Kintore Hydrogen Plant
Bat Transect and Automated Surveys Year 2

August 2024

CONTROL SHEET

Client: Kintore Hydrogen Limited
Project Title: Kintore Hydrogen Plant
Report Title: Bat Transect and Automated Surveys Year 2
Document number: 14334
Project number: 376782

Issue Record

Issue	Status	Author	Reviewer	Approver	Issue Date
1	Final	ACS	JEP	GN	30/08/2024
2					

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EXECUTIVE SUMMARY

EnviroCentre Limited were commissioned by Kintore Hydrogen Limited to undertake Year 2 bat transect and automated static detector surveys, following Year 1 surveys being undertaken in 2023 (July-September), within the site known as Kintore Hydrogen Plant, located south of Kintore. The surveys were required to inform the development of a hydrogen electrolysis plant.

The site is dominated by arable and pasture farmland, but also encompasses watercourses, woodland (including ancient Long – Established Woodland of Plantation Origin (LEPO) woodland, wetland, scrub, grassland and built-up habitats. Ecological connectivity is good throughout the site, providing commuting and foraging opportunities for local bat species. Overall, site habitats were assessed as offering high suitability for foraging and commuting bats.

Transect surveys covered the three main sections of the site, and automated static detectors were deployed at six locations within the main areas and the connecting routes between May – July 2024. Since the Year 1 surveys, the route in the east of the site had been partially altered (moving eastwards) and thus the transect route in that area was altered accordingly, however was considered to cover similar habitats and was not too distant for comparisons of data. The results are detailed in Section 3, with data suggestive of the following findings:

- The data suggests that a roost is present within the site associated with a mature tree in the north of the west transect.
- The wetland habitat in the north of the west transect was considered to be a core sustenance zone for bats, with high recorded activity of common pipistrelle, soprano pipistrelle, Natterer's bat, brown long-eared bat and Daubenton's bat.
- The woodlands and lines of trees along the east transect and the woodland, lines of trees, pond features and road along the central transect displayed consistently high levels of bat activity throughout the survey period.
- Overall, the results were consistent with the 2023 surveys, suggesting that a range of bat species are utilising habitat within and adjacent to the site throughout the active bat season.

Negative impacts to bats as a result of the development works if mitigation measures are not taken include:

- Permanent loss or fragmentation of high-quality foraging, commuting and roosting habitat (tree lines, woodlands, scrub, ponds, watercourses and wetland), that support a regionally important assemblage of bat species.
- Temporary and permanent disturbance to bats within and adjacent to the site during development works due to lighting and vibrations associated with the development and operational activities.

A Species Protection Plan will be required to ensure that disturbance to bats within the locale as a result of works is minimised, and to ensure that suitable avoidance, mitigation and compensatory measures are put in place prior to works commencing.

Good practice mitigation measures include:

- Retention where possible of mature trees, treelines and woodland areas (including ancient and wet woodlands) within and adjacent to the site to maintain adequate foraging and roosting provisions and habitat connectivity.
- Parcels of woodland and treelines that are not scoped for removal should be protected prior to development works commencing.

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1 INTRODUCTION

1.1 Terms of Reference

EnviroCentre Limited were commissioned by Kintore Hydrogen Limited to undertake bat transect and automated static detector surveys within the site known as Kintore Hydrogen Plant, in land south and west of Kintore. The surveys were required to inform development of a hydrogen electrolysis plant.

The site layout can be found in Appendix A.

1.2 Background

A Preliminary Ecological Appraisal (PEA)[1] was undertaken of the whole site boundary in May 2023 by EnviroCentre. The habitats on site were assessed as having high suitability for bats and therefore, in accordance with the Bat Conservation Trust 3rd Edition Guidance, transect surveys and static detector deployment was recommended.

Year 1 of these surveys were completed between July – September 2023[2], and found evidence of bat roosts in proximity to the site and high levels of bat activity associated with the wetland in the north west of the site, the Silver Burn in the east and woodland, treelines and pond features in the central area.

1.3 Scope of Report

The aim of the survey was to inform the future development design and works in regards to ecological constraints pertaining to bats. The main objectives were as follows:

- Observe how bats utilise the habitats on site.
- Identify key commuting features and core sustenance zones on site.
- Compare Year 1 and 2 data findings.
- Make a site assessment about potential impacts to bats as a result of development.
- Outline appropriate mitigation and compensation measures to avoid and reduce impacts to bats during the design, development and operational phase.

1.4 Site Description

Th bat transect locations can be found in Appendix B.

The site encompasses three transects, East, Centre and West, covering land to the south and west of the town of Kintore.

The East Transect refers to the water pipeline connection options and abstraction discharge point, the Central Transect covers the hydrogen pipeline and gas grid connection (including sections of the water pipeline) and the West Transect covers the electrolysis plant and grid connection.

[1] EnviroCentre (2023) ECRPT 13628 - PEA

[2] EnviroCentre (2024) ECRPT 13664 – Bat Transect and Automated Surveys

These transects cross a range of habitats comprising watercourses, grassland, gorse scrub, mixed farmland, coniferous plantations, mixed woodland and wetland habitats, including wet woodland, lowland fen and purple-moor grass rush pasture.

1.5 Legislation

Bats are a European Protected Species (EPS) listed in the EC Directive (92/43) The Conservation of Natural Habitats and of Wild Flora and Fauna (the "Habitats Directive"), which is transposed into Scottish law through the Conservation (Natural Habitats &c.) Regulations 1994 (the "Habitat ns") as amended. Under this legislation it is an offence to deliberately or recklessly:

- capture, injure or kill such an animal;
- harass an animal or group of animals;
- disturb an animal while it is occupying a structure or place used for shelter or protection;
- disturb an animal while it is rearing or otherwise caring for its young;
- obstruct access to a breeding site or resting place, or otherwise deny an animal use of a breeding site or resting place;
- disturb an animal in a manner or in circumstances likely to significantly affect the local distribution or abundance of the species;
- disturb an animal in a manner or in circumstances likely to impair its ability to survive, breed or reproduce, or rear or otherwise care for its young;
- disturb an animal while it is migrating or hibernating; and
- possess, control, transport, sell or exchange specimens of any animal listed on Annex IV of the Habitats Directive. This applies to living or dead specimens and to their derivatives.

It is an offence of strict liability to damage or destroy a breeding site or resting place of such an animal. These sites and places are protected even when the animal isn't present. For example, if a bat isn't present in a summer roost in winter months the roost is still protected by law.

1.6 Report Usage

The information and recommendations contained within this report have been prepared in the specific context stated above and should not be utilised in any other context without prior written permission from EnviroCentre Limited.

If this report is to be submitted for regulatory approval more than 12 months following the report date, it is recommended that it is referred to EnviroCentre Limited for review to ensure that any relevant changes in data, best practice, guidance or legislation in the intervening period are integrated into an updated version of the report.

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2 METHODS

Disclaimer: All guidance listed in the methods deployed was current at the time of field survey. These methods will be carried through to any further EcIA works to remain consistent.

