St David's Church In Wales Primary School

Bat Roost Survey Report

Vale of Glamorgan Council

Project number: 60607805

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Quality information

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1. Executive Summary

AECOM was commissioned by the Vale of Glamorgan Council to undertake bat emergence /re-entry roost surveys of buildings at St David's Church in Wales (CIW) Primary School Site in Colwinston, 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 Site (Figure 1) will be located on the existing St David's CIW Primary School. The Site is located in the village of Colwinston, Cowbridge, Vale of Glamorgan, CF71 7NL (NGR: SS 94108 75688). The residential areas of Colwinston and Maes y Bryn are adjacent to the south, east and north of the Site boundary. The dominant pre-development habitats at the Site are hardstanding, buildings and amenity grassland. Other habitat types consist of broadleaved plantation woodland, standalone trees, standing water (pond), introduced shrub, row of trees, species poor intact hedgerow, fence and wall (Figure 1).

The proposed development is for the demolition of the existing school building and construction of a new two storey school building on the existing playing field. A new playing field and Multi Use Games Area (MUGA) will be instated on the site of the old building once demolition and construction are complete. The existing parking area and vehicle entrance routes will be retained. Detailed landscaping designs are not yet available. A lighting design is not yet available. The proposed site plan layout HLM Architects: Drawing Number: 15-1062-01-SK-007 (12.08.2019) has been used for this assessment.

Emergence/re-entry roost surveys were undertaken in June, July and August 2019. A non-breeding common pipistrelle day roost was confirmed in Building 2. Two common pipistrelle Pipistrellus pipistrellus bats were recorded emerging and re-entering Building 2 (Figure 2). Foraging and commuting activity was recorded at the Site, mostly along the vegetated Site boundaries. Species included common pipistrelle, soprano pipistrelle Pipistrellus pygmaeus, with passes high over the Site by noctule Nyctalus noctule, serotine Eptesicus serotinus and Leisler's Nyctalus leisleri.

Without mitigation, the demolition of Building 2 will destroy a non-breeding common pipistrelle day roost, and potentially disturb, injure or kill individual bats.

A European Protected Species License (EPSL) for bats is required prior to the commencement of any works on Site, in order to comply with current UK and EU legislation.

Compensation for the loss of the roost will be required as part of the EPSL application. The addition of at least two bat boxes into the design of the new building is required to compensate for the loss of the common pipistrelle roost. Installation of bat roost boxes is also required to fulfil BREEAM Issue LE04.

It is recommended that 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.

Any new planting must be of locally native species of value to bats and should seek to create new green corridors where possible.

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

2. Introduction

AECOM was commissioned by Vale of Glamorgan Council to undertake bat roost emergence/re-entry surveys at the proposed St David's Church in Wales (CIW) Primary School Site in St David's, 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.

2.1 Site Location and Description

The Site is St David's Church in Wales Primary School, Colwinston, Cowbridge, CF71 7NL, within a rural area of the Vale of Glamorgan.

The Site is an existing active school, dominated by amenity grassland, hardstanding and buildings with other habitats comprising broadleaved plantation woodland, intact species poor hedgerows, ornamental shrubs, rows of trees, scattered trees, standing water, walls and fences (Figure 1).

The residential areas of Colwinston and Maes y Bryn are adjacent to the south, east and north of the Site boundary. Immediately west of the Site is an unnamed road which runs adjacent to the western edge of the Site boundary. On the other side of the road, approximately 15 m west of the Site is arable land and approximately 100 m west of the site is a farm building. There is a linear hedgerow feature connected to the south-eastern corner of the Site boundary. Approximately 260 m south, 100 m east and 130 m north is further arable land which surrounds the villages of Colwinston and Maes y Bryn.

2.2 Proposed Development

The proposed development is for the demolition of the existing school building and construction of a new two storey school building on the existing playing field. A new playing field and Multi Use Games Area MUGA) will be instated on the site of the old building once demolition and construction are complete. The existing parking area and vehicle entrance routes will be retained. Detailed landscaping designs are not yet available. A lighting design is not yet available.

The construction programme is currently unconfirmed, and the commencement and completion dates are unknown at the time of writing.

