

6.0 BIODIVERSITY

6.1 INTRODUCTION

This chapter was prepared by Brady Shipman Martin and comprises an appraisal of the likely effects on biodiversity (flora and fauna) of proposed residential development (Strategic Housing Development) at the former Magee Barracks, fronting onto Hospital Street, Kildare. The application is for Phase 1 of the overall development, which has been considered in the wider context of the overall Magee Barracks site and its surroundings.

The potential for any impacts on sites designated as European (Natura 2000) sites, under the EU Habitats and Birds Directives was also appraised, and the results of that study are presented in a separate report (Information for Screening for Appropriate Assessment).

An invasive species management plan statement is being implemented at the site, by the landowner, and the latest report prepared by the specialist (Jonathan Ryan, RLH Ltd) is presented as Appendix 6.1 of this EIAR (Preliminary Stage 2 Report, dated 19th June 2019).

This study was carried out by consultant ecologist Matthew Hague CEnv MCIEEM, with bat surveys undertaken by specialist ecologist Brian Keeley MCIEEM (the bat survey report is included in Appendix 6.2 of this EIAR). Additional survey work and research was undertaken by hydrogeologist and chartered engineer Niall Mitchell (BlueRock Environmental Ltd) and incorporated into Chapter 8 (Lands and Soils) and Chapter 9 (Hydrogeology & Hydrology) of this EIAR.

6.2 STUDY METHODOLOGY

6.2.1 Desk Study

A desk-based assessment was undertaken of the site at Magee Barracks and the wider area. Numerous site visits have been undertaken to inform this EIAR chapter, with the first taking place on 24th November 2016. Follow up visits were undertaken by ecologists on behalf of Brady Shipman Martin on 26th September 2018 and a final visit was undertaken by Brady Shipman Martin on 21st May 2019.

This ecological impact assessment (EclA) has been undertaken in accordance with the following publications:

- EPA *Guidelines on the Information to be Contained in Environmental Impact Statements* (EPA, 2002) (and revised and draft guidelines 2015 / 2017);
- EPA Advice Notes of *Current Practice (in the Preparation of Environmental Impact Statements)* (EPA, 2003) (and revised advice notes 2015);
- *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment* (European Commission, 2013);
- *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* (August 2018);
- *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (Transport Infrastructure Ireland (formerly the National Roads Authority), 2009); and

- *Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland: Terrestrial, Freshwater, Coastal and Marine* ('the CIEEM Guidelines') published by the Chartered Institute of Ecology and Environmental Management (CIEEM), September 2018.

The report has regard to the following legislative instruments:

- The Planning and Development Act (2000, as amended);
- The Wildlife Act 1976 and the Wildlife (Amendment) Act 2000;
- European Commission (EC) Habitats Directive 92/43/EEC;
- European Commission (EC) Birds Directive 2009/147/EC;
- European Communities (Birds and Natural Habitats) Regulations 2011-2015;
- Flora (Protection) Order 2015;
- EIA Directive 2014/52/EU of the European Parliament and of the Council of 16th April 2014; and
- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018).

The report has regard to the following policies and plans:

- The Third National Biodiversity Plan 2017 – 2021 (Department of Culture, Heritage and the Gaeltacht 2017);
- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (Inland Fisheries Ireland, 2016);
- Planning for Watercourses in the Urban Environment (Shannon Regional Fisheries Board / Inland Fisheries Ireland);
- Kildare County Development Plan 2017 – 2023, including the associated Natura Impact Report (in particular Chapter 13, which contains natural heritage and green infrastructure policies and objectives);
- Kildare Local Area Plan 2012 – 2018.

Information was also collated from the sources listed below:

- Data on rare and protected plant and animal species contained in the following databases:
 - The National Parks and Wildlife Service (NPWS) of the Department of Culture, Heritage and the Gaeltacht (www.npws.ie);
 - The National Biodiversity Data Centre (NDBC) (www.biodiversityireland.ie);
 - Birdwatch Ireland (www.birdwatchireland.ie);
 - Bat Conservation Ireland (www.batconservationireland.org);
- Recent aerial photography / drone photography and photographs taken at the Site;
- Recent and historic ordnance survey mapping www.geohive.ie;
- Information on protected areas, as well as watercourses, catchments and water quality in the area available from <https://gis.epa.ie/EPAMaps/>;
- Information on soils, geology and hydrogeology in the area available from www.gsi.ie;
- Information on the status of EU protected habitats in Ireland (NPWS, 2013); and
- Information on land-use zoning from the online mapping of the Department of the Environment, Community and Local Government <http://www.myplan.ie/en/index.html>.

This chapter should be read in conjunction with Chapter 8 (Soils and Geology) and Chapter 9 (Hydrogeology & Hydrology).

6.2.2 Field Surveys

A habitat survey of the site was carried out on 24th November 2016, with follow up surveys in 2018 and 2019. Habitats were classified using *A Guide to Habitats in Ireland* (Fossitt, 2000). Vascular plant nomenclature follows that of the *New Flora of the British Isles* 3rd Edition (Stace, 2010). Birds present on the site were recorded during this survey. Signs of large mammals were recorded during the field survey. This involved a combination of direct sightings and observations of signs, tracks and droppings.

The buildings and hard standing areas at Magee Barracks present significant health and safety challenges for day and night-time survey work, including bat survey work. Most of the buildings on the wider Magee Barracks site have been extensively damaged by fire and it is not appropriate to use ladders to closely inspect the buildings. A preliminary bat survey of all structures and trees within the site for the proposed development was undertaken using survey equipment including a high-powered torch and binoculars. Subsequently full bat surveys were undertaken, on 18th October 2017 and 26th September 2018, by two surveyors (Refer to Appendix 6.2). The site was surveyed for evidence of roosting, commuting and feeding bats as follows:

- Trees and buildings were examined in daylight for evidence of good roost features including cavities, crevices, hollows and ivy cover, evidence of bats from staining and audible squeaking of bats. The trees were examined prior to sunset and again after sunrise to allow for hearing any active bats prior to emergence or following return (if present).
- A bat detector assessment of the site was carried out with the aid of a number of ultrasonic receivers (known commonly as bat detectors) including a Pettersson D240X (D240X), two Echometer3 (EM3) and two Songmeter2Bat+ (SM2) monitors. Bat identifications were made based on the comparison of heterodyne signals and time expanded signals from the D240X and all signals recorded on the SM2 were confirmed later with Kaleidoscope Pro sound analysis software and Batsound Pro sound analysis software.
- Once all buildings had been examined for emergence, the site was then assessed for feeding and commuting bats, using static and hand-held bat detectors. Bat identifications and positions were noted with a Garmin Montana GPS and a Garmin GPS attached to the EM3 recorded the positions of bat signals and the time of recording.

Given the scale of the development and the nature and condition of the features that may be impacted it is considered that the level of survey undertaken is adequate.

6.2.3 Evaluation of Ecological Features

The methodologies used to determine the value of ecological resources, to characterise impacts of proposed development and to assess the significance of impacts and any residual effects are in accordance with the *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (NRA, 2009). This methodology is consistent with the *Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland – Terrestrial, Freshwater, Coastal and Marine* ('the CIEEM Guidelines') (CIEEM, September 2018).

Impact assessment is undertaken of sensitive ecological receptors ('key ecological receptors') within the zone of influence of the proposed development. The zone of influence is the 'effect area' over which change resulting from the proposed development is likely to occur and the key ecological receptors are defined as features of sufficient value as to be material in the decision-making process for which potential impacts are likely. In the context of the proposed development, a key ecological receptor is defined as any feature valued as follows:

- International importance
- National importance
- County importance
- Local importance (higher value)

Features of local importance (lower value) and features of no ecological value are not considered to be key ecological receptors.

6.3 THE EXISTING RECEIVING ENVIRONMENT (BASELINE SITUATION)

6.3.1 General Description

Magee Barracks comprises a large area of land, totalling 20.78ha in area, to the east of Kildare Town centre. It is located between Hospital Street and Melitta Road and is surrounded by residential development. The existing residential estates of Ruanbeg and Rowanville lie to the east, Melitta Park and Melitta Road are to the north and Campion Crescent is to the west. Two recently completed schools also adjoin the western boundary. To the south and set back from Hospital street are commercial premises.

The site is open in character and gently slopes to the north and east while the southern portion is quite flat. The overall Magee Barracks site is divided into two separate areas:

The southern half of the site, 11.32ha in area, which forms Phase 1 of the proposed development and which is the subject of the current application, is dominated by hard surfaces and abandoned military buildings. Areas of abandoned and unmanaged planting and lawns as well as groups of trees and hedges are also present in this area. In addition, the north eastern boundary of the Phase 1 site contains an area of Japanese knotweed (*Fallopia japonica*) and giant hogweed (*Heracleum mantegazzianum*). These are alien invasive species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011-2015 and a management plan to eradicate the plants has been in operation at the site since 2018 (Refer to Appendix 6.1 for the latest information on progress with the management plan).

The northern half of the site, which will be the subject of a future (Phase 2) planning application, is quite different in character, comprising a number of agricultural fields, grazed by sheep at the time of the survey, and divided by relatively unmanaged hedgerows.

