5.0 BIODIVERSITY (FLORA AND FAUNA)

5.1 INTRODUCTION

This chapter comprises an appraisal of the likely effects on biodiversity (flora and fauna) of the proposed construction of Phase 2 of a residential development at Clay Farm, Ballyogan, Dublin 18. This chapter of the EIAR was produced by Matthew Hague, BSc MSc CEnv MCIEEM. Matthew is a Suitably Qualified Ecologist with 15 years' experience in consultancy, a Chartered Environmentalist (CEnv) and a full Member of the Chartered Institute of Ecology and Environmental Management (MCIEEM).

The proposed development will comprise c. 927 residential units, a childcare facility, two retail units and associated infrastructural works and landscape works including a bridged link road across the Ballyogan Stream to Phase 1 and c. 6.2 hectares of open space on a site area of c.20.5 hectares. The overall Phase 1 and Phase 2 landholding at Clay Farm is c. 34 hectares of which c.13.3 hectares is reserved for proposed open space, including c.6.0 hectares within the valley of the Ballyogan Stream, which adjoins the Phase 2 site which is to be developed as an Ecopark under the Phase 1 grant of permission. Although outside of the current Phase 2 application area, for the purposes of this Chapter, and cumulative impacts, reference is made to the Phase 1 development and Ecopark where appropriate.

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 outline Habitat Management Plan (HMP), incorporating a Fisheries Protection/Construction Method Statement has been prepared for the proposed development, and is included in **Appendix 5.1**. The HMP reflects the commitments in this EIA Report, as well as the Habitat and Ecological Management Guidelines Plan prepared for Clay Farm Phase 1 (refer to **Appendix 5.2**) relating to the Ecopark and the Clay Farm landholding more generally. **Appendices 5.3 – 5.5** contain additional, detailed biodiversity study reports that have informed this chapter.

Brady Shipman Martin was commissioned to undertake the study on behalf of Viscount Securities, part of the Park Developments Group. It was carried out by consultant ecologist Matthew Hague CEnv MCIEEM, with additional flora and fauna surveys undertaken by botanist Dr Joanne Denyer MCIEEM, ecologist and bat/large mammal specialist Brian Keeley MCIEEM and bird specialist John Fox.

5.2 STUDY METHODOLOGY

5.2.1 Desk Study and Consultations

A comprehensive desk-based assessment has been undertaken, and numerous site visits have been carried out, between July 2014 and September 2017. Informal on-site consultations have been undertaken with a representative of Inland Fisheries Ireland, in January and September 2017, and with the Dún Laoghaire-Rathdown County Council Biodiversity Officer, in July 2017. Informal consultations were also undertaken, by telephone, with the local NPWS Conservation Ranger, in August 2017.

This Ecological Impact Assessment (EcIA) has been undertaken in accordance with the following publications:

- Environmental Protection Agency's (EPA) *Guidelines on the Information to be Contained in Environmental Impact Statements* (2002);
- EPA *Advice Notes of Current Practice (in the Preparation of Environmental Impact Statements)* (2003);

- EPA Draft *Guidelines on the Information to be contained in Environmental Impact Statements* (August 2017);
- EPA *Advice Notes of Current Practice (in the Preparation of Environmental Impact Statements)* (Draft 2017);
- *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 (2013);*
- *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (Transport Infrastructure Ireland (formerly the National Roads Authority), 2009)
- *Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland: Terrestrial, Freshwater and Coastal* ('the CIEEM Guidelines, Second Edition') published by the Chartered Institute of Ecology and Environmental Management (CIEEM), January 2016;
- *Hedgerow Appraisal System: Best Practice Guidance on Hedgerow Surveying, Data Collection and Appraisal*. Unpublished report prepared for the Heritage Council, 2013.

The report has regard to the following legislative instruments:

- The *Planning and Development Acts* (2000 and 2010, as amended);
- The *Wildlife Act 1976* as amended by 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* (SI no 477 of 2011);
- *Flora (Protection) Order* 2015;
- EIA Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014.

The report has regard to the following Policies and Plans:

- *National Biodiversity Plan 2011 – 2016* (Department of Arts, Heritage and the Gaeltacht, 2011);
- *Draft 3rd National Biodiversity Plan 2017 – 2021* (Department of Arts, Heritage, Regional and Rural Affairs, 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);
- *Dún Laoghaire Rathdown County Development Plan 2016 – 2022*.

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 Arts, 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 and photographs taken at the site;
- Recent ordnance survey mapping and aerial photography www.osi.ie;
- Information on water quality in the area available from www.epa.ie;
- Information on local watercourse catchments from www.catchments.ie;
- 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);

- 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.

5.2.2 Plans and Policies Relevant to Nature Conservation

Dún Laoghaire Rathdown County Development Plan 2016-2022

The Plan includes, in Section 4, a range of policies for the protection and enhancement of landscape, heritage and biodiversity – the 'Green County Strategy'. The Plan also includes an over-riding policy, Policy LHB 1 (Access to Natural Heritage) as follows:

It is Council policy to promote, protect and enhance sustainable and appropriate access to the natural heritage of the County (page 96).

Policies LHB 19 to LHB 26 all directly relate to the protection and enhancement of biodiversity; natural heritage and the environment; the Habitats Directive; designated and non-designated sites, and to ecological considerations generally.

The Plan at Appendix 3 includes a statement on the Ecological Network of the County. Policy LHB 21 County-Wide Ecological Network, states that:

It is Council policy to develop an Ecological Network throughout the County which will improve the ecological coherence of the Natura 2000 network in accordance with Article 10 of the Habitats Directive. The network will also include non-designated sites.

The Plan also includes, at Appendix 14, a Green Infrastructure Strategy for the County. Green Infrastructure (GI) is defined as being:

…based on the principle that protecting and enhancing nature and natural processes, and the many benefits human society gets from nature, are consciously integrated into spatial planning and territorial development.' (page 4)

Map 11 of the GI Strategy indicates an Ecological Corridor along the valley of the urban streams of Ballyogan, Carrickmines, Shanganagh – of which the Ballyogan Stream passes through the Clay Farm landholding.

'Treasuring our Wildlife' – a Biodiversity Action Plan for Dún Laoghaire Rathdown County Council 2009 – 2013

In the current County Development plan, Policy LHB21: Biodiversity Plan states that it is Council policy to implement the provisions of the County Biodiversity Plan 2009-2013 and to produce a second Biodiversity Plan which will be set within the context of the second National Biodiversity Plan, 'Actions for Biodiversity, 2011 – 2016' prepared by the Department of Arts, Heritage, Gaeltacht and the Islands. Due regard shall be had to the recommendations arising from the implementation of the current 2009 – 2013 Dún Laoghaire-Rathdown Biodiversity Plan or its successor plan.

The Biodiversity Action Plan adopted in 2009 aims "*to create a vibrant and progressive environment in which to live and work, where the county's natural and built environment is valued, promoted and protected, both for people and wildlife*". The action plan is compatible with development within the county, however it does state that areas with higher biodiversity are important, regardless of designated status. They should be taken into account as part of the planning processes.

Eastern River Basin District Management Plan

Under the EU Water Framework Directive (Directive 2000/60/EC) all Irish waters must achieve '*good ecological status'* by 2015. A River Basin Management Plan, published by the Eastern River Basin District (ERBD, 2010) identified the Loughlinstown River (Lower), downstream of the Ballyogan Stream as being of poor status. No remedial actions for the river are identified in the 'Programme of Measures'.

5.2.3 Field Surveys

The northern part of the overall land holding (i.e. the Phase 1 area) was first surveyed on 2nd July 2014. A second ecological survey was undertaken on 19th November 2014, to cover the Phase 2 lands, which are the subject of the current application. Since 2014, numerous ecological surveys have been undertaken at Clay Farm, covering both the Phase 1 and Phase 2 areas. These surveys include those carried out in 2015 that covered the entire Clay Farm land holding (i.e. Phase 1 and Phase 2), that were requested by Dún Laoghaire-Rathdown County Council as part of a Request for Further Information (Reg. Ref.: D15A/0247) relating to the Clay Farm Phase 1 application. The surveys covered the entire Clay Farm land holding (i.e. both the Phase 1 and Phase 2 lands) in order to provide a comprehensive baseline on the local ecological environment. The baseline survey covered the following elements and where relevant the results are included in this document:

- Bat activity surveys;
- Assessment of bat roosts;
- Assessment of proposed lighting and its impacts on bats;
- Otter surveys;
- Breeding birds surveys;
- Amphibian surveys;
- Lepidoptera surveys;
- Common lizard surveys;
- Badger surveys

Additional bat activity and bat roost assessment surveys were carried out again on the Phase 2 lands over the summer of 2016, with further ecological walkover surveys, including full re-surveys of badger, otter and deer activity, re-appraisal of site suitability for breeding birds, amphibians, lizards and lepidoptera and re-survey of watercourses/drainage ditches undertaken during site visits carried out in January, May, June, July and August 2017.

Habitats

During the course of the site visits the habitats were identified, described and mapped. Habitats were surveyed using the guidelines of Smith *et al.* (2011) and were classified using *A Guide to Habitats in Ireland* (Fossitt, 2000) and the dominant plant species were recorded. A dedicated appraisal of the hedgerows on the site was also undertaken, in August and September 2017, in accordance with the methodology contained in the *Hedgerow Appraisal System* (Heritage Council 2013). Refer to **Appendix 5.3**.

