St Nicholas CIW Primary School - Building Bat Roost Report

Vale of Glamorgan Council

Project number: 60607807

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Quality information

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Revision History

Revision	Revision date	Details	Authorized	Name	Position

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1. Executive Summary

AECOM was commissioned by the Vale of Glamorgan Council to undertake bat roost surveys of buildings at the site of the proposed St Nicholas Church in Wales (CIW) Primary School Site in St Nicholas, South Wales. A Preliminary Ecological Appraisal (PEA) completed by AECOM (AECOM, 2019) identified buildings with features suitable to support roosting bats. This report includes the methodologies and results of the bat roost surveys and outlines potential impacts and recommendations for mitigation and enhancement.

The proposed St Nicholas Church in Wales Primary School site ("the Site) will be located on the existing St Nicholas Church in Wales Primary School Site in St Nicholas, CF5 6SG, NGR: ST 08904 74365. The Site is located in a village on the eastern edge of the Vale of Glamorgan. The southern boundary and part of the eastern boundary is bordered by residential housing. The remainder is surrounded by pastoral fields.

The dominant habitat types on Site include: amenity grassland, buildings and hardstanding. Remaining habitat types include mixed plantation woodland, poor semi-improved grassland, standalone trees, hedgerow with trees, species rich and species poor intact hedgerow, row of trees, standing water, fences and wall (Figure 1).

The proposed development is for the demolition of the existing school building and construction of a new one storey school building on the existing playing field. The Site will include new sports pitches (grass), games court (MUGA), soft play, hard play, car parking, service area and habitat areas. Detailed landscaping designs and lighting designs are not yet available.

Emergence/re-entry roost surveys were undertaken in June and July 2019. No bats were recorded emerging or re-entering any buildings on Site. Moderate to Low levels of foraging and commuting were recorded at the Site, mostly along the boundaries. Species included common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, noctule *Nyctalus noctula* and serotine *Eptesicus serotinus.*

The proposed demolition of the buildings will have no impact on roosting bats.

No further surveys are recommended and a European Protected Species License (EPSL) for bats is not required.

It is recommended that new external lighting avoids features used by commuting and foraging bats and any newly installed bat boxes. Best practice guidance, to avoid and reduce lighting impacts on bats, should be incorporated into any new lighting scheme at the Site.

As an enhancement, bat boxes should be incorporated into the building design or erected on suitable trees. This will also satisfy an additional requirement under BREEAM (2018) LE03.

The Executive Summary is not a substitute for the full report; refer to the full text for further detail.

2. Introduction

2.1 Introduction

AECOM was commissioned by Vale of Glamorgan Council to undertake Bat Roost Surveys of buildings at the proposed St Nicholas Primary School Site in St Nicholas, South Wales (referred to as 'the Site'). The Preliminary Ecological Appraisal (PEA) completed by AECOM (AECOM, 2019) included a Preliminary Ground Level Bat Roost Assessment and identified buildings with features suitable to support roosting bats.

This report includes the methodologies and results of the bat roost surveys and outlines potential impacts and recommendations for mitigation and enhancement.

2.2 Site Location and Description

The proposed Site will be located on the existing St Nicholas Primary School Site on School Lane, St Nicholas, Vale of Glamorgan, CF5 6SG, NGR: ST 08904 74365. The Site is located in the village of St Nicholas. The southern boundary and part of the eastern boundary is bordered by residential housing. The remainder is surrounded by pastoral fields.

The dominant habitat types on Site include: amenity grassland, buildings and hardstanding. Remaining habitat types include mixed plantation woodland, poor semi-improved grassland, standalone trees, hedgerow with trees, species rich and species poor intact hedgerow, row of trees, standing water, fences and wall (Figure 1).

2.3 Proposed Development

The proposed development is for the demolition of the existing school building and construction of a new one storey school building on the existing playing field. The Site will include new sports pitches (grass), games court (MUGA), soft play, hard play, car parking, service area and habitat areas. Detailed landscaping designs and lighting designs are not yet available.

2.4 Objectives

The objectives of the survey and report are:

- To establish the presence or likely absence of any bat roosts within the Site;
- To highlight any potential ecological constraints in relation to bats;
- To outline further survey work that may be required;
- To make suggestions for mitigation, compensation and enhancement of the natural features identified within the Site in respect to bats; and,
- To satisfy Mandatory Requirements under BREEAM (2018)LE03.