6.3.2 Designated Conservation Areas

European sites

There are a number of European sites located within a 15km radius of the proposed development (see Figure 6.1). These are:

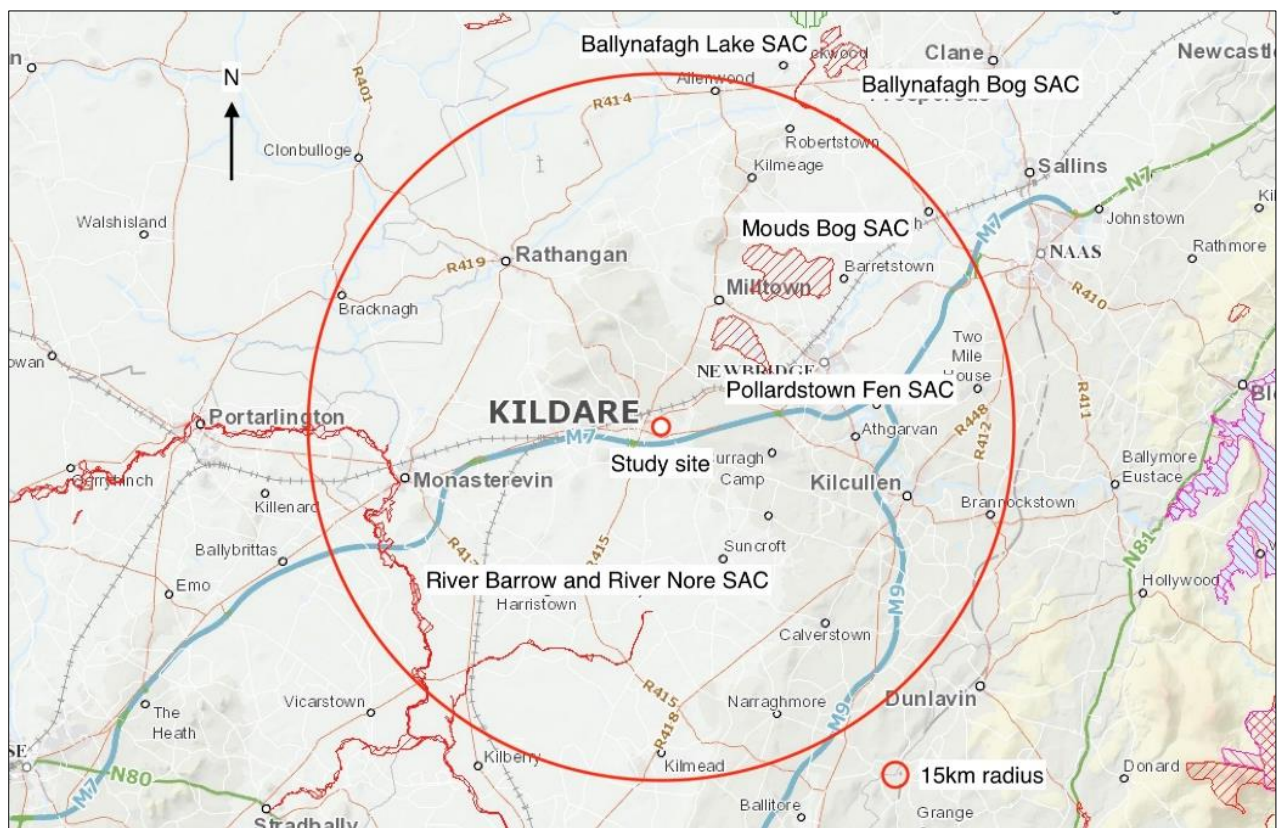
- Pollardstown Fen SAC (Site code 000396)
- Moud's Bog SAC (Site code 002331)
- River Barrow and River Nore SAC (Site code 002162)

The following SACs fall just outside the 15km distance from the site and are included in the appraisal:

- Ballynafagh Lake SAC (Site code 001387)
- Ballynafagh Bog SAC (Site code 000391)

The nearest European designated sites are Pollardstown Fen SAC (4.3km to the north east) and Moud's Bog SAC (7.2km to the north east), with the River Barrow and River Nore SAC located 7.4km to the south at its closest point. Ballynafagh Lake SAC and Ballynafagh Bog SAC are approximately 15km and 16km to the north east respectively. The nearest SPA is Poulaphouca Bog SPA (004063), 22km to the east.

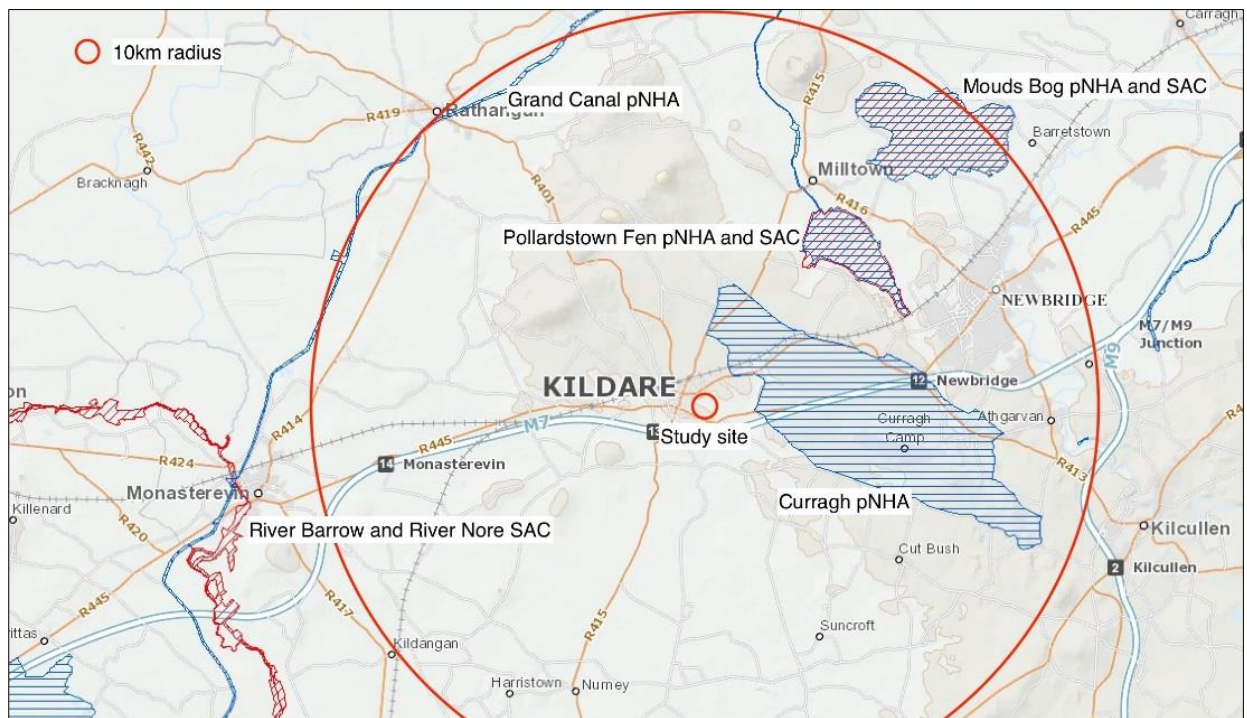
Fig. 6.1: European Sites in Relation to the Study Area



Other Designated Conservation Areas

The nearest site designated for nature conservation is the Curragh (Kildare) (Site code 000392), a proposed Natural Heritage Area (pNHA), approximately 1.3km to the east at its closest point (see Figure 6.2). This site is selected for designation for its extensive open plain area of lowland acid grassland, with dry and wet heath in places. No impacts are expected to arise at this or any other non-European designated site. Pollardstown Fen pNHA, the only other non-European designated site within 5km, is approximately contiguous with Pollardstown Fen SAC and, as such, is not considered further in this report.

Fig. 6.2: Designated conservation areas (non-European sites) in relation to the study area



6.3.3 Rare and Protected Species

The NPWS database was consulted with regard to rare species (Curtis & McGough, 1988) and species protected under the Flora Protection Order (2015). There are records of a number of protected species within the 10km grid square that covers the site (N71). These include blue fleabane (*Erigeron acer*), basil thyme (*Acinos arvensis*) and red hemp nettle (*Galeopsis angustifolia*). These species have been recorded at various locations, including Newbridge sand pits, Loughbrown sand pit, Curragh GAA Club and Fenor in the 1990s, however, none of these plants are known to occur at the former Magee Barracks site and none were recorded during the site visits.

6.3.4 Habitats

All habitats present on the proposed development site are described in this section and are shown in Figure 6.3.

The southern part of the site, where the former military barracks is situated, and which is the subject of the Phase 1 application, contains few features of any ecological significance. It is almost entirely dominated by man-made structures such as buildings and hard surfaces (BL1 as per the Fossitt Guidelines). Small areas of other habitats, such as patches of gorse (*Ulex europaeus*) scrub (WS1), disturbed ground (ED4) and rank grassland (GA2/GS2), scattered trees and sections of hedgerows (WL1) and tree lines (WL2) (including cherry (*Prunus* spp.), beech (*Fagus sylvatica*), Lawson cypress (*Chamaecyparis lawsoniana*), silver birch (*Betula pendula*), Scots pine (*Pinus sylvestris*), horse chestnut (*Aesculus hippocastanum*), larch (*Larix decidua*), poplar (*Populus* spp.), sycamore (*Acer pseudoplatanus*), alder (*Alnus glutinosa*), and lime (*Tilia x europaea*)) are also present.

Fig. 6.3: Habitats present in Magee Barracks (Phase1, with Phase 2 also shown)



The northern half of the site (the future Phase 2 application lands) comprises a number of open fields (GA1) divided by unmanaged hedgerows/tree lines. A small patch of hawthorn (*Crataegus monogyna*) and elder (*Sambucus nigra*) scrub (WS1) is located in the north eastern part of the site on a small slope that rises up to the site boundary in this location.

Two invasive alien plant species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477/2011) (giant hogweed (*Heracleum mantegazzium*) and Japanese knotweed (*Fallopia japonica*)) were recorded near the eastern boundary of the site, in close proximity to the buildings. A management plan to successfully eradicate these species has already been implemented (see Appendix 6.1 for the latest information on progress with the management plan).

No watercourses of any significance are present on the site, the nearest such feature is the Tully Stream, c. 2.5km to the south and separated from the site by the M7 motorway. This is a first order tributary of the River Barrow; however there is no connection between the proposed development site and this stream.

6.3.5 Fauna

The bird community present is typical of such a site, with blue tit, blackbird, jackdaw and magpie (all species of least conservation concern – green listed on the list of *Birds of Conservation Concern in Ireland 2014 to 2019* (Colhoun and Cummins 2013)) present. Two amber list species (of medium conservation concern), a single starling and a pair of house sparrows, were recorded in the south western corner of the site, outside the planning application area. No red list species (high conservation concern) were recorded on the site during the field surveys.

