



Technical Appendix

Drummarnock Wind Farm

Technical Appendix 6-3: Bats

Drummarnock Wind Farm Limited

July 2024



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Glossary of Terms

| Term | Definition |
|--------------------|---|
| Designated Site | Nature sites and areas of countryside can be 'designated', which means they have special status as protected areas because of their natural and cultural importance |
| Habitats Directive | Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (as amended) |

List of Abbreviations

| Acronym | Full Term |
|---------|---|
| AOD | Above Ordnance Datum |
| CIEEM | Chartered Institute of Ecology and Environmental Management |
| EclA | Ecological Impact Assessment |
| EIA | Environmental Impact Assessment |
| NS | NatureScot (formerly known as Scottish Natural Heritage, SNH) |
| NBN | National Biodiversity Network |



1 Introduction

1.1 Terms of Reference

This report presents the findings of Bat surveys at a Site located at Drummarnock, Stirlingshire. Located at National Grid Reference (NGR) NS 75471 87114, circa 10km southwest of Stirling, in the Fintry, Gargunnock and Touch Hills (as shown in Figure 1-1).

The site is associated with a proposed windfarm consisting of four turbines at up to 180m to tip height along with associated infrastructure and access tracks (the Proposed Development).

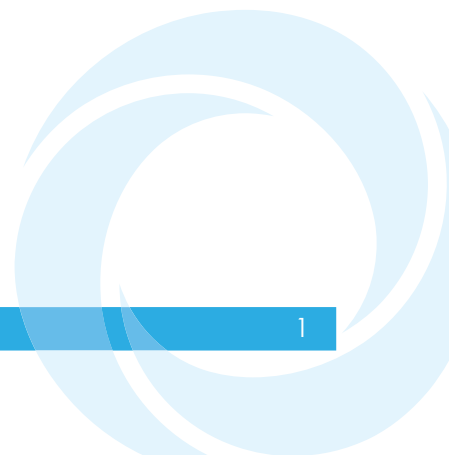
This report is presented as a Technical Appendix to Chapter 6: Ecology of the Environmental Impact Assessment (EIA) Report. It should be read in conjunction with that Chapter and the following technical appendices:

- Appendix 6-1: Extended Phase one Survey;
- Appendix 6-2: National Vegetation Classification Survey; and
- Appendix 6-4: Protected Species Survey.

1.2 Objectives

The principal objectives of this report are to provide details of:

- A desk study to establish whether the proposal could affect protected areas with bats as qualifying species and to assess bat data for the given study area.
- Bat surveys to confirm presence within the Proposed Development Site and to determine the potential of these areas to support bat roosts.



2 Methodology

2.1 Legislation

Bat species in Scotland are protected by the Conservation (Natural Habitats, &c.) Regulations 1994 as amended in Scotland and are commonly referred to as European Protected Species (EPS).

The Regulations transpose into Scottish law the European Community's Habitats Directive (92/43/EEC).

It is an offence to deliberately or recklessly:

- Capture, injure or kill a bat;
- Harass an individual or group of bats;
- Disturb a bat while it is occupying a structure or place used for shelter or protection;
- Disturb a bat while it is rearing or otherwise caring for its young;
- Obstruct access to a breeding site or resting place, or otherwise deny the animal use of the breeding site or resting place;
- Disturb a bat in a manner that is, or in circumstances which are, likely to significantly affect the local distribution or abundance of the species to which it belongs;
- Disturb a bat in a manner that is, or in circumstances which are, likely to impair its ability to survive, breed or reproduce, or rear or otherwise care for its young;
- Disturb a bat while it is migrating or hibernating; It is also an offence of strict liability to:
 - Damage or destroy a breeding site or resting place of a bat even if they are not in use at the time (i.e., a summer roost during the winter period).

2.2 Impacts of Wind Farms

Of the 18 UK bat species, ten occur in Scotland: common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *P. pygmaeus*, Nathusius' pipistrelle *P. nathusii*, Natterer's *Myotis nattereri*, Daubenton's *M. daubentonii*, noctule *Nyctalus noctula*, brown long-eared bats *Plecotus auritus*, Leisler's *N. leisleri* and whiskered/Brandt's *M. mystacinus/M. brandtii* bats. However, the occurrence of these species is variable throughout Scotland.

In addition to the above, several bat species are included within the Scottish Biodiversity List, including Brandt's, Daubenton's, whiskered, Natterer's, noctule, Nathusius's, common pipistrelle, soprano pipistrelle, and brown long-eared bat.

Natural England Technical Information Note TIN051 (Natural England, 2014) provides some guidance on the risk levels associated with UK bat species and wind turbines, based on analysis of flight patterns, foraging strategies and echolocation calls.

Table A6- 3-1, reproduced from TIN051, shows the levels of risk derived for key species. Table A6-3- 2, also reproduced from TIN051, takes relative population sizes into account, and presents the levels of risk at population level.

