

Bat Activity Survey

Land adjacent
Sesswick Way
Wrexham
LL13 0PA

For
SCALES Consultancy



Gritstone ecology

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1 Introduction

1.1 Purpose of the report

The report is written by Stewart Bradshaw, for SCALES Consultancy. Stewart carried out walked transect surveys of an area of arable farmland adjacent Sesswick Way, Wrexham, to provide supporting information for a planning application.

1.2 Survey aims

The aim of the survey was to determine the species present on site, the level of use of the site by foraging & commuting bats, and to identify features of importance for bats.

1.3 Surveyor details

Stewart is licenced to disturb, take and handle all species of bats in all counties of Wales under licence number 75887:OTH:CSAB:2017. He has more than 10 years experience in ecological consultancy, including the planning and preparation of bat surveys, and mitigation licences.

1.4 Proposed development

The development proposals are for the construction of two 8ha glasshouses and supporting infrastructure on an area of arable farmland.

The majority of the land affected is arable farmland. However, a low number of mature trees, and areas of hedgerow will be removed to facilitate the development.

1.5 Site context

The site is an area of arable farmland on the eastern outskirts of Wrexham. The site is bounded by a water treatment works and solar farm to the west, Cefn Road & the River Clywedog to the north, Sesswick Way to the east, and by the line of a former railway to the south.

There are rivers, ponds, arable farmland, hedgerows & mature trees, and busy well-lit roads within 50m of the site. Habitat within 500m includes housing and busy roads, industrial buildings, arable and pasture, hedgerows, mature trees, blocks of woodland, ponds & watercourses.

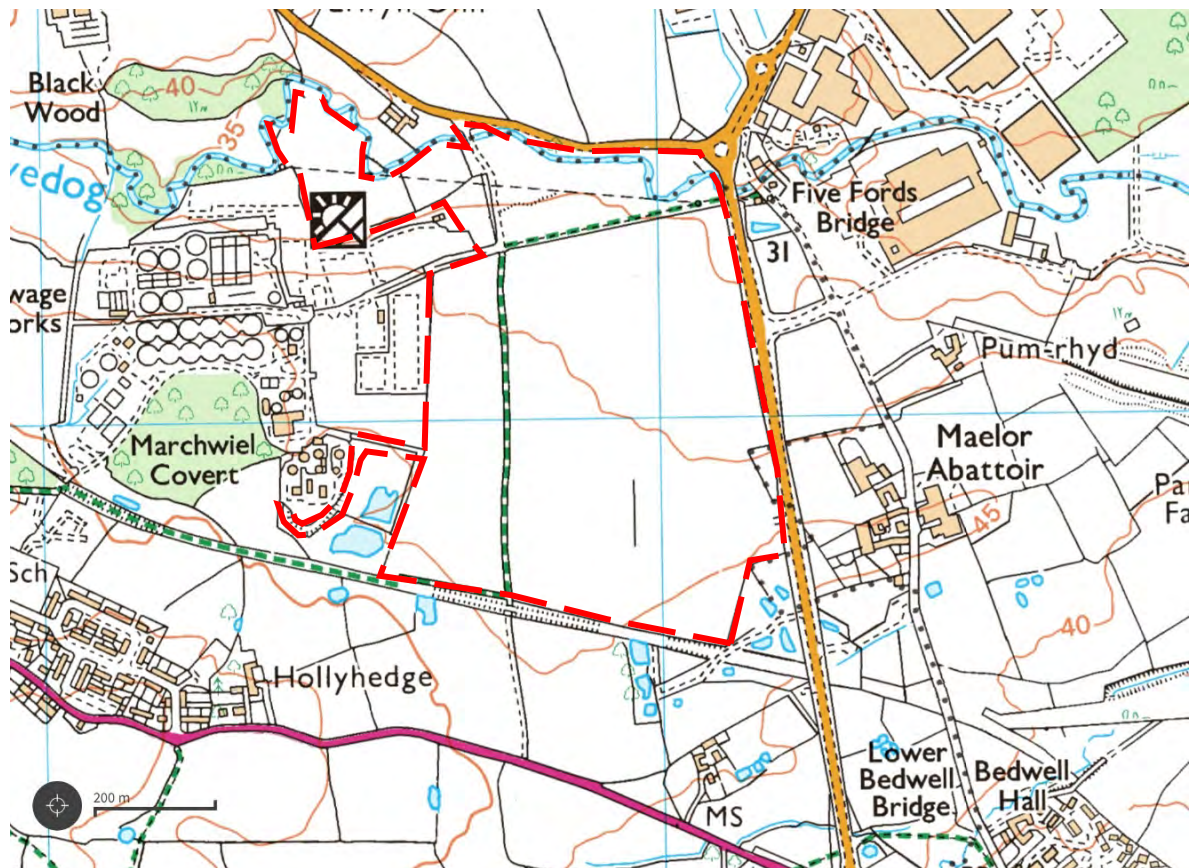
The majority of the site area is arable farmland, which presents low quality habitat for bats. Hedgerows, watercourses and treelines on the site boundary provide potential foraging and commuting habitat, and mature trees may provide suitable roosting habitat.

The site is bounded to the west by Five Fords Water Treatment Works, and a solar farm, which are illuminated by artificial lighting through the night. Sesswick Way to the west is partially lit by high level road lighting. The northern and southern site boundaries are relatively undisturbed.

The majority of the site area provides low quality habitat for bats, with higher value features along the site boundaries, and in individual trees.



1.6 Site location



1.6a – Site location with boundary marked in red.



1.6b – Aerial photograph with boundary marked in red.



2 Methods

2.1 Survey timings

Transect surveys were completed on 30th June, 21st July, and 21st August 2020, in weather conditions suitable for bat activity.

2.2 Desk study

A full range of ecological surveys are being carried out by Greenlight Ecological Consultancy Limited, to provide supporting information for the scheme. Survey information including desk studies were reviewed prior to writing this report.

2.3 Habitat assessment

The habitat on site and in the surrounding area was assessed using Ordnance Survey mapping, and aerial photography. Habitat features on site, and those in the surrounding area were assessed for their suitability for use by bats during the site visit.

2.4 Transect survey method

Desk study information was used to determine habitat features on site, features likely to be used by bats in flight, and transect routes for the surveys.

Ecologists then walked the transect routes for two hours at a constant speed, recording observations of bats along the route. Where possible the number of bats seen, species, type of activity, and direction of flight, was recorded.

Bat calls are automatically recorded, and the location of the calls GPS tagged to allow more detailed analysis of the calls, and to plot call locations on a map.

The transect start points and directions were varied to ensure that different areas of the transect route were walked, at different times relative to sunset.

Additionally, static bat detectors were deployed to record bat activity over a longer period.

2.5 Equipment

The equipment listed below was available for use during the surveys and was used where required.

Elekon Batlogger M – full spectrum bat detector. The Elekon Batlogger M - records bat echolocation calls in high quality, along with temperature and GPS location data. The information is stored on an SD card, and later analysed in detail using Elekon Bat explorer software.

Elekon Batlogger A+ – full spectrum bat detector. The Elekon Batlogger A+ - records bat echolocation calls in high quality, along with temperature. The information is stored on an SD card, and later analysed in detail using Elekon Bat explorer software. A separate GPS device was used to synchronise call times and locations.

Motorola two way radios, were used to relay information between surveyors.

2.6 Survey limitations

The first survey on 30th June had to be cut short by approximately 30 minutes because of torrential rain.

During the third survey on 21st August the maize crop was above two metres, making movement around the field boundaries, and visual observation of bats, difficult in some areas. As a result, it



was not possible to walk a section of transect B (the eastern side of the site) which passes a remnant hedgerow in an arable field.

3 Results

3.1 Transect survey route



3.1a – The site was split into two transect routes, Transect A to the west, Transect B to the east.

Transect A covers the western half of the site. The northern section of the transect includes a river with tree lined banks, an arable field planted with maize, and a solar farm. The southern section of the transect includes an arable field planted with barley, a well-lit water treatment plant on the western boundary, a tree lined former railway line to the southern boundary, and a farm track with hedgerows and occasional trees on the eastern boundary.

Transect B covers the eastern half of the site. The northern section of the transect includes a river with tree lined banks, an arable field planted with maize, and a tree lined embankment. The southern section of the transect includes a farm track with hedgerows and occasional trees on the western boundary, a tree lined former railway line to the southern boundary, and hedgerows & trees adjacent Sesswick Way to the eastern boundary. The northern section of Sesswick Way is illuminated by high level lighting which spills into the field.

Although there are no ponds within the site boundary, there are ponds within 50m, to the southwest & southeast corners of the transect routes.



3.2 Summary results



3.2a – Aerial photograph with location & species of all bats recorded during the transects.

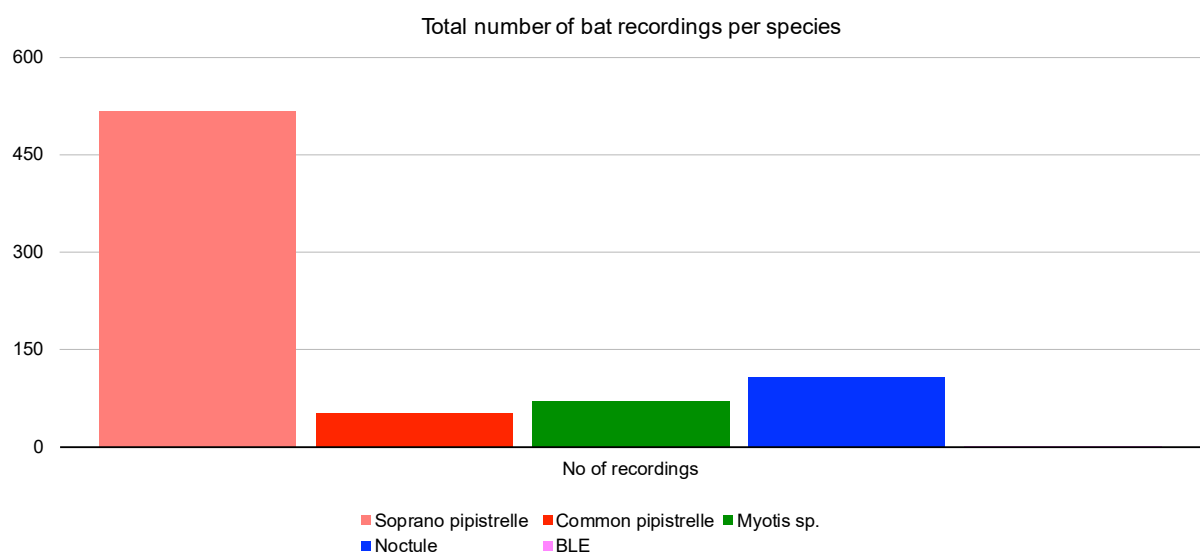


Table 1

Species	Soprano pipistrelle	Common pipistrelle	Myotis sp.	Noctule	BLE
No of recordings	517	53	69	107	1

3.2b – Total number of recordings per species.



Species recorded during the surveys include soprano pipistrelle *Pipistrellus pygmaeus*, common pipistrelle *Pipistrellus pipistrellus*, noctule *Nyctalus noctula*, Myotis sp, including *Myotis Daubentonii*, and brown long-eared bats *Plecotus auritus*.

The species most commonly recorded, and typically the first species recorded during the surveys, was the soprano pipistrelle which was recorded 517 times. Noctule bat calls were the second most frequently recorded species and were recorded 107 times, possibly as a result of their loud echolocation calls. Myotis sp were recorded 69 times Common pipistrelle were recorded 53 times, and brown long eared bats were recorded once.

The maximum number of bats seen together in flight at any one time was two.

Foraging activity was recorded along the northern, western, & southern boundaries, and adjacent to ponds in the southwest corner.

Bat activity alongside Sesswick way was limited to quick commuting passes by common pipistrelle, and noctules.

A single brown long eared bat call was recorded on the northern boundary adjacent the River Clywedog .

No horseshoe bats were recorded during the surveys.



3.3 June transect



3.3a – Aerial photograph with location & species of bats recorded during the June transect.

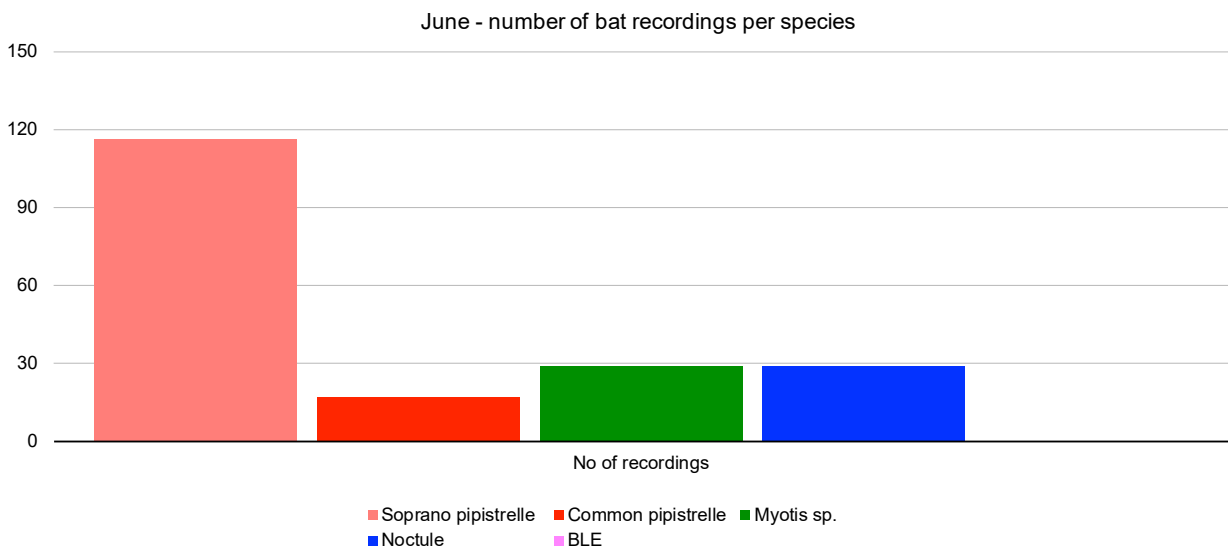
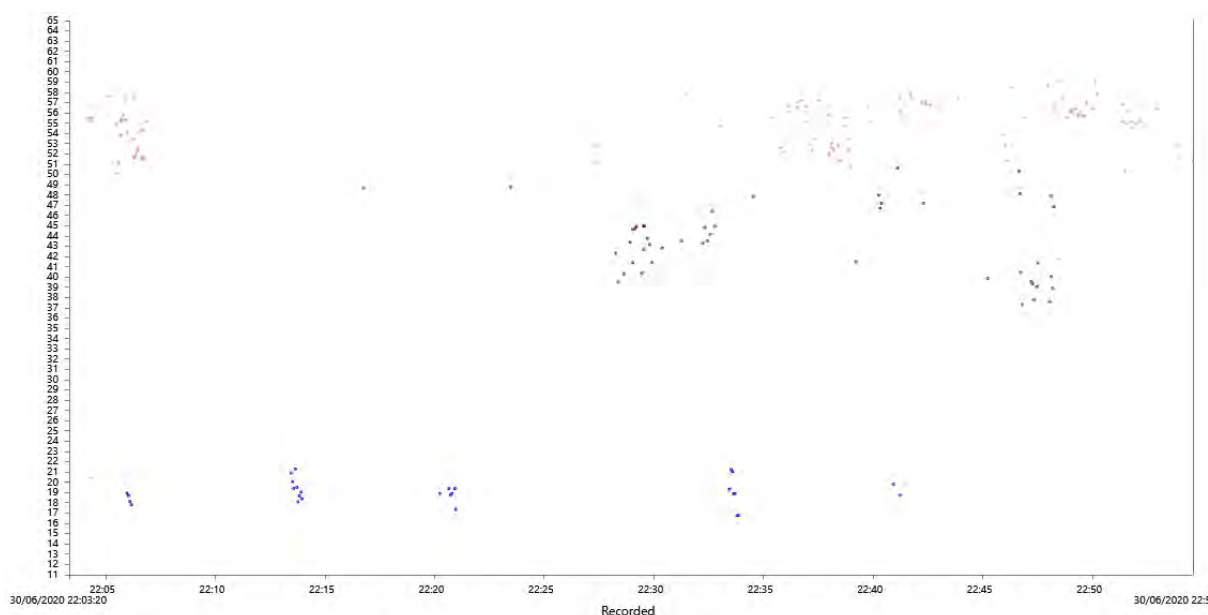


Table 1

Species	Soprano pipistrelle	Common pipistrelle	Myotis sp.	Noctule	BLE
No of recordings	116	17	29	29	0

3.3b – Total number of recordings per species during the June transect.





3.3c – Species, frequency and recording times during the June transect.

Date	30/06/20	Survey type	Dusk		
Sunrise / Sunset	21:41	Survey start	21:40	Survey end	23:40
Surveyors					
Surveyor		Position		Equipment	
Stewart Bradshaw		Transect B		Batlogger M	
Chris Ryan		Transect A		Batlogger A+ & GPS	
Weather					
Temperature	Wind	Rain	Cloud	Other	
15°C	Still	Dry	50%	N/A	
Description					
Warm cloudy evening following a warm dry day. Lots of midges and other insect prey present during survey.					
Limitations					
Transect was stopped early as torrential rain started approximately 90 minutes into the transect. The southern section of transect A, and northern section of transect B were not completed.					

3.3d – Weather conditions, timings, and surveyor information.

Summary of activity

Transect routes were walked in an anti-clockwise direction. Species recorded during the surveys include soprano pipistrelle *Pipistrellus pygmaeus*, common pipistrelle *Pipistrellus pipistrellus*, noctule *Nyctalus noctula*, and Myotis sp, including *Myotis Daubentonii*.

The first species recorded and the species most commonly recorded during the survey was the soprano pipistrelle which was recorded 116 times. Noctule & Myotis sp. bat calls were the second



most frequently recorded and were recorded 29 times. Common pipistrelle were recorded 17 times. No other species were recorded.

The maximum number of bats seen together in flight at any one time was two.

Foraging activity was recorded along the northern, western, & southern boundaries, and adjacent to ponds in the southwest corner.

Bat activity alongside Sesswick way was limited to quick commuting passes by common pipistrelle, and noctules.

A single pass by a soprano pipistrelle was recorded at the northern end of the remnant hedgerow in the large arable field in Transect B.



3.4 July transect



3.4a – Aerial photograph with location & species of bats recorded during the July transect.

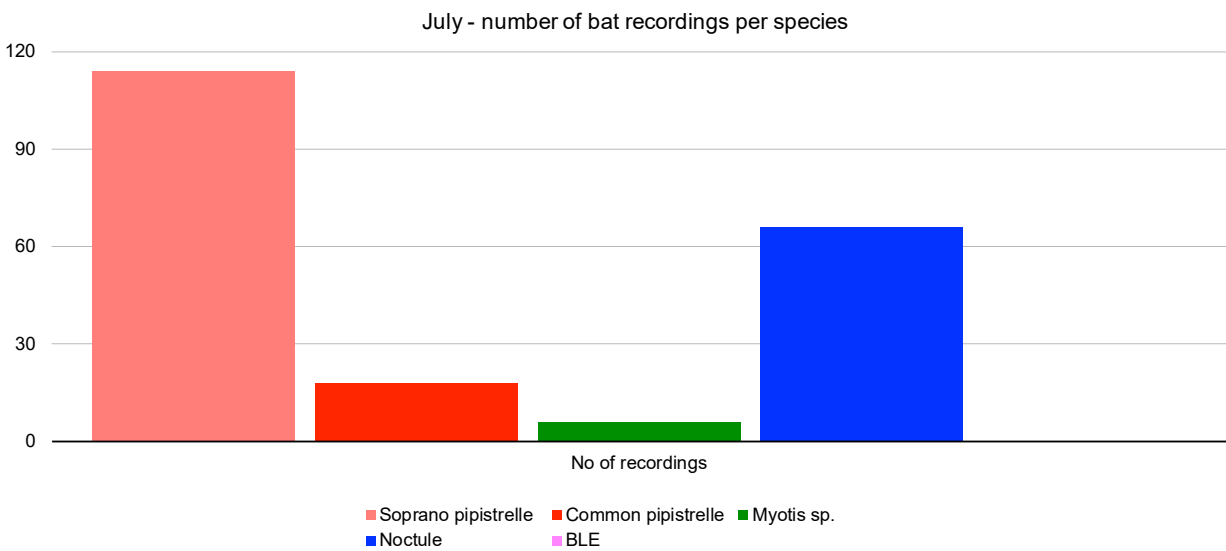
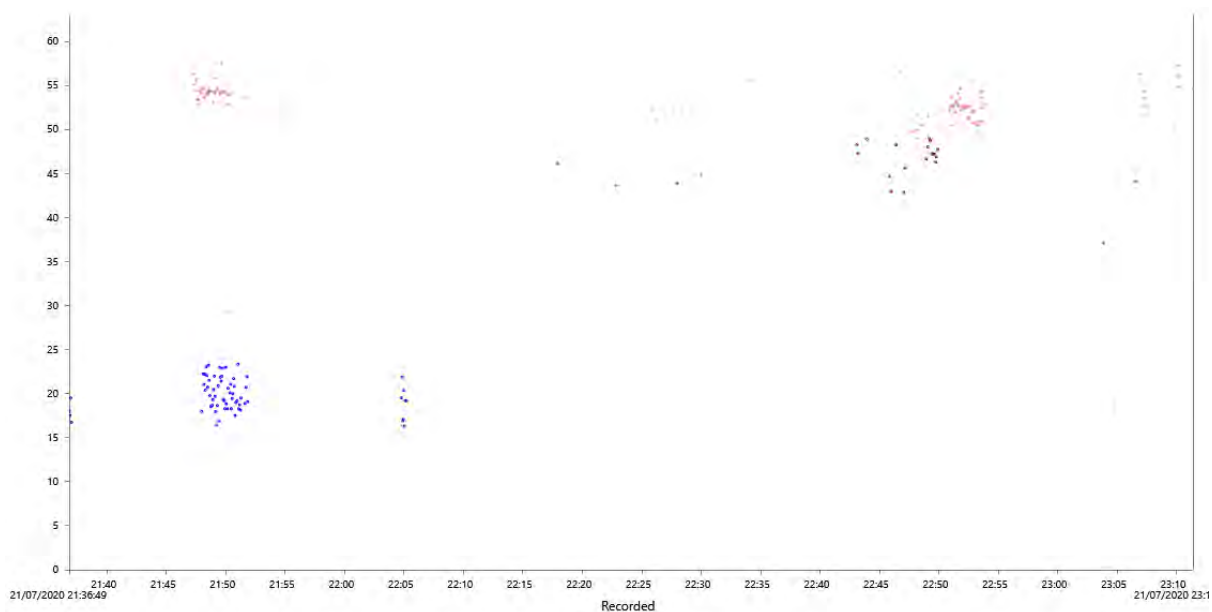


Table 1

Species	Soprano pipistrelle	Common pipistrelle	Myotis sp.	Noctule	BLE
No of recordings	114	18	6	66	0

3.4b – Total number of recordings per species during the July transect.





3.4c – Species, frequency and recording times during the July transect.

Date	21/07/20	Survey type	Dusk		
Sunrise / Sunset	21:22	Survey start	21:20	Survey end	23:25
Surveyors					
Surveyor		Position		Equipment	
Stewart Bradshaw		Transect B		Batlogger M	
Chris Ryan		Transect A		Batlogger A+ & GPS	
Weather					
Temperature	Wind	Rain	Cloud	Other	
13°C	Still	Dry	10%	N/A	
Description Warm evening following a warm dry day. Lots of midges and other insect prey present during survey.					
Limitations None					

3.4d – Weather conditions, timings, and surveyor information.

Summary of activity

Transect routes were walked in a clockwise direction. Species recorded during the surveys include soprano pipistrelle *Pipistrellus pygmaeus*, common pipistrelle *Pipistrellus pipistrellus*, noctule *Nyctalus noctula*, and Myotis sp, including *Myotis Daubentonii*.

The first species recorded and the species most commonly recorded during the survey was the soprano pipistrelle which was recorded 114 times. Noctule bat calls were the second most frequently recorded and were recorded 66 times. Common pipistrelle were recorded 18 times. Myotis sp. were recorded 6 times. No other species were recorded.



The maximum number of bats seen together in flight at any one time was two.

Foraging activity was recorded along the northern, & southern boundaries, and adjacent to ponds in the southwest corner. Two soprano pipistrelle were recorded foraging along the River Clywedog

.

Bat activity alongside Sesswick way was limited to quick commuting passes by two noctules which came onto the site from the east.

There was a comparatively large amount of noctule activity on the southern boundary, with at least two bats foraging over the treeline.



3.5 August transect



3.5a – Aerial photograph with location & species of bats recorded during the August transect.

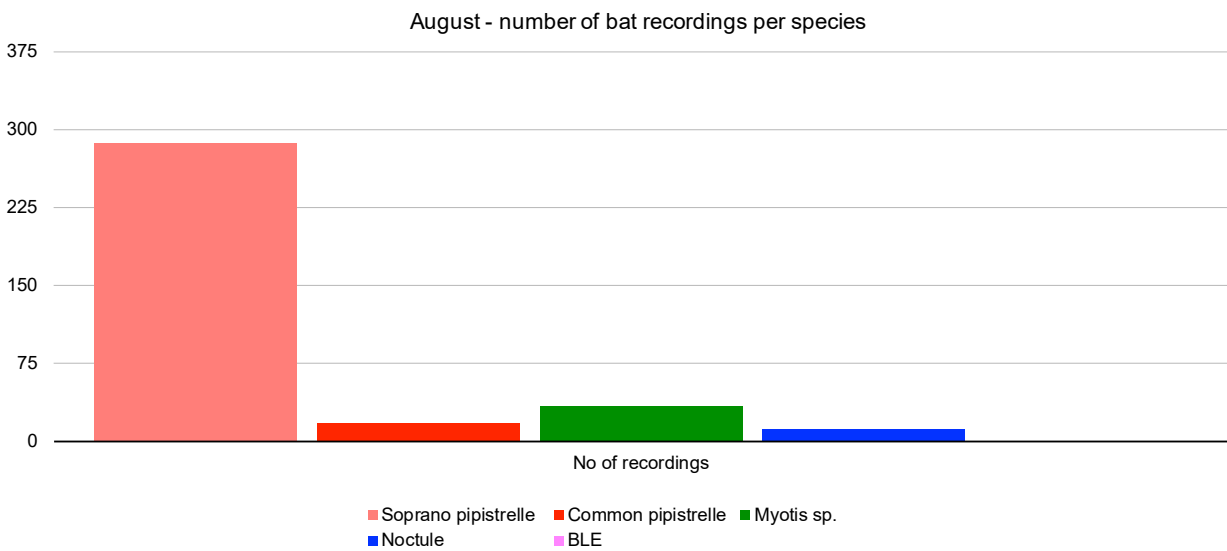
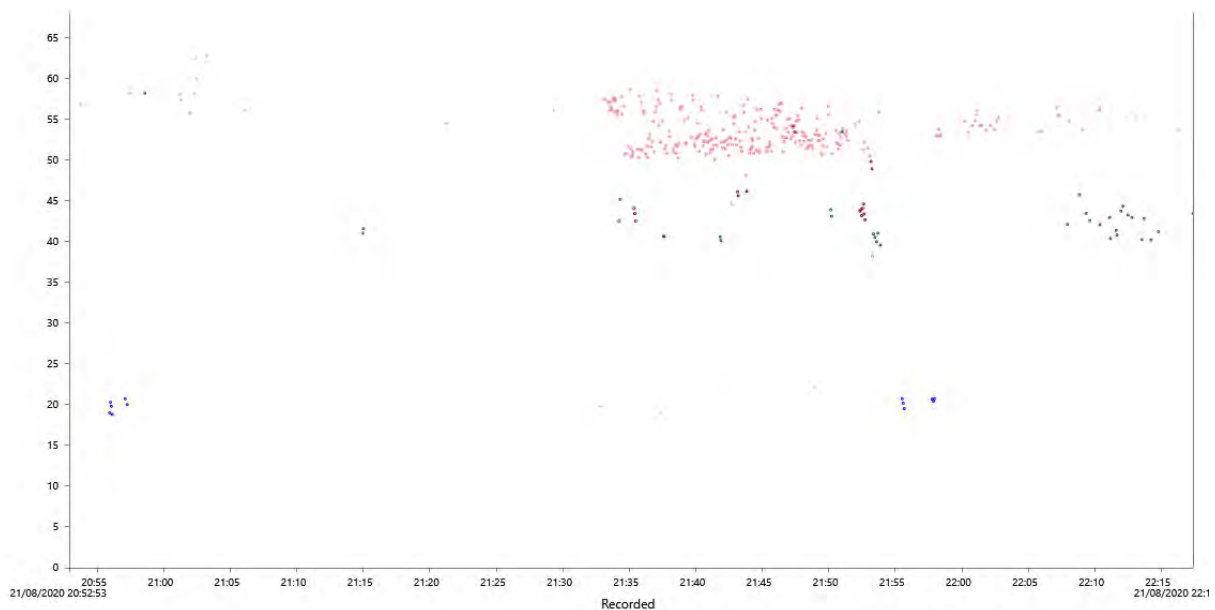


Table 1

Species	Soprano pipistrelle	Common pipistrelle	Myotis sp.	Noctule	BLE
No of recordings	287	18	34	12	1

3.5b – Total number of recordings per species during the August transect.





3.5c – Species, frequency and recording times during the August transect.

Date	21/08/20	Survey type	Dusk		
Sunrise / Sunset	20:25	Survey start	20:25	Survey end	22:25
Surveyors					
Surveyor		Position		Equipment	
Stewart Bradshaw		Transect B		Batlogger M	
Chris Ryan		Transect A		Batlogger A+ & GPS	
Weather					
Temperature	Wind	Rain	Cloud	Other	
18°C	Light breeze	Dry – rain earlier	100%	N/A	
Description Warm evening following a warm dry day. Lots of midges and other insect prey present during survey.					
Limitations Unable to access remnant hedgerow in centre of Transect B, as maize is too high, and too dense.					

3.5dc – Weather conditions, timings, and surveyor information.

Summary of activity

Transect routes were walked in an anti-clockwise direction. Species recorded during the surveys include soprano pipistrelle *Pipistrellus pygmaeus*, common pipistrelle *Pipistrellus pipistrellus*, noctule *Nyctalus noctula*, *Myotis* sp, including *Myotis Daubentonii*, and brown long eared bats *Plecotus auritus*.

The first species recorded and the species most commonly recorded during the survey was the soprano pipistrelle which was recorded 287 times. *Myotis* sp. bat calls were the second most frequently recorded and were recorded 34 times. Common pipistrelle were recorded 18 times.



Noctules were recorded 12 times. A single pass by a brown long eared bat was recorded along the River Clywedog. No other species were recorded.

The maximum number of bats seen together in flight at any one time was two.

Foraging activity was recorded along the northern, & southern boundaries, and adjacent to ponds in the southwest corner. The majority of bat activity was along the River Clywedog in the north, and along the southern boundary.

Bat activity alongside Sesswick way was limited to a single commuting pass by a soprano pipistrelle.

4 Evaluation

Five species of bats were recorded on site during the transect surveys; soprano pipistrelle, common pipistrelle, Myotis sp. including daubentons bats, noctule, and brown long eared bats. No horseshoe bats were recorded during the surveys.

The majority of foraging and commuting activity was recorded along the River Clywedog in the north, along the treeline to the south, on the western boundary adjacent the water treatment works, and adjacent ponds in the southwest corner.

Lower levels of activity were recorded along the central track which runs north-south between the two arable fields, and activity adjacent Sesswick Way was limited to a low number of commuting passes.

The most commonly recorded bats on site were soprano pipistrelles. The maximum number of soprano pipistrelles recorded in flight together was two. Common pipistrelles were recorded less frequently. Pipistrelle species bats are commonly associated with urbanised habitats, and are typically more tolerant of light and disturbance than other species.

Noctule bats were the second most commonly recorded species on site, and were seen foraging and commuting along the site boundaries. The species typically roost in, and forage above, trees and woodlands.

Myotis sp. including daubentons bats were the third most recorded species on site. Daubentons bats were seen foraging above water on the River Clywedog to the north, and close to ponds adjacent the southwest corner of the site. Other Myotis species such as whiskered / Brandt's, and natterers are likely present.

Only one brown long eared bat call was recorded during the transects. This was in an area of clutter adjacent the River Clywedog. Brown long eared bats typically favour darker habitats to forage and commute.

4.1 Legal and planning context

All species of bats in the UK and their roosts are legally protected by UK and European legislation. The UK the legal protection is summarised as follows:

You will be committing a criminal offence if you:

1. Deliberately* capture, injure or kill a bat
2. Intentionally or recklessly disturb a bat in its roost or deliberately disturb a group of bats



3. Damage or destroy a bat roosting place (even if bats are not occupying the roost at the time)
4. Possess or advertise/sell/exchange a bat (dead or alive) or any part of a bat⁵. Intentionally or recklessly obstruct access to a bat roost even if bats are not present at the time

*In a court, 'deliberately' will probably be interpreted as someone who, although not intending to capture/injure or kill a bat, performed the relevant action, being sufficiently informed and aware of the consequence his/her action would most likely have).

5 Impact assessment

The proposals are for the construction of an 8ha glasshouse and associated buildings on an area of arable farmland.

The majority of the land lost to the proposed development is arable farmland. Arable farmland provides low quality foraging habitat for bats. A large proportion of the field which will be affected by the works is adjacent to Sesswick Way, which is lit by high level street lighting in the evenings. This area had the lowest levels of bat activity across the site.

The levels which had the highest levels of bat activity are the northern, southern, and western site boundaries. These areas will be largely undisturbed by the proposed works.

The removal of trees and hedgerows has the potential to disrupt the way bats use the site, and hedgerows and trees should be retained wherever possible. Where it is not possible to retain a hedgerow, either the existing hedgerow should be transplanted, or new hedgerows should be planted to ensure continued use of the site by bats.

Lighting has the potential to disrupt the way bats use the site. Particularly for species such as *Myotis* sp. and brown long eared bats. It is recommended that any lighting be kept to a minimum. Lighting should be directed away from habitat features such as hedgerows and lines of trees which are used by foraging and commuting bats. Where possible lighting should be on a timer or movement sensor to minimise the duration of use, and reduce any potential disturbance.

The construction of the glasshouse includes the construction of a number of lagoons which may be of benefit to foraging bats, as bodies of water are used by insects which are the prey of bats.

6 Conclusion

A total of five species of bat have been recorded foraging and commuting around the proposed development site; with the majority of activity being recorded along the site boundaries.

The majority of the land lost to the development will be arable farmland, which provides low quality habitat for bats. Some of this area will be replaced with lagoons, which may provide an improvement in foraging habitat.

Provided that hedgerows and treelines are retained where possible, and replaced where it is not possible, and lighting is controlled, the impact of the proposed development on bat habitat should be negligible.



7 References

Department for Communities and Local Government (2012). National Planning Policy Framework.