2.5 Legislation

All bats and their roosts in Wales are fully protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). They are also included in Schedule 2 of the Conservation of Habitats and Species Regulations 2017, known as The Habitats Regulations. The Wildlife and Countryside Act 1981 was amended by the Countryside and Rights of Way Act 2000 (CRoW) which adds an extra offence of recklessly disturbing roosting bats or obstructing access to their roosts; makes species offences arrestable, increases the time limits for some prosecutions and increases penalties.

The Wildlife and Countryside Act, the Habitats Regulations and the CRoW Act, together make it an offence, among other things, to recklessly, deliberately or intentionally:

- Capture, injure or kill any wild animal which is a European Protected Species (EPS),

- Disturb wild animal of any such species; and,
- Damage or destroy a breeding or resting site of any such animal.

Disturbance is defined as that which is likely:

- To impair their ability:
  - To survive, to breed or reproduce, or to rear or nurture their young;
  - In the case of animals of a hibernating or migratory species, to hibernate or migrate; or,
- To affect significantly the local distribution or abundance of the species to which they belong.

A bat roost is defined as “any structure or place (including trees) which any bat uses for shelter and protection”. Because bats tend to re-use the same roosts, legal opinion is that the roost is protected whether or not the bat(s) are present at the time.

If the proposed works are likely to destroy or disturb bats or their roosts, then a European Protected Species License (EPSL) will be required from Natural Resources Wales (NRW), which would be subject to appropriate mitigation and working methods to protect bats.

This is a brief summary of the legislation. When dealing with individual cases, the client is advised to consult the full texts of the relevant legislation and obtain further legal advice.

2.6 Quality Assurance

This survey and subsequent report was undertaken in line with AECOM’s Integrated Management System (IMS). Our IMS places great emphasis on professionalism, technical excellence, quality, environmental and Health and Safety management. All staff members are committed to establishing and maintaining our certification to the international standards BS EN ISO 9001:2015 and 14001:2004 and BS OHSAS 18001:2007. In addition, our IMS requires careful selection and monitoring of the performance of all sub consultants and contractors.

All AECOM Ecologists who worked on this project are members of (at the appropriate level) the Chartered Institute of Ecology and Environmental Management (CIEEM) and follow their code of professional conduct (CIEEM, 2013) when undertaking ecological work.

3. Methodology

3.1 Desk Study

The desk study was completed as part of the AECOM PEA and BREEAM Report undertaken in May 2019 (AECOM, 2019). In relation to bats, the objectives of the desk study were to review the existing information available in the public domain to identify the following:

- Special Areas of Conservation (SACs) and Sites of Special Scientific Interest (SSSIs) designated for bats within a 10 km radius of the Site Boundary paying due regard to Bat Conservation Trust (BCT) guidelines (Collins, 2016), using the Multi Agency Geographic Information for the Countryside (MAGIC) website (Natural England, 2019);
- Bat records up to 2 km from the Site Boundary, purchased from the South East Wales Biodiversity Records Centre (SEWBReC);
- Ancient Semi-Natural Woodland (ASNW), Plantation on Ancient Woodland Site (PAWS), Restored Ancient Woodland Site (RAWS) or Ancient Woodland Site of Unknown category (AWSU) within or adjacent to the Site using Ancient Woodland Inventory 2011 dataset downloaded from the spatial dataset website, Lle (Natural Resource Wales (NRW), 2019);
- The Section 7 list of Species of Principal Importance for Conservation of Biological Diversity in Wales;
- Features of ecological interest surrounding the Site, and features connecting these habitats (e.g. hedgerows, watercourses, railway lines) using aerial photographs and Ordnance Survey (OS) maps; and,
- The County Ecologist and Glamorgan Bat Group were consulted regarding locally designated site citations, local bat records not available from SEWBReC and any local knowledge about the area.

3.2 Bat Roost Surveys

3.2.1 Preliminary Ground Level Assessment

During the PEA (AECOM, 2019), all buildings, structures and trees were assessed for their suitability to support roosting bats using category descriptions drawn from Collins (2016) and Mitchell-Jones (2004).

Bat surveys were recommended to confirm presence, or likely absence of bat roosts. The following surveys, in Table 2.1, were recommended.

Table 3.1 Bat Roost Survey Effort

Building No.	Bat Roost Suitability	Number of Survey Visits Required	Timing
B1	Moderate	Two surveys (dusk emergence and dawn re-entry)	May-September
B3	Low	One survey visit (dusk emergence or dawn re-entry)	May-August
B4	Moderate	Two surveys (dusk emergence and dawn re-entry)	May-September

Buildings 2 and 5 had Negligible bat roost suitability and therefore surveys were not recommended.