Bats

Day-time appraisals of potential roost sites and night-time bat activity surveys were undertaken in 2015 and 2016 in accordance with best practice guidelines (*Bat Surveys: Good Practice Guidelines* (Hundt 2012*), Bat Mitigation Guidelines for Ireland* (Kelleher and Marnell 2006), *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (Collins, 2016) *and Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes* (NRA, 2006). The equipment used comprised the following: EM3 bat monitor with display screen, SD card recording facility and GPS; Pettersson D240X heterodyne and time expansion bat

detector; 3 x Songmeter 2 Bat + recording monitors; handheld luxmeter. Software utilised included Kaleidoscope Pro, Batsound and QGIS. Refer to **Appendix 5.4.**

Large Mammals

All hedgerows, tree lines, field edges and watercourses/ditches were searched for any evidence of badgers, such as setts, commuting routes, territorial marking, latrines or feeding signs as well as paw prints, snagged hairs and piles of bedding material. Where potentially active badger setts were encountered these were further examined using sticks in the entrances and by placing motion-activated (infrared) cameras nearby. In tandem with the badger surveys, examinations of the streams and drainage ditches, including Ballyogan Stream to the north, were undertaken to search for evidence of otters, such as tracks, slides, spraints (droppings), feeding signs and holts. This examination included the bridges and culverts to the west of the site and a number of small culverts that are within the site and also to the east, towards the ESB property. Mammal surveys followed the methodologies contained in the NRA *Guidelines* for the Treatment of Badgers Prior to the Construction of National Road Schemes and the *Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes.*

Breeding Birds

A breeding bird survey was undertaken on the lands. For practicality, the lands were subdivided into two sections, northern (Clay Farm Phase 1) and southern (Clay Farm Phase 2). Each section was visited on three separate dates during the month of June 2015. The lands were walked slowly over a four-hour period on each visit. The route walked focused primarily on hedges, areas of scrub and wooded areas. Bird species that were heard or seen were recorded, their position noted and a breeding status assigned to them. Data from the three visits were amalgamated and approximate positions for the birds as seen or heard were plotted on aerial photographs. Approximate populations, a breeding status and conservation status were assigned to each species. Species tables and final maps for the northern and southern sections of the site were prepared. The results of this survey were verified on site over the summer of 2017. Refer to **Appendix 5.5.**

Other Species

The site was evaluated for the presence of and suitability for lepidoptera (butterflies and moths), amphibians (common frog and smooth newt) and reptiles (common/viviparous lizard).

Watercourses

The most significant watercourse in the vicinity of the proposed development area is Ballyogan Stream, which flows through the Clay Farm Phase 1 lands, including the Ecopark. A number of minor watercourses and drainage ditches traverse Clay Farm Phase 2, and flow in to Ballyogan Stream. Biological kick-sampling, a method of assessing the ecological quality of a watercourse, was not undertaken, either in Ballyogan Stream or in any of the field drains, due to the unsuitable substrate of the watercourses and their overall condition.

5.2.4 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 *NRA Guidelines for Assessment of Ecological Impacts of National Road Schemes* (NRA/TII, 2009). This methodology is consistent with the *Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland – Terrestrial, Freshwater and Coastal* ('the CIEEM Guidelines', CIEEM, January 2016).
In accordance with the NRA Guidelines, impact assessment is undertaken of sensitive ecological receptors (Key Ecological Receptors) within the Zone of Influence of the proposed development. According to the NRA Guidelines, 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 at Clay Farm Phase 2, 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.

5.3 THE EXISTING RECEIVING ENVIRONMENT (BASELINE SITUATION)

5.3.1 General Description of the Existing Environment

The Phase 2 site is located on elevated rising ground south of the Ballyogan Stream corridor. Residential development on the Phase 1 lands is currently under construction off Ballyogan Road to the north of the Ballyogan Stream corridor. Further established and new residential development dominates to the immediate south of the site. Mature tree-lines and open lands lie to the west. The grass covered mounds of a former landfill and a tree-lined public golf course lie to the east of the site, while a large ESB transformer station lies to the northeast.

Ballyogan Stream runs west to east within the Phase 1 lands and the Ecopark to the immediate north of the Phase 2 site. This watercourse joins the Carrickmines Stream as it crosses the M50, before meeting the Shanganagh River in Loughlinstown and entering the sea at Ballybrack.

The Phase 2 lands are currently in agricultural use and consist of a number of large fields, divided by mature hedgerows. In places the fields are beginning to show signs of encroaching scrub. The land is elevated, and slopes gradually down from south to north. The Phase 2 and Phase 1 lands are separated by tree-lined ridge, up to 2m high in places, located south of Ballyogan Stream. This area, which forms an integral part of the proposed Phase 1 Ecopark, contains a number of significant ecological features, including mature woodland, badger setts and Ballyogan Stream and its associated flood plain.

5.3.2 Designated Conservation Areas

In ecological and environmental impact assessment, for the risk of an impact to occur there must be a 'source', such as a construction site; a 'receptor', such as a designated site for nature conservation; and a ’pathway’ between the source and the receptor, such as a watercourse that links the construction site to the designated site. Although there may be a risk of an impact, it may not necessarily occur and if it does occur, the impact may not be significant.

The potential for any impacts on European sites from the proposed development site was considered. Full details of that study are presented in a separate Screening for Appropriate Assessment Report. The report concluded that there would be no likely significant effects on any European site as a result of the proposed development, either alone or in combination with other plans or projects.

No designated conservation areas occur within the area of the proposed development, nor in the immediate vicinity of the Clay Farm landholding.

Relevant European Sites

The nearest Special Areas of Conservation (SAC), are Knocksink Wood SAC (Site Code 000725) and Wicklow Mountains SAC (002122), approximately 5km to the south. Rockabill to Dalkey Island SAC (003000) and Dalkey Islands Special Protection Area (SPA) (004172) are within 4km of the mouth of the Shanganagh River, of which the Ballyogan Stream is a tributary. The relevant European Sites are shown in **Figure 5.1**.

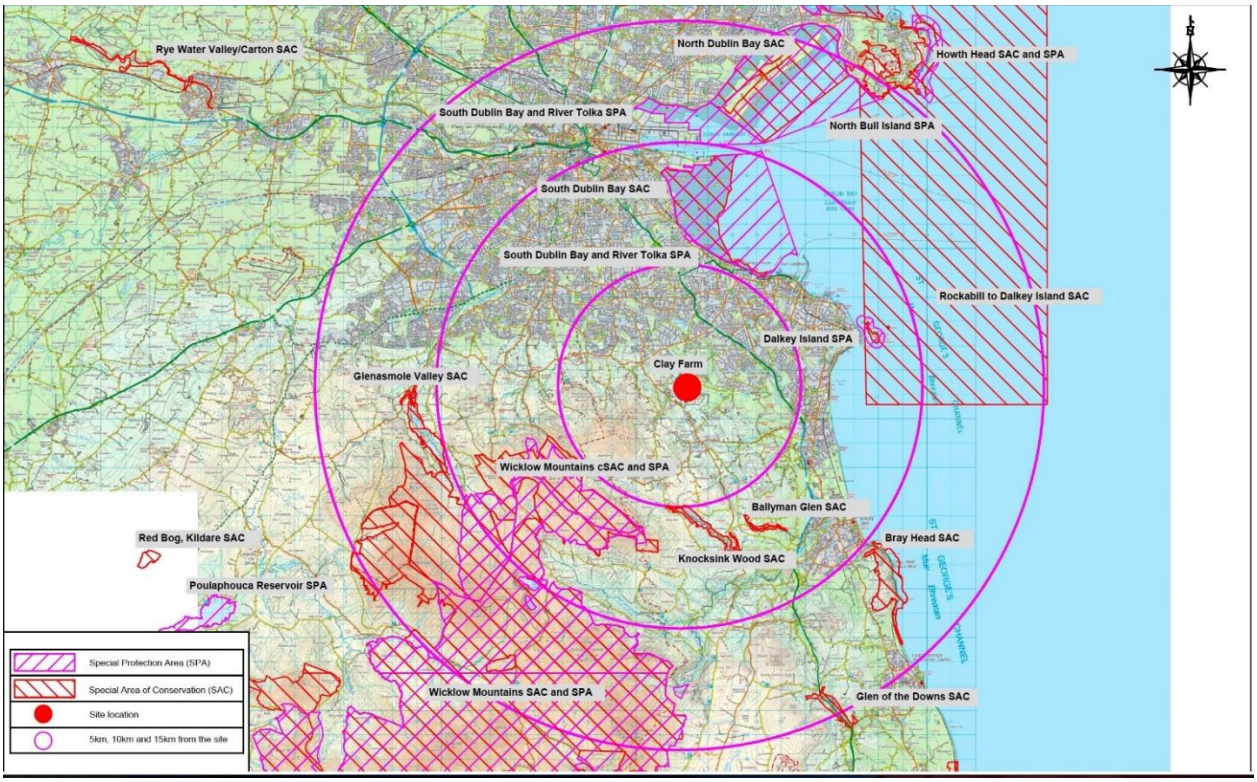


Figure 5.1 shows European Sites in relation to the study area

Other Designated Conservation Areas (other than European Sites)

The nearest sites designated for nature conservation (shown in **Figure 5.2**) are the proposed Natural Heritage Areas (pNHA) of Fitzsimon's Wood (001753) and Dingle Glen (001207) approximately 2km to the west and east respectively. In addition, the Shanganagh River, of which the Ballyogan Stream is a tributary, flows through Loughlinstown Woods pNHA (001211) and enters the sea near Dalkey Coastal Zone and Killiney Hill pNHA (001206), approximately 6km downstream to the east.

