

Topography:

Front section:

Decline from South to North of no more than 5 degrees

Decline from East to West

Back section:

Decline from South to North of no more than 3.4 degrees.

Flood Zone:

1 (No flood risk assessment required)

Key:

T1 Silver Birch

T2 Sycamore

T3 Sycamore

T4 Hawthorn

T5 Ash

T6 Crab Apple

T7 Ash

G1 Goat Willow

JK1a/1b/2 Japanese Knotweed

Tree Preservation Orders:

None

Removals:

The following trees were removed in March 2018 due to hard standing areas on the proposal, prior to nesting, as it would be too late once permission has been granted.

T1, T2, T3, T4, G1 shown on the plan in Orange

JK1a/b/2 The three pockets of Japanese Knotweed will require removing after planning permission is granted.

Additionally, the areas of shrubs, also shown in Orange, will require removing in order for development to take place.

Remains:

The following trees shall remain on site as they pose no hindrance to development.

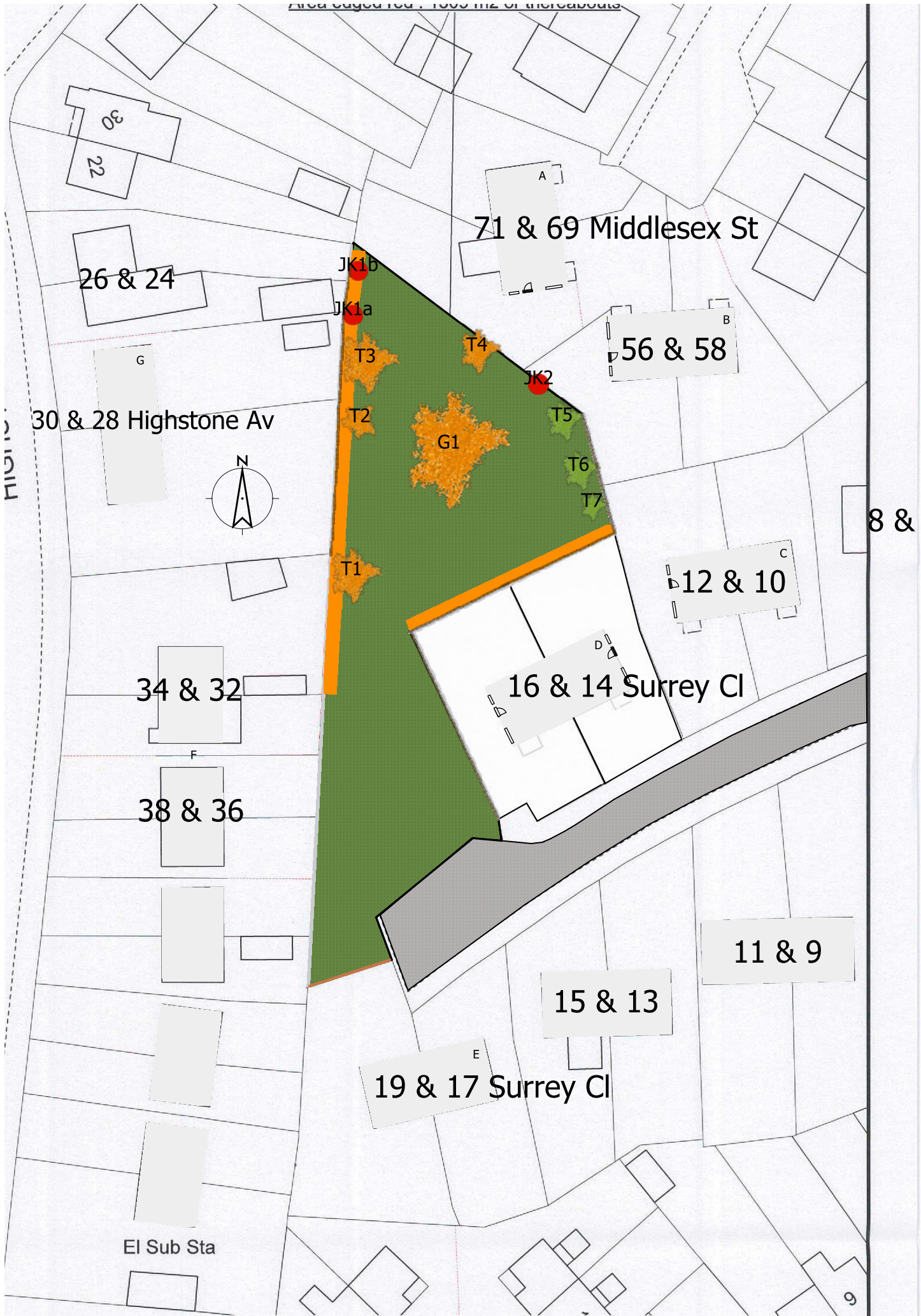
T5, T6, T7

Additions:

New planting shall be subject to the planning departments' recommendations.

Ground works:

An intrusive site investigation shall be carried out after planing permission has been granted beneath the proposed dwellings.