No further surveys are required on trees, which were all accessed as having Negligible suitability to support roosting bats.

3.2.2 Emergence and Re-Entry Surveys

Due to the amalgamation of buildings at the Site (Figure 1). A dusk emergence and a dawn re-entry survey was carried out on the whole building complex (apart from the shipping container) in order to determine the presence and/or absence of bat roosts.

The locations of the buildings and positions of the surveyors are shown in Figure 2.

Surveys paid due regard to Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2016). Each survey consisted of a surveyor stood at a vantage point looking at features on the building identified during the ground level bat roost assessment. Surveyors positioned themselves so that bats could be observed leaving suitable roost features. Bat activity noted around the Site during the emergence/ re-entry surveys was also recorded by the surveyors.

Dusk emergence surveys started at least 15 minutes before sunset and continued for 1.5 hours after sunset.

Dawn re-entry surveys started 1.5 hours before sunrise (see limitations) and continued until sunrise.

Broadband frequency division detectors (BatLogger M) were used and digital recordings were made to assist with species identification if required.

The weather conditions during the surveys were recorded and were considered favourable for bat surveys are given in Table 2.2.

Table 3.2 Bat Surveys

Building No.	Date	Sunrise /Sunset	Start Time	End Time	Surveyors	Weather (Start)	Weather (End)
St Nicholas School Complex – B1 B3 B4	17/06/2019	21:33	21:03	23:03	LN – NRW Bat Licensed Ecologist LJ – NRW Bat Licensed Ecologist UJ – Senior Ecologist JM – Graduate Ecologist KW – Associate Ecologist LF - Ecologist	Wind (mph): 1.1 Cloud Cover (Oktas): 8/8 Temperature (C): 14.1 Humidity (%): 79.1 Precipitation: Dry in daytime and during survey	Wind (mph): 0.0 Cloud Cover (Oktas): 8/8 Temperature (C): 14.7 Humidity (%): 80.6 Precipitation: Dry in daytime and during survey
St Nicholas School Complex – B1 B3 B4	17/07/2019	05:16	03:50*	05:16	LJ – NRW Bat Licensed Ecologist UJ – Senior Ecologist JM – Graduate Ecologist KMo – Graduate Ecologist KMi – Graduate Ecologist	Wind (mph): 0.0 Cloud Cover (Oktas): 5/8 Temperature (C): 10.6 Humidity (%): 80.7 Precipitation: Dry in daytime and during survey	Wind (mph): 1.1 Cloud Cover (Oktas): 7/8 Temperature (C): 14.3 Humidity (%): 84.7 Precipitation: Dry in daytime and during survey

*see limitations

3.3 Data Analysis

Calls were checked and verified by a suitably experienced ecologist, using bat echolocation call analysis where required. Analysis was undertaken with support from reference material including the British Bat Calls Species Identification Guide (Russ, 2012). The AnalookW software programme (Version 4.4a) was used to analyse bat echolocation calls.

3.4 Limitations

Bat surveys offer only 'snapshots' of the location being assessed and do not take account of potential future changes in abundance or diversity of bats at a given site. However, by completing surveys to best practice, the risks of providing unrepresentative assessments are reduced.

The methodology adopted, and the sources of information used by AECOM in providing its services are outlined in this report. The work described in this report was conducted between June 2019 and August 2019 and is based on the conditions encountered and the information available during the said period of time. The scope of this Report and the services are accordingly factually limited by these circumstances. AECOM disclaim any undertaking or obligation to advise any person of any change in any matter affecting the report, which may come or be brought to AECOM's attention after the date of the report.

The dawn re-entry survey undertaken on the Buildings finished at sunrise rather than 15 minutes after sunrise as recommended in Collins (2016). Professional judgement was applied, and the decision was taken to finish the survey at sunrise because no bats had been seen or heard within the 45 minutes before sunrise. Therefore, this deviation from the guidance is not deemed to be a significant limitation.

The dawn re-entry survey started at between 04:46 and 05:50, depending on surveyor location due to unforeseen difficulties with Site access. Starting at 05:50 is 1hr 26 minutes before dawn rather than 1 hr 30 minutes before dawn as recommended in Collins (2016). This is not deemed to be a significant limitation.

Six surveyors were used in June, and five in July. This was considered sufficient to give a vantage point of suitable features on the buildings. The south edge of Building 1 was not resurveyed in July based on a re-assessment of roost potential at that location due to existing external lighting.

