

Kintore Hydrogen Plant Bat Transect and Automated Surveys



January 2024

CONTROL SHEET

Client: Kintore Hydrogen Limited
 Project Title: Kintore Hydrogen Plant
 Report Title: Bat Transect and Automated Surveys
 Document number: 13664
 Project number: 376782

Issue Record

Issue	Status	Author	Reviewer	Approver	Issue Date
1	Final	SF	JEP	GN	18/01/2024
2					

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EXECUTIVE SUMMARY

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

The site is predominantly comprised of arable and pasture farmland, but also includes (and is also immediately adjacent to) watercourses, woodland (including irreplaceable ancient Long – Established Woodland (of Plantation Origin), wetland, scrub, grassland and built-up habitats. Thus, ecological connectivity throughout the site is extensive providing opportunities for commuting and foraging bats. Overall, these habitats were assessed as offering high suitability for foraging and commuting bats.

Transect surveys covered the three main sections of the site, whilst automated static detectors were deployed at six locations within the main areas and the connecting routes between July – September 2023. The results are detailed in Section 3, with data suggestive of the following findings:

- All transects found data suggesting nearby roosts (majority outwith the sites).
- The wetland in the north of the west transect was considered a core sustenance zone for bats with high levels of activity of common pipistrelle, soprano pipistrelle, brown long eared, Daubenton's and Natterer's bat.
- The Silver Burn south of the railway line along the east transect and the woodland, treelines and pond features along the central transect displayed consistently high levels of bat activity throughout the survey period.
- Leisler's bats were identified on three occasions along the west and east transect.

Negative and positive impacts to bats as a result of site development if no mitigation is adopted include:

- Permanent loss of habitat (watercourses, woodland, wetland, grassland and built-up areas) and therefore loss of foraging resource for bats, due to development of the site.
- Fragmentation of commuting and foraging routes.
- Disturbance due to construction and operational works, temporary lighting and vibrations associated with the development and permanent lighting as a result of the final development. These may disrupt foraging and commuting corridors within and adjacent to the site.

Further surveys of the wetland area in the west transect may be required if trees cannot be retained in the development design.

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

Good practice mitigation measures include:

- Development should seek to retain and protect the mature trees, treelines and general woodland features (including ancient and wet woodlands) within and adjacent to the site as far as practicable to maintain adequate foraging provisions and habitat connectivity on site for bat.
- Woodland blocks and treelines that are not scoped for removal, should be adequately protected prior to any works commencing.
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Compensatory measures and enhancement opportunities are recommended in Section 5.3 & 5.4 respectively.

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1 INTRODUCTION

1.1 Terms of Reference

EnviroCentre Ltd. 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.

1.2 Background

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

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.
- 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

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

In reference to Appendix A and Appendix B, 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.

These transects cross watercourses, grassland, gorse scrub, mixed farmland, coniferous plantations, mixed woodland and wetland habitats including wet woodland, lowland fen and purple-moor grass rush pasture. The site boundary is detailed in Appendix A.

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

¹ EnviroCentre (2023) ECRPT 13628 - PEA

Scottish law through the Conservation (Natural Habitats &c.) Regulations 1994 (the “Habitats”) 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.

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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 EclA works to remain consistent.

2.1 Desk Study

A desk study was undertaken in advance of survey work in June 2023. The following sources relevant to bats were checked:

- NatureScot Sitelink² for information on statutory designated sites within 5km of the site, relevant to bats;
- Scotland's Environment Map³ website to locate and identify ancient woodland within or adjacent to the site;
- Aberdeenshire Local Development Plan⁴ 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)⁵ and NBN Atlas⁶ for bat records within 2km of the site which are licenced for commercial use; and
- Scottish Biodiversity List (SBL⁷) and North East Scotland Biodiversity Action Plan (NESBiP) for priority species potentially relevant to the site.

2.2 Bat Activity Transect Survey

Refer to Appendix B for Bat Transect Survey Routes and Static Detector Locations.

The survey was designed and undertaken in reference to the Bat Conservation Trust (BCT): Bat Surveys Good Practice Guidelines⁸.

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, based on the indicated development areas identified in Section 1.4, with habitat type and accessibility main considerations.

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

² NatureScot SiteLink, available from: <https://sitelink.nature.scot/map> (accessed June 2023)

³ Scotland's Environment Map - Ancient Woodland Inventory, Available at: <https://map.environment.gov.scot/sewebmap/> (accessed June 2023).

⁴ ALDP Appendix 12: <https://online.aberdeenshire.gov.uk/ldpmedia/LDP2021/Appendix12LocalNatureConservationSites.pdf> (accessed June 2023)

⁵ NESBReC records obtained in 2022 for central region of site plus 2km radius. NESBReC records available from: <https://nesbrec.org.uk/>

⁶ NBN Atlas, available from: <https://nbnatlas.org/> (accessed June 2023)

⁷ SBL available at: <http://www.gov.scot/Topics/Environment/Wildlife-Habitats/16118/Biodiversitylist/SBL> (accessed June 2023).

⁸ Collins, J. (ed.) (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines, 3rd edition, Bat Conservation Trust.

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 18th & 19th July, 8th August and 5th and 11th September 2023, and led by EnviroCentre Principal Ecologist Gemma Nixon, Senior Ecologist Jennifer Paterson and 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 insight⁹, with the EMT Touch data analysed in device and any files requiring further review using kaleidoscope¹⁰. This analysis was undertaken by 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 July, August and September.

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 (July – September 2023)¹¹.

Comparison to a similar EnviroCentre dataset was undertaken in place of Ecobat¹², (a standardised tool for comparing, analysing and interpreting bat activity data between sites) as it is currently unavailable.

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: <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: 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: >1 pass per night
	Total: >300 calls per night

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 guidelines¹³.

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:

⁹ Titely Scientific - Anabat Insight, Version - 1.9.7-0-g6302e49

¹⁰ Wildlife Acoustics Inc (2021), Kaleidoscope, Version 5.4.9

¹¹ EnviroCentre (2023) ECRPT 13897 – Dunbeg - Bat Survey and Assessment Report

¹² Available at: <http://www.ecobat.org.uk/>

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

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 Scotland¹⁴

Rarity category	Northern Scotland		Score
	Species		
Widespread in (almost) all geographies.	Common pipistrelle (<i>Pipistrellus pipistrellus</i>)	Ppip	Score: 1 each
	Soprano pipistrelle (<i>Pipistrellus pygmaeus</i>)	Ppyg	
Widespread in many geographies, but not as abundant in all.	Brown long eared bat (<i>Plecotus auritus</i>)	Paur	Score: 2 each
	Natterer's bat (<i>Myotis nattereri</i>)	Mnat	
	Daubenton's bat (<i>Myotis daubentoniid</i>)	Mdau	
Rarer or restricted distribution.	Leisler's bat (<i>Nyctalus leisleri</i> ¹⁵)	Nlei	Score: 3 each
	Nathusius pipistrelle (<i>Pipistrellus nathusii</i>)	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 calculated¹⁶:

- 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.