Ecological Impact Assessment

BE-596.1

Surrey Close



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Report title	Ecological Impact Assessment
Report reference	BE596.1
Revision	A
Site address	Land at Surrey Close, Barnsley S70 4NB
Grid reference	SE 34574 05347
Report composed by	Amy Reddick BSc (Hons)
Report reviewed by	David Watts BSc (Hons) FdSc MArborA MCIEEM
Client	Sub Zero Homes
Date	8 th December 2017

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Executive Summary

Bagshaw Ecology Ltd have been requested by Sub Zero Homes to undertake an Ecological Impact Assessment of the land at Surrey Close, Barnsley S70 4NB, in relation to an application for planning. The development proposals are to construct three residential properties on the site.

The survey found the habitats on the site to be of low ecological value, consisting of amenity grassland, scattered trees and tall ruderal vegetation. The site was bordered by other residential properties on all aspects.

None of the trees on site had features with potential for roosting bats. Therefore, no further considerations regarding bats are recommended.

The trees on site provide suitable habitat for nesting birds. It is recommended that no works are carried out to the trees within bird nesting season (1st March – 31st August), unless a further survey can confirm that the nests are no longer occupied.

House sparrows were observed utilising the site during the survey. As sparrows are red list species included on the UK BAP, it is recommended that two sparrow terraces are installed within the development.

The site is suitable for use by foraging hedgehogs, which may be impeded with the addition of fenced gardens within the site. It is recommended suitable mitigation is used to facilitate hedgehog movement through the site.

1. Introduction

1.1. Background

1.1.1. Bagshaw Ecology Ltd have been requested by Aidan Woodrow, on behalf of Sub Zero Homes, to undertake an Ecological Impact Assessment of the land at Surrey Close, Barnsley S70 4NB, hereafter referred to as 'the site'.

1.1.2. The purpose of the report is to identify the habitat types on the site, along with the presence or absence of any protected or notable species. The ecological impact of any proposed development is assessed, and mitigation, management and aftercare proposals are suggested when appropriate.

1.2. Site Details

1.2.1. The site is located at grid reference SE 34574 05347, and is accessed off the north of Surrey Close in Barnsley.

1.2.2. The site comprises an area of amenity grassland and trees. The site is bordered by residential properties to the north, east and west and by Surrey Close to the south.

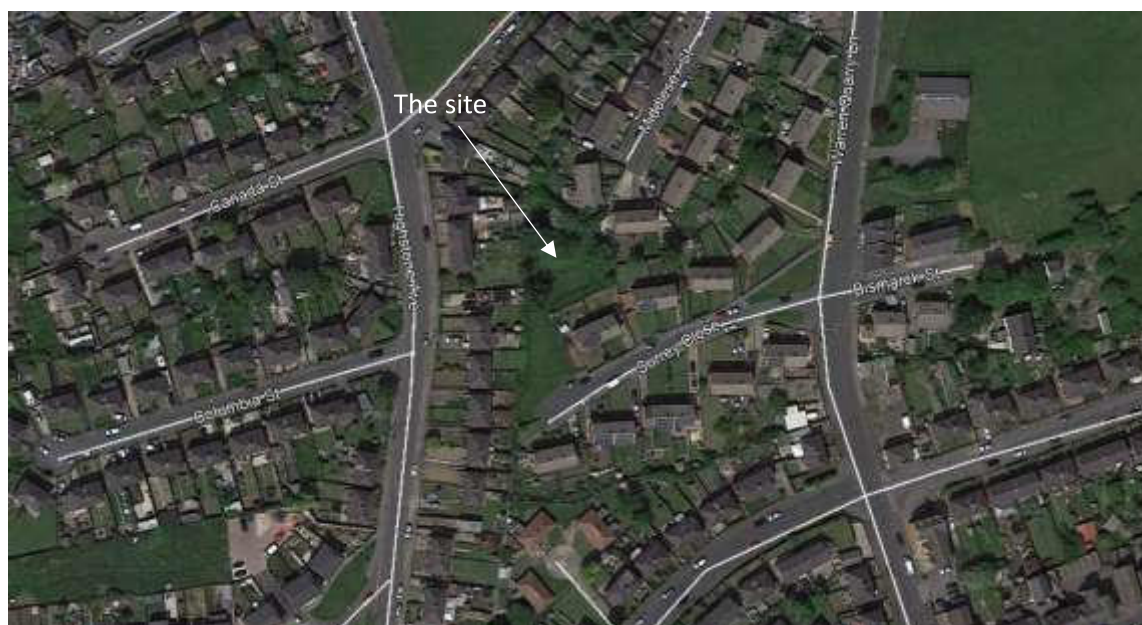


Figure 1. Aerial imagery of site and surrounding area (Google Earth Pro, 2017)

1.3. Development Proposals

1.3.1. The development proposals are to construct three residential properties on the site, in addition to their associated gardens and parking spaces.

2. Legislative Context

2.1. Legislation

2.1.1. The Wildlife and Countryside Act 1981 (as amended), makes it an offence to:

- Deliberately or recklessly injure, kill or capture any animal species protected under Schedule 5 of the act.
- Deliberately or recklessly kill, injure or take any wild bird; to take, damage or destroy the nest of any wild bird while occupied or being built, or to take or destroy the egg of a wild bird. Additional protection is afforded to bird species listed under Schedule 1 of the Act.
- Intentionally pick, uproot or destroy any wild plant included in Schedule 8 of the act.