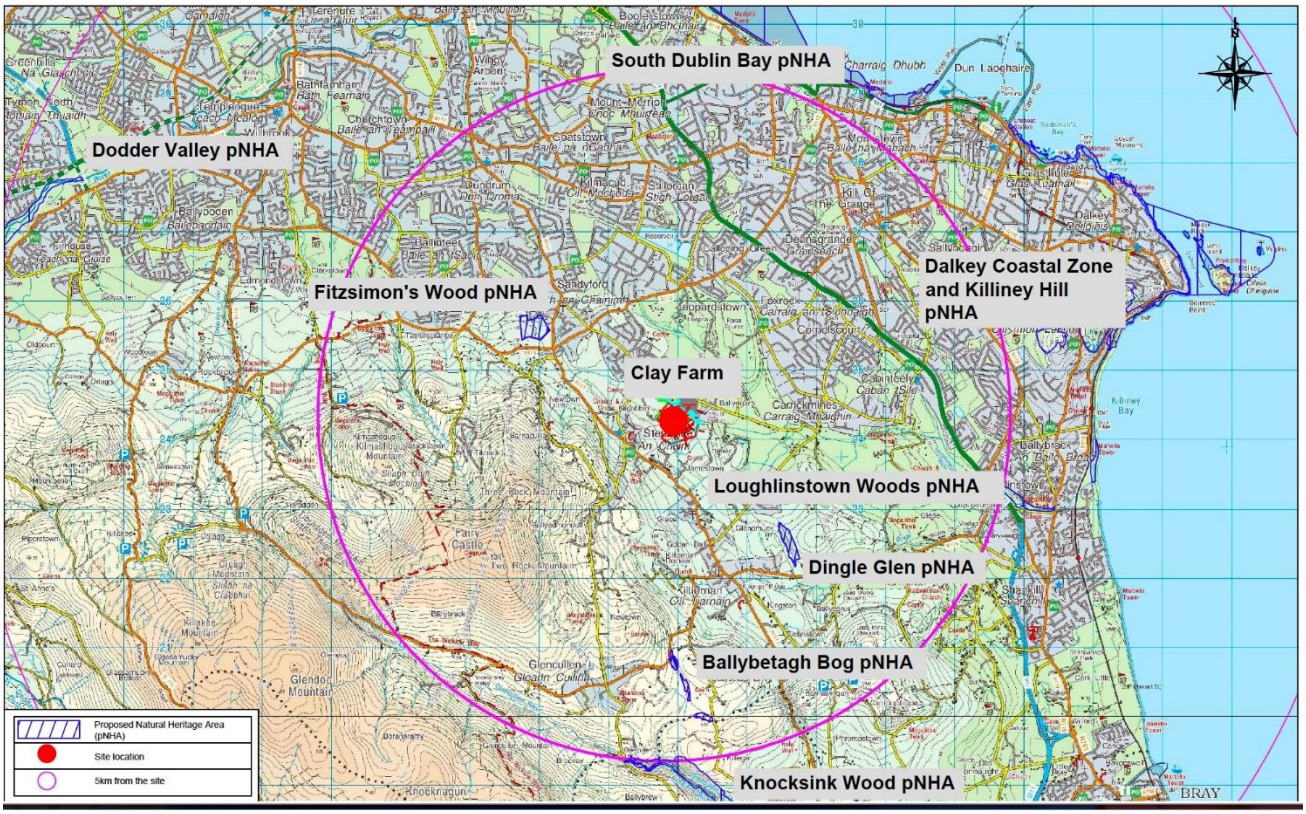


Figure 5.2 shows designated conservation areas (non-European Sites) in relation to the study area

5.3.3 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 no known records of rare or protected plant species within the immediate vicinity of the proposed development.

There are records of bog orchid (*Hammarbya paludosa*), small-white orchid (*Pseudorchis albida*), lesser snapdragon (*Misopates orontium*), red hemp nettle (*Galeopsis angustifolia*), great burnet (*Sanguisorba officinalis*), tufted saltmarsh grass (*Puccinellia fasciculata*), basil thyme (*Acinos arvensis*) within the 10km grid squares (O12 and O22) that cover the site. None of these plants are known to occur at the Clay Farm site. In addition there are records of red squirrel, Sika deer and otter within these squares.

5.3.4 Habitats

All habitats present on the proposed development site are described in this section and are shown in **Figure 5.3** overleaf.

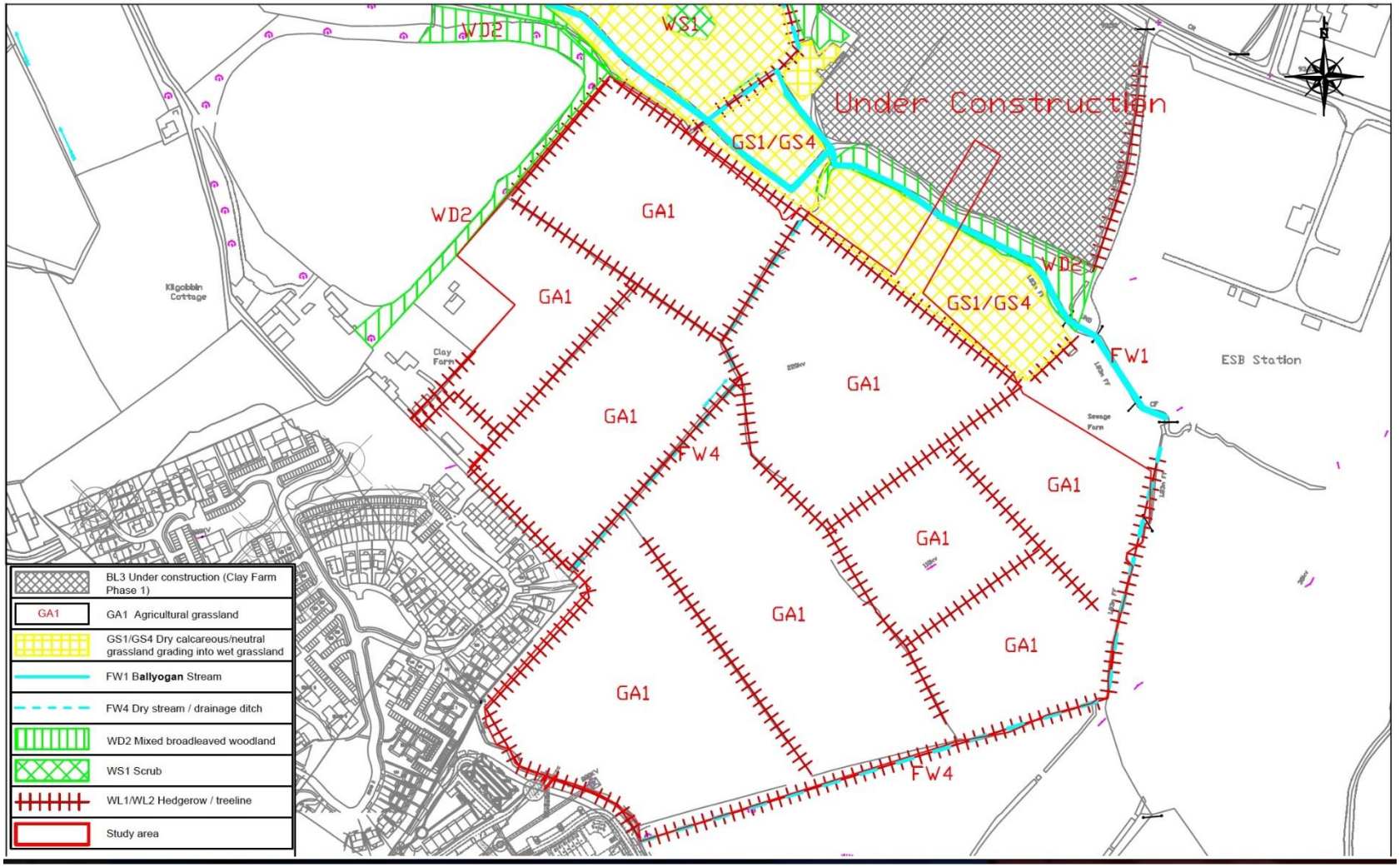


Figure 5.3 habitats present in Clay Farm Phase 2, with part of the Ecopark and Clay Farm Phase 1 also shown

Field Boundaries – Hedgerows and Tree Lines

The field boundaries in the Phase 2 land are dominated by dense, mature hedgerows (Fossitt code **WL1**) and tree lines (**WL2**), particularly in the northern, central and western fields and around the barn and farmyard to the southwest. Including the scrub (**WS1**) encroaching into the fields, some of the field boundaries are in excess of 10m in width. Further east the hedgerows contain fewer trees but are still dense, up to 2-3m deep in places. The hedgerows and tree lines, which are predominately ivy (*Hedera helix*) covered ash (*Fraxinus excelsior*), blackthorn (*Prunus spinosa*), and hawthorn (*Crataegus monogyna*), also contain elder (*Sambucus nigra*), beech (*Fagus sylvatica*), oak (*Quercus robur*), sycamore (*Acer pseudoplatanus*), holly (*Ilex aquifolium*) and occasional Scots pine (*Pinus sylvestris*). Patches of willow (*Salix* spp.) dominated hedgerows are also present, and other notable tree species occasionally present include alder (*Alnus glutinosa*), hazel (*Corylus avellana*) and elm (*Ulmus glabra*). These field boundaries are connected to the mixed broadleaved (**WD2)** woodland that is present immediately to the north and west of Clay Farm Phase 2.

In places the hedgerows (in the east) are covered in dense patches of traveller's joy (*Clematis vitalba*), a non-native plant that can become invasive if left unmanaged. Dense, spreading bramble (*Rubus fruticosus*) and nettle (*Urtica dioica*) scrub is also present close to several of these field boundaries. In addition, many of the fields have a wide (up to 15m) unmown strip, that is, in places, becoming overgrown with bramble and hawthorn scrub.

The hedgerows surveyed are identified in Figure 5.4 and key features of each hedgerow are summarised in Table 5.1, which for clarity, also includes the potential impacts and mitigation measures. The 'Significance' ranking of each hedgerow, based on the ranking system as per Foulkes, N., Fuller, J., Little, D., McCourt, S. and Murphy, P. (2013), is shown on Figure 5.5. Full details of the hedgerow survey and 30m survey sections are shown in Appendix 5.3 (A).