2.4.2 Field Survey

Guidance states transect and automated surveys for high suitability sites are undertaken over the full activity survey season (Apr – Sep), however this survey was not commissioned until late June 2023, as such, survey data for the first half of the 2023 season was not collected. Therefore, assessment of the early season site use by bats cannot be confirmed. However, it is considered the overall assessment of the site is unlikely to differ as a result of this due to the quantity and quality of data collated by surveys across the remainder of the 2023 survey period.

Only dusk transect surveys which were walked in the same route order were undertaken, due to health and safety concerns regarding working within wetland and adjacent to large watercourses with steep banks. This resulted in a lack of variation of survey time at spot checks (e.g. pot checks 1-4 were

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).

always surveyed before sunset). 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. Thus, it is not considered to have affected the assessment of the site.

Due to accessibility issues (cattle in fields and high-water levels at the wetland edge), minor route changes were made to the west transect on the 17th July and the east transect from August 8th onwards. This may have affected the results due to exact spots not being repeatedly surveyed, however, this was not considered to be significant due to the altered routes not being majorly divergent, with similar habitats surveyed.

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 in areas around the whole site to gather supplementary data.

The August central transect EMT data and voice notes 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 July, August and September 2023.

3 RESULTS

3.1 Desk Study

- No statutory designated sites are present within the site.
 - Loch Skene SSSI¹⁷, Ramsar¹⁸ and SPA¹⁹ 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 LNCS²⁰ 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.

3.2 Habitat Description

3.2.1 East Transect

The east transect, where the water pipeline connection options and abstraction discharge point are proposed, comprises the banks of the river Don in the north extent, with mixed farmland, gorse scrub (dense and scattered), asphalt road, woodland (wet and deciduous lowland) early-mature to mature mixed treelines, watercourses and wet ditches. The Dyce to Inverurie railway line also dissects the north extent of the transect.

¹⁷ Site of Specific Scientific Interest – Available at (<https://sitelink.nature.scot/site/1038>) (Accessed June 2023)

¹⁸ Ramsar - Available at (<https://apps.snh.gov.uk/sitelink-api/v1/sites/8442/documents/20>) (Accessed June 2023)

¹⁹ Special Protection Area – Available at (<https://sitelink.nature.scot/site/8536>) (Accessed June 2023)

²⁰ Local Nature Conservation Site – Available at (<https://www.aberdeenshire.gov.uk/media/20028/5a-local-nature-conservation-sites-index.pdf>) (Accessed June 2023)

The surrounding landscape is characterised predominantly by mixed farmland, with blocks of woodlands, treelines, watercourses, farm buildings and associated infrastructure, the town of Kintore to the northwest and the A96 demarcating the south of the transect.

3.2.2 Central Transect

The central transect, where the hydrogen pipeline and gas grid connection is proposed, comprises mixed use farmland with mature woodland bordering the northwest and northeast extent. Small treelines are present along field boundaries in the west and centre. Wet drainage ditches are present along the east extent, with the park burn and a pond present along the south extent, with two further drainage ditches running west to east in the southeast. In the north a building, outhouse and associated garden habitat are present²¹.

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

3.2.3 West Transect

The west transect where the electrolysis plant and grid connection are proposed, comprises mixed use farmland, wetland (comprising lowland fen, purple moor grass rush pasture, wet woodland, native pine woodlands, other coniferous woodland, Deschampsia neutral grassland, lowland dry acid grassland and gorse scrub), treelines and blocks of plantation woodland in the centre and west 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 identified most frequently throughout the transect with common pipistrelle also identified frequently.
- A single Daubenton's bat was recorded along the mature treeline (Spot Count 8) in the centre of the transect in July.
- All bat activity was recorded almost entirely along areas within/ adjacent to treelines and connective gorse scrub, with spot counts 6 and 7 (adjacent to treelines, the silver burn, gorse scrub and mixed farmland) displaying very high activity. However, infrequent passes over open fields to woodland blocks, to the west were also noted.
- Little activity was recorded within and adjacent to the woodland at the south extent of the transect, with only occasional passes of soprano pipistrelle.

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

3.3.2 Central Transect

- Only soprano pipistrelle and common pipistrelle were identified across this transect. Both were identified frequently throughout the surveys, with the soprano pipistrelle identified most often.
- Activity was constant along the west and northeast of the site, particularly adjacent to the woodlands and along adjacent tree and scrub lines.
- Frequent activity was recorded along the central extent of the site, associated with the road and treelines.
- Occasional activity was associated within the southeast of the site, with recordings associated predominantly along the east burn and adjacent drainage ditches.
- A number of common and soprano pipistrelle were recorded foraging over the pond to the southwest of the transect in July.

3.3.3 West Transect

- Only Soprano pipistrelle and common pipistrelle bats were recorded across this transect.
- Activity was very frequent throughout the wetland habitat in the north (Spot Counts 3-5), with common pipistrelle noted most frequently in the east and soprano pipistrelle in the west of this habitat.
- Frequent activity was noted around an individual tree at spot count 4 on 17th July.
- Occasional activity was recorded for the remainder of this transect (Spot Counts 6-15), with activity almost entirely restricted to areas within or immediately adjacent to treelines and occasional passes along field margins.

