

APPENDIX 8.2

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WELSH GOVERNMENT

COSMESTON

BAT SURVEY REPORT

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COSMESTON
BAT SURVEY REPORT**

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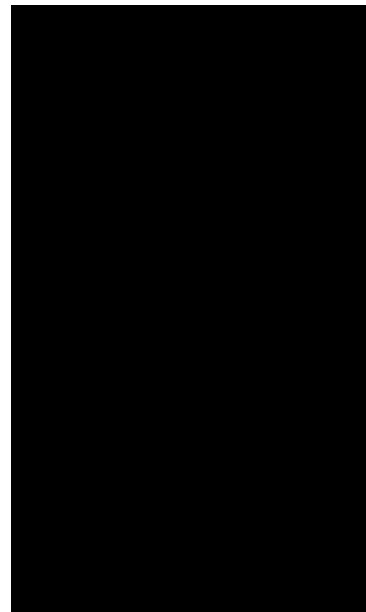
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CA11040-002	Habitat Plan	1:25,000@A2
CA11040-005	Building Inspection Survey – 2016	1:5,000@A3
CA11040-012	Bat Activity Survey Autumn 2016	1:2,500@A2
CA11040-013	Bat Activity Survey Spring 2017	1:2,500@A2
CA11040-014	Bat Activity Survey Summer 2017	1:2,500@A2
CA11040-015	Bat Activity Survey Autumn 2017	1:2,500@A2
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CA11040-017	Building 1 Emergence and Re-entry Survey 2017	1:500@A3
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CA11040-023	Building 7 Emergence Survey 2017	1:500@A3
CA11040-024	Building 8 Emergence and Re-entry Survey 2017	1:500@A3
CA11040-025	Building 9 Emergence Survey 2017	1:500@A3

EXECUTIVE SUMMARY

Wardell Armstrong LLP (WA) was commissioned by Welsh Government (WG) to undertake bat surveys in connection with an outline planning application for a proposed residential development at a site at Cosmeston, Penarth located at approximate National Grid Reference ST17964 68945.

This report details the results of the bat surveys undertaken at the site between August 2016 and August 2017.

The bat surveys followed the guidance provided in the Bat Conservation Trust Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn.) (Collins, 2016).

External and internal Preliminary Roost Assessments (PRA) of buildings and bridge structures was undertaken in September 2016 and April 2017 by an experienced ecologist from Wardell Armstrong LLP. The site contains six buildings and three old railway bridges. The site was assessed as being of low suitability habitat for bats.

Emergence and re-entry surveys were undertaken on the buildings and bridges from 24th May 2017 until 19th September 2017. One dusk activity survey was undertaken per season, spring, summer and autumn, in 2016 and 2017. One transect was walked by two surveyors on each survey with listening stops undertaken at regular intervals. Two automated bat detectors (Wildlife Acoustics, Inc) were deployed on the site, per month.

No bats were observed emerging from or re-entering the majority of the buildings and bridges. During the emergence on Building 3 a possible emergence of a common pipistrelle was observed. During a re-entry survey on Building 6 a common pipistrelle was observed entering Building 3. No bats were observed entering or emerging from Building 4 during the surveys on the building, however a common pipistrelle was possibly observed emerging from Building 4 during an emergence survey on Building 7. Bat activity at bridge B8 started approximately 1 minute after sunset during the emergence survey with extensive common pipistrelle activity under the arch for 15 minutes after sunset.

At least six species of bat were recorded foraging and commuting within the site during the surveys over 2016 and 2017. These are common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, Myotis sp., noctule, Leislars'. The highest recorded activity levels on site were attributable to common pipistrelle during and walked transect surveys, with a large number of soprano pipistrelle calls also recorded during the walked transect surveys. During the re-entry survey a possible re-entry survey was observed.

The evaluation of the bat assemblage on site has considered the assemblage to be of local value. The roost identified in B3 and possible B4 and B8 are likely to be used by individual opportunistic bats. A bat mitigation licence will be required from Natural Resources Wales (NRW) if works to Buildings B3 and B4 and bridge B8 are required. Erection of bat boxes are likely to be required to mitigate the loss of building / bridge roosting sites to development. Mitigation will need to be agreed as part of the bat licence application as well as a suitable monitoring programme.

Habitat proposals should be implemented or created to promote bat activity across the new development (maintaining connectivity north to south and east to west) to provide a benefit to bats and other wildlife as well as mitigate for losses of suitable bat habitat.

Prior to any felling or tree surgery as part of the development, trees will need to be re-assessed for their current bat roost potential. If individual trees are assessed as having high bat roost potential, these trees will be subject to either a detailed inspection by a licensed bat-worker or emergence/re-entry surveys to determine whether a roost is present. If bats or evidence of bat occupation is found within the trees then it will be necessary to apply for a disturbance licence from Natural Resources Wales.

In accordance with the requirements of the Planning Policy Wales 2016 and BSI 42020:2013, ecological enhancements should be proposed which will result in a net gain in biodiversity.

To enhance the opportunities for bats, green infrastructure proposals should seek to maximise planting to include trees which could provide long-term roosting opportunities for bats. Bat boxes could also be erected within the site.

1 INTRODUCTION

1.1 Terms of Reference

1.1.1 Wardell Armstrong LLP (WA) was commissioned by Welsh Government (WG) to undertake bat surveys at a site at Cosmeston, Penarth located at approximate National Grid Reference ST17964 68945.

1.2 Report Objective

1.2.1 The purpose of this report is to detail the results of the 2016 and 2017 surveys, to assess the presence and use of the site by bats.

1.2.2 Provisional mitigation and enhancement opportunities are also discussed, where appropriate.

1.3 Site Context

1.3.1 The site is situated in the Vale of Glamorgan to the east of Lavernock Road (B4267) and south of 'Lower Penarth' housing estate as shown on as shown on Drawing Number CA11040-001/RevA (Site Location Plan and Ecological Survey Area). Farmland borders the site immediately to the east, beyond which is the coastline of the Severn Estuary, with further agricultural land present to the south east. Part of the south-western part of the site is bordered by the 'Fort Road' which leads to the Lavernock Holiday Village.

1.3.2 Drawing CA11040-001/RevA also indicates:

The part of the site which was first subject to bat activity transects in September 2016;

Additional area of land included within the site boundary in November 2017 and was subject to bat activity surveys in 2017.

1.3.3 The site area covers approximately 29ha and comprises a working livery yard with stable block buildings to the east of the site and semi-improved and improved grassland fields extending to north, south and west. The Ty'r Orsaf Site of Importance for Nature Conservation (SINC) is located in the south west corner of the site surrounded by broadleaved woodland. The north and eastern boundaries of the site are bordered by intact hedgerows, with broadleaved woodland dominating the western boundary and residential properties to the north.

1.4 Description of Development

- 1.4.1 The ecological studies are required to inform an outline planning application with accompanying masterplan for a proposed residential development.

1.5 Legislative Framework

- 1.5.1 All UK bat species are European Protected Species and afforded full protection through inclusion of Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 2 of the Conservation of Habitats and Species Regulations 2017.
- 1.5.2 Barbastelle, Bechstein's, noctule, common pipistrelle, soprano pipistrelle, brown long-eared, greater horseshoe and lesser horseshoe bats are included within Section 7 of The Environment (Wales) Act 2016. Species included in this list are considered by the Secretary of State to be "of principal importance for the purpose of conserving biodiversity". Barbastelle, Bechstein's, noctule, soprano pipistrelle, brown long-eared, greater horseshoe and lesser horseshoe bats are listed as priority species on the UK Biodiversity Action Plan (BAP). Lesser horseshoe bats are included in the Vale of Glamorgan local BAP.

1.6 Bat Ecology

- 1.6.1 There are 17 species of bat found breeding in Britain, all of which are insectivorous. These species have different life cycles and strategies but in general each require:

Hibernation roost sites: sites which in winter have a constant temperature of between 3°C and 7°C e.g. underground sites such as caves, mines and built environments offering similar conditions;

Nursery sites where females gather in spring/summer to give birth and rear offspring e.g. roof spaces, crevices/hollows in mature trees;

Roost sites for individual males during spring – autumn e.g. roof spaces and trees;
and

Habitats with numerous insects to feed upon.

- 1.6.2 Roosting habitat includes buildings and structures, caves and trees and means any structure or place that is used for shelter or protection whether or not bats are present at the time.
- 1.6.3 Bats also use a variety of habitats for foraging with broad-leaved woodland and water habitats the most favourable. Arable, improved grassland and moorland are less

favoured. Within these less favoured landscapes, linear features such as hedgerows, lines of trees and riparian strips are often used by bats as they provide rich food sources, shelter and commuter corridors.

2 SURVEY METHODOLOGY

2.1 Desk Study

2.1.1 A desk study was undertaken in February 2017 as part of the Preliminary Ecological Appraisal (dated July 2018) and was informed by review of existing available information provided by South East Wales Biodiversity Records Centre (SEWBReC) for a 2km search radius from the site's boundary. Ordnance Survey (OS) and satellite mapping was also used to gain contextual habitat information.

2.2 Extended Phase 1 Habitat Survey

2.2.1 As part of the PEA, an Extended Phase 1 Habitat Survey was undertaken at the site in September 2016 and updated in April 2017. The purpose of this survey was to map the habitats present within the site and to assess the potential for protected species to be present.

2.2.2 The treelines and broad-leaved woodland around the periphery of the site could provide suitable roosting opportunities and foraging corridors for bats. The farm buildings and associated outhouses and old railway bridges could also provide roosting opportunities. A description of the farm buildings and old railway bridges is provided in Appendix 1. Location of the farm buildings and their reference numbers are shown on Drawing Number CA11040-005 (Building Inspection Survey – 2016).

2.3 Preliminary Roost Assessment

2.3.1 In conjunction with the Phase 1 Habitat Surveys, external and internal Preliminary Roost Assessments (PRA) of buildings and bridge structures was undertaken by an experienced ecologist from Wardell Armstrong LLP. The site contains six buildings and three old railway bridges as shown on Drawing Number CA11040-005 (Building Inspection Survey 2016).

2.3.2 The PRA of the buildings and bridge structures was undertaken to identify potential locations suitable for roosting bats including a search for external features such as cracks, crevices and gaps that could provide access opportunities for bats. Equipment used included torch and binoculars. An internal inspection of the buildings was also conducted, where safe to do so, which included a search for evidence of bat activity such as urine stains, grease stains, droppings, feeding remains and carcasses. Equipment used included torch and binoculars.

2.3.3 The buildings and bridge structures on site have been categorised using the assessment criteria in Table 4.1 of the 3rd edition of the BCT Guidelines (Collins 2016)¹:

Known or confirmed roost;

High: Structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitats;

Moderate: Structure or tree with one or more potential roost sites that could be used by numbers of bats due to their size, shelter, protection, conditions and surrounding habitats, but unlikely to support a roost of high conservation concern;

Low: Structure or tree with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation);

Negligible: Structure or tree with no potential to support bats.

2.3.4 The surrounding habitat both within and adjacent to the site was also surveyed to assess its potential to be used by foraging and commuting bats. This information was combined with a review of aerial photography and OS data to provide contextual information about the local habitat and its likely use by bats.

Bat Roost Survey – Buildings

2.3.5 Following the inspection surveys undertaken in September 2016 and April 2017, the buildings and bridge structures were subject to dusk emergence and dawn re-entry surveys. The aim of the survey was to establish if roosts were present in the buildings and bridge structures and, if so, to establish the type of roost and bat species using the roost. The survey effort undertaken at the building is based on the guidance given in Table 7.3 of the '*Bat Surveys for Professional Ecologists: Good Practice Guidelines* (Collins, J. (ed.) 2016)'.

¹ Collins, J. (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn). The Bat Conservation Trust, London.

- 2.3.6 The dusk emergence surveys are undertaken from 15 minutes before sunset to 1.5 to 2hrs hours after sunset. The dawn re-entry surveys are undertaken 2 - 1.5 hours before sunrise and continue to 15 minutes after sunrise. Weather conditions and times of the building and bridge surveys are provided in Appendix 2.
- 2.3.7 Echo Meter Touch (Wildlife Acoustics, Inc., Massachusetts) bat detectors and iPads (Apple Inc., California) were used by surveyors to detect bats and the built-in Kaleidoscope classifiers were used to assist species identification. Bat Box Duet bat detectors were used by surveyors to detect emerging bats and digital recordings were made from the bat detectors and analysed later using BatSound analysis programme version 4.2. Species identification was made on the basis of the characteristics of the call including peak frequency, minimum and maximum frequency, call duration and inter pulse interval. Observations of bat behaviour, size and the direction of the flight path were also noted where possible.

Activity Surveys 2016/17

- 2.3.8 Following the Extended Phase 1 Habitat and preliminary assessment survey undertaken in September 2016 and April 2017, the site was assessed as being of low suitability habitat for bats. Best practice guidelines (Collins, J. (ed.) 2016) recommend that one visit per transect is undertaken in Spring (April / May), Summer (June-August) and Autumn (September / October). Additionally, one remote bat detector should be deployed per transect with data being collected over five consecutive nights.
- 2.3.9 The activity surveys undertaken in 2016 and 2017 followed the guidance provided in the *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (Collins, J. (ed) 2016). One transect was walked by two surveyors over the survey area to allow complete coverage of the site with listening stops. Each listening stop lasted approximately five minutes.
- 2.3.10 Surveys were undertaken on the original site area in September 2016. Spring and summer 2017 activity surveys were undertaken on the original and additional site area, and the September 2017 survey was undertaken on the additional site area only. The survey routes walked are shown on Drawing Numbers CA11040-012 – 016.
- 2.3.11 Date, times and weather conditions during the surveys are provided in Appendix 2.
- 2.3.12 Echo Meter Touch (Wildlife Acoustics, Inc., Massachusetts) bat detectors and iPads (Apple Inc., California) were used to detect foraging or commuting bats to detect bats and the built-in Kaleidoscope classifiers were used to assist species identification.

Observations of bat behaviour, size and the direction of the flight path were also noted where possible.

Automated survey

- 2.3.13 To supplement the activity survey, one Sound Meter SM2BAT+ Bioacoustics Recorder (Wildlife Acoustics, Inc.) (SM2) was deployed following the guidance provided in the *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (Collins, J. (ed) 2016).
- 2.3.14 The detector was programmed to record ultrasound continuously from 30 minutes before local sunset to 30 minutes after local sunrise for five consecutive nights. The locations of the SM2s is shown on Drawing Number CA11040-016.
- 2.3.15 After retrieval of the recording devices the data files were downloaded as Wildlife Acoustic Audio Compression Files (WAC) and converted to Kaleidoscope Pro 4 Output files and analysed using Kaleidoscope Pro 4 analysis software (Wildlife Acoustics, Inc).
- 2.3.16 Bat Activity Index (BAI) values were calculated for each species recorded at each automated detector location. These indices are calculated by taking the mean nightly pass rates for the automated survey data over the period of their deployment.

