale:
	385087.81	214146.92	58.78mOD	Competitor Dart	1:25

Weather: Overcast | Termination: Engineer instructed

Samples & In Situ Testing				Strata Details				Groundwater	
Depth	Sample ID	Windowless Sample Recovery	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill / Installation
		0.00 - 1.00 = 100%		58.68	0.10		MADE GROUND: Brown slightly gravelly silty CLAY. Gravel is subrounded and rounded fine to medium of mixed lithology. (TOPSOIL)		
							MADE GROUND: Dark grey mottled orangish brown slightly gravelly silty CLAY. Gravel is subrounded fine to medium of limestone and rare brick.		
		1.00 - 2.00 = 100%			(2.60)				
		2.00 - 3.00 = 100%							
				56.08	2.70		MADE GROUND: Dark greyish brown slightly sandy slightly gravelly silty CLAY. Gravel is subrounded fine to medium of limestone and rare brick.		
				55.98	2.80		Stiff orangish brown mottled grey silty CLAY. (CHARMOUTH MUDSTONE FORMATION)		
				55.78	3.00		End of Borehole at 3.00m		

1 2 3 4 5

Sample Key: B = Bulk Disturbed D = Small Disturbed U = Undisturbed Open-Drive W = Water G = Gas ES = Environmental Soil EW = Environmental Water

Start & End of Shift Observations

Date	Time	Depth (m)	Casing (m)	Water (m)

Borehole Diameter

Depth (m)	Dia (mm)

Casing Diameter

Depth	Dia (mm)

Remarks:
Groundwater not encountered.

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Installation

Top (m)	Base (m)	Type	Dia (mm)
0.00	1.00	PLAIN	50
1.00	3.00	SLOTTED	50

T&P Regen
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Contract Name:		Client:			Borehole ID:
Snow Capel		Edward Ware Homes			WS204
Contract Number:	Date Started:	Logged By:	Checked By:	Status:	Sheet 1 of 1
CS-J-0828	14/12/2020	SH		DRAFT	
Windowless Sample Borehole Log	Easting: 385094.75	Northing: 214134.12	Ground Level: 59.05mOD	Plant Used: Competitor Dart	Scale: 1:25
Weather: Overcast		Termination: Engineer instructed			

Samples & In Situ Testing				Strata Details				Groundwater	
Depth	Sample ID	Windowless Sample Recovery	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill / Installation
		0.00 - 1.00 = 80%		58.95	0.10		MADE GROUND: Brown slightly gravelly silty CLAY. Gravel is subrounded and rounded fine to medium of mixed lithology. (TOPSOIL)		
		1.00 - 2.00 = 100%			(2.40)		MADE GROUND: Grey mottled brown slightly gravelly silty CLAY. Gravel is subrounded fine to medium of limestone and rare brick.		
		2.00 - 3.00 = 100%		56.55	2.50				
				56.45	2.60		MADE GROUND: Dark brown slightly gravelly silty CLAY with a high organic content including wood fragments. Gravel is subrounded fine to medium of limestone.		
					(0.40)		MADE GROUND: Dark grey slightly gravelly silty CLAY with rare wood fragments and rootlets. Gravel is subrounded fine to medium of limestone.		
				56.05	3.00		End of Borehole at 3.00m		

1 2 3 4 5

Sample Key: B = Bulk Disturbed D = Small Disturbed U = Undisturbed Open-Drive W = Water G = Gas ES = Environmental Soil EW = Environmental Water

Start & End of Shift Observations

Date	Time	Depth (m)	Casing (m)	Water (m)

Borehole Diameter

Depth (m)	Dia (mm)

Casing Diameter

Depth	Dia (mm)

Remarks:
Groundwater not encountered.

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Installation

Top (m)	Base (m)	Type	Dia (mm)
0.00	1.00	PLAIN	50
1.00	3.00	SLOTTED	50

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Contract Name:	Client:	Borehole ID:
Snow Capel	Edward Ware Homes	WS205

Contract Number:	Date Started:	Logged By:	Checked By:	Status:	Sheet 1 of 1
CS-J-0828	14/12/2020	SH		DRAFT	

Windowless Sample Borehole Log	Easting:	Northing:	Ground Level:	Plant Used:	Scale:
	385071.59	214137.59	58.57mOD	Competitor Dart	1:25

Weather: Overcast | Termination: Engineer instructed

Samples & In Situ Testing				Strata Details				Groundwater	
Depth	Sample ID	Windowless Sample Recovery	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill / Installation
		0.00 - 1.00 = 100%		58.42	0.15		MADE GROUND: Brown slightly gravelly silty CLAY. Gravel is subrounded and rounded fine to medium of mixed lithology. (TOPSOIL)		
		1.00 - 2.00 = 100%			(2.05)		MADE GROUND: Brown slightly gravelly silty CLAY. Gravel is subrounded and rounded fine to medium of mixed lithology and rare brick.		
		2.00 - 3.00 = 100%		56.37	2.20		MADE GROUND: Orangish brown mottled grey slightly gravelly silty CLAY with rare wood fragments. Gravel is subrounded and rounded fine to medium of mixed lithology.		
				55.57	3.00		End of Borehole at 3.00m		

1 2 3 4 5

Sample Key: B = Bulk Disturbed D = Small Disturbed U = Undisturbed Open-Drive W = Water G = Gas ES = Environmental Soil EW = Environmental Water

Start & End of Shift Observations

Date	Time	Depth (m)	Casing (m)	Water (m)

Borehole Diameter

Depth (m)	Dia (mm)

Casing Diameter

Depth	Dia (mm)

Remarks:
Groundwater not encountered.

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Installation

Top (m)	Base (m)	Type	Dia (mm)
0.00	1.00	PLAIN	50
1.00	3.00	SLOTTED	50

T&P Regen www.tandpregeneration.co.uk	Contract Name: Snow Capel		Client: Edward Ware Homes		Borehole ID: WS206 Sheet 1 of 1
	Contract Number: CS-J-0828	Date Started: 14/12/2020	Logged By: SH	Checked By:	Status: DRAFT
Windowless Sample Borehole Log	Easting: 385106.17	Northing: 214239.91	Ground Level: 57.87mOD	Plant Used: Competitor Dart	Scale: 1:25
Weather: Overcast		Termination: Engineer instructed			

Samples & In Situ Testing				Strata Details				Groundwater	
Depth	Sample ID	Windowless Sample Recovery	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill / Installation
0.00 - 0.10	ES1	0.00 - 1.00 = 90%		57.72	0.15		MADE GROUND: Brown slightly gravelly silty CLAY. Gravel is subrounded and rounded fine to medium of mixed lithology. (TOPSOIL)		
0.40 - 0.50	ES2						MADE GROUND: Greyish brown mottled grey slightly gravelly silty CLAY with rare wood fragments. Gravel is subrounded and rounded fine to medium of mixed lithology.		
		1.00 - 2.00 = 90%							
1.50 - 1.60	D3				(2.85)				
		2.00 - 3.00 = 100%							
		3.00 - 4.00 = 100%		54.87	3.00		MADE GROUND: Brown slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to coarse of limestone.		
				54.57	(0.30) 3.30		Stiff orangish brown mottled grey silty CLAY. (CHARMOUTH MUDSTONE FORMATION)		
3.80 - 4.00	D4				(0.90)				
		4.00 - 5.00 = 100%							
				53.67	4.20		Very stiff orangish brown mottled grey silty CLAY. (CHARMOUTH MUDSTONE FORMATION)		
4.80 - 5.00	D5				(0.80)				
				52.87	5.00		End of Borehole at 5.00m		

Sample Key: B = Bulk Disturbed D = Small Disturbed U = Undisturbed Open-Drive W = Water G = Gas ES = Environmental Soil EW = Environmental Water

Start & End of Shift Observations

Date	Time	Depth (m)	Casing (m)	Water (m)

Borehole Diameter

Depth (m)	Dia (mm)

Casing Diameter

Depth	Dia (mm)

Remarks:
Groundwater not encountered.