Table A6-3- 1: Bat Species Likely to be at Risk from Wind Turbines

| Low Risk | Medium Risk | High Risk |
|-----------------------|---------------------|------------------------|
| Long-eared bats | Common pipistrelle | Noctule |
| <i>Myotis</i> species | Soprano pipistrelle | Leiser's |
| Lesser horseshoe | Serotine | Nathusius' pipistrelle |
| Greater horseshoe | Barbastelle | |

Table A6-3- 2: Bat Populations Likely to be Threatened Due to Impacts from Wind Turbines

| Low Risk | Medium Risk | High Risk |
|-----------------------|-------------|------------------------|
| Long-eared bats | Serotine | Noctule |
| <i>Myotis</i> species | Barbastelle | Leiser's |
| Lesser horseshoe | | Nathusius' pipistrelle |
| Greater horseshoe | | |
| Common pipistrelle | | |
| Soprano pipistrelle | | |

Three species are identified to be of high risk from wind turbine mortality: Nathusius' pipistrelle, Leisler's bat and Noctule. This is due to the type of flight each species exhibits, the height at which each species flies at, and the type of habitat preferred.

Common and soprano pipistrelle bats and *Myotis* species do cross open spaces, however, they are relatively less likely to fly at a height that will bring them into contact with a turbine blade. Noctule and Leisler's bats however, and Nathusius' pipistrelle to a lesser extent, do fly at height and often cross open spaces, making them "high risk" species.

Noctule, Leisler's bats and Nathusius' pipistrelle remain in the "high risk" category at population level as they have smaller populations than other more common species and therefore their populations are considered to be at greater risk from wind farm developments.

Common and soprano pipistrelle bats, and *Myotis* species are more common, and therefore their populations as a whole are less threatened by impacts from wind turbines than other scarcer species. This has resulted in a "low risk" classification at the population level.

2.3 Desktop Study

A desk study was undertaken to gain further understanding of the Proposed Development Site, to gather information on the presence of statutory nature conservation sites and existing bat records within 10km of the Proposed Development Site.

Various data sources were utilised including the website of the statutory agency, NatureScot via the 'SiteLink Portal', publicly available datasets available for commercial use held on the National Biodiversity Network (NBN) Atlas website, and aerial photography used to aid the assessment of habitat features.

A review of existing bat survey data from wind energy projects (operational, under construction, and those at various stages in the planning system) within 10km of the Proposed Development Site was also undertaken.

2.4 Emergence Surveys

Based on the presence of moderate value potential roost features (PRFs) identified during the Extended Phase 1 survey (TA 6-1), two emergence activity surveys were undertaken in 2020 to provide robust data on whether or not bats use the structures for roosting in accordance with guidance extant at the time (Collins, 2016).

Roost surveys relate to Target Notes in TA 6-1: Extended Phase 1. The structures requiring survey are shown in Figure 6-3-1, as follows.

- Two small groups of ash *Fraxinus excelsior* trees (TNs, 3, 4 and 6)
- A bridge built on gabion block supports (TN 5)

A dusk survey was undertaken on 17th of August 2020 and a dawn survey on 30th of September 2020. Two surveyors undertook each survey with one surveyor positioned at the bridge and a group of ash trees (TNs 3-5) and the second surveyor at TN 6. Passing bats were noted in 2020 despite sub-optimal conditions. The two surveyors inspected a broken tree categorised as a high value PRF during the Extended Phase 1 survey (Figure 6-3, TN 7). This inspection revealed that the cavity did not lead to an area which was not fully visible and as a result, this feature was determined not to be a bat PRF.

The siting of infrastructure in the vicinity of trees subject to the 2020 emergence/re-entry surveys was altered in 2021 resulting in only one tree with PRFs requiring further survey (TN6). Surveys were undertaken on the 15th of July 2021 and 1st of September 2021 by two surveyors using a hand-held Anabat SD2 detectors in suitable weather conditions.

Further design reiterations in 2023 did not result the siting of infrastructure within the zone of influence of an unchecked potential roost feature (i.e. within 200m plus rotor radius of the boundary of the Proposed Development Site as per NatureScot, 2021).

2.5 Automatic Detector Survey

Two deployments of static bat detectors have been conducted in the Proposed Development Site during the pre-construction phase of the project, the first in 2020 and the second in 2023. The detectors were set up to record activity from 30 minutes before sunset to 30 minutes after sunrise for a period of at least 10 nights (BCT, 2016).

The first deployment was undertaken in June, August and September 2020, the details of which are described in Table A6-3-3, below. The original layout included six turbines in the Proposed Development Site, shown below in Table A6-3-4 and shown on Figure 6-3-2.

Table A6-3- 3: Bat Static Deployment Details 2020

| Visit Number | Date of Deployment and Retrieval | Number of Nights Deployed | Automatic Recording Start and End Time | Detection time per night (hours) |
|--------------|----------------------------------|---------------------------|--|----------------------------------|
| 1 | 23/06/2020 – 07/07/2020 | 14 | 21:35 – 05:05 | 07:30 |
| 2 | 27/07/2020 – 07/08/2020 | 11 | 20:45 – 06:00 | 09:15 |
| 3 | 09/09/2020 – 01/10/2020 | 22 | 18:55 – 07:26 | 12:31 |

Table A6-3- 4: Static Detector Locations 2020

| Turbine | Approximate Grid Reference |
|---------|----------------------------|
| T1 | 272469 687075 |
| T2 | 273110 687306 |
| T3 | 273660 687508 |
| T4 | 273291 686994 |
| T5 | 273821 687177 |
| T6 | 273721 686790 |

During the 2023 surveys, detectors were deployed at four locations over two visits in May and July, and at five locations for the third survey period in August 2023, as shown in Table A6-3-5. Full spectrum bat detectors (Wildlife Acoustics Song Meter Mini Bats) were used.