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 July to September 2023. This should be read in conjunction with Appendix B for static detector locations, Appendix D for the total number of passes, per species, 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.	<ul style="list-style-type: none"> • Moderate overall bat activity was observed throughout the survey period. • Soprano and common pipistrelle displayed peaked numbers of calls at sunset and sunrise in July and August. In September only peaks at sunrise were recorded. • Daubenton’s and brown long eared bats were present throughout the survey period in low but frequent numbers. • Natterer’s bats were present July – August in low numbers. • One call from a Leisler’s bat was recorded across the survey period in August.
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	<ul style="list-style-type: none"> • Fluctuating overall bat activity levels across the survey period were displayed, with moderate activity in July, high activity in August and low activity in September. • In September common pipistrelle activity reduced to 5 hours after sunset (calls extended until approximately 9 hrs after sunset throughout August and September).

	containing small early mature trees also present along road to northeast. Wider landscape dominated by mixed farmland.	<ul style="list-style-type: none"> • Soprano pipistrelle displayed peaks of activity at sunset and sunrise in July, a peak of activity at sunrise in August and a minor peak in activity at sunset. • Brown long-eared bats were recorded throughout the survey period in moderate numbers but were infrequent. • Daubenton's bats were also recorded in July in low and infrequent numbers. • One call from a Leisler's bat was recorded across the survey period in August.
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.	<ul style="list-style-type: none"> • Overall bat activity was moderate in July and high across August and September. • Both soprano and common pipistrelle displayed increasing activity levels as the survey period progressed. • Common pipistrelle displayed peaks in activity at sunset and sunrise throughout the survey period. • Soprano pipistrelle displayed peaks of activity at sunset and sunrise in July, while September displayed consistently high activity throughout the evenings without any clear peaks in activity. • Brown long-eared bats were identified intermittently, in low numbers, between August and September. • Daubenton's and Natterer's bats were recorded intermittently in low numbers in August.
Centre 2 (Between Centre and East Transect)	In treeline immediately south of arable farmland, and immediately north of mature woodland. Treeline is connected to garden habitat and associated individual house 150m to the west.	<ul style="list-style-type: none"> • Overall bat activity in July and August was high, but this decreased to moderate levels in September. • Common pipistrelle displayed minor peaks in activity at sunrise in July and September. In August, peaks in activity were found at sunset and sunrise. • Soprano pipistrelle displayed peaks in activity levels at sunset and sunrise in July. Activity levels were sustainably high throughout the survey period. • Brown long-eared and Daubenton's bats were recorded in low – moderate numbers in July and September, with relatively high numbers recorded in August. • Natterer's bats were recorded in low numbers in August only.
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.	<ul style="list-style-type: none"> • Overall bat activity fluctuated between low – high – low across the survey period. • In August, soprano pipistrelle activity was comparatively high to July and September, with peaks of activity found at sunset and sunrise. • The activity levels of brown long-eared, Daubenton's and Natterer's bats were high in August and September. • One call from a Leisler's bat was recorded in August.
West 2 (Between West and Centre Transect)	Along the north bank of Park Burn, with riparian woodland immediately south, and arable farmland to the north.	<ul style="list-style-type: none"> • Overall bat activity ranged between low, in July, to moderate over August and September. • Common pipistrelle activity was low in July, increasing to moderate over August and September. A peak of activity was observed at sunrise in August. • Soprano pipistrelle displayed low activity in July, increasing to high over August and September. Peaks of activity were identified at sunset and sunrise in July and September, August displayed a peak of activity at sunrise. • Brown long-eared and Daubenton's bats were recorded across the survey period, with activity peaking in August.

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	<i>Ppip, Ppyg, Paur, Mdaub, Mnat, Nlei</i>	11	79	National
East 2	<i>Ppip, Ppyg, Paur, Mdaub, Nlei</i>	9	64	Regional
Centre 1	<i>Ppip, Ppyg, Paur, Mdaub, Mnat</i>	8	57	Regional
Centre 2	<i>Ppip, Ppyg, Paur, Mdaub, Mnat</i>	8	57	Regional
West 1	<i>Ppip, Ppyg, Paur, Mdaub, Mnat</i>	8	57	Regional
West 2	<i>Ppip, Ppyg, Paur, Mdaub, Mnat</i>	8	57	Regional

4 ASSESSMENT AND POTENTIAL IMPACTS

4.1 Bat Assemblage, Activity and Habitat Assessment

4.1.1 Bat Activity Assessment

East

- Consistently high activity shortly after sunset during transects and activity peaks in soprano and common pipistrelle recorded on static East 1 (similar location) at sunset and sunrise in July and August indicate that a roost is likely nearby the Silver Burn south of the railway line and adjacent woodland. This area also links to the River Don, a key commuting route and core sustenance zone for bats.
- Daubenton's bats and brown long-eared bats with occasional presence of Natterer's bats (recorded at East 1 only) at low frequencies, indicates that a variety of bats utilise the area as a commuting route to nearby foraging grounds, rather than as a foraging or roosting resource.
- Infrequent pipistrelle activity was identified along the south of the transect indicating less suitability and use by foraging and commuting bats compared to the northern habitats.

Centre

- Bat activity was focussed along treelines, woodland edges and the pond feature on site throughout the survey period. These linear features and woodlands connect to wider networks of high-quality foraging provisions and roosting opportunities.
- High soprano pipistrelle activity at sunset and sunrise, in July at Centre 1 and Centre 2 indicates the tree lines and woodland edges form part of a core sustenance zones for bats from local roosts.
- The subsequent lack of peaks in August and September may suggest that local summer roosts may have been vacated, with the activity displayed more attributable to foraging and late season swarming activity.

West

- Bat activity for all species (Ppip, Ppyg, Paur, Mnat, Mdau, Nlei) was focussed within the wetland, native ancient woodland and surrounding grasslands in the north extent of the site throughout the survey period. These form a core sustenance zone for bats. They also provide further high-quality commuting corridors and roosting opportunities for bats.
- The tree associated with high bat activity during the July transect, is considered likely to contain a roost²². The high level of soprano pipistrelle activity throughout August, is likely attributable to increased foraging from this roost as a result of adult bats and fledglings.
- Small peaks of soprano and common pipistrelle at sunrise and frequent brown long eared and Daubenton's bats, and occasional Natterer's bats at West 2 throughout the survey period are indicative of this area being a commuting corridor, with the potential to be a core sustenance zone for a range of bat species.

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

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 of **regional** importance. Therefore, the features (watercourses treelines, woodland and wetland etc.) identified as being utilised throughout the survey period contribute to sustaining this regionally important bat assemblage.

4.2 Potential Impacts

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

- 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 bats.
- Disturbance due to temporary lighting and vibrations associated with works and permanent lighting as a result of the development.
- Permanent disturbance to commuting and foraging bats within and adjacent the site, due to lighting and noise disturbance, associated with operational activities.
- Roosting, commuting and foraging provisions could be enhanced post development with the adoption of suitable bat roosting features in/ on buildings and remaining trees on site and incorporating bat friendly landscaping and lighting into the development design.

5 FURTHER SURVEY, MITIGATION AND ENHANCEMENT

5.1 Further Survey

No roosts were identified along the east and central transects. Therefore, no further surveys are advised along these areas. With the appropriate mitigations detailed below, impact and disturbance to roost features should be avoidable, and therefore further surveys on these trees is not recommended.