The proposed Site plan layout drawing number HLM Architects: Drawing Number: 15-1062-01-SK-007 (12.08.2019) shows that the ornamental shrub, broadleaved plantation woodland, pond, scattered trees, rows of trees and hedgerow habitats will be retained. There will be complete removal of all buildings and partial removal of amenity grassland and hardstanding during construction.

2.3 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 Requirements under BREEAM Issue LE04.

2.4 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.

2.5 Quality Assurance

This survey and subsequent report were 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 14001:2015 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	Low	One survey visit (dusk emergence or dawn re-entry)	May-August
B2	Low	One survey visit (dusk emergence or dawn re-entry) (Following the first survey, it was determined that three survey visits in total, including at least one dawn was required)	May-August

Buildings 3, 4 and 5 were assessed as having Negligible bat roost suitability and therefore surveys were not recommended.

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

3.2.2 Bat Roost Surveys

Two surveyors were used to survey each building. Each surveyor was positioned in a location where the features on each building were visible. The location of buildings and positions of the surveyors are evidenced in Figure 3.

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 bat roost assessment. Surveyors positioned themselves so that bats could be observed leaving or re-entering 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 30 minutes before sunset and continued for 1.5 hours.

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

Broadband frequency division detectors (Elekon BatLogger M and Wildlife Acoustics EM3) were used and digital recordings were made to assist with species identification if required.

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

Table 3.2 Bat Surveys

Building No.	Date	Sunset	Start Time	End Time	Surveyors	Weather (Start)	Weather (End)
B1 and B2	18/06/2019	21:33	21:03	23:03	LJ – NRW Bat Licensed Ecologist LF – Ecologist LN – NRW bat Licensed Ecologist JM – Graduate Ecologist	Wind (mph): 0.7 Cloud Cover (Oktas): 8/8 Temperature (C): 15.4 Humidity (%): 88.5 Precipitation: Light rain/drizzle	Wind (mph): 0.0 Cloud Cover (Oktas): 8/8 Temperature (C): 13.3 Humidity (%): 94.2 Precipitation: dry spells with drizzle and light rain
B2	15/07/2019	21:25	20:55	22:55	LN – NRW Bat Licensed Ecologist JM – Graduate Ecologist	Wind (mph): 0.0 Cloud Cover (Oktas): 2/8 Temperature (C): 21.5 Humidity (%): 53.2 Precipitation: Dry	Wind (mph): 0.6 Cloud Cover (Oktas): not recorded Temperature (C): 18.0 Humidity (%): 60.8 Precipitation: Dry
B2	02/08/2019	05:38	04:08	05:38	LN – NRW Bat Licensed Ecologist JM – Graduate Ecologist	Wind (mph): 0.0 Cloud Cover (Oktas): 0/8 Temperature (C): 17.5 Humidity (%): 73.1 Precipitation: Dry	Wind (mph): 0.8 Cloud Cover (Oktas): 0/8 Temperature (C): 17.2 Humidity (%): 77.4 Precipitation: Dry

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 taken to finish the survey at sunrise because the last re-entry was 05:21, with no further bat activity. Therefore, this deviation from the guidance is not deemed to be a significant limitation.

Overall, 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	Coed y Mwstwr Woodland SSSI Distance and Direction: 5 km North-east (Limited connectivity to Site) Description: Mixed deciduous woodland on limestone with a rich, ungrazed ground flora. The wood has an added speleological interest with bats recorded as inhabiting the main cave system - a rare occurrence in Mid Glamorgan (Countryside Council for Wales, 1993). The Citation for the SSSI does not specify the bat species using the SSSI.
Bat Records from the last 10 years within 2 km	Common pipistrelle Pipistrellus pipistrellus (one record at Waterton Lodge, in Colwinston), noctule bat Nycatlus noctule (one record at Waterton Lodge, in Colwinston), soprano pipistrelle Pipistrellus pygmaeus (one record Waterton Lodge, Colwinston), unidentified bat Chiroptera spp. (two records, closest Waterton Lodge Colwinston).
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, common pipistrelle, soprano pipistrelle, brown long-eared bat Plecotus auritus, greater horseshoe bat Rhinolophus ferrumequinum, and lesser horseshoe bat Rhinolophus hipposideros .
Surrounding Land Use	The residential areas of Colwinston and Maes y Bryn are adjacent to the south, east and north of the Site boundary. Immediately west of the Site is an unnamed road which runs adjacent to the western edge of the Site boundary. On the other side of the road, approximately 15 m west of the Site is arable land and approximately 100 m west of the site is a farm building. There is a linear hedgerow feature connected to the south-eastern corner of the Site boundary. Approximately 260 m south, 100 m east and 130 m north is further arable land which surrounds the villages of Colwinston and Maes y Bryn.
Ancient Woodland	There are no Ancient Woodland designations within or adjacent to the Site boundary.
Tree Protection Orders (TPOs)	There are no TPO's within or immediately adjacent to the site.
Council Ecologist and Local Specialist Recorders	The County Ecologist responded stating all records are submitted to SEWBReC. The local bat group were contacted and responded by saying all data is sent directly to SEWBReC.