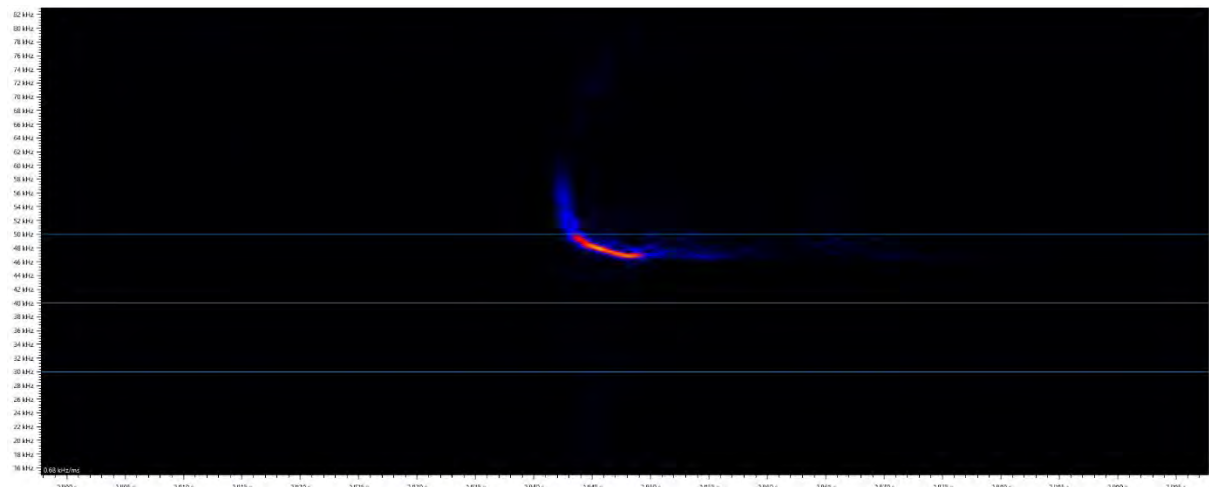
Collins, J. (ed.) (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines. (3rd ed.) The Bat Conservation Trust, London.

Mitchell-Jones, A.J. (2004). Bat Mitigation Guidelines. English Nature.

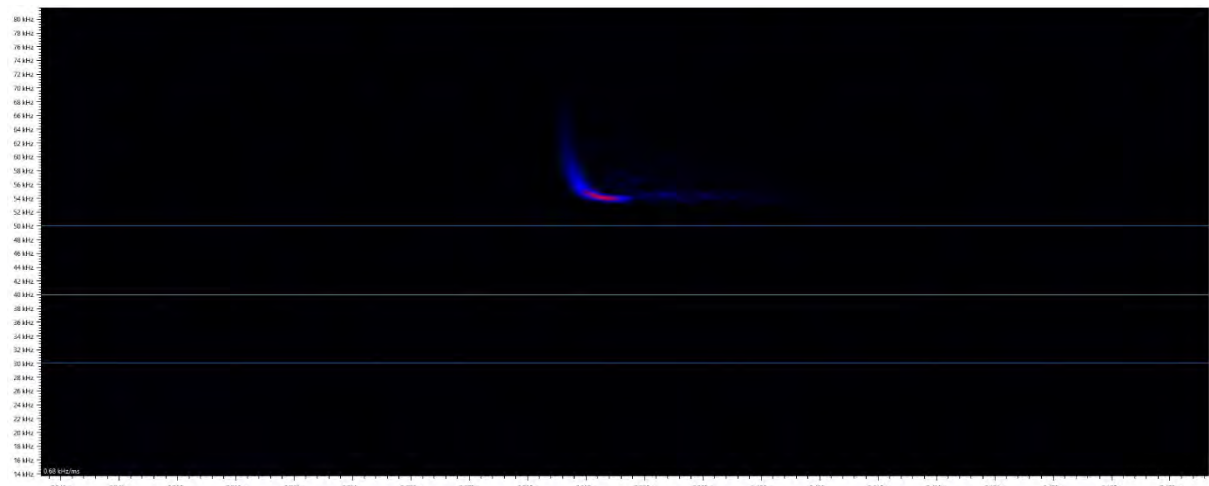
Mitchell-Jones, A.J. & McLeish, A.P. (2004). The Bat Workers Manual. (3rd ed.) JNCC



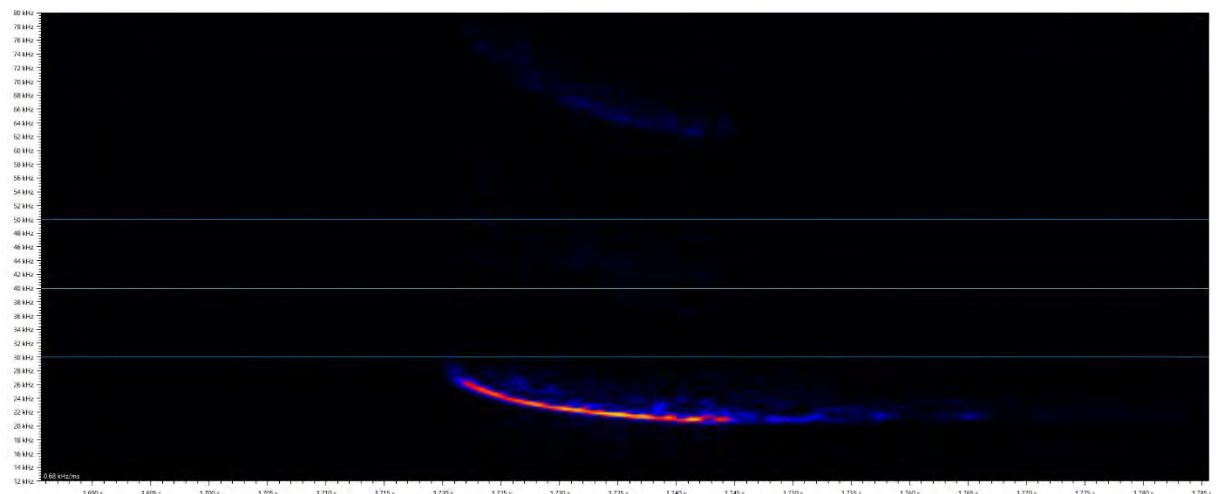
8 Appendix 1 – Sonograms



Common pipistrelle

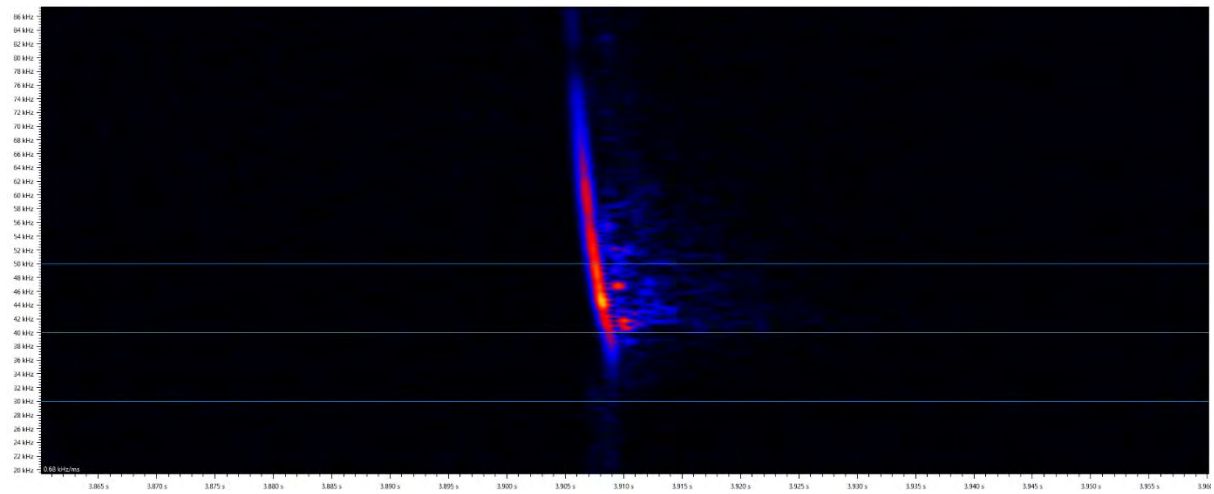


Soprano pipistrelle



Noctule





Myotis sp.



Aerial Tree Inspection

Land adjacent

Sesswick Way

Wrexham

LL13 0PA

For

SCALES Consultancy



Gritstone ecology

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1 Introduction

1.1 Purpose of the report

The report is written by Stewart Bradshaw, for SCALES Consultancy. Stewart carried out aerial tree inspections of three oak trees, to provide supporting information for a planning application.

1.2 Survey aims

The aim of the survey was to assess potential roosting features of the trees, to determine the actual or potential presence of bats, and assess the need for further survey or mitigation.

1.3 Surveyor details

Stewart is licenced to disturb, take and handle all species of bats in all counties of Wales under licence number 75887:OTH:CSAB:2017. He has more than 10 years experience in ecological consultancy, including the planning and preparation of bat surveys, and mitigation licences.

1.4 Proposed development

The development proposals are for the construction of two 8ha glasshouses and supporting infrastructure on an area of arable farmland.

The majority of the land affected is arable farmland. However, a low number of mature trees, and areas of hedgerow will be removed to facilitate the development.

1.5 Site context

The site is an area of arable farmland on the eastern outskirts of Wrexham. The site is bounded by a water treatment works and solar farm to the west, Cefn Road & the River Clywedog to the north, Sesswick Way to the east, and by the line of a former railway to the south.

There are rivers, ponds, arable farmland, hedgerows & mature trees, and busy well-lit roads within 50m of the site. Habitat within 500m includes housing and busy roads, industrial buildings, arable and pasture, hedgerows, mature trees, blocks of woodland, ponds & watercourses.

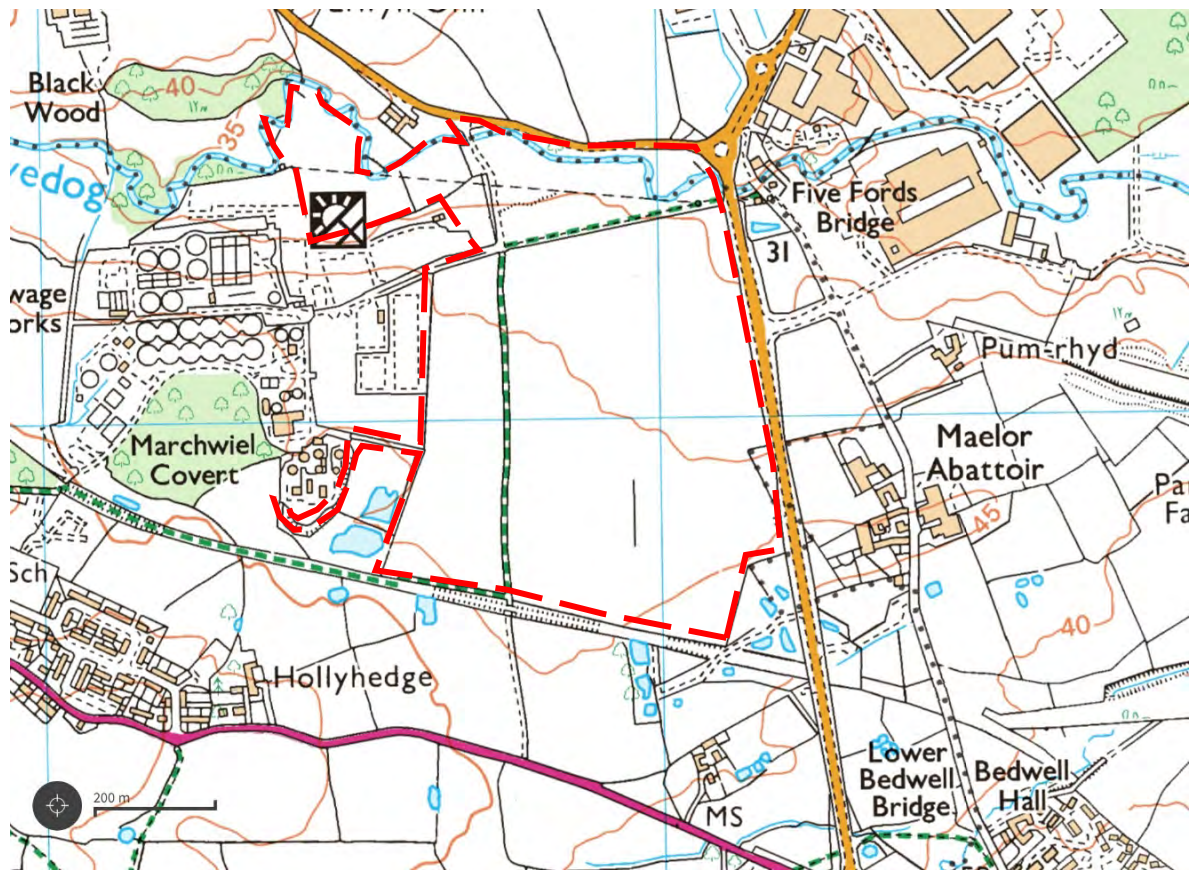
The majority of the site area is arable farmland, which presents low quality habitat for bats. Hedgerows, watercourses and treelines on the site boundary provide potential foraging and commuting habitat, and mature trees may provide suitable roosting habitat.

The site is bounded to the west by Five Fords Water Treatment Works, and a solar farm, which are illuminated by artificial lighting through the night. Sesswick Way to the west is partially lit by high level road lighting. The northern and southern site boundaries are relatively undisturbed.

The majority of the site area provides low quality habitat for bats, with higher value features along the site boundaries, and in individual trees.



1.6 Site location



1.6a – Site location with boundary marked in red.



1.6b – Aerial photograph with locations of inspected trees marked.



2 Methods

2.1 Survey timings

The survey was completed on the 30th June 2020. Weather conditions during the survey were warm and dry with temperatures of 20°C.

2.2 Desk study

A full range of ecological surveys are being carried out by Greenlight Ecological Consultancy Limited, to provide supporting information for the scheme. Survey information including desk studies were reviewed prior to writing this report.

2.3 Habitat assessment

The habitat on site and in the surrounding area was assessed using Ordnance Survey mapping, and aerial photography. Habitat features on site, and those in the surrounding area were assessed for their suitability for use by bats during the site visit.

2.4 Tree inspection

Trees were inspected from ground level, using binoculars and a Clulite torch, and then climbed and inspected where suitable features were present.

2.5 Equipment

The equipment listed below was available for use during the surveys and was used where required.

Clulite CB2 1,000,000 candlepower torch. Rigid Seesnake CA-300 digital endoscope with 0.9m cable reach with 17mm and 6mm imaging heads. Digital endoscope with 5m cable and 8mm head. Digital camera with 50x zoom. 8x25 close focussing binoculars, 4m ladders, bat handling gloves, DNA sampling tubes.

2.6 Limitations

Trees T11a & T11b were inspected in full, during a prolonged period of dry weather, during the active season for bats, with no limitations to the survey.

T8a, on the northern site boundary was not originally highlighted for inspection, and at the time of the climbed inspections of T11a & T11b, had nesting kestrels present, and could not be climbed. As it is not known whether the tree will be directly affected by the proposed works, a ground inspection was completed.



3 Results



3a – Tree locations, numbers, and level of suitability.

The results table at Appendix 1 details the individual trees, and features inspected.

High suitability

From the aerial inspection T11b has features with high suitability for roosting bats. T8a has features with potentially high suitability but could only be assessed from the ground.

Negligible potential

T11a has negligible suitability for use by roosting bats.

3.1 Evidence of use

No evidence of use by bats was found during the tree inspections.

4 Evaluation

Habitat within the site and surrounding area includes: watercourses, ponds, small blocks of woodland, and mature countryside hedgerows, with mature trees. Bats are likely to use these features to commute and forage, and possibly for seasonal movements, as well as for roosting.

T8a is a mature oak tree on the northern site boundary adjacent a public right of way. It is not known whether the tree will be directly affected by the proposed works. Climbed inspections of the tree could not be completed as nesting kestrel were present at the time of the survey. The tree has a number of features which could be used by roosting bats including knot holes & pruning injuries with cavities leading into the main stem, and hazard beam cracks in major limbs in the crown. From the ground inspection the tree is assessed as having high suitability for use by roosting bats.



T11a and T11b are set in the middle of an arable field approximately 100m from the field boundary hedgerows. The isolation of the trees may reduce the likelihood of use by roosting bats.

T11a has a number of superficial features such as dead branches and knot holes which do not provide suitable roosting habitat for bats. T11a has negligible suitability for use by roosting bats and the removal of the tree is unlikely to directly or indirectly impact bats or their habitat.

T11b has a 2m long x 2cm wide split in the bark of a near vertical limb in the west side of the crown, which allows access into a 2cm cavity between bark and heartwood. Although shallow, the cavity is extensive and travels for more than 1m upward and downward. No evidence of use by bats was present at the time of inspection. However, the cavity cannot be fully, and confidently, inspected by endoscope. The removal of the tree could directly impact bats and their habitat.

4.1 Legal and planning context

All species of bats in the UK and their roosts are legally protected by UK and European legislation. The UK the legal protection is summarised as follows:

You will be committing a criminal offence if you:

1. Deliberately* capture, injure or kill a bat
2. Intentionally or recklessly disturb a bat in its roost or deliberately disturb a group of bats
3. Damage or destroy a bat roosting place (even if bats are not occupying the roost at the time)
4. Possess or advertise/sell/exchange a bat (dead or alive) or any part of a bat
5. Intentionally or recklessly obstruct access to a bat roost even if bats are not present at the time

*In a court, 'deliberately' will probably be interpreted as someone who, although not intending to capture/injure or kill a bat, performed the relevant action, being sufficiently informed and aware of the consequence his/her action would most likely have).

5 Impact assessment

T8a has **high suitability** for use by roosting bats (from ground inspection). Removal, or disturbance of this tree has the potential to impact on bats or bat roosts, if present. Further survey and mitigation measures will be necessary if the tree is to be removed.

T11a has **negligible suitability** for use by roosting bats, and its removal will have no negative impact on bats or bat habitat.

T11b has **high suitability** for use by roosting bats. Removal, or disturbance of this tree has the potential to impact on bats or bat roosts, if present. Further survey and mitigation measures will be necessary if the tree is to be removed.

6 Required actions

Depending on the final design of the scheme, and which individual trees will be removed, further surveys and mitigation measures will be necessary, to ensure that bats and their habitat are protected.

Presence – absence surveys of T8a & T11b should be undertaken to assess the use of the trees by roosting bats.

T11a has negligible potential for use by roosting bats, and no further surveys are required prior to removal.



7 References

Department for Communities and Local Government (2012). National Planning Policy Framework.

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

Mitchell-Jones, A.J. (2004). Bat Mitigation Guidelines. English Nature.

Mitchell-Jones, A.J. & McLeish, A.P. (2004). The Bat Workers Manual. (3rd ed.) JNCC



8 Appendix 1 – Results

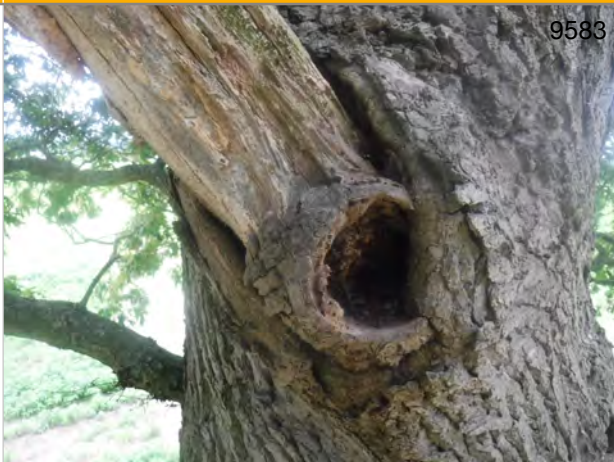


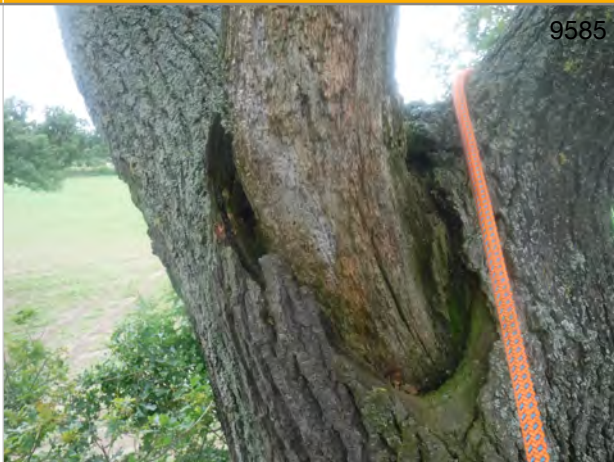
Sesswick Way - Wrexham

Tree / feature number	Species	Height	DBH / Aspect	JPEG	Description	Suitability
T8	Oak	15	1		Mature oak tree adjacent public footpath close to the northern site boundary. Knot holes and pruning injuries in the main stem, broken major limbs, and hazard beam splits in the crown. Checked from ground as nesting birds were present during climbed inspection.	High
T8.1	PRF1	4	N		Knot hole on north side of main stem at 4m, 10cm diameter with exposed heartwood, and 4cm diameter hole at top, potentially leading into main stem cavity.	High

Tree / feature number	Species	Height	DBH / Aspect	JPEG	Description	Suitability
T8.2	PRF2		SW		Rot hole on southwest side of main stem at 4.5m, 15cm diameter with exposed heartwood, with small cavity between bark and heartwood potentially leading into main stem cavity.	High
T8.3	PRF3	6	S		Snapped major limb at 6m on south side of vertical lead stem, potentially has rot hole at base, leading into the limb.	High

Tree / feature number	Species	Height	DBH / Aspect	JPEG	Description	Suitability
T8.4	PRF4	7	Centre		Failed vertical limb in centre of crown with 4m long lateral split. Potential for roosting bats at top of feature, and at base.	High
T11a	Oak	12	70	9582 	Oak in centre of arable field with knot holes and dead branches in the crown.	Negligible

Tree / feature number	Species	Height	DBH / Aspect	JPEG	Description	Suitability
T11a.1	PRF1	4	S	 9583	Knot hole at base of dead limb at 4m on south side of main stem. No suitable cavity present.	Negligible
T11a.2	PRF2	5	SW	 9584	Knot hole at base of dead limb at 5m on southwest side of main stem. No suitable cavity present.	Negligible

Tree / feature number	Species	Height	DBH / Aspect	JPEG	Description	Suitability
T11a.3	PRF3	7	N	 9585	Knot hole at base of dead limb on north side of main stem at 7m. No suitable cavity present.	Negligible
T11b	Oak	10	90	 9586	Mature oak tree in centre of arable field with dead branches, knot holes, and splits in bark present in the crown.	High

Tree / feature number	Species	Height	DBH / Aspect	JPEG	Description	Suitability
T11b.1	PRF1	4	E	 9587	Dead limb with minor rot holes <3cm at base, no suitable cavity present.	Negligible
T11b.2	PRF2	6	W	 9588	Vertical split in bark on inside of near vertical limb. Split is 2cm wide with 2cm cavity between bark and heartwood. More than 1m travel upward and downward. Smooth and dry inside. Cavity cannot be fully inspected using an endoscope.	High

Tree / feature number	Species	Height	DBH / Aspect	JPEG	Description	Suitability
T11b.3	PRF3	6	E	 9589	Upward facing cavity at base of rotting limb at 6m on east side of vertical lead stem. Exposed to the elements with no suitable sheltered cavity.	Negligible

Bat

Presence / absence

Survey

Land adjacent

Sesswick Way

Wrexham

LL13 0PA

For

SCALES Consultancy



Gritstone ecology

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1 Introduction

1.1 Purpose of the report

The report is written by Stewart Bradshaw, for SCALES Consultancy. Stewart carried out aerial tree inspections of three oak trees, in June, followed by presence – absence surveys for two of the trees. The surveys were completed to provide supporting information for a planning application at the site.

1.2 Survey aims

The aim of the surveys was to determine the actual or potential presence of bats and the need for further survey or mitigation.

1.3 Surveyor details

Stewart is licenced to disturb, take and handle all species of bats in all counties of Wales under licence number 75887:OTH:CSAB:2017. He has more than 10 years experience in ecological consultancy, including the planning and preparation of bat surveys, and mitigation licences.

1.4 Proposed development

The development proposals are for the construction of two 8ha glasshouses and supporting infrastructure on an area of arable farmland.

The majority of the land affected is arable farmland. However, a low number of mature trees, and areas of hedgerow will be removed to facilitate the development.

1.5 Site context

The site is an area of arable farmland on the eastern outskirts of Wrexham. The site is bounded by a water treatment works and solar farm to the west, Cefn Road & the River Clywedog to the north, Sesswick Way to the east, and by the line of a former railway to the south.

There are rivers, ponds, arable farmland, hedgerows & mature trees, and busy well-lit roads within 50m of the site. Habitat within 500m includes housing and busy roads, industrial buildings, arable and pasture, hedgerows, mature trees, blocks of woodland, ponds & watercourses.

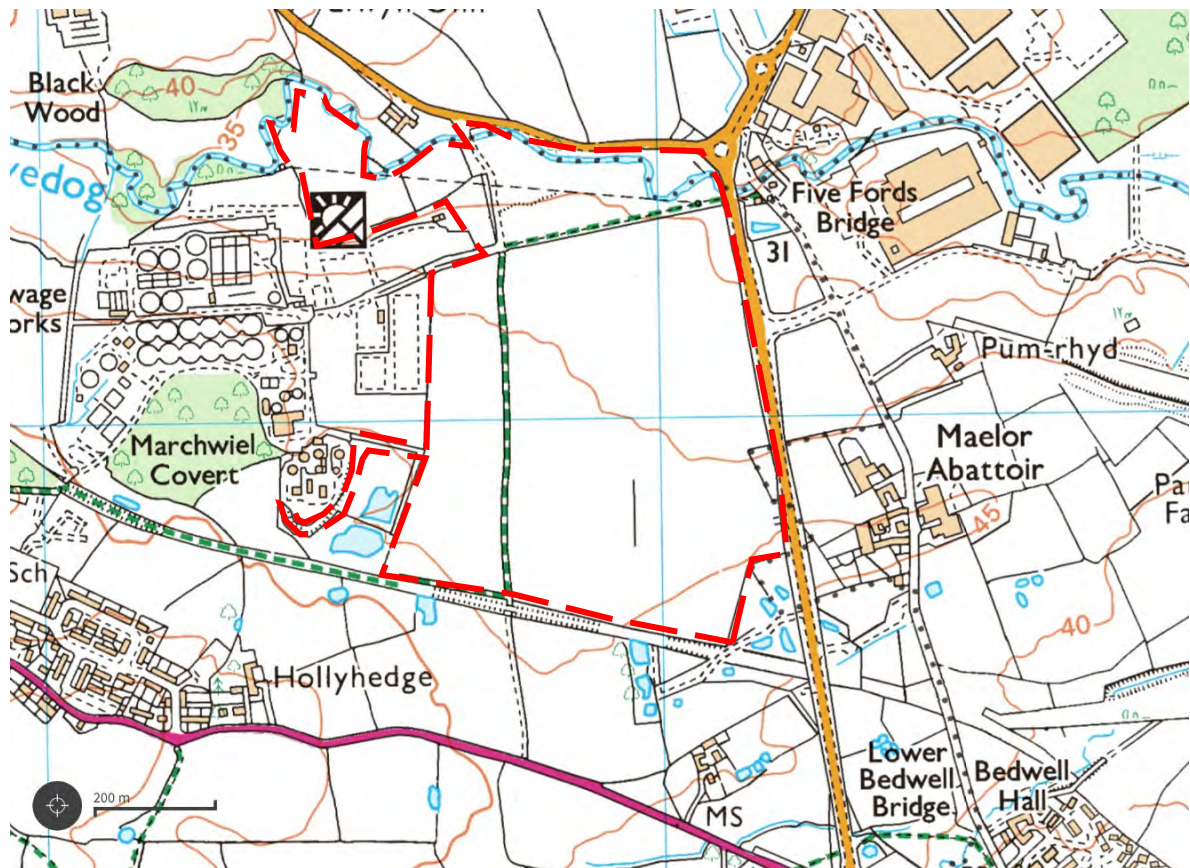
The majority of the site area is arable farmland, which presents low quality habitat for bats. Hedgerows, watercourses and treelines on the site boundary provide potential foraging and commuting habitat, and mature trees may provide suitable roosting habitat.

The site is bounded to the west by Five Fords Water Treatment Works, and a solar farm, which are illuminated by artificial lighting through the night. Sesswick Way to the west is partially lit by high level road lighting. The northern and southern site boundaries are relatively undisturbed.

The majority of the site area provides low quality habitat for bats, with higher value features along the site boundaries, and in individual trees.



1.6 Site location



1.6a - Site location with boundary marked in red



1.6b - Aerial photograph with locations of surveyed trees marked.



2 Methods

2.1 Survey timings

The trees were inspected on 30th June 2020. Dawn surveys were completed on 17th & 31st June, the dusk survey was completed 17th August.

2.2 Desk study

No desk study of the site was undertaken, prior to the preliminary roost assessment, and no other ecological surveys have been carried out in relation to the proposals.

The development has a small footprint, and impacts beyond the site boundary are unlikely. A site-specific investigation was considered more suitable.

2.3 Habitat assessment

The habitat on site and in the surrounding area was assessed using Ordinance Survey mapping, and aerial photography. Habitat features on site, and those in the surrounding area were assessed for their suitability for use by bats during the site visit.

2.4 Tree inspection

Trees were inspected from ground level, using binoculars and a Clulite torch, and then climbed and inspected where suitable features were present.

2.5 Presence / absence survey

Ecologists visited the site at dusk and dawn, to listen to, and record bats, and watch for bats emerging from, or returning to roosts, and compile information on species, numbers, access points, and locations. The surveys were informed by a tree inspection, which identified potential roosting and access points. These points were covered by an observer during the surveys.

2.6 Equipment

The equipment listed below was available for use during the surveys and was used where required.

Clulite CB2 1,000,000 candlepower torch. Rigid Seesnake CA-300 digital endoscope with 0.9m cable reach with 17mm and 6mm imaging heads. Digital camera with 50x zoom. 8x25 close focussing binoculars, 4m ladders, bat handling gloves, DNA sampling tubes.

Elekon Batlogger M – full spectrum bat detector. The Elekon Batlogger M - records bat echolocation calls in high quality, along with temperature and GPS location data. The information is stored on an SD card, and later analysed in detail using Elekon Bat explorer software.

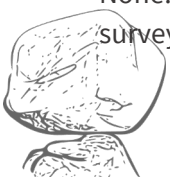
Elekon Batlogger A+ - passive full spectrum bat detector. The Elekon Batlogger A+ records bat echolocation calls in high quality, along with temperature data. The information is stored on an SD card, and later analysed in detail using Elekon Bat explorer software.

Infra-red night vision video cameras, fitted with wide and telephoto lenses, and infra-red lamps were used to observe the trees. The cameras recorded for the full length of the surveys, the videos were checked during and after the surveys were completed.

Motorola two-way radios, were used to relay information between surveyors.

2.7 Survey limitations

None. The surveys were completed during suitable weather conditions during the recognised bat survey season.



3 Results

3.1 Survey 1 - Dawn



4.1a – Surveyor locations and bat activity.

Date	17/07/20	Survey type	Dawn		
Sunrise / Sunset	05:07	Survey start	03:05	Survey end	05:22
Surveyors					
Surveyor		Position		Equipment	
Stewart Bradshaw		West of T8a		Batlogger M + IR Camera	
Assistant		East of T8a		EM touch II + IR Camera	
Chris Ryan		North of T11b		Batlogger A+ & IR Camera	
Assistant		South of T11b		EM touch II + IR Camera	
Weather					
Temperature	Wind	Rain	Cloud	Other	
15°C	Still	Dry	50%	N/A	
Description					
Warm dry morning, following a warm dry night. Lots of midges and other insect prey present during survey.					



Summary of activity

No bats returned to roost in the trees during the survey.

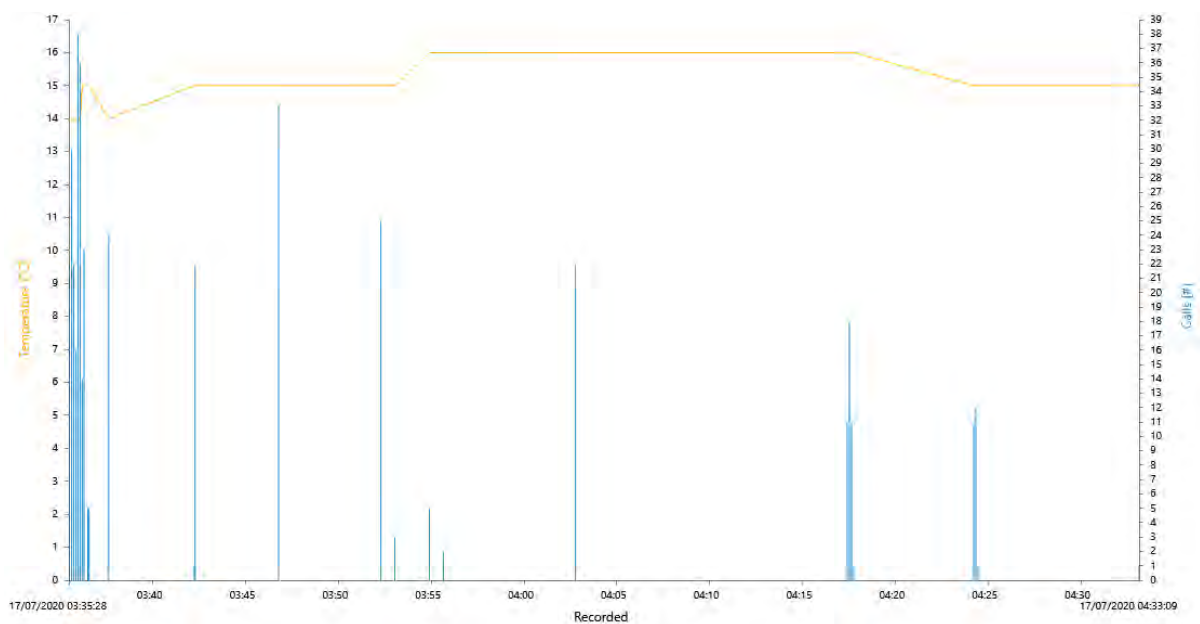
Bat activity during the survey was low with only one bat pass (noctule) heard at T11b, and seven passes recorded at T8a.

The first bat seen was a soprano pipistrelle, recorded at 03:35, passing T8a. The last bat recorded was a noctule at 04:33. Only single bats were seen in flight during the survey.

The species recorded during the survey were: soprano pipistrelle *Pipistrellus pygmaeus*, *Myotis* sp, and Common noctule *Nyctalus noctula*.

Bats were observed in flight, passing along the line of the public footpath which runs east-west alongside T8a. Activity recorded included; foraging activity, and commuting.

Bat activity, by single bats, was infrequent during the survey, until 04:33, after which no further bats were recorded, as shown in the table below.



4.1b – Bat activity levels

Survey Limitations – None.



3.2 Survey 2 - Dawn



4.2a – Surveyor locations and bat activity.

Date	31/07/20	Survey type	Dawn		
Sunrise / Sunset	05:28	Survey start	03:25	Survey end	05:45
Surveyors					
Surveyor		Position		Equipment	
Stewart Bradshaw		West of T8a		Batlogger M + IR Camera	
Assistant		East of T8a		EM touch II + IR Camera	
Chris Ryan		North of T11b		Batlogger A+ & IR Camera	
Assistant		South of T11b		EM touch II + IR Camera	
Weather					
Temperature	Wind	Rain	Cloud	Other	
17°C	Still	Dry	100%	N/A	
Description Warm dry morning, following a warm dry night, with rain showers the previous day. Lots of midges and other insect prey present during survey.					

Summary of activity



No bats returned to roost in the trees during the survey.