There are deemed to be no significant limitations to the surveys or this report.

4. Results

4.1 Desk Study

The desk study results in relation to bats are summarised in Table 3.1.

Table 4.1 Desk Study Results

Designation/Feature	Description
Sites within 10 km designated for bats	There are no designated sites for bats within 10 km of the Site
Bat Records from the last 10 years within 2 km	Unidentified bat *Chiropter sp.* (one record of droppings, possible roost 72 m south east), lesser horseshoe bat *Rhinolophus hipposideros* (Five records, closest 1.6 km north west), unidentified pipistrelle *Pipistrelle sp.* (One record of roosts in stone wall, 74 m south east), serotine *Eptesicus serotinus* (Two records of roost, 72 m south east), unidentified myotis *Myotis sp.* (Two records, closest 1.2 km north east)
Priority Species – Section 7 List	The following bat species are listed on Section 7 Species of Principal Importance in Wales: Barbastelle bat *Barbastella barbastellus*, Bechstein's bat, *Myotis bechsteinii*, noctule *Nyctalus noctul*a, common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, brown long-eared bat *Plecotus auritus*, greater horseshoe bat *Rhinolophus ferrumequinum*, and lesser horseshoe bat.
Surrounding Land Use	Immediately south and east of the Site boundary is residential housing within the village of St Nicholas. The northern boundary of the Site is bordered by linear hedgerows which are connected to additional hedgerows. The adjacent land to the north and west of the Site boundary is pasture for grazing. Approximately 300 m west is a golf resort. The A48 is situated 100 m south of the Site boundary.
Ancient Woodland	There are no ASNW, RAWS or PAWs within or adjacent to the Site boundary.
Tree Protection Orders (TPOs)	There are no trees with a TPO within or adjacent to the Site boundary.
Council Ecologist and Local Specialist Recorders	The County Ecologist responded stating all records are submitted to SEWBReC. The local Bat Group were contacted; no response has been received to date.

4.2 Bat Emergence and Re-Entry Surveys

4.2.1 Roosting

No bat roosts were recorded during the emergence and re-entry surveys.

It is concluded that the buildings on Site do not support roosting bats.

4.2.2 Ad-Hoc Bat Activity

Bat activity detected during the emergence and re-entry surveys comprised passes of foraging and commuting common pipistrelle, soprano pipistrelle, noctule and serotine bat species.

Common pipistrelles were the most common species recorded. These were recorded in association with the eastern and western vegetated site boundaries, with occasional commuting over the school and occasional passes along the road (south of the Site. Soprano pipistrelle foraging was also recorded in the south east corner by the School entrance. Occasional noctule and serotine passes were recorded, commuting and foraging high over the School and village.

5. Potential Impacts

5.1 Roosting Bats

5.1.1 Buildings

St Nicholas School Site does not support roosting bats.

The demolition of the buildings will not impact roosting bats.

5.2 Foraging and Commuting Bats

5.2.1 External Lighting

Without mitigation, any new lighting scheme could spill onto the Site boundaries which are suitable for foraging and commuting bats. This could cause bats to avoid these areas or create severance of commuting routes.

5.2.2 Habitat Loss

All boundary features including hedgerows and rows of trees will be retained under the proposed development plan.

There will be partial removal of poor semi-improved grassland, mixed plantation woodland and amenity grassland which provide potential foraging habitat for bats. This will have a negative impact on bats at a Site level. However, habitat of suitable or greater value to foraging bats is available in the wider landscape. In addition, The proposed development plan includes creation of a new habitat area and replacement amenity grassland which in the long term will compensate for any habitat loss. Enhancement of boundary features will increase the value of the Site to foraging and commuting bats.

6. Recommendations for Further Surveys and Mitigation

6.1 Further Surveys

Under the current proposals, no further bat roost surveys are required.

A European Protected Species License will not be required for demolition of the buildings.

6.2 Recommendations for Mitigation

6.2.1 Bats and External Lighting

There is no legislation requiring an area or road to be lit (ILP, 2018). There are British Standards that relate to various components of lighting and there are also guidelines that relate to crime prevention, prevention of vehicular accidents and amenity use (ILP, 2018). There is legislation requiring bats are protected against disturbance, which includes light disturbance.

To avoid impacting the foraging and commuting habitats of bats within the vicinity any new lighting should avoid Site boundary features, including hedgerows and trees.