The bat surveys undertaken in 2017 and 2018 (which covered the entire Master Plan area) recorded very little bat activity at the Magee Barracks site, with small numbers of common pipistrelles recorded in the west of the Master Plan area, along the western boundary and along the central avenue, with a single occurrence of a soprano pipistrelle and a *Myotis* bat (possibly a Daubenton's bat) also recorded in the 2017 survey. Leisler's bats were recorded in the 2018 survey.

The trees and hedgerows present in parts of the development area are of some use for commuting and foraging bats. A number of former military buildings, in very poor condition, are to be demolished as part of the proposed development. None of these buildings, nor any of the trees, are confirmed to be bat roosts.

Other than occasional fox droppings, no signs of large mammals, such as badger were recorded during the site visit and there are no features of significant value on the site for other species groups such as lepidoptera, reptiles or amphibians.

6.3.6 Overall Evaluation of the Proposed Development Site

No rare species or habitats, or habitats of high ecological value, are present on the site. No rare plants were recorded during the site visit. No evidence of badgers, lepidoptera, reptiles or amphibians was recorded and no significant features suitable for use by these species were recorded on or in the vicinity of the proposed development site.

Overall, with the possible exception of the hedgerows and tree groups, which may be of local importance (lower value), for example for nesting birds and commuting/foraging (but not roosting) bats, it is considered that the site is of no ecological value in accordance with the ecological resource valuations presented in

the National Roads Authority *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (NRA / TII, 2009 (Rev. II)).

6.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The development will consist of the demolition of 17 no. existing buildings (including a range of former Barracks buildings, the Officers' Mess building and Water Tower structure) with a GFA of 16,320 sq.m, and the construction of a development comprising of 375 no. residential units, a neighbourhood centre comprising of 3 no. single-storey retail units with a GFA of 130 sq.m, 105 sq.m and 100 sq.m respectively, a café (including gallery / exhibition area at mezzanine level) with a GFA of 300 sq.m, a two-storey childcare facility with a GFA of 680 sq.m and associated play area, all internal roads, car parking, pedestrian and cycle paths, public open space, and all associated site and infrastructural works on an application site of c. 11.35 ha.

The 375 no. residential units proposed consist of the following:

- 76 no. 3 bed semi-detached units;
- 42 no. 3 bed terrace units;
- 60 no. 4 bed semi-detached units;
- 7 no. 4 bed detached units;
- 16 no. 1 bed apartment units within the duplex blocks;
- 34 no. 2 bed apartment units within the duplex blocks;
- 18 no. 3 bed apartment units within the duplex blocks;
- 30 no. 1 bed apartment units within the apartment blocks; and
- 92 no. 2 bed apartment units within the apartment blocks.

The houses are 2 to 3 storeys in height, the duplex blocks are 2 to 3 storeys in height and the apartment blocks are 4 to 5 storeys in height over basement car park. The associated site and infrastructural works include foul and surface / storm water drainage, attenuation tanks, 639 no. car parking spaces comprising, 560 no. spaces for the residential units, 51 no. visitor spaces and 28 no. spaces to serve the proposed creche, retail, and café units, public open space measuring c. 1.80 hectares, bin and bike stores, 3 no. electricity substations, landscaping, boundary walls, railings and fences.

A new signalised road junction is proposed onto Hospital Street providing access to the proposed development and also to the adjacent lands where a supermarket and cancer treatment clinic are proposed. Road works are also proposed to Hospital Street (R445), including pedestrian crossings, provision of cycle lanes, upgrades to footpaths, signage, road markings and traffic signalling.

6.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

6.5.1 Designated Conservation Areas

The hydrogeological assessment undertaken (see Chapter 9) confirms the regional groundwater flow direction immediately south of Pollardstown Fen to be generally in a northeasterly direction towards the Fen. However a groundwater divide was confirmed and mapped to the northeast of Kildare town. South of this divide, groundwater is interpreted to flow in a southwesterly direction across Kildare town. The proposed development at Magee Barracks is located southwest of this divide and therefore groundwater is interpreted to flow locally in a southwesterly direction across the site and not towards Pollardstown Fen.

As previously stated, the potential for any impacts on these sites under the EU Habitats and Birds Directives (the provision of information for the Screening for Appropriate Assessment) was considered. Full results of that study are presented in a separate Screening for Appropriate Assessment Report. The conclusions of the Report are reproduced below:

'This report concludes on the best scientific evidence, including the hydrogeological assessment, that it can be clearly demonstrated that no elements of the project will result in any likely significant impact on any relevant European site, either on their own or in combination with other plans or projects, in light of their conservation objectives.

As such no mitigation measures are required for the protection of these European sites.

It is considered that this report provides sufficient relevant information to allow the Competent Authority (An Bord Pleanála) to carry out an AA Screening, and reach a determination that the proposed development will not have any likely significant effects on European sites under Article 6 of the Habitats Directive (92/43/EEC) in light of their conservation objectives.'

The detailed assessment of the hydrogeological regime at the site and its regional environs, undertaken by BlueRock Environmental and included in Chapter 9, concluded that there are no SACs or groundwater dependent terrestrial ecosystems (GWDTE) receptors, including Pollardstown Fen, downgradient or in close proximity to the site. Therefore without an environmental receptor being present, the risk is considered to be low. The site is not located within the groundwater catchment of Pollardstown fen and therefore does not pose a risk to this highly sensitive groundwater dependent terrestrial ecosystem.

6.5.2 Habitat Loss and Disturbance within the Site

The development will involve the removal of derelict buildings and hard standing areas of negligible ecological value. This will have no long-term impacts on biodiversity.

It will be necessary to remove elements of the internal hedgerow, tree line and unmanaged scrub and grassland habitat. These habitats are of no more than low local significance although they do provide some wildlife (bird nesting) habitat and act as corridors for movement. However the extensive landscape planting that is proposed will ensure that there will be no residual impact from the loss of habitat on the site.

No bat roosts have been recorded within the proposed development area and no impacts are expected on roosting bats, as it is not expected that any features of significant potential for roosting bats will be removed. The proposed development may result in minor impacts at the local level on commuting and foraging bats, however it is not expected that these impacts will be significant, particularly in view of the fact that the proposed landscape strategy will introduce new habitat throughout the proposed development. Increased lighting and increased human activity have the potential to impact on bat feeding and commuting behaviour.

There will be no impacts on badgers and other large mammals, amphibians, reptiles, lepidoptera or other species groups as a result of the proposed development.

6.5.3 Water

All construction/demolition activities pose a potential risk to watercourses as surface water arising at a site may contain contaminants. The main contaminants arising from construction and demolition activities may include suspended solids, hydrocarbons and concrete/cement products. If not properly managed, such pollutants could pose a temporary risk to surface water quality in local watercourses during the demolition and construction phases.

Although there are no watercourses on or in the vicinity of the site, both the construction and operational phases of the proposed development at Magee Barracks could have impacts on water quality, via runoff to the wider surface water network, including the sewer network and via infiltration to the ground. The nearest stream, the Tully Stream, approximately 2.5km south of the site, is not considered at direct risk from the proposed development. However in the event that contaminated water should enter any drainage ditch, watercourse or sewer during the construction (or operation) of the proposed development, there is the theoretical potential for negative effects on water quality. It is considered that this possibility is remote, provided that – as recommended – standard best-practice water protection measures are adhered to during the construction and operational phases of the project.

Provided that site facilities are correctly designed and proper working procedures are strictly adhered to, no impacts on existing watercourses are expected, either during the construction or operation of the proposed development.

The Phase 1 area is already covered by extensive areas of hard surfacing. However, any change in the area of roads, building roof areas and other structures will alter the potential rate of discharge of rainwater from the site to the local surface water network. There is potential for this to contain contaminants such as petrol and oil from vehicles, home heating oil spillages and other contamination.

6.5.4 Invasive Species

A specific, long-term management plan to permanently eradicate giant hogweed and Japanese knotweed from the Magee Barracks site has been developed and is currently being successfully implemented (see Appendix 6.1). There will be no transfer of invasive plant material during the construction phase that could potentially lead to these species becoming further established in the area. The construction methodology will ensure that no invasive species are introduced, either deliberately or inadvertently, to the site.

6.6 POTENTIAL CUMULATIVE IMPACTS

In general, urbanisation can lead to habitat loss and the loss of open green space, as well as increasing the risk of siltation and pollution of watercourses from waste water and surface water runoff. Much of the Magee Barracks site comprises land that has previously been developed. Nevertheless the potential cumulative effects of development at Magee Barracks (Phase 1) have been assessed in conjunction with the future (Phase 2) development, as well as the other proposed developments (the permitted supermarket development in the south west corner of the Magee Barracks site and the proposed cancer treatment clinic in the south east corner). Taken together, the wider Magee Barracks regeneration proposals will result in significant changes to the site. However it is not considered that any impacts arising will be significant.

The landscaping proposed will incorporate ecologically sensitive planting, and the surface water collection and infiltration system for the entire site has been designed in accordance with the CIRIA SUDS Manual.

This will further ensure that there will be no cumulative impacts as a result of the proposed development.

6.7 'DO NOTHING' IMPACT

There are no apparent threats to the species (such as foxes and nesting birds) that utilise the land at Magee Barracks. Should no development take place it is likely that these species would remain, and the site will become progressively more overgrown and derelict. Furthermore, as stated in this report, Japanese knotweed and giant hogweed are present on the site and are currently being treated. Without ongoing management there is a long-term risk that these plants could spread, both within the Magee Barracks site and outside it.

6.8 AVOIDANCE, REMEDIAL & MITIGATION MEASURES

With regard to the above assessment the following avoidance, mitigation or ecological enhancement measures are recommended during the pre-construction, construction and operational stages of the proposed development.

6.8.1 Designated Conservation Areas

No designated conservation areas (Including Pollardstown Fen SAC) will be impacted in any way by the proposed development and no mitigation measures are required in this regard. Full details are provided in Chapter 9 and in the Appropriate Assessment Screening Report that accompanies the planning application.

6.8.2 Habitats

All site clearance and landscaping works will comply with current legislative requirements and best practice and ensure that no invasive species are introduced to the site. The proposed planting will, over time, provide additional habitat of benefit to bats and birds that will continue to use the site. Details of proposed planting are included in the landscape drawings that accompany the planning application.