From the further potential roost feature surveys undertaken in October 2023²³, the tree associated with the west transect in the wetland area, considered to potentially contain a roost, was assessed as offering high potential for roosting bats. Therefore, if the development design cannot seek to retain this tree and surrounding wetland habitat, further targeted surveys will be required (which may include further transect work covering a full activity season (Apr-Sep inclusive)).

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

At this stage no further bat activity surveys for these areas and no licensing from NatureScot is currently required. However, this will be reviewed following provision of the development design.

5.2 Mitigation

The below outlines good practice mitigation measures to be considered prior to and during re-development works commencing.

- Development should seek to retain and protect the mature individual trees, mature treelines and general woodland features (including ancient and wet woodlands) within and adjacent to the site as far as practicable to maintain adequate foraging provisions and habitat connectivity on site for bat.
- The mature tree in the wetland suspected to contain a roost should 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.
- Woodland blocks and treelines that are not scoped for removal, should be adequately protected prior to any works commencing.
- The lowland fen, purple-moor grass, wet woodland habitat and ancient woodland habitats in the northwest of the site should be retained and protected as far as practicable. This is to maintain a high-quality foraging and commuting resource, that is also considered to provide high potential roosting opportunities for bat.
- All site contractors should be aware as part of the onsite induction process that bats are known to be on site and what mitigation is in place to protect them and what to do if a bat is identified on site during works.
- Clearance works should be scheduled to commence October to March inclusive to avoid the main bat activity season and avoid constraints in relation to roosting bats.
- Any lighting used during development works and post development should be sympathetic to wildlife and not illuminate adjacent green space on site, which will impact bats and other crepuscular wildlife in the locale.

²³ ECREP13665_Kintore Hydrogen Plant_PRF Surveys_Final

- Works causing loud noise and vibration May to August inclusive (main activity season) should be limited to daylight hours to avoid intolerable disturbance to foraging and commuting bats in the locale, where possible.
- Bat roost boxes can be installed on established trees within woodland and treelines adjacent to the route and development site. Bat boxes are best located with a south facing orientation. Further details can be found here: http://www.bats.org.uk/pages/new_build.html.
- Bat friendly external lighting may be installed to reduce any impact to commuting and foraging bats in the wider landscape. Further details can be found here: http://www.bats.org.uk/pages/bats_and_lighting.html.

5.3 Compensation

- Landscaping of the site should seek to replace and improve green infrastructure and encourage long term habitat connectivity to the wider landscape by planting native and nectar producing flowering plants, trees and shrubs that link within the site and to adjacent green infrastructure. Further details can be sought here: <http://www.bats.org.uk/pages/landscapedesign>.
- 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 enhancements should be delivered as a commitment to the planning application:

- Future landscaping of the site should aim to maintain and enhance existing green infrastructure and encourage long-term habitat connectivity to the wider landscape.
- Additional planting of native trees to reinforce the existing woodland on site and species rich wildflower grassland (at least 4m in width) would further enhance the commuting and foraging resources for bats within the surrounding area. Sourcing trees and grass seeds of local provenance (Scottish seed and tree producers) is key to achieving the best biodiversity outcome.
- Sustainable Drainage Systems (SuDS) landscaped to create biodiverse urban wetland, providing a valuable breeding and foraging resource for invertebrates, herpetofauna, birds and small mammals, including a foraging resource for bats. Typical construction for wildlife benefit:
 - A permanently wet central area with a minimum surface area of 200m²;
 - 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
- If any trees are required to be felled/limbed as part of construction works, the felled wood should be retained to construct log piles within the proposed development. Log piles provides a feeding and housing resource for insects which are a prey source for bat species.
- Bat roost boxes can be installed externally or integrated into new build design; they could also be installed on established trees within the proposed multi-use development. Bat boxes are best located with a south facing orientation, at least 3m high and away from artificial lighting. Further details can be found here: http://www.bats.org.uk/pages/new_build.html.

- Woodcrete and reed insect blocks or ‘bug hotels’ should be installed to provide shelter for insects which may be present. Bug hotels may be installed on retained trees or fence posts. Attracting insects to the site increases prey resource for bat species.

The above measures are a significant contribution to the overall biodiversity value of the site for bats.

APPENDICES

A SITE LAYOUT PLAN

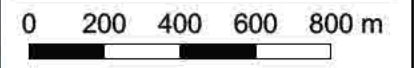







KINTORE HYDROGEN PLANT

Date: 07-07-2023

Paper size: A3

Scale: 1:20,000



- Key:**
-  Electrolysis plant and grid connection
 -  Existing and proposed access roads
 -  Hydrogen and water pipeline connections
 -  Hydrogen pipeline and gas grid connection
 -  Water pipeline connection options and abstraction discharge point