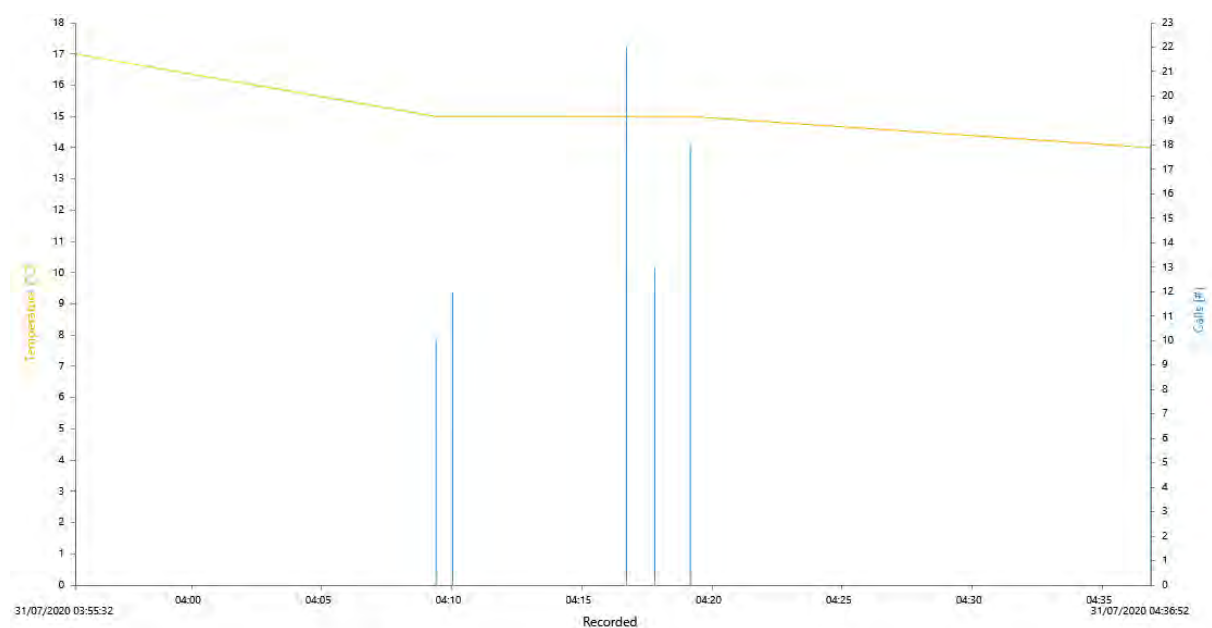
Bat activity during the survey was low with no bats recorded at T11b, and six passes recorded at T8a.

The first bat seen was a soprano pipistrelle, recorded at 03:55, passing T8a. The last bat was recorded at 04:36. Only single bats were seen in flight during the survey.

The only species recorded during the survey was soprano pipistrelle *Pipistrellus pygmaeus*.

Bats were observed in flight, passing along the line of the public footpath which runs east-west alongside T8a. Activity recorded included; foraging activity, and commuting.

Bat activity, by single bats, was infrequent during the survey, until 04:36, after which no further bats were recorded, as shown in the table below.



4.2b – Bat activity levels

Survey Limitations – None.



3.3 Survey 3 - Dusk



4.3a – Surveyor locations and bat activity.

Date	17/08/20	Survey type	Dusk		
Sunrise / Sunset	20:33	Survey start	20:15	Survey end	22:15
Surveyors					
Surveyor		Position		Equipment	
Stewart Bradshaw		West of T8a		Batlogger M + IR Camera	
Assistant		East of T8a		EM touch II + IR Camera	
Chris Ryan		North of T11b		Batlogger A+ & IR Camera	
Assistant		South of T11b		EM touch II + IR Camera	
Weather					
Temperature	Wind	Rain	Cloud	Other	
16°C	Still	Dry	100%	N/A	
Description					
Warm dry evening, following a rainy day with some shorth thunderstorms. Lots of midges and other insect prey present during survey.					

Summary of activity



No bats returned to roost in the trees during the survey.

Bat activity during the survey was low with no bat passes recorded at T11b, and seven passes recorded at T8a.

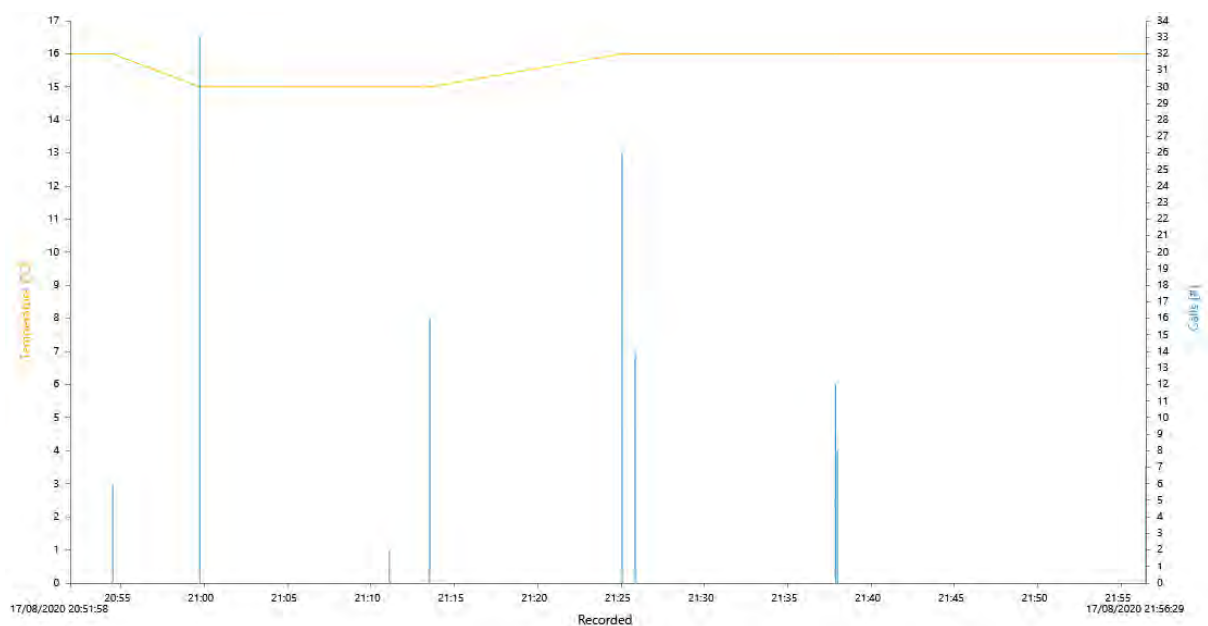
The first bat seen was a common pipistrelle, recorded at 20:51, 18 minutes after sunset, passing T8a.

The last bat recorded was a common pipistrelle at 21:56. Only single bats were seen in flight during the survey.

The only species recorded during the survey was common pipistrelle *Pipistrellus pipistrellus*.

Bats were observed in flight, passing along the line of the public footpath which runs east-west alongside T8a. Activity recorded included; foraging activity, and commuting.

Bat activity, by single bats, was infrequent during the survey, until 21:56, after which no further bats were recorded, as shown in the table below.



4.3b – Bat activity levels

Survey Limitations – None.



4 Evaluation

Habitat within the site and surrounding area includes: watercourses, ponds, small blocks of woodland, and mature countryside hedgerows, with mature trees. Bats are likely to use these features to commute and forage, and possibly for seasonal movements, as well as for roosting.

T11b is situated in the centre of an arable field and will be removed to facilitate the development. The tree was climbed and inspected in June 2020. The tree has features which are potentially suitable for use by roosting bats, However, no indications of use by bats were found.

The dusk and dawn surveys of the tree recorded no bats roosting, and only one bat pass was recorded throughout the surveys.

When compared to similar trees locally, the tree is isolated from hedgerows and other linkages used by bats in flight. The isolation of the tree from the hedgerows is likely to reduce the likelihood of its use by roosting bats.

T8a is situated adjacent a public footpath at the northern end of the proposed development site. At the time of writing it is not known whether the tree will be removed. The tree was inspected from ground level in June 2020. The tree could not be climbed and inspected as nesting kestrel were present.

The dusk and dawn surveys of the tree recorded no bats roosting, and only low levels of bat activity were recorded throughout the surveys.

The presence of kestrels early in the year is likely to deter roosting bats, particularly in larger numbers, and the presence of a maternity colony at that time is unlikely.

The tree has features which could potentially be used at other times of the year including hibernation.

4.1 Legal and planning context

All species of bats in the UK and their roosts are legally protected by UK and European legislation. The UK the legal protection is summarised as follows:

You will be committing a criminal offence if you:

1. Deliberately* capture, injure or kill a bat
2. Intentionally or recklessly disturb a bat in its roost or deliberately disturb a group of bats
3. Damage or destroy a bat roosting place (even if bats are not occupying the roost at the time)
4. Possess or advertise/sell/exchange a bat (dead or alive) or any part of a bat
5. Intentionally or recklessly obstruct access to a bat roost even if bats are not present at the time

*In a court, 'deliberately' will probably be interpreted as someone who, although not intending to capture/injure or kill a bat, performed the relevant action, being sufficiently informed and aware of the consequence his/her action would most likely have).

If bats or bat roosts are present in the building, the proposed conversion of the roof void would likely result in an offence being committed.



5 Impact assessment

The construction of a glasshouse will result in the loss of T11b, and the possible loss of T8a. The work will also result in the loss of an arable field. Arable land in general presents poor foraging habitat for bats as it is bare earth for a large part of the year, and dominated by a monoculture, and (often) sprayed with herbicide, for the remainder. The loss of arable land is unlikely to significantly impact foraging habitat.

The majority of hedgerows and other linear features used by foraging bats will be retained, and there should be no loss of connectivity, or high quality foraging features as a result of the works.

The nature of glasshouse construction is relatively light and fast, with less use of heavy and noisy machinery than a comparatively sized housing or industrial development.

High level lighting and traffic along Sesswick Way to the east, and light & noise from the water treatment works from the west provide a base level of disturbance for the site. Levels of disturbance during construction are unlikely to be much above normal levels for the site.

Once completed the ongoing operation of the site should not significantly increase levels of noise and light locally.

The construction of lagoons on site may provide an improvement in the quality of habitat for foraging bats.

As no bats were recorded roosting in T8 & T11b during the presence-absence surveys, and as no field signs of use were recorded during the ground inspections, and aerial inspections it is unlikely that bat are currently using the trees to roost.

6 Required actions

No field signs of use by bats were found during the ground or aerial inspections, no bats were recorded roosting during the dusk and dawn surveys, and no further survey work is necessary.

As the use of trees by roosting bats is extremely variable throughout the year a precautionary approach to felling the trees should be followed. The trees should be felled under supervision of a licensed bat ecologist, and aerially inspected immediately prior to felling.

Artificial lighting should be designed to minimise light spill onto features which are used by bats, such as hedgerows, trees, and other vegetated linear features used for commuting and foraging.



7 References

Department for Communities and Local Government (2012). National Planning Policy Framework.

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

Mitchell-Jones, A.J. (2004). Bat Mitigation Guidelines. English Nature.

Mitchell-Jones, A.J. & McLeish, A.P. (2004). The Bat Workers Manual. (3rd ed.) JNCC



8 Appendix 1 – Photographs

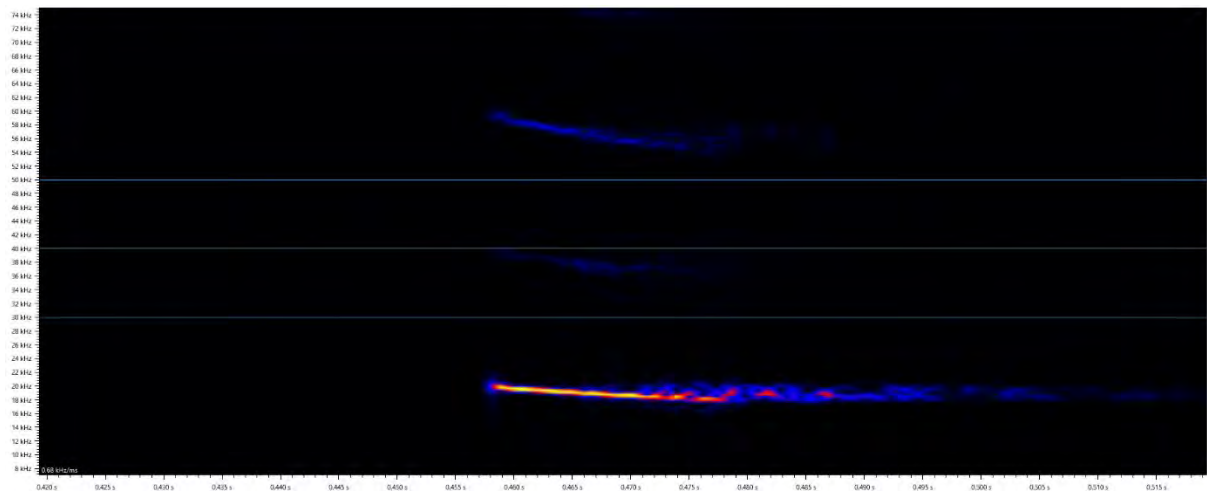


1 – T11b is in the centre of an arable field.

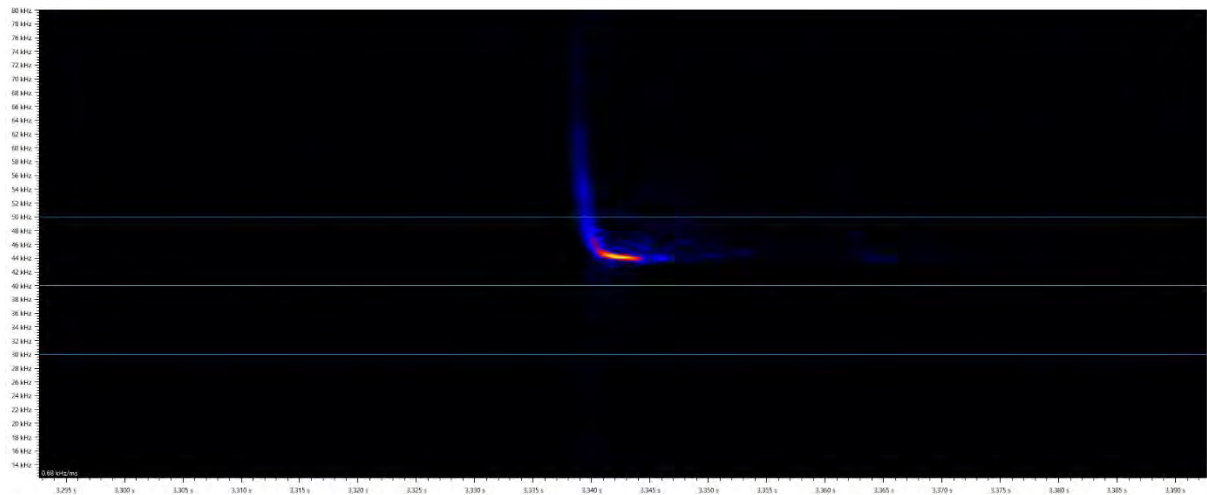


2 – T8a is adjacent a public footpath toward the northern site boundary.

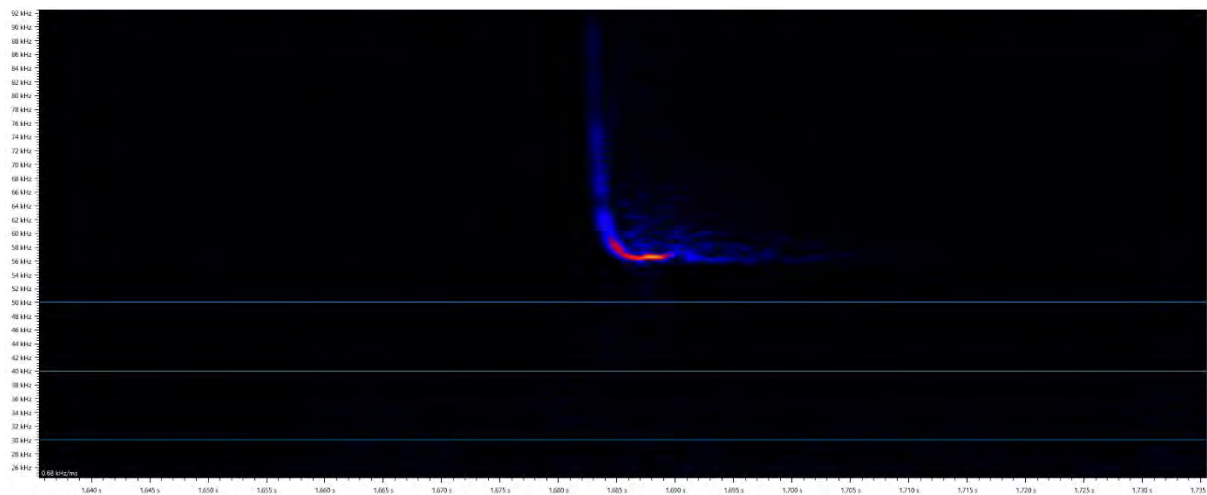
9 Appendix 2 – Sonograms



1 – Common noctule sonogram

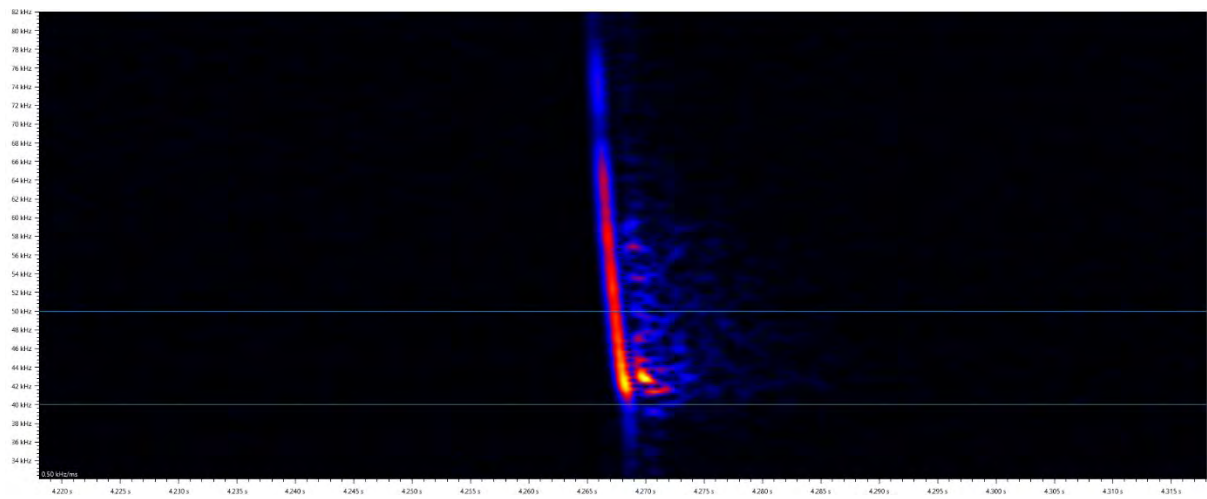


2 – Common pipistrelle sonogram



3 – Soprano pipistrelle sonogram





4 – *Myotis* sp. sonogram



Appendix T

Report Title	Proposed Glasshouse Development on land off Cefn Road, Five Fords, Wrexham – Bird Survey
Date issued	5th August 2020
Author	Tom Knight
Report Version	C429/ 1.1
Client	SCALE5 Consultancy Ltd
Contract Ref.	C429

this report was produced by



**Unit 23, The Malthouse Business Centre,
Regent Street, Llangollen, Denbighshire, LL20 8HS
01978 860889**

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Quality Assurance

Survey/ Assessment Work Schedule		
Survey/Assessment Type	Surveyors/ Author	Date
Reconnaissance Visit	Tom Knight	24/06/20
Bird Survey	Tom Knight	30/06/20, 14/07/20 & 21/07/20

Review Schedule				
Issue	Date	Author	Reviewed by	Approved by
1.0	23/07/20	Tom Knight	Max Ellson	Max Ellson
1.1	05/08/20	Tom Knight	Max Ellson	Max Ellson
Minor amendments in accordance with comments received.				

This report has been prepared by Marches Ecology with all reasonable skill, care and diligence within the terms of the Contract with the client.

The terms of this Contract have been fulfilled by Marches Ecology in accordance with the Chartered Institute of Ecology and Environmental Management's Code of Professional Conduct.

We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.

This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.

The evaluation and assessment provided in this report is specific to the iteration of the proposal detailed in *Section 1*. It would no longer be valid should the layout be changed in anyway, should the report be used for a different proposal at the same site or should it be used a maximum of 12 months after the date of issue.

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Figure 1 – The Application Site and Survey Site

Figure 2 – Reconnaissance Survey Target Note Locations

Figure 3 – Indicative Transect Route and Vantage Point Locations

1 INTRODUCTION

1.1 Project Background

1.1.1 Marches Ecology was commissioned by SCALES Consultancy Ltd to undertake a bird survey of land off Cefn Road, Five Fords, Wrexham (approximate OS Grid Ref. SJ 368 479). This report is provided as supporting information to a planning application for two agricultural glasshouses including ancillary development.

1.1.2 The current application site concerns a large convoluted area of land between Sesswick Way to the east and the DwrCymru Welsh Water (DCWW) Five Fords Wastewater Treatment Works (WwTW) to the west (henceforth referred to as the 'application site'). It is this area which has been assessed for its potential value to birds. The boundary of the application site is shown on *Figure 1*.

1.1.3 Four parts of the application site were excluded from the detailed bird survey. These areas are as follows:

- The land to the north of the River Clywedog, up to Cefn Road (excluded due to difficulties with access, and health and safety concerns along Cefn Road).
- Three areas within the DCWW operational site (due to the high level of security associated with this site it was found not to be expedient to include these areas at the same time as the remainder of the survey site).

The application site with these areas excluded is referred to henceforth as the survey site. The excluded areas are shown on *Figure 1*.

1.1.4 This survey report has four principal aims:

- to review and evaluate existing (bird) data (from Cofnod) of relevance to both the application site and surrounding area;
- to review, characterise and evaluate the potential value of the habitat within the application site;
- to identify birds that nest within the survey site wherever possible; and
- to identify potential development constraints relating to birds and outline potential mitigation/ compensation/ enhancement measures.

1.1.5 This work comprised a review of existing Cofnod data, a reconnaissance survey to assess the value of the habitat for birds and three bird survey visits. The reconnaissance survey was undertaken on the 24th June, while the three bird survey visits were completed during June and July 2020.

1.2 Report Author

1.2.1 This report was produced by Tom Knight of Marches Ecology. Tom Knight is an ecologist with over twenty years of consultancy experience and has undertaken bird surveys on a wide range of sites. His relevant academic qualifications and professional memberships are as follows:

- Chartered Environmentalist (Society for the Environment).
- Full Member of the Chartered Institute of Ecology and Environmental Management (CIEEM).
- PgDip Conservation Management.

- BSc (Hons) Environmental Studies.
- C&G Biological Surveying.

1.3 Site Description and Context

- 1.3.1 The application site extends to approximately 44 hectares. It largely comprises two large and three small arable field units. The River Clywedog and associated woodland and scrub form part of the north-eastern boundary. The field boundaries are either formed by fences, newly planted hedges or defunct hedges/ lines of scrub. Large, mature trees are scattered throughout the application site but are mostly associated with field boundaries or the river corridor. Three parts of the application site are included within the DCWW operational site. These areas include unmanaged grassland, scrub and some mature trees. An agricultural track with associated band of infrequently managed grassland is aligned north-south through the centre of the application site.
- 1.3.2 The application site is located by the southwest end of Wrexham Industrial Estate, between Sesswick Way to the east, the WwTW to the west, and Cefn Road to the north. The southern boundary is bordered by a disused railway which is characterised by dense scrub, trees and stands of tall ruderals. The wider landscape, particularly to the north, south and east, is largely agricultural, and generally characterised by arable fields.

1.4 The Proposed Development

- 1.4.1 The proposed development comprises two 7.6-hectare glasshouses (15.12-hectare in total) with a gable apex height of 8 m and associated buildings/ structures. There would be three small reservoirs. The proposal would be connected to the Five Fords WwTW via a CO₂ pipe and recovery plant, and a gas pipe and heat exchange building. Further details are provided in Greenlight Environmental Consultancy (2020). The proposal is illustrated on a Low Carbon Farming plan entitled 'General Conceptual Layout', Dwg no. 00165-20-101 Rev01, dated 05/06/20.

1.5 Legislation

Introduction

- 1.5.1 This sub-section provides a brief summary of key relevant legislation with regards birds. It should not be considered a comprehensive review and is not meant to be so. It is provided here for information only and is not intended to replace specialised legal advice. It does not replace the text of the legislation, but summarises the salient points.
- 1.5.2 Council Directive 79/409/EEC on the Conservation of Wild Birds 1979 and Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora 1992 are not considered to be of direct relevance in this instance.

The Wildlife and Countryside Act 1981, as amended (WCA)

- 1.5.3 The WCA strengthened protection for nature conservation sites of at least national importance, and provides varying levels of protection for a number of species within the UK. This protection may include prohibition of some or all of: killing, injuring, disturbing, taking, sale/barter or possession of species and also protection of breeding/ sheltering places.
- 1.5.4 All species of bird are protected under *Section 1* of the *Wildlife and Countryside Act 1981* (as amended). The protection was extended by the *CRoW Act 2000*.

1.5.5 The legislation makes it an offence to intentionally or recklessly:

- kill, injure or take any wild bird;
- take, damage or destroy the nest of any wild bird while that nest is in use or being built; or
- take or destroy an egg of any wild bird.

1.5.6 Certain species of bird are listed on *Schedule 1* of the *Wildlife and Countryside Act 1981* (as amended) and receive protection under *Sections 1(4)* and *1(5)* of the Act. The legislation confers special penalties where the above mentioned offences are committed for any such bird and also make it an offence to intentionally or recklessly:

- disturb any such bird, whilst building its nest or it is in or near a nest containing dependant young; or
- disturb the dependant young of such a bird.

The Natural Environment and Rural Communities Act 2006 (The NERC Act)

1.5.7 *Sections 40* to *42* of the NERC Act replace *Section 74* of the CRow Act. *Section 40* of the NERC Act extends to all public authorities (including local planning authorities) the existing *Section 74* duty to have regard to biodiversity as far as is consistent with the proper exercise of their functions. In addition, *Sections 41* (England) and *42* (Wales) provide a list of species and habitats of principal importance for conservation of biological diversity. This list includes a number of species of bird. Government has a statutory duty to promote steps “to further the conservation” of habitats and species listed in *Sections 41* and *42*.

Environment (Wales) Act 2016

1.5.8 The Environment Act enhances and replaces the current NERC Act (*Section 40*) duty to require all public authorities, when carrying out their functions in Wales, to seek to ‘maintain and enhance biodiversity’ where it is within the proper exercise of their functions. In doing so, public authorities must also seek to ‘promote the resilience of ecosystems’. *Section 7* of the Environment Act provides a list of the living organisms and habitats of principal importance for the purpose of maintaining and enhancing biodiversity in Wales. This list replaces that previously provided in *Section 42* of the NERC Act.

2 METHODOLOGY

2.1 Desk Study

- 2.1.1 A desk study was undertaken by Greenlight Environmental Consultancy Ltd; further information is provided in the Interim Ecological Impact Assessment (Greenlight Environmental Consultancy 2020). Records were obtained for a 2 km search area. The data obtained from Cofnod has been provided and has been interrogated for bird records of particular relevance to the application site.

2.2 Field Survey

Introduction

- 2.2.1 The nomenclature for common and scientific names and the taxonomic ordering of species accounts used in this report follows that contained in The British List: A Checklist of Birds of Britain (9th edition), British Ornithologists' Union (2018).

Reconnaissance Survey

- 2.2.2 A walkover survey of the application site was conducted on 24th June 2020 by Tom Knight of Marches Ecology. The weather was 100% bright sunshine, 27 °C with a light breeze. The habitat within the application site was assessed for its potential value to nesting birds. Appropriate routes for the subsequent survey visits were also identified.

Bird Survey

- 2.2.3 The bird survey was completed of the survey site with those areas excluded as explained in *Section 1*. Whilst the habitat complex at *Target Note 4/4a/4b* (see *Figure 2*) was not directly accessed most of this area could be viewed from the boundary to the north and east. Similarly, the area to the north of the River Clywedog (*Target Note 16*) was not directly accessed but some birds could be recorded from within the survey site along the south bank.
- 2.2.4 The areas of land at *Target Notes 2 and 3* could not be viewed from the survey site due to a high earth embankment on the eastern boundary of this area. Some birds within the habitat at *Target Note 2* could be heard from within the survey site. The small area of land at *Target Note 1* could not be viewed from the survey site.
- 2.2.5 The breeding bird survey utilised an adapted version of the British Trust for Ornithology's (BTO) Common Bird Census technique (Marchant 1983; Gilbert *et al.* 1998). The Common Bird Census (CBC) utilises territory mapping and is an established and generally accepted methodology. It requires repeated visits to a site during the bird breeding season. Five to ten visits are appropriate; open habitats would be at the bottom of this range, while woodland would be at the top (Sutherland 1996). Due to the largely open character of the site five survey visits may be considered sufficient data on distribution, relative abundance and records of species of conservation interest (Hill *et al.* 2005). An additional two evening visits are often completed to consider species such as owls and Woodcock (*Scolopax rusticola*). As bird territories are unlikely to align with the survey site boundary birds outside this area were recorded where appropriate. An indicative transect route is shown on *Figure 3*, though this route was varied on each visit.

2.2.6 This work was commissioned in late June. A total of two CBC visits were therefore completed in June/ July 2020 by Tom Knight of Marches Ecology; the dates of the survey visits were as follows:

- 30th June 2020; and
- 14th July 2020.

As the survey visits commenced late in the survey season no analysis of possible territories has been undertaken. The results of the CBC survey are presented as bird species maps in *Appendix 1*.

2.2.7 In addition, an evening visit was undertaken on 21st July 2020. This visit was completed from approximately three hours before dusk (18.00 hours to 22.30 hours) to consider species that may be active at this time of the day.

2.2.8 The evening visit used an adapted vantage point (VP) survey protocol rather than walking a CBC route. Vantage point surveys involve collecting information during timed watches from strategic vantage points covering defined areas. Suitable VP locations were identified during the reconnaissance survey. *Figure 3* shows the approximate VP locations. Approximately one to one-and-a-half hours was spent at each location. The following information was recorded:

- time of registration;
- species;
- number of birds;
- age, phase and sex (if known);
- activity;
- flight direction; and
- notes on behaviour.

The results of the VP survey are presented in tables in *Appendix 2*.

2.2.9 A different survey protocol was used during the evening visit in the hope that observations would obtain a greater level of detail on particular species, at key locations within the survey site and of key species. Shawyer (2011) states that '*vantage point surveys... can be used with some success for barn owls*' where certain site conditions are met, and further that '*For development schemes which are small in size (below 75 ha), observational surveys can also be useful when attempting to establish those places which are being used for movement and feeding by the resident barn owls*'. However, there is some disagreement over the efficacy of this type of survey for recording Barn Owls (*Tyto alba*). The optimum period for such observational surveys (at potential nest sites) is usually between mid-June and during July (Shawyer *op cit.*). Gilbert *et al.* 1998 also suggests observations immediately before/ after dusk. The results of the evening VP survey have not been included on the species maps as they did not achieve full site coverage as the CBC visits did.

2.3 Site Evaluation

2.3.1 A number of lists, documents and legislation have been produced which aid the determination of the conservation status of birds. The following are considered most appropriate to this report and have been utilised in assessment of the application site:

- *Schedule 1 of the Wildlife and Countryside Act 1981* (as amended) – *The Wildlife and Countryside Act 1981* affords greater protection to certain breeding species that are considered appropriately at risk nationally and as such are listed as specially protected under 'Schedule 1'.
- *Section 7 of the Environment (Wales) Act 2016* – *Section 7* lists living organisms of principal importance for the purpose of maintaining and enhancing biodiversity in Wales.
- *Birds of Conservation Concern 4* (Eaton *et al.* 2015) – This document assesses UK bird populations using quantitative criteria to determine the population status of each species which are then placed on one of three lists; Red, Amber or Green.
 - o Red List species are of high conservation concern, being either globally threatened, having historical UK population declines between 1800 and 1995 or a rapid population decline or breeding range contraction by 50% or more in the last 25 years.
 - o Amber List species are of medium conservation concern due to a number of factors, for example having suffered between 25% and 49% contraction of UK breeding range or a 25-49% reduction in breeding or non-breeding populations over the last 25 years. Species which have a five year mean of 1-300 breeding pairs in the UK or are included on the European Red List or for which the breeding population in the UK represents 20% or more of the European breeding populations are also listed on the Amber list.
 - o Green list species have a favourable conservation status.
- *Birds of Conservation Concern in Wales 3* (Johnstone & Bladwell 2016). This is an assessment of the bird populations specific to Wales only.

2.3.2 The ecological importance (value) of habitats and/or species is often assessed according to a number of widely used criteria of which perhaps the most frequently used are naturalness, extent, rarity, and diversity. For the purpose of this report the ecological importance of the bird species (assemblage) present/ likely to be present on the site has been determined using the approach detailed in CIEEM (2018). Geographical context is used as a frame of reference for identifying the importance of ecological features. The frame of reference has the following categories: International/ European - National - Regional - Metropolitan/ County/Vice-county/ other local-authority wide area - Local. Within this report Local is defined as relating to district or parish; less than local refers to features of value at a Site level.

2.3.3 Broadly speaking habitat importance should be determined by identifying designated sites, 'priority habitats' (as defined in CIEEM, 2017) or by using published, ideally local, site selection criteria. The ecological importance of a species considers its distribution and legal or conservation status, the latter is mostly due to inherent rarity. 'Priority species'¹ are also defined in CIEEM (2017) and include legally protected species as well as those identified on various conservation lists.

¹ This term is used throughout this report and conforms to the definition provided in CIEEM (2017).

- 2.3.4 Selection criteria for County Wildlife Sites (CWS) in Wrexham have been produced by Wrexham County Borough Council (WCBC 2015). It includes a section listing species selection criteria. Five criteria are listed for birds and these have been used in evaluating the importance of the bird assemblage supported by/ likely to be supported by the application site.

2.4 Survey Limitations

- 2.4.1 The following may be considered survey limitations:

- The breeding bird survey was initiated late in the survey season. The CBC survey season is usually between mid-March to late June though it can be extended into early July. All of the survey visits were completed towards the end of the standard survey period. It is likely that many early nesting species or individuals will have been missed. It is also difficult to make any definitive conclusions regarding birds that may or may not have bred within the survey site (hence the number of species listed as 'possible breeder' in *Table 2*). Such conclusions at this time of year are obscured by the presence of post-breeding congregations, the movement of non-breeding birds into/ out of the area, birds in eclipse plumage, reduced territoriality/ reduced vocalisation in some species, *etc.* Less registrations were recorded for some species during the second survey visit.

It was not possible to undertake territory analysis and as such many breeding pairs of various species are unlikely to have been recorded. The breeding assemblage, size of the population and use of the site at other times of the year cannot be defined following a small number of visits in June/ July only.

The evening and second CBC survey visits were delayed due to inclement weather (largely as a result of Tropical Storm Edouard).

- A single evening visit was completed; species of Owl and other species more likely to be recorded at this time may have been missed.
- A single evening visit cannot be used to confirm the actual absence of any species (*e.g.* Barn Owl) from the survey site. VP surveys are not suitable for recording some species of bird, and indeed some authorities (*e.g.* Barn Owl Trust 2012) state that they are not useful for Barn Owl monitoring.
- It was not possible to walk through the centre of the field that had been planted with Barley (*Target Note 21*).
- At the time of the survey visit on 14th July 2020 the Maize crop was over head-height in some parts of the fields (particularly those at *Target Notes 17* and *22*). This obscured the surveyor's view and also made it difficult to move quietly along the transect.

The height of the Maize significantly restricted options of suitable vantage points for the evening survey and limited clear views across the survey site. On the evening of the survey it was necessary to relocate VP3 as it was not possible to gain views across the area due to the Maize. At the new location it was necessary for the surveyor to stand. A position adjacent to an overhead pylon was used to break up the surveyor's outline.

Similarly, the view at VP1 was largely limited to the river corridor, marshy grassland at *Target Note 13*, boundary at *Target Note 14*, tree at *Target Note 5*, part of the field at *Target Note 22* and overhead.