2.4 Assessment Limitations

- 2.4.1 The bat surveys have not attempted to produce a comprehensive list of all bat species and their activities within the site, as any ecological survey will be limited by factors that affect their presence, such as time of year, weather conditions, migration pattern and behaviour. The surveys instead aim to provide a general overview of the range of bat species using the site and to highlight key commuting corridors and pinpoint possible bat roosts.
- 2.4.2 Echolocation calls of the brown long-eared bats (*Plecotus auritus*) are significantly quieter than many other bat species within this country, therefore this species can be difficult to record and may at times go unrecorded. Similarly, some bats produce louder calls which travel greater distances with less attenuation, as a result louder calls produced at greater distances from the detectors will be recorded (during activity and automated surveys) more readily whereas quieter calls produced from the same location maybe missed which can lead to bias.
- 2.4.3 Species from the genera *Myotis* and *Nyctalus* are difficult to distinguish individual species within the genera from sonogram calls alone. Where an individual species cannot be determined, a genus is recorded.

- 2.4.4 Activity surveys were only undertaken when weather conditions were predicted to be fine (i.e. no rain, temperatures above 10°C and little wind).
- 2.4.5 During the September survey the SM2 did not record any bats. However, the sensor file contained date, time and temperature records for the duration of the survey which suggests that the recorder was working but that there were just no bats flying in this location during that time.

2.5 Quality Assurance & Environmental Management

- 2.5.1 The surveys and assessments have been overseen by and the report checked and verified by a member of CIEEM and thus bound by its code of professional conduct. All surveys and assessments have been undertaken with reference to the recommendations given in British Standard BS 42020, and as stated within specialist guidance, as appropriate and referenced separately.

3 RESULTS AND EVALUATION

3.1 Desk Study

3.1.1 South East Wales Biodiversity Records Centre (SEWBReC) hold records of the following species within 2km site namely: Pipistrelle bat species (*Pipistrellus*), whiskered bat (*Myotis mystacinus*), serotine (*Eptesicus serotinus*), Leisler's noctule (*Nyctalus leisleri*), noctule (*Nyctalus noctula*), common pipistrelle (*Pipistrellus pipistrellus*), Soprano pipistrelle (*Pipistrellus pygmaeus*), lesser horseshoe bat (*Rhinolophus hipposideros*) as well as unidentified *Myotis* sp. (*Myotis* sp.).

3.1.2 The closest records to the site provided by SEWBReC were *Pipistrellus* sp. at 1.1km and a record of a whiskered bat at 1.2km from the site. As shown in Table 1, with populations of greater than 100,000 within their range, common pipistrelle and soprano pipistrelle are considered to be 'common'.

Table 1: Categorisation of Bats by National Rarity	
Rarity within range	Wales
Common (population. over 100,000)	Common pipistrelle; soprano pipistrelle
Rarer (population. 10,000 – 100,000)	Lesser horseshoe; Daubenton's; Natterer's; brown long-eared
Rarest (population. under 10,000)	Greater horse-shoe; whiskered; Brandt's; Bechstein's; alcahloe; Noctule; Nathusius' pipistrelle; serotine; barbastelle

3.2 Habitat and Preliminary Roost Assessment

3.2.1 An Extended Phase 1 Habitat Survey of the original site area (refer to Drawing Number CA11040-001) was undertaken by Wardell Armstrong LLP on 1st September 2016. The additional land to the east of the disused railway line was surveyed in April 2017. These surveys identified that the site contained features and habitats suitable for supporting both foraging and roosting bats.

3.2.2 The site largely comprises semi-improved and improved grassland fields, areas of hardstanding, farm and stable block buildings, broadleaved woodland, intact species-poor hedgerows, one intact species-rich hedgerow and Ty'r-Orsaf SINC which consists of a disused railway line that supports a mosaic of species-rich neutral and calcareous grassland. The site is therefore considered to be of 'Low' suitability for foraging / commuting bats when assessed in conjunction with suitable habitat in the surrounding area.

3.2.3 The site contains six buildings and three old railway bridges which were externally and internally inspected for their potential to support bat roosts in 2016/17.

3.2.4 Buildings B1, B4 and B6 have been classified as having 'moderate' suitability to support roosting bats and B3, B5 and B7 have been classified as 'low' suitability to support roosting bats. Railway bridges B2 (central rail bridge), B8 (NE rail bridge) and B9 (SW Railway Bridge) were all classified as having 'low' suitability in accordance with current best practice guidelines (Collins, 2016).

3.3 Bat Roost Survey – Buildings and Bridges

3.3.1 The activity recorded during the emergence /re-entry surveys for each structure is outlined below. The building /bridge reference number is denoted in brackets and the locations are shown on Drawing CA11040-005 (Building Inspection Survey – 2016).

Building 1 (B1)

3.3.2 No bats were observed emerging from or re-entering Building 1 during either the emergence or the re-entry surveys.

3.3.3 The first bat recorded during the emergence survey was a common pipistrelle at 21:34, approximately 24 minutes after sunset (21:10). Noctule, common and soprano pipistrelle were recorded foraging and commuting during the survey.

3.3.4 The last bat recorded during the re-entry survey was a soprano pipistrelle at 06:29, approximately 18 minutes before sunrise.

3.3.5 Soprano pipistrelle were recorded foraging around the trees to the east of the Building during the re-entry survey.

Bridge (B2)

3.3.6 No bats were observed emerging from the bridge, (B2), during the survey.

3.3.7 The first bat recorded was a common pipistrelle approximately 20 minutes after sunset.

3.3.8 Common pipistrelle, soprano pipistrelle and a noctule were observed and recorded commuting north/south under the bridge and foraging in the area during the survey.

Building 3 (B3)

3.3.9 During the emergence survey a bat was observed which may have emerged from the building. A re-entry survey was subsequently performed on the building, during which no bats were observed re-entering.

3.3.10 The first bat recorded during the emergence survey was a common pipistrelle at 21:52, approximately 18 minutes after sunset (21:34). The possible emergence was a common pipistrelle at 21:57, approximately 33 minutes after sunset.

3.3.11 During the survey, common and soprano pipistrelle were recorded foraging and commuting in the area.

3.3.12 The last bat recorded during the re-entry survey was a soprano pipistrelle at 05:59, approximately 39 minutes before sunrise. Common and soprano pipistrelle were recorded commuting and foraging during the survey.

3.3.13 During the re-entry survey performed on Building 6 on 05/09/2017, a common pipistrelle was observed entering Building 3 at 06:25, approximately 6 minutes before sunrise.

Building 4 (B4)

3.3.14 No bats were observed emerging or re-entering the building during either the emergence or re-entry survey.

3.3.15 The first bat recorded during the emergence survey was a common pipistrelle at 21:27, approximately 6 minutes before sunset (21:33 hrs).

3.3.16 During the emergence survey, common and soprano pipistrelle were recorded foraging and commuting in the area.

3.3.17 The last bat recorded during the re-entry survey was a Leisler's at 06:38 approximately 15 minutes before sunrise (06:53).

3.3.18 During the re-entry survey brown long-eared, noctule and Leisler's were recorded.

3.3.19 During the emergence survey on Building 7 on 04/07/2017 a common pipistrelle was possibly observed emerging from Building 4 at 21:58, approximately 26 minutes after sunset.

Building 5 (B5)

3.3.20 No bats were observed emerging from the building during the emergence survey.

3.3.21 The first bat recorded was a common pipistrelle at 20:42, approximately 18 minutes after sunset (20:24).

3.3.22 During the emergence survey, common and soprano pipistrelle, and noctules were recorded foraging and commuting.

Building 6 (B6)

- 3.3.23 No bats were observed emerging or re-entering the building during the surveys.
- 3.3.24 The first bat recorded during the emergence survey was a common pipistrelle at 22:03, approximately 31 minutes after sunset (21:32).
- 3.3.25 During the emergence survey, common, nathusius and soprano pipistrelle and noctule were observed foraging and commuting.
- 3.3.26 The last bat recorded during the re-entry survey was a common pipistrelle at 06:31, approximately at sun rise.
- 3.3.27 During the re-entry survey soprano and common pipistrelle were recorded foraging in the garden of building 1 and commuting along the hedgerow between building 6 and 1.

Building 7 (B7)

- 3.3.28 No bats were observed emerging during the survey.
- 3.3.29 The first bat recorded was a common pipistrelle approximately 26 minutes after sunset (21:32).
- 3.3.30 During the survey, common and soprano pipistrelle, and noctule were observed foraging and commuting in the area. Common pipistrelle were observed foraging in and out of the building 7.

Bridge – north-eastern (B8)

- 3.3.31 During the emergence survey a common pipistrelle was observed which may have emerged from the building/bridge. There was also extensive activity under the arch of the bridge from soon after sunset.
- 3.3.32 The first bat recorded during the emergence survey was a common pipistrelle at 20:57, approximately one minute after sunset (20:58). During the survey, common pipistrelle was recorded flying around under the bridge, then out and in again until 21:13, approximately 15 minutes after sunset and a bat was observed but not heard on the bat recorder flying from under the arch of the bridge.
- 3.3.33 The last bat recorded during the re-entry survey was a common pipistrelle at 06:23, approximately 11 minutes before sunrise (06:34). The last bat was observed flying under the bridge after completing three previous passes. During the survey common pipistrelle were recorded.

3.3.34 Given the level of activity observed and the timings of the first bat recorded, a further re-entry survey was therefore undertaken at the bridge. No bats were observed re-entering the structure during this survey.

Bridge - South western (B9)

3.3.35 No bats were observed emerging during the survey.

3.3.36 The first bat recorded was a common pipistrelle at 21:10, approximately 10 minutes after sunset (21:00).

3.3.37 During the survey, common pipistrelle were recorded foraging and commuting.

3.4 Bat Activity Survey 2016 – Autumn (Original Site)

3.4.1 During the September dusk activity survey, common pipistrelle and soprano pipistrelle bat calls were recorded in locations as shown on Drawing Number CA11129-012. The majority of bat activity was recorded in the wooded area in the south east of the site which is part of the Ty'r-Orsaf SINC. The majority of the activity recorded was of common pipistrelle with some soprano pipistrelle. The first bat, a common pipistrelle, was heard commuting at 19:21 hrs, approximately 28 minutes after sunset (18:53 hrs) in the north of the field to the south-east of the site at listening stop three.

Automated Bat Detector Survey Results

3.4.2 The automated bat detector survey results for the time between sunset 29th September 2016 to sunrise 3rd October 2016 are shown in Table 2. The earliest call was a common pipistrelle at 19:18 hrs, approximately 25 minutes after sunset (19:53 hrs) on the third night of recording. The last calls were common pipistrelle at 06:46 approximately 24 minutes before sunrise (07:10) on the third night of recording.

Table 2: Results of automated bat detector survey – Autumn 2016		
Species	Total number of calls	Bat Activity Index
Common pipistrelle	217	43.4
Soprano pipistrelle	32	6.4
Nathusius' pipistrelle	4	0.8
Myotis sp.	3	0.6
Leisler's	2	0.4

3.4.3 A total of 5 automated static detector nights of recordings were undertaken during which 258 echolocation calls were recorded. Five bat species were recorded within the site during the static survey. These included the same species which were

recorded during the activity survey as well as nathusius' pipistrelle, myotis sp. and Leisler's.

3.4.4 Common pipistrelle were the most frequently recorded species within the site accounting for a minimum of 84% of calls within any of the activity and automated surveys.

3.5 Bat Activity Survey 2017 – Spring (Whole Site)

3.5.1 During the May dusk activity survey, common pipistrelle, soprano pipistrelle, nathusius' pipistrelle, noctule and myotis sp. bat calls were recorded in locations as shown on Drawing Number CA11129-013. Bat activity was recorded across the site, apart from the south and western boundaries. The majority of bat activity was recorded along the woodland sections running north-south through the centre of the site, along the disused railway. The majority of the activity recorded was of common pipistrelle with some soprano pipistrelle. Four noctule calls were recorded across the site, adjacent to the farm buildings, along the woodland edge in the field to the east of the buildings, on the northern boundary of the central field and in the south-eastern corner of the south-eastern field. A single nathusius' pipistrelle was recorded along the eastern boundary of the site and a single myotis sp. was recorded along the path in the woodland strip in the south of the site. The first bat, a common pipistrelle, was heard at 21:27 hrs within the field to the north east of the farm buildings, along the woodland strip.

Automated Bat Detector Survey Results

3.5.2 The automated bat detector survey results for the time between sunset 11th May 2017 to sunrise 16th May 2017 are shown in Table 3. The earliest call was a common pipistrelle at 21:18hrs, approximately 37 minutes after sunset (20:41hrs) on the second night of recording. The last calls were common pipistrelle at 04:58 approximately 13 minutes before sunrise (05:11) on the third night of recording.

Table 3: Results of automated bat detector survey – Spring 2017		
<i>Species</i>	<i>Total number of calls</i>	<i>Bat Activity Index</i>
Common pipistrelle	1824	364.8
Soprano pipistrelle	59	11.8
Nathusius' pipistrelle	59	11.8
Myotis sp.	1	0.2
Noctule	92	18.4
Leisler's	6	1.2

- 3.5.3 A total of 5 automated static detector nights of recordings were undertaken during which 2041 echolocation calls were recorded. Six bat species were recorded within the site during the static survey. These included the same species which were recorded during the activity survey and building emergence surveys.
- 3.5.4 Common pipistrelle were the most frequently recorded species within the site accounting for a minimum of 89% of calls within any of the activity and automated surveys.

3.6 Bat Activity Survey 2017 – Summer (Whole Site)

- 3.6.1 During the August dusk activity survey, common pipistrelle, soprano pipistrelle and noctule bat calls were recorded in locations as shown on Drawing Number CA11040-014. Sporadic bat activity was recorded across the site, with the majority of bat activity being recorded along the central section of the site, along the disused railway. The majority of the activity recorded was of common pipistrelle with some soprano pipistrelle. One noctule was heard commuting near listening stop 2. The first bat, a common pipistrelle, was heard at 21:15 hrs within the field in the centre of the site, adjacent to the disused railway line and the northern boundary.

Automated Bat Detector Survey Results

- 3.6.2 The automated bat detector survey results for the time between sunset 4th August 2017 to sunrise 8th August 2017 are shown in Table 4. The earliest call was a noctule at 20:29hrs, approximately 26 minutes before sunset (20:55hrs) on the first night of recording. The last calls were common pipistrelle at 05:31 approximately 16 minutes before sunrise (05:47) on the fourth night of recording.

Table 4: Results of automated bat detector survey – Summer 2017		
<i>Species</i>	<i>Total number of calls</i>	<i>Bat Activity Index</i>
Common pipistrelle	707	141.4
Soprano pipistrelle	45	9
Myotis sp.	154	30.8
Noctule	4	0.8

- 3.6.3 A total of 5 automated static detector nights of recordings were undertaken during which 910 echolocation calls were recorded. Four bat species were recorded within the site during the static survey. These included the same species which were recorded during the activity survey and building emergence surveys.

3.6.4 Common pipistrelle were the most frequently recorded species within the site accounting for a minimum of 77% of calls within any of the activity and automated surveys.