2.1 Desk Study

An updated desk study was undertaken in advance of survey work in May 2024. The following sources relevant to bats were checked:

- Review of Year 1 data previously obtained in 2023.
- NatureScot Sitelink[3] for information on statutory designated sites within 5km of the site, relevant to bats;
- Scotland's Environment Map[4] website to locate and identify ancient woodland within or adjacent to the site;
- Aberdeenshire Local Development Plan[5] for information on non-statutory designated sites within 2km of the site, relevant to bats;
- Records request from North East Scotland Biological Records Centre (NESBReC)[6] and NBN Atlas[7] for bat records within 2km of the site which are licenced for commercial use; and
- Scottish Biodiversity List (SBL[8]) and North East Scotland Biodiversity Action Plan (NESBiP) for priority species potentially relevant to the site.

2.2 Bat Activity Transect Survey

Bat Transect Survey Routes and Static Detector Locations can be found in Appendix B.

The survey was designed and undertaken in reference to the Bat Conservation Trust (BCT): Bat Surveys Good Practice Guidelines[9].

Manual bat activity transects comprise ecologists walking predetermined transect routes, to observe, listen and record bats in flight away from their roosts using hand-held bat detectors and recorders. This data is used to facilitate an impact assessment and inform the requirement for, and design of, mitigation and/or compensation, in line with current wildlife legislation.

Three transect routes were pre-determined for the site in 2023, which were taken forward for the Year 2 surveys in 2024, identified in Section 1.4, with habitat type and accessibility main considerations. However, the East transect was altered from the previous year due to changes in site boundary changes.

[3] NatureScot SiteLink, available from: https://sitelink.nature.scot/map (accessed May 2024)
[4] Scotland's Environment Map - Ancient Woodland Inventory, Available at: https://map.environment.gov.scot/sewebmap/ (accessed May 2024).
[5] ALDP Appendix 12: https://online.aberdeenshire.gov.uk/ldpmedia/LDP2021/Appendix12LocalNatureConservationSites.pdf (accessed May 2024)
[6] NESBReC records obtained in 2022 for central region of site plus 2km radius. NESBReC records available from: https://nesbrec.org.uk/
[7] NBN Atlas, available from: https://nbnatlas.org/ (accessed May 2024)
[8] SBL available at: http://www.gov.scot/Topics/Environment/Wildlife-Habitats/16118/Biodiversitylist/SBL (accessed May 2024).
[9] Collins, J. (ed.) (2023). Bat Surveys for Professional Ecologists: Good Practice Guidelines, 4th edition, Bat Conservation Trust.

Transect routes covered a range of habitats on site, with those identified as having moderate or high suitability for bat being prioritised. Surveys commenced at sunset, stopping at 15 pre-determined spot counts and recording any bat activity over a 3-minute period before continuing to the next spot count. Frequency division bat detectors (Bat Box Duet) and an EMT Touch on both iPhone and Android devices were used to record the sound files and provide accurate location data for bat movements.

Accurate numbers of bats can be difficult to identify during flight, therefore each bat pass (i.e. each call identified using a bat detector) is recorded to species level with an indication of the time it was identified, its location and behaviour. This information is gathered to characterise activity at the site.

Transect surveys were undertaken on the 21st May, 11th June, 3nd and 17th July 2024 and led by EnviroCentre Lead Principal Ecologist Gemma Nixon, Lead Senior Ecologist Jennifer Paterson and Consultant Ecologist Scott Fraser, all of whom are members of the Chartered Institute of Ecology and Environmental Management (CIEEM). The information gathered from the Anabat static detectors was analysed using Anabat insight[10], with the EMT Touch data analysed in device and any files requiring further review using kaleidoscope[11]. This analysis was undertaken by Ecologist Antonia Stewart and Consultant Ecologist Scott Fraser, with support from Principal Ecologist Mhairi Mackintosh.

2.3 Automated Survey

Six static bat detectors (Anabat Swift) were deployed in varying habitats along and between transects and left in-situ for five days in May, June and July 2024. The locations of static detectors were the same locations for Year 1 and Year 2.

2.3.1 Assessment Methodology for Bat Activity Levels

Activity levels were assessed by comparing the average passes per night recorded from the static transect data and comparing them to a similar EnviroCentre dataset from the northwest coast of Scotland undertaken over the same survey period (May-July 2024)[12]. Table 2-1 shows the activity level definitions by bat species.

Table 2-1: Static Detector Activity Level Definitions

Activity Levels	Activity Level Definition
Low Activity	Soprano and common pipistrelle: <50 calls a night
	Brown long eared, Daubenton's, Natterer's and Leisler's bats and Nathusius pipistrelle: <0.5 calls per night
	Total: <100 calls per night
Moderate Activity	Soprano and common pipistrelle: = 50-100 passes a night
	Brown long eared, Daubenton's, Natterer's and Leisler's bats and Nathusius pipistrelle: 0.5 – 1 pass per night
	Total: 100-300 calls per night
High Activity	Soprano and common pipistrelle: >100 average passes a night
	Brown long eared, Daubenton's, Natterer's and Leisler's bats and Nathusius pipistrelle: >1 pass per night
	Total: >300 calls per night

[10] Titely Scientific - Anabat Insight, Version - 1.9.7-0-g6302e49
[11] Wildlife Acoustics Inc (2021), Kaleidoscope, Version 5.4.9
[12] EnviroCentre (2023) ECRPT 13897 – Dunbeg - Bat Survey and Assessment Report

2.3.2 Assessment Methodology for Species Assemblages

The assessment was made based on the habitat value and the bat species assemblages scoring system, as described in the current bat mitigation guidelines[13].

To determine the maximum possible score any site could achieve, a score is assigned to each species that could be present in the geographical area.

The bat mitigation guidelines (2023) scoring system for Northern Scotland and the maximum score thresholds can be observed in Table 2-2 below.

Table 2-2: Scoring System for Bat Species Assemblages in Scotland[14]

Rarity category	**Northern Scotland**		
	Species		**Score**
Widespread in (almost) all geographies.	Common pipistrelle (*Pipistrellus pipistrellus*)	Ppip	Score: 1 each
	Soprano pipistrelle (*Pipistrellus pygmaeus*)	Ppyg	
Widespread in many geographies, but not as abundant in all.	Brown long eared bat (*Plecotus auritus*)	Paur	Score: 2 each
	Natterer's bat (*Myotis nattereri*)	Mnat	
	Daubenton's bat (*Myotis daubentoniid*)	Mdau	
Rarer or restricted distribution.	Leisler's bat (*Nyctalus leisleri*[15])	Nlei	Score: 3 each
	Nathusius pipistrelle (*Pipistrellus nathusii*)	Pnat	
Threshold (maximum possible score)			**14**

Once the score for each has been calculated and summed to determine the maximum theoretical score, the threshold score needed for any assemblage to meet each geographic level of importance, can be calculated[16]:

- Assemblage score meets or exceeds 45% of the maximum score: County importance.
- Assemblage score meets or exceeds 55% of the maximum score: Regional importance.
- Assemblage score meets or exceeds 70% of the maximum score: National importance.

2.4 Constraints

2.4.1 Desk Study

Desk studies are limited by the reliability of third-party information and the geographical availability of biological and/or ecological records and data. This emphasises the need to collate up-to-date, site-specific data based on field surveys by experienced surveyors. The absence of a species from biological records cannot be taken to represent actual absence. Species distribution patterns should be interpreted with caution as they may reflect survey/reporting effort rather than actual distribution.