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Installation

Top (m)	Base (m)	Type	Dia (mm)
0.00	1.00	PLAIN	50
1.00	5.00	SLOTTED	50

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www.tandpregeneration.co.uk

Contract Name:	Client:	Borehole ID:
Snow Capel	Edward Ware Homes	WS207

Contract Number:	Date Started:	Logged By:	Checked By:	Status:	Sheet 1 of 1
CS-J-0828	14/12/2020	SH		DRAFT	

Windowless Sample Borehole Log	Easting:	Northing:	Ground Level:	Plant Used:	Scale:
	384993.13	214219.77	55.28mOD	Competitor Dart	1:25

Weather: Overcast | Termination: Engineer instructed

Samples & In Situ Testing				Strata Details				Groundwater	
Depth	Sample ID	Windowless Sample Recovery	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill / Installation
0.00 - 0.10	ES1	0.00 - 1.00 = 100%		55.08	0.20		Brown slightly gravelly silty CLAY. Gravel is subrounded and rounded fine to medium of mixed lithology. (TOPSOIL)		
0.40 - 0.50	ES2			54.88	0.40		Orangish brown friable slightly gravelly silty CLAY. Gravel is subrounded and rounded fine and medium of mixed lithology.		
0.80 - 1.00	D3						Firm orangish brown mottled grey silty CLAY. (CHARMOUTH MUDSTONE FORMATION)		
		1.00 - 2.00 = 100%			(1.20)				
				53.68	1.60		Stiff dark grey silty CLAY. (CHARMOUTH MUDSTONE FORMATION)		
1.80 - 2.00	D4								
		2.00 - 3.00 = 100%			(1.10)				
				52.58	2.70		Very stiff dark grey silty CLAY. (CHARMOUTH MUDSTONE FORMATION)		
					(0.30)				
				52.28	3.00		End of Borehole at 3.00m		

1 2 3 4 5

Sample Key: B = Bulk Disturbed D = Small Disturbed U = Undisturbed Open-Drive W = Water G = Gas ES = Environmental Soil EW = Environmental Water

Start & End of Shift Observations

Date	Time	Depth (m)	Casing (m)	Water (m)

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Borehole Diameter

Depth (m)	Dia (mm)

Casing Diameter

Depth	Dia (mm)

Installation

Top (m)	Base (m)	Type	Dia (mm)
0.00	1.00	PLAIN	50
1.00	3.00	SLOTTED	50

Remarks:
Groundwater not encountered.

T&P Regen
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Contract Name: Snow Capel			Client: Edward Ware Homes		Borehole ID: BH202
Contract Number: CS-J-0828	Date Started: 23/03/2021	Logged By: SH	Checked By:	Status: DRAFT	Sheet 1 of 1
Cable Percussion Borehole Log	Easting:	Northing:	Ground Level:	Plant Used: Dando 4000	Scale: 1:50
Weather: Clear	Termination: Driving refusal		SPT Hammer: N/R, Energy Ratio: N/R		

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill / Installation
				0.10		MADE GROUND: Brown slightly gravelly silty CLAY. Gravel is subrounded and rounded fine to coarse of mixed lithology.		
				(2.90)		MADE GROUND: Brown mottled grey slightly gravelly silty CLAY. Gravel is subrounded fine to medium of mixed lithology.		
1.20	D1	SPT(S) 1.20m, N=7 (1,2/1,2,2,2)						
2.00	D2	SPT(S) 2.00m, N=7 (1,1/1,2,2,2)						
3.00	D3	SPT(S) 3.00m, N=10 (1,2/2,2,3,3)		3.00		Stiff orangish brown mottled dark grey friable silty CLAY. (CHARMOUTH MUDSTONE FORMATION)		
4.00	D4	SPT(S) 4.00m, N=11 (1,1/2,2,3,4)		(3.00)				
5.00	D5	SPT(S) 5.00m, N=31 (3,4/6,7,8,10)						
6.00	D6			6.00		Extremely weak residual MUDSTONE. (CHARMOUTH MUDSTONE FORMATION)		
		SPT(C) 6.50m, N=38 (5,6/8,9,10,11)						
7.00	D7			(3.00)				
8.00	D8	SPT(C) 8.00m, N=51 (5,10/10,12,14,15)						
9.00	D9	SPT(C) 9.00m, 50 (5,10/50 for 225mm)		9.00		End of Borehole at 9.00m		

Sample Key: B = Bulk Disturbed D = Small Disturbed U = Undisturbed Open-Drive W = Water G = Gas ES = Environmental Soil EW = Environmental Water

Start & End of Shift Observations

Date	Time	Depth (m)	Casing (m)	Water (m)
23-03-2021	12:30	0.00		
23-03-2021	16:00	9.00	1.50	

Borehole Diameter		Casing Diameter	
Depth (m)	Dia (mm)	Depth	Dia (mm)

Remarks:
Groundwater not encountered.

Chiselling

From (m)	To (m)	Duration	Remarks
8.50	9.00	01:00	

Installation

Top (m)	Base (m)	Type	Dia (mm)
0.00	1.00	PLAIN	50
1.00	6.00	SLOTTED	50

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

T&P Regen www.tandpregeneration.co.uk	Contract Name: Snow Capel	Client: Edward Ware Homes		Borehole ID: BH201
	Contract Number: CS-J-0828	Date Started: 23/03/2021	Logged By: SH	Checked By:	Status: DRAFT	Sheet 1 of 1
Cable Percussion Borehole Log	Easting:	Northing:	Ground Level:	Plant Used: Dando 4000	Scale: 1:50
Weather: Clear	Termination: Driving refusal		SPT Hammer: N/R, Energy Ratio: N/R	

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill / Installation
				0.10		MADE GROUND: Brown slightly gravelly silty CLAY. Gravel is subrounded and rounded fine to coarse of mixed lithology.		
				(2.90)		MADE GROUND: Brown mottled grey slightly gravelly silty CLAY. Gravel is subrounded fine to medium of mixed lithology.		
1.20	D1	SPT(S) 1.20m, N=6 (1,1/1,1,2,2)						
2.00	D2	SPT(S) 2.00m, N=7 (1,1/2,1,2,2)						
3.00	D3	SPT(S) 3.00m, N=8 (1,1/2,2,2,2)		3.00		Stiff orangish brown mottled dark grey friable silty CLAY. (CHARMOUTH MUDSTONE FORMATION)		
4.00	D4	SPT(S) 4.00m, N=17 (1,2/3,3,4,7)		(2.00)				
5.00	D5	SPT(S) 5.00m, 50 (5,7/50 for 225mm)		5.00		Extremely weak residual MUDSTONE. (CHARMOUTH MUDSTONE FORMATION)		
6.00	D6							
		SPT(C) 6.50m, N=50 (5,10/11,12,15,12)		(3.00)				
7.00	D7							
8.00	D8	SPT(C) 8.00m, N=50 (4,9/10,15,20,5)		8.00		End of Borehole at 8.00m		

Sample Key: B = Bulk Disturbed D = Small Disturbed U = Undisturbed Open-Drive W = Water G = Gas ES = Environmental Soil EW = Environmental Water

Start & End of Shift Observations

Date	Time	Depth (m)	Casing (m)	Water (m)
23-03-2021	11:30	0.00		
23-03-2021	12:00	8.00	1.50	

Borehole Diameter		Casing Diameter	
Depth (m)	Dia (mm)	Depth	Dia (mm)

Remarks:
Groundwater not encountered.