DEVELOPMENT ELEMENTS PLAN

FIGURE 4

Status: DRAFT

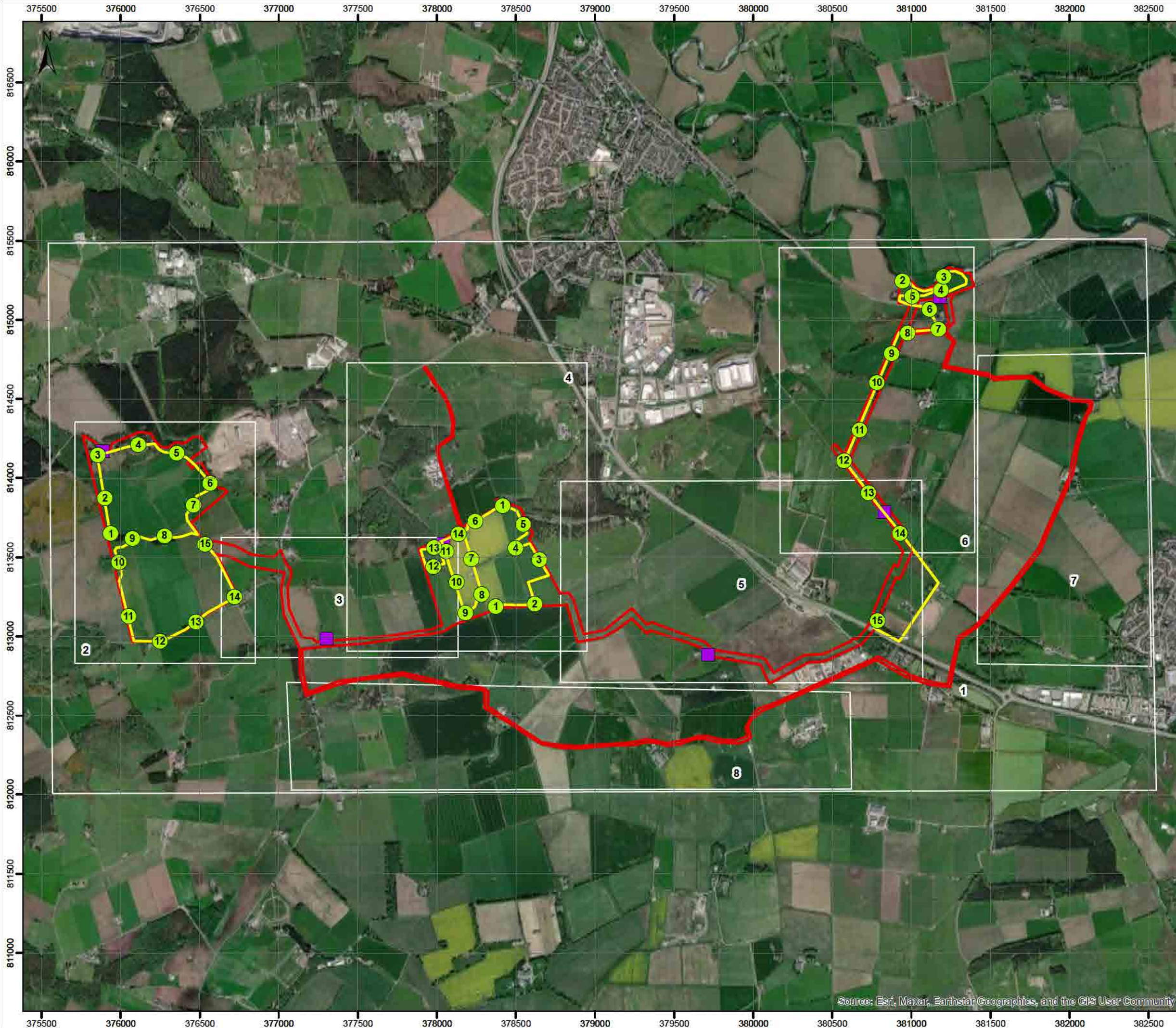
Revisions: V2

Drawn by: Rhys Williams

Approved by: Tom Dearing

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B BAT TRANSECT SURVEY PLAN



Legend

- Hydrogen Development Area
- Spot Count Location
- Transects
- Static Detector Locations

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 Client
 Kintore Hydrogen Limited

Project
 Kintore Hydrogen Plant

Title
 Bat Transect Survey Route Plan
 Page 1 of 8

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Legend

- ▭ Hydrogen Development Area
- Spot Count Location
- Transects
- Static Detector Locations

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Legend

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Project
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- ▭ Hydrogen Development Area
- Spot Count Location
- Transects
- Static Detector Locations

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Title
 Bat Transect Survey Route Plan
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- Hydrogen Development Area
- Spot Count Location
- Transects
- Static Detector Locations

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Title
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- Hydrogen Development Area
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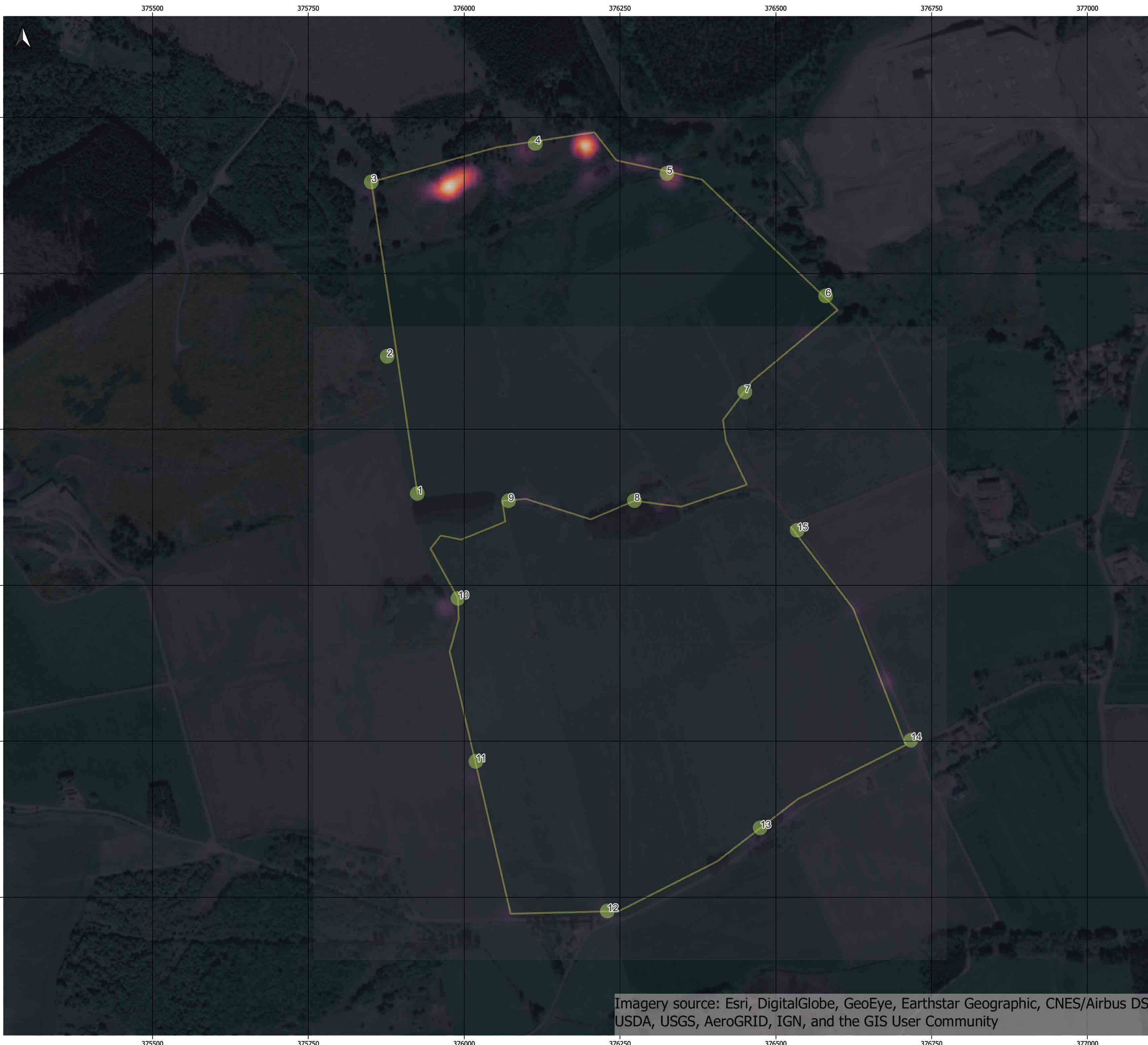
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C BAT TRANSECT HEAT MAPS