[13] Reason, P.F. and Wray, S. (2023). UK Bat Mitigation Guidelines: a guide to impact assessment, mitigation and compensation for developments affecting bats. Chartered Institute of Ecology and Environmental Management, Ampfield
[14] Rarity category derived from Table 3.1, p30 and assemblage score detailed in Section 3.4.28, p35, both from UK Bat Mitigation Guidance document (2023).
[15] Note: The guidance document does not list Leisler's bats to be present in northern Scotland. However, they are known to be present, albeit under recorded, in the area.
[16] Assemblage importance percentage detailed in Section 3.4.29, p35 of UK Bat Mitigation guidance Document (2023).

2.4.2 Field Survey

Only dusk transect surveys which were walked in the same route order were undertaken, due to health and safety concerns regarding working within wetland areas and adjacent to large watercourses with steep banks. This resulted in a lack of variation of survey time at spot checks. However, this still gave an impression of bat activity across the site and the survey areas were supplemented with static detectors to gather additional data. Therefore, the assessment of the site is unlikely to have been affected.

Due to cattle present in fields, minor route changes were made on the west transect on 3rd July and the centre transect on 21st May and 3rd July. This may have affected the results due to exact spots not being repeatedly surveyed. However, this is unlikely to have significantly impacted the results as the changes to the routes were minor and covered similar habitats as the original route.

As surveyors could only be in one location at one time, it is likely that bat activity within the site was missed during the manual bat transect surveys. To overcome this limitation the manual surveys were repeated over a three-month period and static detectors were deployed across the whole site to gather additional data.

The June east transect EMT data were not recorded due to a technical error. However, from the surveyor's knowledge of the transects bat activity over the course of the survey period, the activity was consistent with the other surveys. This assessment was corroborated by the static detector results. Therefore, this was not considered to have impacted the final assessment of the transect and over site.

2.4.3 Disclaimer

Bats are transient species and utilise a variety of habitats and structures throughout their active period (April-September).

This bat survey forms a 'snapshot' of how bats were found to utilise the site during site visits in May, June and July 2024.

3 RESULTS

3.1 Desk Study

- No statutory designated sites are present within the site.
    - Loch Skene SSSI[17], Ramsar[18] and SPA[19] is located approximately 5km south of the site. It is designated for wintering waterfowl, but the waterbody and surrounding woodland provides optimal foraging opportunities for local bats and is connected to the site via Tillakae burn and the associated riparian woodland and bankside vegetation.
- No non-statutory designated sites are present within the site.
    - Cottown Woods LNCS[20] is located 1.2km north of the site. it is designated for its mosaic of woodland types, fen habitat and plant and invertebrate diversity, and therefore offers optimal foraging opportunities for local bats. It is connected to the site via the ancient woodland north of the west transect.
    - Rollo Mire, a proposed nature conservation site, is located 1.7km northeast of the site via the Tuach burn of which the Rollomire burn is a tributary of. It is designated for its fen habitat, which would provide optimal foraging opportunities for local bats. It is connected to the site via the Tuach burn well as treelines, woodland and field and road margins.
- Long-Established Woodland (of Plantation Origin) and native woodland is present in the northwest extent of the site where the electrolysis plant is proposed. LEPO and native woodland are also present along the boundary of the water pipeline connection in the central and western extents, as well as to the northwest and northeast of the hydrogen pipeline and gas grid connection.
- Records from NESBReC returned the following:
    - Seven unidentified pipistrelle bats, nine common pipistrelle (*Pipistrellus pipistrellus*) and thirteen soprano pipistrelle (*Pipistrellus pygmaeus*) records were returned between 2013 - 2021. These sightings were predominantly in and around residential housing 2km to the north of the site in the town of Kintore, with 15 of these records being roosts.
    - One record of a brown long-eared bat foraging amongst residential housing in Kintore 2km north of the site in 2021.
- No additional records were returned from NBN Atlas since 2021.

3.2 Habitat Description

3.2.1 East Transect

The east transect covers the location of the proposed water pipeline connection options and abstraction discharge point, and comprises the banks of the River Don in the north, with mixed agricultural land, gorse scrub (dense and scattered), asphalt road, woodland (wet and deciduous lowland), early-mature to mature mixed treelines, water courses and wet ditches. The north extent of the transect is also dissected by the Dyce to Inverurie railway line.

[17] Site of Specific Scientific Interest – Available at (https://sitelink.nature.scot/site/1038) (Accessed June 2024)
[18] Ramsar - Available at (https://apps.snh.gov.uk/sitelink-api/v1/sites/8442/documents/20) (Accessed June 2024)
[19] Special Protection Area – Available at (https://sitelink.nature.scot/site/8536) (Accessed June 2024)
[20] Local Nature Conservation Site

The locale is dominated by mixed farmland, with parcels of woodland, treelines, watercourses, farm buildings and associated infrastructure. The town of Kintore is located to the northwest, and the A96 demarcates the south of the transect.

3.2.2 Central Transect

The central transect covers the proposed hydrogen pipeline and gas grid connection and comprises mixed farmland with mature woodland forming the border in the northwest and northeast. Small lines of trees are present along field boundaries in the centre and west. Wet drainage ditches are present along the east extent with the park burn and a pond present along the south extent, and two further drainage ditches running west to east in the southeast. A building, outhouse and associated garden habitat are present in the north[21].

Farm buildings and residential housing to the north are connected to the transect by the farmland, scattered treelines and the woodland to the northwest.

3.2.3 West Transect

The west transect, where the electrolysis plant and grid connection are proposed, comprises mixed farmland, wetland (comprising lowland fen, purple-moor rush pasture), wet woodland, native pine woodland, other coniferous woodland, *Deschampsia* neutral grassland, lowland dry acid grassland and gorse scrub, treelines and blocks of plantation woodland in the centre and east of the transect.

The surrounding landscape is comprised of coniferous plantation woodland, gorse scrub, mixed farmland, scattered mature treelines, residential buildings and associated garden habitats. An active Substation development is present 50m to the northeast of the transect.

3.3 Bat Activity Transect Survey Results Summary

The below comprises a summary of bat activity identified during the activity transect surveys. This should be read in conjunction with Appendix B: Transect Routes and Appendix C: Transect Heat Maps.

3.3.1 East Transect

- Soprano pipistrelle were the most frequently identified species throughout the transect, with common pipistrelle occasionally identified.
- Bat activity was very strongly associated with areas along lines of trees and riparian woodland, with spot counts 5, 7, 8 and 10 (adjacent to lines of trees and the Silver Burn and associated woodland) displaying high activity. Infrequent passes over open fields were noted throughout the transect.
- Little activity was recorded adjacent to the River Don in the north and the fields and lines of tree in the south between spot counts 13-15, although some activity was noted in the woodland at the far south extent of the transect.

[21] No roosting bats were identified within buildings during the previous year's summer activity surveys. See EnviroCentre (2023), ECRPT 13595 - Bat Activity Survey, for further information.