BIO PRE-CONST 1: Where it is intended to retain trees and hedgerows within the development, trees to be retained shall be treated in accordance with British Standard BS5837:2012 *Trees in Relation to Design, Demolition and Construction' – Recommendations*, with protective fencing being installed prior to commencement of development.

BIO OPER 1: The planting proposed for the development shall, if appropriate given the site characteristics, comprise a mix of native trees and shrubs. The planting will also incorporate a range of species that will attract feeding invertebrates, including moths, butterflies and bees. It will take account of and implement the relevant objectives of the All-Ireland Pollinator Plan 2015-2020

6.8.3 Fauna

BIO PRE-CONST 2: Where practicable, the removal of trees and other features suitable for use by nesting birds shall be undertaken outside the bird nesting season (avoiding the period 1st March to 31st August). Should the construction programme require vegetation clearance between March and August bird nesting surveys shall be undertaken by suitably experienced ecologists. If no active nests are recorded,

vegetation clearance shall take place within 24 hours. In the event that active nests are observed, an appropriately sized buffer zone shall be maintained around the nest until such time as all the eggs have hatched and the birds have fledged. Once it is confirmed that the birds have fledged and no further nests have been built or occupied, vegetation clearance may take place.

BIO PRE-CONST 3: Bat roosts have not been recorded at the Magee Barracks site and it will not be necessary to apply for a derogation licence under Regulation 54 or 55 of the European Communities (Birds and Natural Habitats) Regulations 2011-2015. However, in line with good practice, no demolition or mature tree removal shall take place before the buildings and any mature trees on site scheduled for removal are first surveyed by a qualified bat specialist for the presence of bats. Any ivy-covered trees which require felling shall be left to lie for 24 hours after cutting to allow any bats beneath cover to escape. Trees with potential for bat roosting, i.e. those showing cavities, shall be felled in the presence of a bat specialist in case bats are present. If found, such animals should be safely retained in an escape-proof container until nightfall then released onsite.

BIO OPER 2: All new lighting for the proposed development shall be designed and constructed taking account of the recommendations of Bat Conservation Ireland (2010). The lighting scheme for the proposed development shall adhere to the following lighting design characteristics:

- The minimum level of appropriate / required lighting level will be provided within the developed / residential areas;
- Light standards will be fitted with low intensity, horizontal cut-off LED light fittings employing a narrow directional light or cowled light. This will avoid the effect of light spill arising;
- Light standards and associated lighting will be directed away from areas of open space; and
- No floodlighting will be used in the development.

BIO OPER 3: A total of 9 bat boxes (such as Schwegler 2F) shall be erected on mature trees to be retained as part of the Phase 1 and 2 development proposals, with advice from an experienced bat specialist.

6.8.4 Water

Full details of the surface water and foul drainage proposals are contained in the project Water Services Design Report, the Environmental Site Assessment and Chapter 9 of this EIAR. These were prepared by Garland Consulting and BlueRock Environmental Ltd.

The surface water collection and infiltration system for the entire site has been designed in accordance with the CIRIA SUDS Manual.

There are a number of existing sewers traversing the site which will be diverted into the proposed foul drainage system for the Phase 1 site. It is proposed to provide two new gravity sewer systems – a northern and a southern system – on the Phase 1 site. The southern system will discharge to the existing foul sewer on Hospital Street and the northern system will discharge to the existing 600 diameter foul sewer at the eastern boundary in adjacent Ruanbeg Housing Estate. No foul water discharge to ground is proposed.

The foul and surface water drainage design is to accepted standards and will ensure that there will be no significant adverse effects on surface or groundwater receptors as a result of the proposed development.

6.9 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

The proposed development will result in the removal of derelict buildings, hard surfaces and neglected habitats and their replacement with a mixed residential development and associated public open space and landscaped areas. This will result in no long-term residual impact on any ecological receptors, either within or in the vicinity of the site, or associated with any site designated for nature conservation.

6.10 MONITORING

Regular monitoring of all construction works will take place to ensure the correct and full implementation of the mitigation measures set out in this chapter.

The bat boxes installed on the site will be checked annually for a period of five years post construction, to ensure that they continue to be accessible to bats.

6.11 REINSTATEMENT

The majority of the site area to be removed comprises habitats of negligible or low local ecological value. No reinstatement of these features is required. Where trees and hedgerows are removed it would not be appropriate or feasible to reinstate these features. Rather, the mitigation measures described in this chapter and in Chapter 7 (Landscape) of this EIAR will be implemented, including the use of ecologically diverse landscape planting where appropriate.

6.12 INTERACTIONS

At Magee Barracks the main interactions of importance to biodiversity relate to landscape, soil and water, including hydrology and hydrogeology. Lighting, air/climate, noise/vibration and archaeology interactions are also relevant. The mitigation measures have been designed to minimise the potential impact that the construction and operational phases of the development may have on the receiving environment, including on soil, water and air quality. The concept of control and attenuation at source of all emissions to air and water has been incorporated into the design and the proposed construction and operational phases of the development.

The landscape design for the proposed development and the surface water management proposals have been developed in an iterative manner, taking into account the requirements to minimise the impacts on biodiversity, both locally and within the wider landscape. The landscape scheme proposes ecologically sensitive planting and utilises sustainable drainage to provide for potentially diverse habitats.

6.13 DIFFICULTIES ENCOUNTERED IN COMPILING

No difficulties were encountered in compiling this chapter of the EIAR. All surveys were undertaken to an appropriate level given the nature of the site and the proposed development.

6.14 REFERENCES

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APPENDIX 6.1 INVASIVE SPECIES MANAGEMENT PLAN REPORT (PREPARED BY RLH LTD)

Non – Native Invasive Plant Report

For

The Former Magee Barracks Site

Kildare Town

For

Columbia Estates Irl. Ltd.

Drafted By RLH Ltd.

Revised (2) On 19th June 2019

(Preliminary)

Stage 2 Report

Stage 2

The following preliminary report is in addition to the original **Non Native Invasive Plant Species Report** Dated 16th July 2018 along with Stage 1 Completion Report Dated 29th October 2018, which confirms a secondary treatment has been completed at The Magee Barracks site in accordance with good code of Practice.

The specific treatment and Management Program for Invasive species at the site has been updated allowing for an additional treatment to be added and as per projected time frames as outlined below.

Stage 1

- Site Survey & Report - Summer 2018. **Completed**
- Containment Area – Sept. 2018 **Completed**
- Initial herbicide treatment Sept. 2018. **Completed**
- Visit from Kildare County Council Rep Sept 2018 **Completed**

Stage 2

- Monitoring Winter/ Spring 2018/19 **Completed**
- Full site re – survey ,late Spring and early Summer 2019
- Herbicide treatment - Summer 2019 (Pre-**Deep Burial**).
- Visit from County Council Rep Summer 2019 **Completed**
- Additional Herbicide Treatment **Completed**

Stage 3

Depending on a suitable location being identified on site and agreement with all parties

- Excavation and deep burial will take place Summer 2019.
- Visit from Kildare County Council Rep during burial Summer 2019