3.7 Bat Activity Survey 2017 – Autumn (Additional Area)

3.7.1 During the September dusk activity survey, common pipistrelle, soprano pipistrelle, nathusius' pipistrelle and myotis sp. bats calls were recorded in locations as shown on Drawing Number CA11040-015. Bat activity of mainly common and soprano pipistrelles were recorded across the additional area of the site, apart from the north-western boundary. The majority of the activity recorded was of common pipistrelle with some soprano pipistrelle. A single nathusius' pipistrelle was recorded along the eastern boundary of the site and a myotis sp. was recorded along the eastern boundary and in the centre of the additional area of the site. The first bat, a common pipistrelle, was heard at 21:27 hrs along the western boundary of the additional area of the site, adjacent to the disused railway.

Automated Bat Detector Survey Results

3.7.2 No bat calls were recorded at this location during the survey.

3.8 Evaluation

3.8.1 Overall, 6 of the 17 British resident bat species were found to be using the habitats on the Site. Common pipistrelle were the most frequently recorded species within the site with soprano pipistrelle the second most frequent. Both species are considered to be common and widespread and therefore considered to be of **local** value. Despite nathusius' pipistrelle, *myotis* species, Leisler's and noctule bats being rarer within Wales, the level of activity observed on site by these species was low. Therefore, it is considered that these species are of **local** value.

3.8.2 Overall, the bat assemblage for the site is considered to be of **local** value. Based on their conservation value alone, these populations of bats using the site are not considered to be an "important" ecological feature for the purposes of this assessment.

4 RECOMMENDATIONS

4.1.1 The proposed development of the site has the potential to result in the loss of woodland and hedgerow habitat which has the potential to disturb, kill / injure bats if present at the time of the vegetation clearance works. The loss of habitat could also fragment the habitat, thus affecting connectivity and the movement of bats.

4.1.2 The demolition or renovation of buildings and bridge structures could also result in the loss of roosting sites for bats.

4.1.3 Assessment of Effects

4.1.4 Bats are a legally protected species under the Wildlife and Countryside Act 1981 (WCA) and the Conservation of Habitats and Species Regulations 2017. They are also listed as Section 7 species of the Environment (Wales) Act 2016. The impacts of the proposed development must therefore be considered to determine whether or not there is potential to contravene the governing legislation. Further assessment of the effects of development upon them will be required to support a planning application.

4.2 Potential Mitigation Measures

4.2.1 *Bat Roosts*

4.2.2 Common pipistrelle bats were observed emerging from Buildings B3 and possibly from B4 and the bridge B8, although no exact exit/re-entry point was identified. The results of the surveys recorded only one bat emerging or re-entering each structure per survey, which suggests that they are being used by opportunistic individual bats. A licence will therefore be required from Natural Resources Wales (NRW) if works are likely to affect Buildings B3 and B4 and bridge B8. Erection of bat boxes and will need to be agreed as part of the bat licence application.

4.2.3 Prior to any felling or tree surgery as part of the development, trees will need to be re-assessed for their current bat roost potential. This is due to the transient nature of bats and the potential for potential roosting opportunities to be established within trees as natural part of aging and weathering process. If individual trees are assessed as having high bat roost potential, these trees will be subject to either a detailed inspection by a licensed bat-worker or emergence/re-entry surveys to determine whether a roost is present. If bats or evidence of bat occupation is found within the trees then it will be necessary to apply for a disturbance licence from Natural Resources Wales.

- 4.2.4 If future surveys identify bat roosts within any of the trees to be removed on site, the loss of these roost will be mitigated for depending on the species, type and size of roost found. Mitigation measures proposed are likely to include the erection of bat boxes within retained habitat on site.
- 4.2.5 It is recommended that trees assessed as having low suitability for supporting bat roosts are soft felled between March and October, when bats are active and less vulnerable to disturbance. Soft felling is a 'proceed with care' approach and requires the tree surgeon to carefully cut and lowering tree limbs to the ground and leaving them grounded overnight to allow any bats to make their way out. If felling is required during the winter period it is recommended that a climb and inspect survey is carried out prior to felling.
- 4.2.6 ***Commuting / Foraging***
- 4.2.7 Habitat proposals should be implemented or created to promote bat activity across the new development (maintaining connectivity north to south and east to west) to provide a benefit to bats and other wildlife as well as mitigate for losses of suitable foraging / commuting habitat. Measures could include:

Planting of broadleaved woodland, including native species located within the site and managed to encourage the development of a 'natural woodland' habitat;

Planting of species rich native hedgerows within green infrastructure/landscape areas would provide suitable corridors and foraging habitat for bats and other wildlife;

Any loss of hedgerow will be mitigated for where practical and possible through the translocation or creation of the same length somewhere else on site, with a focus on locations where connectivity between any green space on site and the wider countryside;

Allowing retained trees to grow either side of gaps created in hedgerows and woodland so that their canopy spread will minimise the gap and maintain connecting corridors across the site for use by foraging and commuting bats. These measures should be implemented at the earliest possible opportunity to give the maximum amount of time possible for tree canopies to spread before roads are constructed;

Protecting retained areas of broadleaved woodland and retained hedgerows protected from ingress by machinery during works by the erection of tree protection fencing at an appropriate distance. Fencing design should be in accordance with BS 5837:2012 *Trees in relation to design, demolition and construction*;

Minimising noise and lighting levels associated with the construction activities where possible. It is recommended that night time working is avoided and there should be no direct illumination of hedgerows and potential roosting sites;

Providing a tool box talk to all contractors prior to construction works so that they are aware of the potential risks to roosting bats and the penalties associated with their disturbance. The talk should describe measures to be undertaken by contractors to minimise potential impacts on foraging and commuting bats should night-time working be necessary at a time when bats are active; and

A sensitive lighting scheme for both the construction and the operational phase implemented to minimise light spill onto retained habitat and ecologically sensitive receptors.

5 ENHANCEMENTS

- 5.1.1 In accordance with the requirements of the Planning Policy Wales 2016 and BSI 42020:2013, ecological enhancements should be proposed which will result in a net gain in biodiversity.
- 5.1.2 To enhance the opportunities for bats, green infrastructure proposals should seek to maximise planting to include trees which could provide long-term roosting opportunities for bats. Bat boxes could also be erected within the site.

6 MONITORING

6.1.1 Monitoring, may be required for the proposed mitigation and enhancement measures to determine:

the success/effectiveness of the mitigation measures;

early warning of mitigation measures which are not proving effective; and

how to remedy the situation should any of the implemented measures fail e.g. due to lack of management.

6.1.2 Monitoring of bat activity across the site can be secured through a planning condition.

6.1.3 Bat roost monitoring will be specified within the appropriate licence from Natural Resources Wales, if required. Best practise guidelines will be followed.

Appendix 1
Building and Bridge Descriptions

Appendix 1: Building and Bridge Descriptions: Site Visit undertaken 1st September 2016 and 25th April 2017

Building Reference	Description	Photograph	Potential
1	<p>Two storey brick building with pitched slate roof tiles.</p> <p>Tiles are missing. Open void is present on the south-eastern aspect of the roof. Small gaps are also present in the fascia beneath the guttering. Very small gaps are present between the brick wall and fascia. On the north western corner the wooden board is coming away from the overhang, exposing a void.</p> <p>The southern aspect has a narrow single tiled roof porch above a doorway. Gaps beneath tiles do not appear to enter the building.</p> <p>During an update survey on 25.4.17 it was noted that remedial works had been undertaken to the roof and soffits of the building. There are no longer missing/broken roof tiles and therefore there is no access to the roof void. One of the two chimneys have also been removed and new roof tiles installed. There is however still damage to the inner corner of the north-western soffit box.</p>	 <p>02.09.16</p>  <p>25.04.17</p>	Moderate

2	<p>Bridge constructed from stone and brick. The pointing in the brickwork is generally of good standard.</p>		Low
3	<p>A large two storey stone farm building with a pitch metal roof used for storing hay. Damage to brickwork but inside is very open, draughty and exposed. There is a single storey stone pigsty with a pitch metal roof attached to the southern aspect of the main building. There are some crevices in broken stone work which may be used by a small number of roosting bats.</p>		Low
4	<p>Stable block – stone farm building with a pitched metal roof. Stable doors provide entry. Whilst gaps are present near to the roof providing entry it is very open and is therefore of poor suitability. The extension on the eastern side is brick built, single storey with a flat roof. Slightly open window with holes present in the brickwork. No access from southern end of the eastern aspect with cracks in windows. South western corner is ivy clad. Western aspect has open gaps in boarded windows and small holes in brickwork. Extensive damage to brickwork beneath metal roof creating large exposed gaps in roof space. Northern aspect has gaps between brickwork and roof space providing entry.</p>		Moderate

<p>5</p>	<p>A stone farm building with pitch metal roof.</p> <p>Large exposed gaps beneath roof on the southern aspect and on the south-eastern corner near to a security light.</p> <p>A 'half' stable door is located on the south-western aspect and 2 on the north-western aspect as well as a window. There are holes present in the pointing of the brickwork all around the outside of the building but pointing within is good with a few holes and therefore there is low/negligible potential inside.</p>		<p>Low</p>
<p>6</p>	<p>A stone farm building with pitched metal roof.</p> <p>Along the northern aspect of building near to building 1 there are gaps present in brickworks towards the roof.</p> <p>Internal inspection: Ground floor level: Several holes within brickwork which could provide entry points for bats.</p> <p>Southern, eastern and western side of building has some ivy clad areas. Externally there are small gaps in brickwork.</p> <p>Large narrow gap in south western corner of building was clad in cobwebs. Old sealed fireplace clad with cobwebs.</p>		<p>Moderate</p>

7	<p>Large triple ridged farm building. Stone building with pitched metal roof. Draughty and well lit. Metal and wooden beams support the roof. There are gaps between wall and roof providing entry points.</p>		Low
8 - North eastern bridge	<p>Principally stone bricks with small bricks in line of arch. Thick ivy cladding obscuring most of the external features. Gaps in stone bricks of the supporting arms of the bridge. Southern side is covered in ivy and unable to be viewed from close up due to fencing and unstable earth mound. Arch in main bridge is in good condition.</p>		Low

<p>9 - South western bridge</p>	<p>Principally stone bricks with small bricks in line of arch. North west facing support has many gaps in pointing. A large vertical crack up western support wall. South facing side has less cracks in the support walls but a few. Arch in main bridge is in good condition. Recently had surrounding vegetation cut down.</p>		<p>Low</p>
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Appendix 2
Bat Surveys 2016/2017 – Dates/Times/Weather Conditions

Appendix 2 - Bat Surveys 2016/2017 – Dates/Times/Weather Conditions

2017 Building Emergence/Re-entry Surveys

Weather Conditions and Times and Dates of 2017 – Emergence/Re-entry Survey				
Building	Date	Start Time (sunset/sunrise time) hrs	End Time (hrs)	Weather Conditions
1	24.05.17	20:55 (21:10)	22:40	Start: 19°C, dry, wind WSW 3mph, 0% cloud cover. End: 18°C, wind WSW 3mph, 0% cloud cover.
1	15.09.17	05:17 (06:47)	07:02	Start: 9°C, dry, wind NNW 9mph, 40% cloud cover. End: 9°C, dry, wind NNW 9mph, 50% cloud cover.
2	22.06.17	21:17 (21:32)	23:02	Start: 16°C, dry, wind 13mph, 40% cloud cover. End: 14°C, dry wind 13mph, 50% cloud cover.
3	27.06.17	21:24 (21:34)	23:04	Start: 19°C, dry, wind W 3mph, 90% cloud cover. End: 17°C, dry, wind N 6mph, 100% cloud cover.
3	31.08.17	04:53 (06:23)	06:38	Start: 11°C, dry, wind N 4mph, 50% cloud. End: 10°C, dry, wind WNW 3mph, 40% cloud cover.
4	29.06.17	21:19 (21:33)	23:03	Start: 14°C, light rain, wind NNW 10mph, 100% cloud cover. End: 12°C, light rain, wind NW 6mph, 100% cloud cover.

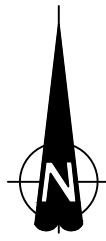
Weather Conditions and Times and Dates of 2017 – Emergence/Re-entry Survey				
Building	Date	Start Time (sunset/sunrise time) hrs	End Time (hrs)	Weather Conditions
4	19.09.17	05:23 (06:53)	07:08	Start: 9°C, dry, wind NW 7mph, <5% cloud cover. End: 8°C, dry, wind WNW 6mph, 20% cloud cover.
5	21.08.17	20:14 (20:24)	21:54	Start: 19°C, dry, wind WNW 5mph, 10% cloud cover. End: 18°C, dry, wind W 4mph, 100% cloud cover.
6	21.06.17	21:20 (21:32)	23:02	Start: 23°C, dry, wind W 13mph, 25% cloud cover. End: 18°C, dry, wind W 18mph, 100% cloud cover.
6	05.09.17	05:01 (06:31)	06:46	Start: 17°C, dry, wind SSW 9mph, 90% cloud cover. End: 17°C, light rain, wind SSW 11mph, 100% cloud cover.
7	04.07.17	21:17 (21:32)	23:02	Start: 18°C, dry, wind WNW 8mph, 40% cloud cover. End: 16°C, dry, wind WNW 6mph, 20% cloud cover.
8 (NE railway bridge)	03.08.17	20:43 (20:58)	22:28	Start: 17°C, dry, wind WSW 16mph, 90% cloud cover. End: 16°C, dry, wind WSW 15mph, 100% cloud cover.
8 (NE railway bridge)	07.09.17	05:04 (06:34)	06:49	Start: 14°C, dry, wind WSW 6mph, 50% cloud cover. End: 13°C, dry, wind S 8mph, 80% cloud cover.

Weather Conditions and Times and Dates of 2017 – Emergence/Re-entry Survey				
Building	Date	Start Time (sunset/sunrise time) hrs	End Time (hrs)	Weather Conditions
9 (SW railway bridge)	02.08.17	20:45 (21:00)	22:30	Start: 18°C, dry, wind WSN 8mph, 100% cloud cover. End: 17°C, light rain, wind WSW 9mph, 100% cloud cover.

2016/2017 Bat Activity- Transect Surveys

Weather Conditions and Times and Dates of 2016/17 Activity surveys						
Area of site	Month	Date	Transect	Start Time (sunset time) hrs	End Time	Weather Conditions
Original area only	September	29.09.16	Autumn dusk activity transect	18:53 (18:53)	20:53	Start: 14°C, dry, wind W 9mph, partially cloudy. End: 13°C, dry, wind W 13mph, partially cloudy.
Whole site	May	10.05.17	Spring dusk activity transect	20:50 (20:50)	23:50	Start: 14°C, dry, wind 0mph, 5% cloud cover. End: 10°C, dry, wind 0mph, 5% cloud cover.
	July	31.07.17	Summer dusk activity transect	21:03 (21:03)	00:00	Start: 16°C, light rain, wind SW 5mph, 100% cloud cover. End: 15°C, dry, wind WSW 9mph, 40% cloud cover.
Additional area only	September	25.09.17	Autumn dusk activity transect	19:05 (19:05)	21:05	Start: 17°C, dry, wind NNW 6mph, 90% cloud cover. End: 16°C, dry, wind NNE 1mph, 10% cloud cover.