Chiselling

From (m)	To (m)	Duration	Remarks
7.50	8.00	01:00	

Installation

Top (m)	Base (m)	Type	Dia (mm)
0.00	1.00	PLAIN	50
1.00	6.00	SLOTTED	50

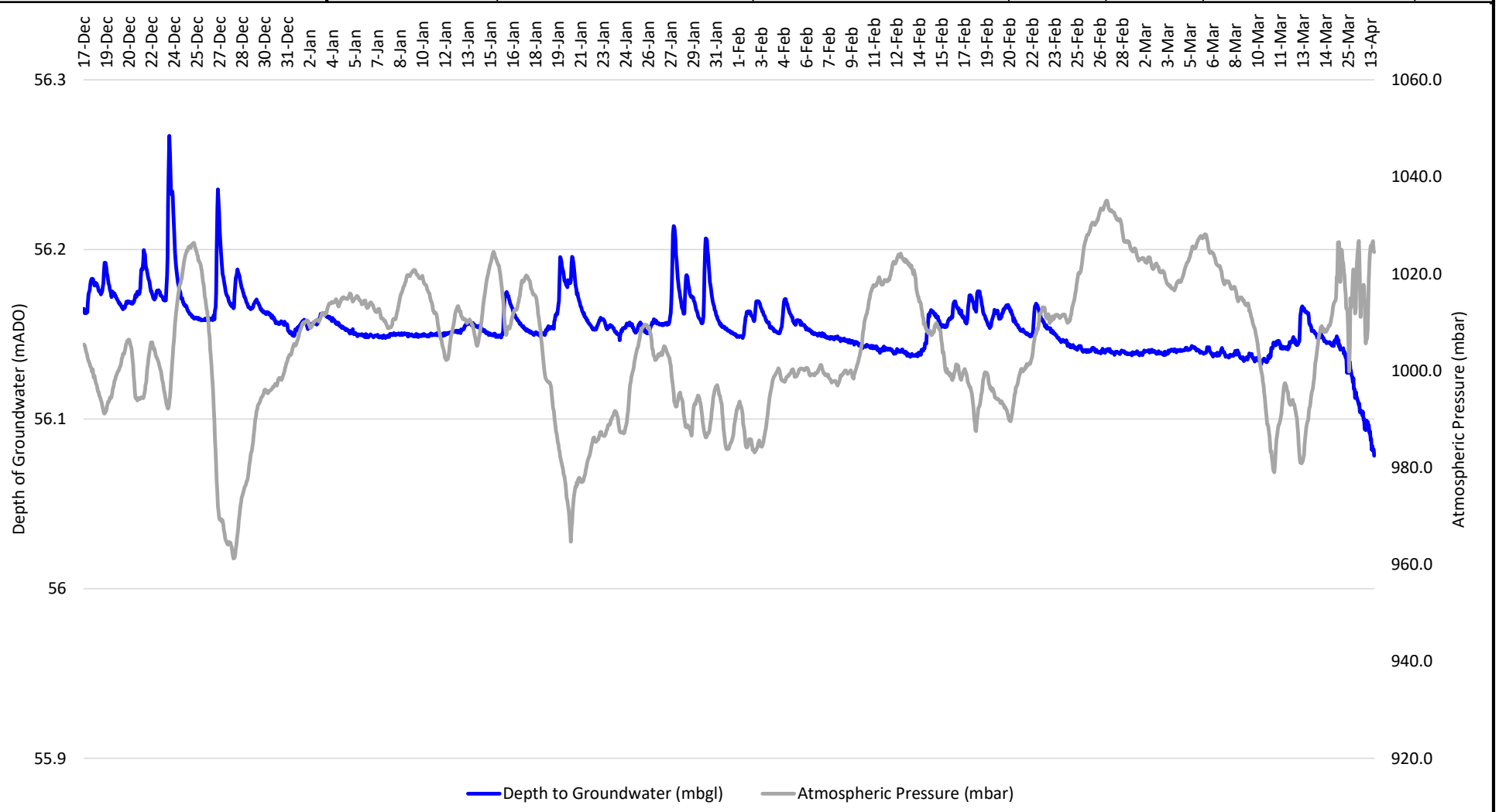
Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

D Site Groundwater Levels

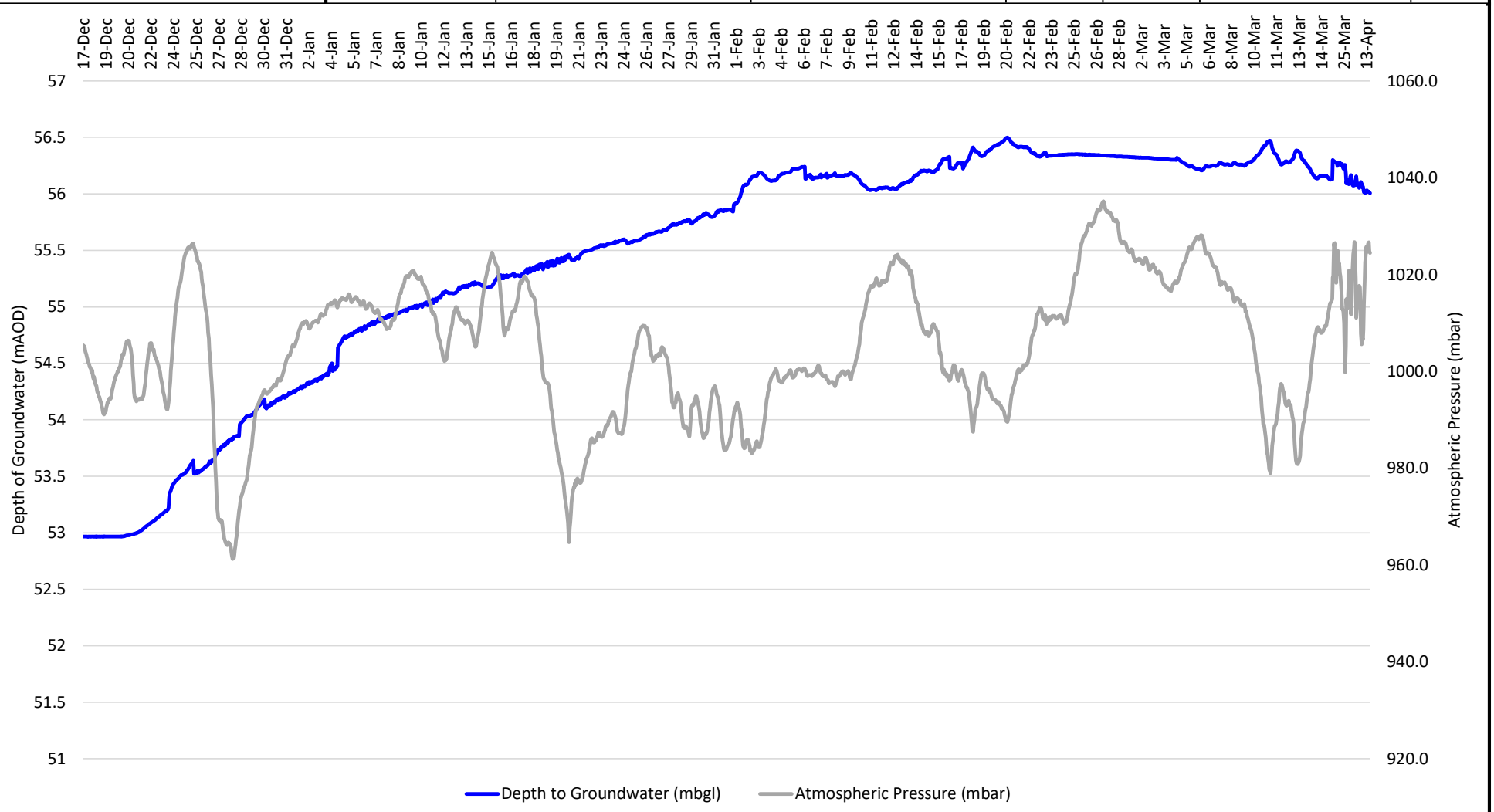
Groundwater Monitoring Results

Site Address:	CS-J-0916	Base of Installation (mbgl)	N/A	Min. GW Level (mbgl)	-0.10
		Ground level (mAOD)	56.17	Min. GW Level (mAOD)	56.08
		Depth of Probe (mbgl)	0.39	Max. GW Level (mbgl)	0.09
				Max. GW Level (mAOD)	56.27
Site ID:	Snow Capel	Run Time (Days)	120	Min. Atm' Pres' (mB)	961.2
Hole ID:	Moat	Run Time Period	17/12/2020 – 16/04/2021	Max. Atm' Pres' (mB)	1035.1