- Due to the width of the largest arable field at *Target Note 6* (around 400 m) birds were often distant but the views were unobstructed.
- Some parts of the survey site are characterised by scrub or other dense vegetation which prevented direct access (e.g. parts of the River Clywedog corridor). The vegetation in many parts of the site (e.g. Maize) is also higher in the mid-summer. This reduced the recording of visual registrations with correspondingly greater reliance on audible registrations. However, most of the survey site was readily accessible.
- Dense vegetation along the River Clywedog prevented all parts of the channel from being viewed and therefore being able to determine the presence of features that might support key species, e.g. Kingfisher (*Alcedo atthis*).
- None of the trees within the survey site were inspected in detail as part of this study. Many of the trees scattered throughout the application site are likely to be of potential value for nesting birds, including hole-nesting species and large birds such as raptors. Tree foliage obscured parts of the trunk and upper branches of the trees.
- The building at *Target Note 4b* was not inspected in detail. There is no internal access.
- It was difficult to establish the boundary of the application/ survey site in some places (e.g. the area at *Target Note 2*).
- It is difficult to hear birds in locations close to Sesswick Way due to traffic noise and some parts of the DCWW operational site.
- Some small parts of the application site (*Target Notes 1, 2, 3, 4/4a/4b and 16*) were excluded from the survey site as explained in *Sections 1 and 2.2*. Whilst most of the areas at *Target Note 4/4a/4b and 16* were viewed from the adjacent survey site it was not possible to view the areas at *Target Notes 1, 2 and 3*, and therefore to record birds in these locations.
- During the first bird survey visit spraying of the field (with tractor-mounted herbicide/ pesticide) at *Target Note 6* commenced at approximately 08.05 hours. Whilst this may have resulted in some disturbance it is considered to be part of normal practice within an arable field.
- As it is located within the gas plant, photos were not allowed to be taken of the habitat at *Target Note 3*.

The survey limitations listed above (particularly the timing of visits, number of visits, not accessing some parts of the application site and not undertaking surveys targeted at key species) do significantly affect the findings of the survey and therefore the conclusions and prescribed mitigation measures. The evaluation and assessment undertaken in this report therefore rely heavily on assessment of the potential value of the habitat present along with professional judgement/ knowledge of the area.

The survey was conducted in accordance with a Covid-19 Risk Assessment. This did not give rise to any limitations at this site.

3 RESULTS

3.1 Desk Study

Records within 2 km of Application Site

- 3.1.1 Cofnod provided a large number of bird records from within 2 km of the application site largely with four-figure grid references. Records of potential relevance to the application site include Kestrel (*Falco tinnunculus*), Reed Bunting (*Emberiza schoeniclus*), House Sparrow (*Passer domesticus*), Dunnock (*Prunella modularis*), Bullfinch (*Pyrrhula pyrrhula*), Starling (*Sturnus vulgaris*), Long-tailed Tit (*Aegithalos caudatus*), Swallow (*Hirundo rustica*), Kingfisher, Redwing (*Turdus iliacus*), Song Thrush (*Turdus philomelos*), Fieldfare (*Turdus pilaris*), Lapwing (*Vanellus vanellus*), Mallard (*Anas platyrhynchos*), Coal Tit (*Periparus ater*), Whitethroat (*Sylvia communis*), Green Sandpiper (*Tringa ochropus*), Barn Owl, Skylark (*Alauda arvensis*), Snipe (*Gallinago gallinago*), Linnet (*Linaria cannabina*), Swift (*Apus apus*), Redstart (*Phoenicurus phoenicurus*), Willow Warbler (*Phylloscopus trochilus*), Goldcrest (*Regulus regulus*), Woodcock, Spotted Flycatcher (*Muscicapa striata*), Cuckoo (*Cuculus canorus*), Grasshopper Warbler (*Locustella naevia*), Meadow Pipit (*Anthus pratensis*), Green Woodpecker (*Picus viridis*), Hobby (*Falco subbuteo*), Cetti's Warbler (*Cettia cetti*), Marsh Tit (*Poecile palustris*), Grey Partridge (*Perdix perdix*), Dipper (*Cinclus cinclus*), Yellowhammer (*Emberiza citrinella*), Tree Sparrow (*Passer montanus*) and Peregrine (*Falco peregrinus*).
- 3.1.2 One of the Kestrel records is dated 2018 and is from within the application site. The Kingfisher record is from 'Wrexham WwTW' and the Green Sandpiper from 'Five Fords WwTW'.
- 3.1.3 The Barn Owl records include locations from Cross Lanes (2008, 2010, 2011, 2016), Pentre Maelor (2017), Plas Issa Farm (2014, 2017) and Bangor-is-y-coed (2016). Some of these records are likely to be from/ close to nest sites.

3.2 Walkover Survey

Habitat Description

- 3.2.1 *Figure 2* presents Target Notes (numbered 1 to 22) recorded during the reconnaissance survey.
- Arable*
- 3.2.2 The application site is largely dominated by five arable fields (*Target Notes 6, 15, 17, 21 and 22*) of varying size. At the time of the reconnaissance survey four of these fields had been planted with Maize whilst the fifth (*Target Note 21*) had been planted with Barley. At this time the Maize was approximately 0.2-0.5 m high and the Barley was 0.3 m.



Part of the arable field at *Target Note 6*.



The arable field at *Target Note 6* from close to the southeast corner, looking approximately northwest. The stretch of hedge at *Target Note 9* is visible.



Part of the arable field at Target Note 17 with large Oak tree.



Part of the arable field at Target Note 21.

Boundary Features and Trees

- 3.2.3 The largest arable field (*Target Note 6*) has a recently planted hedge (outside the site boundary) along Sesswick Way. The hedge is currently managed to approximately 3 m high and 3 m wide. It includes *Crataegus monogyna* (Hawthorn), *Prunus spinosa* (Blackthorn), *Corylus avellana* (Hazel) and *Acer campestre* (Field-maple). The soil in the field is quite sandy. There are narrow margins of tall ruderals including *Urtica dioica* (Common Nettle), *Cirsium arvense* (Creeping Thistle) and *Heracleum sphondylium* (Hogweed). It is typical of the other fields/ field boundaries within the application site.

- 3.2.4 There is a short section of part managed hedge/ line of shrubs at *Target Note 8* which includes a mature *Quercus robur* (Pedunculate Oak) tree. It is largely directly bordered by dense scrub outside the application site. There is a short section of gappy hedge in the middle of the large arable field (*Target Note 9*).
- 3.2.5 The southern application site boundary is bordered by a disused railway (*Target Note 8a*). This feature is characterised by dense scrub with occasional trees, patches of dense *Rubus fruticosus* agg. (Bramble) and stands of tall ruderals. The shrubs extend to approximately 5-6 m high, are dominated by Hawthorn, and the side is flailed.
- 3.2.6 There is a relatively recently planted hedge at *Target Note 10*. It is managed to approximately 1.8 m high and 1.5 m wide and is dominated by Hawthorn with frequent Blackthorn and lesser amounts of *Rosa canina* agg. (Dog-rose) and Hazel. Immediately adjacent and to the east, there is a track with a wide strip of infrequently managed, species-poor grassland. There is a narrow strip of unmanaged grassland along the boundary of the arable field.
- 3.2.7 There is an unmanaged line of shrubs with a small number of large, mature trees at *Target Note 14*. The trees include Pedunculate Oak, *Acer pseudoplatanus* (Sycamore) and *Fraxinus excelsior* (Ash). These trees are large enough to contain holes of potential value for hole-nesting birds. The shrubs/ defunct hedge extend to approximately 5-10 m high and include Hawthorn, *Sambucus nigra* (Elder), Blackthorn and Field-maple. Along the margins there are wide stands of Common Nettle. This feature is located on a low slope up to approximately 12 m wide.



Part of the defunct hedge/ line of shrubs and trees at *Target Note 14*.

- 3.2.8 There is a mature Pedunculate Oak at *Target Note 5* with an approximate diameter at breast height (dbh) of 1.3 m. This tree contains a large rot cavity at the base of the trunk. There is a large hollow branch towards the southwest side, close to the initial bifurcation of the main trunk. Faecal splashing, some feathers/ down and flies were noted around this hole. Three Kestrels including at least one juvenile were noted in and around this tree. This tree had been used for nesting by a pair of Kestrel. The ground beneath this tree had been greatly disturbed by agricultural operations.



The large Oak tree at *Target Note 5*.



The cavity within the Oak at *Target Note 5* that had apparently been used for nesting by a pair of Kestrels.

- 3.2.9 There is a large, mature Pedunculate Oak at *Target Note 20*. It has an approximate dbh of 1.1 m. At least one large rot-hole was visible with a second hollow branch also present. The rot-hole may be in use by Grey Squirrel (*Sciurus carolinensis*).



Hollow branch towards the crown of the tree at *Target Note 20*.

- 3.2.10 There is a mature Sycamore with an approximate dbh of 1 m at *Target Note 11*.
- 3.2.11 There are a number of other trees scattered throughout the application site, e.g. *Target Notes 3, 4, 7, 8, 12, 17 and 19*, many have not been assigned a Target Note as part of this study. Further boundary features/ hedges are also present within the application site (e.g. *Target Note 4*).

Woodland/ Scrub

- 3.2.12 There is a young broad-leaved woodland/ scrub plantation partly bordered by a young planted hedge at *Target Note 4*. Large, mature ornamental trees are scattered throughout this area along with dense patches of Bramble and Common Nettle. The plantation is located over *Arrhenatherum elatius* (False Oat-grass)-dominated grassland.
- 3.2.13 There is a low bund to approximately 4 m high around the gas plant within the DCWW operational site (*Target Note 3*). It supports a young broad-leaved plantation including species such as *Alnus glutinosa* (Alder), Pedunculate Oak, *Betula pendula* (Silver Birch), *Ilex aquifolium* (Holly) and Hawthorn. The trees are generally up to 4-5 m high with an approximate dbh of 0.1 m. In places there is also rough grassland/ tall ruderals and patches of dense Bramble scrub.
- 3.2.14 There are a number of large trees adjacent to the river to the north of the arable field at *Target Note 17*. Most of these trees are located outside the application site.

- 3.2.15 There is a line of mature, unmanaged scrub with a small number of young/ semi-mature trees on a low slope at *Target Note 19*. The scrub includes Hazel, Hawthorn and Elder, and the trees include Sycamore and Ash.



Scrub at *Target Note 19*.

- 3.2.16 Further woodland/ scrub is also present within the application site (e.g. *Target Notes 12* and *16*).



Line of shrubs on western boundary of the field at *Target Note 21*.

River Clywedog Corridor

- 3.2.17 The corridor of the River Clywedog (*Target Note 12*) is characterised by areas of unmanaged grassland, stands of tall ruderals, patches of dense Bramble, *Fallopia ×bohemica* (Hybrid Japanese Knotweed) and scattered young to mature trees and shrubs. The grassland is generally dominated by False Oat-grass, and the tall ruderals are typically Common Nettle and Hogweed. The trees and shrubs include *Salix fragilis* (Crack Willow),

Salix caprea (Goat Willow), *Salix viminalis* (Osier), *Salix cinerea* (Grey Willow), Alder, *Ulmus glabra* (Wych Elm), Sycamore and Ash. There are some large, mature specimens.



A stretch of the River Clywedog (Target Note 12).



Willow scrub/ trees, Bramble and stands of tall ruderals by the River Clywedog.

- 3.2.18 The river is approximately 5-6 m wide with a slow/ moderate flow over silt/ gravel. The rough grassland/ tall ruderals extend down the banks where *Phalaris arundinacea* (Reed Canary-grass) is frequent along with locally frequent *Impatiens glandulifera* (Indian Balsam) and occasional *Oenanthe crocata* (Hemlock Water-dropwort). Aquatic vegetation appears to be limited to a small amount of a fine-leaved pondweed (*Potamogeton* sp.).
- 3.2.19 To the north of the river, up to Cefn Road, there is a complex of broad-leaved woodland/ scattered trees, dense scrub including large patches of Bramble, stands of tall ruderals, Hybrid Japanese Knotweed and some unmanaged grassland (Target Note 16). There is a young planted hedge adjacent to Cefn Road.

- 3.2.20 There is a vertical exposed earth cliff that extends to approximately 2.5 m above the water level at *Target Note 18*. The cliff is stepped as a large number of lumps of concrete have been tipped down the bank. Two holes are apparent in the upper section of cliff though on further inspection neither hole extends further than approximately 0.15 m. This cliff is of sub-optimal though potential value for Kingfisher. Similar features may be present elsewhere along the river. A second earth cliff extending to 1.8 m high was noted at *Target Note 18a* which is just outside the application site boundary – no holes were recorded.



Part of the earth cliff at *Target Note 18*.

Grassland

- 3.2.21 There is a small field fragment at *Target Note 7* that has been bisected by Sesswick Way. It is characterised by unmanaged grassland, tall ruderals and scattered scrub. It is dominated by False Oat-grass with locally abundant Common Nettle, frequent Hogweed, occasional Creeping Thistle and Bramble. There is a large remnant hedge on the west side that includes some old laid specimens of Field-maple, Blackthorn and Hawthorn. This boundary also contains three mature Oak trees and a Field-maple.
- 3.2.22 The western two-thirds of the fenced area at *Target Note 4* is characterised by poor semi-improved grassland (*Target Note 4a*) dominated by False Oat-grass with several large stands of Common Nettle and scattered shrubs. The grassland is tussocky with a sward height of approximately 1.4 m.



Part of the grassland resource at Target Note 4a.

- 3.2.23 To the east of the gas plant within the DCWW operational site there is an area of rough, unmanaged grassland with tall ruderals and scattered Willow scrub. It is dominated by False Oat-grass with abundant Common Nettle, locally frequent Creeping Thistle and occasional Hogweed and *Dipsacus fullonum* (Teasel).



Part of the grassland/ tall ruderals at Target Note 2.

- 3.2.24 The grassland at Target Note 1 is infrequently cut poor semi-improved with tall ruderals including abundant Common Nettle, locally frequent Hogweed and occasional *Rumex obtusifolius* (Broad-leaved Dock).
- 3.2.25 There is a small area of marshy grassland/ inundation grassland (Target Note 13) adjacent to the River Clywedog corridor. The margins are dominated by *Festuca rubra* (Red Fescue) and *Agrostis capillaris* (Common Bent) while the centre is characterised by locally abundant *Alopecurus geniculatus* (Marsh Foxtail) with locally frequent *Juncus inflexus* (Hard-rush), *Juncus effusus* (Soft Rush), occasional *Epilobium hirsutum* (Great Willowherb), and lesser amounts of *Apium nodiflorum* (Fool's Water-cress), *Veronica beccabunga* (Brooklime),

Pulicaria dysenterica (Common Fleabane), *Carex pendula* (Pendulous Sedge) and Hemlock Water-dropwort. It was largely dry at the time of the survey but the very centre was damp. It may be winter-wet.



The marshy grassland at Target Note 13.

- 3.2.26 Further areas of grassland are present throughout the application site including the narrow strip along the track at Target Note 10.



The track, hedge and infrequently managed grassland at Target Note 10, from the southern end looking north.

Other Habitat

- 3.2.27 There is a small, single-storey brick building at Target Note 4b. There are holes in the slate-tiled roof on the southern side of this building. The western of the holes measures approximately 12 cm by 10 cm, the eastern is larger but has a roofing batten across it. The

building appears to have been used for bat mitigation (several slots and holes have been created in the eastern and northern elevations). The doors have been boarded-up.

An old Wren nest was noted behind the barge board on the eastern elevation.



The building at Target Note 4b.



The holes in the roof of the building at Target Note 4b.

- 3.2.28 There is a single-span bridge over the River Clywedog at *Target Note 12a*. It has a metal deck with concrete/ sheet pile abutments. It is possible that birds, including the Dipper could nest on top of the abutments though none was present on the day of the reconnaissance visit.
- 3.2.29 Ephemeral/ short perennial vegetation is largely restricted to gate-ways, tracks, and in some places, field margins.

Adjacent Habitat

- 3.2.30 The application site is immediately bordered to the north by Cefn Road and east by Sesswick Way, on the opposite side of which are further arable fields and the southern end of Wrexham Industrial Estate. The Industrial Estate is a complex of industrial/ manufacturing units of varying size, with some areas of unmanaged grassland/ tall ruderals, scrub and mature trees.
- 3.2.31 There is a disused railway characterised by scrub and mature trees adjacent to the southern boundary of the application site. To the south of this feature there are further arable fields. There is a complex of scrub, mature trees and ponds by the southeast site corner. This is an ecological mitigation area.
- 3.2.32 The remainder of the Five Fords WwTW is located to the west of the application site. It comprises a complex of built structures, hard-standing, areas of amenity grassland, infrequently managed grassland, ephemeral vegetation, scrub and plantation woodland. The resource at *Target Note 2* is part of a wider resource of rough grassland, tall ruderals and scattered scrub. There are also several lagoons and ponds. An area of broad-leaved woodland (Marchwiell Covert) is located on the southern end of the WwTW.

3.3 Bird Survey

Introduction

- 3.3.1 During each CBC survey visit the location and movements of every bird present or flying over is recorded. The standard 'Species and Activity Codes' are used for recording purposes. Following the completion of all the survey visits the species maps are compiled. All registrations for a single species from all visits are copied onto separate maps. These maps can subsequently be analysed to determine number of breeding pairs, *etc*, although as stated above this was not undertaken in this instance. The species maps are presented in *Appendix 1*. The species maps exclude all gulls, corvids (with the exception of Jay) and pigeons/ doves (with the exception of Stock Dove). Due to the number present the movements of Swallows, Martins and Swifts were also not mapped though notes on their locations/ behaviour were taken.
- 3.3.2 The results of the VP survey are presented in *Appendix 2* as four tables (*Tables 6 to 9*). Again, the tables exclude all gulls, corvids (with the exception of Jay) and pigeons/ doves (with the exception of Stock Dove). Due to the number present the movements of Swallows, Martins and Swifts were also not recorded unless considered noteworthy.
- 3.3.3 *Table 1* below presents a summary of the weather conditions for each of the three survey visits.

Table 1 – Weather Conditions

Visit no.	Date	Start – End Time	Weather Conditions
1	30/06/20	05.50 – 10.20 hrs	100% white/grey cloud, dull, beaufort wind speed 0-1 increasing to 2-3 by 08.05 hrs; brightening to 90% cloud and brief sunny spells by about 08.00 hrs. Temperature at start: 13.6°C.
2	14/07/20	05.50 – 11.05 hrs	100% thick grey cloud, dull, beaufort 1-2(3). Temperature at start: 13.8°C. Brightening to 60% grey/ white cloud by 07.30 hours. At 09.35 hours 100% grey cloud with brief spell of light drizzle.
3	21/07/20	18.00 – 22.30 hrs	At start 95% grey/ white cloud, beaufort 0-1, clearing to 50% cloud with some sunshine by 18.40 hrs, and 15% high, thin cloud with bright sunshine by 19.00 hrs. Temperature at start: 19.1 °C.

Recorded Species and Status

- 3.3.4 The results of the breeding bird survey are summarised in *Table 2* below which lists all of the birds recorded from within/ over the survey site. As territorial analysis has not been undertaken it has not been possible to provide an estimate of breeding pairs. The conservation status, where applicable, is provided in the second column.
- 3.3.5 The terms used in the site status column follow those used by the BTO² (Non-breeding-Possible breeder-Probable breeder-Confirmed breeder).

Table 2 – Summary of Breeding Bird Survey Results

Species	Conservation Status*	Site Status
Mandarin (<i>Aix galericulata</i>)		Possible breeder
Mallard (<i>Anas platyrhynchos</i>)	UK Amber, Wales Amber	Possible breeder
Pheasant (<i>Phasianus colchicus</i>)		Possible breeder
Sparrowhawk (<i>Accipiter nisus</i>)		Possible breeder
Buzzard (<i>Buteo buteo</i>)		Possible breeder
Kestrel (<i>Falco tinnunculus</i>)	S7, UK Amber, Wales Red	Confirmed breeder
Hobby (<i>Falco subbuteo</i>)	Sch1	Possible breeder
Lapwing (<i>Vanellus vanellus</i>)	S7, UK Red, Wales Red	Possible breeder
Black-headed Gull (<i>Chroicocephalus ridibundus</i>)	S7, UK Amber, Wales Red	Non-breeding. Flying over.
Lesser Black-backed Gull (<i>Larus fuscus</i>)	UK Amber, Wales Amber	Non-breeding. Flying over.
Herring Gull (<i>Larus argentatus</i>)	S7, UK Red, Wales Red	Non-breeding. Flying over.
Stock Dove (<i>Columba oenas</i>)	UK Amber	Possible breeder
Woodpigeon (<i>Columba palumbus</i>)		Possible breeder
Collared Dove (<i>Streptopelia decaocto</i>)		Possible breeder

² <https://www.bto.org/sites/default/files/u36/downloads/breedingcodes.pdf>

Species	Conservation Status*	Site Status
Swift (<i>Apus apus</i>)	UK Amber, Wales Amber	Non-breeding. Flying over.
Great Spotted Woodpecker (<i>Dendrocopos major</i>)		Possible breeder
Green Woodpecker (<i>Picus viridis</i>)	Wales Amber	Possible breeder
Magpie (<i>Pica pica</i>)		Possible breeder
Jay (<i>Garrulus glandarius</i>)		Possible breeder
Jackdaw (<i>Corvus monedula</i>)		Possible breeder
Rook (<i>Corvus frugilegus</i>)		Possible breeder
Carrion Crow (<i>Corvus corone</i>)		Possible breeder
Blue Tit (<i>Cyanistes caeruleus</i>)		Probable breeder
Great Tit (<i>Parus major</i>)		Probable breeder
Skylark (<i>Alauda arvensis</i>)	S7, UK Red, Wales Amber	Possible breeder
Sand Martin (<i>Riparia riparia</i>)		Non-breeding. Flying over.
Swallow (<i>Hirundo rustica</i>)		Non-breeding. Flying over.
House Martin (<i>Delichon urbicum</i>)	UK Amber	Non-breeding. Flying over.
Long-tailed Tit (<i>Aegithalos caudatus</i>)	Wales Amber	Possible breeder
Chiffchaff (<i>Phylloscopus collybita</i>)		Confirmed breeder
Blackcap (<i>Sylvia atricapilla</i>)		Probable breeder
Garden Warbler (<i>Sylvia borin</i>)		Possible breeder
Lesser Whitethroat (<i>Sylvia curruca</i>)		Possible breeder
Whitethroat (<i>Sylvia communis</i>)	Wales Red	Confirmed breeder
Sedge Warbler (<i>Acrocephalus schoenobaenus</i>)		Probable breeder
Wren (<i>Troglodytes troglodytes</i>)		Confirmed breeder
Blackbird (<i>Turdus merula</i>)		Confirmed breeder
Song Thrush (<i>Turdus philomelos</i>)	S7, UK Red, Wales Amber	Confirmed breeder
Mistle Thrush (<i>Turdus viscivorus</i>)	UK Red, Wales Amber	Possible breeder
Robin (<i>Erithacus rubecula</i>)		Confirmed breeder
Whinchat (<i>Saxicola rubetra</i>)	UK Red, Wales Red	Non-breeding.
Dunnock (<i>Prunella modularis</i>)	S7, UK Amber	Confirmed breeder
Yellow Wagtail (<i>Motacilla flava</i>)	S7, UK Red, Wales Red	Possible breeder
Grey Wagtail (<i>Motacilla cinerea</i>)	UK Red, Wales Amber	Possible breeder
Pied Wagtail (<i>Motacilla alba</i>)		Possible breeder
Goldfinch (<i>Carduelis carduelis</i>)		Possible breeder
Siskin (<i>Carduelis spinus</i>)		Non-breeding. Flying over.
Greenfinch (<i>Chloris chloris</i>)	Wales Amber	Possible breeder

***Key to Status Column**

Sch1 = Included on *Schedule 1* of the *Wildlife and Countryside Act 1981*, as amended.

S7 = Included in *Section 7* of the *Environment (Wales) Act 2016*.

UK Red = Included on the current Birds of Conservation Concern 4 Red List (Eaton *et al.* 2015).

UK Amber = Included on the current Birds of Conservation Concern 4 Amber List (Eaton *et al.* 2015).

Wales Red = Included on the current Birds of Conservation Concern in Wales Red List (Johnstone & Bladwell 2016).

Wales Amber = Included on the current Birds of Conservation Concern in Wales Amber List (Johnstone & Bladwell 2016).

3.3.6 Other species recorded close to but not within the survey site:

- Cormorant (*Phalacrocorax carbo*).
- Moorhen (*Gallinula chloropus*).
- Bullfinch (*Pyrrhula pyrrhula*).
- Willow Warbler (*Phylloscopus trochilus*).

The latter two species could potentially nest within the application site and are priority species.



Juvenile Whinchat on northern boundary of field at Target Note 6 (14/07/20).



Young Kestrel in Oak tree at *Target Note 5* (30/06/20).



Song Thrush in song from boundary at *Target Note 14* (30/06/20).

4 DISCUSSION AND EVALUATION

4.1 Confirmed Use of the Survey Site

4.1.1 48 species were recorded during the bird survey from the survey site or flying over it. A further four species were recorded from habitat immediately adjacent to the application site. Eight species were confirmed to have bred within the survey site with a further four probable breeding species, and 27 are considered to be possible breeding species where conclusive evidence was not recorded.

4.1.2 One species listed on *Schedule 1* of the *Wildlife and Countryside Act 1981* (as amended) was recorded during the bird survey: Hobby. The Hobby is categorised as a possible breeding species.

4.1.3 Of the 48 species recorded, 21 are priority species. These priority species are as follows:

- Confirmed breeder – Kestrel, Whitethroat, Song Thrush, Dunnock.
- Possible breeder – Mallard, Hobby, Lapwing, Stock Dove, Green Woodpecker, Skylark, Long-tailed Tit, Mistle Thrush, Yellow Wagtail, Grey Wagtail, Greenfinch.
- Non-breeder – Black-headed Gull, Lesser Black-backed Gull, Herring Gull, Swift, House Martin, Whinchat.

Bullfinch and Willow Warbler are priority species and were recorded from habitat directly adjacent to the survey site. Both could potentially nest within the application site.

4.1.4 Table 3 below provides a summary of the priority species recorded from the survey site and their site status, as far as is known. The table does not include species that were recorded flying over and are unlikely to breed within the survey site.

Table 3 – Priority Species of Bird Recorded from the Survey Site and their Site Status; Breeding/ Summer Use

Species	Site Status
Mallard (<i>Anas platyrhynchos</i>)	Nest in dense vegetation near water and sometimes in holes in trees and other places. Some nesting opportunities associated with the River Clywedog for a small number of birds.
Kestrel (<i>Falco tinnunculus</i>)	Nest in medium/ large trees, holes, buildings and abandoned nests of other birds ³ . Nest confirmed in tree at <i>Target Note 5</i> . Other suitable trees present in the survey site.
Hobby (<i>Falco subbuteo</i>)	They typically nest in trees or an open area on the edge of woodland with most utilising an old Crow nest. Their territory can be large with a home range of about 750 hectares ⁴ . There are trees within the application site that could be used for nesting. However, it is believed that the bird recorded was flying towards the WwTW, and likely to be exploiting the congregation of Swallows and Martins at this location.
Lapwing (<i>Vanellus vanellus</i>)	Nest on bare ground or short, tussocky grassland ⁵ , spring-sown arable/ bare ground and wet grassland/ wetland habitat for feeding. The potential value

³ <http://www.raptortrust.org.uk/pictures/kestrelnest.pdf>

⁴ <http://www.cheshireandwirralbirdatlas.org/species/hobby-breeding.htm>

⁵ http://www.rspb.org.uk/Images/Englishlapwings1_tcm9-133256.pdf

Species	Site Status
	of the application site is likely to be dependent on the crop. Nearby wetland habitat may be available within the WwTW.
Stock Dove (<i>Columba oenas</i>)	Nest in holes in trees, in buildings and other cavities. A number of large trees within the application site provide opportunities.
Green Woodpecker (<i>Picus viridis</i>)	Nest in holes in large deciduous trees usually located close to feeding grounds (grasslands with ant nests and other invertebrates). A number of large trees within the application site provide opportunities although the limited amount of foraging habitat available may be a limiting factor.
Skylark (<i>Alauda arvensis</i>)	Skylarks nest on the ground, in vegetation that is 20-50 cm high ⁶ . The vegetation also needs to be open enough to give the birds access to the ground. A single singing bird was recorded on one occasion in the field at <i>Target Note 6</i> . It is not known whether nesting was attempted. Nesting opportunities are likely to change between years depending on the crop being grown. Whilst Skylarks will use Maize fields for nesting evidence suggests that these nests are less successful (when compared with other crops) (Praus & Weidinger 2015).
Long-tailed Tit (<i>Aegithalos caudatus</i>)	Nest in a range of locations but generally between tree branches, in scrub including Bramble, or other dense vegetation. There are nesting opportunities around the edges of the application site but particularly along the river corridor.
Whitethroat (<i>Sylvia communis</i>)	Whitethroats prefer fairly open habitat with patches of scrub, Bramble, hedgerows and other low, dense vegetation. They are frequent around the application site and are found in more-or-less every patch of scrub, hedgerow and stand of tall ruderals.
Song Thrush (<i>Turdus philomelos</i>)	Often nests in woodland and scrub but can nest anywhere there is dense cover including the ground in thick vegetation. The River Clywedog corridor, scrub/ trees at <i>Target Note 4</i> and overgrown hedge at <i>Target Note 14</i> appeared to be favoured within the application site although they were also recorded outside the boundary, particularly the disused railway at <i>Target Note 8a</i> .
Mistle Thrush (<i>Turdus viscivorus</i>)	Usually nests in trees or large shrubs. Nesting opportunities throughout the application site but particularly in northern part.
Whinchat (<i>Saxicola rubetra</i>)	Generally, an upland species of open habitats, often near watercourses, though historically has used rough grassland and arable in lowland locations. There are very few records from lowland areas in North Wales (Brenchley <i>et al.</i> 2013). The closest currently known breeding location is likely to be the edge of Ruabon Mountain. Considered unlikely that this species would breed at the application site.
Dunnock (<i>Prunella modularis</i>)	Most frequently nests in hedges and scrub; requires dense, low cover. Recorded from many of the hedges, patches of scrub and the river corridor throughout the application site.
Yellow Wagtail (<i>Motacilla flava</i>)	Nest on the ground around wetlands, wet grassland, saltmarshes, hay meadows and some vegetable/ arable crops. The Yellow Wagtail is a rare breeding species in North Wales (estimated at 10-20 pairs) with a restricted

⁶ http://www.rspb.org.uk/Images/skylark_tcm9-133209.pdf

Species	Site Status
	distribution (Brenchley <i>et al.</i> 2013). This species has bred in fields of Maize. It is possible that this species could nest within the application site though it is currently considered unlikely. A single bird was recorded on a single occasion in the field at <i>Target Note 6</i> – visits earlier in the year would be required to confirm breeding.
Grey Wagtail (<i>Motacilla cinerea</i>)	Usually nest near watercourses or waterbodies, in hollows and crevices associated with a range of features. There are potential nesting opportunities along the River Clywedog.
Greenfinch (<i>Chloris chloris</i>)	Nest in a range of trees, shrubs and hedgerows. Largely recorded from outside the survey site (e.g. the disused railway at <i>Target Note 8a</i>) but there is potential nesting habitat scattered throughout the application site.

4.2 Potential Value of Existing Habitat

Breeding/ Summer Use

- 4.2.1 This sub-section considers the potential value of the habitat within the application site for priority species⁷ that were not recorded during the bird survey (and therefore covered by sub-section 4.1).
- 4.2.2 Based on assessment of the habitat, records provided by Cofnod and information from Brenchley *et al.* (2013) priority species that could nest within the application site are listed in the tables below. *Table 4* includes those species that are 'quite likely' to find nesting opportunities and those within *Table 5* are 'less likely'.

Table 4 – Priority Species that are Quite Likely to find Nesting Opportunities within the Application Site

Species	Habitat Assessment
Barn Owl (<i>Tyto alba</i>)	Nest in buildings, nest-boxes and suitable tree cavities. This species remains fairly widespread but scattered in northeast Wales (Brenchley <i>et al.</i> 2013). It has also suffered a significant decline. Cofnod provided a number of records from all around, but outside, the application site. Some of the large trees within the application site could contain a suitable cavity. The building at <i>Target Note 4b</i> could be used by Barn Owl though it is considered to be of sub-optimal potential value. This species was not recorded during any of the survey visits.
Starling (<i>Sturnus vulgaris</i>)	The Starling is a semi-colonial hole-nesting species though it will also use buildings and nest-boxes. Some of the large trees within the application site may provide nesting opportunities. However, this species favours areas of lowland pasture which may be a limiting factor in this area which is dominated by arable fields.
Dipper (<i>Cinclus cinclus</i>)	Nest in a variety of situations including beneath bridges, in walls, in or on trees and in rock-faces. The River Clywedog provides a few nesting opportunities including the bridge at <i>Target Note 12a</i> .

⁷ As defined in CIEEM (2017).

Species	Habitat Assessment
Willow Warbler (<i>Phylloscopus trochilus</i>)	Favours pioneer scrub/ young woodland/ sparsely wooded areas. Nest usually on the ground on the edge of scrub/ woodland (e.g. Simms 1985) in dense, low vegetation. Potential nesting opportunities within application site (e.g. <i>Target Notes</i> 2, 3, 4 and 12). Suitable habitat outside application site (e.g. <i>Target Note</i> 8a).
Linnet (<i>Carduelis cannabina</i>)	Nest semi-colonially in <i>Ulex europaeus</i> (Gorse), Hawthorn, Bramble and other dense scrub ⁸ . Potential nesting opportunities within the application site are largely associated with the River Clywedog, and areas of scrub at <i>Target Notes</i> 2, 3, 4/4a/4b, 7, 14 and 19. Suitable habitat outside application site (e.g. <i>Target Note</i> 8a).
Bullfinch (<i>Pyrrhula pyrrhula</i>)	Nests in scrub, hedges, woodland undergrowth and other dense vegetation. Nesting opportunities in many parts of the application site but particularly the northern end. Suitable habitat outside application site (e.g. <i>Target Note</i> 8a).
Reed Bunting (<i>Emberiza schoeniclus</i>)	Prefer to nest in wetland habitat or reedbed, however increasingly use 'dry' habitats. Require dense, but fairly low vegetation including tall herbs and low shrubs ⁹ . Potential nesting opportunities within the application site, particularly along the River Clywedog and at <i>Target Note</i> 2.

Table 5 – Priority Species that are Less Likely to find Nesting Opportunities within the Application Site

Species	Habitat Assessment
Grey Partridge (<i>Perdix perdix</i>)	Nest on the ground generally in dense grassland/ vegetative cover – in the base of hedges, on the edge of scrub, stands of tall herbs, etc. A good supply of insect prey items is important. The application site provides few potential nesting opportunities. This species is 'extremely rare' in North Wales (Brenchley <i>et al.</i> 2013) and is therefore unlikely to be found at the site.
Quail (<i>Coturnix coturnix</i>)	Nest on the ground generally in dense grassland/ long grass. Similar to the Grey Partridge this species is extremely rare in North Wales and is therefore unlikely to be found at the site. No Cofnod records.
Kingfisher (<i>Alcedo atthis</i>)	Nest in low vertical earth banks. Some suitable though sub-optimal earth banks available along the River Clywedog that are located on the boundary of the application site. Appears to be largely associated with the larger rivers in northeast Wales (Brenchley <i>et al.</i> 2013).
Goldcrest (<i>Regulus regulus</i>)	Largely favours conifers for nesting though it will use Ivy-covered deciduous trees. It may be limited within the application site as there are no conifer trees present.
Marsh Tit (<i>Poecile palustris</i>)	Generally, nests within tree cavities and is associated with broad-leaved woodland. They do not stray far from their natal site. The population has suffered significant decline. It is possible that there may be opportunities in trees along the River Clywedog and associated area of woodland to the west – Black Wood – outside the application site.