2.1.2. The Conservation of Habitats and Species Regulations 2010 makes it an offence to deliberately capture, kill or disturb any animal protected under Schedule 2 of the regulations. It is also an offence to damage or destroy a breeding site or resting place of an animal, even if the animal is not present at the time.

2.2. Policy

2.2.1. The UK Biodiversity Action Plan (UKBAP) includes a list of 943 national priority species and 56 habitats of principal importance, with all species and habitats having specific action plans defining the measures required to ensure their conservation. Although the UKBAP has since been superseded by County Biodiversity Plans, it remains a useful point of reference.

2.2.2. Section 41 of the Natural Environment and Rural Communities Act (NERC) 2006 requires that any public bodies take into consideration any species and habitats listed in the UKBAP when implementing their duty and exercising any normal functions.

2.2.3. The National Planning Policy Framework (NPPF) states that planning decisions should aim to protect or enhance biodiversity and conservation interests, and where possible any development should aim to increase net gains in biodiversity.

3. Methods

3.1. Ecological Data Search

- 3.1.1. The local biological record centres, Barnsley Biological Records Centre (BBRC), was consulted as to any protected/notable species within 1km of the site.
- 3.1.2. The Department for Environment, Food and Rural Affairs' (DEFRA) Magic Maps website was consulted as to any land based designations within 1km of the site.
- 3.1.3. Aerial imagery was assessed to give an appraisal of the surrounding land use.

3.2. Phase 1 Habitat Survey

- 3.2.1. The habitat survey and mapping exercise was carried out on the 28th November 2017.
- 3.2.2. The survey was undertaken by Amy Reddick BSc (Hons) a graduate ecologist and licenced bat surveyor (Class Licence 2017-32206-CLS-CLS), with experience of carrying out habitat surveys.
- 3.2.3. The study area was surveyed in accordance with JNCC (2010) guidelines. Habitat types were assigned an alphanumeric code, and target notes were made identifying important species, along with the presence of potential habitats for any protected or notable species.
- 3.2.4. Habitats and species present on or adjacent to the site were assessed using CIEEM's (2016) guidelines. Ecological features were classed as being of either international, national, regional, district, local, low or of negligible importance (see table 3.1).

Table 3.1 Importance of Ecological Features

Value of feature	Key examples
International	Internationally designated sites (SPA, pSPA, SAC, cSAC, pSAC, Ramsar site, Biogenetic Reserve, or an area which meets designation for such sites. Internationally significant and viable areas of a habitat type listed in Annexe 1 of the Habitats Directive. Any regularly occurring, globally threatened species. A regularly occurring population of an internationally important species, which is threatened or rare in the UK.
National	A nationally designated site (SSSI, NNR), or an area which has met the published selection criteria. A regularly occurring significant number/population of a nationally important species (e.g. listed on the Wildlife and Countryside Act 1981 (as amended)). A feature identified as being of critical importance in the UK BAP.
Regional/County	Viable areas of key habitat identified in the regional or county BAP. A regularly occurring significant population/number of any important species important at regional/county level. Sites of conservation importance which exceed the district selection criteria but which fall short of SSSI selection guidelines.

Value of feature	Key examples
District	Areas of habitat identified in District/City/Borough BAP. Sites that the designating authority has determined meet the published ecological selection criteria for designation. Sites/features which are scarce within the District/City/Borough. A regularly occurring significant population/number of any important species important at District/City/Borough level.
Local	Areas identified in a Local BAP. Sites/features which are scarce in the locality or which are considered to appreciably enrich the habitat resource within the local context (e.g. species-rich hedgerows). Local Nature Reserves. Any populations, species or habitats of local importance.
Low/Site	Habitats of moderate to low diversity which support a range of locally and nationally common species, the loss of which can be easily mitigated.
Negligible	Habitats of no ecological value, the removal of which requires no mitigation.

3.3. Bat Scoping Survey

3.3.1. Trees were assessed from the ground using binoculars to identify any potential roost features. Potential roost features were assessed for their suitability for roosting bats using methods prescribed by Collins (2016) and Andrews *et al.* (2013).

Table 3. Bat Roosting Potential in Trees

Roosting potential	Criteria
Confirmed Presence	Presence confirmed by the survey.
High	A tree with one of more potential roost features that is obviously suitable for large numbers of bats.
Moderate	A tree with one or more potential roost features but which is unlikely to support roosts of high conservation status.
Low	A tree of sufficient size and age to contain potential roost features but with none seen from the ground, or features with very limited roost potential.
Negligible	Negligible habitat features likely to be used by roosting bats.

4. Results

4.1. Constraints

4.1.1. The site survey was conducted outside the optimum period for Phase 1 Habitat surveys. Some species are only visible at certain times of the year, and may not have been present during the survey.

4.2. Designated Sites

4.2.1. A search on Magic Maps (DEFRA, 2017) found several designated and notable habitats within 1km of the site, including:

- Seven Deciduous Woodland Priority Habitats, the closest of which is approximately 305m west of the site.