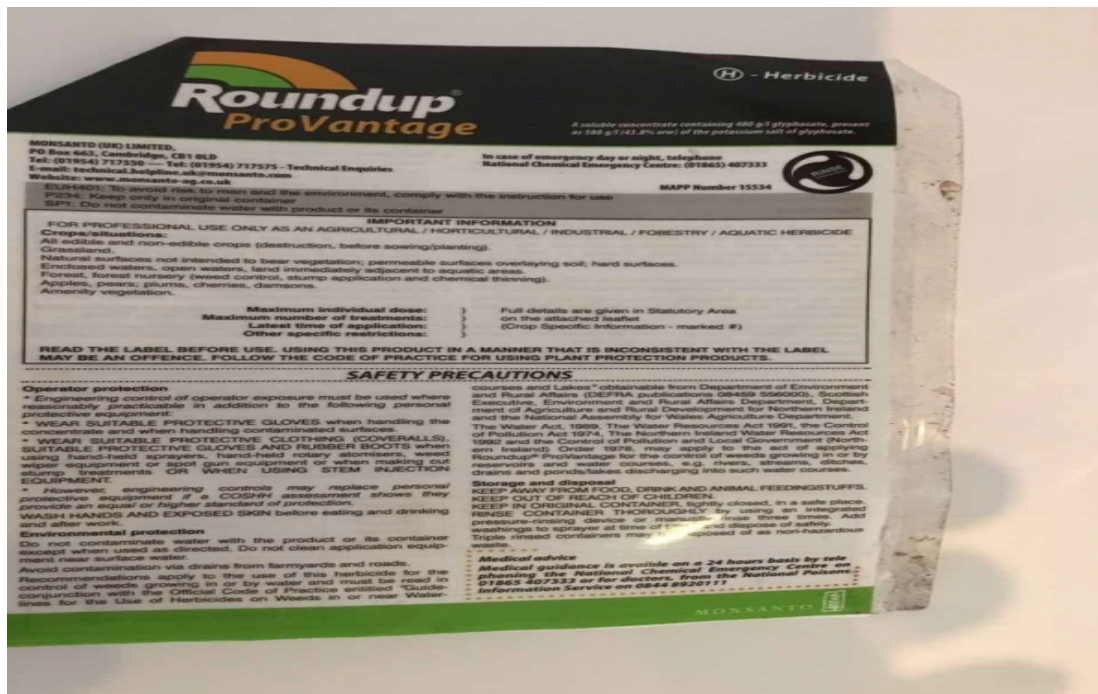
Stage 4

- Monitoring and Re Survey of site 2019, 2020 and 2021

Stage 2 Additional Treatment Due to Attempted Re-Colonisation

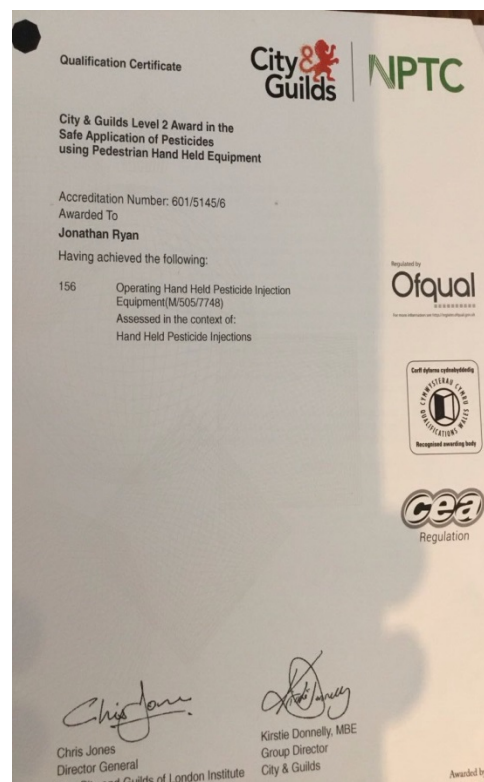
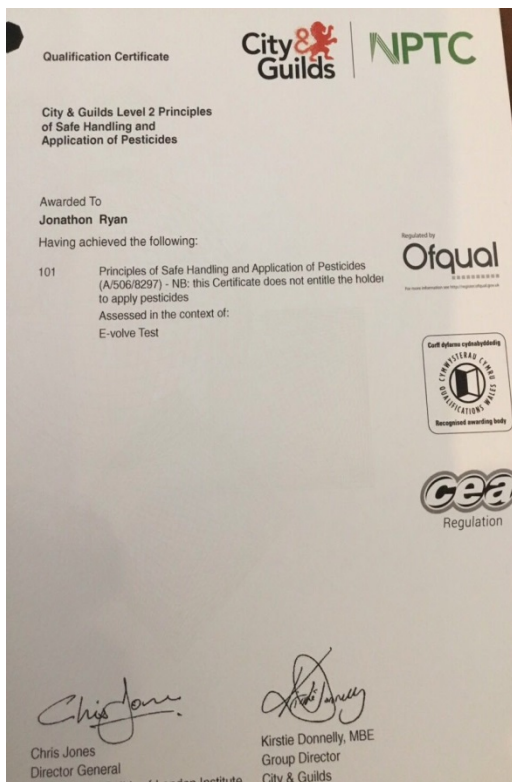
Stage 2

- Following on from the winter 2018/spring 2019 monitoring of the treatment area. It was agreed upon with the client that the initial Herbicide Treatment delivered good results and was successful. As the Japanese knotweed was now controlled and was not the dominant invasive species in the area it had left formally dominated ground open to recolonisation. Giant Hogweed seed from former Plants were now trying to colonise the area without competition. In response to this development an additional treatment was added to Stage 2 to control the Giant Hogweed in addition to retreating any remaining Japanese Knotweed Regrowth ready for treatment. In this case the remaining Japanese Knotweed regrowth was sporadic regrowth laterally from the rizonses on the margins of the stands and dotted re-growth through the main stand area.
- Second Herbicide treatment May 2019 **Completed**
- The Treatment herbicide used was Roundup Pro Advantage 480



Stage 2

- The two Herbicide application methods used were Stem Injection and Foliar Spray by Knapsack Spot Treatment.
- Both the injector kit and knapsack Sprayer were used by a Qualified Professional User in accordance with Safe Handling and Application of Pesticides with a Hand Held Pesticide Injector/Knapsack Certification attached.



Stage 2

- Both the Japanese Knotweed and Giant Hogweed were administered herbicide by each specific method depending on the stage of growth in accordance with manufacturers Area of use application guidelines for rates and technical Guidelines.
- Visit from Kildare County Council Rep – June 2019 **Completed**
Nicola Timmons from the Department of the Environment Kildare Co.Council. visited the site in early June. She was walked through the second treatment methods and measures, along with viewing the initially Treated Invasive species, the containment area with buffer zone, and Biosecurity measures .

Nicola Timmons : Contact details (ntimmons@kildarecoco.ie)

Picture Post Treatment 2018



Stage 2

Picture Pre-Treatment May 2019

(Giant Hogweed attempting to Colonise the Area)



Picture Post Treatment June 2019

(Treated Giant Hogweed)



Stage 2

Picture Post Treatment June 2019

(Japanese Knotweed Regrowth Treated)



Stage 2

Many Thanks

Jonathan Ryan

Dip/Hort

Bsc Land Hort

Hons Ba Hort Bus Mgt

RLH Ltd

jonathan@rlh.ie

087-2736996

APPENDIX 6.2 BAT SURVEY REPORT

Bats of the former Magee Barracks site, Kildare town, County Kildare



Brian Keeley B.Sc. (Hons) in Zool. MCIEEM

October 2018

Introduction

Bats are a widespread element of the Irish fauna. They are known to occur from much of the rural landscape, but they are also present within the urban environment and here they occupy buildings and occasionally trees for short or long periods. Houses and other buildings are a vital element of the annual cycle of all Irish bat species and at no time more so than the period May to August, but many bats may also avail of buildings as hibernation sites, but the presence of bats may be impossible to determine at that time of year.

Changes to a site such as the demolition of existing buildings, tree-felling and hedgerow removal and the introduction of new houses and entire estates may remove roost sites and place bats at risk of death or injury and reduce the lands available to bats as a feeding site or in some way prevent full utilisation of the area by bats by interfering with a bat's ability to commute through a site or roost within the site.

Bats are protected by Irish and EU law and to prevent unlawful injury or death, it is essential that a full understanding of the site is available in advance to protect the resident bats from unintentional disturbance and to create a pathway by which a legal derogation and exemption may be designed in consultation with the National Parks and Wildlife Service. This is a service of The Department of Culture, Heritage and the Gaeltacht if impacts are likely to be severe.

The site at Magee Barracks, Kildare town, County Kildare will undergo changes to the entire nature of the site and will be removed from agricultural use and the removal of the army barracks buildings (now partially destroyed) to housing. The field to the north will be cleared of the existing vegetation to facilitate construction and horticultural landscaping and removal of agricultural features.

Surveys within Kildare and the surrounding area have shown the presence of common and soprano pipistrelles, Daubenton's bat, brown long-eared bat and Leisler's bat, whiskered bat in several the Coillte plantations including Donadea and forest parks and in a stud farm in the Curragh area in 2017 and Natterer's bat often in older estate buildings, while brown-longed eared bats are widespread throughout Kildare. Nathusius' pipistrelle has been recorded on the Wicklow / Kildare boundaries. It is not known from the immediate area being surveyed.

Prior to the significant changes to a site including the demolition of a considerable number of buildings and the felling of trees, it is necessary to ensure that there will be no impact upon protected species, such as all of Ireland's bats. Bats of less common species may be present within a site unbeknownst to owners and residents and there is a requirement to undertake a survey by suitably qualified ecologists with the appropriate equipment to determine which species are present.

Should bats be present, knowledge of the species concerned and the potential consequences of the modifications of the site can assist in identifying measures to alleviate the negative effects of these changes.

Surveying for bats in September allows for an understanding of the bat fauna in a period when bats are engaged in mating in advance of moving to their winter sites wherein they will hibernate.

Surveying in mid-October indicates the feeding activity in advance of hibernation and in some parts of the island, bats have commenced more prolonged torpor if weather conditions don't favour good feeding on insects.

A bat detector assessment in autumn provides information on the surviving young and adults after the breeding season and may indicate mating activity and preparation for hibernation.

Methodology

The site at Magee Barracks, Kildare town was examined over two consecutive years; commencing on 18th October 2017 and followed by an earlier survey on 26th September 2018. Surveying was undertaken by two surveyors for evidence of roosting, commuting and feeding bats by the following procedures and equipment:

Trees around the field and former barracks and all buildings were examined in daylight for evidence of good roost features including cavities, crevices, hollows, ivy cover, evidence of bats from staining, audible squeaking of bats. The trees were examined prior to sunset and again after sunrise to allow for hearing any active bats prior to emergence or following return (if present).

In October 2017, a bat detector assessment of the site was carried out with the aid of a number of ultrasonic receivers (known commonly as bat detectors) including a Pettersson D240X (D240X), two Echometer3+ (EM3) and two Songmeter2Bat+ (SM2) monitors. Bat identifications were made based on the comparison of heterodyne signals and time expanded signals from the D240X and all signals recorded on the SM2 were confirmed later with Kaleidoscope 3.1.1 sound analysis software and Batsound 4.1 sound analysis software. Examples of these signals are included in the Results section.

The bat detector survey commenced with each surveyor assessing either the barracks and trees or the northern field and hedgerow. Once all buildings had been examined for emergence, the site was then assessed for feeding and commuting bats. One SM2 was placed at a derelict building towards the southeast of the site while a second was placed in the northern part of the south-western building.

Bat identifications and positions were noted with a Garmin Montana GPS and a Garmin GPS attached to the EM3 recorded the positions of bat signals and the time of recording and are shown in the Results section.

Bat activity was assessed from sunset (at 18.25 hours) up to 20.00 hours and from 06.30 hours up to 08.00 hours (sunrise at 08.02 hours). Pre-dawn covered as much of the site as possible to determine if there were any roosts in close proximity to the site or within it.

In 2018, surveying was undertaken by one bat specialist commencing at buildings to the southern section of the site and progressing through the site over the following one and a half hours. Prior to dawn, surveying commenced at 06.00 hours and continued up to 07.30 hours. This involved repeatedly checks of the buildings and trees within the site for bat activity and any evidence of bat entry into a tree or building. One SM2 was placed to the southwestern edge of the site and was then moved to a tree within the central tree lined avenue at approximately 20.00 hours up to dawn of 27th September 2018.

Any additional data for the area was sought from Bat Conservation Ireland.

Existing Environment

2017

Bat species roosting within the site

None / Potentially single soprano pipistrelle

Bat species feeding or commuting within the site

Common pipistrelle *Pipistrellus pipistrellus*

Soprano pipistrelle *Pipistrellus pygmaeus*

Myotis bat species *Myotis daubentonii* (most probably)

On 18th to 19th October 2017, almost all bat activity noted was of common pipistrelle. This species was noted predominantly around the former army barrack buildings. One bat was seen to fly in at one end of the building and emerge from the other end, feeding within the building on a regular beat. In addition to this, male bat social calls were noted repeatedly in several areas, including around the buildings and along the lane through the centre of the site flanked by semi-mature trees.