⁸ http://www.rspb.org.uk/Images/linnet_tcm9-133205.pdf

⁹ http://www.rspb.org.uk/Images/Reed%20bunting_tcm9-133207.pdf

Species	Habitat Assessment
Grasshopper Warbler (<i>Locustella naevia</i>)	Nest low down in dense vegetation including rough grassland, stands of tall ruderals, reedbeds, moorland, <i>etc.</i> Potentially suitable habitat within the application site is found along the River Clywedog, vegetation adjacent to the hedge at <i>Target Note 14</i> , the habitat complex at <i>Target Notes 4/4a/4b</i> and possibly at <i>Target Notes 2</i> and <i>7</i> . It is not a common bird in North Wales (Brenchley <i>et al.</i> 2013).
Spotted Flycatcher (<i>Muscicapa striata</i>)	Nests in holes in trees, gaps behind bark, climbing plants against walls, on other suitable built structures and in nest-boxes. This species prefers open, wooded, habitats such as parks, church-yards, <i>etc.</i> Whilst the application site may offer a small number of nesting opportunities, suitable habitat is generally limited to the River Clywedog corridor, the boundary at <i>Target Note 14</i> and the area at <i>Target Notes 4/4a</i> and <i>4b</i> . The disused railway at <i>Target Note 8a</i> , outside the application site, provides suitable habitat.
Yellowhammer (<i>Emberiza citrinella</i>)	Nest on or close to the ground in ditch vegetation, at the base of thick hedgerows or scrub. This habitat is frequently associated with uncut grass margins ¹⁰ . The dense cover favoured by this species is limited within the application site and most of the hedges are young, recently planted.
Tree Sparrow (<i>Passer montanus</i>)	Nest in small colonies in tree holes, Willow pollards, farm buildings. Largely associated with arable farmland where cereals are grown in North Wales and also mostly along river valleys (Brenchley <i>et al.</i> 2013). It has suffered a significant decline. This species is 'extremely rare' in North Wales (Brenchley <i>et al.</i> 2013) and is therefore unlikely to be found at the site.

Wintering/ Passage

- 4.2.3 Some of the birds listed in *Table 2* above may be considered as 'resident' at the application site. The application site provides wintering opportunities for a range of birds particularly those associated with arable fields, rivers, scrub and hedgerows. The arable fields could support a number of birds during the winter depending on the level of use of herbicides/ pesticides and their management at the time. Based on the records provided by Cofnod this could include Lapwing, Golden Plover (*Pluvialis apricaria*), Skylark, Meadow Pipit, various finches including Linnet, buntings including Yellowhammer, winter thrushes, House Sparrow and possibly Tree Sparrow.
- 4.2.4 Winter thrushes – Redwings and Fieldfares as well as immigrant Blackbirds, *etc* – are also likely to find a food source associated with berry-bearing shrubs. This resource is likely to be limited within the application site at present as many of the hedges are young. The habitat outside the application site, along the disused railway at *Target Note 8a*, may be of particular value.
- 4.2.5 Areas of long grassland and scrub may support wintering passerines and may be of particular value to seed and fruit-eating species. This may include various finches and buntings. This habitat is also likely to support good numbers of invertebrates and as such may be important for insectivorous species. The River Clywedog may support small numbers of wildfowl including Mallard.

¹⁰ https://www.rspb.org.uk/Images/Englishyellowhammer1_tcm9-133268.pdf

- 4.2.6 Small numbers of Woodcock and Snipe may find feeding opportunities along the river corridor and other wet areas of the application site including the marshy grassland at *Target Note 13*.
- 4.2.7 Any congregation of larger birds at the application site could potentially attract a hunting Peregrine though this is unlikely to be a frequent event.
- 4.2.8 Various Gulls could loaf on the arable fields, particularly when crop heights remain low (e.g. mostly in the winter).
- 4.2.9 Due to the different habitats available and feeding opportunities the application site will be used by a number of birds during passage migration. Some of the species mentioned above may also be recorded on passage migration along with species that may only be present briefly, to feed, and then move on to their breeding/ wintering grounds. Such migrants could include species such as Wheatear (*Oenanthe oenanthe*), Redstart and a number of other passerines.
- 4.2.10 A single juvenile Whinchat was recorded from the edge of the Maize field at *Target Note 6* on 14th July 2020. This individual is likely to have dispersed from its natal site.

Other Use of the Application Site

- 4.2.11 The application site may be used by birds for a number of other reasons including feeding/ hunting and loafing/ roosting. During the survey on 14th July 2020 a single Swallow was recorded flying out of the hedge at *Target Note 9*. This feature may have been used for roosting. As stated above the application site is likely to provide a good supply of food/ prey items for seed/ fruit-eating and insectivorous species as well as birds of prey. The number of small flocks of Goldfinch were conspicuous during the bird survey. This species is likely to feed on seed-producing plants in field margins and unmanaged areas of the site.
- 4.2.12 Swallow, House Martin, Sand Martin and Swift were all noted feeding over the application site including some Swallows hawking low over the arable fields (up to approximately 20 over the Barley field at *Target Note 21* on 14th July and more than 20 birds over the Barley field and Maize field at *Target Note 6* on the evening of 21st July). Larger numbers of these birds were observed hunting over the WwTW.
- 4.2.13 While the size of the small mammal population within the application site is not known it is likely that the unmanaged or infrequently managed grassland and stands of tall ruderals in parts of the application site (*Target Notes 1, 2, 4/4a/4b, 10, 12, 13, 14 and 16*) provide habitat for mice, voles and shrews. In turn these provide potential prey items for birds of prey which would include Kestrel, Buzzard and possibly various Owls. The areas of grassland at *Target Notes 1, 2, 4a, 10, 12 and 13* may be particularly attractive to hunting Barn Owls.
- 4.2.14 Areas of unmanaged grassland may provide a range of potential prey items such as snails (which may be important for species such as Thrushes, Blackbird, Dunnock, Robin, Wren, etc).
- 4.2.15 During the survey visit on 14th July 2020 a number of bird species, but in particular Song Thrush, Blackbird and Dunnock, were observed foraging for food within the centre of Maize fields. Other species (e.g. Greenfinch, Pied Wagtail, Stock Dove) were recorded foraging around the edges of the fields.

4.3 Summary and Evaluation

- 4.3.1 The limited survey undertaken confirms that peripheral habitats around the margins of the application site (some outside the application site boundary) are likely to be of most value for local bird populations. The connected complex of habitats that include the corridor of the River Clywedog (*Target Notes 12/ 13/ 16/ 18*), the overgrown hedge at *Target Note 14*, the scrub/ trees and unmanaged grassland at *Target Notes 4/4a/4b* and the wide band of scrub at *Target Note 19* are likely to be of particular value. The disused railway at *Target Note 8a* is also likely to be of particular value. The railway is likely to be a locally important wildlife corridor in addition to the habitat it provides.
- 4.3.2 Many of the species recorded in the more valued areas of habitat are 'ubiquitous scrub-nesting species' (e.g. Fuller 1982) or species associated with a scrub/ grassland mosaic or the interface of those habitats. The application site appears to support several pairs of Song Thrush, though some of those recorded could have nested outside the application site boundary. However, the range of species found was restricted and did not include some species that might be expected, e.g. Reed Bunting. Similarly, 'woodland species' were particularly under-represented. Whilst there are no large areas of woodland present it might be expected that species such as Nuthatch (*Sitta europaea*) and Treecreeper (*Certhia familiaris*) might use the site, particularly along the river or at *Target Note 4*.
- 4.3.3 The hedgerows within the application site are an important habitat feature. Most of those within the southern part of the application site (e.g. *Target Note 10*) are currently of less value as they are relatively young and planted, though many still supported species such as Whitethroat and Dunnock. Boundary features within the northern part of the application site (e.g. *Target Notes 14* and *19*) are unmanaged and overgrown, and therefore of greater value for a range of nesting birds. The hedgerow at *Target Note 7* is also old and established. The number of Whitethroats associated with boundary features throughout the application site was notable. The Whitethroat remains widespread and frequent in northeast Wales.
- 4.3.4 Similarly, the dense scrub, trees, Bramble and tall ruderals associated with the disused railway (*Target Note 8/8a*) are likely to be of value for scrub/ tree-nesting species. The disused railway is located immediately outside the southern application site boundary.
- 4.3.5 Another feature of the site are the scattered large/ mature trees (e.g. *Target Notes 5* and *11*). These trees are largely Pedunculate Oak, Ash and Sycamore. A pair of Kestrel had nested in the Oak at *Target Note 5* and many of the trees scattered throughout the application site are likely to be of potential value for large birds such as raptors as well as hole-nesting species. The Kestrel remains widespread in North Wales though the population is believed to be in significant decline (Brenchley *et al.* 2013). The Hobby could potentially nest within the application site and is believed to be spreading into northeast Wales from the east (Brenchley *et al.* 2013).
- 4.3.6 Some of the trees within the application site are large enough to contain features that could be used by Barn Owls for nesting/ roosting. The Barn Owl is not a common species in North Wales (Brenchley *et al.* 2013). Barn Owl Trust (2012) states that '*Almost all buildings in which Barn Owls roost or nest are 3 m high or taller*'. It is therefore considered less likely that the building at *Target Note 4b* would be used by this species, but it cannot be entirely discounted without further investigation. The author of this report has recorded Barn Owls using buildings that are lower than this. Barn Owls only require an entrance hole measuring approximately 70 mm by 70 mm (Barn Owl Trust *op cit.*) and this building does contain potentially suitable holes in the roof. It is not known what the interior of this building is like

and whether it is suitable/ unsuitable for Barn Owls. The structure appears to be entirely sealed.

- 4.3.7 Based on the evidence collected over the three survey visits it suggests that the application site does not appear to be of great value generally for ground-nesting species, or at least those associated with open/ agricultural fields. The nesting bird assemblage associated with the two largest arable fields (*Target Notes 6 and 21*) appears to be particularly impoverished and almost entirely limited to the field boundaries. There are few inveterate priority 'farmland birds' present. It is believed that increasing Maize production is responsible for a decline in bird diversity and also a reduction in population size (e.g. Sauerbrei *et al.* 2014). This may explain the almost complete absence of ground-nesting birds from most of the agricultural fields although none were recorded from the field within which Barley was being grown.
- 4.3.8 A single singing Skylark was recorded on one occasion but it is possible that the number of pairs using the fields in the application site might vary between years depending on the crop being grown. Evidence was noted that other cereal crops (e.g. wheat, oats) may have been grown in the past. A field of the size of that at *Target Note 6* might normally be expected to support more than one pair though there may be other limiting factors. Other than Skylark, there are few ground-nesting birds that use Maize (e.g. Praus & Weidinger 2015). A single Yellow Wagtail was also recorded on one occasion and this species has nested in Maize fields. Seven Lapwings were noted on 14th July 2020 feeding around an area of surface water by the pile of manure in the field at *Target Note 6*. Lapwings can nest in Maize, particularly early on in the year when it is not too tall, though they are most likely to do so when located close to suitable wetland habitat for feeding. Lapwing are known to breed in the area, and are most frequent as a breeding species in North Wales towards the eastern boundary (Brenchley *et al.* 2013).
- 4.3.9 Reasonable numbers of Swallows, House Martins, Sand Martins and Swifts were recorded hunting over some parts of the application site. These birds were associated with a larger congregation that presumably travel to the WwTW to feed.
- 4.3.10 With reference to WCBC (2015) it is considered that the nesting bird assemblage/ potential nesting habitat within the application site is unlikely to be of county value. However, some of the habitat and features within the application site are of at least local (district) value. This habitat/ features includes:
- Scattered large/ mature trees including that within which Kestrel nested (*Target Note 5*).
 - The River Clywedog and associated habitat complex (*Target Notes 12, 13, 16 and 18*).
 - The overgrown hedge at *Target Note 14*.
 - The habitat complexes at *Target Notes 2 and 4/4a/4b*.
 - The scrub at *Target Note 19*.
- Habitat immediately adjacent to the application site boundary is of similar value and includes the disused railway at *Target Note 8*. As noted previously the disused railway may be of greater value as a wildlife corridor.
- If a species such as Kingfisher, Barn Owl or Hobby were to be recorded nesting within the application site it might be considered to be of county value.
- 4.3.11 The value of the application site to birds at other times of the year (e.g. winter) and for uses other than nesting, is considered to be of no more than local value and possibly site value.

5 CONCLUSIONS/ RECOMMENDATIONS

5.1 Introduction

5.1.1 Brief details regarding the proposal are provided in *Section 1.4*. This is not a full impact assessment and the following text is based entirely on the information provided by the following two plans:

- A Low Carbon Farming plan entitled 'General Conceptual Layout', Dwg no. 00165-20-101 Rev01, dated 05/06/20.
- A SCALES Consultancy Ltd plan entitled 'Five Fords Glasshouses Losses Plan', Dwg no. SC/F/FG/003, dated 6th June 2020.

No further information with regards the proposal has been provided. No information with regards proposed mitigation measures, any mitigation area or soft landscaping has been provided.

5.1.2 The following is a brief summary of the potential perceived main impacts due to the proposal:

Construction Phase

- Permanent direct habitat loss. Direct habitat loss is largely limited to the arable field at *Target Note 6*, which includes two mature Pedunculate Oak trees and part of the arable field at *Target Note 22*. This field is not considered to be of particular value for nesting birds though Skylark is likely to be lost from the site (as a nesting species, if indeed it does nest at this site). Any ecology mitigation/ compensation area provided may be too small to support nesting Skylark should the habitat be suitable (though this cannot be confirmed). The Oak trees provide potential nest sites for larger birds though none was recorded during the survey visits.

At the present time it is not known whether the mature trees at *Target Notes 5* and *11* might be lost although the former appears to be within an area of proposed hard-standing. A pair of Kestrel nested in the tree at *Target Note 5*. Should Kestrel be lost from the site as a breeding species this may be considered a locally significant impact. It is understood that some sections of hedgerow would be lost. This habitat loss will result in the loss of feeding/ loafing habitat for a small number of birds.

A small area of rough grassland/ scattered scrub at *Target Note 2* would be permanently lost due to the construction of the proposed CO₂ recovery plant and a small area of infrequently managed poor semi-improved grassland/ tall ruderal vegetation would be lost at *Target Note 1* due to the construction of the proposed Heat Transfer Area.

- Temporary direct habitat loss. Utility connections are to be installed from the northwest end of the proposed development connecting with a new Heat Transfer Area to be located within the Five Fords WwTW and also connecting with a gas and electricity supply. A CO₂ recovery pipe is also to be connected to a new CO₂ recovery plant within the Five Fords WwTW to the southwest of the proposed development. These works would affect the habitat at *Target Notes 1, 4/4a* and *19* as well as the arable field at *Target Note 17* (approximately 6700 m²), and the habitat at *Target Notes 2* and *3* (approximately 5611 m²) as well as the arable field at *Target Note 21* respectively.

No detail is currently available but it is understood that these habitats would be reinstated. Where this included the replacement of mature shrubs and trees this impact would be medium or long-term.

- Direct damage/ destruction to nests. Should work be undertaken during the nesting season there is a risk that nests could be directly impacted.
- Indirect disturbance. There will be some level of disturbance to birds using adjacent habitat throughout the construction phase. The duration of the construction phase is not known. It is well known that many bird species can be disturbed (even at low levels of disturbance) due to the presence of humans though some species are not affected (e.g. Hockin *et al* 1991; Fernandez-juricic 2001; Bötsch *et al.* 2017). These effects include breeding behaviour, breeding success, nest-site choice, population density, community structure, distribution and habitat use.

The duration and timing of the works to excavate the utilities trench connecting to the heat transfer area and electricity supply is currently not known. The route of the trench is currently aligned in close proximity to the building at *Target Note 4b*. Should Barn Owls use this building there is the potential for birds to be subject to disturbance during these works.

- Displacement. Due to the proximity of the proposed development to valued habitat both inside (e.g. *Target Note 7*) and outside (*Target Note 8a*) the application site there will be some displacement of nesting birds from these areas. Some of this displacement is likely to be temporary during the construction phase but some will be permanent due to the operation of the site.

This may be significant for some priority species such as the Whitethroat. Other nesting species that might be affected could include Great Spotted Woodpecker, Green Woodpecker, Song Thrush, Blackbird, Dunnock, Robin, Wren, Chiffchaff, Willow Warbler, Blackcap, Sedge Warbler, Blue Tit, Great Tit, Long-tailed Tit, Goldfinch, Greenfinch, Bullfinch and Stock Dove. Most of the young hedges with associated strips of tall ruderal vegetation that the Whitethroat prefers are located in the south of the application site, with some directly adjacent to the proposed development (e.g. *Target Notes 6 and 10*).

It is understood that the grassland at *Target Note 10* (approximately 3191 m²) will not be permanently lost. However due to the proximity of the proposal birds that currently utilise this resource could be displaced. This may be a locally significant impact if it is used by hunting Barn Owls.

- Indirect damage to adjacent habitat. The proposal includes extensive earth-works around most of the boundaries but particularly along the southern and eastern. A 5 m high slope is to be created into the site directly adjacent to the boundaries. Due to the proximity of these earthworks to the disused railway (*Target Note 8a*) and a number of large, mature trees (e.g. *Target Notes 5, 7, 8/ 8a and 11*) it is possible that damage may be caused to the root systems. A smaller slope is also to be created directly adjacent to much of the grassland at *Target Note 10*. Adjacent habitat could also be affected by inadvertent releases of pollutants, e.g. sediment-laden runoff and dust.
- Increased vehicular use of the site. The increased number of vehicles accessing the application site both during the construction and operation phases would increase levels of disturbance and the potential for collisions with some species.

Operation Phase

- Indirect disturbance. This will include an increased level of noise due to operation of the site and human presence.
- Displacement. Should the tree at *Target Note 5* be retained, Kestrel may be permanently displaced from this tree.
- Bird mortality due to collisions with the glass-houses. The glass-houses will be 7 m high to gutter level and 8 m to the gable apex height. In some locations the glass-houses will directly border valued habitat used by nesting birds. It is considered possible that one of the more significant impacts of the proposal may be mortality of birds due to collisions with the glass-houses. Barton *et al.* (2017) states that '*Studies of bird-window collisions have identified several correlates of collision rates, including habitat features, window area, seasonality, time of day, and avian density*'. Buildings with a large number of windows increase the risk (e.g. Rebolo-Ifran 2019). However, there is insufficient information available to enable assessment of the magnitude of this impact at the application site.
- Increased vehicular use of the site.
- Creation of reservoirs. No information has been provided on these reservoirs but they could provide a different habitat for birds. The value of these features may be limited somewhat as they are to be lined.
- Lighting. It is not currently known what internal and external lighting may be installed.

5.2 Recommendations

Further Survey

- 5.2.1 Further survey would be required to confirm the breeding bird assemblage on the application site. This should include both evening visits and survey visits commencing earlier in the season (e.g. March/ April).
- 5.2.2 Surveys that target particular key species should also be undertaken. For Barn Owls this should include visits early in the year (between December and April) to check trees/ any other suitable features for suitable nesting locations (e.g. Barn Owl Trust 2012). All large trees within/ close to the proposed development site and ancillary works should be checked for potentially suitable nest-holes and also assessed for their potential value to species such as the Hobby. This survey should be undertaken prior to the foliage obscuring branches/ trunks. The survey area should be extended beyond the footprint of the proposed development as detailed in Shawyer (2011) and Barn Owl Trust (2012). The tree inspection should be combined with visits in July to check for nesting Hobby.
- 5.2.3 The building at *Target Note 4b* should be subject to a detailed investigation to confirm whether or not it is used by Barn Owls. As roosting bats may be present this would require a surveyor with both a *Schedule 1* bird licence and a bat licence. This inspection should be undertaken at a time of year when bats are least likely to be present as well as avoiding the more sensitive periods of the Barn Owl breeding cycle. No information has been provided on the use of this building by bats. If it is not possible to access the interior of this building observations of this building should be undertaken at an appropriate time of year.

- 5.2.4 Should there be any potential for direct or indirect impacts on any part of the River Clywedog then further survey of this habitat should be undertaken. Such further survey should include a direct search for Kingfisher nest locations/ potential nesting locations, again in the spring (March/ April), before the banks are obscured by leaves/ vegetation. This may require wading of some sections.

Discussion and Recommendations

- 5.2.5 It should be possible to provide habitat types for many of the key species identified in *Table 3* within areas of retained habitat and an ecology mitigation/ compensation area. There are many different approaches that could be adopted and various species with differing requirements that could be targeted, all equally laudable. The key nesting species for consideration at the application site should include:

- Kestrel;
- Whitethroat;
- Song Thrush; and
- Dunnock.

Species that may be secondary targets include Lapwing, Stock Dove, Willow Warbler, Long-tailed Tit, Mistle Thrush, Grey Wagtail, Linnet, Bullfinch, Greenfinch and Reed Bunting.

As mentioned above it is possible that Skylark would be lost from the site as a breeding species.

Habitat for hunting Kestrel (and Barn Owl) should also be provided.

- 5.2.6 The habitats required by the above listed target species would include short and long (tussocky) grassland, large standard trees, various types of scrub and stands of tall ruderals. Reed Bunting would require patches of scrub close to the river corridor. Kestrel and Song Thrush would only find nesting opportunities once the planted trees/ shrubs are of sufficient age.
- 5.2.7 It should be possible to provide many of these features within areas of retained habitat and an ecology mitigation/ compensation area although it is acknowledged that other ecological resources (of greater priority) and site requirements are likely to determine compensation proposals rather than birds.
- 5.2.8 Based on the perceived impacts of the proposal the following recommendations are provided (in no particular order):

Best Practice

- The destruction of any bird nests that are in use is illegal. The simplest option to avoid issues arising from the presence of nesting birds is to schedule work that affects nesting habitat (e.g. removal of vegetation including soil stripping and clearance of trees/ shrubs) outside the nesting period (March to August inclusive). Such work should seek to ensure that, as far as is possible, all areas within the footprint of the proposed development remain unattractive to breeding birds for the duration of the work. Should any occupied nests be found during the work, a buffer zone (determined on the basis of the species concerned and the location of the nest in the context of the surrounding vegetation, but no less than 5 m) should be retained until it can be ascertained that the chicks have left the nest. The buffer zone will be appropriately fenced and signed.

If it is not possible to clear vegetation, fell/ prune trees/ shrubs outside the nesting season all such areas should be checked by a suitably qualified ecologist prior to

commencement of works. If any active nests are found at this time a buffer zone as detailed above would be provided.

In particular work that could affect the habitat at *Target Notes 2, 3, 4/4a/4b, 5, 10, 11* and *19* should be avoided during the nesting season.

- It is not currently known whether the tree at *Target Note 5* will be directly affected though it seems likely. However, due to its proximity to the proposed development it is possible that the pair of Kestrels that have nested in this tree may be displaced. If construction is proceeding in this area whilst the Kestrels are in residence at this tree then a suitable buffer zone should be provided using temporary protective fencing. A suitably qualified ecologist should be consulted with regards an appropriate buffer zone.
- General best practice measures should be implemented during the construction phase to avoid any indirect impacts (e.g. dust, diffuse pollution, etc) on adjacent habitat. The general advice contained in the Guidance for Pollution Prevention (GPP) leaflets produced by SEPA, EA and the Environment and Heritage Service (Northern Ireland) should be adhered to, particularly the following:
 - o PPG1: Understanding Your Environmental Responsibilities - Good Environmental Practices.
 - o GPP5: Works and Maintenance in or Near Water.
 - o PPG6: Working at Construction and Demolition Sites.
- Any site compound required during the construction phase should be located well away from the tree at *Target Note 5*, the River Clywedog and any other habitat features that might be used by nesting birds.
- To minimise potential impacts on birds nesting near to the proposed development there should be no night-time working either during the construction or operation phases. A vehicle speed limit should also be enforced during both construction and operation phases.

Habitat Retention

- Wherever possible large, mature trees should be retained and a suitable buffer provided around them both during the construction and operation phases.
- All trees to be retained should be protected prior to and during the construction phase by the installation of temporary protection fencing. This fencing should comply with 'BS 5837:2012 Trees in Relation to Design, Demolition and Construction. Recommendations' and Local Planning Guidance Note 17: Trees and Development (WCBC 2012).

Nest-box Provision

- As the pair of Kestrel that nested in the Oak at *Target Note 5* may be permanently displaced or the tree felled, three alternative nest-boxes suitable for this species¹¹ should be provided, one in the tree-line at *Target Note 14*, the second on a suitable tree in the area at *Target Note 4* and the third on the large Oak at the western end of the field at *Target Note 17*. The latter two locations would be subject to permission from DCWW. These nest-boxes should be installed before the tree at *Target Note 5* is impacted.
- A range of nest-boxes for other birds should be installed within any ecology mitigation/compensation area or landscaped grounds around the site. At least 20 boxes should be

¹¹ <https://shopping.rspb.org.uk/bird-prey-nest-boxes/kestrel-nest-box.html>

installed and should include Schwegler 1B (both 26 mm and 32 mm entrance holes), 2H, 2GR and 3SV¹². All of these bird-boxes will be of wood-crete and target a range of species.

All nest-boxes should be installed either by a suitably qualified ecologist or under their supervision. They should also be subject to annual maintenance and monitoring.

Southern Buffer Strip

- A buffer of minimum width 10 m, but ideally 20 m, should be retained between the edge of the proposed earthworks (crest of the proposed slope) and the disused railway adjacent to the southern boundary (*Target Note 8a*) as well as other features that contain mature trees (e.g. *Target Notes 7 and 8*). This strip of land could form part of the compensatory habitat provision. It could be sown with a tussocky grassland mix and be managed for the benefit of hunting Barn Owls, etc. This grassland should not be grazed or cut. Periodic management would be required to prevent succession to scrub/trees. An appropriate mixture might be EG10 – Tussock Grass Mixture (Emorsgate Seeds)¹³ or Low Maintenance Meadow Mixture (Wildflower.co.uk)¹⁴. This grassland would also benefit other wildlife including hunting Kestrel.

Habitat Creation – Ecology Mitigation/ Compensation Area

- No information is currently available with regards a proposed ecology mitigation/ compensation area. Any such area should include areas of rough infrequently managed grassland as described above for hunting Barn Owls and Kestrel as well as some areas of more floriferous grassland. An appropriate mix for the floriferous grassland might be WFG4 Neutral Soils (Germinal Amenity)¹⁵ or RE1 Traditional Hay Meadow¹⁶. Rough grassland for Barn Owls should ideally be provided as far away from Sesswick Way as possible.

The ecology compensation/ mitigation area should also include new areas of dense native scrub and hedgerows for the benefit of species such as the Whitethroat. A greater length of hedgerow than that to be lost should be planted. Any sections of hedge to be affected by temporary works (e.g. where the CO₂ recovery pipe crosses the hedge at *Target Note 10*) should be replaced. The modification of habitat structure can affect the reactions of birds to human presence. Increasing bird tolerance has been recorded with greater availability of escape cover (shrub and coniferous cover, and shrub height) (Fernandez-juricic *op. cit.*).

Scrub planting (e.g. restricted to shrub species only) should include different types of scrub. Not only can habitat types that currently do not exist on the application site be provided for the benefit of birds of conservation concern (e.g. Linnet, Bullfinch) but it is likely to provide more opportunities for birds that already use the application site thereby increasing the population size (e.g. Whitethroat). This can be achieved simply by careful

¹² <https://www.schwegler-natur.de/vogelschutz/?lang=en>

[https://www.nhbs.com/4?q=&hPP=60&idx=titles&p=0&fR\[shops.id\]\[0\]=4&fR\[shops.id\]\[1\]=4&hFR\[subjects_equipm ent.lv1\]\[0\]=Bird%20Boxes%20%3E%20Woodcrete%20%26%20WoodStone%20Bird%20Boxes](https://www.nhbs.com/4?q=&hPP=60&idx=titles&p=0&fR[shops.id][0]=4&fR[shops.id][1]=4&hFR[subjects_equipm ent.lv1][0]=Bird%20Boxes%20%3E%20Woodcrete%20%26%20WoodStone%20Bird%20Boxes)

¹³ <https://wildseed.co.uk/mixtures/view/43>

¹⁴

<https://www.wildflowershop.co.uk/WF%20Meadow%20Seed%20Mixes/WF%20Meadow%20Mix%20Low%20Mtc e.htm>

¹⁵ <https://germinalamenity.com/wfg4-neutral-soils>

¹⁶ <https://germinalamenity.com/re1-traditional-hay-meadow-mg5-grassland>

planning of the proposed planting to ensure that different types of scrub community are provided.

Some stands purely of Gorse and Broom should be provided to benefit species such as Linnet. A mixed scrub type including Hawthorn, Blackthorn, Elder, Dog-rose, Holly and Hazel should be provided to benefit scrub-nesting species including various Warblers and other key species such as Dunnock. Some stands of Willow (including Grey and Goat Willow, and Osier) should be created to benefit species such as Willow Warbler and Reed Bunting. This Willow scrub should be located close to the River Clywedog. All of the scrub is likely to require periodic management to maintain this succession stage and vary the age structure.

The hedges should be planted in a staggered double row and include the species listed for the scrub along with Field-maple. The ecology compensation/ mitigation area should include both managed and unmanaged hedges, with and without trees. Whitethroat prefer low hedges with broad uncut strips of tall herbaceous perennial vegetation as they usually nest in the latter (Stoate & Szczur 2001). Strips of such vegetation (at least 2 m wide) should be promoted adjacent to the hedges. Stoate & Szczur *op cit.* also indicates that hedges being managed for the benefit of Whitethroats should be approximately 1.8-1.95 m high. Yellowhammers also prefer low hedges though not as preferentially as Whitethroats.

Patches of Bramble and tall herbs (e.g. Common Nettle, Willowherbs, *etc*) should either be planted or otherwise promoted through appropriate management.

A small number of standard trees should be planted in the ecology compensation/ mitigation area. These should be limited to Pedunculate Oak at the present time. All shrubs/ trees and seed-mixes should be of ideally locally native provenance but as a minimum certified British native origin.

The provision of a wild bird cover crop could be considered in the ecology compensation/ mitigation area. This would provide a food source for a range of species including Finches.

- The creation of shallow surface waterbodies within any proposed ecology mitigation/ compensation area should be considered as a possible enhancement. These could be combined with any habitat creation proposed for Great Crested Newts. However, the waterbodies should be shallow so as to provide potential feeding habitat for species such as the Lapwing.
- A detailed soft landscaping plan and Ecological Management Plan should be produced for any proposed ecology mitigation/ compensation area. The habitat layout should be designed to complement any adjacent existing habitat. Depending on the timescale required some of the habitats could be allowed to naturally regenerate rather than undertake large-scale planting.

Utility Connection Routes

- The alignment of the utilities trench connecting to the heat transfer area and electricity supply should be moved as far away as possible from the building at *Target Note 4b* as well as large/ mature trees in the area at *Target Note 4/4a*. Without any reference to other ecological resources that might be present in this area it is suggested that the utilities trench could be aligned parallel with and to the immediate west of, the WwTW access road, e.g. adjacent to the eastern boundary of the area at *Target Notes 4/4a/4b*, and thence out into the arable field at *Target Note 17*. Even if the utilities trench is

moved to the suggested alignment the works may still cause disturbance at the building and other mitigation measures may be required, e.g. the installation of screens (Shawyer 2011).

- If possible, the pipes that cross the slope at *Target Note 19* should be installed beneath this feature without using an open trench, e.g. directional drilling. If this is not possible any existing large, mature shrubs that would be affected should be translocated to a suitable location within the same feature.

Bird/ Glass Collisions

- Birds are unable to distinguish reflected habitat from real, they generally cannot see clear or reflective glass. There is currently little literature available on this in Europe with far more research having been undertaken in (North) America where it is recognised as a considerable problem (e.g. Klem 2009; Fischer 2014; Sheppard 2019). Much of this research relates to collisions involving migratory species but there is recognition that most glass collisions happen at low level buildings (mostly below 35 feet – Hayes 2020). Fatalities can occur at structures as small as bus shelters (Barton *et al.* 2017). Even in North America this is a relatively recent area of research. Birds may collide with the building during the day and less frequently, at night when they can be attracted to lit structures.

US Fish & Wildlife Service (2016) and Sheppard & Phillips (2015) provide a number of options for avoiding/ minimising bird/ glass collisions. Most of these options involve adapting the glass and or window design and include:

- o Installation of a pattern to the outer surface of the glass. Horizontal lines should be no more than 5 cm apart and vertical lines no more than 10 cm.
- o Installation of a special film, glass or covering (Including external films/ coverings, fritted glass, ultraviolet patterned glass, opaque/ translucent glass, screens and netting).
- o Installation of interior vertical cords, *etc.*
- o Installation of angled glass (facing downwards so that it does not reflect the sky, *etc.*).
- o Installation of architectural features, e.g. overhangs, shutters, louvers, mesh, awnings.
- o Exterior landscaping to avoid funnelling birds towards the glass.
- o Interior landscaping, e.g. moving indoor plants away from the windows.
- o The use of glass in all buildings should be minimised.

The use of bird-friendly glass/ features in both glass-houses should be considered. Guidance will be required from a technical expert on the most appropriate product to use. Further information is available on the American Bird Conservancy¹⁷ website.

US Fish & Wildlife Service (*op cit.*) recommends that '*To make an effective virtual cue, all window treatment should be applied to at least the first two to three stories or the height of the adjacent vegetation. However, applying treatments to just the first story windows or known problem windows can be helpful as well.*

If bird-friendly glass/ features are not installed then it is recommended that a monitoring programme is established to record the species, numbers and locations of any birds involved in collisions with the glass. Should this monitoring identify any particular problem areas then mitigation measures as detailed above should be retro-fitted at least

¹⁷ <https://abcbirds.org/threat/bird-strikes/>

at these locations. The results of the monitoring should be added to the Global Bird Collision Mapper¹⁸ (GBCM).

Lighting

- It is currently not known what external and internal lighting is to be installed. Any lighting used in the glasshouses should follow the recommendations listed in US Fish & Wildlife Service (2016)/ Sheppard & Phillips (2015).

Any external lighting at the proposed development site should follow guidance provided by The Bat Conservation Trust and Institution of Lighting Professionals (2018). Lighting that reduces vertical and horizontal light spillage should be used. The boundary hedgerows, adjacent habitat and any ecology mitigation/ compensation area should be kept as dark as possible.

Ecological Method Statement

- An Ecological Method Statement (EMS) or similar document should be produced to guide all ecological mitigation/ compensation/ enhancement measures. The EMS should incorporate a programme for ecological compliance audit. The final EMS should be included in a Construction Environmental Management Plan (CEMP).