Table 5.1. Summary of hedgerow survey and evaluation, extracted from Appendix 5.3

ID	Internal/ boundary[1]	Appraisal Score[2]	Hedgerow Significance	Condition Assessment[3]	Potential impacts	Possible mitigation measures
H14	Boundary	24	Highly significant (Highly significant (Heritage Hedgerow - in accordance with the hedgerow appraisal system – see reference Foulkes, N., Fuller, J., Little, D., McCourt, S. and Murphy, P. (2013) *Hedgerow Appraisal System - Best Practise Guidance on Hedgerow Survey, Data Collation and Appraisal*. Woodlands of Ireland, Dublin. Unpublished Report). Scores ≥16 in all appraisal categories; scores 4 in Historical significance category as part of the 'Pale boundary' and scores 4 for ground flora significance and association with a stream.	Unfavourable Scores 22/24 overall but unfavourable tree species >10% cover.	No direct habitat loss. Potential disturbance to ground flora on bank by people accessing the hedgerow. No shading impacts as there is a 'habitat creation area' between the houses and the hedgerow.	Protect hedgerow and bank during construction (e.g. by temporary fencing of hedgerow and root protection zone). Planting adjacent to the hedgerow should include dense thorny species such as Holly *Ilex aquifolium* to reduce public access to hedge bank. Interpretative signs to people of the historical significance of the hedgerow.

ID	Internal/ boundary[1]	Appraisal Score[2]	Hedgerow Significance	Condition Assessment[3]	Potential impacts	Possible mitigation measures
H15	Internal	12	Moderately significant	Favourable Scores 23/24 overall	Two thirds of the hedgerow will be lost. However, one third of the hedgerow will be retained. This is the section that has the most mature trees and is the most ecologically valuable.	Protect hedgerow to be retained during construction (e.g. by temporary fencing of hedgerow and root protection zone) during construction. Incorporate native scrub species into planting scheme. Retain boundary hedgerows to maintain ecological corridor around the site.
H16	Internal	12	Moderately significant	Favourable Scores 19/24 overall	Three quarters of the hedgerow will be lost. However, one quarter of hedgerow will be retained, where it links into the Heritage Hedgerows H14 and H17. Drainage channel will be retained as an open channel and is likely to increase in diversity, as it is currently heavily shaded.	Protect hedgerow to be retained during construction (e.g. by temporary fencing of hedgerow and root protection zone) during construction. Water channel should be designed to be as natural as possible and accessible by fauna. If possible allow the channel to colonise naturally with native species. If planting is required then avoid any invasive plants/ material potentially contaminated with invasive plants as this channel links to Ballyogan stream below.

ID	Internal/ boundary[1]	Appraisal Score[2]	Hedgerow Significance	Condition Assessment[3]	Potential impacts	Possible mitigation measures
H17	Internal	16	Highly significant (Heritage Hedgerow). Scores ≥16 in all appraisal categories; scores 4 in Historical significance category as part of the 'Pale boundary'	Favourable Scores 22/24 overall	A section of c50m is to be removed for bridge construction. There will be a temporary bridge during construction and a permanent bridge during operation. The bridge will create a permanent gap (c30m) in the hedgerow with the loss of the hedgebank in the bridge location	Protect hedgerow to be retained during construction (e.g. by temporary fencing of hedgerow and root protection zone) during construction. Planting around and under the bridge of suitable low native shrubs to provide a corridor linking the hedgerow either side of the bridge.
H20	Internal	11	Low significance	Favourable Scores 23/24 overall	Entire hedgerow will be lost	Incorporate native scrub species into planting scheme. Retain and enhance boundary hedgerows to maintain ecological corridor around the site.
H21	Internal	10	Low significance	Favourable Scores 20/24 overall	Entire hedgerow will be lost	Incorporate native scrub species into planting scheme. Retain and enhance boundary hedgerows to maintain ecological corridor around the site.
H22	Internal	20	Highly significant (Heritage Hedgerow). Scores ≥16 in all appraisal categories; scores ≥6 in historical significance category. Also associated with calcareous / potential tufa forming spring.	Favourable Scores 24/24 overall	Entire hedgerow and spring will be lost. Not possible to retain spring as ground levels will be altered in this area.	Incorporate native scrub species into planting scheme. Retain and enhance boundary hedgerows to maintain ecological corridor around the site. No mitigation possible in relation to spring, but natural water features will be present on site.
H23	Boundary	Included with H27				
H24	Internal	9	Low significance	Unfavourable Scores 18/24 overall	Entire hedgerow will be lost	Incorporate native scrub species into planting scheme. Retain and enhance boundary hedgerows to maintain ecological corridor around the site.

ID	Internal/ boundary[1]	Appraisal Score[2]	Hedgerow Significance	Condition Assessment[3]	Potential impacts	Possible mitigation measures
H25	Internal	15	Moderately significant	Favourable Scores 20/24 overall	Entire hedgerow will be lost but drainage channel will be retained as open channel flowing to channel in H16 and providing a corridor across the site. The channel is likely to increase in diversity as currently heavily shaded.	Water channel should be designed to be as natural as possible and accessible by fauna. If possible allow the channel to colonise naturally with native species. If planting is required then avoid any invasive plants/ material potentially contaminated with invasive plants as this channel links to Ballyogan stream below.
H26	Internal	7	Low significance	Favourable Scores 18/24 overall	Entire hedgerow will be lost	Incorporate native scrub species into planting scheme. Retain and enhance boundary hedgerows to maintain ecological corridor around the site.
H27	Boundary	19	Highly significant (Heritage Hedgerow). Scores ≥16 in all appraisal categories; scores 4 in historical significance category	Favourable Scores 23/24 overall	No direct habitat loss. Need to ensure no damage during construction and that disturbance is minimised during operation. Potential for impacts to water quality in drainage ditch/ stream during construction and operation (e.g. changes to water quality and quantity).	Protect hedgerow and bank during construction (e.g. by temporary fencing of hedgerow and root protection zone). Standard mitigation measures to protect watercourses from pollution during construction (see EIAR, Chapter 8). Surface water system incorporating SuDS included in design to prevent operational impacts to water quality and quantity.
H28	Boundary	17	Highly significant (Heritage Hedgerow). Scores ≥16 in all appraisal categories; scores 4 in historical significance category	Favourable Scores 23/24 overall	A section of c30m is to be removed for road access and the hedgerow will be shortened at the southern end (c10m) for greenway access. This will create a permanent gap (c30m) in the hedgerow.	Protect hedgerow and bank during construction (e.g. by temporary fencing of hedgerow and root protection zone). Not possible to provide planting to link the hedgerow as the access road is not a bridge with a gap underneath.

ID	Internal/ boundary[1]	Appraisal Score[2]	Hedgerow Significance	Condition Assessment[3]	Potential impacts	Possible mitigation measures
H29	Boundary	10 (estimated[4])	Low significance	Favourable (estimated[4]) Scores 21/24 overall	Entire hedgerow will be lost	Incorporate native scrub species into planting scheme. Retain and enhance boundary hedgerows to maintain ecological corridor around the site.
H31	Internal	6	Low significance	Favourable Scores 21/24 overall	Entire hedgerow will be lost	Incorporate native scrub species into planting scheme. Retain and enhance boundary hedgerows to maintain ecological corridor around the site.
H32	Boundary	n/a	n/a	n/a	No direct habitat loss. Need to ensure no damage during construction and that disturbance is minimised during operation.	Protect hedgerow and bank during construction (e.g. by temporary fencing of hedgerow and root protection zone).
H34	Boundary	23	Highly significant (Heritage Hedgerow). Scores ≥16 in all appraisal categories; scores 4 in structural significance category	Unfavourable Scores 23/24 overall but alien invasive species (*Lysichiton americanus*[5]) present	A section of c50m is to be removed for bridge construction. There will be a temporary bridge during construction and a permanent bridge during operation. The bridge will prevent trees regenerating, which will create a permanent canopy gap, but ground flora will continue under bridge providing an ecological link. The bridge structures will be set back from the stream to avoid damage to the stream and ground flora. There will be no diversion of the stream during construction.	Protect hedgerow to be retained, watercourse and ground flora in the vicinity of the bridge construction zone (e.g. by temporary fencing of hedgerow and root protection zone) during construction. Minimise disturbance to ground flora and bank under the bridge and, if possible, allow natural recolonisation of hedgerow flora. Create management plan to control and prevent spread of *Lysichiton americanus* during and after construction. This should include a pre-construction survey of this hedgerow.

Figure 5.4 Surveyed hedgerows and location of 30m survey sections showing hedgerow labelling system referred to in Table 5.1

Figure 5.5 Map of hedgerow significance

Fields

The fields in Clay Farm Phase 2, particularly in the northern and western parts of the site, comprise regularly mown/grazed agricultural grassland (**GA1**), with relatively limited species diversity. Meadowgrass (*Poa annua*), ryegrass (*Lolium perrene*) and creeping bent (*Agrostis stolonifera*) dominate, with daisy (*Bellis perennis*), creeping buttercup (*Ranunculus repens*), occasional white clover (*Trifolium repens*) ragwort (*Senecio jacobaea*) and broad-leaved dock (*Rumex obtusifolius*) also present.

The southernmost two fields, near to Cruagh Wood/Cruagh Green, also consist of regularly mown/grazed agricultural grassland, but are flatter and wetter in places, with patches of rushes (*Juncus* spp.), horsetails (*Equisetum arvense*), great willowherb (*Epilobium hirsutum*) and meadowsweet (*Filipendula ulmaria*) present in places.