3.3.2 Central Transect

- Soprano pipistrelle and common pipistrelle were recorded throughout the transect.Soprano pipistrelle was the most frequently identified species.
- Activity was constant in the west and northeast of the site, particularly adjacent to the woodlands and lines of trees/scrub.
- Frequent activity was recorded along the central section of the transect, associated with the road and the pond in the south.
- Infrequent activity was recorded in the southeast.

3.3.3 West Transect

- Soprano and common pipistrelle were identified on the west transect.
- Activity was high in the wetland habitat in the northern extent of the transect, comprising both soprano and common pipistrelle. The highest intensity of activity was associated with an individual Scots pine tree within the wetland between spot counts 3 and 4.
- There was frequent activity on the central extent, primarily associated with the woodland blocks in the centre and east, as well as the areas of scrub and treelines.
- Bat activity was low in the south, although moderate activity was recorded at spot count 13 within the area of woodland.

3.4 Automated Static Bat Survey Summary

3.4.1 Bat Activity Levels

Table 3-1 below summarises key patterns in bat activity at each Anabat location from May to July 2024. This should be read in conjunction with Appendix B for statics detector locations, Appendix D for the total number of passes per species and per deployment, and Appendix E for activity levels after sunset.

Table 3-1: Bat Activity Results

Position	Location	Key species Patterns
East 1 (East Transect)	Immediately west of the Silver Burn and associated wet woodland, with railway line to the south, River Don to the north and a single house with associated garden and mature treelines.	• Recorded bat activity was moderate during May and June and low in July. • Common and soprano pipistrelle were present throughout the survey period. Common pipistrelle numbers were low throughout the survey period, while soprano pipistrelle were present in high numbers in May then declined through the season. • Brown long-eared bats and natterer's bats were present in low numbers in May and June, though abundance of brown long-eared bats rose to moderate in June. • High numbers of Daubenton's bats were recorded throughout the survey period.
East 2 (East Transect)	Within small mature treeline in pasture field immediately north of small road. Gorse scrub present to northwest and along roadside verges. Treelines containing small early	• Bat activity was high in May and July, and moderate in June. Overall numbers of recorded calls per night was highest of the transects. • Soprano and common pipistrelle displayed peaked numbers of calls around sunset and sunrise throughout the May-July, although the peaks were noticeably lower in June for common pipistrelle.

Position	Location	Key species Patterns
	mature trees also present along road to northeast. Wider landscape dominated by mixed farmland.	• Dominant species recorded were common and soprano pipistrelle, with soprano pipistrelle numbers high throughout the survey period, and common pipistrelle numbers high in May and moderate for the rest of the season. • Natterer's bats were also recorded in low numbers in May and high numbers in July.
Centre 1 (Centre Transect)	On field boundary between arable and pasture fields, with semi-mature treelines to the south and mature woodland and associated scrub to the northwest. Telegraph wire is also present approximately 25m east of detector.	• Activity was high in May and fell to low levels in June and July. • Common and soprano pipistrelle were recorded throughout though frequency was inconsistent through the survey period. • A moderate level of activity for Nathusius pipistrelle and Daubenton's bats was considered in May and absent in June/July. Natterer's bats were present in high numbers in May and also absent for the remainder of the survey period.
Centre 2 (Between Centre and East Transect)	In treeline on border of mature woodland, immediately south of arable farmland. Treeline is connected to garden habitat and associated individual house 150m to the west.	• Bat activity showed a pattern of decreasing levels through the survey period, starting high in May and ending low in July. • Soprano pipistrelle numbers were high in May/June and low in July, while common pipistrelle were recorded in low numbers throughout. • Brown long-eared bats were recorded in low numbers in May and June.
West 1 (West Transect)	Amongst gorse scrub north of Dewsford Burn, south of wetland, Scots Pine plantation and wet woodland. Mixed farmland present to the south.	• Recorded activity was high in May and moderate in June/July. • Soprano pipistrelle activity was high throughout the survey period. • Common pipistrelle numbers were high in May, then reduced to low for the rest of the survey period. • Natterer's bat activity was high in June and July, but none was recorded in May. • Brown long-eared bats and Daubenton's bats were present in low numbers, though brown long eared bat activity was moderately high in July.
West 2 (Between West and Centre Transect	Along the north bank of Park Burn, with grassland and scattered scrub/trees immediately south, and arable farmland to the north.	• Bat activity was low throughout the survey period. • Common and soprano pipistrelle both displayed low activity from May through to July. • Brown long-eared bats showed low activity in June and July. • Natterer's bats and Daubenton's bats were recorded in moderate numbers in June, and low numbers during the remainder of the surveys.

3.4.2 Species Assemblages

In reference to the bat species assemblages scoring system (Northern Scotland) and based on the value of habitats where bat activity was recorded, the following value is assigned, as displayed in Table 3-2, below.

Table 3-2: Bat Species Assemblage Results

Position	Species	Threshold Score/14	Importance of Assemblage score %	Importance level
East 1	*Ppip, Ppyg, Paur, Mdaub, Mnat,*	8	57	Regional
East 2	*Ppip, Ppyg, Mnat*	4	29	County
Centre 1	*Ppip, Ppyg, Mdaub, Mnat, Pnat*	9	64	Regional
Centre 2	*Ppip, Ppyg, Paur*	4	29	County
West 1	*Ppip, Ppyg, Paur, Mdaub, Mnat*	8	57	Regional
West 2	*Ppip, Ppyg, Paur, Mdaub, Mnat*	8	57	Regional

4 ASSESSMENT AND POTENTIAL IMPACTS

4.1 Bat Assemblage, Activity and Habitat Assessment

4.1.1 Bat Activity Assessment

East

- Bat activity was higher in the centre and north of the transect, suggesting that the habitats present are more suitable for foraging and commuting when compared to habitats in the south.
- Relatively low frequencies of commuting Daubenton's bats, brown long-eared bats and Natterer's bats were recorded.
- Overall, bat species and activity were similar to the 2023 transect results, though there was less activity associated with gorse scrub in the centre in 2024 when compared with the previous year's data. This could likely be due to the 2024 period covering the early season when bats would be colonising maternity roosts and feeding young and thus bats may be prioritising habitats nearer roost locations.
- Results were generally consistent with the bat activity recorded in 2023, though recorded species diversity was lower at East 2 compared with previous surveys, and no Leisler's bats were recorded. Brown long-eared bat activity was also lower than in 2023. This may reflect the difference in survey period with reference to the bat activity season, with a range of bat species utilising habitats on the east transect later in the season. Daubenton's bat activity was higher compared to the previous year, indicating a greater usage of the woodland and riverine habitats on site during the 2024 survey period.

Centre

- The highest bat activity levels were recorded along lines of trees, woodland edges, the pond feature and the road. These habitats offer suitable foraging resources and good connectivity to additional habitat in the wider area such as woodland and scrub.
- Overall, the species recorded and the distribution of bat activity was consistent with the results from the 2023 surveys, although the intensity of bat activity was generally lower overall. There was higher activity associated with the pond in the south in 2024 compared with the previous year, which could represent a core sustenance zone for bats colonising maternity roosts. The comparable results suggest that bats in the locale utilise the foraging and commuting resources consistently through the entire summer season.
- Overall activity in Centre 1 and 2 was lower than in the previous year's surveys suggesting a great use in the post breeding season, however species assemblage was consistent and both years' results showed a reduction in activity and species present in July. Results also showed fewer species present across the two locations when compared with results for the previous year, with no Daubenton's bats or Natterer's bats recorded in Centre 2 in 2024, however and a Nathusius pipistrelle was recorded in Centre 1, whilst they had not been recorded in 2023.