DRAWINGS



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REFERENCE

Site boundary (29.14Ha) _____

2Km Search area _____

Original site boundary EP1 Habitat Survey in September 2016 _____

Additional land included within site boundary and subject to EP1 Habitat Survey in April 2017 _____

A	Amended to show revised site boundary.	05/10/17	R.JH	J.LH	J.LH
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REVISION	DETAILS	DATE	DR'N	CHK'D	APP'D
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CLIENT
WELSH GOVERNMENT

PROJECT
COSMESTON ECOLOGICAL SURVEY

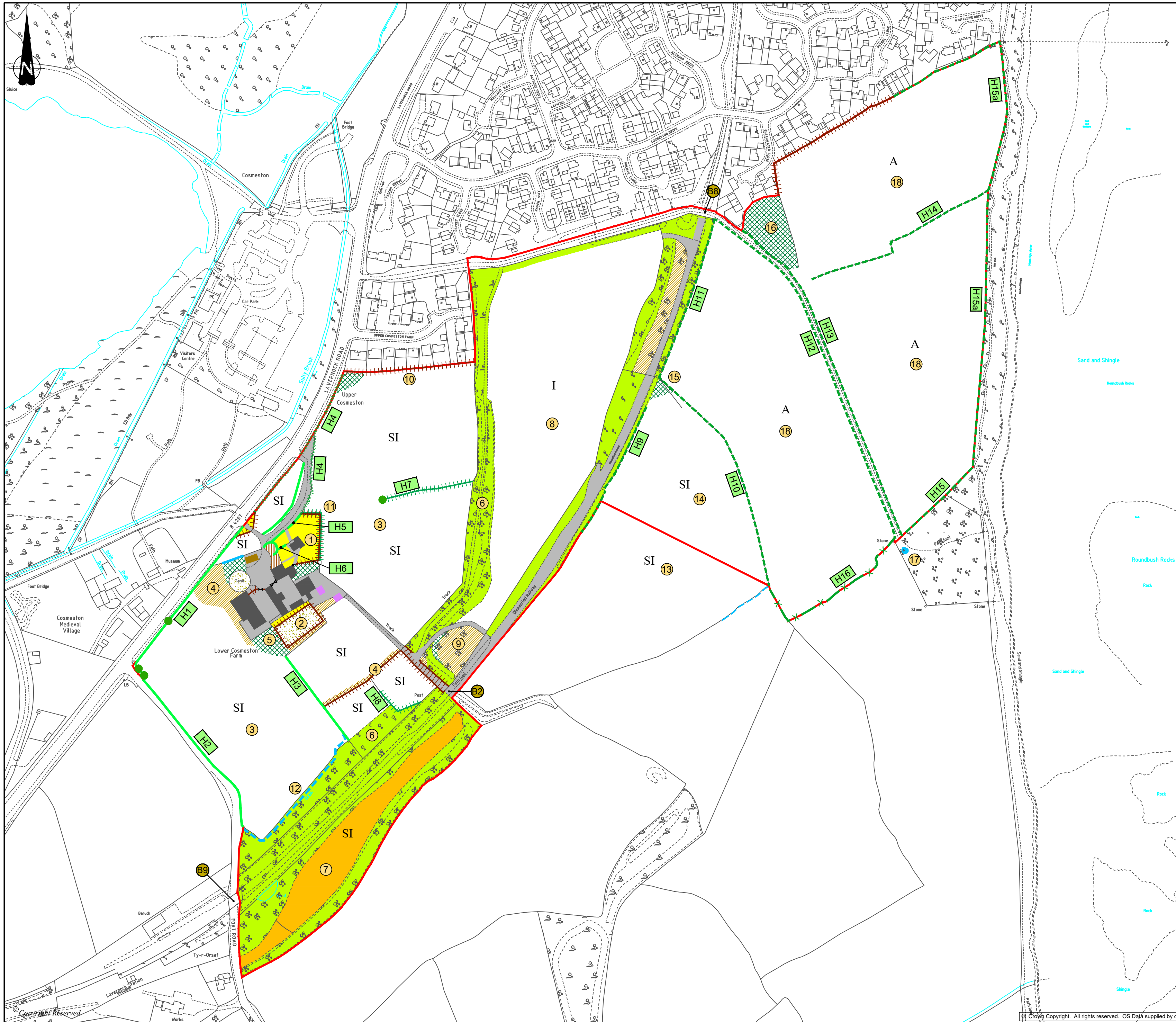
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SITE LOCATION PLAN & ECOLOGICAL SURVEY AREA

DRG No.	CA11040-001	REV	A
DRG SIZE	A3	SCALE	1:25,000
		DATE	17/10/16
DRAWN BY	R.JH	CHECKED BY	J.LH
		APPROVED BY	J.LH

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REFERENCE

Survey area	---
Amenity grassland	---
Improved grassland	I
Semi-improved grassland	SI
Poor semi-improved grassland	SI
Arable	A
Broad-leaved woodland	---
Sand	---
Tall ruderal	---
Pond/Standing water	---
Wet watercourse	---
Dry watercourse	---
Storage container	---
Gate	---
Building	---
Hardstanding	---
Disturbed ground	---
Scrub	---
Chicken coop	---
Fence	---
Hedgerow intact species poor	---
Hedgerow intact species rich	---
Hedgerow defunct species poor	---
Hedgerow defunct species rich	---
Defunct species poor remnant hedgerow	---
Tree	---
Target note	---
Target note hedgerow	---
Bridge reference number	---

REVISION	DETAILS	DATE	DRAWN	CHK'D	APP'D

CLIENT
WELSH GOVERNMENT

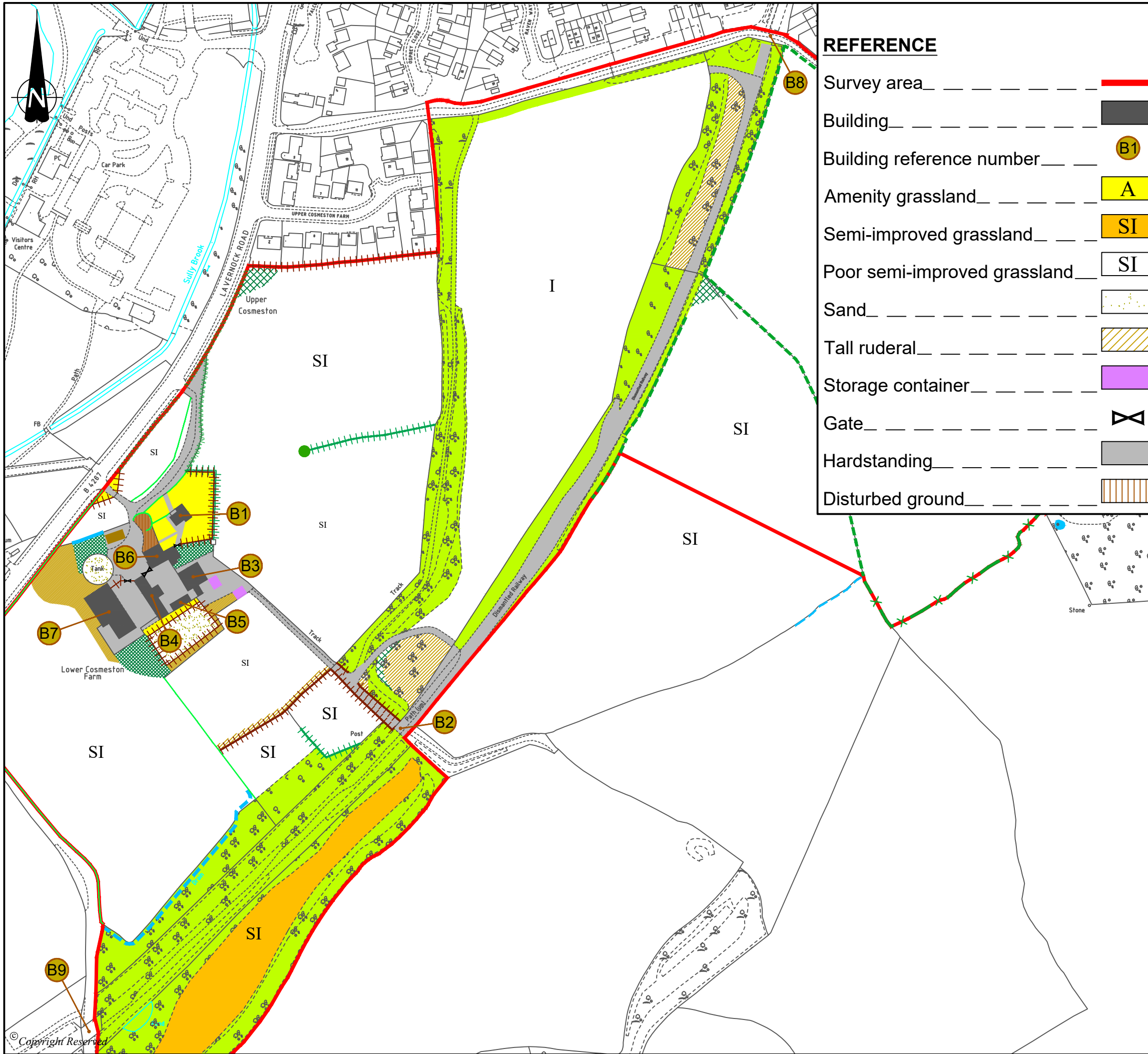
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DRAWING TITLE
HABITAT PLAN

DRG No.	CA11040-002	REV	
DRG SIZE	A2	SCALE	1:2500
		DATE	05/10/17
DRAWN BY	RJH	CHECKED BY	KH
		APPROVED BY	JLH

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REFERENCE

Survey area	---	---	Woodland broad-leaved	---	---
Building	---	---	Scrub	---	---
Building reference number	---	B1	Chicken coop	---	---
Amenity grassland	---	A	Fence	---	---
Semi-improved grassland	---	SI	Intact species poor hedgerow	---	---
Poor semi-improved grassland	---	SI	Species poor tree-line	---	---
Sand	---	---	Hedgerow intact species rich	---	---
Tall ruderal	---	---	Hedgerow defunct species rich	---	---
Storage container	---	---	Hedgerow defunct species poor	---	---
Gate	---	---	Semi-mature tree	---	---
Hardstanding	---	---	Watercourse wet	---	---
Disturbed ground	---	---	Watercourse dry	---	---

REVISION	DETAILS	DATE	DR'N	CHK'D	APP'D
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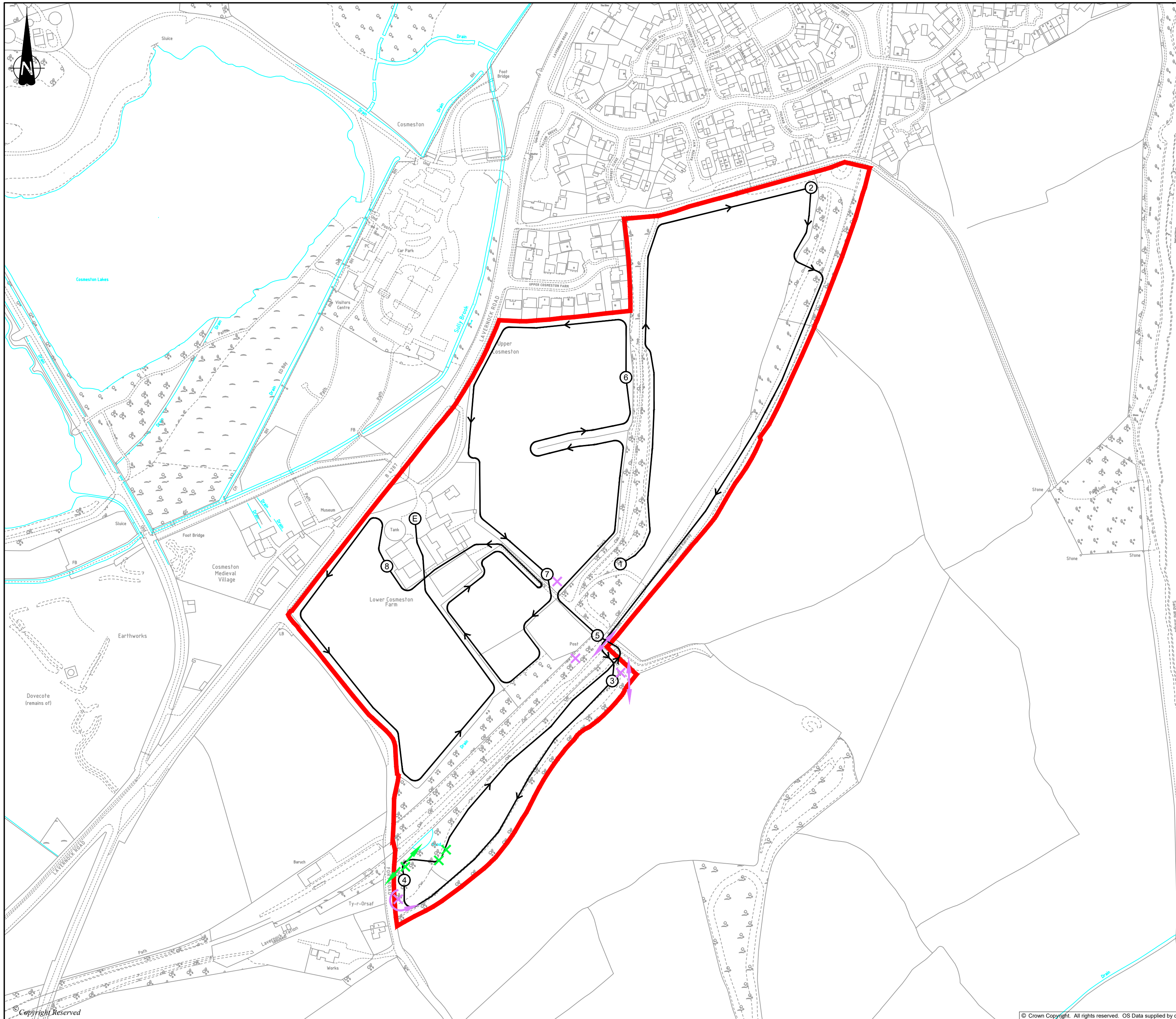
PROJECT
COSMESTON ECOLOGICAL SURVEY

DRAWING TITLE
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		DATE	24/07/18
DRAWN BY	RJH	CHECKED BY	KH
		APPROVED BY	JLH

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REFERENCE

- Survey area _____
- Listening stop _____
- Transect route _____
- End of transect _____
- Common Pipistrelle _____
- Soprano Pipistrelle _____