Bat activity was noted on site between 18.36 hours (11 minutes after sunset) and 03.04 hours and hence no bats were noted to return to roosts prior to dawn. This is usually uncovered by the activity carried out by bats prior to return to the roost in the morning during which they circle repeatedly and will often touch against the final entry point. If bats enter during darkness, this behaviour may be overlooked. Prior to dawn on 19th October, temperatures in Kildare had fallen and bat activity ceased five hours before sunrise.

The first bat noted was a soprano pipistrelle in the south-eastern corner of the site at 18.36 hours. This bat was most probably roosting in very close proximity and potentially within the site. This species was not heard for the remainder of the survey.

Another species that was very fleetingly present was a *Myotis* bat individual at 20.36 hours. This bat was recorded by the SM2 monitor to the east / south-east of the site. All signals recorded by the SM2 on the west side were of common pipistrelles. There were no bats present prior to dawn on 19th October 2017. Bat activity had ceased by 03.04 hours.

Several the trees immediately north of the former barracks buildings offer features of potential benefit to bats including cavities and splits. While no bats were noted here, these trees are potential roost sites.

2018

Bat species roosting within the site

None

Bat activity prior to dawn suggests that there are common pipistrelles roosting relatively close to the site. There was one brief period of soprano pipistrelle in the southwestern edge of the site. There was no Leisler's bat activity prior to dawn. This species is not roosting close to the site.

Bat species feeding or commuting within the site

Common pipistrelle	<i>Pipistrellus pipistrellus</i>
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>
Leisler's bat	<i>Nyctalus leisleri</i>
Myotis bat species	<i>Myotis daubentonii</i>

Bat activity was higher in September 2018 than in October 2017. This is due to the lateness of the latter survey and the cooler nights. There was bat activity prior to dawn in September 2018 and not in October 2017.

Three species were recorded during the active survey and a fourth was noted by the static monitor along the tree avenue. As in October 2017, this was most probably a Daubenton's bat entering the site briefly during the night.

Leisler's bat activity was occasional and was encountered once during the active survey and on five occasions during the passive survey all prior to 23.00 hours and at the earliest at 19.38 hours.

Most bat activity was close to trees and hedge and there was no evidence that bats were focusing on the buildings.

Impacts of The Proposed Development without mitigation

✦ Loss of building and tree roosts

There are no building or tree roosts confirmed for the site while there are numerous buildings with some potential and several mature or semi-mature trees with moderate to good roost potential. These will either be cleared as part of this proposal or will be illuminated by housing and rendered useless to bats. There is a possibility that there are trees used at other occasions as roost sites by the bat species noted within the site.

✦ Lighting

There will be an increased level of lighting as there is no source of illumination at present in the former barracks. Pipistrelles are less affected by light than all other species, but pipistrelles will avoid light where possible and it reduces the suitability of a site for feeding, commuting and roosting. Daubenton's bats also avoid light where possible.

In addition to this, there is also the possibility that the other less light-tolerant species such as the *Myotis* bat observed will be affected by the lighting that will be introduced. Leisler's bats may be attracted to lighting later into the night time to feed on moths that themselves are attracted or disorientated by the lights.

Feeding is likely to decrease within the radius of the houses and street lights for the duration of illumination on each occasion as well as being reduced by hedgerow and vegetation removal. Thus, treelines in surrounding fields may be affected by the change in use of the site.

Increase in Noise

There will be an increase in noise from the introduction of housing. Unless there is considerable high frequency emission (from 5 kHz up to 60 kHz) it is unlikely to affect feeding and commuting bats in a significant way. As there is limited evidence of bats being present, it is very limited in its impact.

Proposed Mitigation

Examination of all buildings/ trees with roost potential prior to demolition/ felling

All buildings and trees with roost potential must be examined for bats prior to their removal. The main tree roost potential lies along the western perimeter of the site. Surveying must include a bat detector assessment as well as a visual examination undertaken by a licensed bat specialist. Buildings may be demolished at any time of year *if not occupied by bird nests. Trees with nesting birds must be retained until nesting is complete and young are fledged, and a derogation is acquired (if permissible) if within the nesting period. To avoid nesting birds and potential delays, buildings could be demolished in September and early October.*

Timing of felling of trees

Trees with roost potential shall be felled in the period September 1st to October 31st. Trees with roost potential within the site must not be felled in periods of sustained cold weather when bats are too torpid to escape from the tree at the time of felling.

Bat boxes

9 x 2F Schwegler bat boxes shall be erected in unlit areas at a height of no less than 3 metres above ground level away from dense clutter and human interference. These may be arranged in any order but should include boxes facing southerly as well as alternative directions. Boxes may be placed on the same tree, building or pole up to a total of three per tree or may be separated.

Lighting

Trees must not be fully illuminated to provide potential for bats to feed and commute through the proposed development. This may require cowls or hoods to provide dark areas towards the crown of trees.

Impacts After Mitigation

It is anticipated that this development will have no direct impact upon the conservation status of any bat species. There will be an increase in ambient light levels around the new houses that will illuminate feeding and roosting areas for bats. There is a minor loss of feeding that will be partially replaced once vegetation establishes around the estate. Overall, there will be no measurable loss of roost sites and short to long-term negligible loss of feeding.

Mitigation will ensure that should a bat or bats be present prior to clearance of the site, there is sufficient survey to identify the roost and allow bats to be removed under licence or to escape risk.

Appendices



Buildings within Magee Barracks with Limited Roost Potential



Tree roost potential within the site

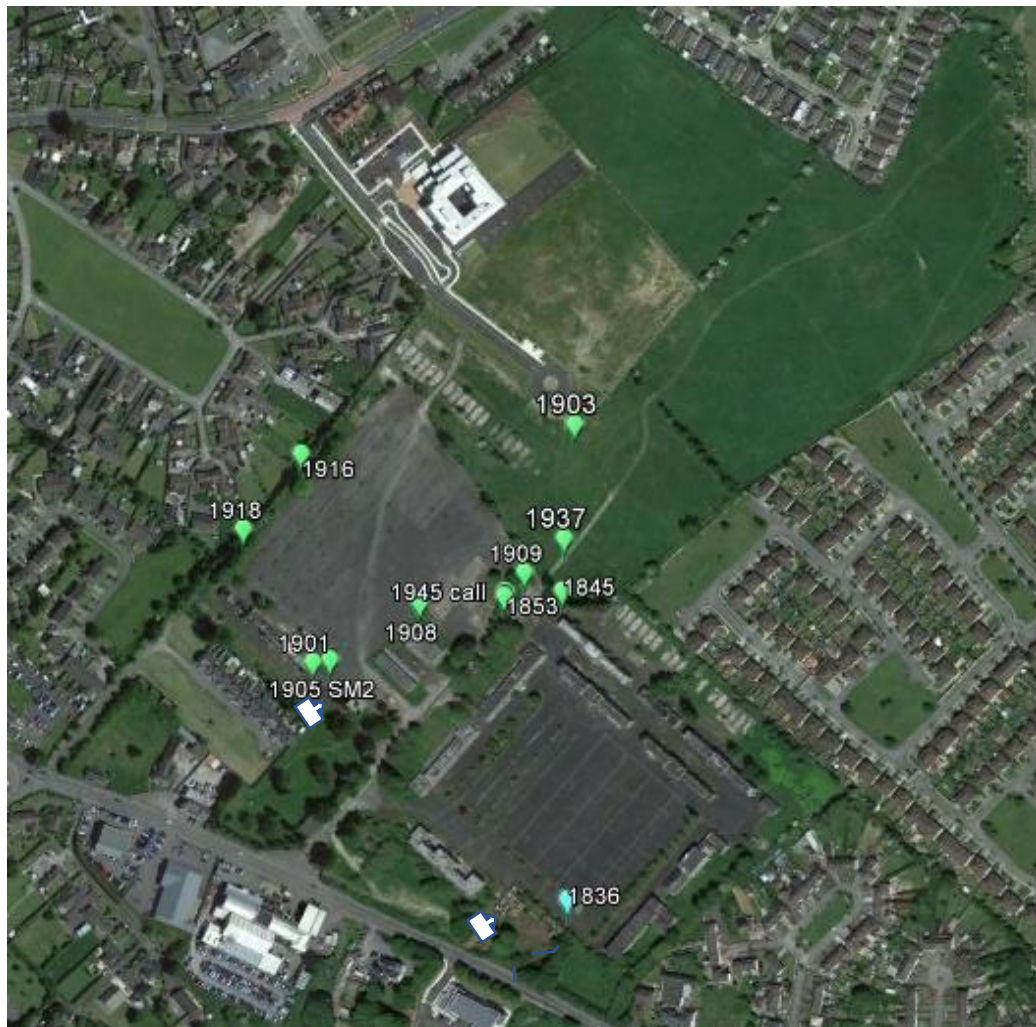


Figure 1: Bat activity 18th October 2017

Legend

The numbers noted are the time of each signal in 24-hour clock

All points are common pipistrelle except for 18.36 hours; a soprano pipistrelle


 *Location of SM2 monitors*



Figure 2: Bat activity from sunset up to 21.11 hours 26th September 2018

Legend

Green paddle

Yellow paddle



Common pipistrelle

Leisler's bat

Location of SM2 monitor (moved from west edge to tree avenue around 20.00 hours)