West

- Bat activity was most intense in the wetland, native ancient woodland and surrounding grasslands in the north extent of the transect, as these habitats provide both important

foraging resources and commuting and roosting opportunities for bats and which represent a core sustenance zone for bats colonising maternity roosts.

- The woodland and scrub in the centre of the route also showed high activity, indicating that these habitats are being utilised by pipistrelle for foraging and commuting.
- The tree associated with intense bat activity in the north of the transect is likely to contain a roost[22]. The high level of soprano pipistrelle activity throughout the survey period suggests that this is a soprano pipistrelle roost. These results are consistent with the surveys in 2023, which also found a spike in soprano pipistrelle activity in this location which continued into August, perhaps as a result of young from a local maternity roost(s) foraging in this area at this this period.
- Overall bat activity was higher in 2024 than in 2023, with higher activity recorded on the central extent of the transect. Activity was high in the wetland in the north in both 2023 and 2024. The higher levels of activity may be due to the survey period in 2023 covering the end of the bat activity season, when bats are dispersing and some bat species are preparing to hibernate, thus foraging and commuting activity is reduced.
- Overall activity for West 1 was higher in 2024 when compared with 2023, however West 2 was lower in 2024 than in 2023. Activity of Daubenton's was lower in 2024 than 2023, whilst Natterer's bats were consistent across 2023 and 2024. Leisler's bats were recorded in 2023 but were not detected in 2024. Overall bat activity was lower than in 2023, though levels for July were comparable across the two years.

4.1.2 Bat Assemblage Assessment

Based on the bat species assemblage scoring system and on the value of habitats found on site, the local population of bats is considered to be of **regional** importance. Therefore, the features within the site (watercourses, lines of trees, woodland, wetland etc.) identified as being utilised throughout the survey period contribute to sustaining a regionally important bat assemblage.

The results of the Year 2 bat assemblage assessment are consistent with the previous year's results, although the importance level of some individual transect areas are lower as a result of reduced species richness. This could reflect the 2024 survey period being earlier in the bat season or could be influenced by other factors such as varying weather conditions through the year.

4.2 Potential Impacts

The following negative impacts to bats may occur because of the proposed development if mitigation is not adopted:

- The permanent loss or fragmentation of high-quality foraging, commuting and roosting habitat (tree lines, woodlands, scrub and watercourses), that support a regionally important assemblage of bat species.
- Disturbance to bats during development works due to temporary lighting and vibrations associated with the development.
- Permanent disturbance to commuting and foraging bats within and adjacent to the site as a result of noise and lighting associated with the development operational activities.

Positive impacts to bats that may occur as a result of the proposed development include:

[22] This tree was also assessed as high suitability for containing a potential roost during further survey works in October 2023 - EnviroCentre (2023) ECRPT 13665 – Potential Roost Feature Survey

- Increased roosting opportunities for bats within the site if bat boxes are incorporated into the development buildings and/ or remaining trees.
- Enhanced foraging and commuting resources for bats if bat friendly landscaping and lighting is included in the development design.

5 FURTHER SURVEY, MITIGATION AND ENHANCEMENT

5.1 Further Survey

No roosts were identified along the central and east transects, therefore further surveys are not recommended along these routes. If the appropriate mitigation measures below and put in place, impact and disturbance to roost features should be avoidable, and therefore further surveys on these trees are not advised.

From the 2024 results and the results of surveys in July-September and October 2023, the mature tree associated with the north extent of the west transect is considered likely to contain a roost and offers high potential for roosting bats. This tree and the surrounding wetland is to be retained as part of the development design therefore, further targeted surveys are not required.

A Species Protection Plan (SPP) will be required to ensure that disturbance to bats within the locale as a result of works is minimised, and to ensure that suitable avoidance, mitigation and compensatory measures are put in place prior to works commencing.

At this stage no licencing from NatureScot is required.

5.2 Mitigation

The following mitigation measures are recommended prior to and during development works to reduce negative impacts on bats:

- Retention where possible of mature trees, treelines and woodland areas (including ancient and wet woodlands) within and adjacent to the site, in order to maintain foraging resources and habitat connectivity for bats.
- The mature tree in the wetland suspected to contain a roost will be retained and protected from disturbance/development.
- A client agreed buffer of 30m from the adjacent woodlands in the centre region of the site will be implemented into the development design.
- Parcels of woodland and treelines that are not scoped for removal should be protected prior to works commencing.
- The development design will include the retention and protection of the lowland fen, purple-moor grass, wet woodland and ancient woodland habitats in the northwest of the site. This will maintain high-quality foraging, commuting and roosting resources for bats in the locale.
- Site contractors should be made aware during site induction that bats are known to be present on site, and the mitigation measures that are in place to protect them as well as what to do in case of a bat being identified during site works.
- Any clearance works should be scheduled during October to March inclusive to avoid the main bat activity season and avoid constraints in relation to roosting bats.
- Wildlife-friendly lighting should be used during development works and post development works. Lighting should not illuminate adjacent green space on site as this could negatively impact bats and other crepuscular wildlife in the locale. Low- or high-pressure sodium lamps instead of mercury and metal halide lamps are preferred for their UV filtering properties, reducing light spillage and pollution.

- Bat-friendly external lighting could be installed to reduce negative impacts on commuting and foraging bats in the locale, such as by using 'warm white' lighting[23 ; 24].
- Works causing loud noise and vibration between May to August inclusive (main bat activity season) should be limited to daylight hours to avoid intolerable disturbance to foraging and commuting bats in the locale, where possible.
- Installation of bat boxes on trees within retained woodland and treelines to maintain/ increase roosting opportunities within the site for bats. Bat boxes should be installed with a south-facing orientation[25], and a range of bat boxes are commercially available[26].

5.3 Compensation

- The landscaping and planting scheme should aim to replace and enhance green infrastructure for bats and improve habitat connectivity to the wider landscape, by planting native and nectar-producing flowering plants, shrubs and trees that link the site with surrounding green space[27].
- The small treelines within the central transect are well used as commuting corridors between core sustenance zones and therefore, should be retained where possible or should be adequately compensated for within landscape design to maintain connections between these areas.

5.4 Opportunities for Biodiversity Enhancement

To comply with local and national planning policy and planning policy guidance, including NPF4, the following biodiversity enhancement measures should be delivered as a commitment to the planning application:

- Landscaping within the development site should seek to maintain and enhance existing green space and encourage long-term ecological connectivity between the site and the wider area.
- Planting of native trees to enhance existing woodland within the site, and planting of species-rich flowering grassland (at least 4m in width) to enhance commuting and foraging habitat for bats. Tree, grass and wildflower seeds should locally sourced and native species to achieve maximum enhancement to biodiversity.
- Creation of Sustainable Drainage Systems (SuDS) with suitable native aquatic planting as part of the development, to create biodiverse wetland habitat that will provide valuable breeding and foraging resources for invertebrates, amphibians, reptiles, birds and small mammals including bats. Typical SuDS construction for wildlife benefit includes:
    - A permanently wet central area with a minimum surface area of 200m^2;
    - Varied depths with deepest area to be minimum of 1.5m deep;
    - Scalloped edges to increase the area of marginal habitat;
    - Varied profile incorporating marginal shelves and long gently sloping banks;
    - No artificial connectivity to other wetland features (i.e., the pond is not to be considered as part of the SuDS system); and
    - Native planting to be undertaken, using a selection of native marginal, floating and submerged species.