4.2 Bat Emergence and Re-entry Survey Roost Surveys

Results are summarised in Table 3.2.

Building 2 was confirmed as a non-maternity, summer roost for at least two roosting common pipistrelle bats.

Bat activity detected during the emergence and re-entry surveys comprised passes of foraging and commuting common pipistrelle, soprano pipistrelle, noctule, serotine and a call with characteristic of Leisler's.

Table 4.2 Bat Emergence Survey Results (18/06/2019)

Building No.	Survey Date	Roost Results	Ad-Hoc Bat Activity Results
B1	18/06/2019	No roost - No bats were recorded emerging. Appendix A – Photographs 5 and 6	Common pipistrelles frequent, occasional soprano pipistrelles, seen foraging and commuting around site boundaries and along hedgerow on western site boundary and along the lane/hedgerows outside the site. Occasional noctules and serotine foraging and commuting over the Site. One call with characteristics of Leisler's was identified.
B2	18/06/2019	Confirmed Roost. (21:57) At least one common pipistrelle emerged from corner of the facia on south side of building and flew along the hedgerow, 25 minutes after sunset. Appendix A – Photographs 1, 2 and 3.	Common pipistrelles frequent, occasional soprano pipistrelles, seen foraging and commuting around site boundaries and along hedgerow on western site boundary and along the lane/hedgerows outside the site. Occasional noctules and serotine foraging and commuting over the Site.
	15/07/2019	Confirmed Roost. (22:01) Emergence of two pipistrelles from under facia board, between door and right side of window on south side.	Common pipistrelles frequently foraging along hedgerow on western site boundary, along the lane and over playing fields. Occasional noctule pass over school and field.
	02/08/2019	Confirmed Roost. (04:44) One common pipistrelle seen re-entering via south east corner of facia. (04:54) Two common pipistrelles emerged from south east corner, looped and flew south east. (05:09) One common pipistrelle landed on wall and crawled under roof line into roost. (05:15) Common pipistrelle roost entry between 2nd and 3rd window under facia. (05:16) Possible common pipistrelle re-emergence from west side of building (05:21) Common pipistrelle re-entered via roof line.	Frequent foraging and commuting by common pipistrelles by road along hedgerow west of Site. Two often circling outside roost. Two soprano pipistrelles recorded early on foraging. Occasional noctule passing high above school heading south.

5. Site Assessment – Summary

5.1 Roosts

The existing St David's Primary School supports a non-maternity roost of two common pipistrelle bats located in Building 2 (Figure 2). Common pipistrelle bats are a common and widespread species. The building does not support a roost of rare bats or a roost of high conservation value. The roost entrance is located on the south face of the building (Appendix A, Photographs 1 and 2).

Buildings 1, 3, 4 and 5 at St David's Primary School do not support roosting bats.

5.2 Bat Activity

At least five species of bat were recorded foraging and/or commuting within and adjacent to the Site boundary (Table 3.5) The following species were identified during the bat surveys:

- Common pipistrelle;
- Soprano pipistrelle;
- Noctule;
- Leisler's; and,
- Serotine.

Bat activity was most prevalent along the western boundary of the Site, particularly on the south side of Building 2.