4.2.2. BBRC hold no records of designated sites within the survey area or within 1km of the site.

4.3. Habitats

4.3.1. The land use in the nearby surrounding area is predominantly residential, with moderate levels of tree cover. The terrestrial connectivity to and from the site was good for mobile species such as birds and bats but was limited for less mobile species due to the proximity to roads and houses.

4.3.2. The site consisted of an area of scattered trees and amenity grassland within a residential housing estate. The habitats on the site were all of low ecological importance. Table 4.1, below, summarises the habitat types found on the site. A map of the habitats can be viewed in the appendices.

Table 4.1 Habitats as defined by JNCC (2010) on the site

JNCC Habitat Type	Description	Ecological Value	Image of Habitat
A3 Scattered trees	The centre of the site consisted predominantly of grey willow <i>Salix cinerea</i> with bramble <i>Rubus fruticosus</i> . There are also several trees located in the perimeter of the site which include silver birch <i>Betula pendula</i> , ash <i>Fraxinus excelsior</i> , grey willow, box <i>Buxus sempervirens</i> and hawthorn <i>Crataegus laevigata</i> . There were also several introduced shrubs including lilac <i>Syringa vulgaris</i> .	Low	

JNCC Habitat Type	Description	Ecological Value	Image of Habitat
C3.1 Tall ruderal	At the perimeter of the site beneath the scattered trees and adjacent to the amenity grassland. Species include rosebay willowherb <i>Chamerion angustifolium</i> , cleavers <i>Galium aparine</i> , common dandelion <i>Taraxacum officinale</i> , star thistle <i>Centaurea solstitialis</i> , false-oat grass <i>Arrhenatherum elatius</i> and cock's foot <i>Dactylis glomerata</i> .	Low	
J1.2 Amenity grassland	Surrounding the central trees on the site was recently mown grassland which was low in forb species.	Negligible	
J2.1 Intact hedgerow	A Japanese privet <i>Ligustrum japonicum</i> hedge was located at the north boundary of the site. An area of Japanese knotweed <i>Fallopia japonica</i> was observed adjacent to the hedge.	Low	

4.4. Bats

4.4.1. DEFRA (2017) holds no records of granted European Protected Species Licences for bats within 1km of the site.

4.4.2. BBRC hold records of bat species within the site or within 1km of the site, including:

- Common pipistrelle *Pipistrellus pipistrellus*
- Noctule *Nyctalus noctula*

4.4.3. The scoping survey found no artificial structures suitable for bats on the site.

4.4.4. None of the trees on the site exhibited any features with potential for roosting bats.

4.5. Other Mammals

4.5.1. BBRC hold records of brown hare *Lepus europaeus*, European badger *Meles meles*, harvest mouse *Micromys minutus* and European hedgehog *Erinaceus europaeus* within 1km of the site.

4.5.2. No signs or habitats suitable for any protected or notable mammal species were observed on the site.

4.6. Reptiles and Amphibians

4.6.1. DEFRA (2017) holds no records of granted European Protected Species Licences for great crested newts *Triturus cristatus* within 1km of the site.

4.6.2. BBRC hold records of common toad *Bufo bufo* and common frog *Rana temporaria* within 1km of the site.

4.6.3. The habitat types found on the site are suitable for reptiles and amphibians, with some areas of scattered trees and tall ruderal vegetation; however, the site has limited terrestrial connectivity for these species and there are no ponds within 1km of the site. Therefore, it has limited value as a habitat for amphibians or reptiles.

4.6.4. A search on aerial imagery (Google Earth Pro, 2017) revealed no ponds within 250m of the site.

4.7. Bird Species

4.7.1. BBRC hold records of kingfisher *Alcedo atthis*, hen harrier *Circus cyaneus*, peregrine falcon *Falco peregrinus*, brambling *Fringilla montifringilla*, firecrest *Regulus ignicapilla*, redwing *Turdus iliacus* and fieldfare *Turdus pilaris* within 1km of the site which are afforded protection under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended).

4.7.2. The trees and hedges on site provide suitable habitat for nesting birds. House sparrow *Passer domesticus*, robin *Erithacus rubecula* and blackbird *Turdus merula* were observed utilising the habitats on site during the survey.

4.8. Invertebrates

4.8.1. The site provides suitable habitat for invertebrates consisting of areas of scattered trees and ephemeral vegetation.

5. Impact Assessment

5.1. Habitats

5.1.1. The habitats on the site are considered to be of low or negligible ecological importance, and their removal will result in minimal ecological impact.

5.2. Species

5.2.1. The trees and hedges on the site provide suitable habitat for nesting birds. All nesting birds are protected under the Wildlife and Countryside Act 1981 (as amended). The removal or trimming of any of the trees on site during bird nesting season could disturb nesting birds and potentially kill or injure their young.

5.2.2. House sparrows were observed utilising the trees on the site during the survey. House sparrows are listed as a red list National Priority Species on the UK BAP (Biodiversity Action Plan) due to large declines. Removal of habitat utilised by house sparrows could have negative impacts on the local population.