[23] Further information is available at: https://www.bats.org.uk/about-bats/threats-to-bats/lighting
[24] Further information is available at: https://theilp.org.uk/publication/guidance-note-8-bats-and-artificial-lighting/
[25] Further information is available at: https://www.bats.org.uk/our-work/buildings-planning-and-development/bat-boxes
[26] Example bat box is available at: https://www.nhbs.com/2f-schwegler-bat-box-general-purpose
[27] Further information is available at: https://www.bats.org.uk/our-work/landscapes-for-bats/landscape-and-urban-design

- Wood from any trees felled as part of development works should be retained and used to construct log piles within the site, to provide a feeding and hunting resource for insects which are a source of prey for bat species.
- Additional bat roost boxes could be installed externally or integrated into the design of new buildings within the development, to increase roosting provision for local bat species. Bat boxes should ideally be located in a south facing orientation, at least 3m above the ground and away from artificial lighting[28].
- 'Bug hotels' could be installed as part of the development in order to provide sheltering habitat for insects, which act as a prey source for bat species. Bug hotels can be constructed from materials like woodcrete and reeds[29 ; 30], and can be installed on retained trees or fence posts.

[28] Further information is available at: https://www.bats.org.uk/our-work/buildings-planning-and-development/bat-boxes
[29] Example is available at: https://www.nhbs.com/schwegler-insect-nesting-aid-wood-concrete
[30] Further information is available at: https://www.nhbs.com/schwegler-insect-nesting-aid-reed

APPENDICES

A SITE LAYOUT PLAN

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816000 814000 812000

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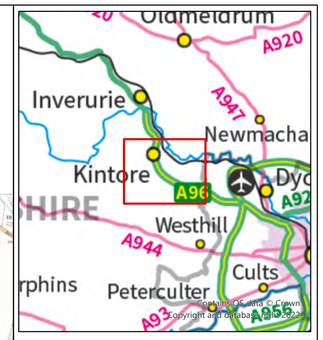


PAN boundary

KINTORE
Cottown
BLACKBURN
Kinellar
Muir of Kinellar

0 0.5 1 Kilometers

Rev	Date	Rqst	Drwn	Chkd	Appd
R1	20.02.24	WS	PM	WS	
R2	27.02.24	WS	PM	WS	
R7	18.03.24	WS	PM	WS	
R8	18.03.24	WS	PM	WS	

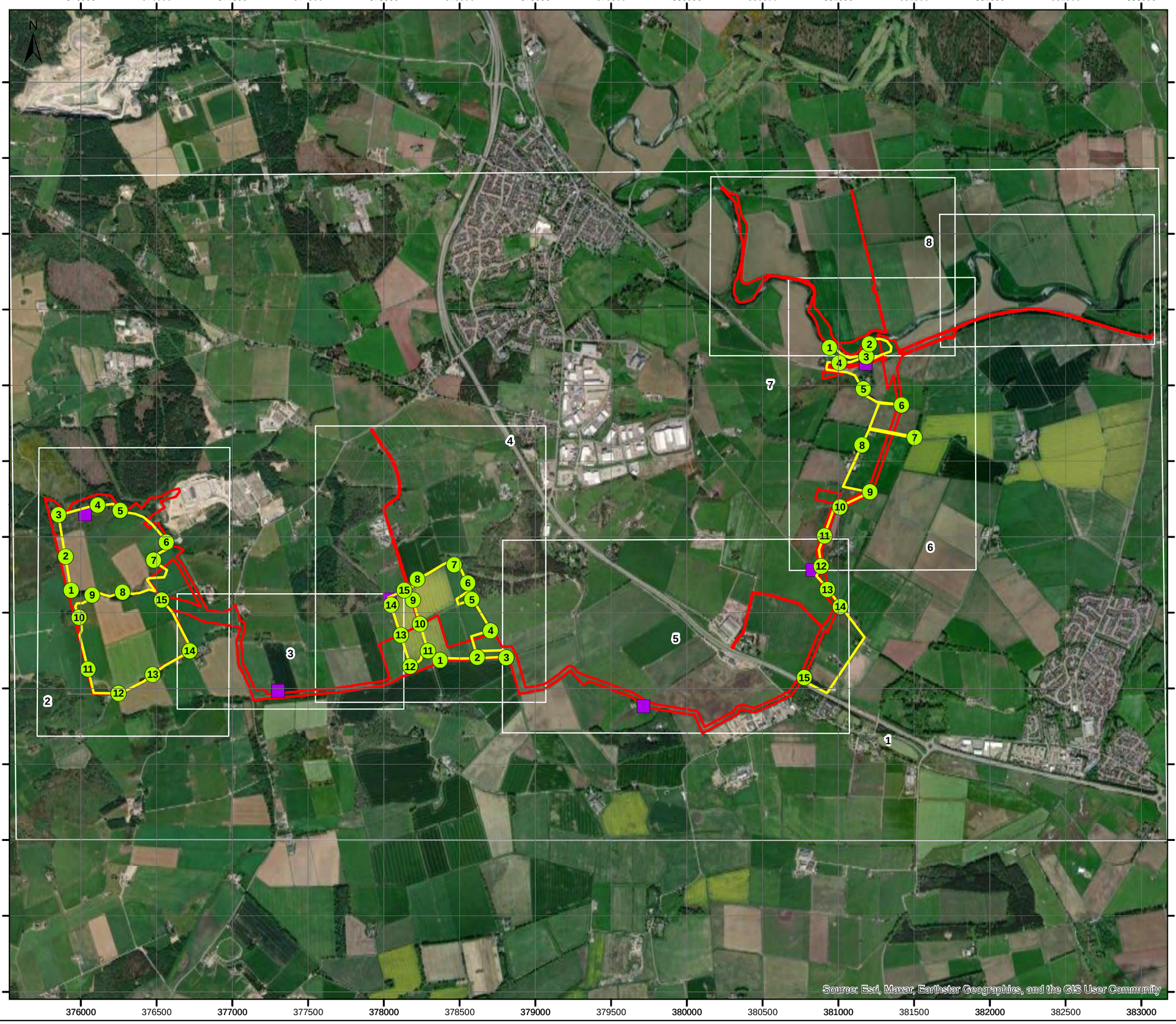
STATERA ENERGY - KINT0RE

PROPOSAL OF APPLICATION NOTICE REDLINE BOUNDARY

B&P BLACKHALL & POWIS
Suite 11 | The Garment Factory | 10 Montrose Street | Glasgow | G1 1RE
Tel: +44 (0)141 433 7371 | www.blackhallpowis.com