6. Potential Impacts

6.1 Roosting Bats

Building 2 was confirmed as a non-maternity, summer roost for at least two common pipistrelle bats. There were three points of entry identified on Building 2. Two are located on the south facing side of the building; one on the bottom right-hand corner of the facia and the other midway under the wall line (Appendix A, Photograph 1 and 3). The third entry point was located on the west-side of the building under the facia (Appendix A, Photograph 2). It has been confirmed that the existing buildings will be demolished and replaced with a playing field and games court.

Without mitigation, this will result in:

- Destruction of a non-maternity, summer roost;
- Potential killing or injury of bats during demolition, if bats are present at the time of the work; and,
- Potential disturbance of the bats during demolition, if bats are present at the time of work.

6.2 Foraging and Commuting Bats

6.2.1 External Lighting

External lighting plans have not been developed. As the buildings are being demolished, any new lighting scheme will have no impact on the existing roost. Without mitigation, any new external 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.

1.1.1 Habitat Loss

All boundary features including hedgerows and rows of trees will be retained under the proposed development plan. There will be removal of amenity grassland. Grassland habitat of greater value to foraging bats is available in the wider landscape. In addition, the proposed development plan includes creation of a new habitat area (with species rich grassland and native shrubs/trees) and replacement of amenity grassland which in the long term will compensate for any habitat loss and enhancement of boundary features will increase the value of the Site to foraging and commuting bats.

7. Recommendations for Mitigation

7.1 European Protected Species License

Demolition of Building 2 will require a European Protected Species Licence (EPSL).

An EPSL is essential for any work that will have an impact on bats such as damaging or destroying their breeding or resting places. A licence must be in place before works commence to allow the works to proceed in line with current UK and EU legislation.

A licence application can take at least six weeks to process, so it is advised that an application is submitted to Natural Resource Wales at least two months before the proposed start date to avoid any delays to the programme. Once an application is approved, works can then proceed with mitigation in place for bats. Detailed mitigation would be outlined in a bat licence application method statement and would be subject to approval by Natural Resources Wales. This is likely to include supervision of demolition by a licensed bat ecologist and/or accredited agents and inclusion of compensatory roosts within the final scheme as outlined below.

7.2 Demolition – Timing of Works

Demolition during winter (between early November and late March) is recommended to limit the likelihood of encountering bats, which use the building during the summer.

7.3 Demolition – Pre-Demolition Survey

Further bat emergence/ re-entry surveys may be required prior to demolition to establish the presence of bats in the roost immediately prior to demolition works. This would be completed as part of the mitigation to be outlined in detail in a bat licence application method statement.

If demolition is due in summer (April - October) surveys will be required immediately prior to demolition.

If demolition is due in winter (November to March), it is unlikely that further surveys will be required prior to demolition as this would be outside of the season of peak bat activity and unlikely to result in any useful information.

7.3.1 Validity of Data

If demolition work is completed prior to October 2020, no further surveys would be required prior to applying for a European Protected Species Licence. If the schedule is delayed, additional bat emergence and re-entry surveys may be required in accordance with guidance to inform the application for a licence.

7.4 Demolition – Soft Strip and Supervision

Ecological supervision will be necessary for demolition of a roost. Areas of high risk will be hand stripped by contractors which will be supervised by an NRW bat licensed ecologist who can remove any bats by hand if found during the works.

7.5 Compensatory Roost Cavities/Boxes

At least one common pipistrelle roost location will be destroyed as a result of the demolition of Building 2.

To mitigate for this loss, two (loss + one) compensatory roost crevices/ bat boxes will be installed in the new school building.

All new roost provision will need to be situated away from light spill, with clear flight paths towards corridors and foraging suitable 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/tiles/cavities should be positioned at least 4 m above ground level to protect any resident bats from disturbance or predation by domestic pets. Each new roost feature (boxes/tiles/cavities) can be positioned with a different orientation between south east and south west to provide a range of microclimate options.

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 used 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 are shown in Table 7.1.

7.6 Breathable Roof Membranes

Avoid the use of BRM in any building where compensatory bat boxes or access to roof voids will be installed.