REVISION	DETAILS	DATE	DRAWN	CHK'D	APP'D

CLIENT
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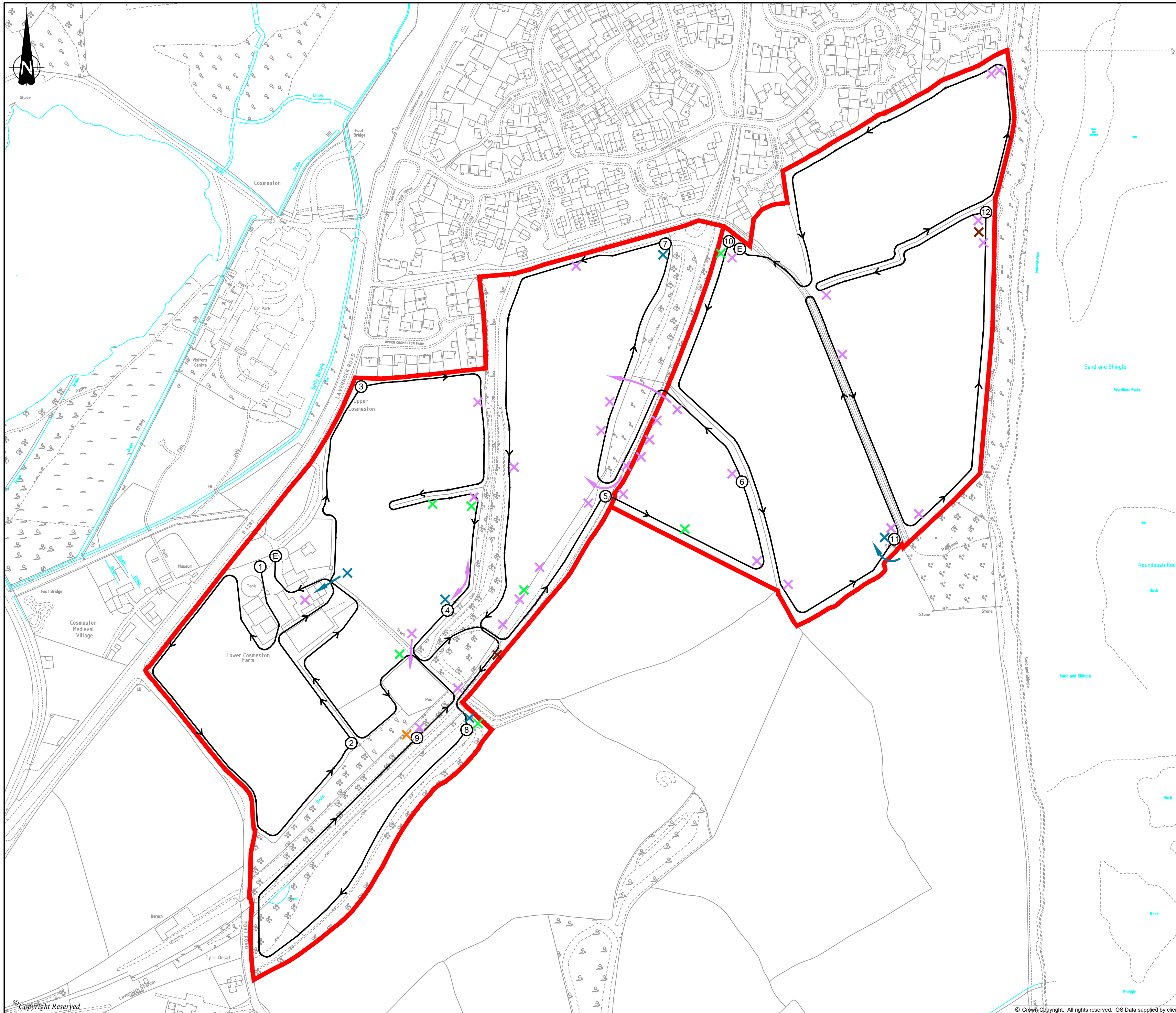
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BAT ACTIVITY SURVEY - AUTUMN 2016

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DRAWN BY	RJH	CHECKED BY	KH
		APPROVED BY	AB

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REFERENCE

- Survey area
- Listening stop 1
- Transect route
- End of transect E
- Common Pipistrelle X
- Soprano Pipistrelle X
- Nathusius Pipistrelle X
- Noctule X
- Myotis species X

REVISION	DETAILS	DATE	DRAWN	CHK'D	APP'D
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CLIENT
WELSH GOVERNMENT

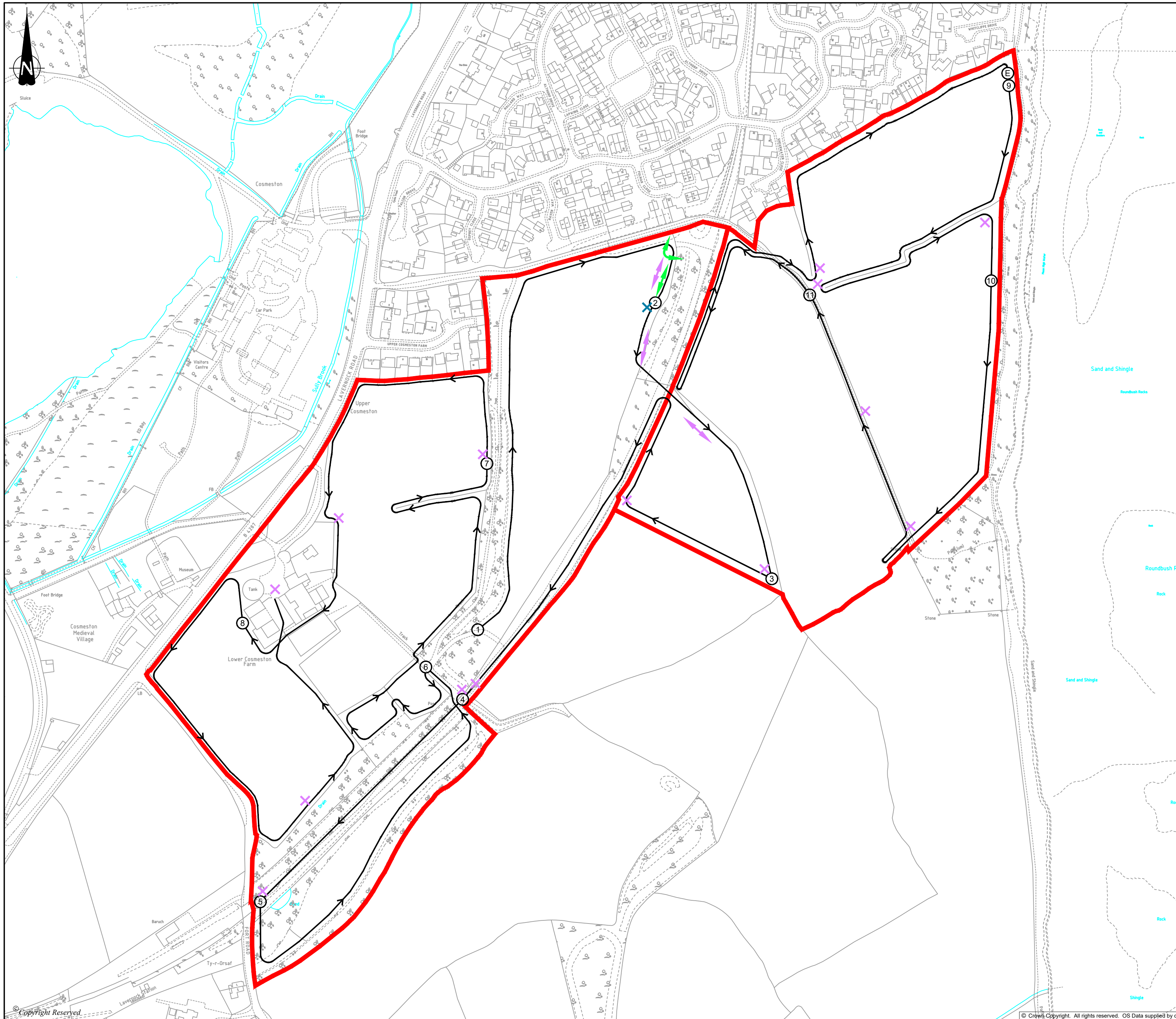
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DATE 01/08/17	
DRAWN BY RJH	CHECKED BY KH
APPROVED BY AB	

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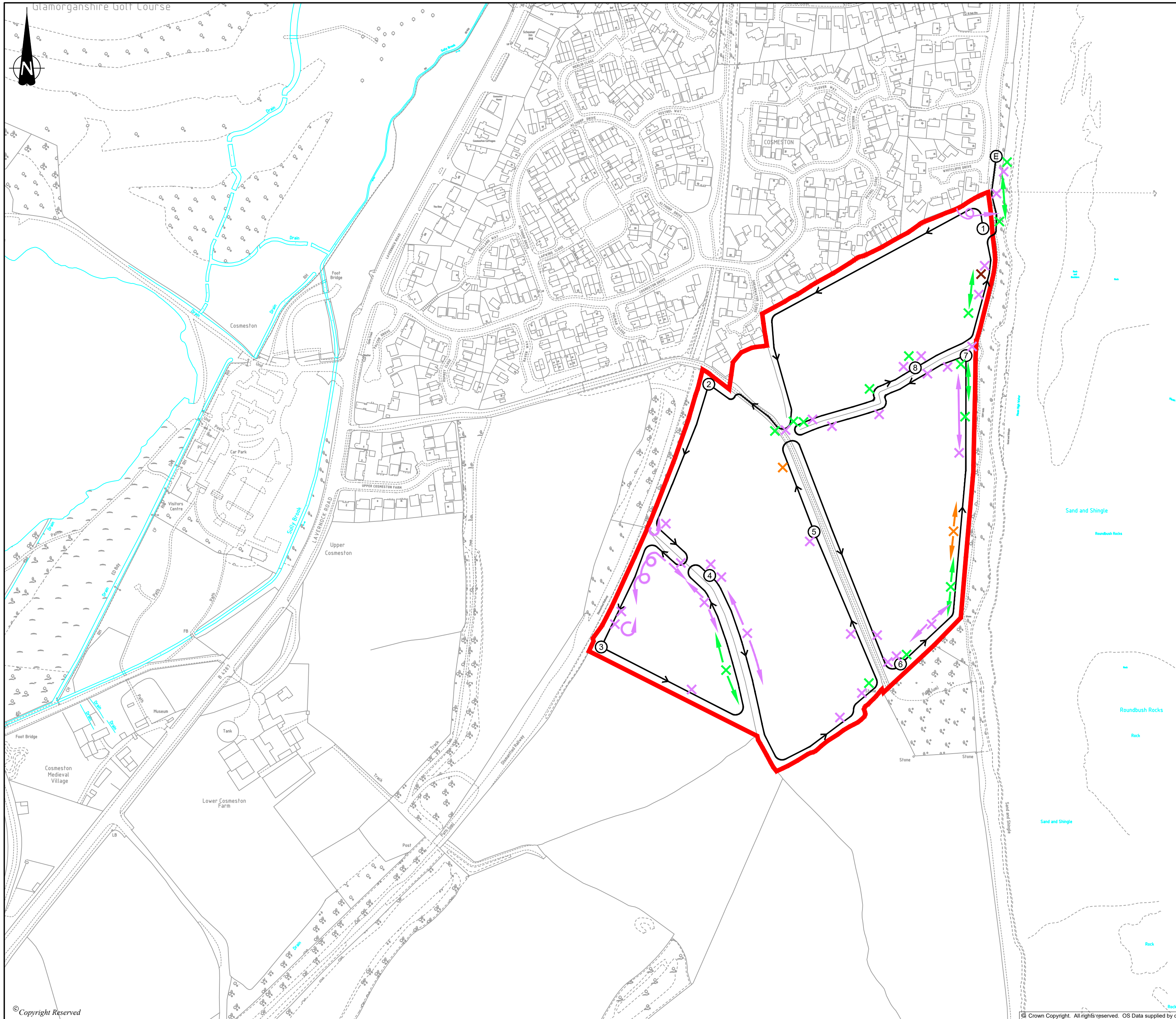
DO NOT SCALE FROM THIS DRAWING

REFERENCE

- Survey area _____
- Listening stop _____
- Transect route _____
- End of transect _____
- Common Pipistrelle _____
- Soprano Pipistrelle _____
- Noctule _____

REVISION	DETAILS	DATE	DRAWN	CHK'D	APP'D
CLIENT					
WELSH GOVERNMENT					
PROJECT					
COSMESTON ECOLOGICAL SURVEY					
DRAWING TITLE					
BAT ACTIVITY SURVEY - SUMMER 2017					
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DRAWN BY RJH	CHECKED BY KH	APPROVED BY AB			
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REFERENCE

Survey area	---	
Listening stop	---	①
Transect route	---	→
End of transect	---	ⓔ
Common Pipistrelle	---	
Soprano Pipistrelle	---	
Nathusius Pipistrelle	---	
Myotis species	---	