5.2.3. Hedgehogs have been recorded within 1 km of the site. If fences are used to divide new residential gardens this could have negative effects on hedgehog migration through the landscape.

5.2.4. Although the habitats on site provide suitable pollination opportunities for invertebrates, there is an abundance of suitable habitat in the surrounding landscape, including residential gardens.

6. Conclusion and Recommendations

6.1. Avoidance of Ecological Impacts

- 6.1.1. No tree removals should be undertaken during bird nesting season (1st March – 31st August). If this is not possible, a nesting bird check should be carried out within 48 hours prior to removal, and works should only commence if it has been established that no nesting birds are present.
- 6.1.2. To aid the movement of hedgehogs through the site it is recommended that properties are divided by hedgerows, or if fences are to be used, that holes are cut into fences between gardens approximately 13x13cm in size. The habitat could also be enhanced by providing linear features such as hawthorn or blackthorn hedgerows in gardens or along the site boundary.

6.2. Mitigation

- 6.2.1. To mitigate for the loss of house sparrow habitat it is recommended that two 1SP Schwegler Sparrow Terraces are incorporated into the developments site either on the surface of or within a north facing wall at a height of at least 2 metres. Care should be taken to ensure the bird boxes are not positioned near to features such as tall shrubs, which predators may use to reach the nests.

7. References

Andrews et al (2013). *The Bat Tree Habitat Key*. Bridgewater: AEcol

CIEEM (2016). *Guidelines for Ecological Impact Assessment in Britain and Ireland: Terrestrial, Freshwater and Coastal, 2nd Edition*. Winchester: Chartered Institute of Ecology and Environmental Management

Collins, J. (2016). *Bat Surveys Good Practice Guidelines – 3rd Edition*. London: Bat Conservation trust
Conservation of Habitats and Species Regulations 2010

Conservation of Habitats and Species Regulations, 2010.

DEFRA (2017) *Magic Maps* [online]. Available at >www.magic.gov.uk< [accessed 29th November 2017]

Google Earth Pro (2017). *Google Earth* [online]. Available at: >www.earth.google.com< [accessed 29th November 2017]

Harris, S., Yalden, D. (2008). *Mammals of the British Isles*. Southampton: The Mammal Society

Joint Nature Conservation Committee (2010). *Handbook for Phase 1 Habitat Survey*. Peterborough: JNCC

Mitchell-Jones, A.J. (2004). *Bat Mitigation Guidelines*. English Nature

Mitchell-Jones, A.J., McLeish, A.P. (2004). *Bat Workers Manual*. Joint Nature Conservation Committee

Natural Environment and Rural Communities Act 2006.

Wildlife and Countryside Act 1981 Ch. 69.

Appendices

Appendix 1: Photographs



Plate 1: Amenity grassland and scattered trees at the south aspect of the site



Plate 2: Entrance to the site



Plate 3: Grey willow at the centre of the site



Plate 4: Tall ruderal vegetation at edge of site

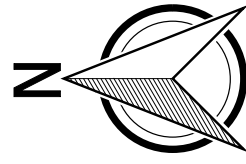
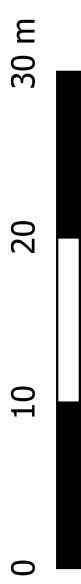


Plate 5: Scattered trees and tall ruderal vegetation



Plate 6: Privet hedge at north boundary of site and adjacent Japanese knotweed

Appendix 2: Phase 1 Habitat Map	
Site name:	Surrey Close
Client:	Aidan Woodrow
Drawn by:	Amy Reddick
Date:	4th December 2017



Key

Target Notes:

Japanese knotweed

Phase 1 Habitats:

A3.1 - Scattered trees

C3.1 - Tall ruderal

J1.2 - Amenity grassland

J2.1 - Intact hedge

Arboricultural Impact Assessment

BE-596.2

Land at Surrey Close



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Report title	Arboricultural Impact Assessment
Report reference	BE596.2
Revision	B
Site address	Surrey Close, Barnsley S70 4NB
Grid reference	SE 34574 05347
Report compiled by	David Watts BSc (Hons) FdSc MArborA MCIEEM
Client	Sub Zero Homes
Date	5 th February 2018

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Executive Summary

Bagshaw Ecology Ltd have been instructed by Sub Zero Homes to undertake an Arboricultural Impact Assessment of the land at Surrey Close, Barnsley S70 4NB, in relation to an application for planning. The development proposals are to construct three residential properties on the site.

The site survey identified seven individual trees and one group of trees on the site. All trees on the site are Category C trees, of low arboricultural quality.

The development will necessitate the removal of four trees and one group of trees. Although these are of low arboricultural quality, the three individual trees provide screening between the property and adjacent properties. Further tree planting is recommended to mitigate for this.

It is recommended that an Arboricultural Method statement is followed during construction works. This includes the installation of temporary tree protection fencing.

1. Introduction

1.1. Instruction

1.1.1. Bagshaw Ecology Ltd have been instructed by Aidan Woodrow, on behalf of Sub Zero Homes, to carry out an Arboricultural Impact Assessment of the land at Surrey Close, Barnsley S70 4NB, hereafter referred to as 'the site'.