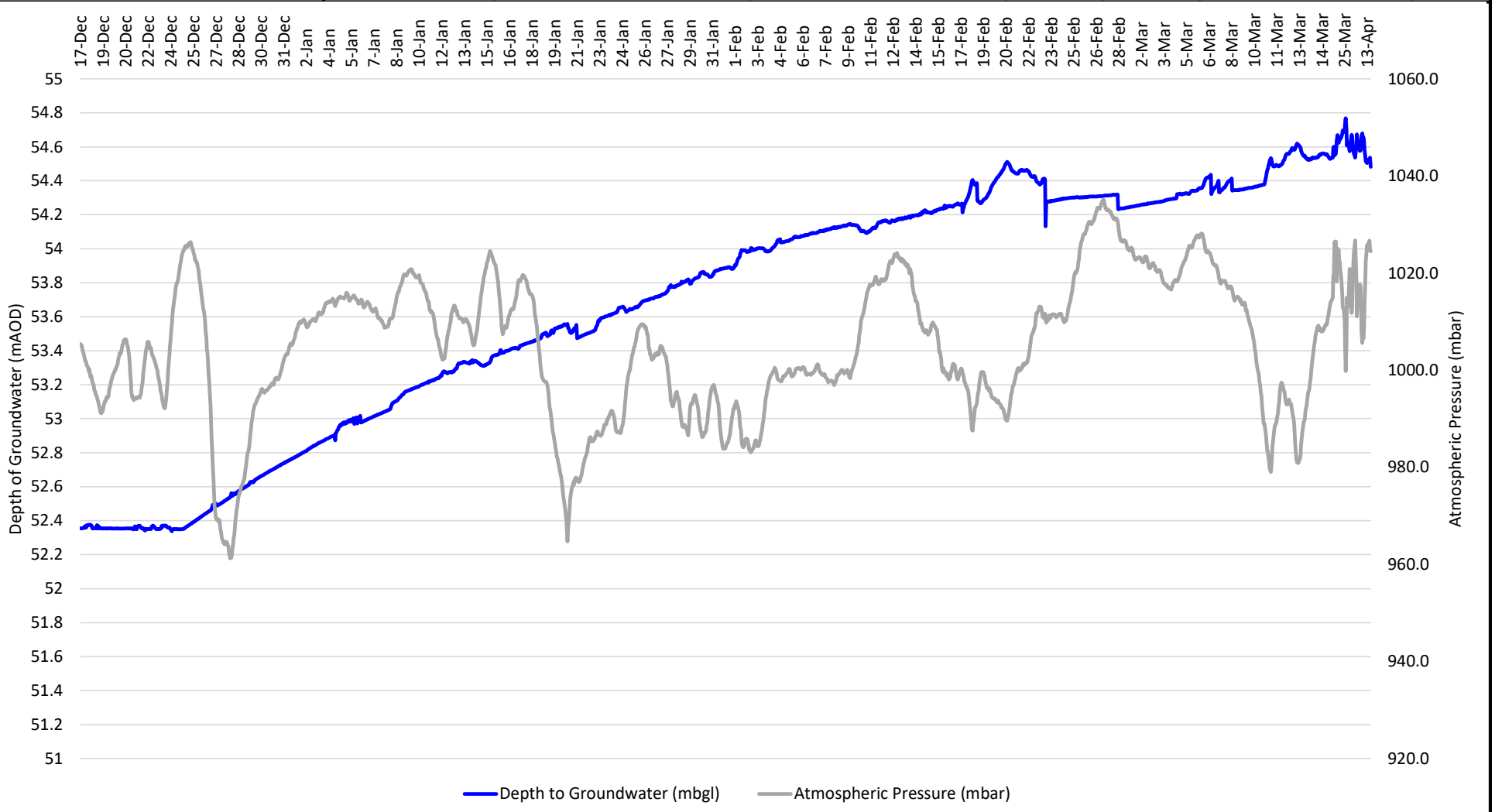
Groundwater Monitoring Results

Site Address:	CS-J-0916	Base of Installation (mbgl)	N/A	Min. GW Level (mbgl)	1.37
		Ground level (mAOD)	57.87	Min. GW Level (mAOD)	52.97
		Depth of Probe (mbgl)	4.90	Max. GW Level (mbgl)	4.90
				Max. GW Level (mAOD)	56.50
Site ID:	Snow Capel	Run Time (Days)	120	Min. Atm' Pres' (mB)	961.2
Hole ID:	WS206	Run Time Period	17/12/2020 – 16/04/2021	Max. Atm' Pres' (mB)	1035.1



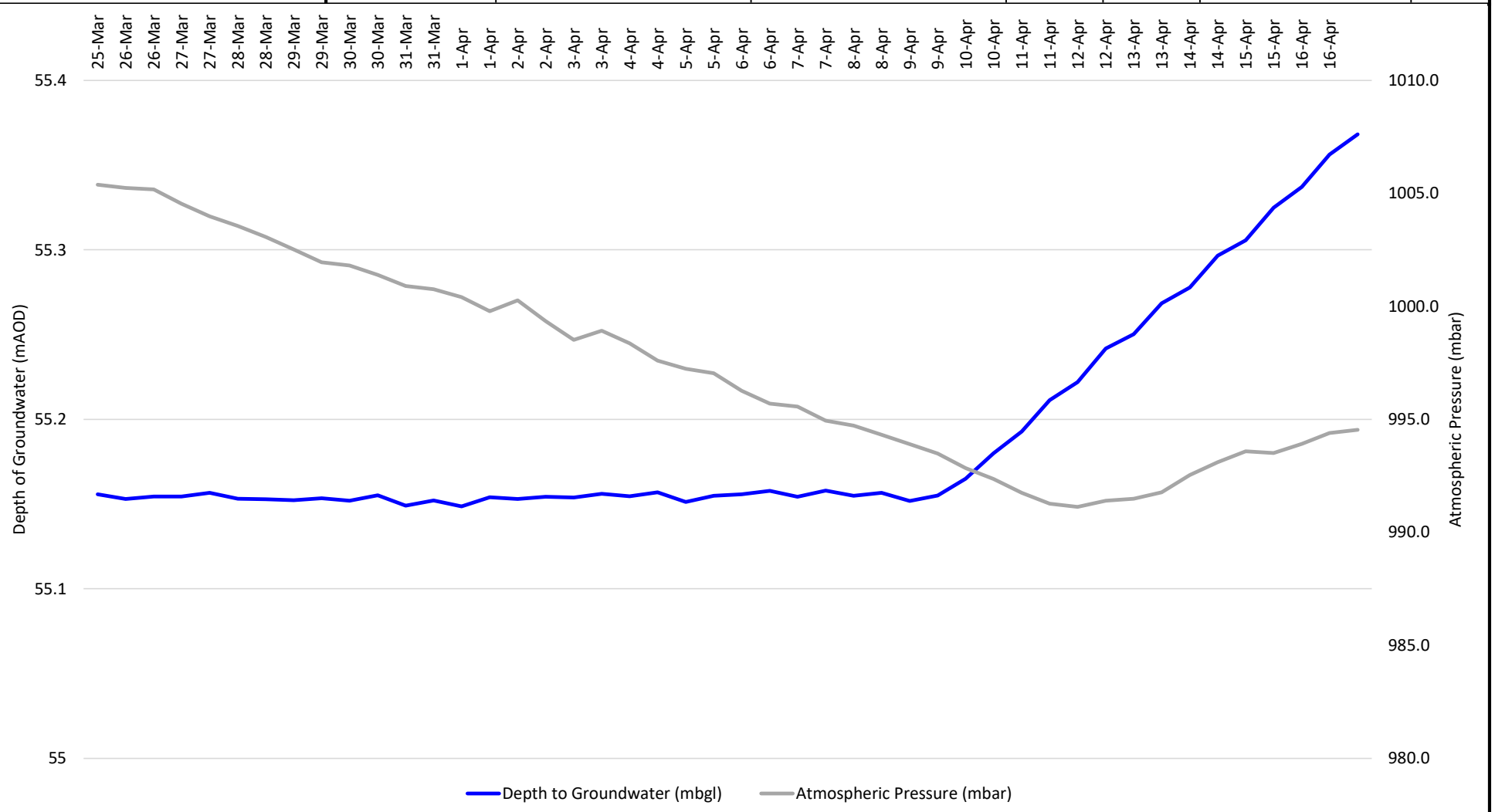
Groundwater Monitoring Results

Site Address:	CS-J-0916	Base of Installation (mbgl)	3.00	Min. GW Level (mbgl)	0.51
		Ground level (mAOD)	55.28	Min. GW Level (mAOD)	52.34
		Depth of Probe (mbgl)	2.93	Max. GW Level (mbgl)	2.94
				Max. GW Level (mAOD)	54.77
Site ID:	Snow Capel	Run Time (Days)	120	Min. Atm' Pres' (mB)	961.2
Hole ID:	WS207	Run Time Period	17/12/2020 – 16/04/2021	Max. Atm' Pres' (mB)	1035.1