Many modern BRM fabrics are known to abrade over time and form loose fibres, in which bats often become entangled and die. For this reason BRMs must not be used in bat roosting areas, even if partially covered with traditional bitumastic roof felt.

BRMs are installed in many buildings to allow the roof to breathe so that traditional ventilation is not required. Research by Bat Conservation Trust and University of Reading's Technologies for Sustainable Built Environment (TSBE) Centre shows that all non–woven roofing membranes, produced using spun-bond filaments pose a serious threat to bats as a result of entanglement. In addition, the functionally of the membranes is affected by the bats (BCT, 2013).

Only bituminous roofing felt that does not contain polypropylene filaments should be used. For example bitumen felt type 1F, which is hessian reinforced.

Building Regulations

It is sometimes wrongly stated that the use of bitumen felt in roofs does not comply with Building Regulations. The Building Regulations that apply to this situation are Parts C and Parts L. The Building regulations that apply to existing buildings are parts L1B (domestic), L2B (non-domestic) and Part C (condensation and ventilation).

The Building Regulations state that energy performance of the whole building needs to be improved where possible for existing buildings. When considering a pitched roof this is done by increasing levels of insulation to meet the recommended minimum. The Regulations state that contractors must "assess the condensation risk within the roof space and make appropriate provisions in line with part C relating to the control of condensation". Part C then goes on to recommend meeting the recommendations made in BS 5250:2011. In this document it is made clear that both High resistance (bitumen) and Low resistance (BRM) underlays are acceptable as long as appropriate ventilation is provided. The materials must comply with British standards, national technical certificate or another acceptable EU certificate (which bitumen felt does).

7.7 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.

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; 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;
- Avoid using reflective surfaces under lights; and/or,
- 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.

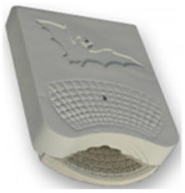
The mitigation for lighting and bats is also a requirement in BREEAM Issue LE03.

7.8 Landscape Planting

New vegetated corridors (treelines, hedgerows) should be designed into the proposed development, wherever possible, to create new opportunities for foraging and commuting bats. Corridors which connect the new bat boxes with the surrounding habitat will be important.

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.

Table 7.1 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

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Appendix A Site Photographs

Photograph 1: Building 2 – south face. Roost entry / emergence location circled, beneath gable end facia board.

Photograph 2: Building 2 - west face. Roost re-entry on 02/08/2019 location circled.