1.1.2. The purpose of the report is to:

- Assess the quality of the trees on and immediately adjacent to the site, in accordance with BS5837: 2012 – Trees in Relation to Design, Demolition and Construction: Recommendations (hereafter referred to as BS5837: 2012).
- Identify trees suitable for retention and for removal due to the proposed development.
- Prescribe tree protection measures to ensure that retained trees thrive after the development has been completed.
- Prescribe arboricultural recommendations for the long-term management of trees on the site.
- To assess the site for its suitability for mitigation planting, and to specify planting requirements.

1.2. Site Details

1.2.1. The site is accessed off the northwest of Surrey Close in Barnsley. The surrounding area is predominantly residential, with moderate levels of tree cover.

1.2.2. The site comprises an area of mown grassland, bordered by semi-mature and early-mature trees and scrub. The topography of the site is variable, with an incline from the north to the south.

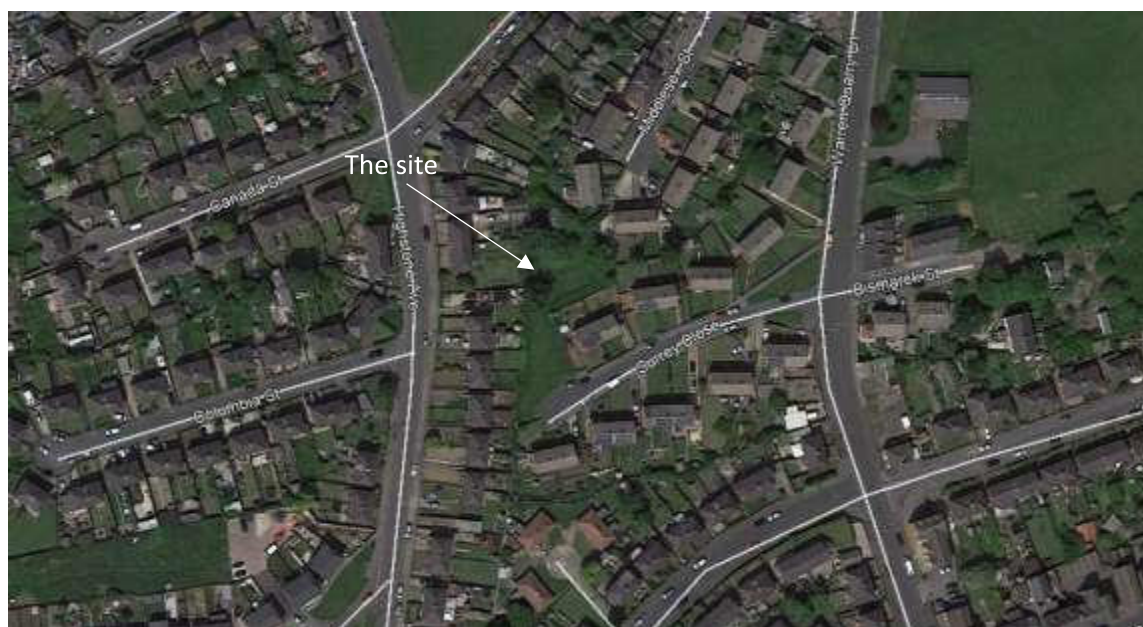


Figure 1.1 Aerial imagery showing approximate site boundary (Google Earth Pro, 2017)

1.3. Proposed Development

- 1.3.1. The development proposals are to construct three residential properties on the site, in addition to their associated gardens and parking spaces.

2. Methods

2.1. Desk Based Study

2.1.1. The local council was consulted to determine if there are any Tree Preservation Orders or Conservation Areas affecting trees on or immediately adjacent to the site.

2.1.2. Cranfield (2017) was consulted as to the soil type of the site and the surrounding area.

2.2. Site Survey

2.2.1. The site survey was carried out on 28th November 2017. The survey was carried out by David Watts, an experienced arboricultural consultant, who holds an FdSc in Arboriculture, a BSc (Hons) Ecology, has been awarded the Lantra Professional Tree Inspection Certificate and who is a member of the Arboricultural Association at Professional level.

2.2.2. All trees on site were inspected from ground level, using the Visual Tree Assessment (VTA) method (Mattheck *et al*, 2015). Any notable defects of trees were recorded; however, the site survey did not constitute a full tree safety assessment.

2.2.3. Trees were plotted onto an Ordnance Survey map with a Getac PS236. Tree heights and crown clearances were measured to the nearest 0.1 m with a clinometer. Crown spreads of trees were recorded to the nearest 0.1m with a laser measurer.

2.2.4. The diameter at breast height (DBH) of trees was measured to the nearest 10mm. This was used to calculate the root protection area (RPA) of trees using methods prescribed in BS5837: 2012:

- For single stem trees, the RPA was calculated as a circle with a radius 12 times the DBH.
- For trees with 2-5 stems, the RPA was calculated using the formula:

$$RPA = \sqrt{(\text{Stem 1 DBH})^2 + (\text{Stem 2 DBH})^2 + \dots (\text{Stem 5 DBH})^2}$$

- For trees with 6 or more stems, the RPA was calculated using the formula:

$$RPA = \sqrt{(\mu \text{ DBH})^2 \times \text{number of stems}}$$

2.2.5. In accordance with BS5837: 2012, trees were classified as either A, B, C or U, using the criteria shown in Table 1.