¹⁸ <https://flap.org/global-bird-collision-mapper/>

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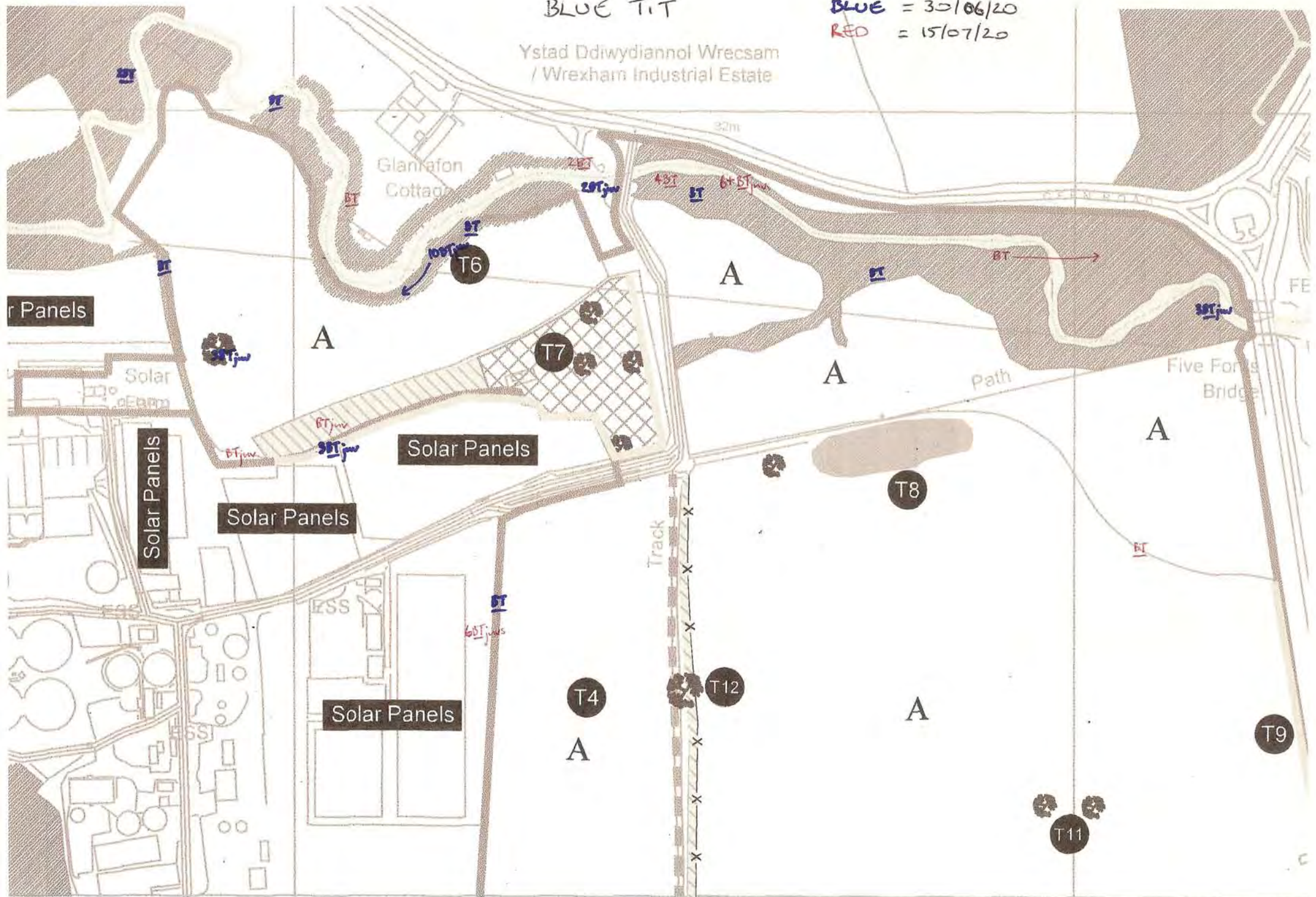
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7 APPENDIX 1 – BIRD SPECIES MAPS

BLUE = 30/06/20

Ystad Ddiwydiannol Wrecsam
/ Wrexham Industrial Estate





GREAT TIT

BLUE = 30/06/20

RED = 14/07/20

Ystad Ddiwydiannol Wrecsam
/ Wrexham Industrial Estate

Glankafon
Cottages

32m

r Panels

Solar
panels

Solar Panels

Solar Panels

Solar Panels

Solar Panels

ESS

ESS

Track

Path

Five Fords
Bridge

T6

T7

T5

T8

T4

T12

A

T9

T11

A

A

A

A

2GT juv

2GT juv

2GT juv

5GT juv

2GT

3GT juv

1G

4GT juv

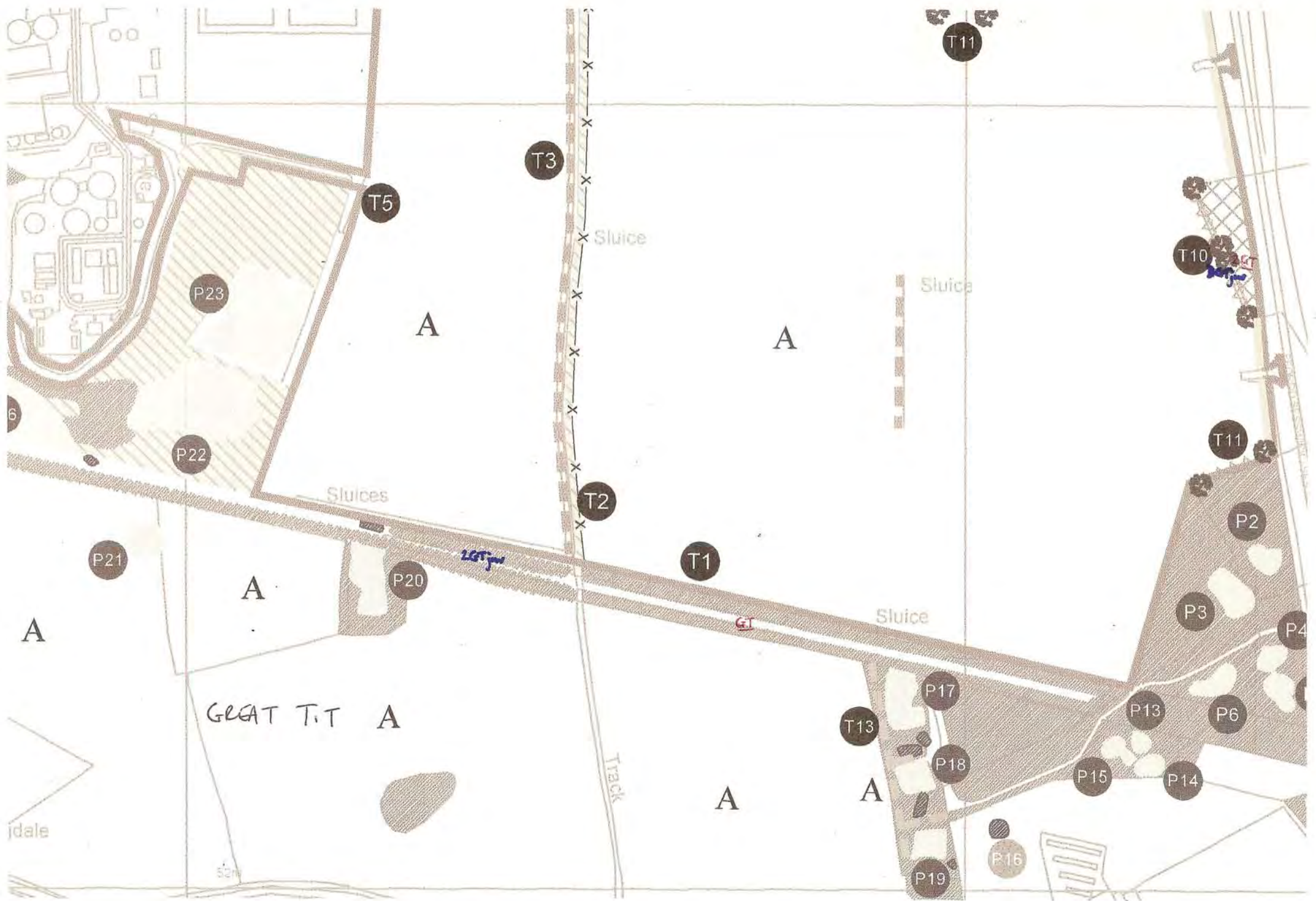
6GT juv

3GT juv

2GT juv

4GT juv

1G



LONG-TAILED T.T

Ystad Ddiwydiannol Wrecsam
/ Wrexham Industrial Estate

BLUE = 30/06/20

RED = 14/06/20

r Panels

Glanafon
Cottages

32m

41 Tr 6 juv

8LT

T6

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A

T7

A

25T

FE

Five Fords
Bridge

A

Path

Solar Panels

T8

Solar Panels

Track

Solar Panels

Solar Panels

T4

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T12

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T9

T11

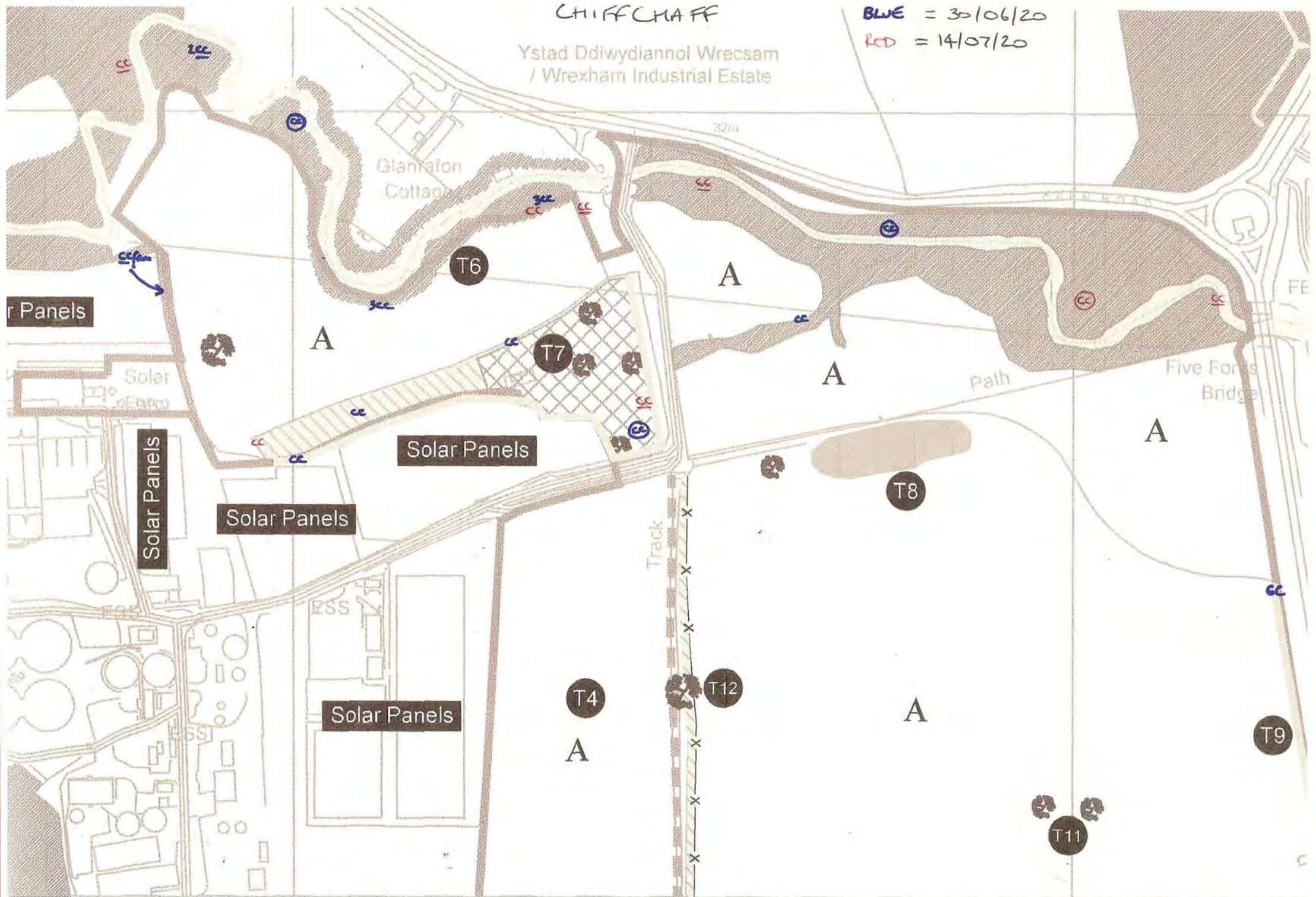


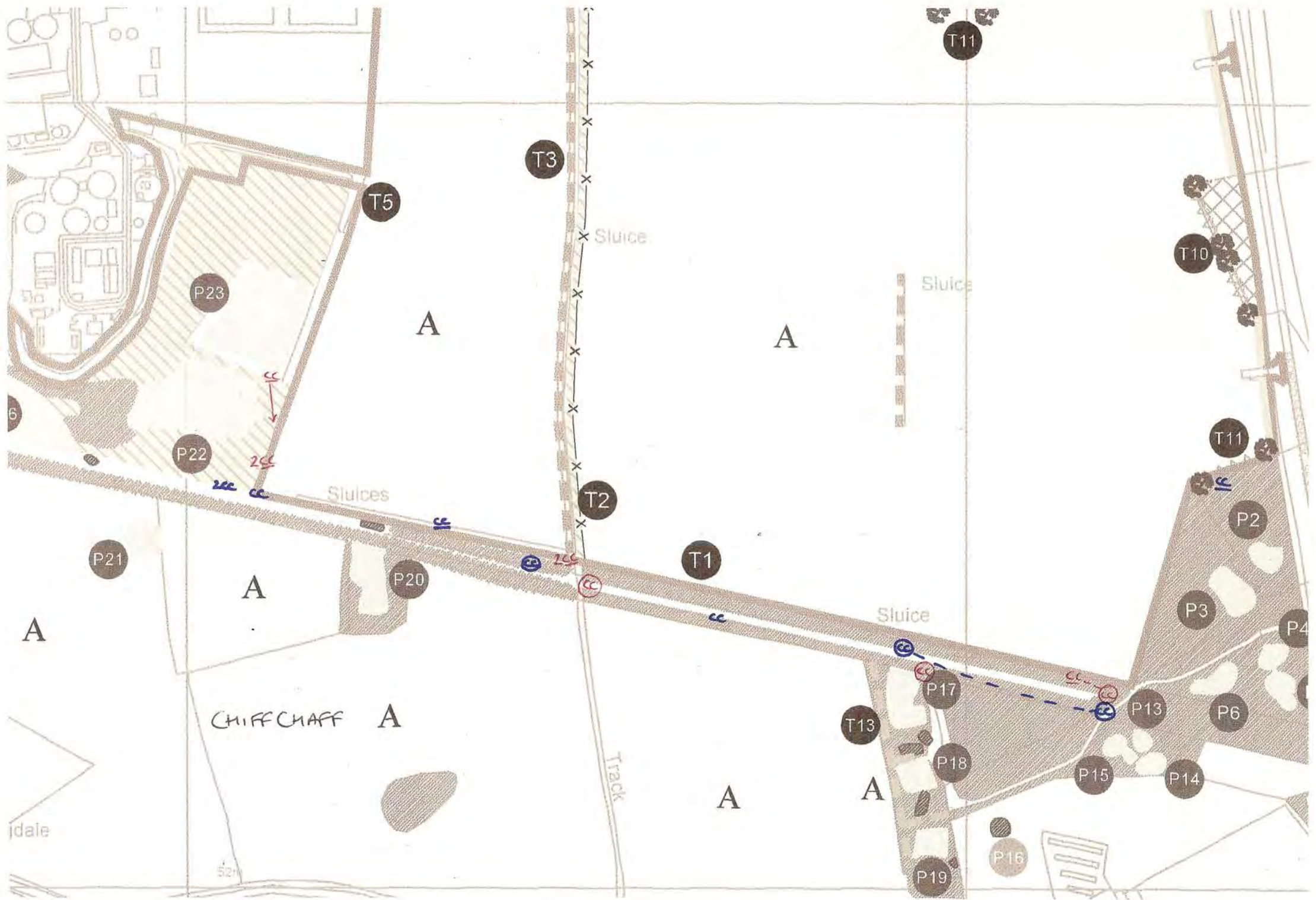
CHIFFCHAFF

Ystad Ddiwydiannol Wrecsam
/ Wrexham Industrial Estate

BLUE = 30/06/20

RED = 14/07/20





WHITE THRUSH

Ystad Ddiwydiannol Wrecsam
/ Wrexham Industrial Estate

BLUE = 30/06/20

RED = 14/07/20

r Panels

Solar
of Ebbw

Solar Panels

Solar Panels

Solar Panels

Solar Panels

Glanafon
Cottages

32m

CELESTIAL

FE

Five Fords
Bridge

Path

Track

T6

T7

T8

T4

T12

T9

T11

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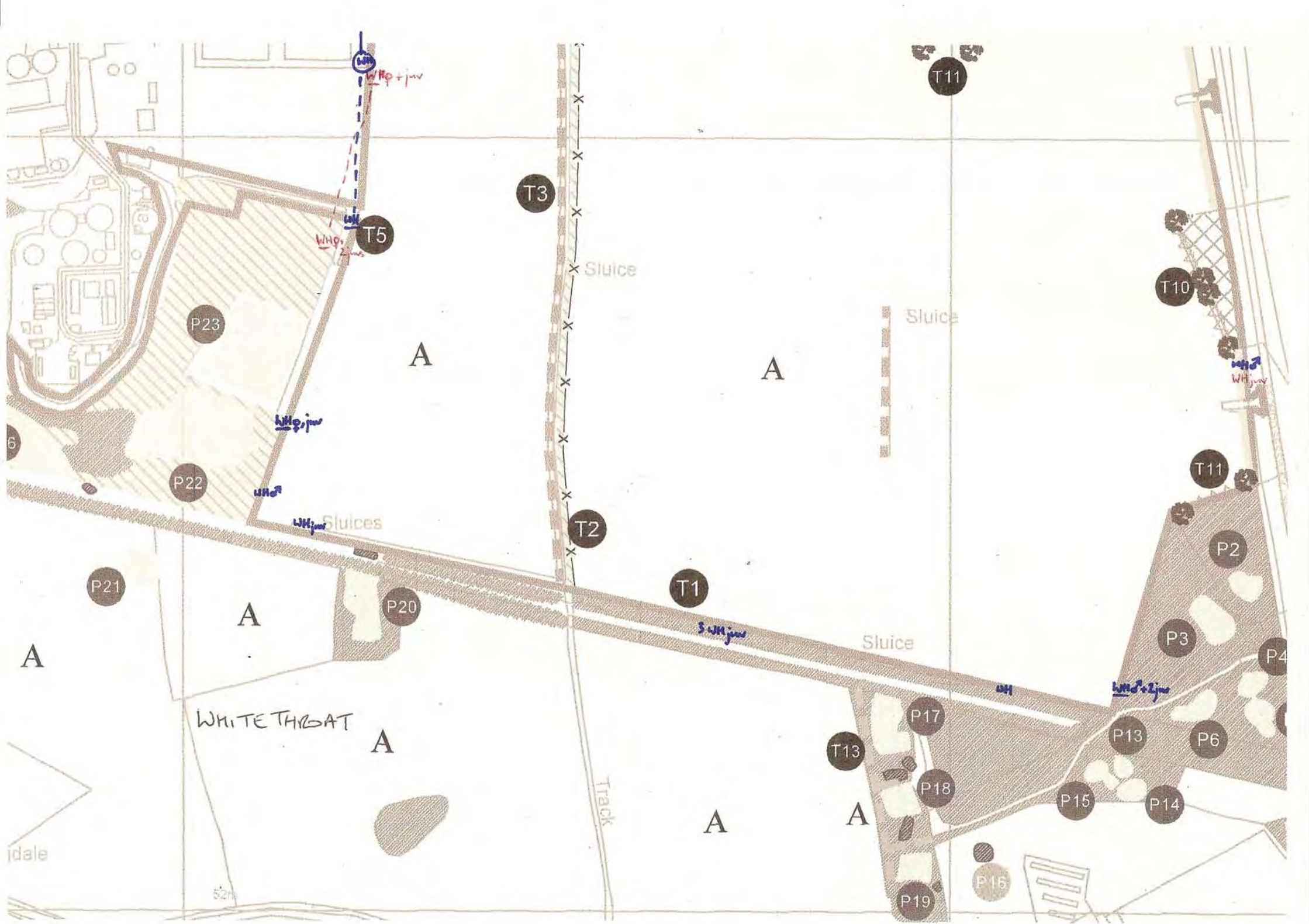
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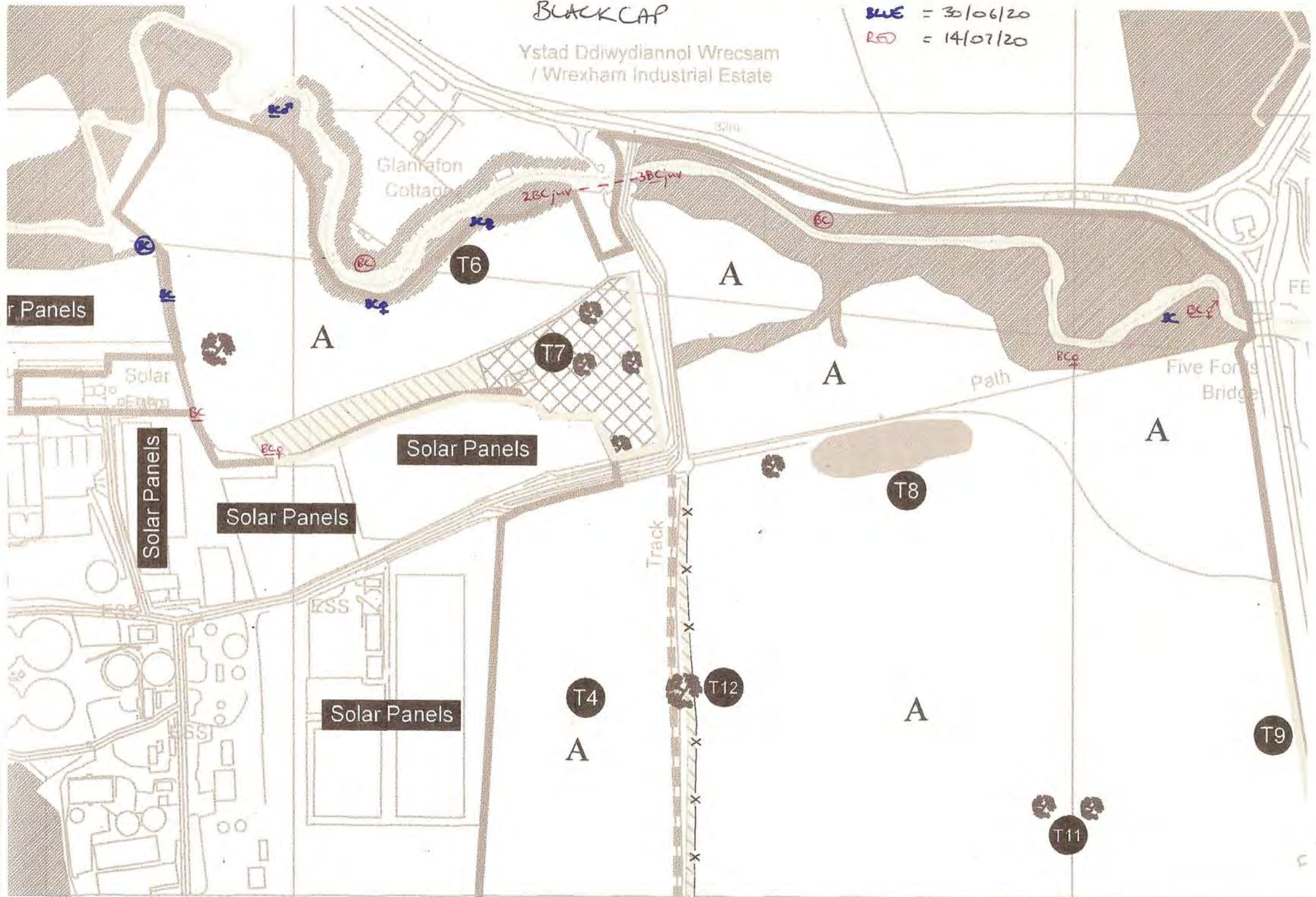