Blue paddle

Soprano pipistrelle



Figure 3: Bat activity prior to dawn on 27th September 2018

Legend

Green paddle Common pipistrelle Blue paddle Soprano pipistrelle

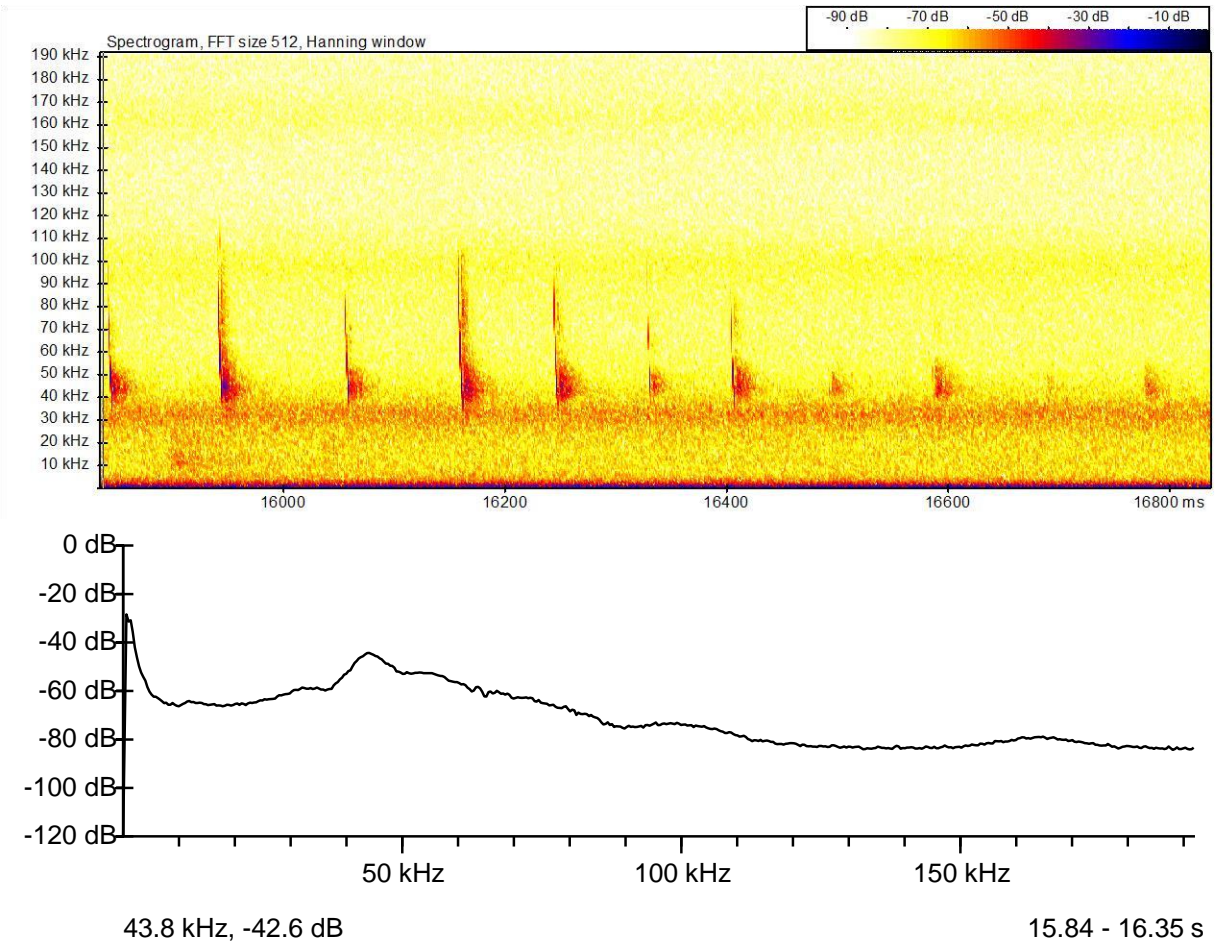


Figure 4: *Myotis* species noted by SM2 at 20.36 October 2017

This is most probably a Daubenton's bat. This species has a very strong association with water. The nearest suitable pond is in the Irish National Stud approximately 1 kilometre away from the site

BCIreland data: search results 5 October 2018			
Search parameters: Roosts Transects All bat data within 1000m of N7350312114.			
Ad-hoc observations			
Survey	Grid reference	Date	Species
EIA survey- Paul Scott (Scott Cawley)	N7302112289	29/04/2014	Pipistrellus pipistrellus
EIS surveys - Brian Keeley	N7280012600	20/07/2006	Nyctalus leisleri; Pipistrellus pipistrellus Pipistrellus pygmaeus

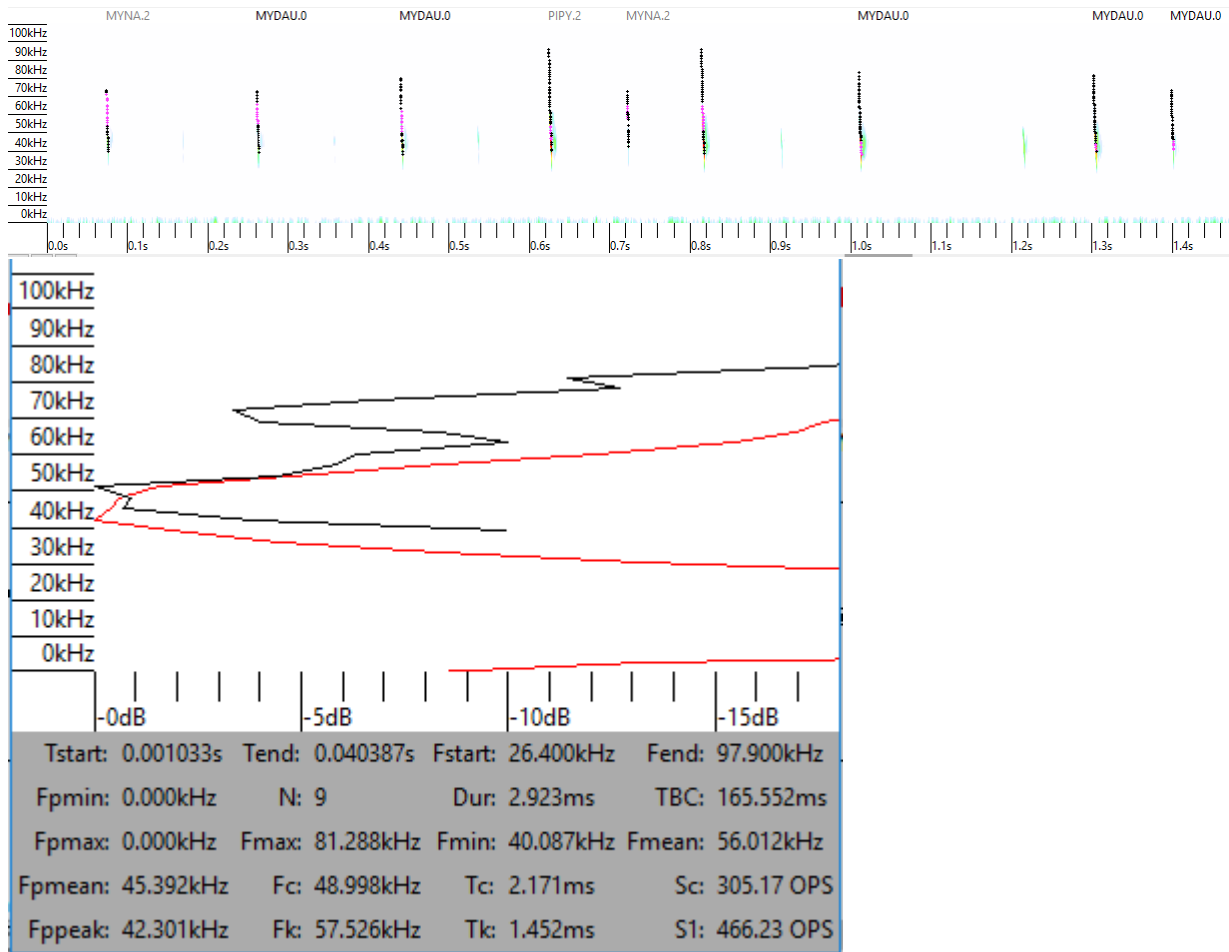


Figure 5: Daubenton's bat at 21.42 hours by SM2 along the tree lined avenue September 2018
The frequency of maximum energy would appear to be around 42 kHz.

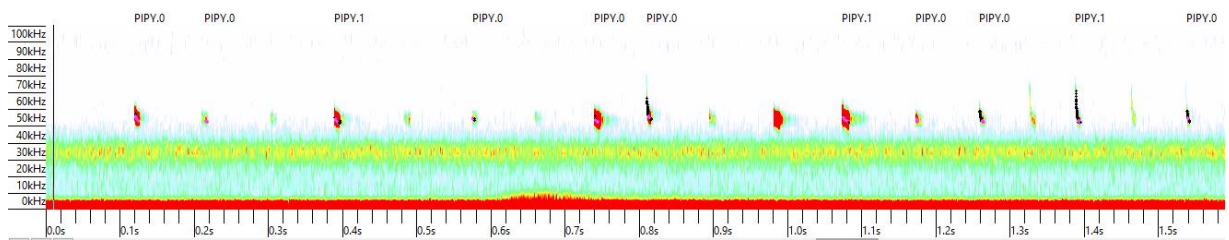


Figure 6: Soprano pipistrelle at 20.07 hours

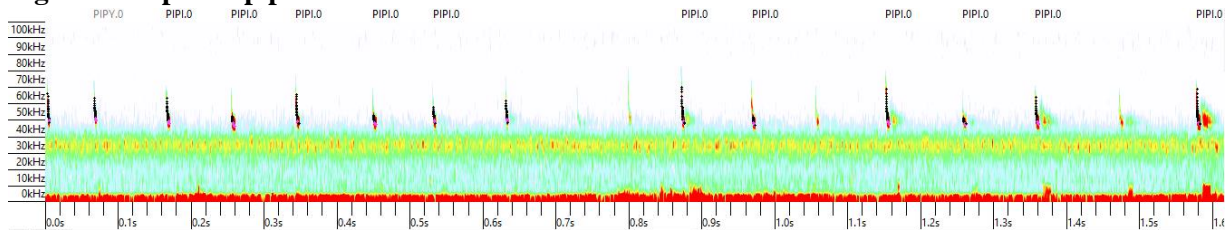


Figure 7: Common pipistrelle at 20.15 hours

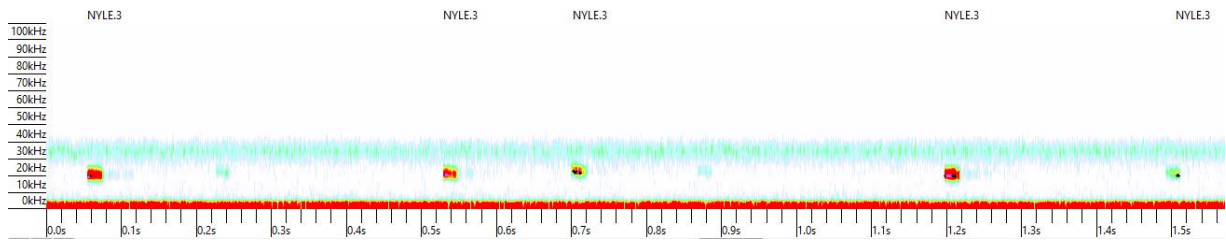


Figure 8: Leisler’s bat at 19.38 hours

Table 1: Bat activity from sunset onwards in the active survey (EM3 hand-held) 26th September 2018