The four locations correspond to the Proposed Development Site design layout that was in place during the start of the survey period. The layout of the Proposed Development Site has evolved through the design process; therefore, the third survey period involved the deployment of five detectors to accommodate the change of location for T2, see Figure 6-3-3.

However, the five detector locations used in 2023, combined with the data gathered in 2020 are considered appropriate coverage across the entire Proposed Development Site to represent the final proposed turbine locations as set out in the EIAR as shown in Table A6-3-6.

Table A6-3- 5: Bat Static Deployment Details 2023

| Visit Number | Date of Deployment and Retrieval | Number of Nights Deployed | Automatic Recording Start and End Time | Detection time per night (hours) |
|--------------|----------------------------------|---------------------------|--|----------------------------------|
| 1 | 19/04/2023 – 29/04/2023 | 10 | 20:00 – 06:28 | 10:28 |
| 2 | 05/06/2023 – 20/06/2023 | 21 | 21:25 – 05:02 | 07:37 |
| 3 | 17/08/2023 – 28/08/2023 | 12 | 19:56 – 06:39 | 10:43 |

Table A6-3- 6: Static Detector Locations 2023

| Turbine | Approximate Grid Reference |
|----------|----------------------------|
| T1 | 272767 687404 |
| T2 (Old) | 273417 687885 |
| T2 (New) | 273763 686961 |
| T3 | 272913 687021 |
| T4 | 273610 687517 |

2.6 Sonogram Analysis

Analysis of full spectrum WAV files was undertaken firstly by Kaleidoscope (to convert the raw data into ZCA files) and then Analook W software to enable identification of species. Files were manually analysed to identify bat species and to separate common and soprano pipistrelle.

Sonogram files classified as “noise” by Kaleidoscope during the conversion process were then subject to manual checking of sonograms, and where bat calls were present, manual identification was undertaken. Species identification broadly followed that presented in (Russ, 2012), considering the geographical location of the Proposed Development Site, habitats present and ecologists' own expertise and knowledge.

Sonogram data for each detector location during each of the survey sessions was organised and used for analysis of activity levels across static detector locations and across survey periods. This process was repeated in both 2020 and 2023.

Absolute measures of bat activity are not possible to reliably calculate for automated field studies as during an individual recording session, it is not possible to differentiate between one individual bat passing the detector ten times or ten different bats passing the detector on a single occasion. As a result, relative measures are used and must be taken into consideration when interpreting results.

2.6.1 2020

In addition to the above, the data was also organised into the required format to upload for additional analysis within the secure online tool Ecobat (<http://www.ecobat.org.uk/>).

This analysis tool enables comparisons to be made in a spatial context allowing a geographically relevant assessment of activity levels. It should be noted that there is no function within Ecobat to know what volume of data is being used for geographic comparisons and as the system is in its infancy, interpreting comparative measures, especially within the remote Scottish uplands will require caution.

The Ecobat analysis approach includes a variety of outputs useful for ascertaining the importance of a site with respect to bat distribution and activity levels. In upland habitats, the issue of spatial and temporal variation is very pronounced with the potential for bat detectors to record no activity at locations generally unsuitable for bats, for example some wind farm sites.

Ecobat can analyse rates of activity including or excluding ‘zero activity’ nights. Analysis provided by Ecobat with respect to the geographical context provides a comparative measure of high, moderate, or low activity, however, and is based on the exclusion of ‘zero activity’ nights and although presented here, is likely to be an over-estimation of true activity levels.

2.6.2 2023

As the Ecobat bat activity level assessment tool is off-line, and has been for some time, a bespoke assessment methodology was employed. For ease of examination, three arbitrary levels have been created to provide a context in which to discuss the results. Table A6-3-7 indicates the levels of activity required to be considered to be “low”, “medium” or “high” activity.

These criteria have been developed by Atmos Consulting based on over 6 years working on multiple upland windfarm projects. It should be recognised that in the context of bat activity across wider landscapes these activity brackets are all relatively low as would be expected for a site at this altitude supporting upland habitats.

Bat pass rates are often highly variable between nights, with some nights having few or no passes and other nights having high activity. This is particularly pronounced on sites

within the Scottish Highlands. In these circumstances, the median is likely to be a more useful summary of the typical activity than the mean (Lintott & Matthews, 2018).

The Proposed Development Site is geographically located on the southern boundary of the Scottish Highlands and is therefore considered analogous. The median number of passes per hour is calculated per species per turbine which only considers hours which recorded at least one bat pass, discounting the hours with no passes.

Table A6-3- 7: Criteria for Determining Bat Activity Levels

| Activity Level | Median Number of Bat Passes per hour ¹ |
|----------------|---|
| Low | < 2 |
| Medium | 2 – 5 |
| High | > 5 |

¹ A bat pass is classified as the presence of a species within a single Anolook file.

The index of bat activity was taken to be a sonogram file (maximum length of 15 seconds) recorded from the static detectors. Although this is to some degree an arbitrary measure, the activity levels are comparable across detectors and is a frequently used index.

For the purpose of this report, each file containing a call from a species is termed a “pass.” The data is converted to passes per hour adjusting for location specific night-time duration (sunset to sunrise) and days of deployment (adjusted to each detectors period of functioning).