The following recommendations in line with best practice guidance should be incorporated into any new lighting scheme at the Site:

- Light spill onto any new bat roost boxes must be avoided;
- In the first instance, external lighting must be designed to avoid light spill onto boundary features including rows of trees, hedgerows and woodland edges; and,
- Light spill onto sensitive areas such as the Site boundaries and retained woodland is predicted, this should be limited to levels of 3 Lux or less.

Suggestions for mitigating external lighting and achieving the lighting recommendations above are outlined in the ILP Bats and Lighting Guidance Note (ILP, 2018) and best practice guidance (BCT, 2009, BCT 2014 and Gunnell et. al., 2012). These include:

- Only light areas which need to be lit, and use the minimal level of lighting required to comply with guidance such as Institute of Lighting Engineers Guidance Notes for the Reduction of Obtrusive Light (2005);
- Avoid aesthetic lighting which has no other function, and up lighting of trees and buildings.
- Use the lowest level of illumination required for purpose;
- Where lighting is proposed, use lighting modelling programs to indicate where the light spill will occur;
- LED luminaires should be used where possible due to their sharp cut off, low intensity, good colour rendition and dimming capability.
- A warm white spectrum (ideally <2700Kelvin) should be adopted to reduce blue light component; Avoid neutral white, cool white and blue spectrums of light;
- All luminaires should lack or have negligible UV elements. Avoid white and blue spectrums of light;
- Eliminate bare lamps and any upward pointing light.
- Luminaires should be mounted on the horizontal, i.e. no upward tilt. The spread of light should be at or near the horizontal. Flat cut off lanterns are best. Only luminaires with an upward light ratio of 0% and with good optical control should be used – See ILP Guidance for the Reduction of Obtrusive Light;
- Luminaires should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats (Stone, 2012);

- Where lighting columns are in proximity (adjacent to) the wildlife corridors/boundary features and where light spill onto these features is predicted by the lighting models, the luminaries must be moved or fitted with back light control systems to reduce light spill onto the adjacent wildlife corridors/boundary features. This additional feature minimises light spill from the back of the luminaire to avoid intrusive light spill behind the column.
- Any external security lighting should be set to motion sensors and short (1 min) timers;
- Limit the times that the lights are on, to provide some dark periods; Limit the times that the lights are on to provide some dark periods; and/or dimming of lights during certain periods; the proposed new lighting could be dimmed or turned by 75% from 22:00 until 06:00 daily; and,
- Avoid using reflective surfaces under lights; and
- Do not use a lamp greater than 150W for security lighting.

This will increase the value of the Site for a number of other nocturnal species, as well as for bats.

The mitigation for bats is covered as a 'mandatory requirement' in Section 9 LE03.

6.3 Recommendations for Enhancing Site Ecology

6.3.1 Boundary Features

Vegetated site boundary features should be retained, wherever possible, to maintain bat commuting corridors across the Site and avoid the risk of severing local flight paths.

New vegetated corridors (treelines, hedgerows) should be designed into the proposed development, wherever possible, to create new opportunities for foraging and commuting bats. The planting scheme of new features should be of locally sourced native species of benefit to wildlife. Gunnell et al. (2013) 'Landscape and Urban Design' (free to download) has suggested planting lists which are of benefit to invertebrates and foraging bats.

6.3.2 Bat Box Provision

BREEAM (2018) Issue LE03 requires ecological enhancement. Bat boxes are recommended on the new building to provide roosting opportunities for bats. As roosts were not found, this is not a legal requirement but an option for an additional requirement under LE03.

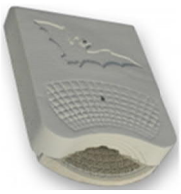
It is recommended a minimum of three boxes of various designs are incorporated into the building at design stage or erected onto suitable trees.

Biodiversity for Low and Zero Carbon Buildings: A Technical Guide for New Builds (Williams, 2010) suggests various ways of including a roost void compliant with Building Regulations within a variety of modern structures. Products such as cavity bat boxes, bat bricks and bat tiles could also be utilised to match external fabrics. Alternatively, roost space could be provided by fitting pre-made bat boxes to the external face of the new or refurbished buildings. The choice of bat box should be suitable for crevice dwelling species. Example roost provisions to incorporate on buildings or trees are shown in Table 5.1.

Encouraging these species onto a site also provides an interesting educational opportunity. If bats are present, local bat groups or local ecological companies may be willing to lead talks and walks in the school grounds, involving staff, students and the wider community.