REVISION	DETAILS	DATE	DRAWN	CHK'D	APP'D

CLIENT
WELSH GOVERNMENT

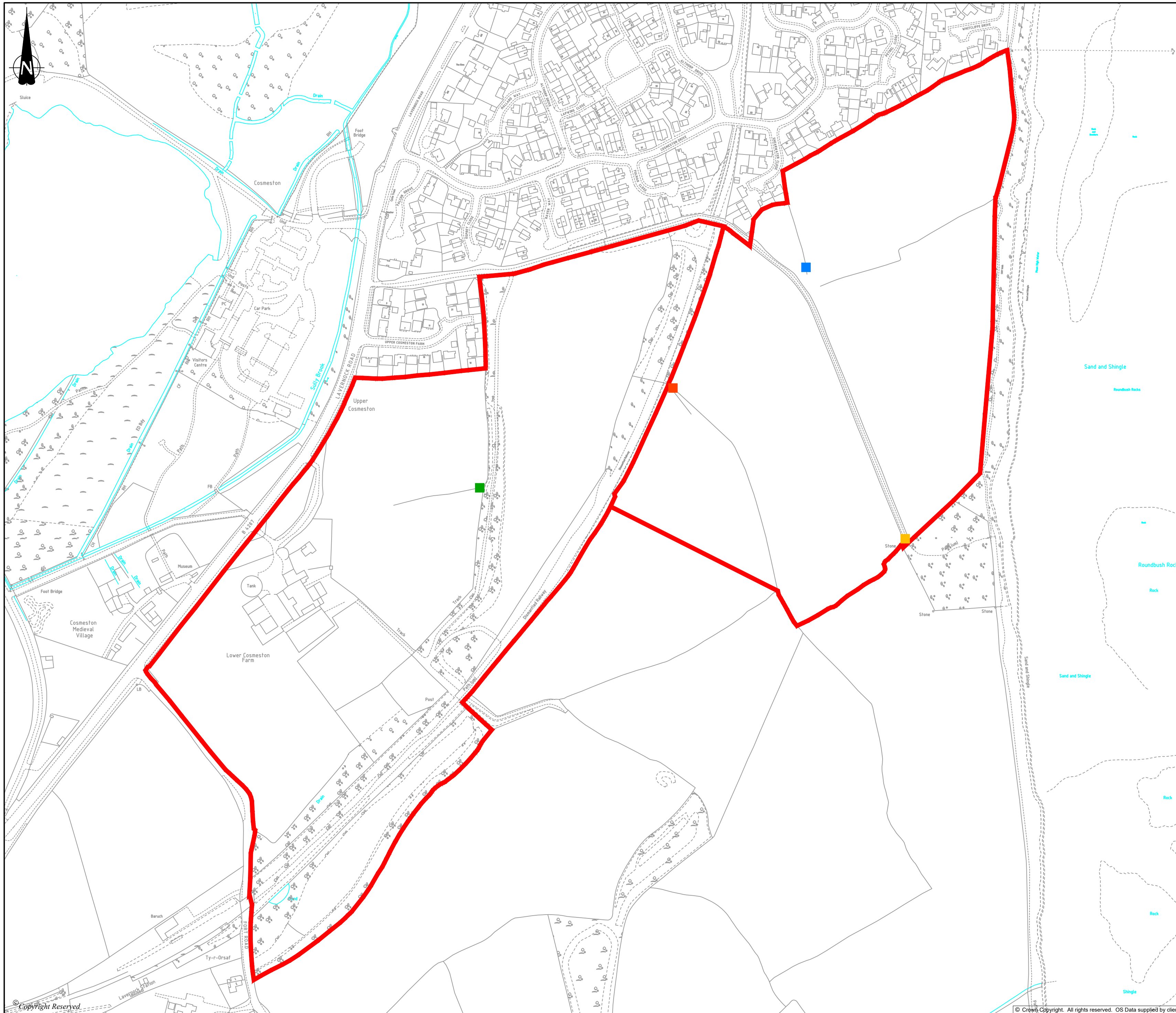
PROJECT
COSMESTON ECOLOGICAL SURVEY

DRAWING TITLE
BAT ACTIVITY SURVEY - AUTUMN 2017

DRG No.	CA11040-015	REV	
DRG SIZE	A2	SCALE	1:2500
		DATE	01/08/17
DRAWN BY	RJH	CHECKED BY	KH
		APPROVED BY	AB

<input checked="" type="checkbox"/> CARDIFF	TEL 029 2072 9191	WEB: WWW.WARDELL-ARMSTRONG.COM
<input type="checkbox"/> BIRMINGHAM	<input type="checkbox"/> CARLISLE	<input type="checkbox"/> CROYDON
<input type="checkbox"/> GLASGOW	<input type="checkbox"/> LEIGH	<input type="checkbox"/> LONDON
<input type="checkbox"/> NEWCASTLE UPON TYNE	<input type="checkbox"/> SHEFFIELD	<input type="checkbox"/> STOKE-ON-TRENT
		<input type="checkbox"/> EDINBURGH
		<input type="checkbox"/> MANCHESTER
		<input type="checkbox"/> TAUNTON





DO NOT SCALE FROM THIS DRAWING

REFERENCE

- Survey area _____ █
- SM2 BAT+ Automated detector location _____
- Autumn 2016 _____ █
- Spring 2017 _____ █
- Summer 2017 _____ █
- Autumn 2017 _____ █

REVISION	DETAILS	DATE	DRAWN	CHK'D	APP'D
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CLIENT
WELSH GOVERNMENT

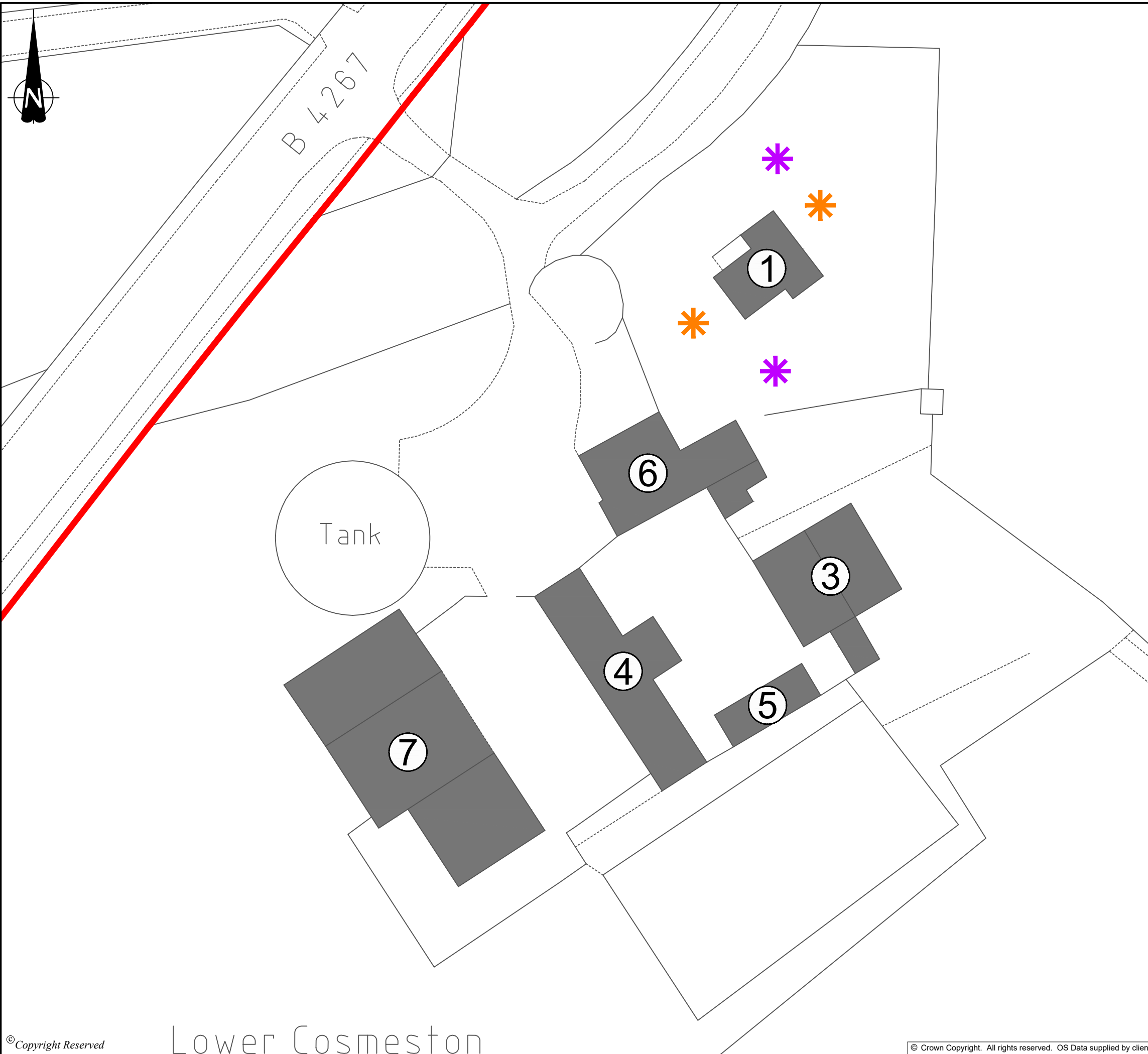
PROJECT
COSMESTON ECOLOGICAL SURVEY

DRAWING TITLE
**AUTOMATED DETECTOR LOCATIONS
2016 & 2017**

DRG No.	CA11040-016	REV	
DRG SIZE	A2	SCALE	1:2500
		DATE	01/08/17
DRAWN BY	RJH	CHECKED BY	KH
		APPROVED BY	AB

- CARDIFF
- BIRMINGHAM
- GLASGOW
- NEWCASTLE UPON TYNE
- CARLISLE
- LEIGH
- SHEFFIELD
- CROYDON
- LONDON
- STOKE-ON-TRENT
- EDINBURGH
- MANCHESTER
- TAUNTON





DO NOT SCALE FROM THIS DRAWING

REFERENCE

- Survey area _____
- Building _____
- Building reference number _____ ①
- Surveyor location - Emergence survey _____
- Surveyor location - Re-entry survey _____

REVISION	DETAILS	DATE	DR'N	CHK'D	APP'D

CLIENT
WELSH GOVERNMENT

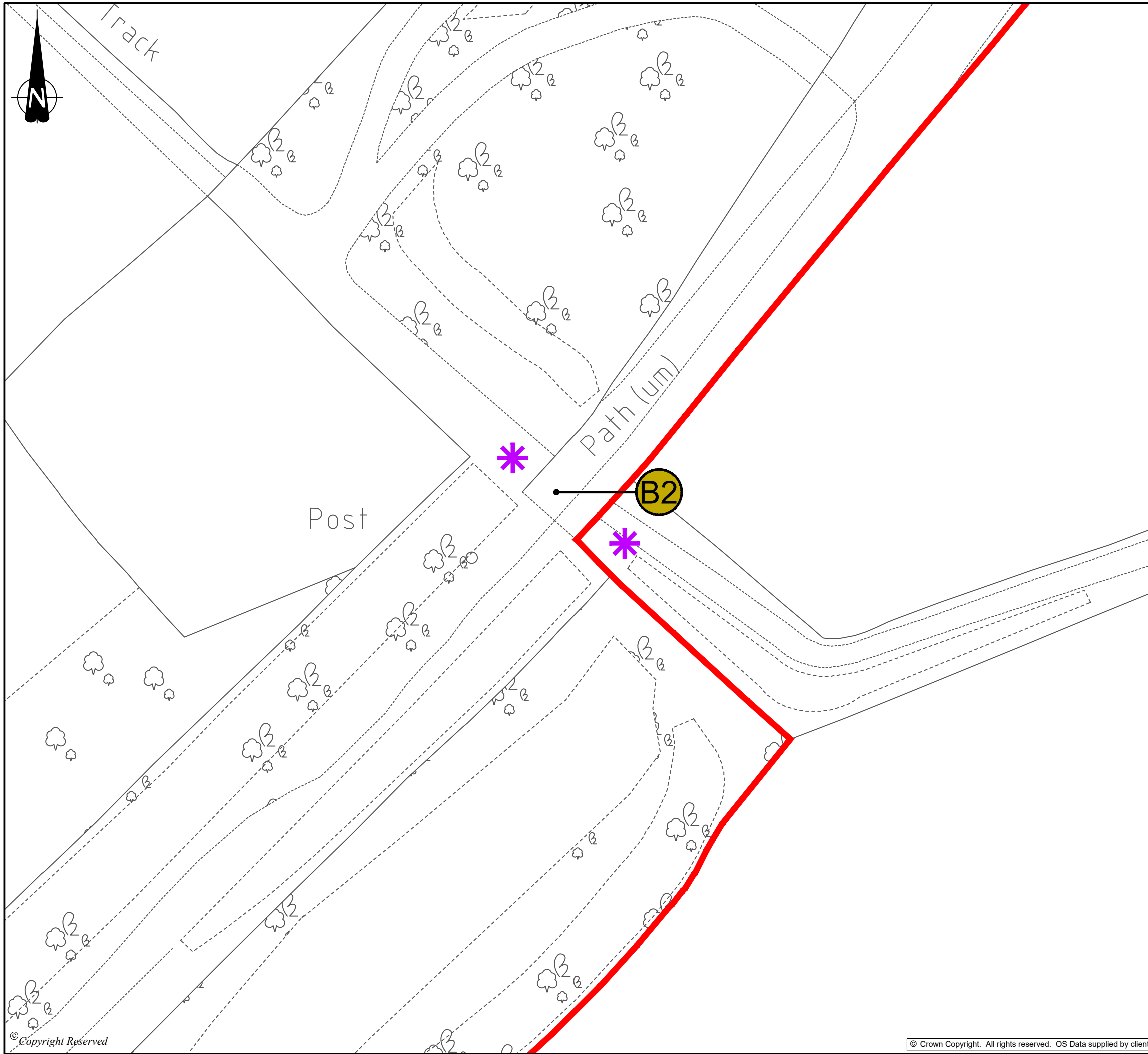
PROJECT
COSMESTON ECOLOGICAL SURVEY

DRAWING TITLE
BUILDING 1 EMERGENCE & RE-ENTRY SURVEY 2017

DRG No. CA11040-017	REV
DRG SIZE A3	SCALE 1:500
DRAWN BY RJH	CHECKED BY KH
	APPROVED BY AB


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 NEWCASTLE UPON TYNE SHEFFIELD STOKE-ON-TRENT TAUNTON







DO NOT SCALE FROM THIS DRAWING

REFERENCE

Survey area _____ 

Building reference number _____ 

Surveyor location - _____ 

Emergence survey _____

REVISION	DETAILS	DATE	DR'N	CHK'D	APP'D

CLIENT

WELSH GOVERNMENT

PROJECT

COSMESTON ECOLOGICAL SURVEY

DRAWING TITLE

BUILDING 2 EMERGENCE SURVEY 2017

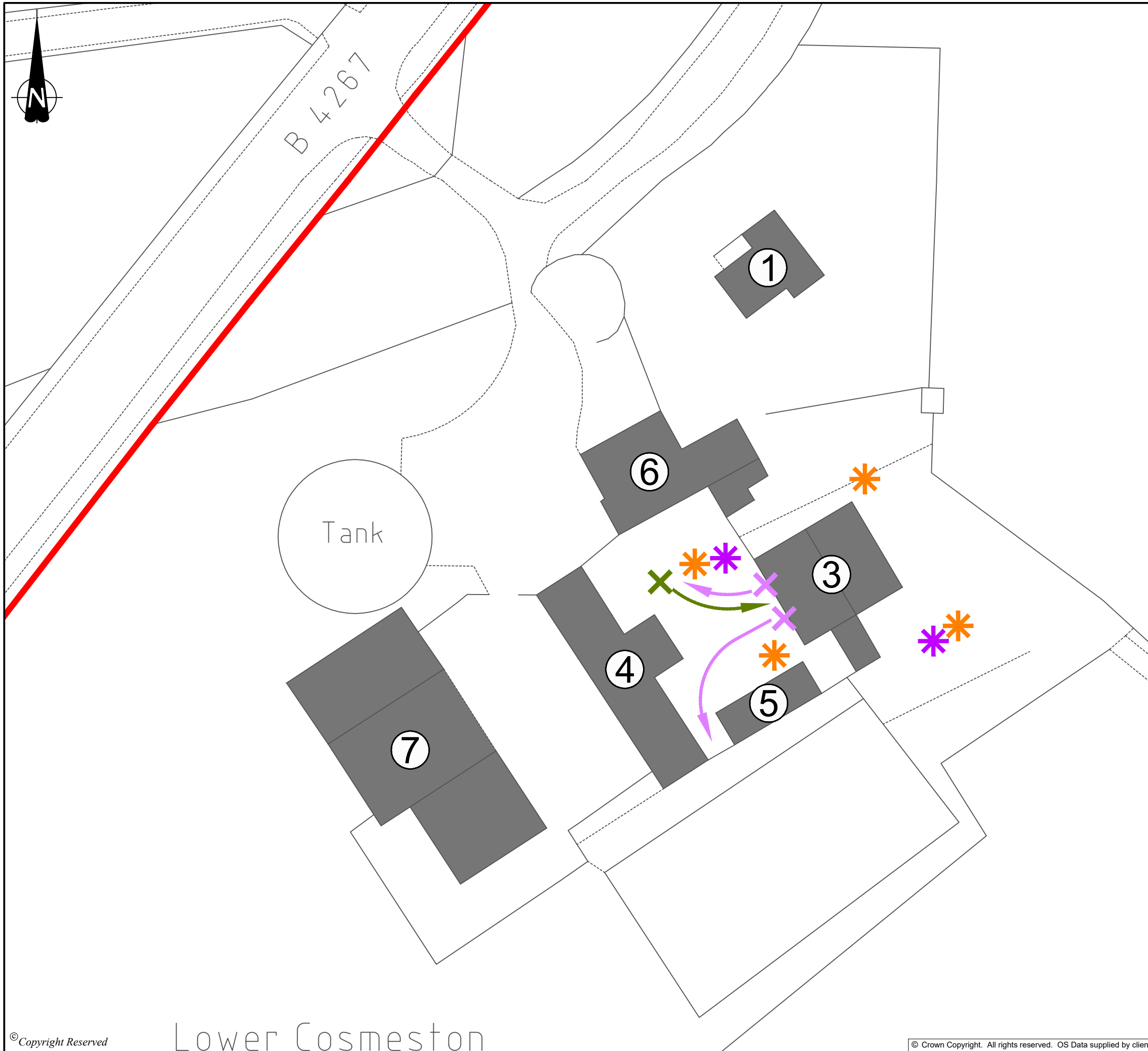
DRG No.	CA11040-018	REV	
DRG SIZE	A3	SCALE	1:500
		DATE	12/03/18
DRAWN BY	RJH	CHECKED BY	KH
		APPROVED BY	AB