Legend

- Transect Route
- Spot Count Location

400 Intensity of Bat Activity

0

Do not scale this map

Client
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Project
Kintore Hydrogen Plant

Title
Bat Transect - West - Heat Map

Status
FINAL

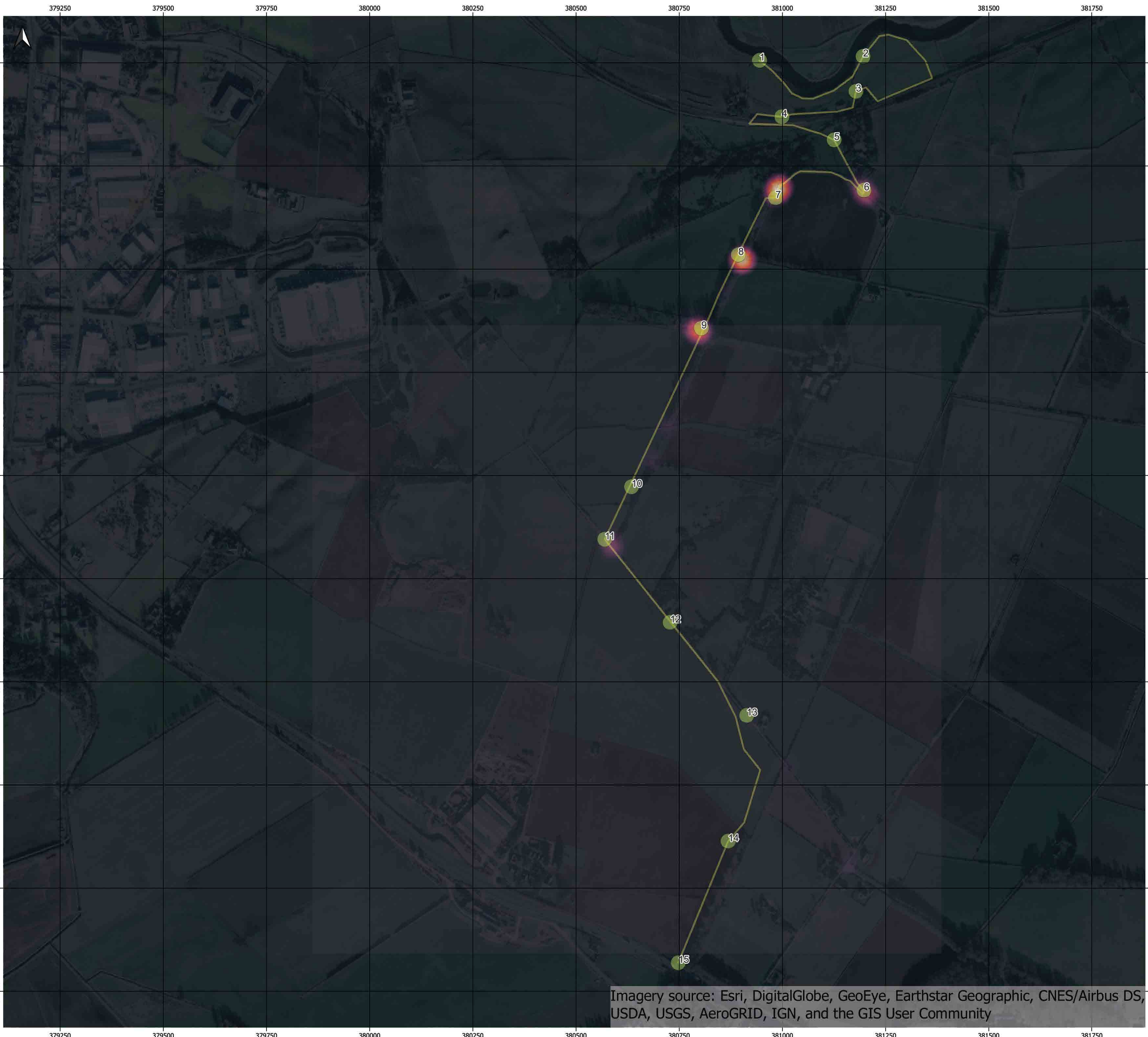
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Legend