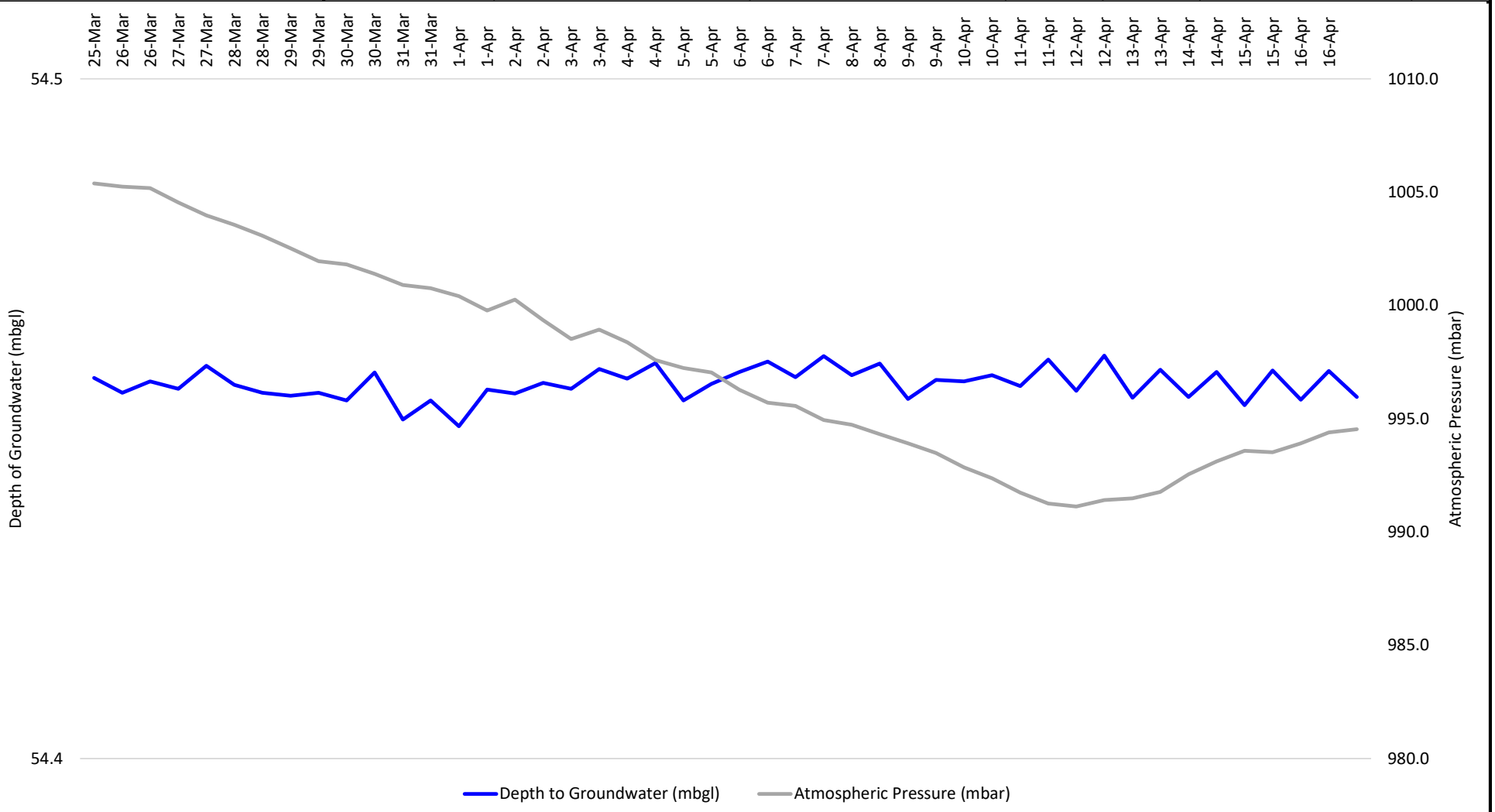
Groundwater Monitoring Results

Site Address:	CS-J-0916	Base of Installation (mbgl)	5.64	Min. GW Level (mbgl)	5.28
		Ground level (mAOD)	60.65	Min. GW Level (mAOD)	55.15
		Depth of Probe (mbgl)	5.50	Max. GW Level (mbgl)	5.50
				Max. GW Level (mAOD)	55.37
Site ID:	Snow Capel	Run Time (Days)	23	Min. Atm' Pres' (mB)	991.1
Hole ID:	BH201	Run Time Period	25/03/2021 – 16/04/2021	Max. Atm' Pres' (mB)	1005.4



Groundwater Monitoring Results

Site Address:	CS-J-0916	Base of Installation (mbgl)	6.07		Min. GW Level (mbgl)	5.85
		Ground level (mAOD)	60.31		Min. GW Level (mAOD)	54.45
		Depth of Probe (mbgl)	5.85		Max. GW Level (mbgl)	5.86
					Max. GW Level (mAOD)	54.46
Site ID:	Snow Capel	Run Time (Days)	23		Min. Atm' Pres' (mB)	991.1
Hole ID:	BH202	Run Time Period	25/03/2021	16/04/2021	Max. Atm' Pres' (mB)	1005.4



E Moat Water Quality

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 21/04524
Issue Number: 1 **Date:** 05 May, 2021

Client: JBA Consulting (Saltaire)
Salts mill
Victoria Road
Saltaire
Shipley
BD18 3LF

Project Manager: [redacted]
Project Name: Snow Capel
Project Ref: 2020s1556
Order No: TBC
Date Samples Received: 28/04/21
Date Instructions Received: 28/04/21
Date Analysis Completed: 05/05/21

Prepared by: **Approved by:**

[redacted]

UKAS TESTING
1247

Envirolab Job Number: 21/04524

Client Project Name: Snow Capel

Client Project Ref: 2020s1556

Lab Sample ID	21/04524/1	21/04524/2	21/04524/3	21/04524/4	21/04524/5	21/04524/6	21/04524/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	Moat North	Moat NW	Moat NE	Moat East	Moat SE	Moat SW	Moat West			
Depth to Top										
Depth To Bottom										
Date Sampled	26-Apr-21	26-Apr-21	26-Apr-21	26-Apr-21	26-Apr-21	26-Apr-21	26-Apr-21			
Sample Type	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW			
Sample Matrix Code	N/A	N/A	N/A	N/A	N/A	N/A	N/A			
Alkalinity by titration (carbonate) (w)$_A$	<15	<15	<15	<15	<15	<15	<15	mg/l Ca CO3	15	Titration w
Chloride (w)$_A^{\#}$	13	12	14	14	17	11	13	mg/l	1	A-T-026w
Nitrate (w)$_A^{\#}$	<0.1	<0.1	0.8	<0.1	<0.1	<0.1	<0.1	mg/l	0.1	A-T-026w
Sulphate (w)$_A^{\#}$	75	63	107	113	79	47	51	mg/l	1	A-T-026w
Arsenic (dissolved)$_A^{\#}$	-	1	1	-	2	2	-	µg/l	1	A-T-025w
Boron (dissolved)$_A^{\#}$	-	26	63	-	66	50	-	µg/l	10	A-T-025w
Cadmium (dissolved)$_A^{\#}$	-	<0.2	<0.2	-	<0.2	<0.2	-	µg/l	0.2	A-T-025w
Calcium (dissolved)$_A^{\#}$	102	105	99	93	111	98	106	mg/l	1	A-T-049w
Copper (dissolved)$_A^{\#}$	-	<1	<1	-	<1	<1	-	µg/l	1	A-T-025w
Chromium (dissolved)$_A^{\#}$	-	<1	<1	-	24	<1	-	µg/l	1	A-T-025w
Lead (dissolved)$_A^{\#}$	-	<1	<1	-	<1	<1	-	µg/l	1	A-T-025w
Magnesium (dissolved)$_A^{\#}$	14	14	15	16	16	14	14	mg/l	1	A-T-049w
Mercury (dissolved)$_A^{\#}$	-	<0.1	<0.1	-	<0.1	<0.1	-	µg/l	0.1	A-T-025w
Nickel (dissolved)$_A^{\#}$	-	1	3	-	2	2	-	µg/l	1	A-T-025w
Potassium (dissolved)$_A^{\#}$	4	4	3	3	4	3	4	mg/l	1.2	A-T-049w
Selenium (dissolved)$_A^{\#}$	-	<1	<1	-	<1	<1	-	µg/l	1	A-T-025w
Sodium (dissolved)$_A^{\#}$	21	20	22	23	27	20	20	mg/l	1	A-T-049w
Zinc (dissolved)$_A^{\#}$	-	2	1	-	4	2	-	µg/l	1	A-T-025w