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REFERENCE


Survey area _____ 


Building _____ 

Building reference number _____ ①

Surveyor location -
Emergence survey _____ 

Surveyor location -
Re-entry survey _____ 

Possible Common Pipistrelle
emergence _____ 

Common Pipistrelle observed
re-entering B3 during re-entry
survey on B6 5/9/17 _____ 

REVISION	DETAILS	DATE	DR'N	CHK'D	APP'D

CLIENT

WELSH GOVERNMENT

PROJECT

COSMESTON ECOLOGICAL SURVEY

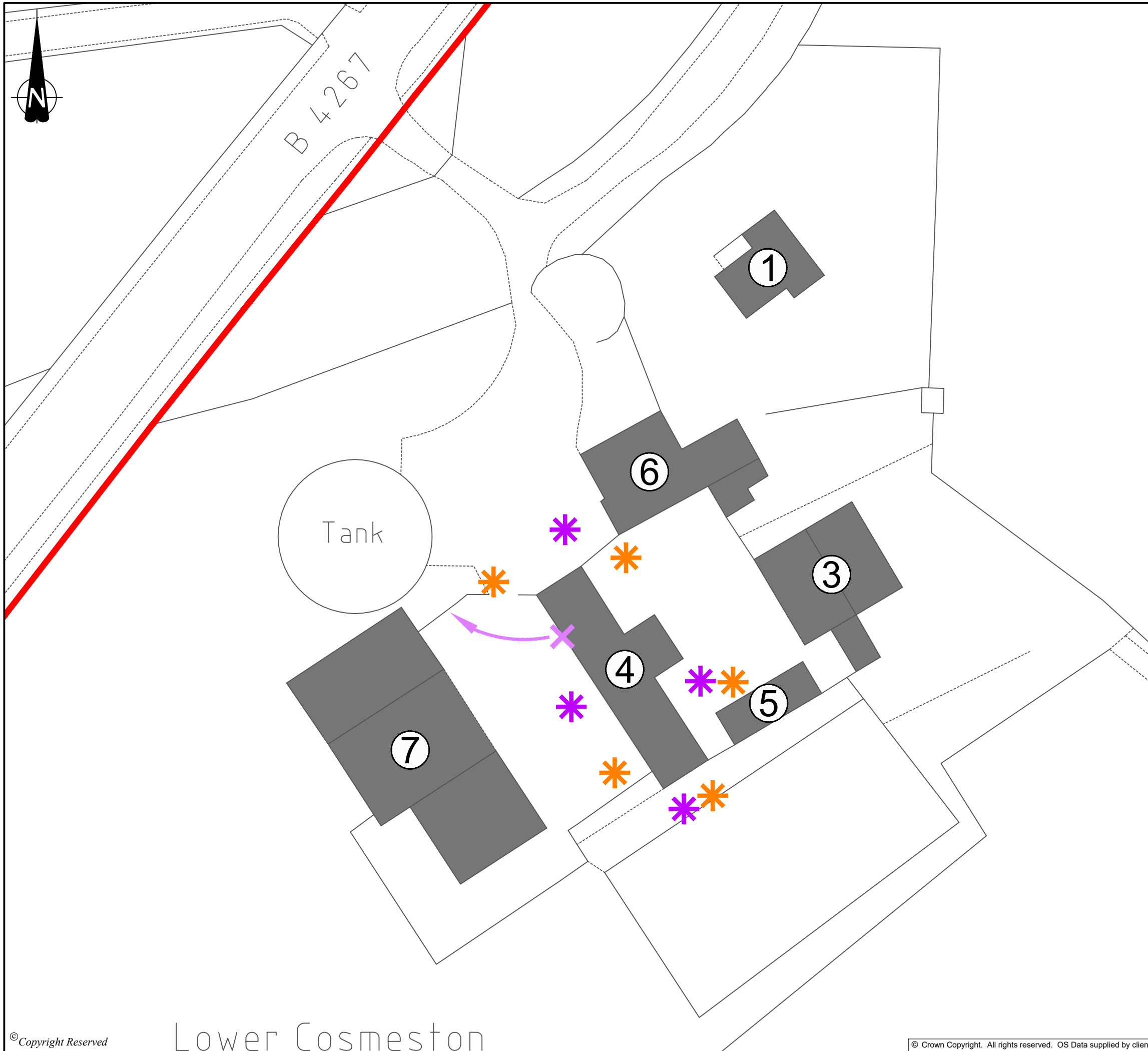
DRAWING TITLE

**BUILDING 3 EMERGENCE &
RE-ENTRY SURVEY 2017**

DRG No.	CA11040-019	REV	
DRG SIZE	A3	SCALE	1:500
		DATE	12/03/18
DRAWN BY	RJH	CHECKED BY	KH
		APPROVED BY	AB

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DO NOT SCALE FROM THIS DRAWING

REFERENCE

- Survey area _____
- Building _____
- Building reference number _____ ①
- Surveyor location -
Emergency survey _____
- Surveyor location -
Re-entry survey _____
- Common Pipestrelle observed
during emergence survey on
B7 4/7/17 _____

REVISION	DETAILS	DATE	DR'N	CHK'D	APP'D

CLIENT
WELSH GOVERNMENT

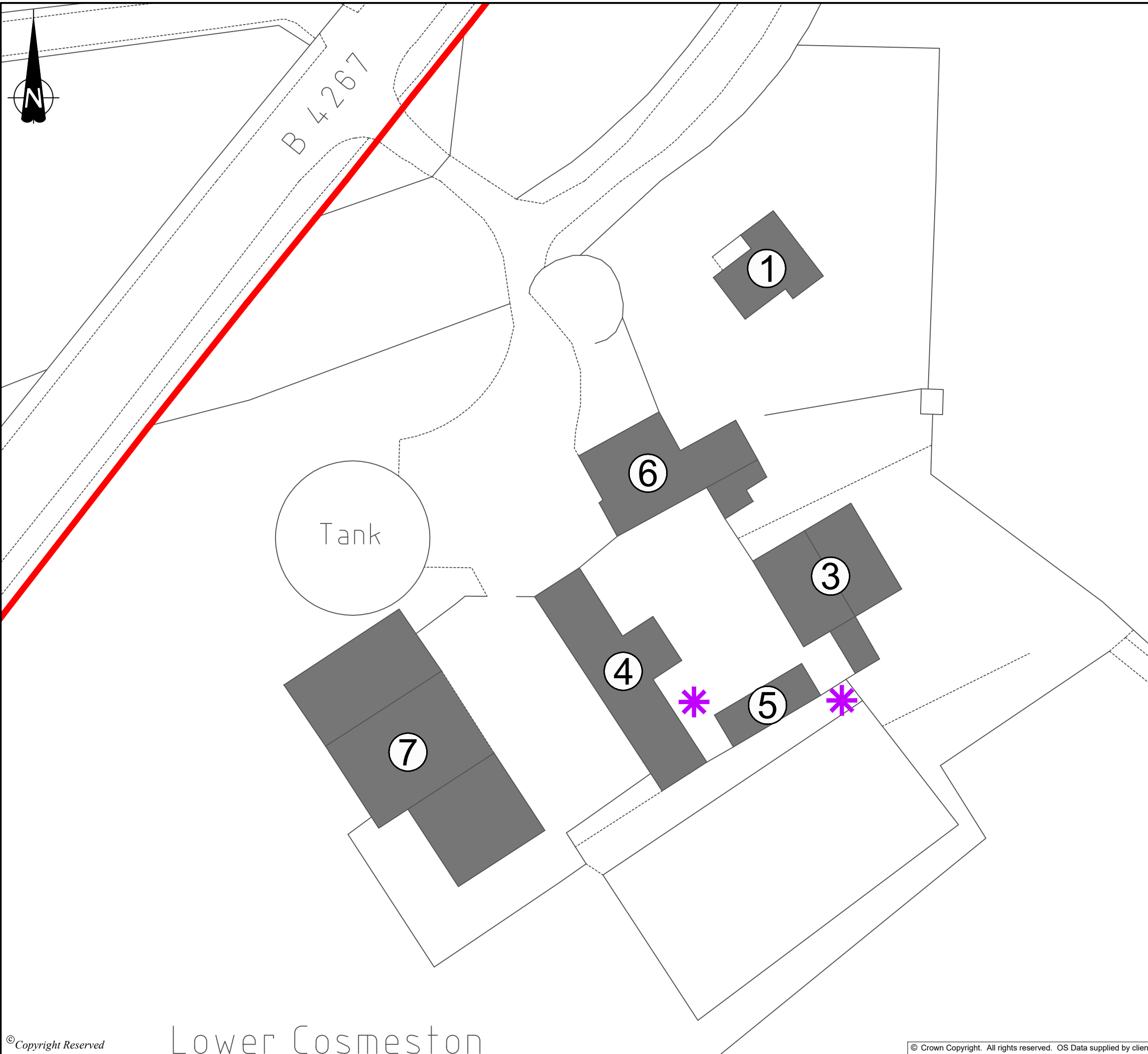
PROJECT
COSMESTON ECOLOGICAL SURVEY

DRAWING TITLE
BUILDING 4 EMERGENCE & RE-ENTRY SURVEY 2017

DRG No.	CA11040-020	REV
DRG SIZE	SCALE	DATE
A3	1:500	12/03/18
DRAWN BY	CHECKED BY	APPROVED BY
RJH	KH	AB

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DO NOT SCALE FROM THIS DRAWING

REFERENCE

- Survey area _____
- Building _____
- Building reference number _____
- Surveyor location - _____
- Emergency survey _____

REVISION	DETAILS	DATE	DR'N	CHK'D	APP'D

CLIENT
WELSH GOVERNMENT

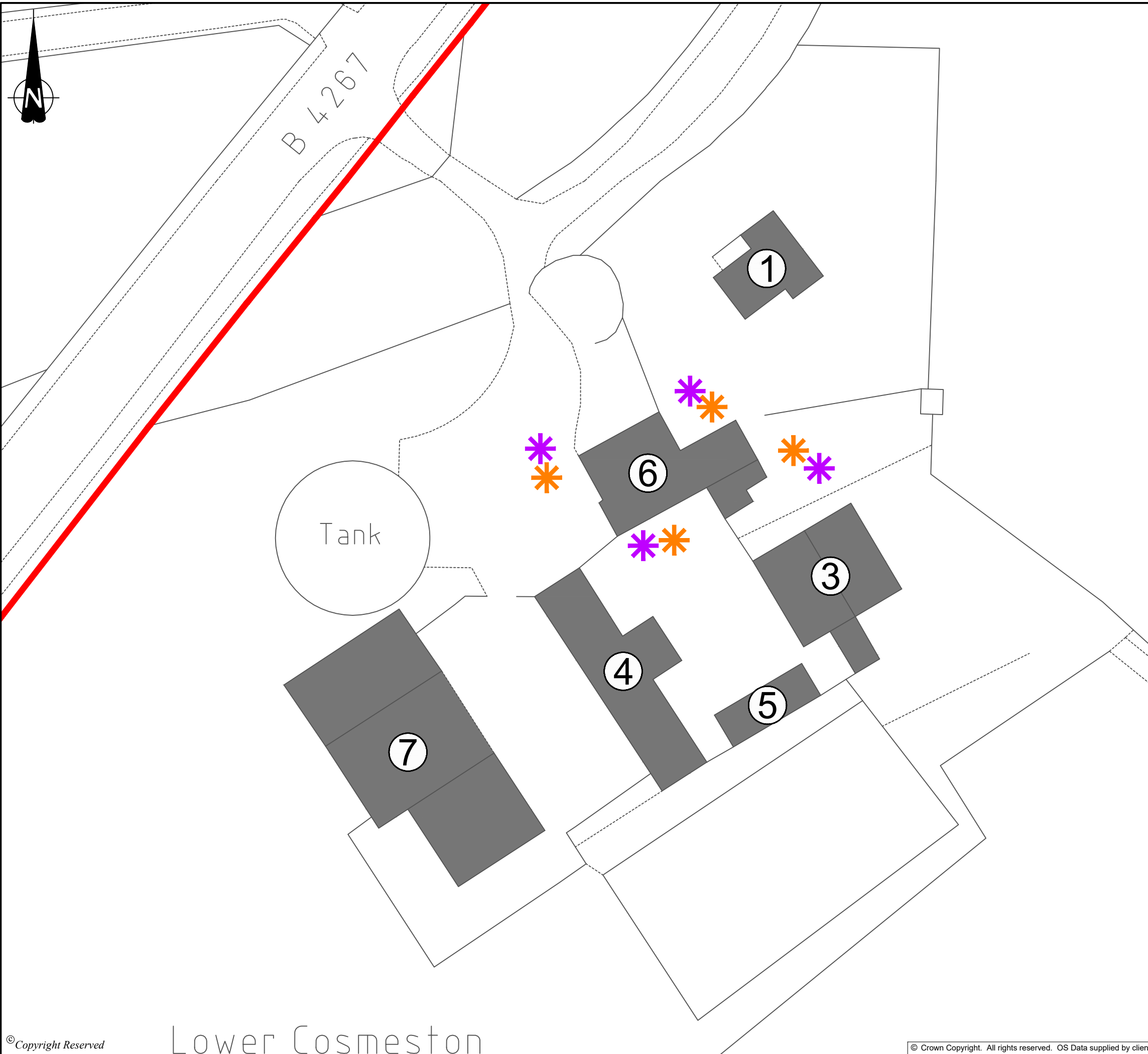
PROJECT
COSMESTON ECOLOGICAL SURVEY

DRAWING TITLE
BUILDING 5 EMERGENCE SURVEY 2017

DRG No.	CA11040-021	REV
DRG SIZE	SCALE	DATE
A3	1:500	22/03/18
DRAWN BY	CHECKED BY	APPROVED BY
RJH	KH	AB

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 GLASGOW LEIGH LONDON MANCHESTER
 NEWCASTLE UPON TYNE SHEFFIELD STOKE-ON-TRENT TAUNTON