All new roost provision should be situated away from light spill, with clear flight paths towards corridors and suitable foraging habitats to be used by bats. Advice from a suitably qualified ecologist should be sought when drawing up the specifications for bat roosts and locations. Bat boxes should be positioned at least 4 m above ground level to protect any resident bats from disturbance or predation by domestic pets. Each box can be positioned with a different orientation between south east and south west to provide a range of microclimate options.

Table 6.1 Examples of Roost Box Options

Roost Provision		Designed for Trees/Buildings?
Schwegler 1WQ Summer and Winter Bat Roost https://www.wildcareshop.com/summer-and-winter-bat-roost.html http://www.nhbs.com/title/161275/1wq-schwegler-summer-winter-bat-roost		Buildings
Schwegler 1FQ Bat Box (75) https://www.wildcareshop.com/bat-box-75.html http://www.nhbs.com/title/160551/1fq-schwegler-bat-roost-for-external-walls		Buildings
Schwegler 1WI Summer and Winter Bat Box https://www.wildcareshop.com/schwegler-1wi-summer-and-winter-bat-box.html http://www.nhbs.com/title/177079/1wi-schwegler-summer-and-winter-bat-box		Buildings
Bat Slope for 1MF Bat and Swift Nest Box http://www.nhbs.com/bat-slope-for-1mf-bat-and-swift-nest-box		Buildings
Habitat Bat Box - Custom Brick Facing http://www.nhbs.com/title/183578/habibat-bat-box-custom-brick-facing	 	Buildings
1FTH Schwegler Universal Bat Summer Roost http://www.nhbs.com/title/203503/1fth-schwegler-universal-bat-summer-roost	 	Buildings
1FD Schwegler Bat Box http://www.nhbs.com/title/177076/1fd-schwegler-bat-box	 	Trees

7. References

AECOM (2019). Preliminary Ecological Appraisal (PEA) and BREEAM Ecology Report St Nicholas Church in Wales Primary School.

Bat Conservation Trust, 2009. Bats and Lighting in the UK. Bats and the Built Environment Series. [pdf] Bat Conservation Trust. Available through: Bat Conservation Trust website http://www.bats.org.uk/data/files/bats_and_lighting_in_the_uk__final_version_version_3_may_09.pdf

Bat Conservation Trust, (2014). Artificial Lighting and Wildlife. Interim Guidance: Recommendations to help minimise the impact artificial lighting. London: Bat Conservation Trust. June 2014.

CIEEM (2017) Professional Code of Conduct. Chartered Institute of Ecology and Environmental Management (CIEEM) November 2017.

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

Conservation of Habitats and Species Regulations (2017). Available through: Legislation.gov.uk website https://www.legislation.gov.uk/uksi/2017/1012/contents/made [Accessed 30/10/2018]

Gunnell, K., Murphy, B. and Williams, C. (2013). Designing for Biodiversity: A technical Guide for new and existing buildings. RIBA Publishing. Bat Conservation Trust.

Gunnell, K., Grant. G. and Williams, C. (2012). Landscape and Urban Design for Bats and Biodiversity. Bat Conservation Trust.

Institute of Lighting Professionals (ILP) (2018). Guidance Note 08/18 Bats and artificial lighting in the UK, Bats and the Built Environment series.