2.3. Constraints

2.3.1. The survey was constrained by the season in which it took place. Some pathogens of trees, in particular fruiting bodies of decay fungi, are only visible at certain times of year.

2.3.2. The GPS device used to plot the trees is accurate up to a range of 2m; therefore, actual tree locations may vary to those shown in the Tree Constraints Plan.

Table 2.1 BS5837 Cascade Chart (adapted from British Standards, 2012)

Category	Definition	Retention	Colour code
Category A	Trees of high quality with an estimated remaining life expectancy of at least 40 years; trees that are particularly good examples of their species, especially if rare or unusual.	Highly desirable	Light green
Category B	Trees of moderate quality with an estimated remaining life expectancy of at least 20 years; trees lacking the special quality to merit category A designation.	Desirable	Dark blue
Category C	Trees of low quality with an estimated remaining contribution of at least 10 years, or trees with a stem diameter below 150mm; unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories.	Feasible, but should be removed if posing a constraint to development	Grey
Category U	Trees that have serious, irremediable, structural and/or physiological defects, including those that will become unviable after removal of other category U trees.	Unfeasible	Dark red

3. Results

3.1. Desk Based Study

- 3.1.1. A search on the website of Barnsley Metropolitan Borough Council (2017) confirmed that there are no trees afforded protection by TPOs on the site, and that the site is not within a Conservation Area.
- 3.1.2. Cranfield (2017) states that the soil type of the surrounding area consists of freely draining, slightly acid, loamy soils. No further soil analysis was carried out as part of the survey.

3.2. Tree Population Assessment

- 3.2.1. A total of seven individual trees and one group of trees were identified on the site. These all consisted of Category C trees, of low quality.
- 3.2.2. Tree species on the site include sycamore *Acer pseudoplatanus*, silver birch *Betula pendula*, hawthorn *Crataegus monogyna*, ash *Fraxinus excelsior*, crab apple *Malus sylvestris*, and goat willow *Salix caprea*.
- 3.2.3. There were no trees on the site which warranted Category A or Category B designation. No trees on the site had an estimated safe useful life expectancy (SULE) of less than 10 years to warrant Category U designation.
- 3.2.4. T5 had a SULE of 11-20 years, and was therefore downgraded to Category C.
- 3.2.5. T7 and G1 had an average diameter at breast height (DBH) of 150mm, and were therefore downgraded to Category C.
- 3.2.6. T1, T2, T3, T4 and T6 had a SULE of greater than 20 years, but were unremarkable trees of limited arboricultural merit, and were therefore downgraded to Category C.
- 3.2.7. Although the trees on the site are all individually of low quality, together they contribute to the amenity value of the surrounding area. Most importantly, they provide screening between the site and adjacent properties.

4. Impact Assessment

4.1. Tree Removals

- 4.1.1. Four Category C trees tree and one Category C group of trees are recommended for removal. These include T1, T2, T3, T4 and G1.
- 4.1.2. T1 will necessitate removal due to the construction of the driveway. Retention of this tree would be feasible if the driveway were constructed of a cellular confinement system; however, due to the low quality of this tree, it is considered more pragmatic to remove and replace with a suitable species.
- 4.1.3. Although the trees necessitating removal are of low arboricultural quality, they do provide screening between the site and the adjacent properties of Highstone Avenue. Therefore, further mitigation planting will be necessary.

4.2. Tree Protection

- 4.2.1. The installation of temporary tree protection fencing and the provision of an Arboricultural Method Statement will be required to ensure the survival of trees to be retained.

5. Recommendations

5.1. Trees Works

- 5.1.1. T1, T2, T3, T4 and G1 are recommended for removal. Trees recommended for removal are shown in Appendix 2: Arboricultural Constraints Plan.
- 5.1.2. All tree works should be carried out by a suitably qualified and fully insured arboricultural contractor who is able to comply with BS3998: 2010 – Tree Works: Recommendations.
- 5.1.3. At the time of writing, no trees on the site are afforded protection by TPOs or Conservation Areas. This may be subject to change, and any legal designations affecting trees should be verified with the local authority prior to the commencement of any tree works. Killing or damaging a protected tree is a criminal offence, and can result in an unlimited fine.

5.2. Tree Protection

- 5.2.1. It is recommended that an Arboricultural Method Statement (AMS) is followed during construction works. An outline AMS can be viewed in the appendices. This should be reviewed by an arboricultural consultant prior to the commencement of works on the site.
- 5.2.2. To ensure the survival of retained trees, the installation of temporary tree protection fencing during development works is recommended. The location of tree protection fencing can be viewed in Appendix 3: Tree Protection Plan. Further specifications on tree protection fencing can be viewed in the AMS.