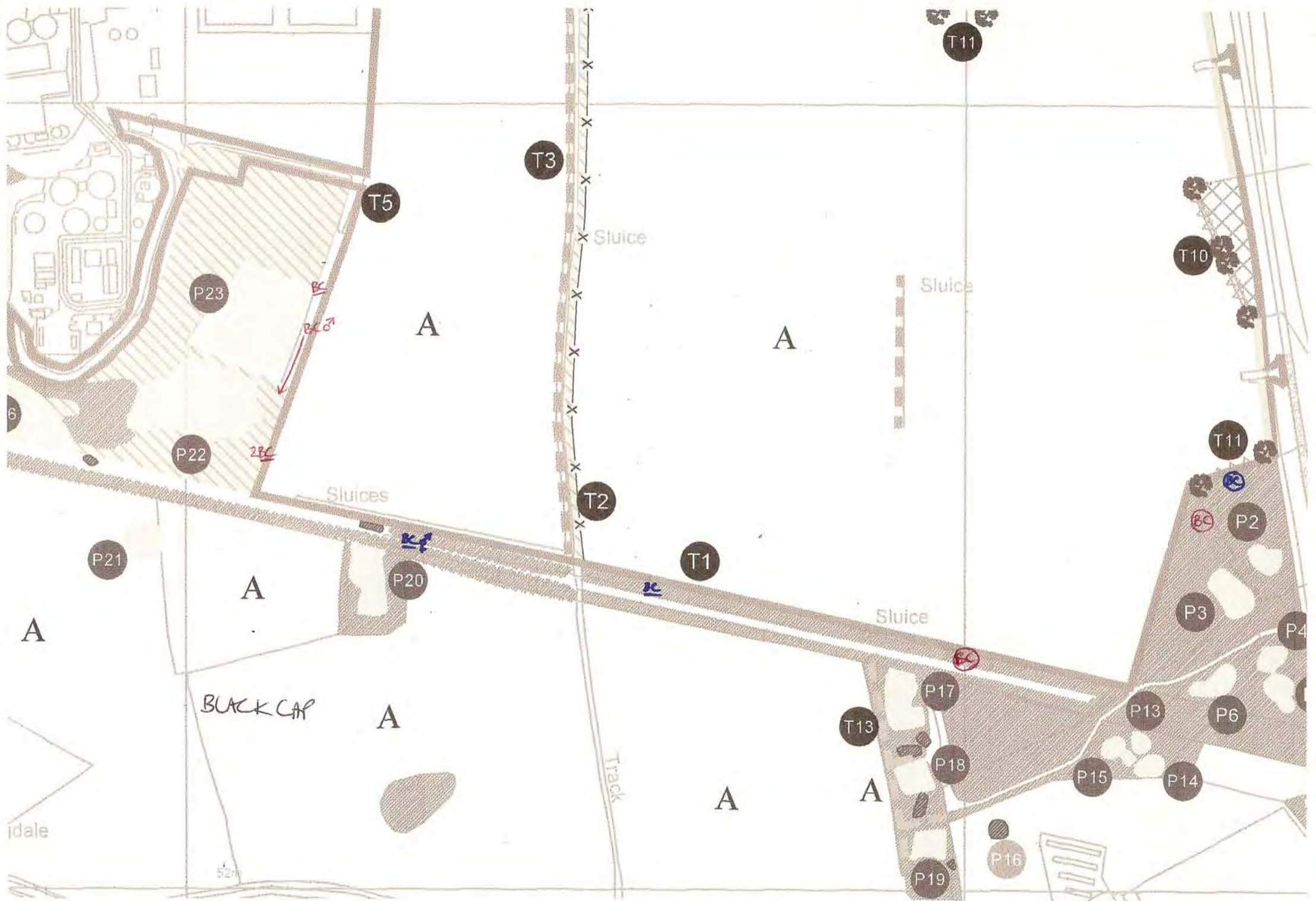
BLACKCAP

Ystad Ddiwydiannol Wrecsam
/ Wrexham Industrial Estate

BLUE = 30/06/20

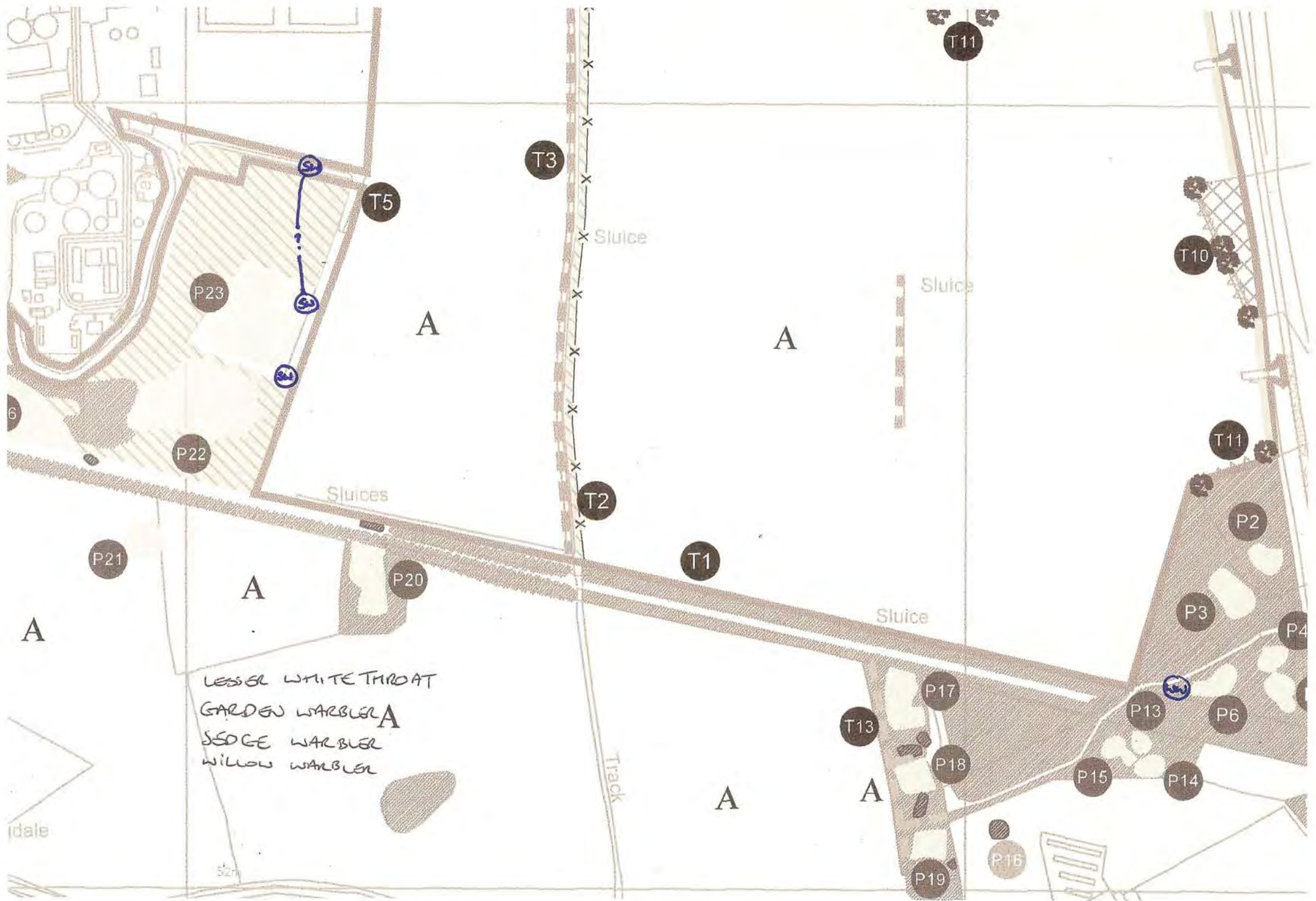
RED = 14/07/20





BLUE = 30/06/20
RED = 14/07/20



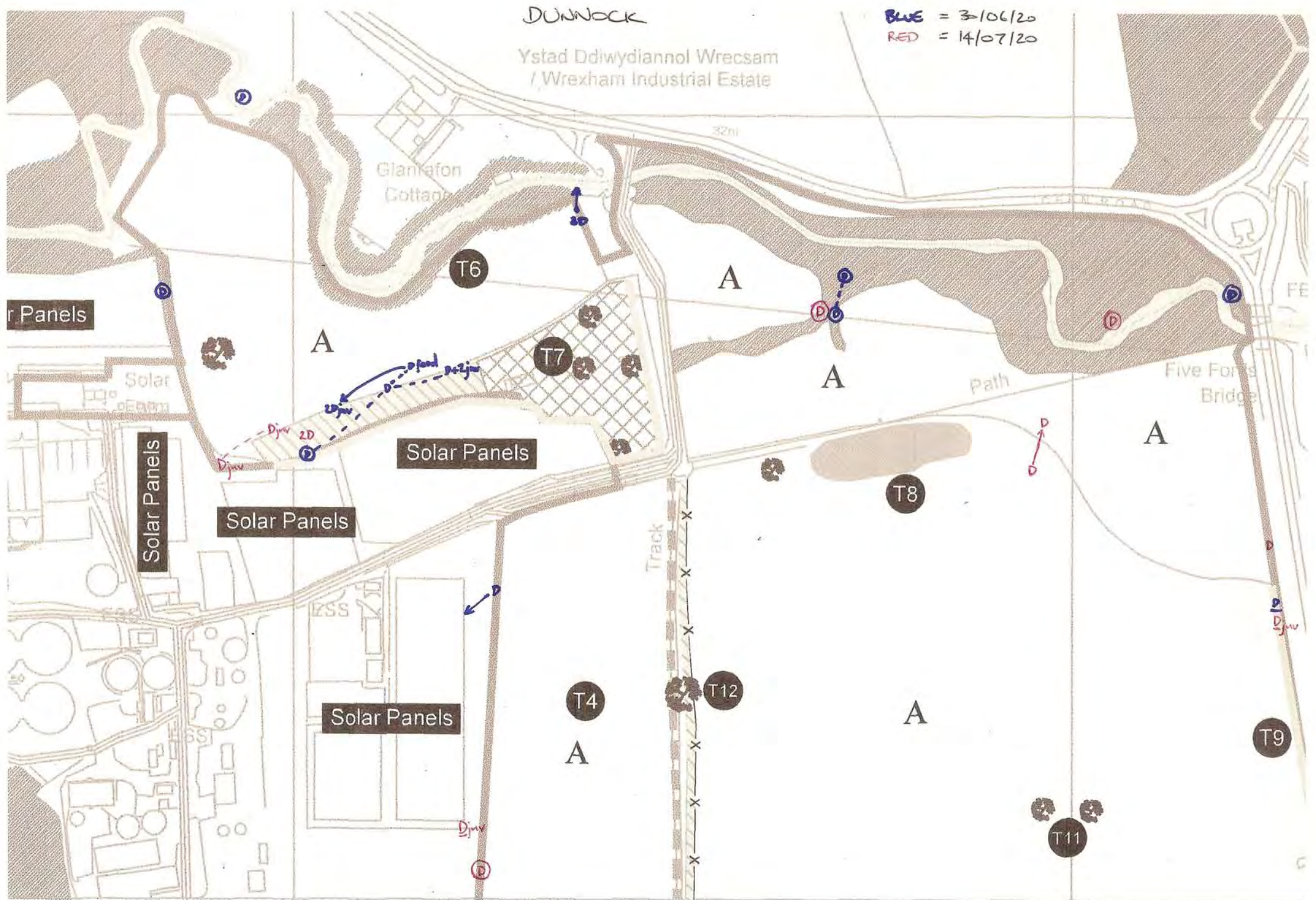


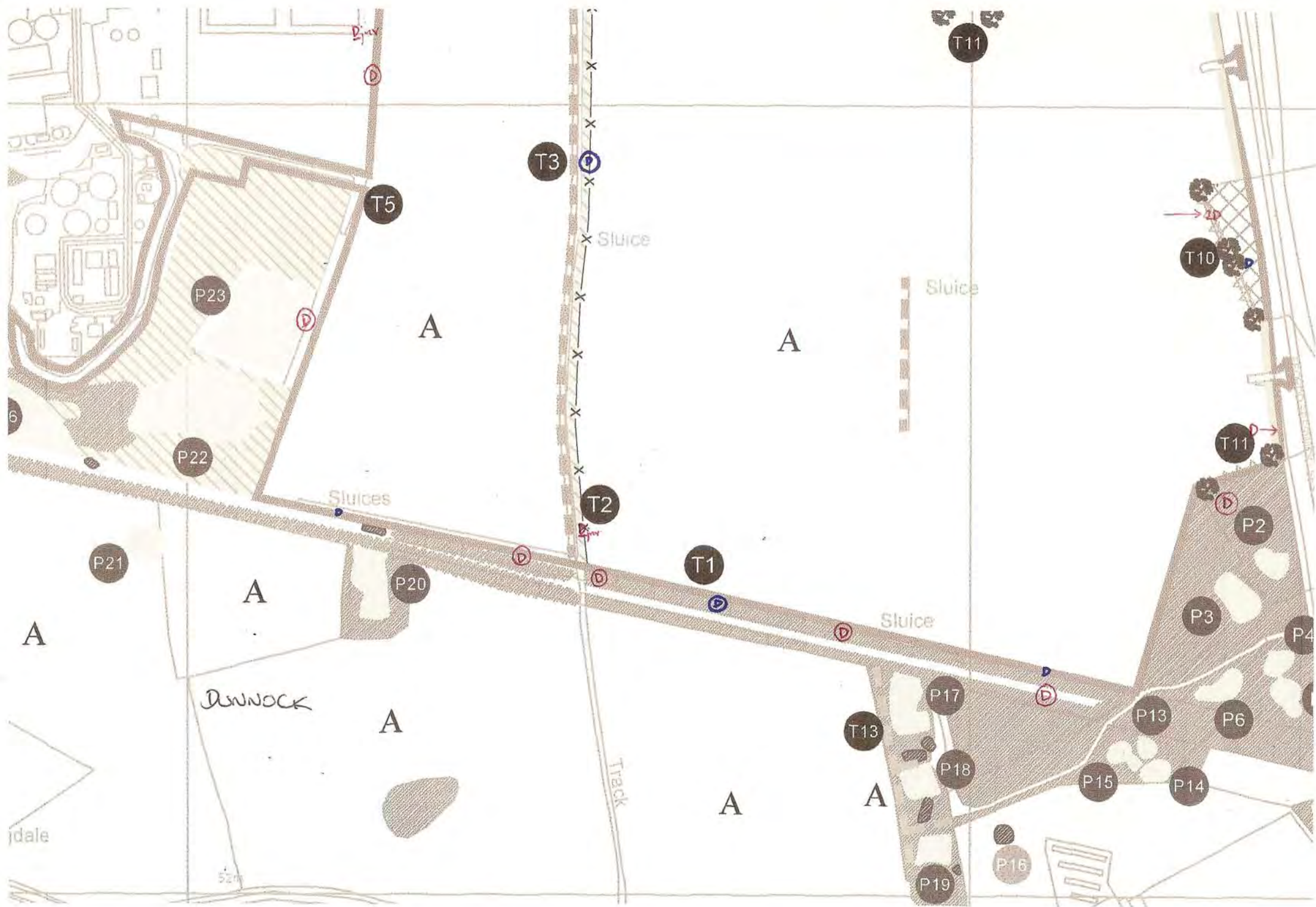
DUNNOCK

Ystad Ddiwydiannol Wrecsam
/ Wrexham Industrial Estate

BLUE = 3/06/20

RED = 14/07/20





Robin

Ystad Ddiwydiannol Wrexham
/ Wrexham Industrial Estate

BLUE = 30/06/20

RED = 14/07/20

Solar Panels

Solar
Panels

Solar Panels

Solar Panels

Solar Panels

Solar Panels

Glanrafon
Cottage

32m

Path

Five Fords
Bridge

Track

T6

T7

T8

T4

T12

T11

T9

A

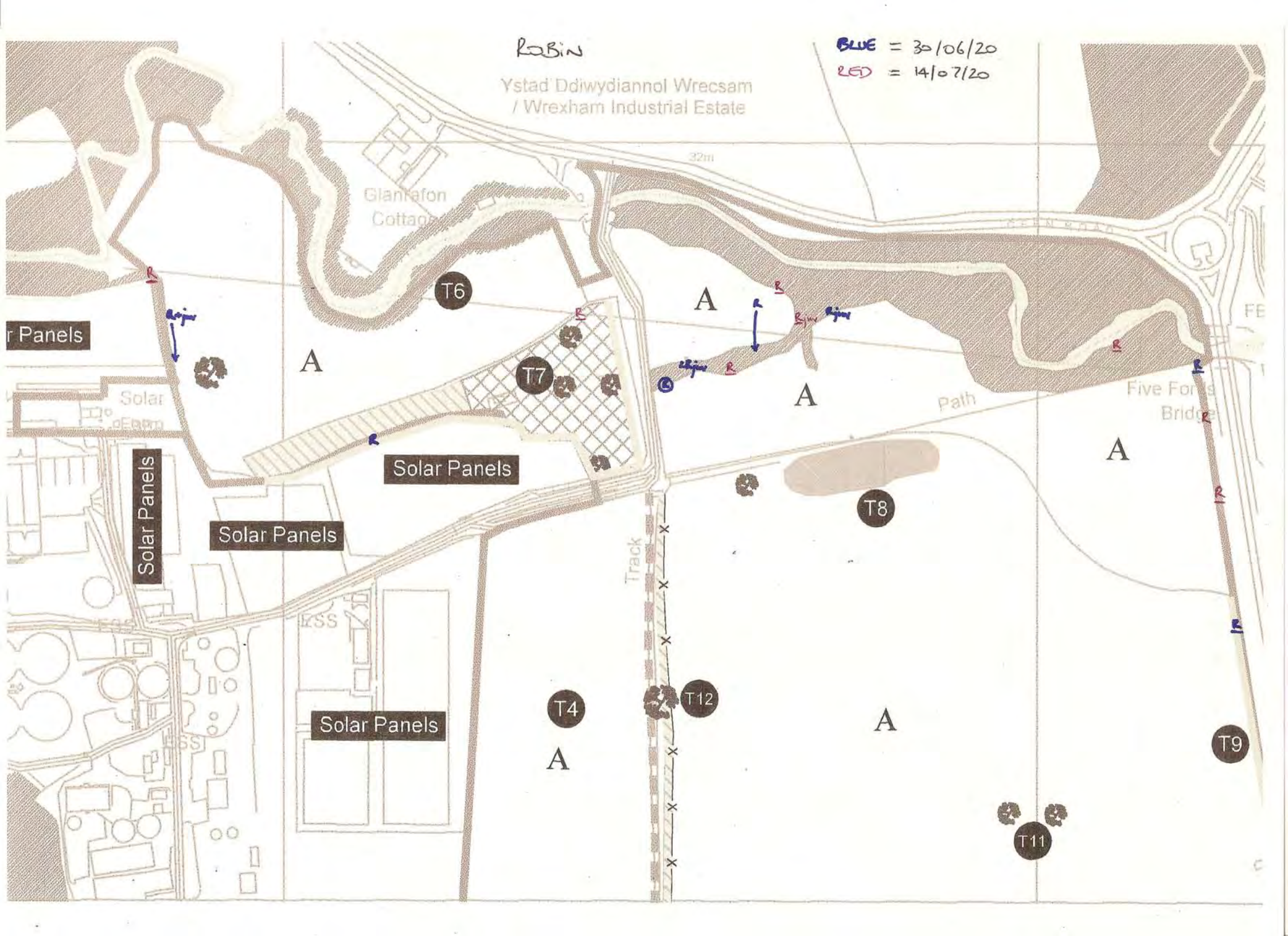
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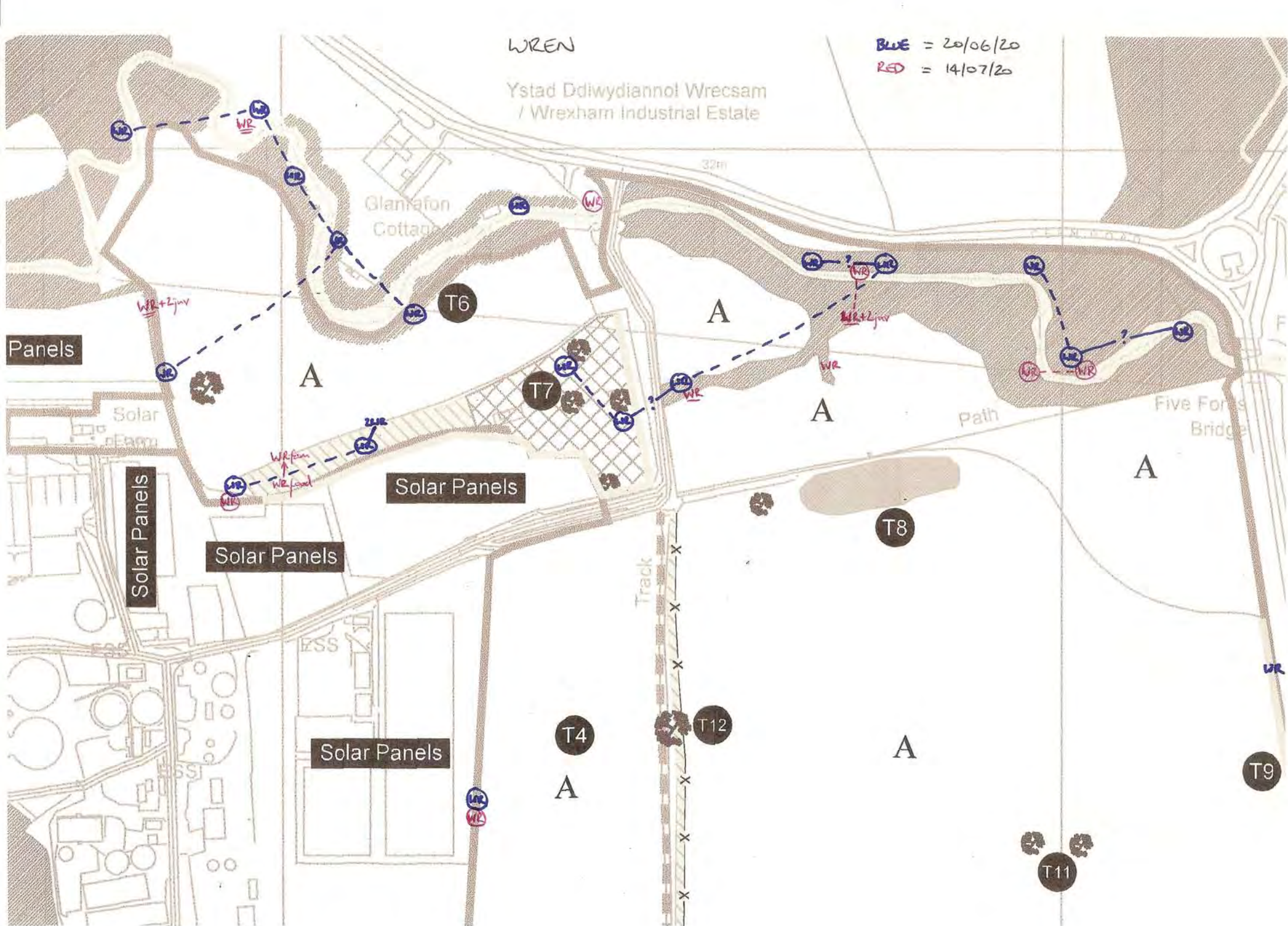
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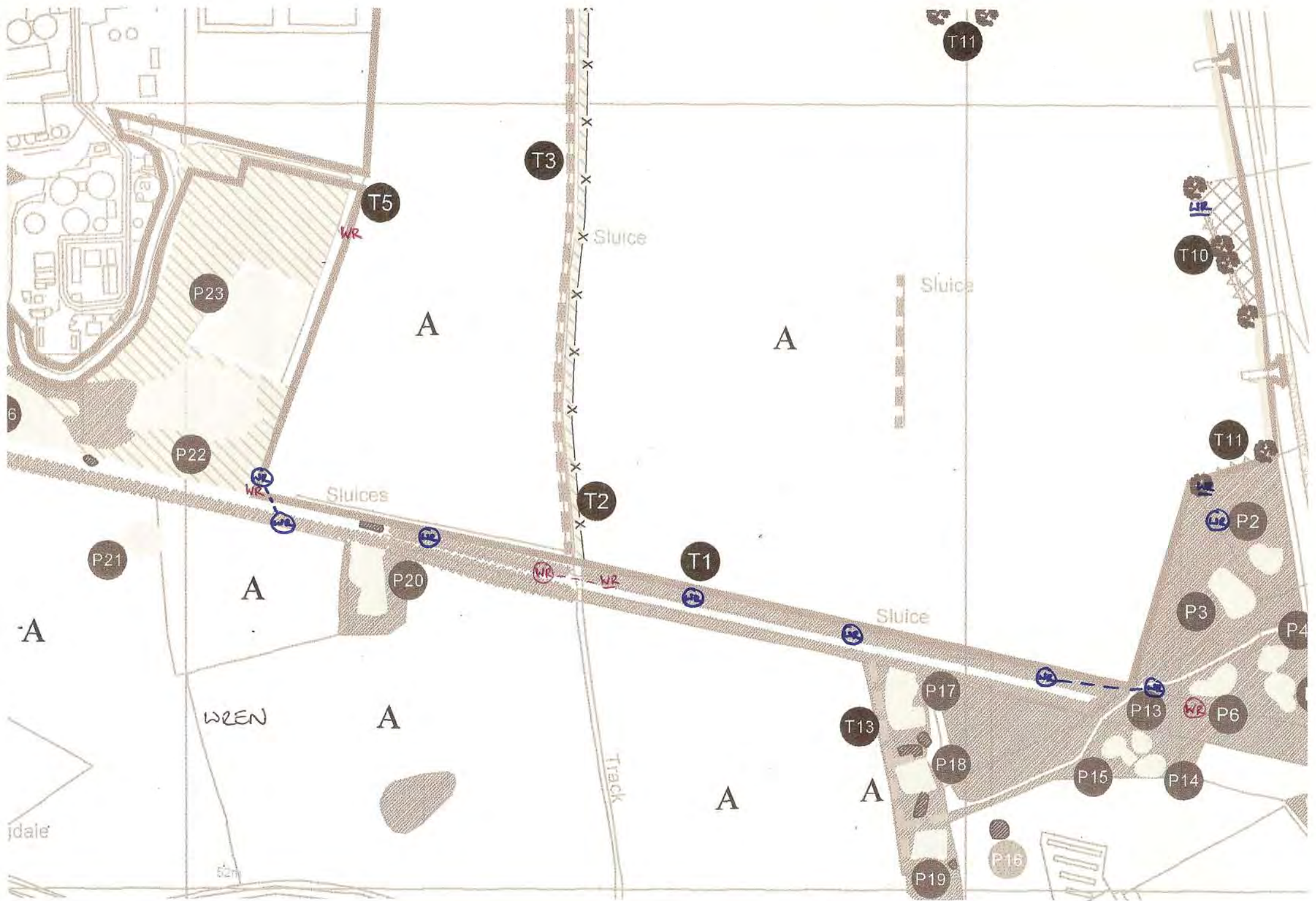
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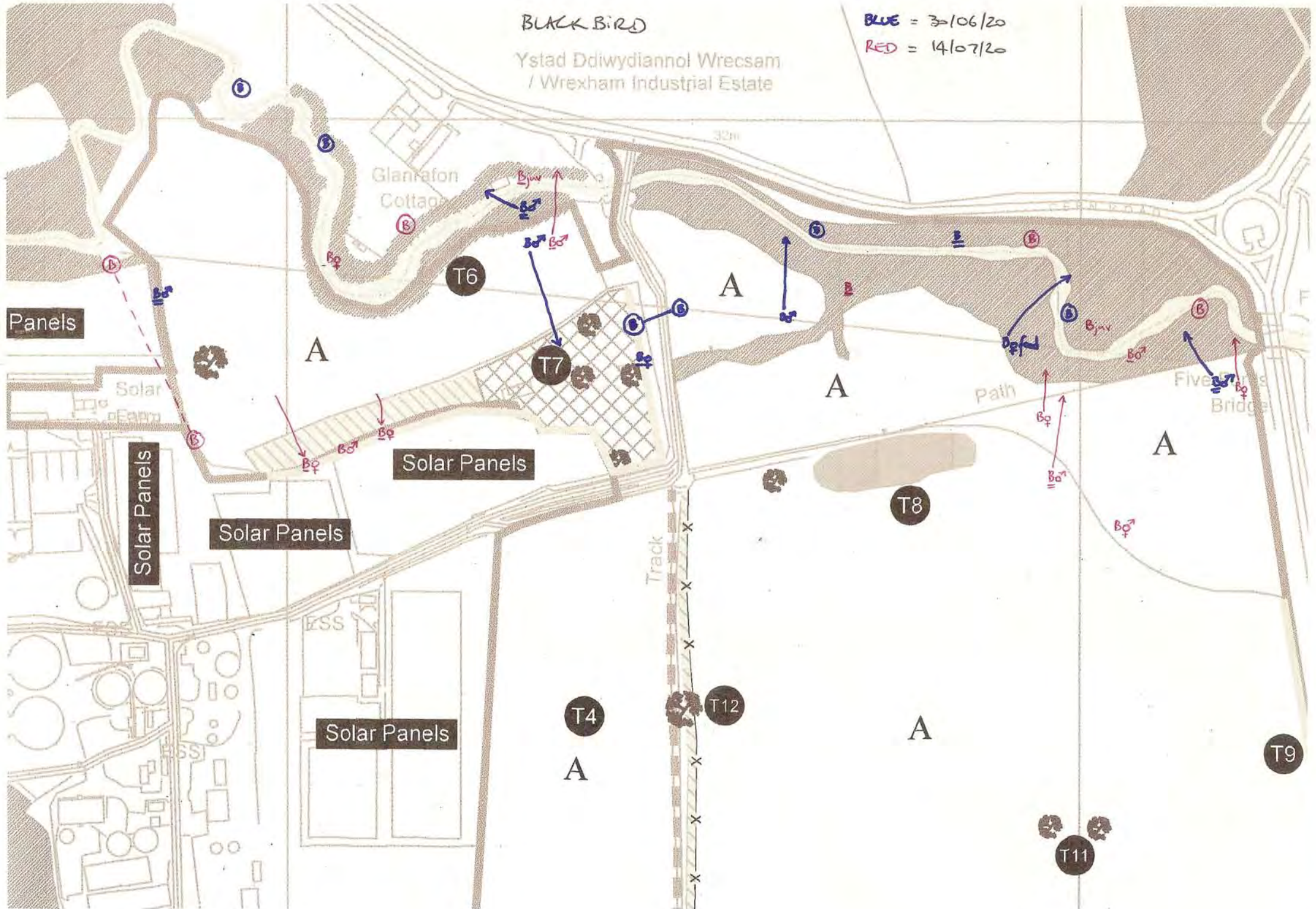