Date: 18/03/2024 | Scale @ A1: 1:11,000

B BAT TRANSECT SURVEY PLAN



Legend

- PAN boundary
- Spot Count Location
- Transect
- Static Detector Locations

Do not scale this map

Client
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Project
Kintore Hydrogen Plant

Title
Year 2 Bat Transect Survey Route Plan
Page 1 of 8

Status
FINAL

Drawing No.	Revision	Date
376782-GIS024	-	30 Aug 2024
Drawn	**Checked**	**Approved**
JEP	GN	GN

Scale
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-	-	-	-

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375500 376000 376500 377000

814000 813500 813000

N

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Legend

- PAN boundary
- Spot Count Location
- Transect
- Static Detector Locations

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Page 2 of 8

Status
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Drawing No.	Revision	Date
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Page 3 of 8

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Page 4 of 8

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Legend

- PAN boundary
- Spot Count Location
- Transect
- Static Detector Locations

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Drawing No.	Revision	Date
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Legend

- PAN boundary
- Spot Count Location
- Transect
- Static Detector Locations

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Drawing No.	Revision	Date
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Scale
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Legend

- PAN boundary
- Spot Count Location
- Transect
- Static Detector Locations

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Page 7 of 8

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382000 382500 383000

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Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Legend

- PAN boundary
- Spot Count Location
- Transect
- Static Detector Locations

Do not scale this map

Client
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Title
Year 2 Bat Transect Survey Route Plan
Page 8 of 8

Status
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Drawing No.	Revision	Date
376782-GIS024	-	30 Aug 2024
Drawn	**Checked**	**Approved**
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Scale
1:4,500 @A3
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Rev	Date	Amendment	Initials
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C BAT TRANSECT HEAT MAPS

380250 381000 381750 382500

815250 814500 813750 813000

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

0 75 150 m

Imagery source: Esri, DigitalGlobe, GeoEye, Earthstar Geographic, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Spot Count Locations
- Transect Route
- Intensity of Bat Activity: 400 / 0

Do not scale this map

Client
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Project
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Title
Bat Transect - East - Heat Map

Status
FINAL

Drawing No.	Revision	Date
376782-GIS020	-	19 Sep 2024
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SF	JEP	GN

Scale
1:9,500 @ A3

Rev	Date	Amendment	Initials
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Legend

- Spot Count Locations
- Transect Route
- 400 Intensity of Bat Activity
- 0

Do not scale this map

Client
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Project
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Title
Bat Transect - Centre - Heat Map

Status
FINAL

Drawing No.	Revision	Date
376782-GIS020	-	19 Sep 2024
Drawn	**Checked**	**Approved**
SF	JEP	GN

Scale
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Legend

- Spot Count Locations
- Transect Route
- 400 Intensity of Bat Activity
- 0

Do not scale this map

Client
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Project
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Title
Bat Transect - West - Heat Map

Status
FINAL

Drawing No.	Revision	Date
376782-GIS020	-	19 Sep 2024
Drawn	**Checked**	**Approved**
SF	JEP	GN

Scale
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D AUTOMATED STATIC BAT SURVEY RESULTS

The below tables show the average (avg) calls per night at each survey location over the course of the survey period. The colour schema included within tables below indicates: Green = low activity, Yellow = moderate activity, Red = high activity and White = no activity. The classification of the activity levels is described in Section 2.4 in Table 2-1.

Automated Static Bat Survey Results – West

Avg Count Per Night	West 1			West 2		
Species	May	June	July	May	June	July
Common pipistrelle	177.0	27.2	12.2	42.8	21.7	22.9
Soprano pipistrelle	195.6	166.0	192.2	42.8	16.6	8.3
Nathusius pipistrelle	0.0	0.0	0.0	0.0	0.0	0.0
Brown long-eared bat	0.0	0.2	0.6	0.0	0.1	0.1
Natterer's Bat	0.0	4.7	13.0	0.2	0.7	0.1
Daubenton's bat	0.4	0.2	0.0	0.2	0.7	0.1
Total Avg Calls Per Night	**373.0**	**198.2**	**218.0**	**86.0**	**39.9**	**31.6**

Automated Static Bat Survey Results - Centre

Avg Count Per Night	Centre 1			Centre 2		
Species	May	June	July	May	June	July
Common pipistrelle	84.0	14.2	43.6	21.2	31.4	3.1
Soprano pipistrelle	224.2	47.2	51.9	295.0	230.8	18.4
Nathusius pipistrelle	0.2	0.0	0.0	0.0	0.0	0.0
Brown long-eared bat	0.0	0.0	0.0	0.2	0.4	0.0
Natterer's Bat	3.4	0.0	0.0	0.0	0.0	0.0
Daubenton's bat	0.8	0.0	0.0	0.0	0.0	0.0
Total Avg Calls Per Night	**312.6**	**61.4**	**95.4**	**314.4**	**262.6**	**21.6**

Automated Static Bat Survey Results - East

Avg Count Per Night	East 1			East 2		
Species	May	June	July	May	June	July
Common pipistrelle	17.6	31.5	5.4	291.6	64.6	54.4
Soprano pipistrelle	118.2	70.7	13.8	200.6	210.4	351.8
Nathusius pipistrelle	0.0	0.0	0.0	0	0.0	0
Brown long-eared bat	0.4	0.8	0.0	0	0.0	0
Natterer's Bat	0.2	0.3	0.0	0.4	0.0	1.4
Daubenton's bat	3.8	3.3	1.4	0	0.0	0
Total Avg Calls Per Night	**140.2**	**106.7**	**20.6**	**492.6**	**275.0**	**407.6**