The section of the Ecopark through which the proposed bridge will be constructed comprises a section of unmanaged (unmown) species rich dry calcareous and neutral grassland (**GS1**), grading into wet grassland (**GS4**). This area contains several grass species including sweet vernal grass (*Anthoxanthum odoratum*), crested dogstail (*Cynosurus cristatus*), Yorkshire fog (*Holcus lanatus*), Timothy (*Phleum pratense*), red fescue (*Festuca rubra*) and the bent grasses *Agrostis capillaris* and *A. stolonifera*. Some ryegrass (*Lolium perenne*) and quaking grass (*Briza media*) is also present. There are abundant rushes (*Juncus* spp.) as well as horsetails, great willowherb and large stands of meadowsweet, with a number of willow and gorse (*Ulex europaeus*) dominated pockets of scrub (**WS1**) establishing. Buddleia (*Buddleja davidii*), brambles (*Rubus fruticosus* agg.) and nettle are also frequent, with self-heal (*Prunella vulgaris*), knapweed (Centaurea nigra), ribwort plantain (*Plantago lanceolata*) and silverweed (*Potentilla anserina*) present.

Watercourses

Minor field drains and ditches (**FW4**), frequently dry, are located along a number of the hedgerows and tree lines. In the western half of the site the ditches associated with H16 and H25 flow northwards to Ballyogan Stream (**FW1**), outside the Clay Farm Phase 2 boundary. In the eastern half, the ditches flow east along hedgerows H22 and H26, before draining via headwalls to a ditch on the eastern boundary (H27). This ditch flows north and eventually joins the Ballyogan Stream to the north east of Clay Farm.

5.3.4 Fauna

Bats

The dedicated bat surveys undertaken to date have concluded that there are no bat roosts within the Phase 2 area, however this finding does not rule out the occasional use of features on the site by roosting bats. The nearest confirmed roost was a small soprano pipistrelle roost in a beech tree, to the west of the site and outside the development area (within the Ballyogan Stream corridor). This was a relatively small roost and it is likely to be non-breeding bats, possibly male bats establishing mating roosts.

During the August 2016 bat surveys, all bats were noted to be moving from the proposed development site prior to dawn and from this assessment and previous surveys, bats returning to roosts were noted heading in north-westerly and northerly directions while it was noted that *Myotis* bats and pipistrelles were associated with the farm yard to the west and adjoining the site. There was no evidence of bats emerging or returning to the house that will be nearest to the development.

Bat activity was high in the western corner of the site at dusk (close to the Clay Farm yard) in August 2016 and bats were noted here prior to dawn both in 2015 and 2016. It is highly probable that these areas (outside the Clay Farm landholding) are roost sites for bats including *Myotis* bats of an unconfirmed species.

Bat activity throughout the site was moderate with occasional Leisler's bat activity, both widespread pipistrelle species and occasional *Myotis* bat signals. Remote monitors also identified the presence of brown long-eared bats. These are rarely heard in bat detector surveys during active monitoring except where a roost is extremely close and they are often rare in passive recordings. Of several hundred bat signals recorded, only 2 brown long-eared bat signals were noted.

The main areas for bat activity were the hedgerow and Ballyogan stream to the north and the area around the red barn (outside the Clay Farm landholding). *Myotis* bat activity was also noted along the golf course boundary at the southern/eastern end of the site.

All Irish bat species are fully protected under the *Wildlife Act* (1976) and subsequent amendments, and incorporated into the *European Communities (Birds and Natural Habitats) Regulations*, 2011.

Badgers

There is a linear group of 5 badger setts (or possibly 4 where one sett has scattered entrances, one of which is permanently no longer in use) along the ridgeline to the south of Clay Farm Phase 1. Note that the accurate location of these setts are not marked on Figure 5.3 (habitat map), at the request of Dún Laoghaire-Rathdown County Council. These setts range in use and extent from inactive single entrances to a multiple entrance main sett that is highly active. The main sett is the most easterly of the setts identified and comprises no less than 5 entrances. Bedding has regularly been observed (most recently in June and August 2017) at two of the main sett entrances. An infrared, motion activated camera has provided additional evidence that this sett was occupied at the time of survey and that there is an active main sett that is likely to sustain a breeding population within the site.

Two more setts are present within 100 metres to the west of the main sett. Neither of these was in use in July 2015 or in June 2017 but one sett (the sett closest to the bottom of the bank) had bedding in the entrance in August 2015 and had clearly been re-occupied in the intervening period. The sett between this and the main sett is inactive and may be disused. Another sett to the west of this is a single entrance sett that was inactive throughout the entire assessment as evidenced by the lack of movement of a number of sticks placed in the entrance. The final sett on site is a single entrance sett close to the culvert and earth bridge over the stream. This sett is close to the stream. Bedding was visible within the entrance in August 2015, but not in June 2017. The activity surveys undertaken to date (July 2017) have recorded no badger setts within the Phase 2 lands proposed for development.

Badgers commute to the east along the hedgerow before travelling towards a small bridge over the stream and onwards around the ESB site. There are also tracks leading through the fences south of the stream into the ESB lands and quite likely the golf course. Two latrines have been recorded denoting territorial claim to the bridge and surrounding lands. The badger signs continue over the bridge and south around the ESB wall. Badgers feed throughout the site with much evidence in the area close to the main bank travelling upstream and along the stream passing the ESB as well as downstream into neighbouring gardens. Badger signs and tracks lead westwards along the bank and through the wooded area that lies outside Phases 1 and 2 and close to the stream through an open field before entering gardens at Castle Lodge. There are a number of tracks through the Phase 2 lands but these are also used by foxes that are denning close to the southern perimeter. Badger digging was present even relatively close to the area where a vixen and cubs were seen on several occasions. Young foxes were seen on several occasions towards the Kilgobbin Woods area and an adult male was also seen returning prior to dawn.

Badgers are fully protected under the *Wildlife Act* (1976) and subsequent amendments.

Otters

No evidence of otters has been observed on the site, however the author has recorded signs of otters (spraints) on watercourses within 5km of the site (at Cabinteely) and otters were observed both in the Carrickmines River Valley and along Bride's Glen, to the south and east of Clay Farm during the preparation of the Biodiversity Plan for Cherrywood Strategic Development Zone in 2012. It is reasonable to expect that otters may occasionally pass along the Ballyogan stream to the north. The species is fully protected under the *Wildlife Act* (1976) and subsequent amendments, and in the *European Communities (Birds and Natural Habitats) Regulations*, 2011.

Other Large Mammals

Evidence of other large mammals, such as fox and Sika deer has frequently been recorded at Clay Farm Phase 2, notably including regular sightings of both species in June, July and August 2017.

Breeding Birds

A total of 33 common bird species of Ireland have been recorded on the site, of which 12 were confirmed as breeding in June 2015. No species of high conservation concern were recorded, however 11 species of medium conservation concern were, of which 3 were confirmed to breed on the site (robin, mistle thrush and stonechat). The remaining species recorded were of least conservation concern, 9 of which were confirmed to breed on the site. Several of the species recorded were seen in flight only and most probably were not breeding on the site. The hedgerows and tree lines that are present throughout Clay Farm Phase 2 are of importance for nesting and feeding birds. Birds, as well as their nests and eggs, are fully protected under the *Wildlife Act* (1976) and subsequent amendments.

Table 5.2 Bird Species Identified, Numbers Present and Breeding Status, Clay Farm Phase 2 June 2015

Common Name	BTO Code	Species	Breeding Status	Numbers Present
Pheasant	PH	*Phasianus colchicus*	Possible Breeding	1 to 3 pairs
Herring Gull	HG	*Larus argentatus*	Non Breeding	3 birds flying over
Stock Dove	SD	*Columba oenas*	Possible Breeding	2 birds flying over
Woodpigeon	WP	*Columba palmubus*	Probable Breeding	4 to 8 pairs
Swift	SI	*Apus apus*	Non Breeding	9 birds flying over
Swallow	SI	*Hirundo rustica*	Non Breeding	15 birds flying over
House Martin	HM	*Delichon urbica*	Non Breeding	21 birds flying over
Wren	WR	*Troglodytes troglodytes*	Confirmed Breeding	15 to 22 pairs
Dunnock	D.	*Prunella modularis*	Confirmed Breeding	8 to 12 pairs
Robin	R.	*Erithacus rubecula*	Confirmed Breeding	5 to 10 pairs
Stonechat	SC	*Saxicola torquata*	Confirmed Breeding	1 pair
Song Thrush	ST	*Turdus philomelos*	Confirmed Breeding	1 to 2 pairs
Mistle Thrush	M.	*Turdus pilaris*	Confirmed Breeding	1 to 2 pairs
Blackbird	B.	*Turdus merula*	Confirmed Breeding	8 to 17 pairs
Blackcap	BC	*Sylvia atricapilla*	Confirmed Breeding	6 to 12 pairs
Willow Warbler	WW	*Phylloscopus trochilus*	Possible Breeding	1 pair

Chiffchaff	CC	*Phylloscopus collybiitta*	Possible Breeding	1 pair
Goldcrest	GC	*Regulus regulus*	Possible Breeding	1 to 2 pairs
Great Tit	GT	*Parus major*	Confirmed Breeding	2 to 4 pairs
Coal Tit	CT	*Parus ater*	Possible Breeding	1 pair
Blue Tit	BT	*Parus caeruleus*	Confirmed Breeding	8 to 14 pairs
Long-tailed Tit	LT	*Aegithalos caudatus*	Confirmed Breeding	2 pairs
Magpie	MG	*Pica pica*	Probable Breeding	5 to 8 pairs
Jackdaw	JD	*Corvus monedula*	Possible Breeding	1 pair
Hooded Crow	HC	*Corvus corone cornix*	Probable Breeding	2 to 5 pairs
Starling	SG	*Sturnus vulgaris*	Possible Breeding	1 to 2 pairs
House Sparrow	HS	*Passer domesticus*	Possible Breeding	4 to 8 pairs
Chaffinch	CF	*Fringilla coelebs*	Possible Breeding	4 pairs
Lesser Redpoll	LR	*Carduelis flammea*	Possible Breeding	1 pair
Goldfinch	GO	*Carduelis carduelis*	Probable Breeding	3 to 7 pairs
Bullfinch	BF	*Pyrrhula pyrrhula*	Confirmed Breeding	3 to 5 pairs

Amphibians and Reptiles

Overall the fields in the Clay Farm Phase 2 site are dry, with very few wet areas suitable for use by breeding amphibians (newts and frogs). No amphibians have been observed during the surveys undertaken to date at Clay Farm Phase 2.