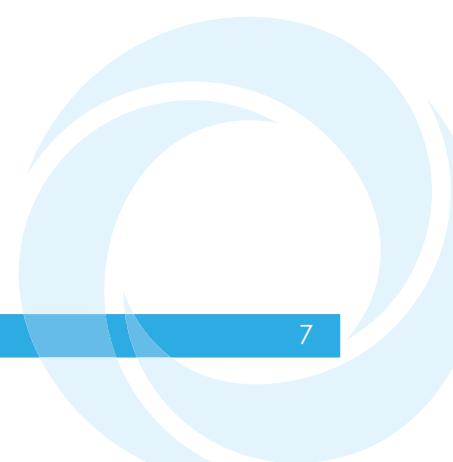
2.7 Limitations

No issues were noted with data collection during surveys, so no limitations were identified. The change of location of T2 during a design iteration between the second and third survey periods resulted in three sets of data that relate to the old location and only one set of data that relates to the new location.

The gathering of two datasets is considered sufficient coverage of the Proposed Development Site however as the data collected from T6 in 2020 is 200m from the T2 new location. Using the two datasets in conjunction with each other means that the lack of data from the new T2 is not to be considered a limiting factor.

The 2020 emergence/re-emergence surveys were carried in sub-optimal weather conditions, despite forecasts predicating the possibility of suitable conditions. The emergence survey undertaken on 17th August took place in fog and the re-entry on the 29th September in drizzly conditions with occasional rain.

Although these surveys yielded some information it was considered further data was required to provide an unambiguous result. Further surveys were therefore carried out during optimal conditions in 2021. Given the PRFs are not within the zone of influence of the 2023 design, plus the optimal data from 2021, there is no limitation in respect of PRFs.



3 Results

3.1 Desk Study

3.1.1 Designated Sites

A search of the SiteLink website yielded no results of designated sites within 10km of the Proposed Development Site for which bat species are of qualifying interest (NatureScot, 2023).

3.1.2 Species Records

The results of the search for bat species records within 10km of the Proposed Development Site within the last 10 years on the NBN Atlas website are shown below in Table A6-3-8. Distances are approximate, and each species may be associated with multiple records within the data as provided by the local record centre.

Table A6-3- 8: The Wildlife Information Centre Records of Bats from the Last 10 Years within 10km of the Proposed Development Site (NatureScot, 2023)

| Species | Summary of Records |
|--|---|
| Daubenton's bat <i>Myotis daubentonii</i> | 22 records within the last 10 years, closest record |
| Natterer's bat <i>Myotis nattereri</i> | 14 records within last 10 years, closest record 3.1km north |
| Nathusius's pipistrelle <i>Pipistrellus nathusii</i> | 1 record within the last 10 years, closest record 9.2km southeast |
| Common pipistrelle <i>Pipistrellus pipistrelle</i> | 803 records within the last 10 years, closest record on the Proposed Development Site |
| Soprano pipistrelle <i>Pipistrellus pygmaeu</i> | 520 records within the last 10 years, closest record on the Proposed Development Site |
| Brown long-eared bat <i>Plecotus auritus</i> | 1 record within last 10 years, closest record 2.4km northeast |

3.2 Bat Activity Surveys

3.2.1 Emergence Surveys

The first emergence survey, conducted at dusk on the 17th August 2020, recorded 42 passes and the second, conducted at dawn on the 30th September, recorded 10 passes. The PRFs were deemed not to host a bat roost.

The turbine layout change required further emergence surveys to be conducted, the first of which, on 15th of July 2021, recorded low bat activity with a total of 5 passes comprised of both common and soprano pipistrelle. The second survey, conducted on 1st of September 2021, was busier than the first as an individual pipistrelle was foraging around the tree throughout the entire survey, as the sun rose the individual flew eastward. The PRFs were deemed not to host to bat roost.

3.2.2 Survey Summary – 2020

In summary, the results of the static bat detector deployment periods in 2020 identified the presence of at least three species; common pipistrelle, soprano pipistrelle and *Myotis* spp., shown in Table A6-3-9. In total, 2,598 passes were identified across the three survey periods and most of the activity was low, a median hourly pass rate of 1 was calculated at each of the six turbines for common pipistrelle and soprano pipistrelle. *Myotis* spp. were only recorded at T1 and T3, both recorded a low level of activity. The unidentified pipistrelle was recorded at low activity around four of the turbines and medium at two, T4 and T5.

Table A6-3- 9: Summary of Static Detector Deployment 2020

| | <i>Myotis</i> spp. | <i>Nyctalus</i> spp. | <i>Pipistrellus</i> spp. | <i>Pipistrellus pipistrellus</i> | <i>Pipistrellus pygmaeus</i> | <i>Plecotus auritus</i> |
|-------------|------------------------|------------------------|--------------------------|----------------------------------|------------------------------|-------------------------|
| Detector ID | Median Passes per Hour | Median Passes per Hour | Median Passes per Hour | Median Passes per Hour | Median Passes per Hour | Median Passes per Hour |
| T1 | 1 | 0 | 1 | 1 | 1 | 0 |
| T2 | 0 | 0 | 1 | 1 | 1 | 0 |
| T3 | 1 | 0 | 1 | 1 | 1 | 0 |
| T4 | 0 | 0 | 2 | 1 | 1 | 0 |
| T5 | 0 | 0 | 3 | 1 | 1 | 0 |
| T6 | 0 | 0 | 1 | 1 | 1 | 0 |

3.2.3 Visit 1: 19/04/2023 – 28/04/2023.

The first survey period of static bat detector deployment recorded passes from unidentified pipistrelle, and common pipistrelle, shown below in Table A6-3-10. A total of 2 passes were recorded during the survey period, 1 unidentified pipistrelle at T2 and 1 common pipistrelle at T3. The two other detectors recorded no bat passes.