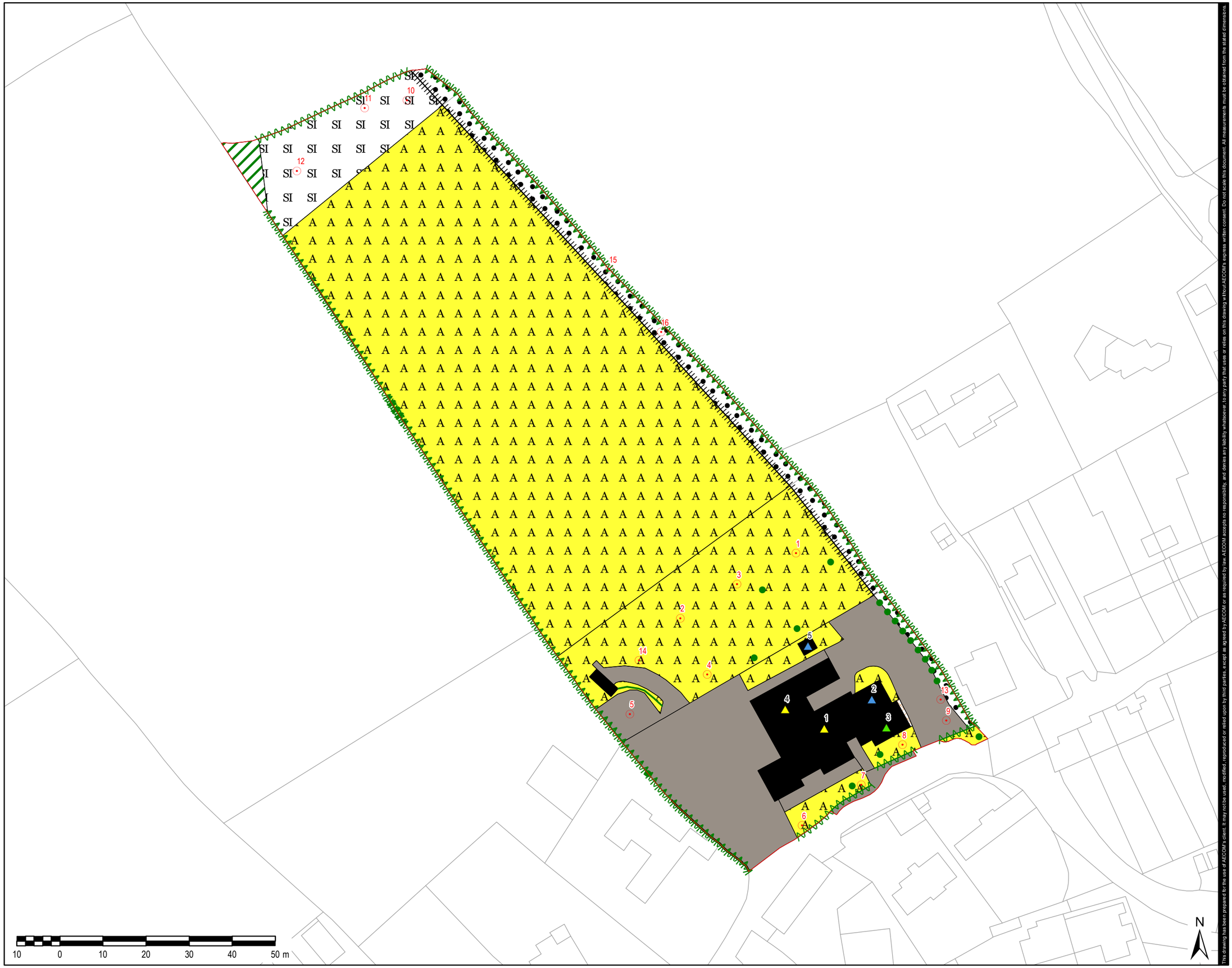
Mitchell-Jones A.J. (2004) Bat Workers Manual (3rd edition). JNCC.

Natural Resources Wales (NRW) (2011) Ancient Woodland Inventory 2011. Retrieved from Lle A Geo Portal forWales. http://lle.gov.wales/catalogue/item/AncientWoodlandInventory2011/?lang=en.

Russ, J. (2012) British bat calls: a guide to species identification. Pelagic publishing.

Williams, C. (2010). Biodiversity for Low and Zero Carbon Buildings: A Technical Guide for New Builds. RIBA Publishing. London

7.1 Figure 1. Phase 1 Habitat Map



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Project Title:

ST NICHOLAS CHURCH IN WALES PRIMARY SCHOOL

Client:

VALE OF GLAMORGAN COUNCIL

LEGEND

- Site Boundary
- Target Note
- Trees

Bat Suitability Buildings

- Moderate Suitability
- Low Suitability
- Negligible

Phase 1 Linear Habitats

- Broadleaved parkland/scattered trees
- Fence
- Hedge with trees - native species-rich
- Intact hedge - native species-rich
- Intact hedge - species-poor
- Wall

Phase 1 Habitat Areas

- Broadleaved Woodland - Plantation
- SI — Poor Semi-Improved Grassland
- Cultivated/Disturbed Land - Amenity Grassland
- Introduced Shrub
- Buildings
- Bare Ground
- Hardstanding

AECOM Internal Project No:

60571313

Drawing Title:

PHASE 1 HABITAT PLAN

Scale at A3: 1:800

Drawing No:			Rev:
FIGURE 1			001
Drawn:	**Chk'd:**	**App'd:**	**Date:**
GM	JM	LN	23/08/19