Nevertheless, even minor wet areas and temporary ponds may be of value for amphibians, in particular during the spring breeding season.

The site at Clay Farm Phase 2 is a relatively highly managed area and there are areas of dryness and direct exposure to the sun and heat, suitable for use by common lizard, such as the stony track leading through Phase 2 towards the ESB site and the ESB perimeter wall. No evidence of the species has been recorded, however, it is possible that lizards may occur within the site. Records of the species exist from a linear distance of under 2.5km at Barnacullia (2nd June 2014) and approximately 5km in 2011 and 2009.

Amphibians and reptiles are fully protected under the *Wildlife Act* (1976) and subsequent amendments.

Lepidoptera

The site was assessed for the presence of butterflies and for the suitability of the habitats for butterfly abundance and diversity. The fields within Clay Farm Phase 2 are of only limited value for these insects, however, the area to the north of Clay Farm Phase 2 (within the Ecopark), which is dominated by unmanaged grassland and encroaching scrub habitats, is attractive to two species of butterfly: ringlet and meadow brown, both of which were recorded on the site in July 2017. Both of these species benefit from the edges around pasture and value grasses, thistle (also attractive to painted lady) and bramble. Stands of nettle, present within the Ecopark and along several of the internal and boundary hedgerows in Phase 2 may also benefit several other butterfly species including small tortoiseshell, peacock, red admiral, painted lady and comma. In July 2017 only one butterfly species, peacock butterfly, was recorded on any of the buddleia shrubs present on the site.

Fisheries

Ballyogan Stream, which flows through the Clay Farm Ecopark, to the north of the Phase 2 area, forms part of the catchment of the Carrickmines/Loughlinstown system, a regionally important salmonid system. This system supports a resident population of brown trout and a migratory population of sea trout (both Salmo trutta). As a result the constraints relating to developments that may affect salmonid waters apply (for example the *European Communities (Quality of Salmonid Waters) Regulations* 2008 (SI no. 293 of 1988). Overall the stream system is in good condition, and is considered to be a valuable local biodiversity and fisheries resource. According to information provided by Inland Fisheries Ireland the Carrickmines system supports a resident population of Brown trout and a migratory population of Sea trout (both *Salmo trutta*). Because of extensive culverting at the former Ballyogan landfill, located immediately downstream of Clay Farm, there is limited fish transition above the old landfill. However, information provided by IFI (7th September 2017) suggests that salmonid fish may occasionally be present within the section of the Ballyogan Stream that flows through the proposed Ecopark within the adjoining Phase 1 lands.

Water Quality

Water quality in Irish rivers and streams is monitored by the Environmental Protection Agency (EPA), which assigns a 'Q-value' (where Q1 = pristine quality and Q5 = grossly polluted (Toner *et al*., 2005)) to the watercourse. The Q-value is based on an assessment of invertebrate species present in the watercourse. No EPA monitoring stations are known to be present on the Ballyogan stream upstream of Clay Farm (http://gis.epa.ie/Envision). A single station is present downstream of the site, after the confluence with the Carrickmines Stream, near the Carrickmines M50 junction. The most recent water monitoring data available (2009) indicates that the stream in this area is Q3-4 (slightly polluted). Ongoing water quality monitoring that is taking place on Ballyogan Stream as part of the Phase 1 development has to date indicated no changes in water quality as a result of the Phase 1 construction.

Due to the substrate present in the Ballyogan Stream at Clay Farm (dominated by sand and gravel, with silty areas, and only occasional short stretches of riffle) it was not possible to assess the water quality of the stream using the standard Q-value methodology (kick-sampling). Regular visual assessments of Ballyogan Stream have indicated that it appears to be reasonably clean and unpolluted. A number of small fish (sticklebacks) were observed in the stream during the summer survey of 2014, as well as in June and September 2017. Sltation/discolouration was noted in the stream on one occasion (29th June 2017). This appears to have been caused by unknown disturbance upstream of Clay Farm (siltation was noted in the stream to the west of Clay Farm, at Castle Court) and was no longer present during a follow-up survey undertaken on 19th July 2017.

5.3.5 Overall Evaluation of the Proposed Development Site

The site is not within or adjacent to any designated area. Neither Rockabill to Dalkey Island SAC nor Dalkey Island SPA (within 4km of the mouth of the Shanganagh River, of which the Ballyogan Stream is a tributary) are considered to be sensitive ecological receptors.

Habitats

The substantial hedgerows that form the field boundaries, both within the site and along the boundary, are the main ecological feature on the Clay Farm Phase 2 site. These areas are of **Local Importance (Higher Value)**, in accordance with the ecological resource valuations presented in the *NRA Guidelines for Assessment of Ecological Impacts of National Road Schemes* (NRA/TII, 2009 (Rev.2)). They are considered to be sensitive ecological receptors and, as confirmed by the hedgerow appraisal carried out, a number of the boundary and internal hedgerows are classified as **Heritage Hedgerows, of high significance.**

A calcareous / potential tufa-forming spring is located within the application site at H22. While it is considered to have some similarities to the Annex I priority habitat 'Petrifying springs with tufa formation', it is not an Annex 1 habitat. It has only one of the species that would normally be associated with this habitat, and this species is common in other habitats. This is a small feature, and small amounts of tufa (calcareous deposits) were found at this location. There is no significant tufa formation. This spring is not a good example of this habitat and has no connections to designated SAC sites.

Tufa springs are fairly common in Co. Dublin and there are excellent examples at Glenasmole Valley SAC (c 10km W), Ballyman Glen SAC (c5.5km SE) and Knocksink Wood SAC (c4.5km S). Within a 5km radius of the Phase 2 site spring, there are two known main areas of tufa springs (undesignated) at Bride's Glen/ Ticknick (c3km SE) and Cherrywood (3.5km E). One of the Cherrywood springs is considered an excellent example of the Annex I priority habitat. The loss of the calcareous spring at Clay Farm Phase 2 would therefore not be a significant impact at a county level, but would be a permanent, significant negative impact at a local level. It is not an Annex 1 Habitat and therefore does not fall within the requirements of Article 6 of the Habitats Directive in respect to impacts, management and protection of Natura 2000 sites (both SACs and SPAs).

The agricultural fields that dominate Clay Farm Phase 2 are of **Local Importance (Lower Value)** and are not considered to be sensitive ecological receptors.

The section of the Ecopark through which it is proposed to construct the bridge includes an area of unmanaged species rich wet grassland, as well as a section of the woodland corridor associated with Ballyogan Stream and the stream itself, and a section of mature tree line in the vicinity of the Pale Ditch. This area is of **Local Importance (Higher Value)**. This section of the site is considered to be a sensitive ecological receptor.

Fauna

No features of significance for roosting **bats** are present within the Phase 2 lands, however the site is of significance for commuting and foraging bats. The larger hedgerows and tree lines within and around the site are all of importance for nesting **birds**. The site is **Local Importance (Higher Value)** for bats and breeding birds and these species are considered to be sensitive ecological receptors.

The ridge that separates the Phase 1 and Phase 2 lands is occupied by a number of active and inactive **badger** setts, including a highly active multiple entrance main sett. There is also badger activity throughout the Phase 2 field boundaries. Although no evidence of otters has been recorded on the site, the species is well known from the wider area and is likely to utilise Ballyogan Stream, at least occasionally. The site is therefore considered to be of **Local Importance (Higher Value)** for badgers and otters, which are considered to be sensitive ecological receptors.

Deer (Sika deer) activity has also been recorded on numerous occasions on the Phase 2 land during the course of the ecological surveys undertaken since 2014. The site is of **Local Importance (Lower Value)** for deer, which are not considered to be sensitive ecological receptors.

The following species groups are considered to be sensitive ecological receptors, however in each case the Clay Farm Phase 2 site is of no more than **Local Importance (Lower Value)**:

- Lepidoptera;
- Common lizard;
- Amphibians.

5.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

5.4.1 Proposed Development

It is proposed to provide a residential development of approximately 927 units, a childcare facility, 2 retail units, road infrastructure and landscape works on the Clay Farm Phase 2 lands with associated amenity facilities, as well as connections to existing services. Full details of the proposed development are provided at Chapter 2 - Project Description and Alternatives Examined. This proposed development is in addition to the 425 residential units and childcare facility permitted, and under construction, on the Clay Farm Phase 1 lands to the north of the site.

A bridge with a total span of approximately 96m will be constructed to provide vehicle and pedestrian access between the ongoing Phase 1 and proposed Phase 2 development. A reinforced concrete abutment and associated pad will be positioned at both ends of the proposed structure, the intermediate spans will be supported by reinforced concrete piers cast into reinforced concrete foundation pads. Piles will be required beneath the pads of the abutments and intermediate piers. The deck will be constructed with an in situ reinforced concrete deck cast above permanent formwork which will span between the pre-stressed concrete beams.

Conditions 18 & 19 of the grant of permission for Clay Farm Phase 1 propose the development of a greenway along the eastern / south-eastern boundary of the Phase 2 lands linking Cruagh Wood/Manor and Stepaside Park in the south with Clay Farm Phase 1 and Ballyogan Road/LUAS Green Line in the north. In accordance with the planning conditions the applicant is facilitating the provision of the greenway, which is currently under design development by the Planning Authority.

Full details of the proposed development are presented in Chapter 2 of this EIA Report (Project Description and Alternatives Examined), and Chapter 6 Landscape and Visual Impact Assessment. For further details of the landscape proposals please refer to the landscape drawings and landscape design rationale report prepared by Brady Shipman Martin.