The bat activity level on the Proposed Development Site during visit one is regarded as low for unidentified and common pipistrelle, based upon the median pass per hour value.

Table A6-3- 10: Visit 1- Total Passes per Species and Activity Levels at Each Detector

| Visit No. | Detector ID | Myotis spp. | | | Nyctalus spp. | | | Pipistrellus spp. | | | Pipistrellus pipistrellus | | | Pipistrellus pygmaeus | | | Plecotus auritus | | |
|-----------|-------------|--------------|-----------------|------------------------|---------------|-----------------|------------------------|-------------------|-----------------|------------------------|---------------------------|-----------------|------------------------|-----------------------|-----------------|------------------------|------------------|-----------------|------------------------|
| | | Total Passes | Passes per Hour | Median Passes per Hour | Total Passes | Passes per Hour | Median Passes per Hour | Total Passes | Passes per Hour | Median Passes per Hour | Total Passes | Passes per Hour | Median Passes per Hour | Total Passes | Passes per Hour | Median Passes per Hour | Total Passes | Passes per Hour | Median Passes per Hour |
| 1 | T1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | T2 (Old) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | T3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | T4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Colour scheme: green = low activity, amber = medium activity, red = high activity.

3.2.4 Visit 2: 05/06/2023 – 14/06/2023.

The second deployment of static bat detectors on the Proposed Development Site yielded a total of 449 passes during the survey period, shown in Table A6-3-11. The species recorded include *Myotis* spp., *Nyctalus* spp., unidentified pipistrelle, common pipistrelle, soprano pipistrelle, and brown long-eared bat. The most prominent species was common pipistrelle; 299 passes spread across the four turbines, 77 at T1, 38 at T2, 94 at T3 and 90 at T4. Soprano pipistrelle was the second most common species recorded, 92 passes, followed by the unidentified pipistrelle, 52 passes, the *Myotis* spp. recorded 2 passes, and the *Nyctalus* spp. and brown long-eared bats recorded 1 pass each.

Most of the activity recorded during the visit was of medium level, using the median number of passes per hour. In particular, common pipistrelle activity was medium at four turbines, and the unidentified pipistrelle activity was medium at three of the turbines, and low at one. Soprano pipistrelle activity was medium at two of the turbines and low at two. *Myotis* spp. activity was recorded at three of the turbines, one of which was medium and two were low. *Nyctalus* spp. were only recorded at one turbine at low activity, and brown long-eared bat was also only recorded at one turbine at low activity.

Table A6-3- 11: Visit 2 - Total Passes per Species and Activity Levels at Each Detector

| Visit No. | Turbine No. | <i>Myotis</i> spp. | | | <i>Nyctalus</i> spp. | | | <i>Pipistrellus</i> spp. | | | <i>Pipistrellus pipistrellus</i> | | | <i>Pipistrellus pygmaeus</i> | | | <i>Plecotus auritus</i> | | |
|-----------|-------------|--------------------|-----------------|------------------------|----------------------|-----------------|------------------------|--------------------------|-----------------|------------------------|----------------------------------|-----------------|------------------------|------------------------------|-----------------|------------------------|-------------------------|-----------------|------------------------|
| | | Total Passes | Passes per Hour | Median Passes per Hour | Total Passes | Passes per Hour | Median Passes per Hour | Total Passes | Passes per Hour | Median Passes per Hour | Total Passes | Passes per Hour | Median Passes per Hour | Total Passes | Passes per Hour | Median Passes per Hour | Total Passes | Passes per Hour | Median Passes per Hour |
| 2 | T1 | 1 | 0.01 | 1 | 0 | 0 | 0 | 14 | 0.2 | 2 | 77 | 1.1 | 4 | 22 | 0.31 | 2 | 0 | 0 | 0 |
| | T2 (Old) | 0 | 0.00 | 0 | 0 | 0 | 0 | 9 | 0.21 | 1 | 38 | 0.52 | 4 | 15 | 0.21 | 1 | 0 | 0 | 0 |
| | T3 | 2 | 0.03 | 2 | 1 | 0.01 | 1 | 14 | 0.2 | 2 | 94 | 1.32 | 4 | 31 | 0.44 | 1 | 0 | 0 | 0 |
| | T4 | 1 | 0.01 | 1 | 0 | 0 | 0 | 15 | 0.21 | 2 | 90 | 1.29 | 3 | 24 | 0.34 | 2 | 1 | 0.01 | 1 |

Colour scheme: green = low activity, amber = medium activity, red = high activity.

3.2.5 Visit 3: 17/08/2023 – 27/08/2023.

The third survey period recorded 809 bat passes on the Proposed Development Site during static bat detector deployment, shown below in Table A6-3-12. Common pipistrelle was recorded the most often during the survey period, 451 passes across the five detector localities. Soprano pipistrelle recorded 205 passes, the unidentified pipistrelle recorded 138 passes, the *Nyctalus* spp. recorded 7 passes, the *Myotis* spp. recorded 6 passes, and the brown long-eared bat 2 passes.