- Transect Route
- Spot Count Location

400 Intensity of Bat Activity

0

Do not scale this map

Client
Kintore Hydrogen Limited

Project
Kintore Hydrogen Plant

Title
Bat Transect - East - Heat Map

Status
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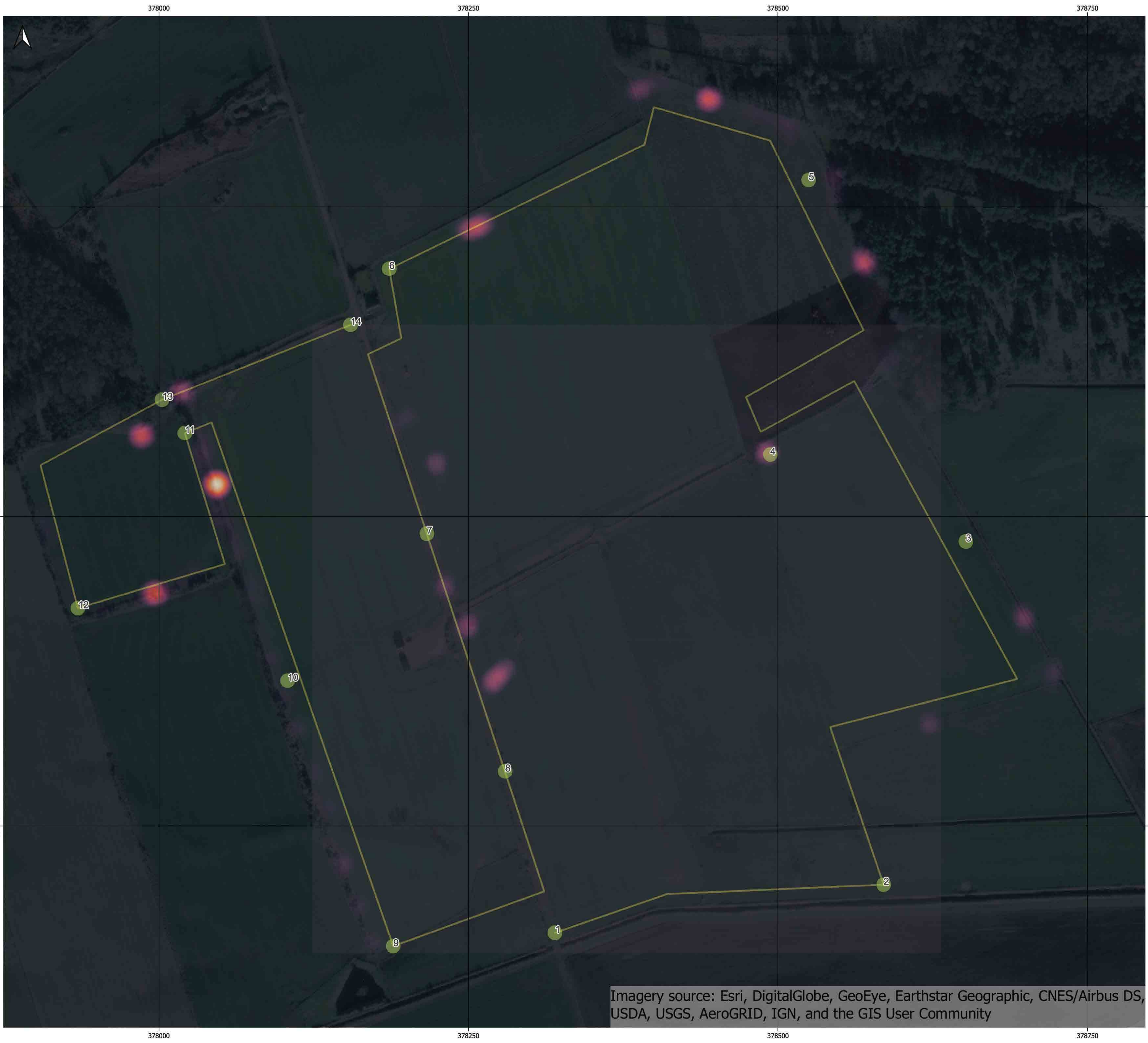
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Legend

- Transect Route
- Spot Count Location

400 Intensity of Bat Activity

0

Do not scale this map

Client
Kintore Hydrogen Limited

Project
Kintore Hydrogen Plant

Title
Bat Transect - Centre - Heat Map

Status
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Drawing 376782-QGIS020	Revision -	Date 18 Jan 2024
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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	July	August	September	July	August	September
Common pipistrelle	2.6	15.0	9.0	22.6	86.5	59.1
Soprano pipistrelle	10.9	488.9	37.6	26.7	116.0	120.4
Brown long-eared bat	0.2	7.4	2.2	0.6	2.2	0.4
Daubenton's bat	0.4	7.0	2.0	0.4	2.8	1.1
Natterer's bat	0.0	20.4	2.0	0.0	0.7	0.0
Leisler's bat	0.0	0.1	0.0	0.0	0.0	0.0
Total Avg Calls Per Night	17.7	539.6	55.6	52.1	212.5	185.7

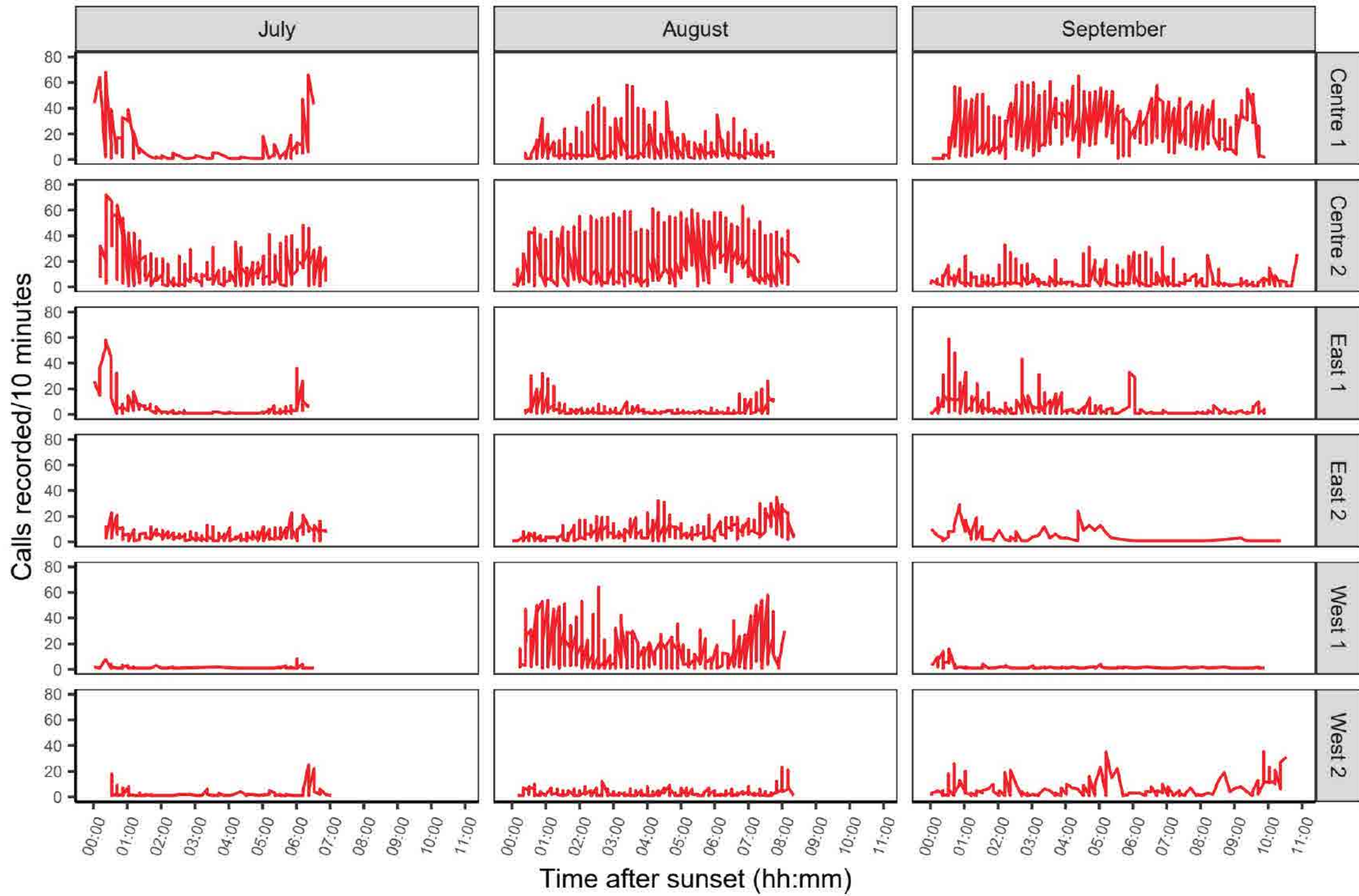
Automated Static Bat Survey Results - Centre