5.5 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

5.5.1 Construction Phase

Designated Conservation Areas – Screening for Appropriate Assessment

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 following paragraphs comprise a summary of the conclusions outlined in that report:

> *Due to the fact that none of the habitats and species listed as 'Qualifying Interests or Special Conservation Interests' in any European site will be affected by any element of the proposed Clay Farm Phase 2 development has been assessed that the project will 'not result in any likely significant effects' on any European site.*
>
> *As it is concluded that there will be no risk of significant negative effects on any European site as a result of the proposed project, either alone or in combination with other plans or project, in that regard, the Appropriate Assessment Process – preparation of a Natura Impact Statement – is not required.*

Habitat loss

The development of Clay Farm Phase 2 will involve the removal of the agricultural fields.

The proposed development will result in the loss of five hedgerows considered to be of low significance (H20, H21, H24, H26 and H31). Although these are of low significance, they do provide wildlife habitat and act as a corridor for movement. Their loss would be considered to be a probable permanent, significant negative impact at a site level. However, if the boundary hedges are enhanced and maintained and there is sufficient replacement native scrub planting on the site, then there would be no residual impact from the loss of these hedgerows.

The proposed development will result in the loss of part/ all of three hedgerows considered to be of moderate significance (H15, H16 and H25). One quarter of H15 and one third of H16 will be retained; these are the sections with the most mature trees in these hedgerows. All of H25 will be lost, but the drainage channel associated with H25 and H16 will be maintained as an open channel. The loss of these hedgerows would be considered to be a probable permanent, significant negative impact at a local level. However, the drainage channel is currently of low diversity as it is heavily shaded and opening it up is likely to be a probable positive permanent impact on the channel. If the water channel is suitably the boundary hedges are enhanced and maintained and there is sufficient replacement native scrub planting on the site, then there would be a probable permanent, significant negative impact at a site level.

There are six high significance hedgerows (Heritage Hedgerows) on the Phase 2 site. Of these, two H14 and H27 (including H23) will have no direct habitat loss and appropriate enhancement and management will be undertaken. Enhancement planting should include thorny or spiny species such as *Ilex aquifolium*, *Prunus spinosa* and native *Rosa* sp. to protect the hedgerows from recreational access/ disturbance. Therefore there will be no significant impacts to these hedgerows.

One hedgerow (**H28**) will have a canopy gap created of c30m. This is required to allow the Planning Authority to provide an access road connecting Clay Farm Phase 2 to the adjacent Cruagh Wood development (this access is part of the requirements of the planning permission for the Cruagh Wood development). In addition, c10m is required to allow the Planning Authority to develop the proposed greenway from the Clay Farm Phase 2 boundary through to Cruagh Wood. The latter opening will be located close to the existing gateway, in an area that is already disturbed. This may shorten the hedgerow, but will not create an actual gap in the hedgerow. The creation of the c30m gap to allow access to Cruagh Wood will result in a permanent gap with loss of hedgerow, ground flora and bank. In the east of the site. two hedgerows (H17 and H34) will have a canopy gap (c50m) created during construction for temporary (construction) and permanent (operation) bridges which may also cause disturbance to ground flora. After construction, planting should reduce the canopy gap to c30m. H34: The temporary bridge will be raised to reduce disturbance to the hedgerow ground flora, stream and hedge bank in H34. The permanent bridge through H34 will have a 3m minimum clearance above the stream. Although this will not be high enough for trees to grow under, low scrub and ground flora should persist under the bridge maintaining the wildlife corridor. During construction there is a risk of non-native alien species spread, and during operation the hedgerow will be at risk from recreational use and disturbance. H17: The bridge over H17 will not be raised above the hedge bank due to ground levels in this area. The bridge will create a permanent gap in the hedgerow ground flora and canopy and a section of bank ('Pale ditch') will be lost in this area. Suitable planting of low native shrubs at the edges and under the bridge will provide a link between the hedgerow sections either side of the bridge gap. The ground flora was relatively species-poor in this hedgerow and its local loss is not considered significant. During operation there is a risk of disturbance/ damage to the hedgerows from recreational use and disturbance. In the absence of mitigation, there would be a probable permanent, significant negative impact at a local level on these hedgerows. However, the hedgerows to be retained will be protected during construction (including an invasive species management plan for H34), the stream and ground flora in H34 will be protected during bridge construction and suitable planting will maintain a wildlife corridor (although not a hedgerow). The

hedgerows will be protected and enhanced as part of an 'eco-park' in this area. Additional planting to enhance the hedgerows should include thorny or spiny species such as *Ilex aquifolium*, *Prunus spinosa* and native *Rosa* sp. to protect the hedgerow. The creation of permanent single gaps in these hedgerows that are over 5m will mean that the hedgerows will be considered to be in 'unfavourable' condition (Foulkes *et al*., 2013). Therefore there will be a probable permanent, significant negative impact at a site level on these hedgerows.

The final high significance hedgerow H22 will be completely removed and the calcareous spring associated with it will be lost due to excavation and disturbance during construction. No mitigation is possible for the loss of the spring, although native scrub planting and enhancement to boundary hedges will offset some loss of scrub species within the hedgerow. This will therefore be a permanent, significant negative impact at a local level.

The retention and protection of the boundary hedgerows, and key sections of internal hedgerows, will ensure that the existing ecological connectivity provided by the most significant hedgerows and tree lines will be retained. In addition, a setback with no development and incorporating dense and ecologically sensitive planting, will be provided in the vicinity of the Ecopark in the northern part of the Phase 2 area abutting the Ecopark, to provide protection for local fauna (adjacent to H14).

All retained habitat, in particular the boundary hedgerows and the riparian corridor along Ballyogan Stream will be protected as per the requirements of British Standard BS5837:2012 *Trees in Relation to Design, Demolition and Construction' – Recommendations*, with protective fencing being installed around all trees and hedgerows to be retained, prior to commencement of development.

The development of the bridge linking Phase 1 and Phase 2 will require the installation of a temporary hardstanding platform to facilitate bridge construction will also be required for the duration of the construction period. However, due to the proposed design of the permanent bridge, with piers set back from the riparian corridor (the pier on the northern side of Ballyogan stream, the closest to the watercourse, will be 5m from the stream), no stream diversion will be required, and no bankside vegetation removal will be required.

The temporary crossing of Ballyogan Stream to facilitate construction access will consist of a temporary bridge, such as Mitchell CB12, to be installed for the duration of the construction works. This will be raised above the stream banks and will minimise any impacts on the riparian corridor.

On completion of the construction works, the temporary hardstanding platform will be removed and the habitat within the Ecopark will be reinstated in so far as is practicable.

Disturbance to/loss of Habitat for Roosting Bats

No bat roosts have been recorded within the proposed development area at Clay Farm Phase 2 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 loss of a proportion of the hedgerows and tree lines on the site will result in impacts on commuting and foraging bats, however it is not expected that these impacts will be significant, particularly in view of the fact that most of the tree lines and hedgerows that form the boundary of the site will be retained, as will the connectivity towards and along the Ballyogan Stream and Ecopark.

Disturbance to/loss of Habitat for Badgers and other Large Mammals

The badger setts recorded to the north of the Clay Farm Phase 2 proposed development area, within the ridgeline, will be retained. Given the locations of the setts, as well as the proposed buffer zone between the development area and the setts, and the topography in the northern part of the site (sloping steeply down to the ridge line), it is not considered likely that any direct impacts to badger setts will occur, and it will not be

necessary to temporarily or permanently close any badger setts. Therefore a licence to disturb badgers (issued by NPWS under Section 23 of the Wildlife Act, 1976, as amended), will not be required.

No impacts are expected on otters as a result of the proposed development, and access along the Ballyogan Stream corridor will be maintained during the construction phase and beyond.

Disturbance to/loss of Habitat for Nesting Birds

The loss of the hedgerows and tree lines on the site will result in impacts at the local level on nesting birds, however it is not expected that these impacts will be significant, particularly in view of the fact that the habitat areas associated with the Ballyogan Stream and the Ecopark to the north will be retained, and enhanced, and the boundary hedgerows and tree lines will also be retained.

Disturbance to/loss of Habitat for Amphibians, Reptiles and Lepidoptera

It is not expected that impacts on any of these species groups will be significant, and the open space provided as part of the proposed development, as well as the Ecopark adjacent to Clay Farm Phase 2 will incorporate features suitable for use by amphibians, reptiles, butterflies and moths.

Discharges to Surface Water from the Construction Site

Both the construction and operational phases of the proposed development at Clay Farm Phase 2 could have impacts on water quality in the Ballyogan Stream and beyond. However, all construction works will proceed in line with the recommendations and guidance provided in the Construction Management Plan for the residential development and the bridge, as well as the Fisheries Protection/Construction Method Statement (Appendix 5.1). Contamination of water from foul water, hydrocarbons, silt or other pollutants will not be allowed.

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.

5.5.2 Operational phase

Impacts of Lighting from the Development

Increased lighting and increased human activity has the potential to impact on bat feeding and commuting behaviour. The proposed lighting for the scheme (prepared by Penston MEP Consulting Ltd) including for the bridge, has been designed in accordance with the following guidelines:

- Bats and Lighting – Guidance Notes for Planners, Engineers, Architects and Developers (Bat Conservation Ireland, 2010);
- Guidance Notes for the Reduction of Obtrusive Light GN01 (Institute of Lighting Professionals, 2011);
- Bats and Lighting in the UK – Bats and the Built Environment Series (Bat Conservation Trust UK, January 2008).

The proposed lighting may affect bat species, in particular, light-intolerant bat species (such as *Myotis* species and brown long-eared bats) during foraging and if directed at emergence points would affect all bat species, even those that will feed in illuminated areas. This could be an issue created by the proposed bridge crossing above the Ecopark, however, the lighting designed for the bridge will incorporate baffles to significantly reduce light spill from the bridge into the Ecopark. There are no roosts known within the site and therefore illumination

would only affect commuting and feeding rather than roosting. At worst, lighting associated with the proposed development would be a permanent slightly negative impact.