Most of the activity recorded during the survey period was of medium level, using the median number of passes per hour. Common and soprano pipistrelle are deemed to be of medium activity level at five turbines, and unidentified pipistrelle was of medium activity at three of the turbines and low at two. The *Nyctalus* spp. was recorded at three of the turbines, one at medium activity and two at low activity. The *Myotis* spp. was recorded at four of the turbines, all of which were at low activity. The brown long-eared bat was recorded at two of the turbines, both at low activity.

Table A6-3- 12: Visit 3 - Total Passes per Species and Activity Levels at Each Detector

| Visit No. | Turbine No. | <i>Myotis</i> spp. | | | <i>Nyctalus</i> spp. | | | <i>Pipistrellus</i> spp. | | | <i>Pipistrellus pipistrellus</i> | | | <i>Pipistrellus pygmaeus</i> | | | <i>Plecotus auritus</i> | | |
|-----------|-------------|--------------------|-----------------|------------------------|----------------------|-----------------|------------------------|--------------------------|-----------------|------------------------|----------------------------------|-----------------|------------------------|------------------------------|-----------------|------------------------|-------------------------|-----------------|------------------------|
| | | Total Passes | Passes per Hour | Median Passes per Hour | Total Passes | Passes per Hour | Median Passes per Hour | Total Passes | Passes per Hour | Median Passes per Hour | Total Passes | Passes per Hour | Median Passes per Hour | Total Passes | Passes per Hour | Median Passes per Hour | Total Passes | Passes per Hour | Median Passes per Hour |
| 3 | T1 | 1 | 0.01 | 1 | 2 | 0.02 | 2 | 24 | 0.24 | 2 | 86 | 0.86 | 4 | 31 | 0.31 | 2 | 1 | 0.01 | 1 |
| | T2 (Old) | 1 | 0.01 | 1 | 3 | 0.03 | 1 | 15 | 0.15 | 1 | 62 | 0.62 | 3 | 41 | 0.41 | 2 | 1 | 0.01 | 1 |
| | T2 (New) | 0 | 0.00 | 0 | 0 | 0 | 0 | 23 | 0.23 | 1 | 88 | 0.88 | 3 | 40 | 0.4 | 3 | 0 | 0 | 0 |
| | T3 | 3 | 0.03 | 1 | 2 | 0.02 | 1 | 39 | 0.39 | 2 | 144 | 1.44 | 4 | 43 | 0.43 | 3 | 0 | 0 | 0 |
| | T4 | 1 | 0.01 | 1 | 0 | 0 | 0 | 37 | 0.37 | 2 | 71 | 0.71 | 4 | 50 | 0.5 | 2 | 0 | 0 | 0 |

Colour scheme: green = low activity, amber = medium activity, red = high activity.

3.2.6 Spatial Variation

Amalgamating the data from the three survey periods allows for comparison of the activity at each of the turbines throughout the season.

Activity levels at T1 varied throughout the season for bat species as no activity was recorded during the first visit. Common and soprano pipistrelle species recorded medium activity during the two later survey periods. *Nyctalus* spp. were recorded at low activity during the second visit and medium activity during the third.

Myotis spp. were recorded at low activity for the second and third survey periods. Brown long-eared bats were not recorded during the second survey period and recorded at low activity during the third.

Activity levels at T2 (old position) were low for common pipistrelle during the first visit and medium for the second and third. Soprano pipistrelle was not recorded during the first visit but was recorded at low activity in the second and medium in the third visit. Three bat species were not recorded during the first and second visits, *Myotis* spp., *Nyctalus* spp. and brown long-eared bats, and were recorded at low activity during the third visit.

Activity levels were only recorded at T2 (new position) during the third visit. The common and soprano pipistrelle were recorded at medium activity, and the *Myotis* spp., *Nyctalus* spp., and brown long-eared bats were not recorded.

Activity levels at T3 were low for common pipistrelle in the first visit, and medium during the second and third. Soprano pipistrelle was not recorded during the first visit but was recorded at low activity for the second survey and medium during the third. The *Nyctalus* spp. was not recorded during the first visit but was recorded at low activity during the second and third visits.

Myotis spp. was not recorded during the first survey period but was recorded at medium activity during the second and low during the third. The brown long-eared bat was not recorded at T3 during the surveys.

Activity levels at T4 were varied throughout the season as no bat species was recorded during the first survey period. The common and soprano pipistrelle were recorded at medium activity level during the second and third visits.

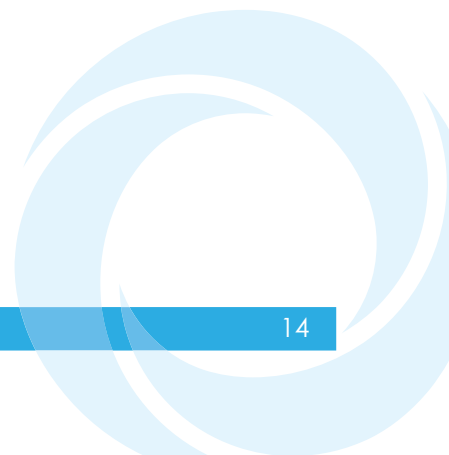
The *Myotis* spp. was recorded at low activity during the second and third survey period. The brown long-eared bat was recorded at low activity during the second visit and not during the third. The *Nyctalus* spp. was not recorded at T4 during the three visits.