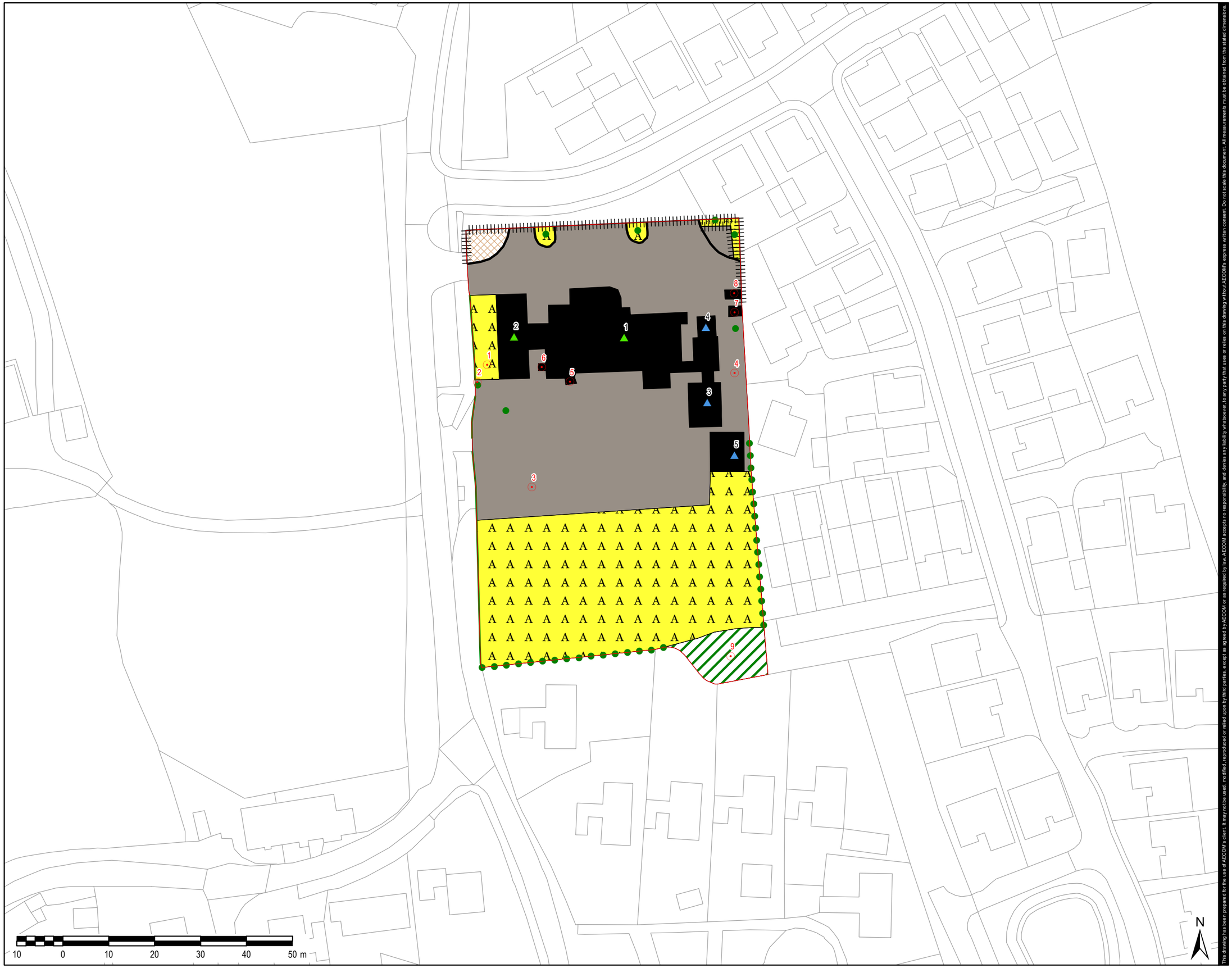
Photograph 3: Building 2 – South face. Roost entry / emergence location, beneath gable end facia board. This feature is also used by nesting house sparrow (nest material can be seen).

Photograph 4: Amenity grassland playing fields.

Photograph 5: Building 1. Potential roost features - Gap between soffit. Not roosting activity recorded.

Photograph 6: Building 1 .

Figure 1. Phase 1 Habitat Map



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Project Title:

ST DAVID'S CHURCH IN WALES PRIMARY SCHOOL

Client:

VALE OF GALMORGAN COUNCIL

LEGEND

- Site Boundary
- Target Note
- Trees

Bat Suitability Buildings

- Low Potential
- Negligible

Phase 1 Linear Habitats

- Broadleaved parkland/scattered trees
- Fence
- Intact hedge - species-poor
- Wall

Phase 1 Habitat Areas

- Broadleaved Woodland - Plantation
- Cultivated/Disturbed Land - Amenity Grassland
- Introduced Shrub
- Buildings
- Hardstanding

AECOM Internal Project No:

60571313

Drawing Title:

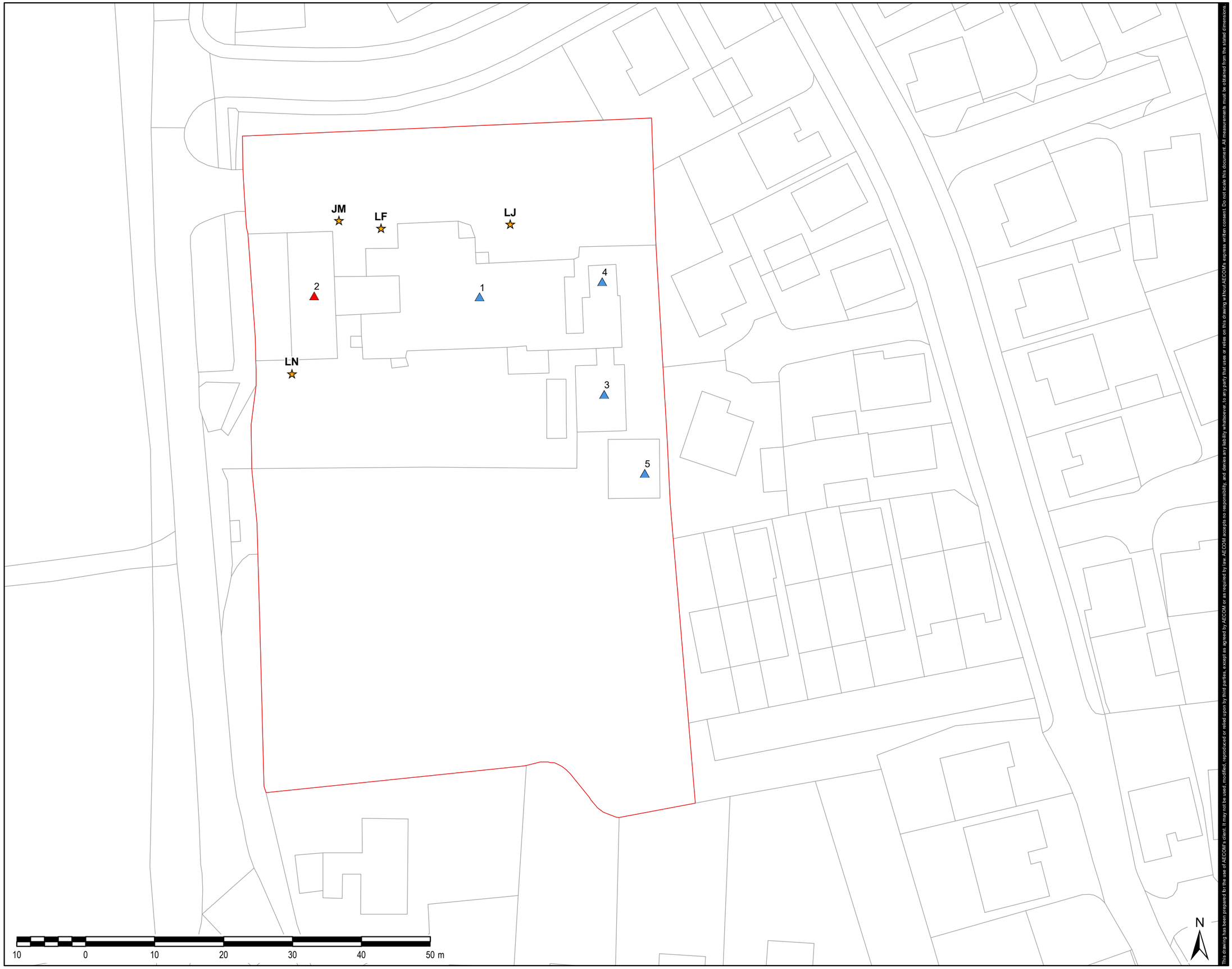
PHASE 1 HABITAT PLAN

Scale at A3: 1:750

Drawing No:			Rev:
FIGURE 1			001
Drawn:	**Chk'd:**	**App'd:**	**Date:**
GM	JM	LN	16/08/19

Filename: F:\Projects\Environmental\Jobs - Live\60607805_VOG St David's School\007_GIS\702_Maps\F1_Phase1 Habitat Plan.mxd

Figure 2. Bat Survey Building Results and Surveyor Locations



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Project Title:

ST DAVID'S CHURCH IN WALES PRIMARY SCHOOL

Client:

VALE OF GALMORGAN COUNCIL

LEGEND

- Confirmed Roost
- No Roost
- Site Boundary
- Surveyor Location

AECOM Internal Project No:

60571313

Drawing Title:

BAT ROOST SURVEY PLAN AND RESULTS

Scale at A3: 1:500

Drawing No:			Rev:
FIGURE 1			001
Drawn:	**Chk'd:**	**App'd:**	**Date:**
GM	JM	LN	04/09/19

Filename: \\Ukcdf1fp002\ukcdf1fp002-v1ie\Projects\Environmental\Jobs - Live\60607805_VOG St David's School\007_GIS\702_Maps\F1_Bat_Survey_Plan.mxd