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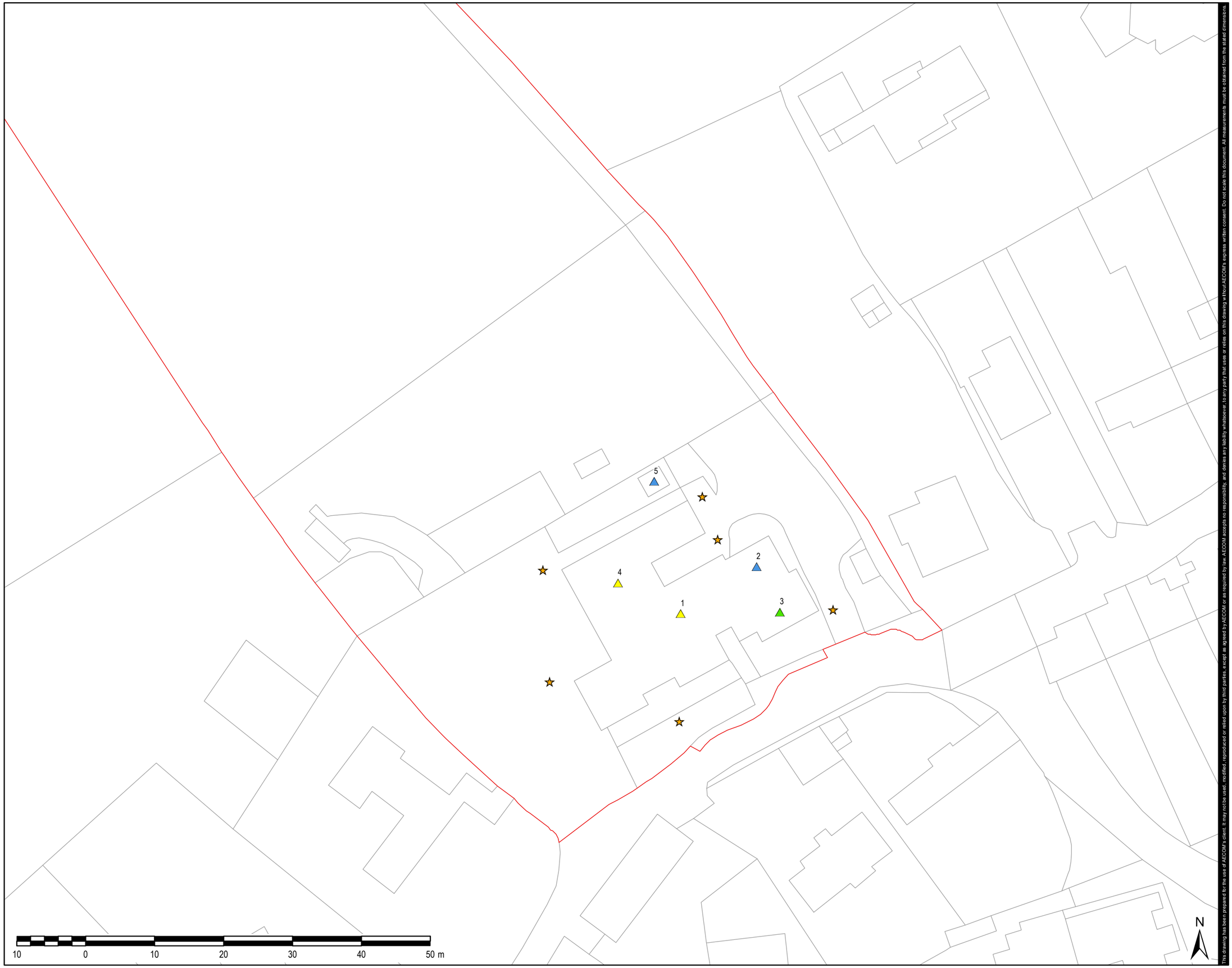
7.2 Figure 2. Bat Survey Locations



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Project Title:

ST NICHOLAS CHURCH IN WALES PRIMARY SCHOOL

Client:

VALE OF GLAMORGAN COUNCIL

LEGEND

- Site Boundary
- Surveyor Location

Bat Suitability Buildings

- Moderate Suitability
- Low Suitability
- Negligible

AECOM Internal Project No:

60571313

Drawing Title:

BAT SURVEY PLAN

Scale at A3: 1:500

Drawing No:			Rev:
FIGURE 1			001
Drawn:	**Chk'd:**	**App'd:**	**Date:**
GM	JM	LN	23/08/19

Filename: P:\UKCDF1-IE\Projects\Environmental\Jobs - Live\60607807_VOG St Nicholas' School\007_GIS\702_Maps\F1_Bat_Survey_Plan.mxd

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