3.2.7 Temporal variation

The increase in bat activity throughout the season, from visit one to three, corresponds with the life cycle for bat species in the UK. Bat species tend to remain in their maternity roosts until June which corresponds with the dataset; minimal activity in April (visit one) and an increase in June (visit two). Bats tend to leave their roosts in August which corresponds with the further increase in activity in visit three.

Whilst the data indicates that there may be roosts near to the Proposed Development Site for common and soprano pipistrelle, due to the level of activity recorded for these two species across the entire Proposed Development Site, based on survey data, no

confirmed roost features are considered within the Zone of Influence of the Proposed Development Site.



4 References

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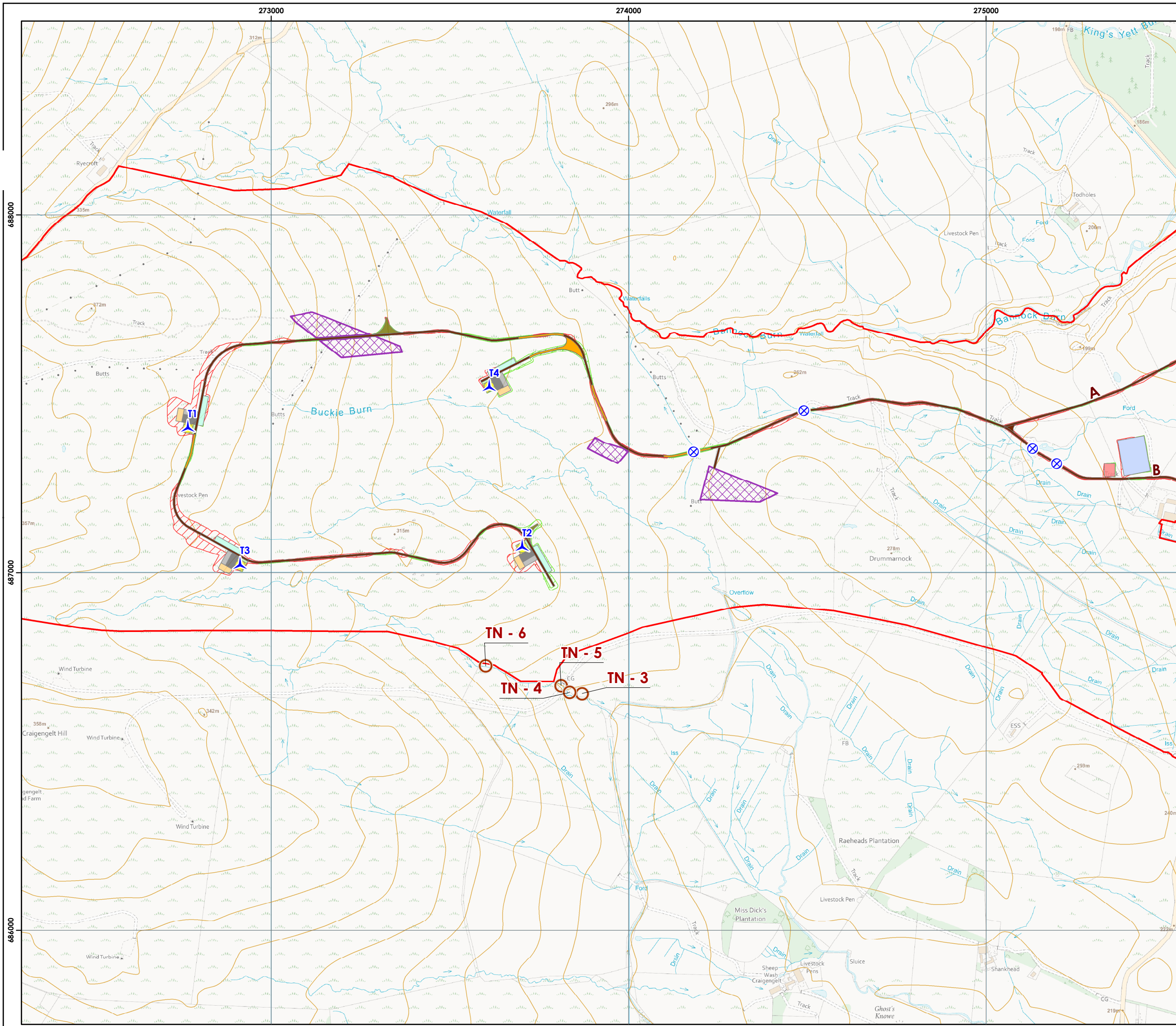
Drummarnock Wind Farm

wind2

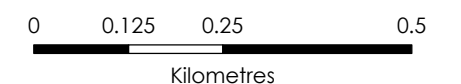
Figure 6-3-1
Bat Emergence Survey Results