Avg Count Per Night	Centre 1			Centre 2		
Species	July	August	September	July	August	September
Common pipistrelle	29.9	314.5	834.5	74.7	234.3	22.9
Soprano pipistrelle	119.3	319.0	1082.8	490.3	983.7	177.5
Brown long-eared bat	0.0	1.6	1.0	0.5	6.9	0.1
Daubenton's bat	0.0	0.5	0.3	0.2	3.0	0.6
Natterer's bat	0.0	0.3	0.0	0.0	0.7	0.0
Leisler's bat	0.0	0.0	0.0	0.0	0.0	0.0
Total Avg Calls Per Night	149.3	636.6	1955.5	565.8	1229.3	204.0

Automated Static Bat Survey Results - East

Avg Count Per Night	East 1			East 2		
Species	July	August	September	July	August	September
Common pipistrelle	55.1	30.4	19.8	83.2	731.9	9.5
Soprano pipistrelle	98.0	116.9	149.6	185.0	357.0	84.5
Brown long-eared bat	0.6	3.9	5.3	0.8	0.6	0.3
Daubenton's bat	1.7	3.9	3.3	0.3	0.0	0.0
Natterer's bat	0.0	0.9	0.0	0.0	0.0	0.0
Leisler's bat	0.0	0.1	0.0	0.0	0.1	0.0
Total Avg Calls Per Night	172.3	156.5	190.5	273.3	1122.9	94.8

E AUTOMATED STATIC BAT SURVEY ACTIVITY PLOTS



Legend

— Ppyg

Do not scale this map

Client
Kintore Hydrogen Limited

Project
Kintore Substation

Title
Bat Activity Plots (Soprano Pipistrelle)

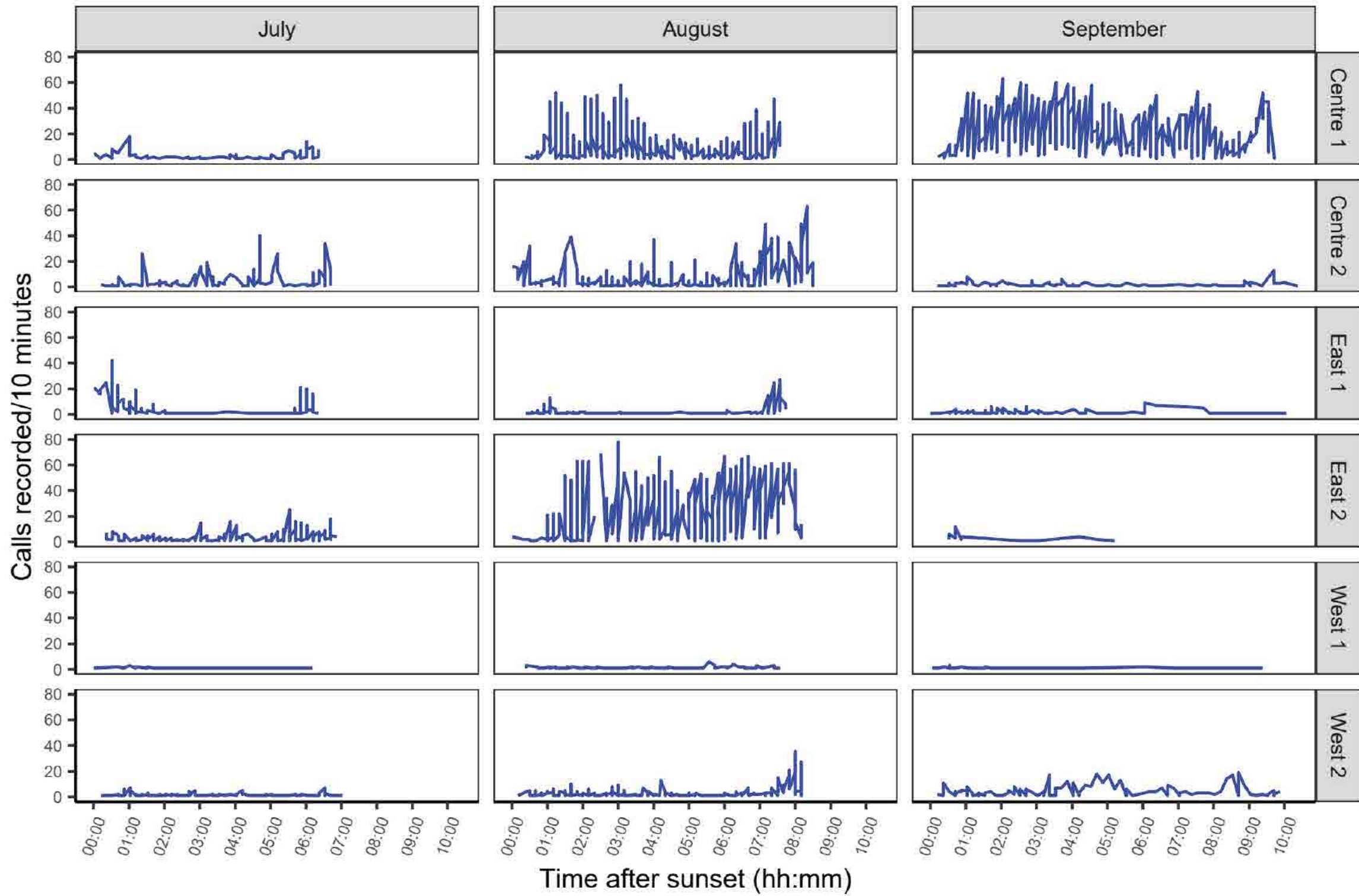
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Legend

— Ppip

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Project
Kintore Substation

Title
Bat Activity Plots (Common Pipistrelle)

Status
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Drawing No. 376782-GIS018	Revision -	Date 17 Jan 2024
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