5.3. Mitigation

- 5.3.1. Further tree planting will be required to mitigate for trees removed due to development. At least six trees should be incorporated into the development proposals. The location of trees planted for mitigation should be detailed in the development plans, and should include trees adjacent to the west boundary to provide screening to adjacent properties.
- 5.3.2. Trees planted for mitigation should be heavy standard in size, and should be planted in accordance with BS8545: 2014 – Trees: from Nursery to Independence in the Landscape. Trees should be sourced from UK-grown stock.
- 5.3.3. Tree species planted for mitigation should be agreed with by the local authority tree officer. Suggested species include:
- Silver birch *Betula pendula*
 - Hornbeam *Carpinus betulus*
 - Sweet gum *Liquidamber styraciflua*
 - Dawn redwood *Metasequoia glyptostroboides*

6. References

- Barnsley Metropolitan City Council (2017). *Interactive Maps* [online]. Available at: >www.barnsley.gov.uk< [accessed 8th December 2017]
- British Standards (2010). *BS3998: 2010 – Tree Works: Recommendations*. British Standards Institute, London
- British Standards (2012). *BS5837: 2012 - Trees in Relation to Design, Demolition and Construction: Recommendations*. British Standards Institute, London
- British Standards (2014). *BS8545: 2014 – Trees: from Nursery to Independence in the Landscape*. British Standards Institute, London
- Cranfield (2017). *Interactive Soilscape Viewer* [online]. Available at: >www.landis.org.uk< [accessed 8th December 2017]
- Google Earth Pro (2017). *Google Earth* [online]. Available at: >www.google.co.uk/earth< [accessed 29th November 2017]
- Johnson, O., More, D. (2004). *Collins Tree Guide*. London: HarperCollins
- Mattheck, C., Bethge, K. and Weber, K. (2015). *The Body Language of Trees*. The Karlsruhe Research Institute, Karlsruhe (Germany)
- Weber, K. and Mattheck, C. (2001). *Manual of Wood Decay in Trees*. Stonehouse: Arboricultural Association

Appendices

Appendix 1: Tree Survey Schedule

A plan of the tree locations can be viewed in Appendix 2: Tree Constraints Plan.

Key	
Species	Common name following Johnson & More (2004)
Height	Measured to nearest 0.1m
CC	Height of crown clearance, to nearest 0.1m
Stems	Number of stems bifurcating below 1.5m
DBH	Diameter at breast height (1.5m), in millimetres
Crown spread	Measured to nearest 0.1m
Age	Y – Young sapling/newly planted tree SM – Semi-mature; tree in 1/3 of estimated lifespan EM – Early mature; tree in 2/3 of estimated lifespan
	Age
	M – Mature; tree in 3/3 of estimated lifespan OM – Over mature; tree that has exceeded its natural life span V – Veteran tree
	RPA
	Root protection area, in metres squared
	RPR
	Root protection radius from stem, in metres
	SULE
	Safe useful life expectancy of tree, in years
	See BS5837 cascade chart (Table 1)
	Category
	#
	Denotes estimated value

Individual Trees

Tree No.	Species	Height	CC	Stems	DBH	Crown Spread				Age	Comments	RPA	RPR	SULE	Category
						N	E	S	W						
T1	Silver birch <i>Betula pendula</i>	10.6	0	11	200 av.	3.5	4.5	4#	2.6	EM	Shrubby form. Included primary branch unions.	109	5.9	21-40	C
T2	Sycamore <i>Acer pseudoplatanus</i>	6.8	0.7	1	180	2.3	1.9	3#	3#	SM	Included primary branch unions.	15	2.2	>40	C

Tree No.	Species	Height	CC	Stems	DBH	Crown Spread				Age	Comments	RPA	RPR	SULE	Category
						N	E	S	W						
T3	Sycamore <i>Acer pseudoplatanus</i>	10.6	2.1	6	250 av.	3.6	5	5#	3#	EM	Mechanical damage to stem. Included stem unions, with natural braces above.	170	7.3	21-40	C
T4	Hawthorn <i>Crataegus monogyna</i>	5.8	0.3	7	180 av.	3#	3#	3.8	3#	SM	Dense vegetation around stem. Shrubby form.	88	5.3	>40	C
T5	Ash <i>Fraxinus excelsior</i>	8.4	0.2	9	200 av.	5#	4#	3.8	4.1	EM	Apical leader died back. Suppressed by adjacent trees.	109	5.9	11-20	C
T6	Crab apple <i>Malus sylvestris</i>	4.8	0.6	4	150 av.	3.8	3.5	3#	3#	SM	Shrubby form. Deadwood <100mm diameter.	41	3.6	21-40	C
T7	Ash <i>Fraxinus excelsior</i>	7.6	1.6	2	150 150	2.9	3#	3#	2.7	SM	No major visible defects.	20	2.5	>40	C

Groups of Trees

Group No.	Species	Av. Height	Av. CC	No. of trees	Av. DBH	Av. Crown Spread				Age	Comments	Av. RPA	Av. RPR	SULE	Category
						N	E	S	W						
G1	Goat willow <i>Salix caprea</i>	5	0	5	150	3	3	3	3	SM	Dense group of trees and shrubs	10	1.8	21-40	C



T5 Ash



T6 Crab apple



T7 Ash

G1

#2

#1

f2 Sycamore

Silver birch