Key

- Option area
- ▲ Proposed turbine
- Bat Static Locations
- Infrastructure Polygon**
- Turbine foundation
- Crane hardstanding
- Auxiliary crane hardstanding
- Blade storage area
- Nacelle storage area
- Tower storage area
- Working area
- Turning head
- Borrow pit
- Substation
- Construction compound
- Earthworks - cut
- Earthworks - fill
- Onsite access track - cut
- Onsite access track - floating
- ⊗ New watercourse crossing



atmos
CONSULTING



Scale @ A3:
1:10,000



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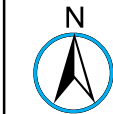
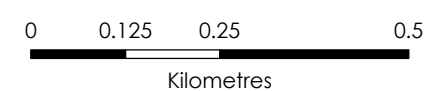
Drumarnock Wind Farm

wind2

Figure 6-3-2
Bat Static Locations
Site layout 2020

Key

- Option area
- ▲ Proposed turbine
- Bat Static Locations
- Infrastructure Polygon**
- Turbine foundation
- Crane hardstanding
- Auxiliary crane hardstanding
- Blade storage area
- Nacelle storage area
- Tower storage area
- Working area
- Turning head
- Borrow pit
- Substation
- Construction compound
- Earthworks - cut
- Earthworks - fill
- Onsite access track - cut
- Onsite access track - floating
- ⊗ New watercourse crossing

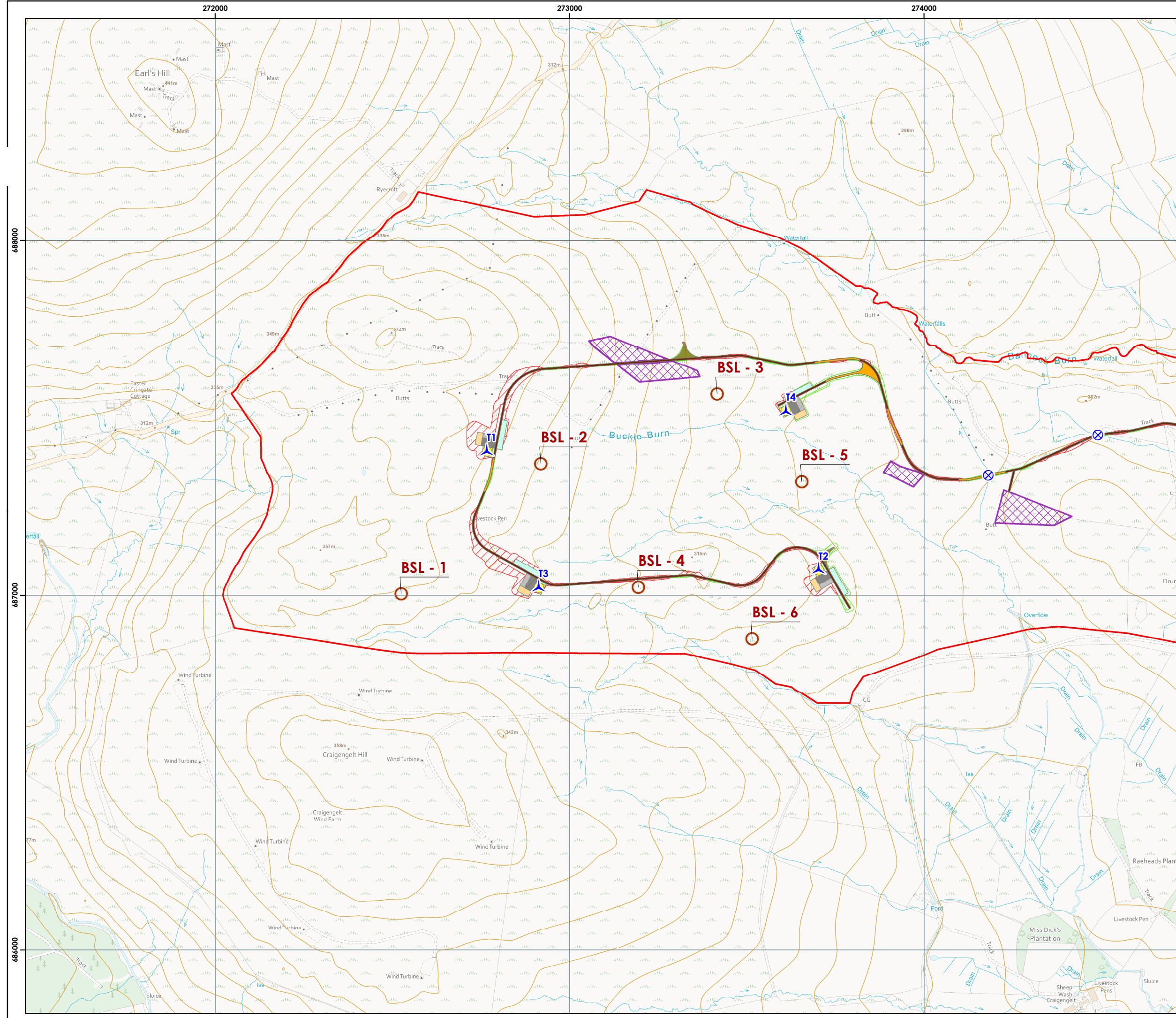


Scale @ A3:
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Drawn by: LB Checked by: TH Approved by: SM



Drummarnock Wind Farm

wind2

Figure 6-3-3
Bat Static Locations
Site layout 2023

Key

- Option area
- ▲ Proposed turbine
- Bat Static Locations
- Infrastructure Polygon**
- Turbine foundation
- Crane hardstanding
- Auxiliary crane hardstanding
- Blade storage area
- Nacelle storage area
- Tower storage area
- Working area
- Turning head
- Borrow pit
- Substation
- Construction compound
- Earthworks - cut
- Earthworks - fill
- Onsite access track - cut
- Onsite access track - floating
- ⊗ New watercourse crossing

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0 0.125 0.25 0.5
Kilometres



Scale @ A3:
1:10,000



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