Envirolab Job Number: 21/04524

Client Project Name: Snow Capel

Client Project Ref: 2020s1556

Lab Sample ID	21/04524/1	21/04524/2	21/04524/3	21/04524/4	21/04524/5	21/04524/6	21/04524/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	Moat North	Moat NW	Moat NE	Moat East	Moat SE	Moat SW	Moat West			
Depth to Top										
Depth To Bottom										
Date Sampled	26-Apr-21	26-Apr-21	26-Apr-21	26-Apr-21	26-Apr-21	26-Apr-21	26-Apr-21			
Sample Type	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW			
Sample Matrix Code	N/A	N/A	N/A	N/A	N/A	N/A	N/A			
PAH 16MS (w)										
Acenaphthene (w)$_A^{\#}$	-	<0.01	<0.01	-	<0.01	<0.01	-	µg/l	0.01	A-T-019w
Acenaphthylene (w)$_A^{\#}$	-	<0.01	<0.01	-	<0.01	<0.01	-	µg/l	0.01	A-T-019w
Anthracene (w)$_A^{\#}$	-	<0.01	<0.01	-	<0.01	<0.01	-	µg/l	0.01	A-T-019w
Benzo(a)anthracene (w)$_A^{\#}$	-	<0.01	<0.01	-	<0.01	<0.01	-	µg/l	0.01	A-T-019w
Benzo(a)pyrene (w)$_A^{\#}$	-	<0.01	<0.01	-	<0.01	<0.01	-	µg/l	0.01	A-T-019w
Benzo(b)fluoranthene (w)$_A^{\#}$	-	<0.01	<0.01	-	<0.01	<0.01	-	µg/l	0.01	A-T-019w
Benzo(ghi)perylene (w)$_A^{\#}$	-	<0.01	<0.01	-	<0.01	<0.01	-	µg/l	0.01	A-T-019w
Benzo(k)fluoranthene (w)$_A^{\#}$	-	<0.01	<0.01	-	<0.01	<0.01	-	µg/l	0.01	A-T-019w
Chrysene (w)$_A^{\#}$	-	<0.01	<0.01	-	<0.01	<0.01	-	µg/l	0.01	A-T-019w
Dibenzo(ah)anthracene (w)$_A^{\#}$	-	<0.01	<0.01	-	<0.01	<0.01	-	µg/l	0.01	A-T-019w
Fluoranthene (w)$_A^{\#}$	-	<0.01	<0.01	-	<0.01	<0.01	-	µg/l	0.01	A-T-019w
Fluorene (w)$_A^{\#}$	-	<0.01	<0.01	-	<0.01	<0.01	-	µg/l	0.01	A-T-019w
Indeno(123-cd)pyrene (w)$_A^{\#}$	-	<0.01	<0.01	-	<0.01	<0.01	-	µg/l	0.01	A-T-019w
Naphthalene (w)$_A^{\#}$	-	0.25	<0.01	-	<0.01	<0.01	-	µg/l	0.01	A-T-019w
Phenanthrene (w)$_A^{\#}$	-	<0.01	<0.01	-	<0.01	<0.01	-	µg/l	0.01	A-T-019w
Pyrene (w)$_A^{\#}$	-	<0.01	<0.01	-	<0.01	<0.01	-	µg/l	0.01	A-T-019w
Total PAH 16MS (w)$_A^{\#}$	-	0.25	<0.01	-	<0.01	<0.01	-	µg/l	0.01	A-T-019w

Envirolab Job Number: 21/04524

Client Project Name: Snow Capel

Client Project Ref: 2020s1556

Lab Sample ID	21/04524/8							Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	Sneedhams Pond									
Depth to Top										
Depth To Bottom										
Date Sampled	26-Apr-21									
Sample Type	Water - EW									
Sample Matrix Code	N/A									
Alkalinity by titration (carbonate) $(w)_A$	<15							mg/l Ca CO3	15	Titration w
Chloride $(w)_A^{\#}$	36							mg/l	1	A-T-026w
Nitrate $(w)_A^{\#}$	<0.1							mg/l	0.1	A-T-026w
Sulphate $(w)_A^{\#}$	95							mg/l	1	A-T-026w
Calcium (dissolved)$_A^{\#}$	122							mg/l	1	A-T-049w
Magnesium (dissolved)$_A^{\#}$	19							mg/l	1	A-T-049w
Potassium (dissolved)$_A^{\#}$	3							mg/l	1.2	A-T-049w
Sodium (dissolved)$_A^{\#}$	37							mg/l	1	A-T-049w

REPORT NOTES

General
This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR

[redacted] [redacted]

Client: JBA Consulting (Saltaire), Salts mill, Victoria Road, Saltaire, Shipley, BD18 3LF

Project No: 21/04524

Date Received: 28/04/2021 (am)

Project: Snow Capel

Cool Box Temperatures (°C): 11.9

Clients Project No: 2020s1556

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

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SO22 4NR
http://www.ARCAUK.com

SNOW CAPEL, MATSON, GLOUCESTER: GEOARCHAEOLOGICAL BOREHOLE STUDY

WRITTEN SCHEME OF INVESTIGATION

[redacted]
16 December 2021 (revised 24 January 2022)

1. Introduction

1.1 This Written Scheme of Investigation (WSI) outlines a methodology to be used in conducting a geoarchaeological borehole study of land at Snow Capel, Matson, Gloucester (henceforth 'the site' or 'study area'). The study area has been proposed for residential development by Edward Ware Homes and Bromford Developments Ltd. The investigative approach outlined in this WSI accords with Historic England's guidance for environmental archaeology, geoarchaeology and preserving archaeological remains (Campbell et al. 2011, Historic England 2015, 2016).

1.2 The study area coincides with the Sneedham's Green moated site, a Scheduled Monument (1019399) under the Ancient Monuments and Archaeological Areas Act 1979 (Historic England 2021). That site was first included on the Schedule of Ancient Monuments on 17 January 1951. As a Scheduled Monument, Snow Capel is by definition a heritage asset of national significance. Nevertheless, an aerial photograph taken in 1970 during the construction of the M5 motorway suggests that that infrastructure project caused some disturbance and resulted in the capping of at least some of the site with overburden (EPD 2017, Williams 2021).

1.3 The proposed development does not overlap the bounds of the Scheduled Monument. However, a Tier 2 water environment assessment has indicated that construction *could* result in lowering of the water level and thus oxidation of organic deposits that *might* survive in the moat (this author's italics) (Williams 2021). This risk is addressed in the development proposals through a sustainable drainage system that will serve to top up the moat water using filtered surface run off water from the development. Further details are submitted with the current planning application.