DO NOT SCALE FROM THIS DRAWING

REFERENCE

- Survey area _____
- Building _____
- Building reference number _____
- Surveyor location -
Emergency survey _____
- Surveyor location -
Re-entry survey _____

REVISION	DETAILS	DATE	DR'N	CHK'D	APP'D

CLIENT
WELSH GOVERNMENT

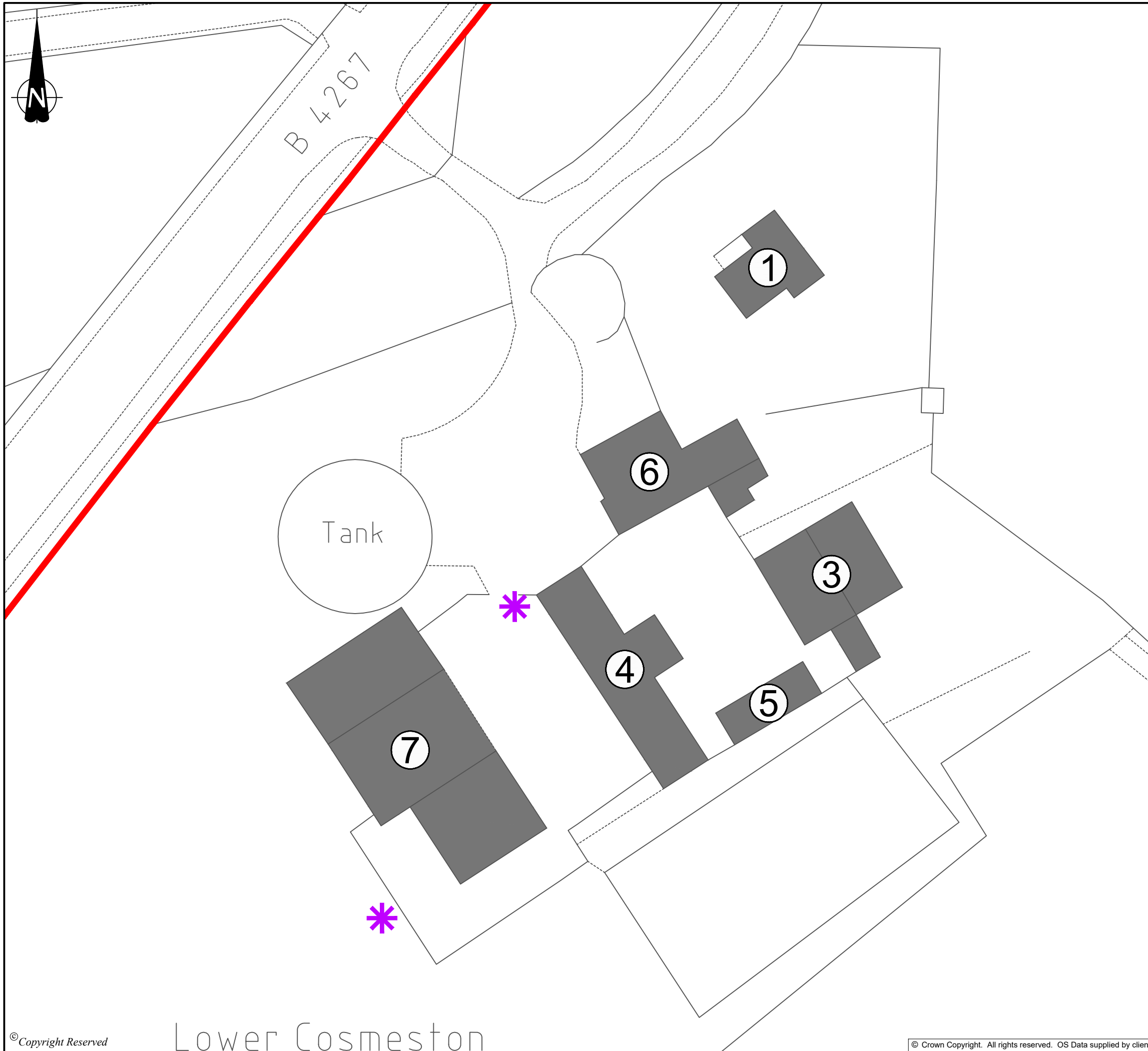
PROJECT
COSMESTON ECOLOGICAL SURVEY

DRAWING TITLE
BUILDING 6 EMERGENCE & RE-ENTRY SURVEY 2017

DRG No.	CA11040-022	REV	
DRG SIZE	A3	SCALE	1:500
		DATE	22/03/18
DRAWN BY	RJH	CHECKED BY	KH
		APPROVED BY	AB


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 BIRMINGHAM CARLISLE CROYDON EDINBURGH
 GLASGOW LEIGH LONDON MANCHESTER
 NEWCASTLE UPON TYNE SHEFFIELD STOKE-ON-TRENT TAUNTON







DO NOT SCALE FROM THIS DRAWING

REFERENCE

Survey area _____ 

Building _____ 

Building reference number _____ ①

Surveyor location -
Emergence survey _____ * 

REVISION	DETAILS	DATE	DR'N	CHK'D	APP'D

CLIENT

WELSH GOVERNMENT

PROJECT

COSMESTON ECOLOGICAL SURVEY

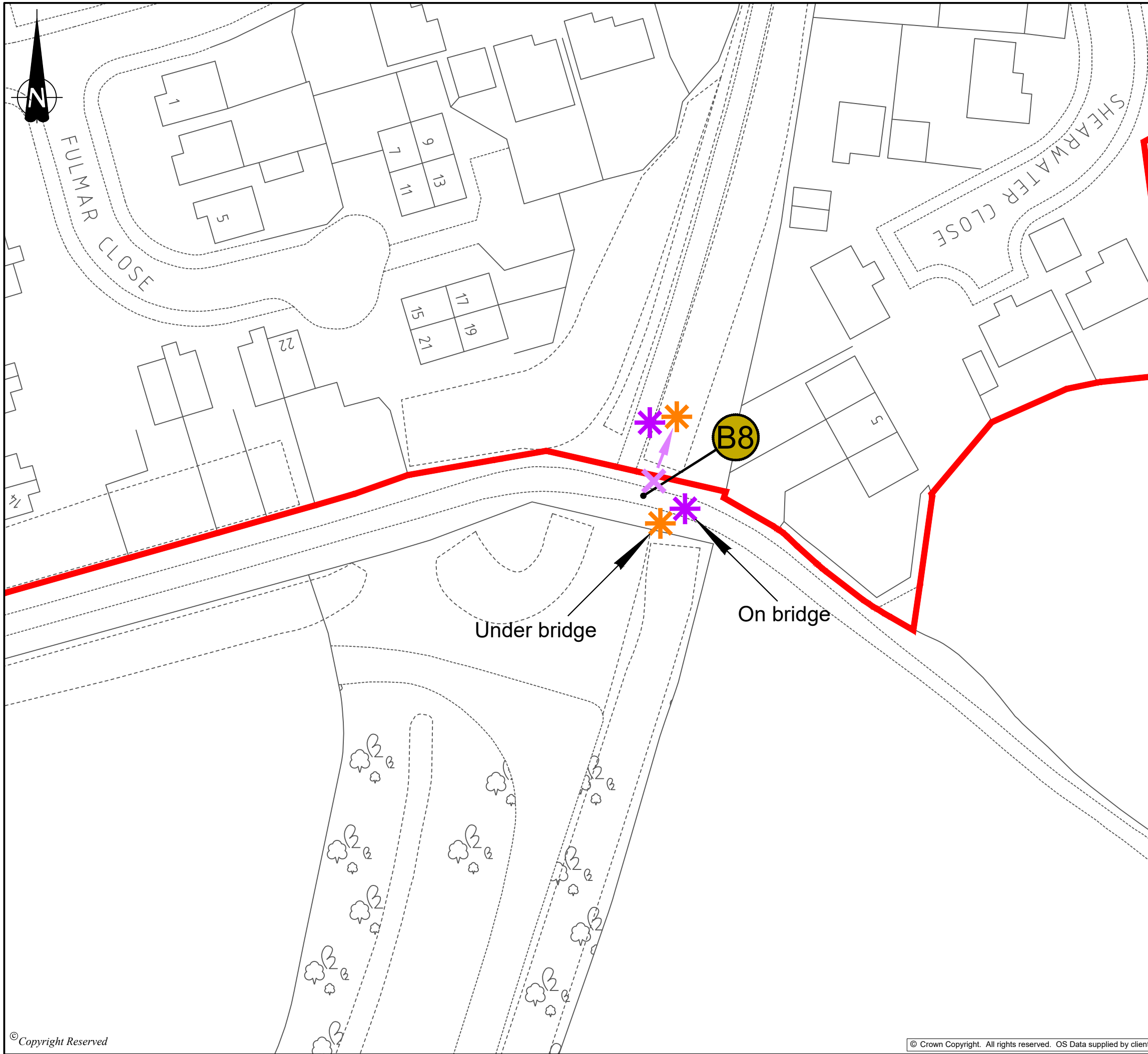
DRAWING TITLE

BUILDING 7 EMERGENCE SURVEY 2017

DRG No.	CA11040-023	REV	
DRG SIZE	A3	SCALE	1:500
		DATE	22/03/18
DRAWN BY	RJH	CHECKED BY	KH
		APPROVED BY	AB

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REFERENCE

- Survey area_ _ _ _ _
- Building reference number_ _ _
- Surveyor location -
Emergency survey_ _ _ _ _
- Surveyor location -
Re-entry survey_ _ _ _ _
- Common Pipistrelle_ _ _ _ _

REVISION	DETAILS	DATE	DR'N	CHK'D	APP'D

CLIENT
WELSH GOVERNMENT

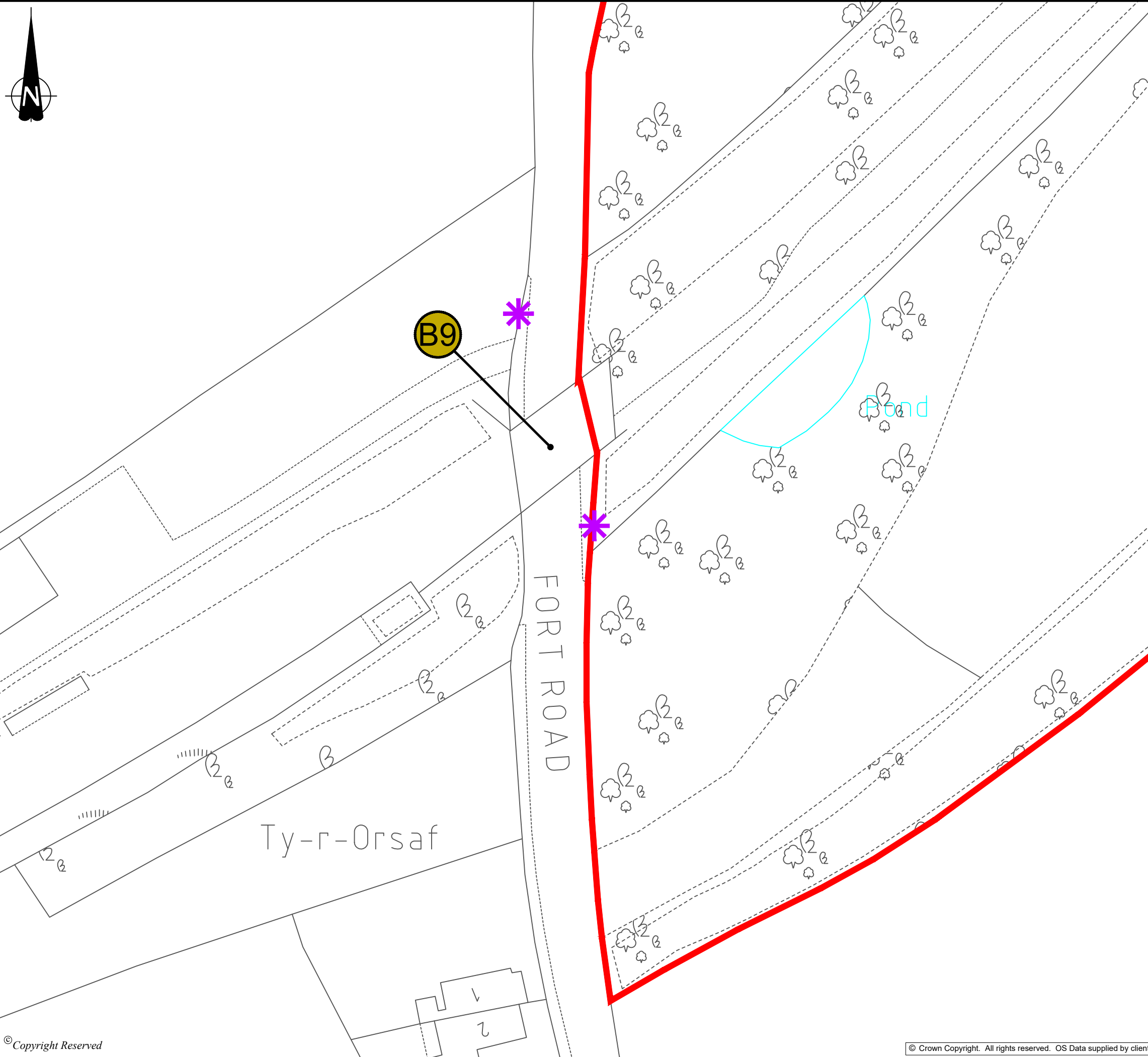
PROJECT
COSMESTON ECOLOGICAL SURVEY

DRAWING TITLE
**BUILDING 8 EMERGENCE &
RE-ENTRY SURVEY 2017**

DRG No.	CA11040-024	REV
DRG SIZE	SCALE	DATE
A3	1:500	26/03/18
DRAWN BY	CHECKED BY	APPROVED BY
RJH	KH	AB




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REFERENCE

Survey area_ _ _ _ _ 
 Building reference number_ _ _ 
 Surveyor location -
 Emergence survey_ _ _ _ _ 

REVISION	DETAILS	DATE	DR'N	CHK'D	APP'D

CLIENT
WELSH GOVERNMENT

PROJECT
COSMESTON ECOLOGICAL SURVEY

DRAWING TITLE
BUILDING 9 EMERGENCE SURVEY 2017

DRG No.	CA11040-025	REV	
DRG SIZE	A3	SCALE	1:500
		DATE	26/03/18
DRAWN BY	RJH	CHECKED BY	KH
		APPROVED BY	AB

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