E AUTOMATED STATIC BAT SURVEY ACTIVITY PLOTS

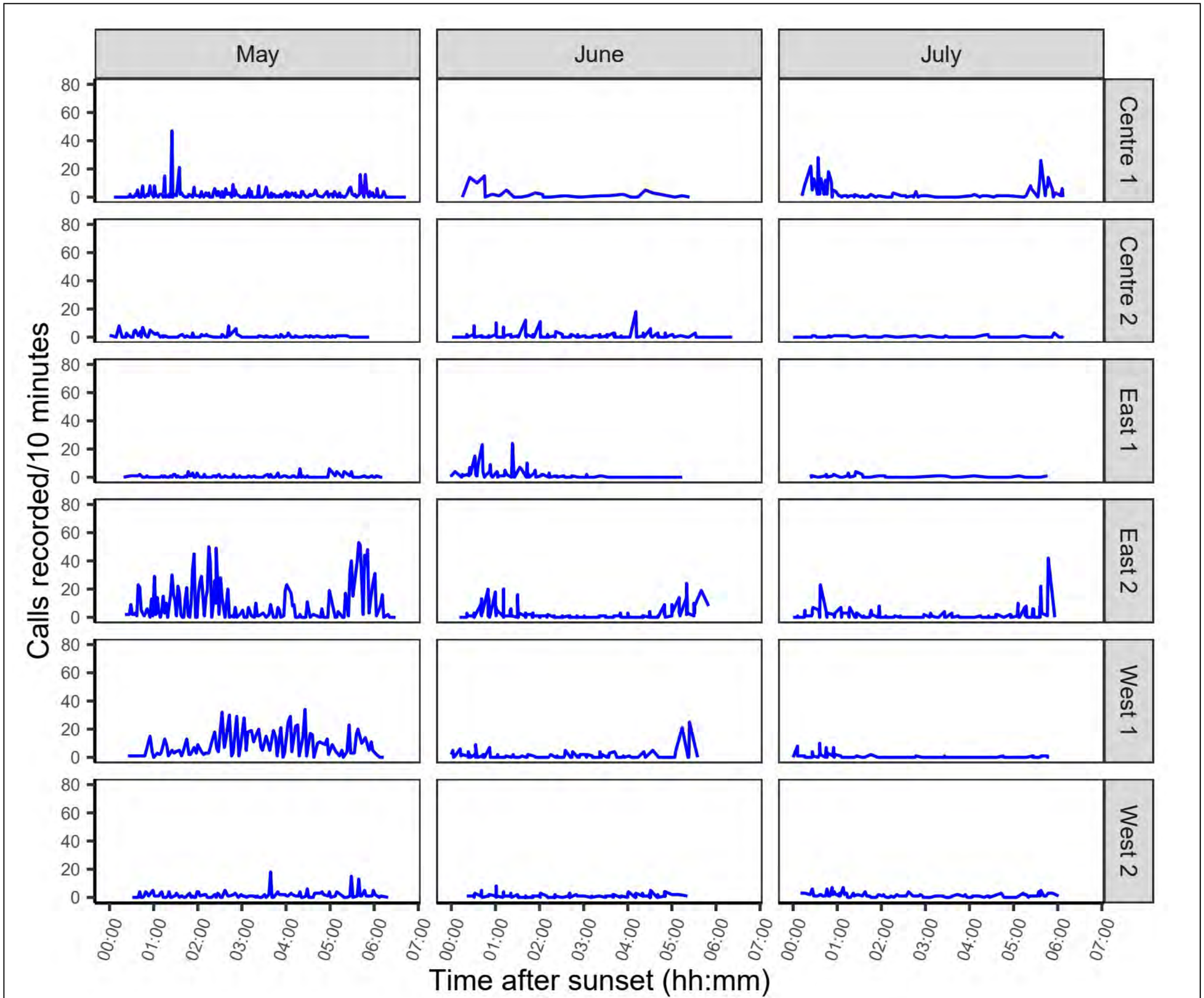

Image Source: RStudio Team (2020). RStudio: Integrated Development for R. RStudio, PBC, Boston.

Legend

Ppip

Do not scale this map

Client
Kintore Hydrogen Limited

Project
Kintore Substation

Title
Bat Activity Plots (Common Pipistrelle) - 2024 Update

Status
FINAL

Drawing No.	Revision	Date
376782-GIS018	A	15 Dec 2023
Drawn	**Checked**	**Approved**
LC	SF	JEP

Rev	Date	Amendment	Initials
A	28 Aug 2024	Data update for 2024 surveys	LC

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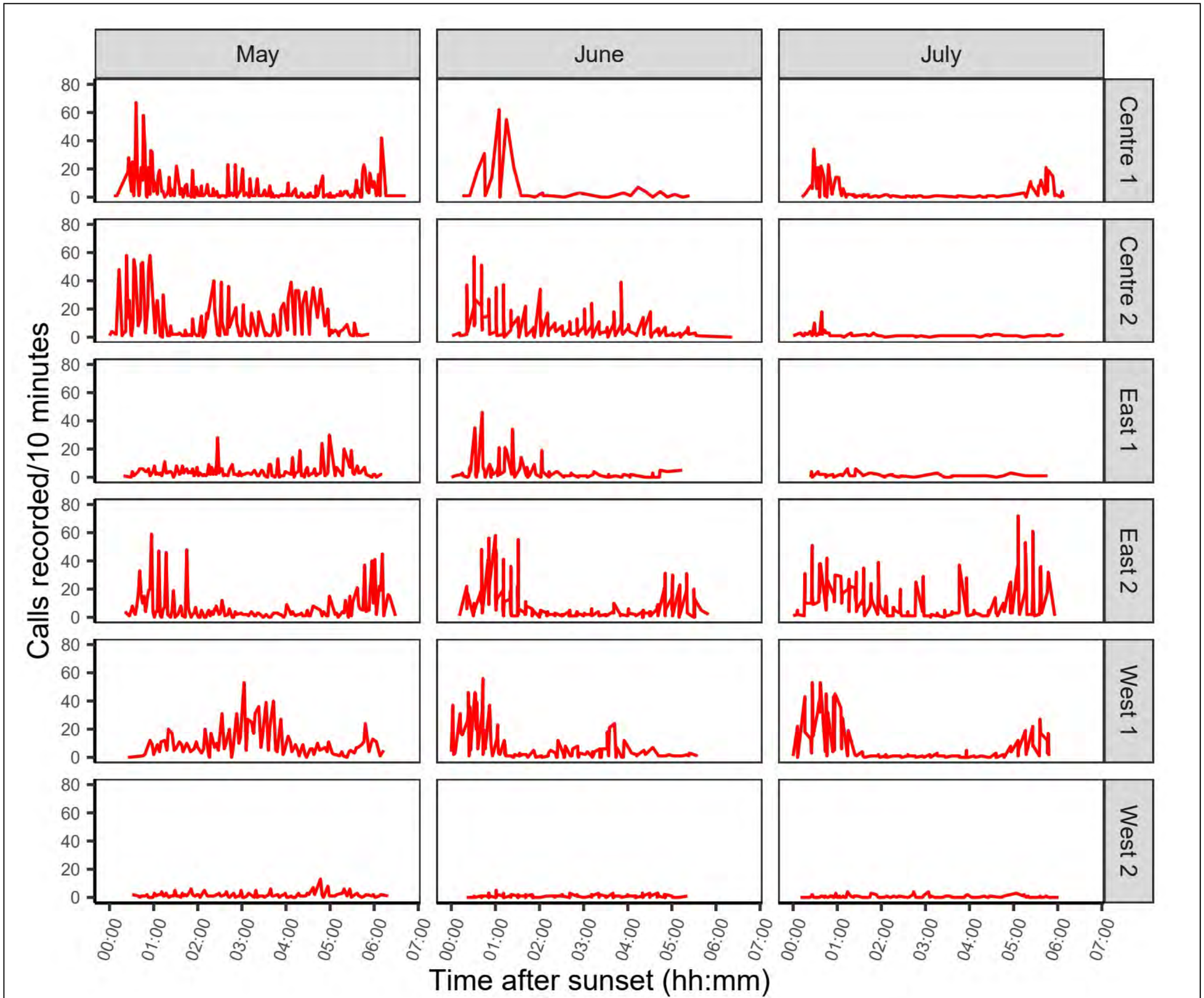

Image Source: RStudio Team (2020). RStudio: Integrated Development for R. RStudio, PBC, Boston.

Legend

Ppyg

Do not scale this map

Client
Kintore Hydrogen Limited

Project
Kintore Substation

Title
Bat Activity Plots (Soprano Pipistrelle) - 2024 Update

Status
FINAL

Drawing No.	Revision	Date
376782-GIS018	A	15 Dec 2023
Drawn	**Checked**	**Approved**
LC	SF	JEP

Rev	Date	Amendment	Initials
A	28 Aug 2024	Data update for 2024 surveys	LC

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