1.4. The Snow Capel site is centred on NGR 385088 214218, while the Sneedham's Green moat edge lies at c +56.4m OD and the area within rises to +56.7m OD (Figure 1). The moated area measures approximately 80m on an east to west axis and 40m north to south, while the maximum width of the moat is about 14m (Figure 2). An area of approximately 66 by 42m is partially enclosed (the enclosure is open of the southern side) (Williams 2021). Dipper measurements of the moat suggest that its base lies at a maximum of +55.34m OD (Williams 2021). However, whether the moat is infilled by sediment and the character of potential fills has not previously been determined. Water levels within the moat were measured at between+56.166 and +55.970m OD in January to April 2021, while ground water level in five window sample boreholes south of the moated

area varied between +58.76 and +55.59m OD in January and February 2021 (Williams 2021). Ground water north and west of the moat varied between +56.04 and +54.45m OD during the same interval.

1.5 The British Geological Survey (BGS) map the bedrock geology of the study area as Chamouth Mudstone Formation, an Early Jurassic sub-unit of the Lias Group dating from 199 to 183 million years ago (British Geological Survey 2021a, 2021b). Although no superficial deposits are mapped on the site by the BGS, geotechnical boreholes suggest that up to 3.1m of motorway-derived Made ground exists south of the moat and 1.6m of the same to the north-east, while rockhead occurs at +54.6m OD north, +55.0m OD west and +57.5m OD south and east of the moat (Williams 2021). Further, the Tier 2 water environment assessment implies that the M5-derived Made ground has had an impact on ground water and suggests that a perched water table exists within that stratum north and south of the site (Williams 2021, figure 3, 13).

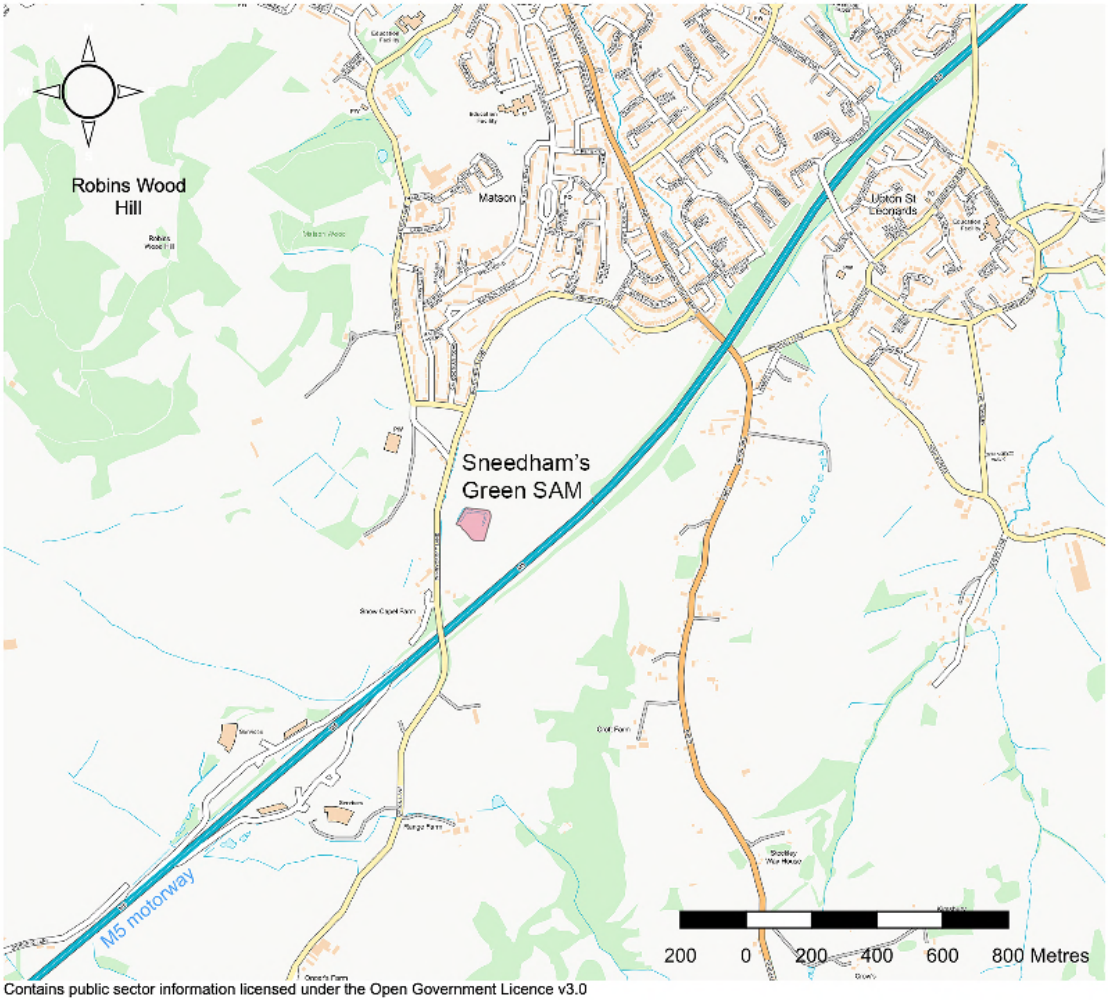

Figure 1. The location of the Snow Capel and the Sneedham's Green Scheduled Monument

1.6 Given that (a) the Sneedham's Green site is of demonstrable national archaeological importance by virtue of being a Scheduled Monument, while (b) the Tier 2 water environment assessment indicates that development might result in a lowered water table (although subject to mitigation through drainage

run off), and (c) the nature of any infilling sediments in the moat are unknown, the aims of the present geoarchaeological borehole study are to:

1.6.1 Characterise the lithostratigraphy of the moat infills (thickness, properties and variation);

1.6.2 Determine the mode of formation of the infilling strata;

1.6.3 Provide a chronology for the infilling strata;

1.6.4 Assess the preservation of biological remains within the moat fills;

And by resolving the Aims 1.6.1–1.6.4 to:

1.6.5 Assess the palaeoenvironmental potential of the moat fills;

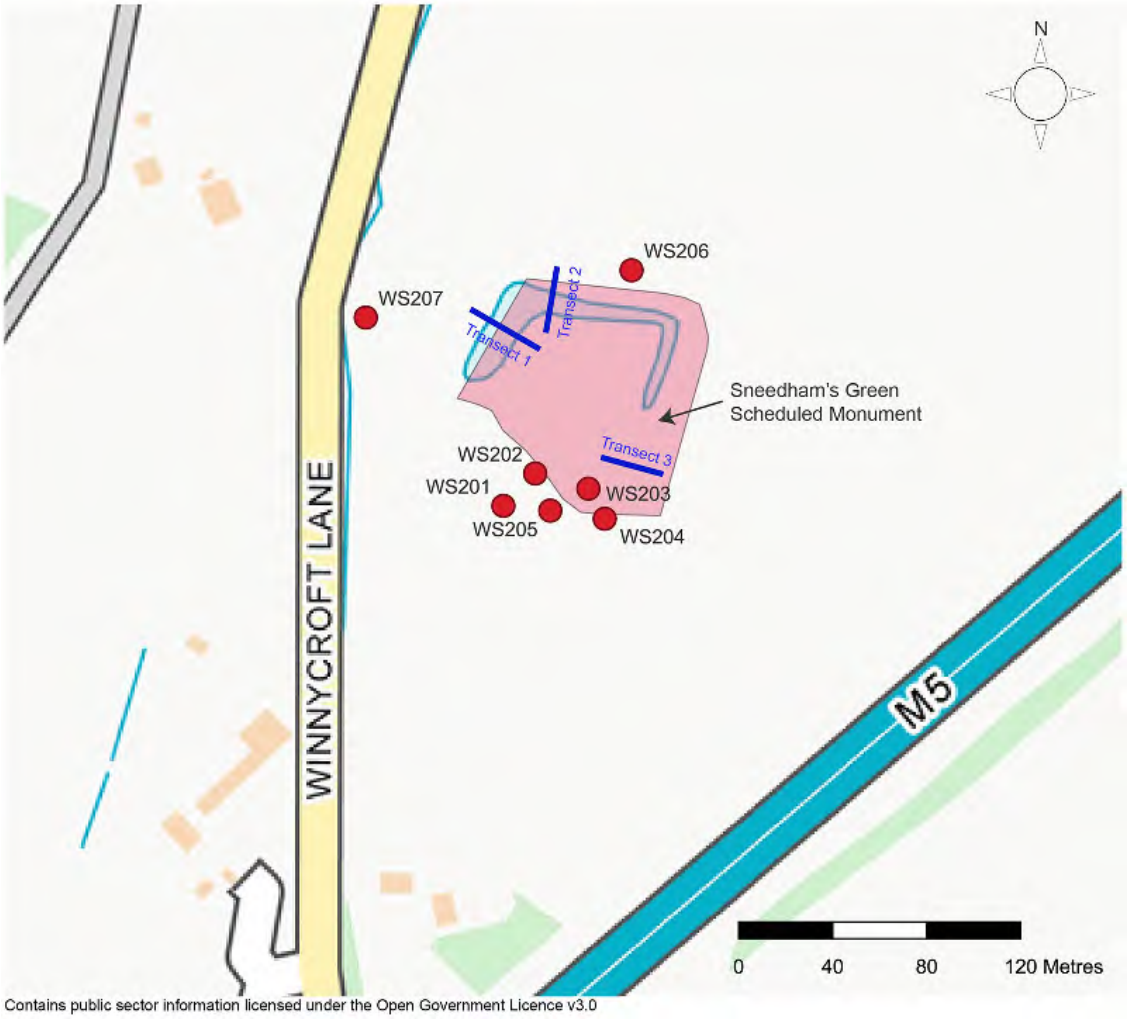

Figure 2. Proposed borehole transects plotted against locations of geotechnical boreholes

2. Methodology

2.1 Field

2.1.1 Boreholes will be manually drilled along three transects – two across the presently visible negative feature (Transects 1 and 2) and one across the presumed infilled portion to the south (Transect 3). Transect 3 will be drilled first and Gloucester City Council's archaeologist informed of the results (particularly with regards the presence/absence of a lining to the moat), thereby

allowing decisions to be made with regards the subsequent approach to Transects 1 and 2.

2.1.2 Initial boreholes along each transect will be advanced using 20mm diameter gouge auger heads to enable the infilling deposits to be characterised. Once the gouge auger survey of each transect is complete and the nature of the infilling deposits has been established, Russian auger heads will be employed in up to three locations to collect samples for laboratory description and sub-sampling. It is possible that a Russian auger will not penetrate fills of the sediment infilled moat (Transect 3), in which case an Atlas Cobra TT petrol-powered hammer driving 75–55mm diameter gouge augers and 54mm core samplers will be employed to collect sample material.

2.1.3 Transect locations will be planned in an ArcGIS or QGIS project (indicative locations for are shown in Figure 2). Those data will then be uploaded to a Leica GS16 RTK GPS, the latter device used to both locate transects in the field and then record the relevant elevations with respect to Ordnance Datum (OD) (when using SmartNet GSM correction the GS16 has a vertical accuracy of c 20mm). Boreholes will be drilled at variable intervals along each transect and on the basis of practical considerations (drilling within the moat will require waders, while drilling in water depths >1m will not be possible), but a minimum of three gouge auger boreholes per transect will be completed.

2.1.4 Strata revealed in gouge auger heads will be described to standard geological criteria in the field (Jones *et al*. 1999, Munsell Color 2000, Tucker 2011) and then discarded prior to the next auger drive. Given the particular field circumstances (drilling with waders and compact bedrock geology) it is anticipated that it will not be possible to advance gouge auger boreholes more than 3m below ground level.

2.1.5 Sequences of overlapping sediment cores of 500mm (length) by 50mm (diameter) will be collected from up to three locations using a Russian (closed chamber) auger. Cores so obtained will be placed in half-section plastic drainpipe, labelled and then wrapped in plastic film and then transported to the laboratory for further study.

2.1.6 Should Atlas Cobra TT-driven core samplers be employed. Continuous 1m long, 50mm diameter cores will be collected through the moat fills. Perspex liners placed within the core chamber will be extracted on site, labelled and sealed before being transported to the laboratory.

2.1.7 Fieldwork will be led by ARCA officers (Nick Watson or Prof Keith Wilkinson) with experience of working on waterlogged archaeological sites (see http://www.arcauk.com/our-staff.html for details).

2.2 Laboratory

2.2.1 The lithology of the Russian auger and Atlas Cobra TT-driven cores will be photographed and then described in ARCA's Winchester laboratory using the same standard criteria (Jones *et al*. 1999, Munsell Color 2000, Tucker 2011) as employed for the gouge auger samples in the field.

2.2.2 Lithological and positional data obtained from the gouge auger (in the field) and Russian auger/ Atlas Cobra TT-driven cores (laboratory) will be combined with those from prior geotechnical studies in a RockWorks 21 database (RockWare

2021). These data will then be used to plot composite cross sections along each transect across the moat.

2.2.3 Sub-samples will be taken opportunistically from fine-grained beds in the Russian auger/ Atlas Cobra TT-driven cores for palynological and plant macro-fossil assessment (carried out by Dr Rob Batchelor and Dr Mike Simmonds of Quaternary Scientific, University of Reading), and AMS ^{14}C measurement (undertaken at SUERC, East Kilbride, Scotland). Methods of sample preparation for biostratigraphic assessment will thereafter follow those outlined by Lowe and Walker (2014, 228–262), while all such works will accord with Historic England guidelines for environmental archaeology (Campbell et al. 2011). Specialists assessing samples for palynology and plant macro remains will be asked to comment on preservational bias, floristic diversity and sub-fossil concentration, in addition to the potential of the remains to reconstruct past environments and subsistence economy.

3. Reportage

3.1 A brief (1–2 sides A4) report on the stratigraphy of the gouge auger boreholes will be produced within five working days of the completion of fieldwork.

3.2 An integrated geoarchaeological report incorporated lithological, biostratigraphic and chronological data will be produced within 14 weeks of the completion of fieldwork[1]. The report will directly address the aims outlined in Section 1.6.

3.3 Reports will be issued in digital (PDF) format only.

4. Archive

4.1 The archive will be compiled in accordance with Archaeology Data Service (2011) guidelines. It will be both digital [dGPS locations for the borehole transects, a RockWorks database (in SQL Lite format) and the report itself (Adobe PDF)] and material. The latter will comprise Russian auger cores, microscope slides with pollen residue and plant macro fossils (stored in water in glass vials). The cores will be held at the University of Winchester for 12 months following completion of the fieldwork and pending decisions on further analyses, but will thereafter be discarded without further notice. Microscope slides and glass vials containing plant macrofossils will be archived at the University of Reading until the project is deemed complete.

5. ARCA

5.1 ARCA is the geoarchaeological consultancy arm of the University of Winchester. It was founded in 2004 as a formalisation of previous ad-hoc arrangement. ARCA was formally launched at the Institute of Field Archaeologists conference in March 2005 and has been a Registered Organisation (RO) of the Chartered Institute for Archaeologists (CIfA) since 2010.

[1] The constraints being the lead in and measurement times required for AMS ^{14}C dating.

5.2 ARCA specialises in geoarchaeology, geophysics and geomatics. In respect of the former, ARCA has a particular expertise in the carrying out borehole surveys and using stratigraphic data to produce deposit models. ARCA possesses both manual and mechanical drilling equipment and has working relationships with a number of geotechnical companies who operate larger drilling equipment. Since its launch it has worked for most of the larger archaeological contractors in southern Britain as well as a number of utility and construction companies, charities and local authorities.

6. Health and Safety

6.1 A Risk Assessment of the geoarchaeological investigations at Snow Capel will be made and lodged with the University of Winchester Health and Safety Manager at least one week before the fieldwork begins. The Risk Assessment will also be passed to the client

6.2 Health and safety protocols applied in the laboratory are outlined in the University of Winchester Health and Safety Policy (2013).

7. Chartered Institute for Archaeologists

7.1 ARCA is a Registered Organisation (RO) of the Chartered Institute for Archaeologists (CIfA) and as such it adheres to all codes and guidance of the CIfA (CIfA 2015). The present project will be managed by Prof Keith Wilkinson, a Member of the Chartered Institute for Archaeologists (MCIfA).

8. Insurance

8.1 Through the University of Winchester, ARCA holds Public Liability Insurance to a maximum of £20 million and professional indemnity insurance to in excess of £1 million.

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