Date	Time	Auto Id	Manual Id
26/09/2018	19:35:42	Common Pipistrelle	Common Pipistrelle
26/09/2018	19:37:55	Common Pipistrelle	Common Pipistrelle
26/09/2018	19:39:01	Common Pipistrelle	Common Pipistrelle
26/09/2018	19:39:34	Leisler’s Bat	Leisler’s Bat
26/09/2018	19:40:04	Common Pipistrelle	Common Pipistrelle
26/09/2018	19:40:08	Common Pipistrelle	Common Pipistrelle
26/09/2018	19:40:41	Common Pipistrelle	Common Pipistrelle
26/09/2018	19:43:24	Common Pipistrelle	Common Pipistrelle
26/09/2018	19:43:28	Common Pipistrelle	Common Pipistrelle
26/09/2018	19:44:01	Common Pipistrelle	Common Pipistrelle
26/09/2018	19:44:34	Common Pipistrelle	Common Pipistrelle
26/09/2018	19:51:47	Common Pipistrelle	Common Pipistrelle
26/09/2018	19:52:53	Common Pipistrelle	Common Pipistrelle
26/09/2018	19:55:03	Common Pipistrelle	Common Pipistrelle
26/09/2018	19:55:07	Common Pipistrelle	Common Pipistrelle
26/09/2018	19:55:37	Common Pipistrelle	Common Pipistrelle
26/09/2018	20:02:52	Common Pipistrelle	Common Pipistrelle
26/09/2018	20:07:52	Soprano Pipistrelle	Soprano Pipistrelle
26/09/2018	20:10:05	Common Pipistrelle	Common Pipistrelle
26/09/2018	20:15:38	Common Pipistrelle	Common Pipistrelle
26/09/2018	20:18:58	Common Pipistrelle	Common Pipistrelle
26/09/2018	20:32:17	Common Pipistrelle	Common Pipistrelle
26/09/2018	20:40:36	Common Pipistrelle	Common Pipistrelle
26/09/2018	20:41:43	Common Pipistrelle	Common Pipistrelle
26/09/2018	20:42:16	Common Pipistrelle	Common Pipistrelle
26/09/2018	20:42:50	Common Pipistrelle	Common Pipistrelle
26/09/2018	20:43:56	Common Pipistrelle	Common Pipistrelle
26/09/2018	20:44:26	Common Pipistrelle	Common Pipistrelle
26/09/2018	20:44:30	Common Pipistrelle	Common Pipistrelle
26/09/2018	20:45:03	Common Pipistrelle	Common Pipistrelle
26/09/2018	20:52:49	Common Pipistrelle	Common Pipistrelle
26/09/2018	20:53:19	Common Pipistrelle	Common Pipistrelle
26/09/2018	21:00:36	Common Pipistrelle	Common Pipistrelle
26/09/2018	21:01:41	Common Pipistrelle	Common Pipistrelle

Table 2: Bat activity prior to sunrise in the active survey (EM3 hand-held) 27th September 2018

Date	Time	Auto Id	Manual Id
27/09/2018	06:28:41	Common Pipistrelle	Common Pipistrelle
27/09/2018	06:29:11	Common Pipistrelle	Common Pipistrelle
27/09/2018	06:29:14	Common Pipistrelle	Common Pipistrelle
27/09/2018	06:32:34	Common Pipistrelle	Common Pipistrelle
27/09/2018	06:33:04	Soprano Pipistrelle	Soprano Pipistrelle
27/09/2018	06:39:13	Common Pipistrelle	Common Pipistrelle

Table 3: Bat activity from sunset on to sunrise in the passive survey (SM2) 26th – 27th September 2018

Date	Time	Auto Id	Manual Id
26/09/2018	19:18:30	Soprano Pipistrelle	Common Pipistrelle
26/09/2018	19:33:00	Common Pipistrelle	Common Pipistrelle
26/09/2018	19:33:30	Common Pipistrelle	Common Pipistrelle
26/09/2018	19:34:00	Common Pipistrelle	Common Pipistrelle
26/09/2018	19:34:30	Common Pipistrelle	Common Pipistrelle
26/09/2018	19:35:00	Common Pipistrelle	Common Pipistrelle
26/09/2018	19:37:00	Common Pipistrelle	Common Pipistrelle
26/09/2018	19:37:30	Common Pipistrelle	Common Pipistrelle
26/09/2018	19:38:00	Common Pipistrelle	Common Pipistrelle
26/09/2018	19:38:30	Leisler's Bat	Leisler's Bat
26/09/2018	20:07:08	Soprano Pipistrelle	Soprano Pipistrelle
26/09/2018	20:15:38	Common Pipistrelle	Common Pipistrelle
26/09/2018	20:18:38	Common Pipistrelle	Common Pipistrelle
26/09/2018	20:19:08	Common Pipistrelle	Common Pipistrelle
26/09/2018	20:38:08	Common Pipistrelle	Common Pipistrelle
26/09/2018	21:09:18	Soprano Pipistrelle	Soprano Pipistrelle
26/09/2018	21:09:48	Soprano Pipistrelle	Soprano Pipistrelle
26/09/2018	21:16:48	Soprano Pipistrelle	Soprano Pipistrelle
26/09/2018	21:17:18	Leisler's Bat	Common Pipistrelle
26/09/2018	21:17:48	Leisler's Bat	Common Pipistrelle
26/09/2018	21:19:48	Leisler's Bat	Common Pipistrelle
26/09/2018	21:24:48	Common Pipistrelle	Common Pipistrelle
26/09/2018	21:26:18	Common Pipistrelle	Common Pipistrelle
26/09/2018	21:29:18	Common Pipistrelle	Common Pipistrelle
26/09/2018	21:29:48	Common Pipistrelle	Common Pipistrelle
26/09/2018	21:34:18	Common Pipistrelle	Common Pipistrelle
26/09/2018	21:34:58	Common Pipistrelle	Common Pipistrelle
26/09/2018	21:41:58	Mydau	Daubenton's bat
26/09/2018	21:45:28	Common Pipistrelle	Common Pipistrelle
26/09/2018	21:51:28	Common Pipistrelle	Common Pipistrelle
26/09/2018	21:52:58	Common Pipistrelle	Common Pipistrelle
26/09/2018	21:53:28	Noid	Common Pipistrelle
26/09/2018	21:56:28	Common Pipistrelle	Common Pipistrelle

26/09/2018	21:56:58	Leisler's Bat	Common Pipistrelle
26/09/2018	22:02:00	Common Pipistrelle	Common Pipistrelle
26/09/2018	22:05:00	Common Pipistrelle	Common Pipistrelle
26/09/2018	22:05:30	Leisler's Bat	Leisler's Bat
26/09/2018	22:06:00	Leisler's Bat	Leisler's Bat
26/09/2018	22:06:30	Leisler's Bat	Common Pipistrelle
26/09/2018	22:10:30	Soprano Pipistrelle	Common Pipistrelle Soprano Pipistrelle
26/09/2018	22:12:00	Common Pipistrelle	Common Pipistrelle
26/09/2018	22:18:30	Noid	Common Pipistrelle
26/09/2018	22:21:30	Common Pipistrelle	Common Pipistrelle
26/09/2018	22:25:00	Common Pipistrelle	Common Pipistrelle
26/09/2018	22:26:30	Common Pipistrelle	Common Pipistrelle
26/09/2018	22:35:00	Soprano Pipistrelle	Soprano Pipistrelle
26/09/2018	22:35:30	Common Pipistrelle	Common Pipistrelle
26/09/2018	22:38:00	Common Pipistrelle	Common Pipistrelle
26/09/2018	22:39:30	Leisler's Bat	Leisler's Bat
26/09/2018	22:40:30	Common Pipistrelle	Common Pipistrelle
26/09/2018	22:43:30	Leisler's Bat	Common Pipistrelle
26/09/2018	22:45:00	Common Pipistrelle	Common Pipistrelle
26/09/2018	22:45:30	Leisler's Bat	Common Pipistrelle
26/09/2018	22:49:10	Leisler's Bat	Leisler's Bat
26/09/2018	22:51:10	Common Pipistrelle	Common Pipistrelle
26/09/2018	22:53:40	Common Pipistrelle	Common Pipistrelle
26/09/2018	22:57:40	Common Pipistrelle	Common Pipistrelle
26/09/2018	22:58:10	Common Pipistrelle	Common Pipistrelle
26/09/2018	22:59:10	Noid	Common Pipistrelle
26/09/2018	23:03:00	Common Pipistrelle	Common Pipistrelle
26/09/2018	23:06:00	Common Pipistrelle	Common Pipistrelle
26/09/2018	23:06:30	Common Pipistrelle	Common Pipistrelle
26/09/2018	23:08:00	Common Pipistrelle	Common Pipistrelle
26/09/2018	23:08:30	Soprano Pipistrelle	Soprano Pipistrelle
26/09/2018	23:24:30	Leisler's Bat	Common Pipistrelle
26/09/2018	23:26:00	Soprano Pipistrelle	Soprano Pipistrelle
26/09/2018	23:28:00	Common Pipistrelle	Common Pipistrelle
26/09/2018	23:33:30	Common Pipistrelle	Common Pipistrelle
26/09/2018	23:40:00	Common Pipistrelle	Common Pipistrelle
26/09/2018	23:42:00	Noid	Common Pipistrelle
26/09/2018	23:53:00	Common Pipistrelle	Common Pipistrelle
27/09/2018	01:29:20	Soprano Pipistrelle	Soprano Pipistrelle