BLACK BIRD

Ystad Ddiwydiannol Wrecsam
/ Wrexham Industrial Estate

BLUE = 31/06/20

RED = 14/07/20



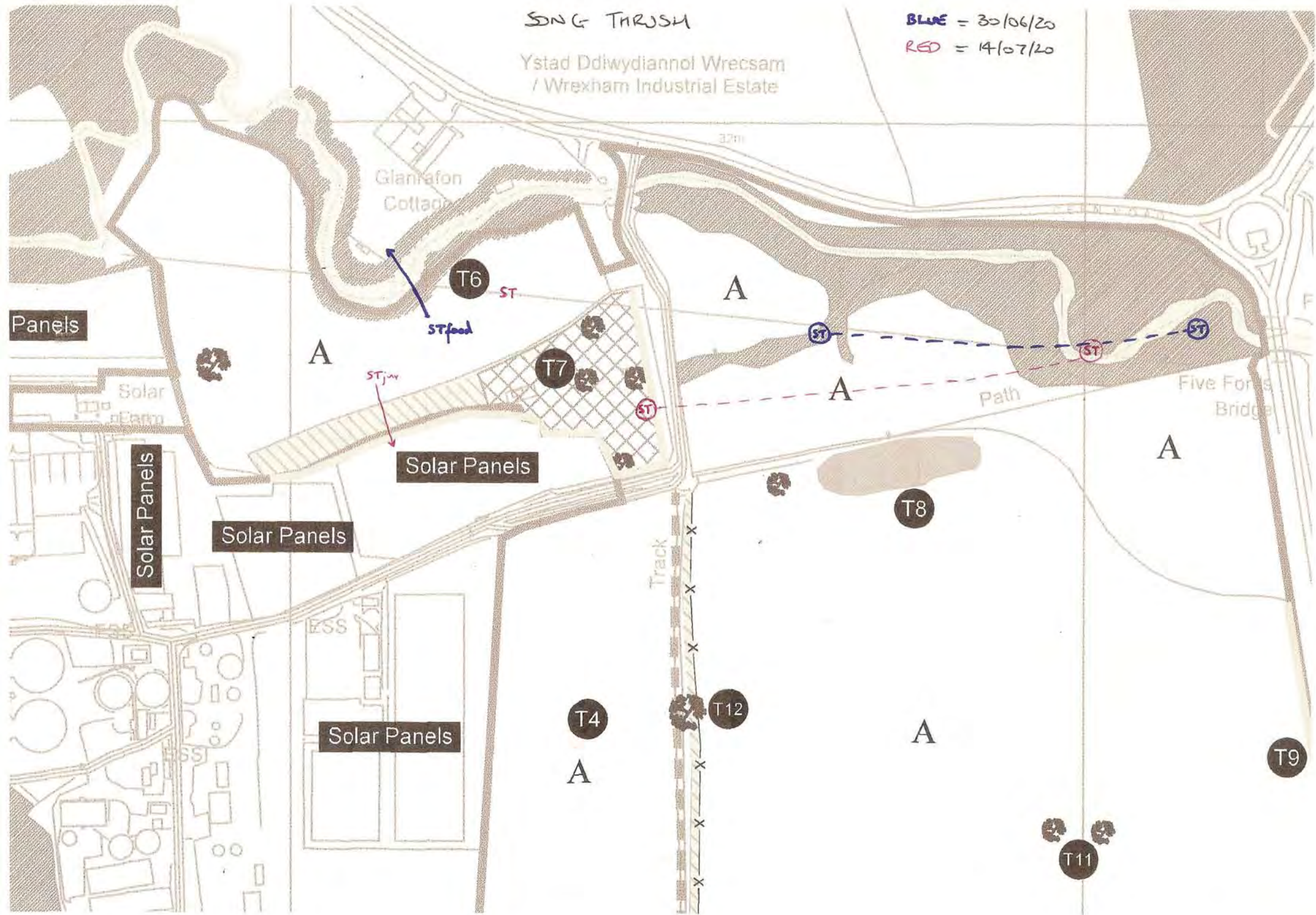


SNG THRESH

Ystad Ddiwydiannol Wrecsam
/ Wrexham Industrial Estate

BLUE = 30/06/20

RED = 14/07/20



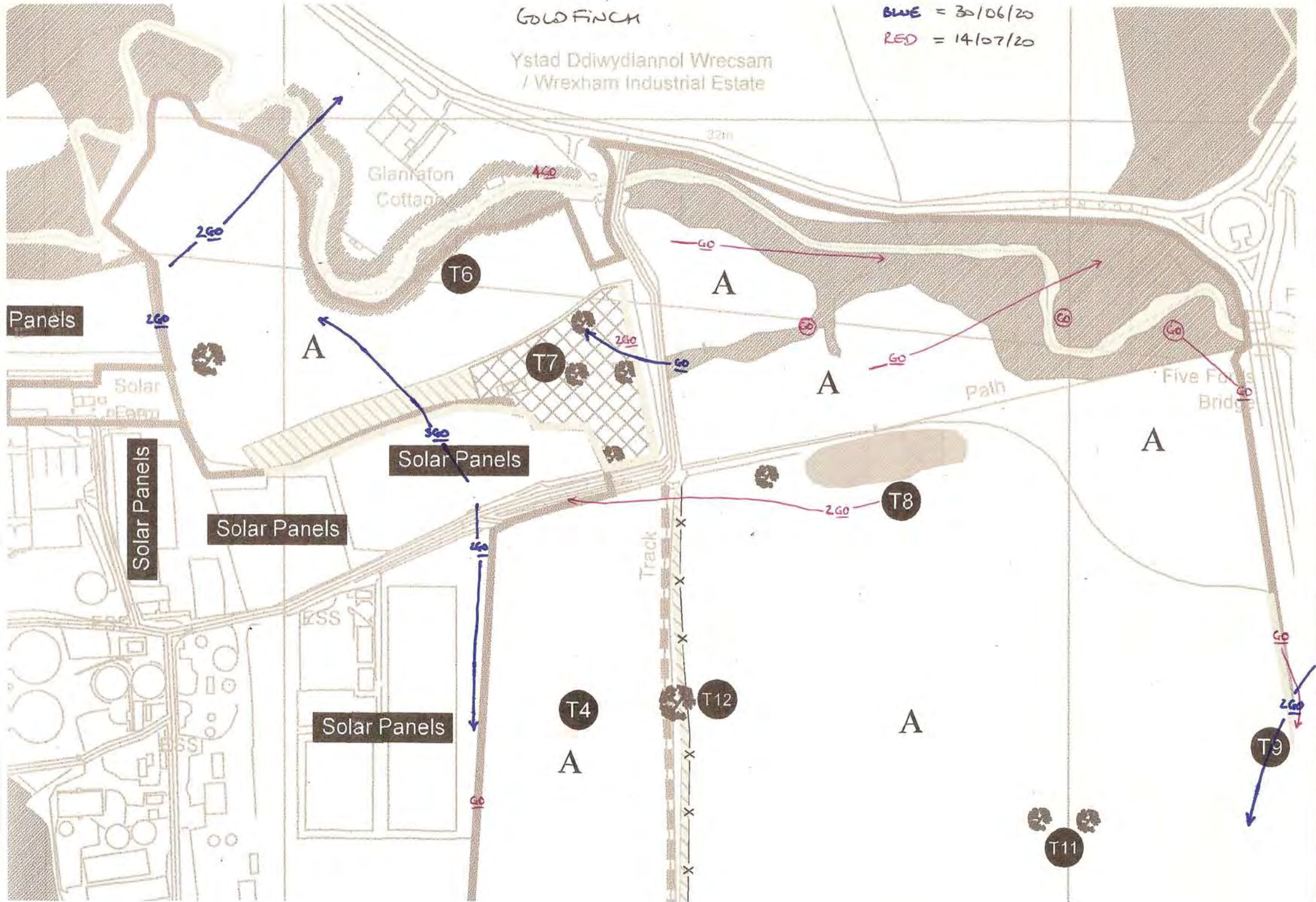


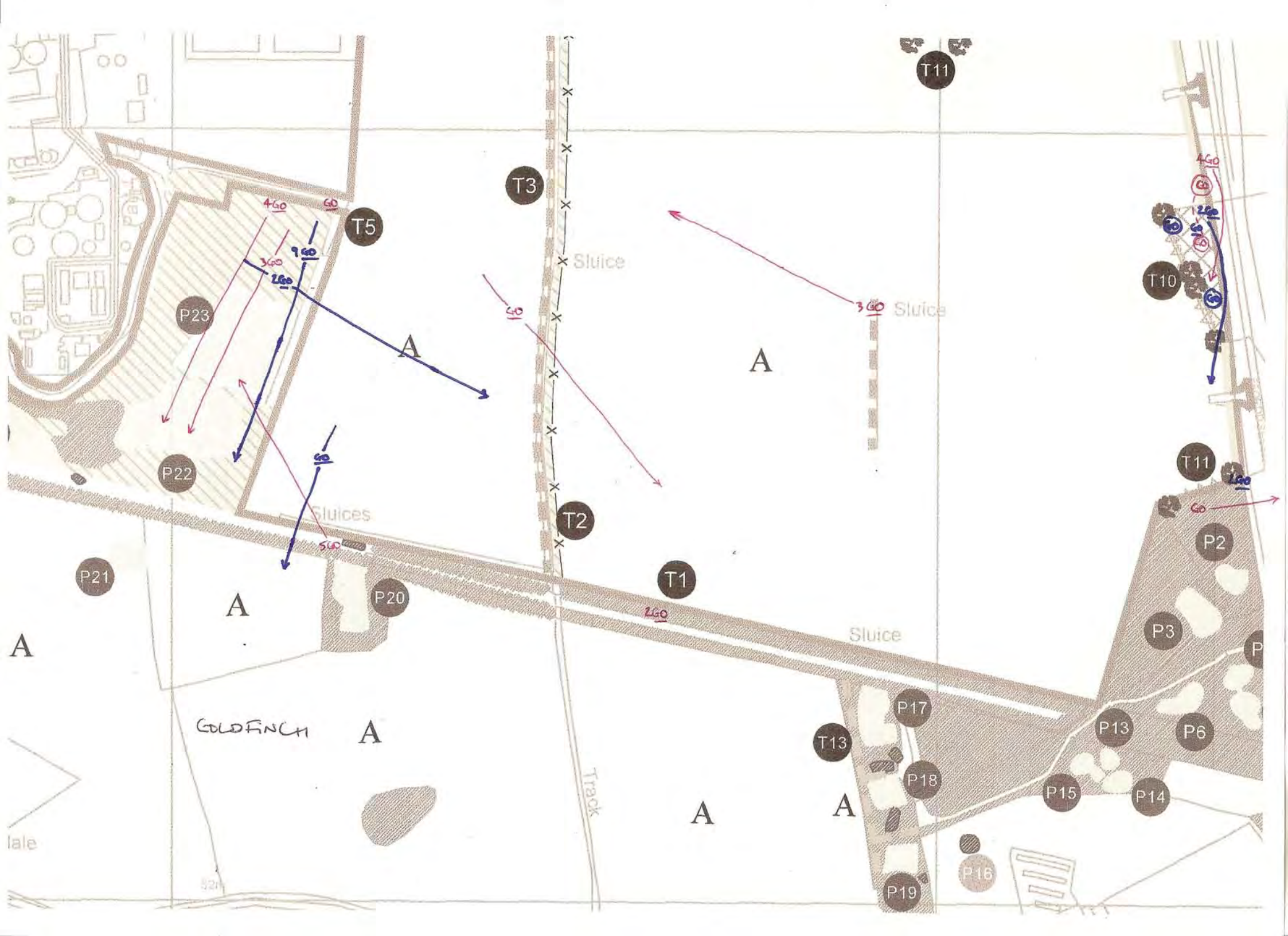
GOLD FINCH

Ystad Ddiwydiannol Wrecsam
/ Wrexham Industrial Estate

BLUE = 30/06/20

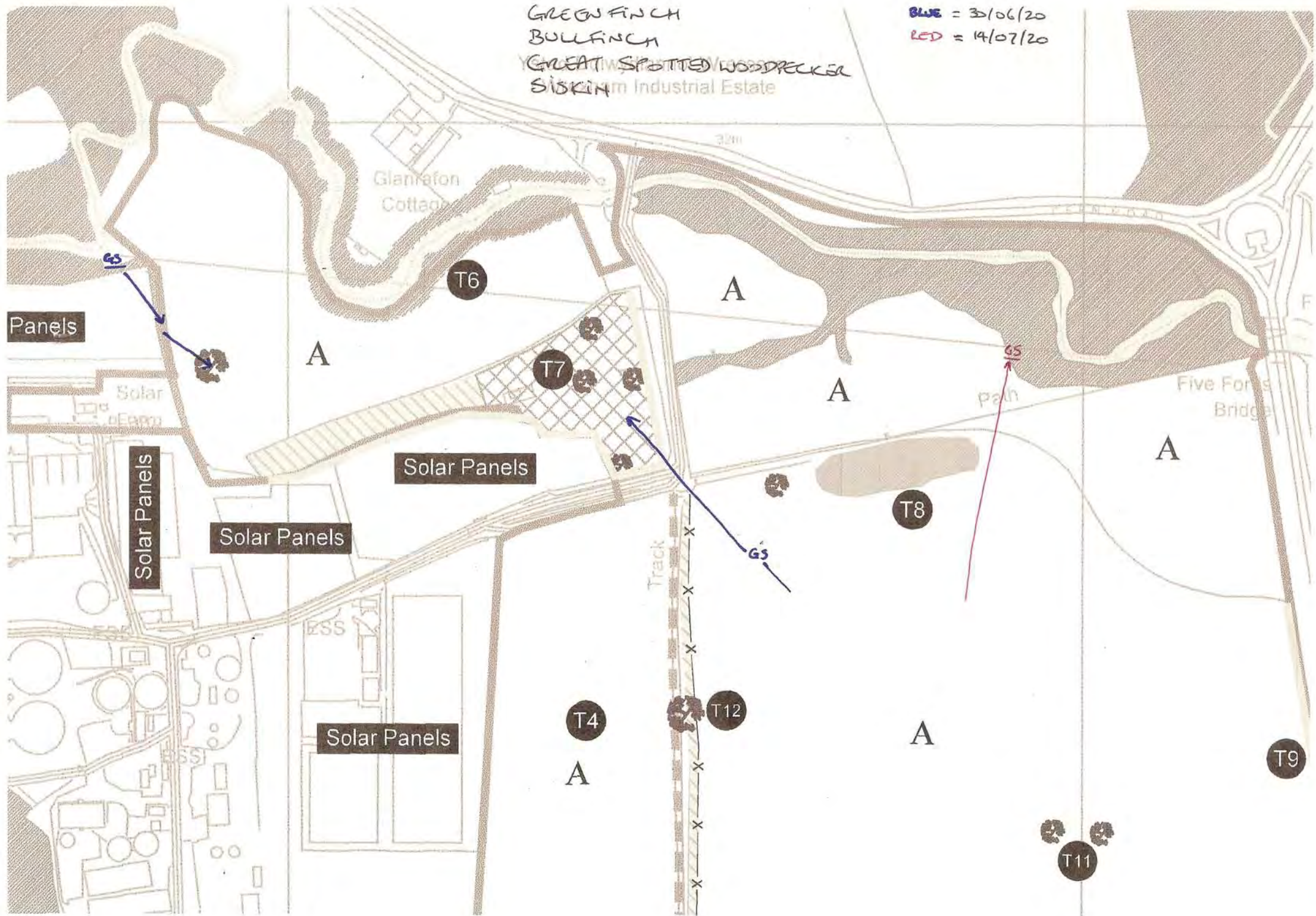
RED = 14/07/20

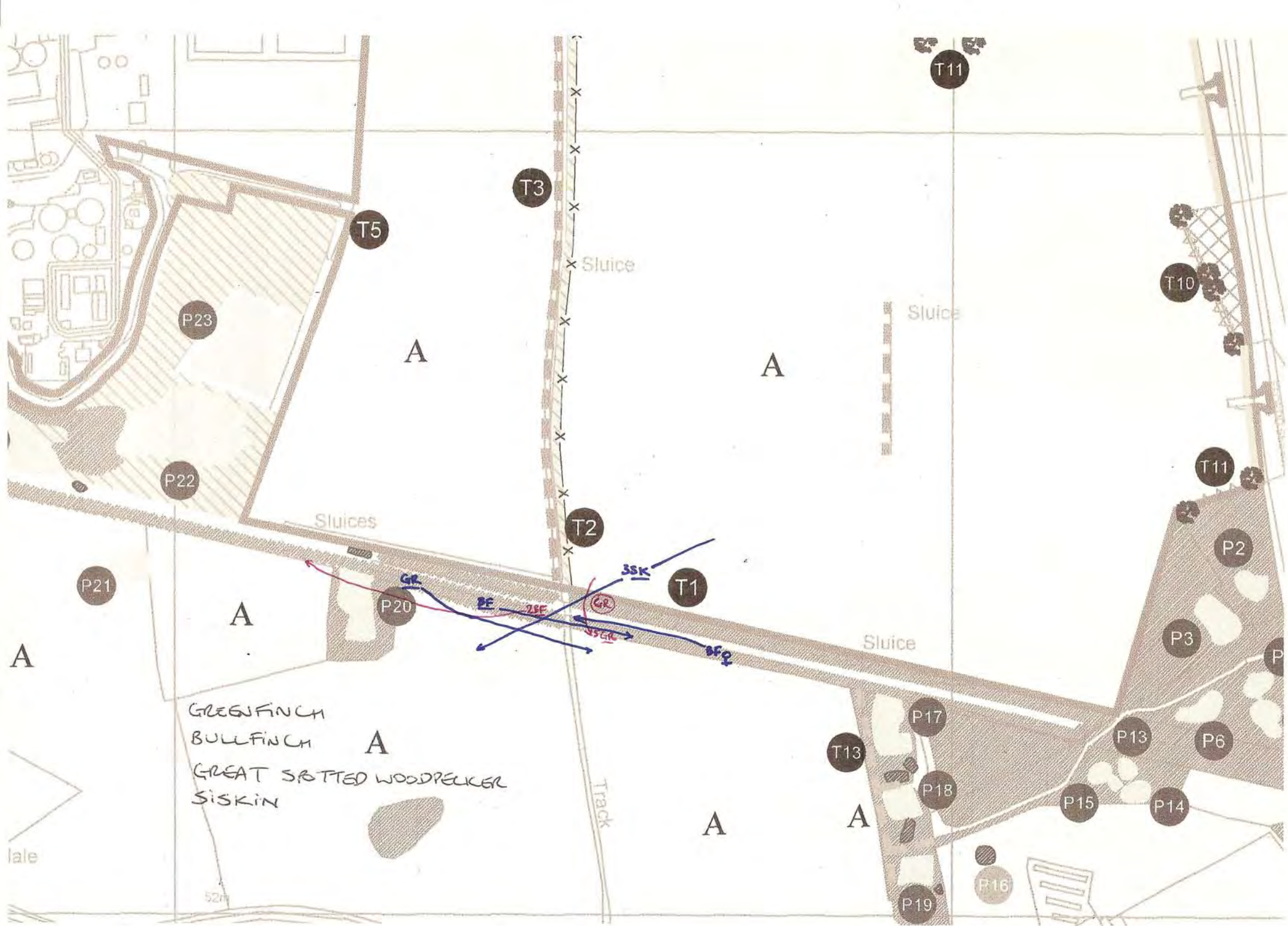




GREEN FINCH
BULLFINCH
GREAT SPOTTED WOODPECKER
SISKIN

BLUE = 3/06/20
RED = 14/07/20

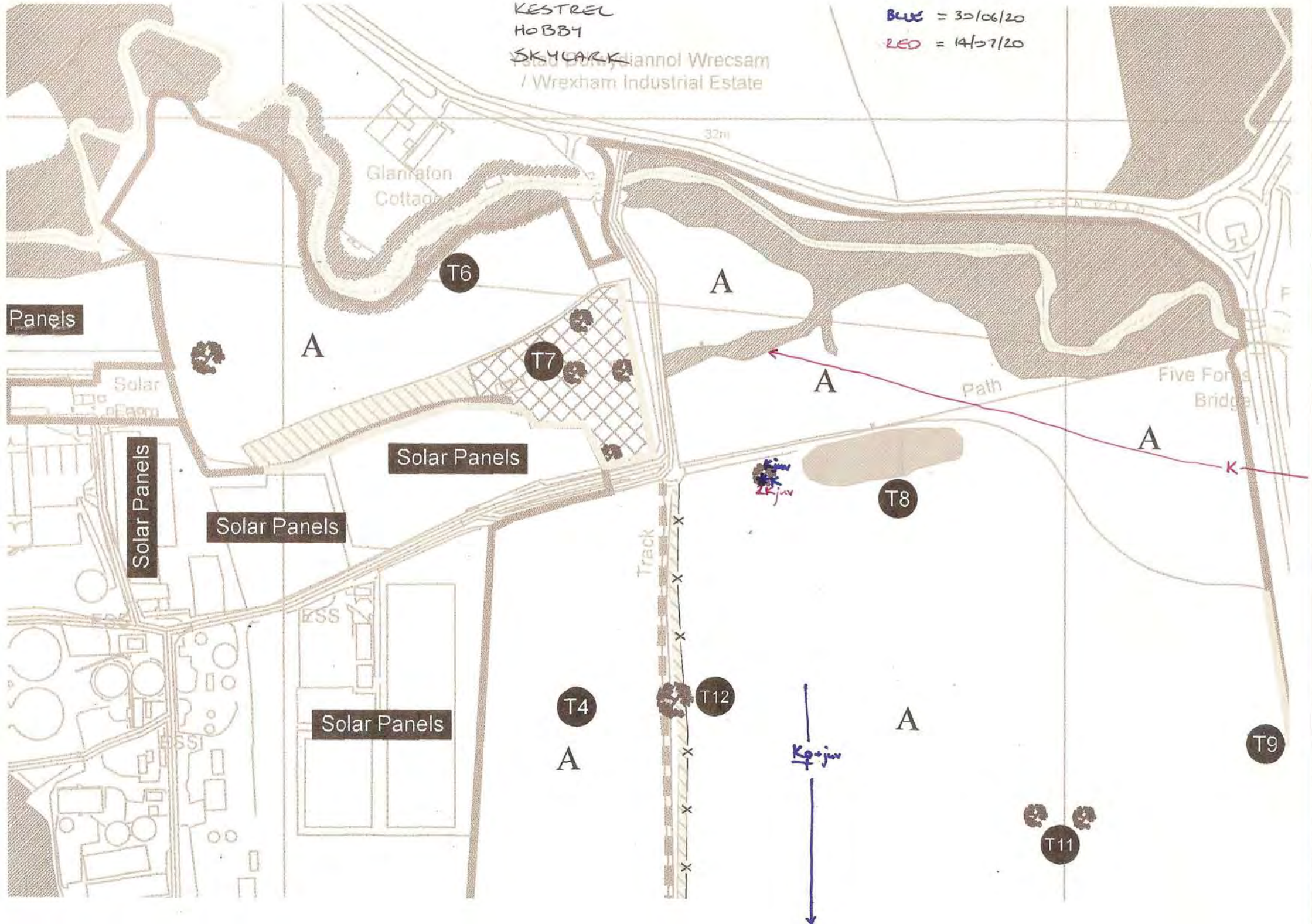


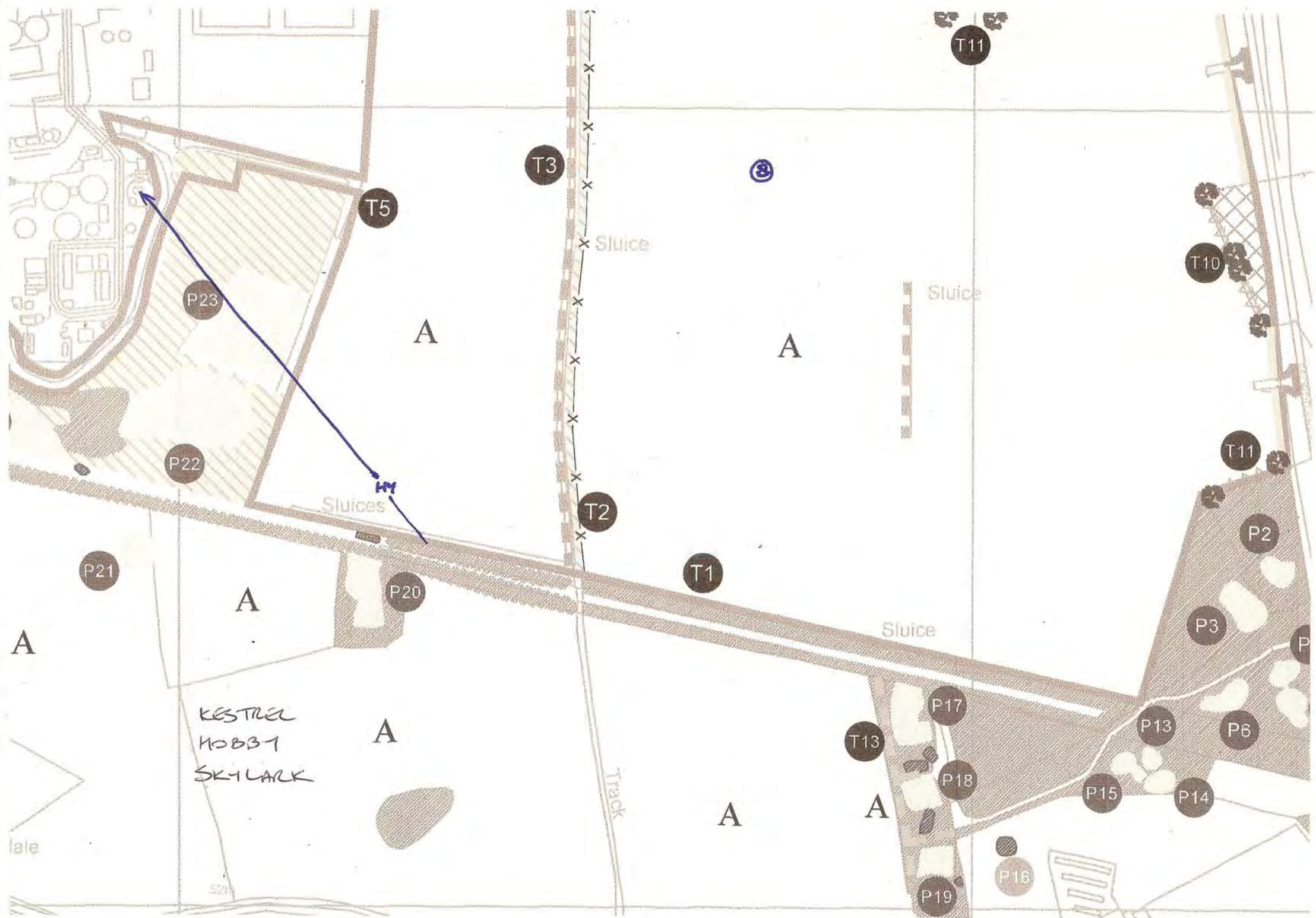


KESTREL
HOBBY
SKYCLARK
Pistol Point, Wrexham
/ Wrexham Industrial Estate

Blue = 30/06/20

Red = 14/07/20





PIED WAC TAIL
 GREY WAC TAIL
 MANDARIN
 STOCK DOVE
 CORMORANT
 PHEASANT
 JAY

BUZZARD

BLUE = 3/06/20

RED = 14/07/20

Panels

Solar

Solar Panels

Solar Panels

Solar Panels

Solar Panels

Track

Path

Five Fords Bridge

T6

T7

T8

T4

T12

T9

T11

A

A

A

A

A



A

21

22

21

2SD

2

6PW+juv
3SD

PM

PW

2SD

GL

J

SMN

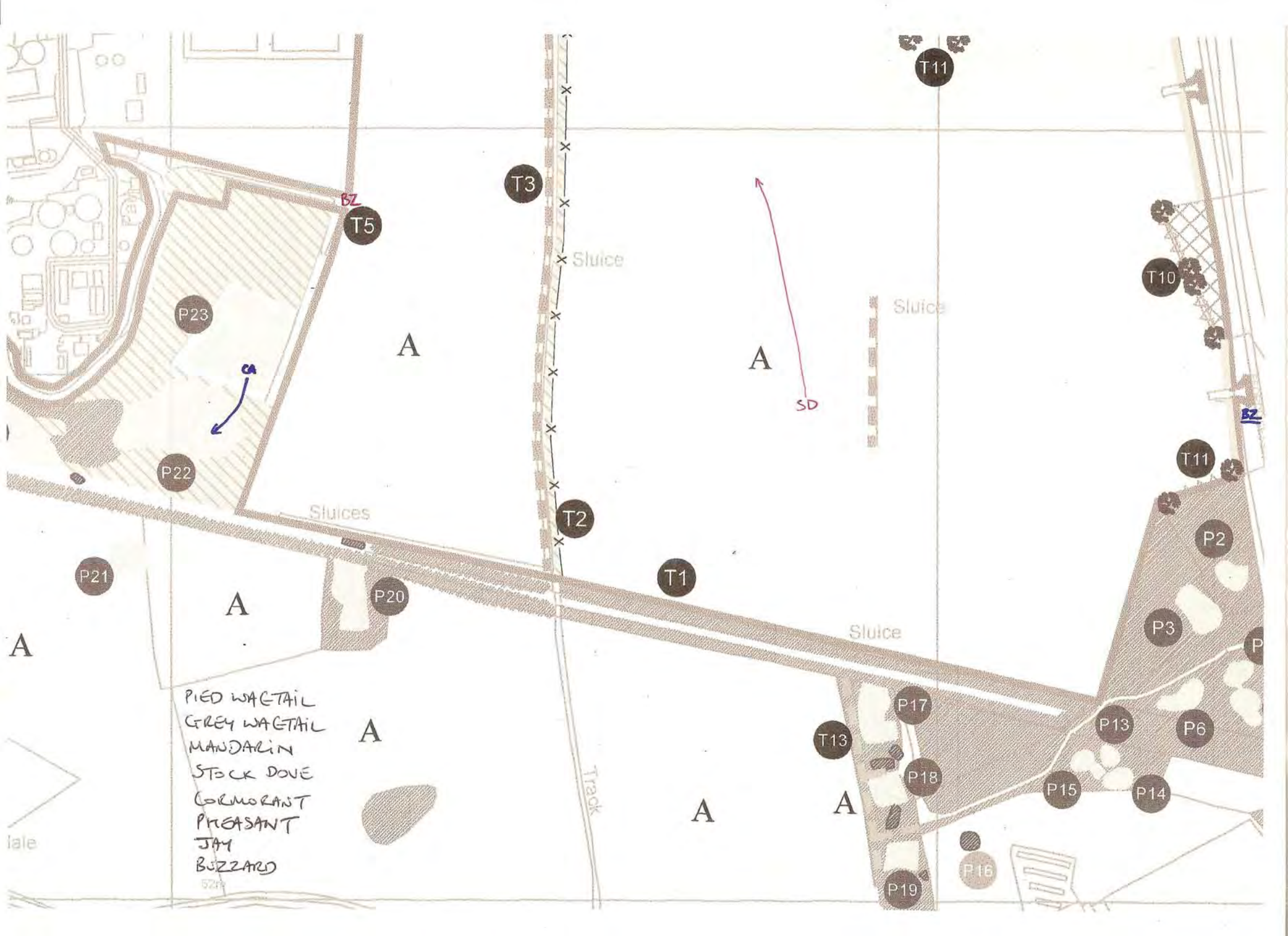
MNP+2juv

GL

Glanrafon Cottage

Wrexham Industrial Estate

32m



MALLARD
LAPWING
YELLOW WAGTAIL
WHINCHAT
MISTLE THRUSH

SPARROWHAWK

BLUE = 30/06/20

RED = 14/07/20

Glanrafon
Cottage

T6

A

T7

A

Path

Five Fords
Bridge

A

Solar Panels

Solar Panels

Solar Panels

Solar Panels

Track

T12

T4

A

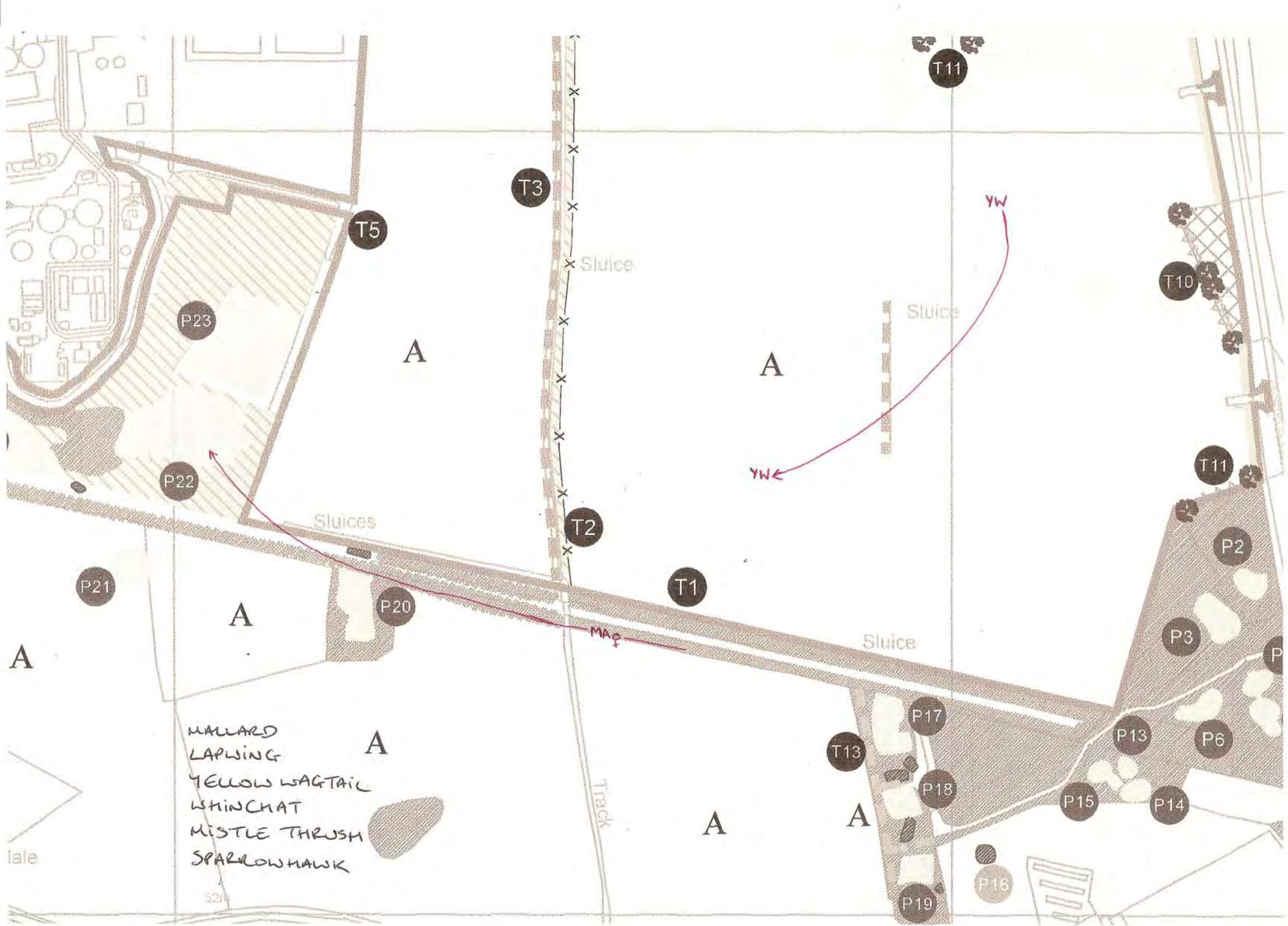
7L

T8

WC juv
WC juv

T9

T11



8 APPENDIX 2 – RESULTS OF VANTAGE POINT SURVEY*Table 6 – Vantage Point Survey Start/ End Times*

Vantage Point	Start Time	End Time
1	18.00 hours	19.00 hours
2	19.25 hours	21.00 hours
3	21.20 hours	22.30 hours

Table 7 – Vantage Point 1

Time (24-hour)	Species	Activity
18.00	Wren	One singing from river-side scrub. Sang periodically throughout observation period.
18.00 (and 18.25)	Blackcap	One singing from river-side scrub.
18.00	Chiffchaff	One calling from river-side scrub. Calling periodically throughout observation period.
18.00	Great Spotted Woodpecker	One calling from river-side tree.
18.00	Goldfinch	One adult and two juvenile birds calling from river-side scrub.
18.00 (and 18.41, 18.57)	Long-tailed Tit	4+ calling from river-side scrub.
18.03	Song Thrush	One singing in distance, possibly from area at <i>Target Note 4</i> .
18.04	Chiffchaff	One juvenile flew from Maize north into riverside scrub. Calling periodically throughout observation period.
18.06 (and 18.36, 18.38)	Blackbird	One male flew from riverside scrub across Maize field, not seen to land. 18.36 – alarm call.
18.06	Goldfinch	One calling from river-side scrub.
18.10 (and 18.18)	Blackbird	One male flew from river-side scrub into Maize field.
18.10	Song Thrush	One flew from river-side scrub into Maize field.
18.14 (and 18.31, 18.48)	Goldfinch	Two flying overhead calling east to west. Three at 18.31, two at 18.48.
18.24 (and 18.57)	Blue Tit	Two juvenile calling from river-side scrub.
18.31	Great Tit	One flew from Maize into river-side scrub.
18.33 (and 18.39, 18.59)	Pied Wagtail	One flying overhead calling west to east.
18.34	Greenfinch	One flying overhead calling northeast to southwest.
18.38	Dunnock	One singing from river-side scrub.
18.41	Jay	One calling from river-side tree.

Time (24-hour)	Species	Activity
18.46	Robin	One calling from scrub at <i>Target Note 14</i> .
18.49 (and 18.59)	Blackcap	One calling from river-side scrub. Different bird to that recorded at 18.00 hrs.
18.50	Stock Dove	One flew in from north to land on overhead wires.
18.52	Stock Dove	One flying north to south over Maize. Not seen to land.
18.54	Song Thrush	One flew from Maize into river-side scrub.
18.54	Blackbird	One juvenile flew from Maize into river-side scrub.
18.55	Goldfinch	Two calling from river-side scrub then flew west to east.
18.59	Stock Dove	Two circling over Maize, not seen to land.

Table 8 – Vantage Point 2

Time (24-hour)	Species	Activity
19.25	Wren	One calling from adjacent disused railway scrub. Called periodically throughout observation period.
19.25	Chiffchaff	One calling from adjacent disused railway scrub. Called periodically throughout observation period.
19.26 (and 19.31, 19.36, 19.53, 20.14, 20.20)	Goldfinch	One flying overhead calling west to east. 19.31 and 19.53 flying east to west.
19.30	Blackbird	One male flew from Maize field into disused railway scrub.
19.35	Swallow	20+ feeding over Barley field (<i>Target Note 21</i>) and Maize field (<i>Target Note 6</i>). Present throughout observation period.
19.40	Buzzard	One perched on camera column in WwTW.
19.45	Mallard	Male and female flew northeast to southwest over Barley field landing on waterbody to east of <i>Target Note 3</i> .
19.48	Chiffchaff	One calling from adjacent disused railway scrub and subsequently singing. Different bird to that recorded at 19.25 hrs.
19.50	Blackbird	One giving alarm call from adjacent disused railway scrub.
19.50	Dunnock	One singing from adjacent disused railway scrub.
19.55	Green Woodpecker	Initially heard from well to the west, possibly Marchwiell Covert or disused railway.
20.00	Three cyclists travelled along central track (<i>Target Note 10</i>).	
20.00	Song Thrush	One singing from disused railway.
20.01 (and 20.15)	Green Woodpecker	One calling from disused railway, then at 20.15 hrs flying to east side of application site.
20.05 to 20.15	Car parked at northern end of central track (<i>Target Note 10</i>).	

Time (24-hour)	Species	Activity
20.07	Kestrel	One flying overhead southwest to northeast, and well away from site.
20.09	Blackbird	One male flew from Maize into disused railway scrub.
20.10	Blue Tit	One calling from disused railway scrub.
20.11	Whitethroat	Short burst of song from disused railway scrub.
20.12	Wren	One calling from adjacent disused railway scrub. Different bird to that recorded at 19.25 hrs.
20.16	Bullfinch	Two calling from adjacent disused railway scrub.
20.30	Blackbird	One giving alarm call from adjacent disused railway scrub.
20.34	Pied Wagtail	One flying over calling south to north.
20.40	Jay	One calling from disused railway scrub.
20.45	Goldfinch	One singing from eastern application site boundary.
20.53 to past end of period.	Car parked at northern end of central track (Target Note 10). Occupant walked down track.	
20.58	Blackbird	One calling from disused railway scrub.

Table 9 – Vantage Point 3

Time (24-hour)	Species	Activity
21.20	Mandarin	Three flying over from east to west. Not seen to land.
21.25	Chiffchaff	One calling from southern edge of Maize field.
21.25	Blackbird	One male flew calling from Maize field to river-side scrub.
21.27	Blackbird	One male flew across Maize field to river-side scrub.
21.28	Blackbird	One female flew calling across Maize field to river-side scrub.
21.29	Song Thrush	One flew south to north over the Maize field to river-side scrub.
21.31	Song Thrush	One flew south to north over the Maize field to river-side scrub.
21.33	Song Thrush	One singing from river-side scrub/ tree.
21.35	Blackbird	One giving alarm call from scrub at Target Note 4.
21.37	Robin	One calling from river-side scrub.
21.37	Blackbird	Two different birds giving alarm call from river-side scrub.
21.51	Mallard	Four flying over from northeast to southwest. Not seen to land.



- Application Site
(approximate boundary)
- Areas excluded from
Survey Site
(Survey Site is remaining area of
Application Site)

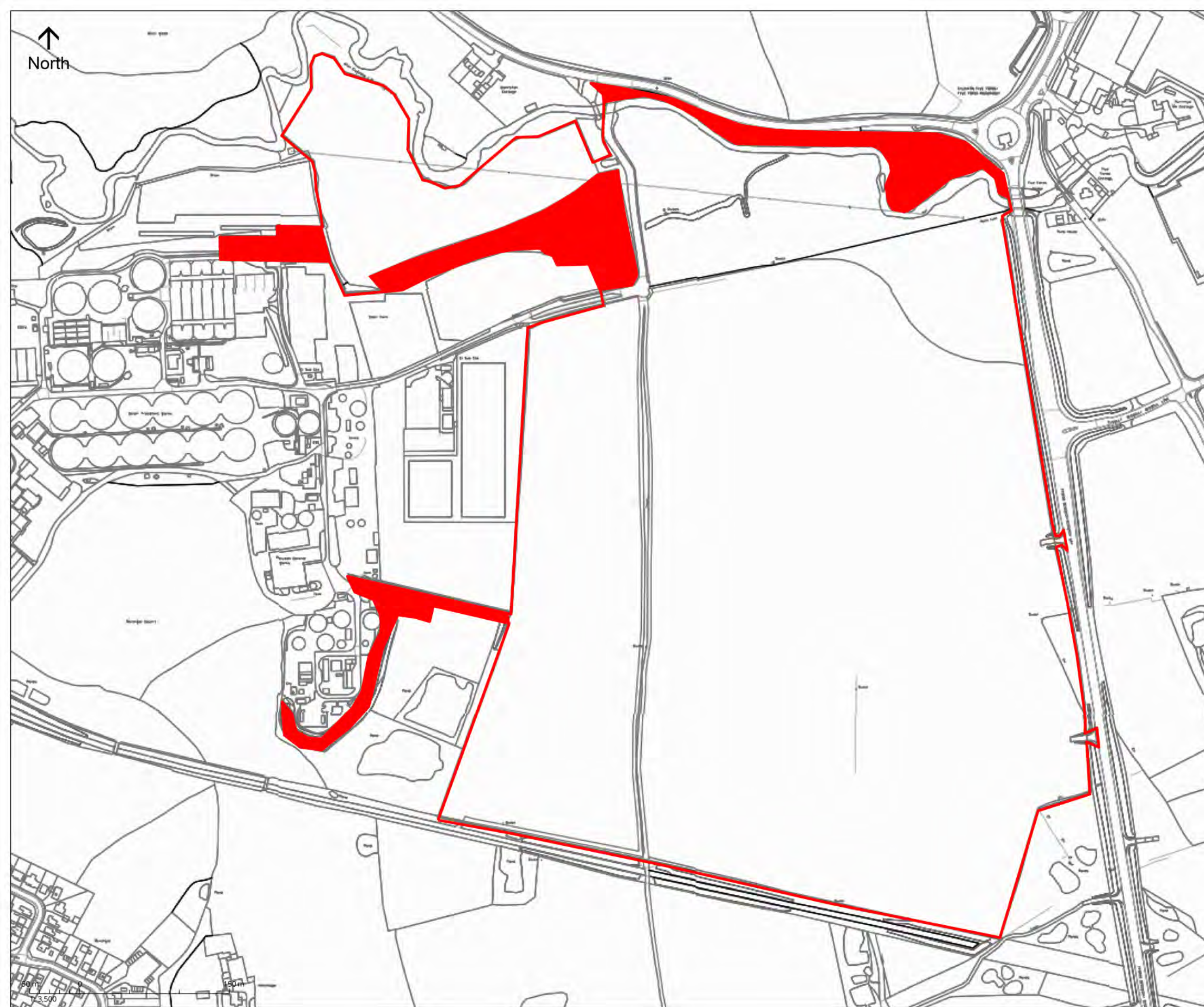
C429 Proposed Glasshouse Development
on land off Cefn Road, Five Fords,
Wrexham - Bird Survey

Figure 1 - The Application Site and Survey
Site

Date: 09/07/2020

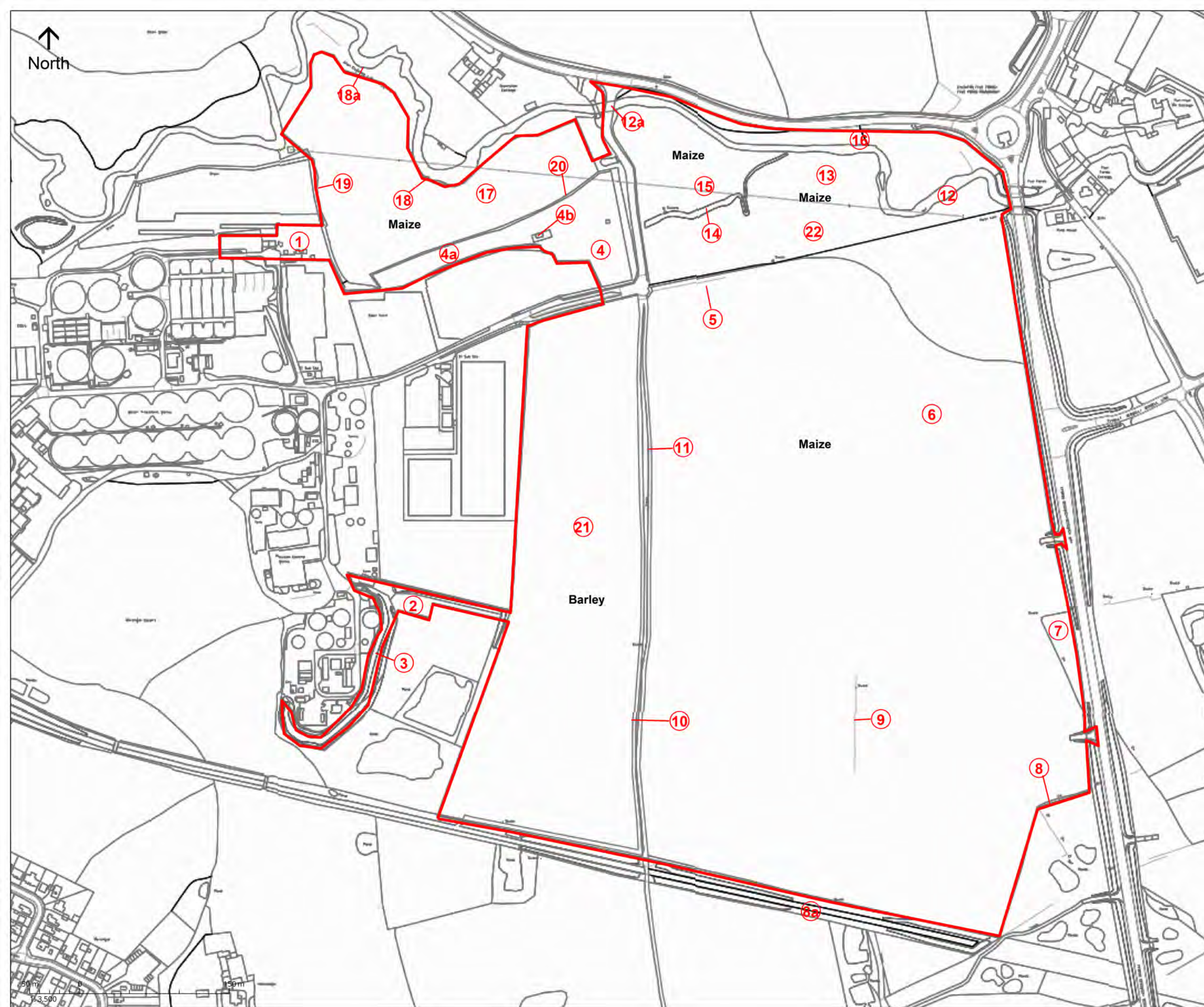
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- Application Site
(approximate boundary)
- Target Note



C429 Proposed Glasshouse Development
on land off Cefn Road, Five Fords,
Wrexham - Bird Survey

Figure 2 - Reconnaissance Survey Target
Note Locations

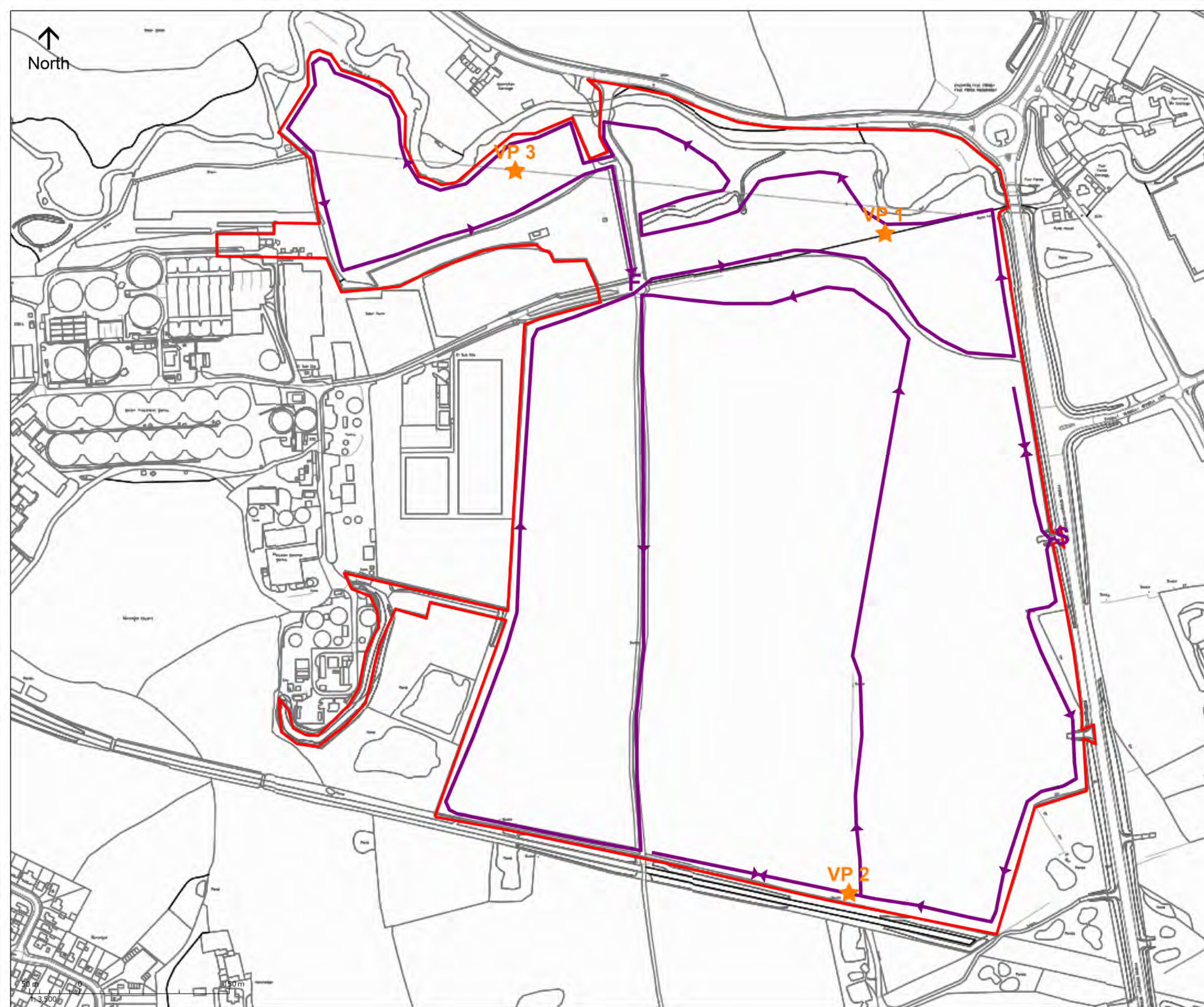
Date: 09/07/2020

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↑
North

- Application Site
(approximate boundary)
- Indicative transect
route
S = Start | F = Finish
- Vantage Point



C429 Proposed Glasshouse Development
on land off Cefn Road, Five Fords,
Wrexham - Bird Survey

Figure 3 - Indicative Transect Route and
Vantage Point Locations

Date: 22/07/2020

marches ecology

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