Discharges to Surface Water from the Development

An increase in the area of hard surfacing in roads, building roof areas and other structures will increase the potential rate of discharge of rainwater from the site to the local watercourses. There is potential for this to contain contaminants such as petrol and oil from vehicles, home heating oil spillages and other contamination.

Invasive Plant Species

There is a potential, in any large development site, for the introduction or spread of invasive plant species through the movement of soils or vegetation. No significant stands of invasive plants are present in the vicinity of the proposed development area. However, a small patch of American skunk cabbage (*Lysichiton americanus*), a scheduled species in the *European Communities (Birds and Natural Habitats) Regulations* 2011 (SI no 447 of 2011), has recently been recorded outside the Phase 2 area, upstream of the proposed bridge crossing. There is the potential for this species to spread along the Ballyogan Stream corridor, if measures are not implemented to eradicate it.

5.6 Potential Cumulative Impacts

In general, the on-going urbanisation of parts of South County Dublin will lead to habitat loss and loss of open green space and will increase the risk of siltation and pollution of watercourses from wastewater and surface water.

The potential impacts of the development of Phase 2 at Clay Farm have been assessed in conjunction with Phase 1, currently under construction to the north. Taken together, the two phases of development will provide a significant number of new residential units in an area of existing agricultural fields. Cumulative impacts may be considered to be significant at a local scale, however, on completion of construction works these impacts are not considered to be significant.

A very significant portion of the site (a total of 6.86ha, equating to 34% of the site area) is to be retained as open space with ecologically sensitive planting SuDS features and green roofs also featuring. The retention/provision of the Ecopark within the Phase 1 area to the north (which will also include a greenway with cycle/footpath, to be provided by Dún Laoghaire-Rathdown County Council) will also provide a key section of proposed ecological corridor for the wider environment as envisaged in the Green Infrastructure Strategy (Appendix 14 of the County Development Plan 2016-2022).

5.7 DO NOTHING IMPACT

Currently, the site is not under any significant threats, although there is minor evidence of localised dumping and anti-social behaviour along Ballyogan Stream to the north. This activity appears to have ceased since the construction programme of Clay Farm Phase 1 commenced. The fields in Clay Farm Phase 2 are currently in agricultural use and there are no apparent threats to the fauna that utilise the land, such as deer, badgers and nesting birds. Should no development be undertaken on the site it would be expected that these species would be expected to remain, however, in the medium to long-term (5-20 years or more), particularly should the fields be taken out of agricultural use, scrub and woodland habitat may replace much of the open grassland.

No signs of alien invasive plants such as Japanese knotweed (*Fallopia japonica*) or giant hogweed (*Heracleum mantegazzianum*) were recorded during the field surveys. In the event that the site remains undeveloped, it is not expected that these species would colonise the site naturally. Without management

intervention in the Ecopark, there is a long-term risk that the small, isolated population of American skunk cabbage could spread along Ballyogan Stream.

5.8 AVOIDANCE, REMEDIAL AND MITIGATION MEASURES

5.8.1 Construction Phase

No designated conservation areas will be impacted in any way by the proposed development and no mitigation measures are required in this regard. Full details are provided in the Appropriate Assessment Screening Report that accompanies the application.

BIO CONST 1: Habitats

As it is proposed to change the site from an agricultural to an urban character, it is not possible to mitigate all of the potential impacts on local ecological receptors. The installation of the bridged link between Phase 1 and Phase 2 will require the temporary use of a hardstanding platform and the removal of a section of the trees both along Ballyogan Stream and along the ridgeline between the Ecopark and Phase 2.

In order to mitigate this habitat loss, and in order to maximise the biodiversity value of the retained habitat and to ensure that habitat connectivity in the wider area is maintained, significant new planting will be incorporated into the landscape design for the proposed development. This planting will, wherever possible, comprise an appropriate mixture of native trees and shrubs, preferably of local provenance, and including species attractive to pollinators. Refer to Table 5.1 and Chapter 6 Landscape and Visual Assessment. In particular, the significant areas of open space that form part of the Phase 2 development will be planted and managed in a way that maximises the biodiversity value of these areas. For example a significant area of c.1.2ha of open space will be provided to the north of the development area. The open space runs along the southern side of the tree-lined hedgerow and potential line of the pale ditch. This open space backs onto and extends the proposed Ecopark being delivered under the Phase 1 permission. A densely planted habitat creation area will be provided within the western portion of this open space. In addition, a large area of c. 1.4ha of open space will be provided as a central spine through the development area directly connecting the centre of the development area to the Phase 1 Ecopark. The open space is designed to provide for informal 'play in the landscape', exercise opportunities, social activity, seating, however it will also serve to enhance local biodiversity by including creation of a stream corridor with wetland features.

The planting will, over time, provide replacement habitat of benefit to the bats and birds that will continue to use the site and its boundaries.

Connectivity to the Ecopark will be maintained, and, with the exception of the c.50m wide bridge corridor working way leave, the Ecopark will be largely unaffected by – and fenced off from – the proposed development. This will ensure retention of large areas of undisturbed habitat, including grassland, trees, hedgerows and associated scrub planting, all of which will be subject to long-term management, following the guidance set out in Appendix 5.2.

All site clearance and landscaping works will comply with current legislative requirements and best practice. In particular, trees to be retained will be treated in accordance with British Standard BS5837:2012 *Trees in Relation to Design, Demolition and Construction' – Recommendations*, with protective fencing being installed around all trees and hedgerows to be retained, prior to commencement of development. All planting plans and landscaping proposals will further ensure that no invasive species are introduced, either deliberately or inadvertently, to the site.

A Habitat Management Plan (HMP) has been developed and is included in Appendix 5.1 of this report. In addition to the measures set out in this chapter, all works will comply with the requirements of the HMP,

particularly in relation to reinstating the grassland habitat within the Ecopark post-construction (on removal of the temporary hardstanding area associated with the construction of the bridge), and maintaining the bankside habitat in the vicinity of the proposed bridge.

BIO CONST 2: Fauna

As part of the provision of the new bridge measures will be implemented to ensure that passage along the Ballyogan Stream corridor and the Ecopark is maintained for birds, mammals (such as otters, badgers and bats) and aquatic fauna.

Where feasible and practicable, the removal of trees and other features suitable for use by nesting birds will 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 will be undertaken by suitably experienced ecologists. If no active nests are recorded, vegetation clearance will take place within 24 hours. In the event that active nests are observed, an appropriately sized buffer zone will be maintained around the nest until such time as all the eggs have hatched and the birds have fledged – a period that may be three weeks from the date of the survey. Once it is confirmed that the birds have fledged and no further nests have been built or occupied, vegetation clearance may take place immediately.

No bat roosts have been recorded at Clay Farm Phase 2 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* (S.I. 477/2011). However any mature tree scheduled for removal will first be surveyed by a qualified bat specialist for the presence of bats. Any ivy-covered trees which require felling should be left to lie for 24 hours after cutting to allow any bats beneath the cover to escape. Trees with potential for bat roosting i.e. those showing cavities, should 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;

A total of Six Schwegler 2F bat boxes will be erected, with advice from an experienced bat specialist, on mature trees as part of the development. In addition a minimum of eight triple cavity swift boxes (such as Schwegler 17A) will also be installed on buildings as part of the development, including four within the structure of the bridge crossing the Ecopark (assuming that they can be installed a minimum of 6m from the ground).

All new lighting for the proposed development at Clay Farm Phase 2 will be designed and constructed taking account of the recommendations of Bat Conservation Ireland (2010). In summary, the following measures are proposed:

- No floodlighting will be used – this causes a large amount of light spillage into the sky. The spread of light will be kept below the horizontal.
- Hoods, louvres, shields or cowls will be fitted on the lights if necessary to reduce light spillage if high intensity lighting is required or to protect trees or other potential roosts from light overspill.
- Lights should be of low intensity. It is better to use several low intensity lights than one strong light spilling light across the entire area.
- Lights away from essential areas such as major roads should be motion sensitive rather than permanently lit and attached to a timer system to switch off quickly in the absence of sustained movement.
- Narrow spectrum lighting should be used with a low UV component. Glass also helps reduce the UV component emitted by lights.

The lighting scheme for the proposed development, designed by Penston MEP, adheres to these lighting design characteristics. In particular, the following measures have been designed:

- Luminaire selection limits upward light spill;
- Dimming lights by 30% post-curfew will reduce running and maintenance cost;
- As bat feeding periods are from dusk to dawn, dimming lights by 30% post-curfew will reduce the impact of artificial lighting on the existing fauna and flora in the area;
- The lighting scheme achieves the recommended lux levels in accordance with current regulations and standards;
- The lighting scheme achieves good uniformity throughout the development to ensure good visibility at night;
- The inclusion of baffles/shields on luminaires positioned within the eco-park;
- Co-ordination with the landscape developers will ensure light positions do not clash with tree position, limiting light obstruction and future maintenance costs.

No badger setts will be directly affected by the proposed development, and all setts are at a sufficient distance from all construction works to ensure that they will be unaffected for example by vibration caused by piling or other construction work. The setts, all of which are located to the north of the Phase 2 area along the ridgeline, will be retained intact and undisturbed, with an undeveloped buffer zone, planted where appropriate with thorny shrubs to minimise human disturbance. Nevertheless, should it be required, for example if any new badger setts are recorded within the area proposed for development, any such setts on development lands will be closed and excluded under licence from NPWS. Such works will be undertaken outside the breeding season (that is, outside the period 1st December to 31st June) and will involve appropriate mitigation of any impacts. It is not currently necessary to apply for such a licence.

Any ponds present in the fields to be disturbed will be inspected by a suitably experienced ecologist prior to works being undertaken. Should any frog spawn or tadpoles be discovered, a licence to remove frog spawn may be required from NPWS.

BIO CONST 3: Aquatic Environment and Watercourses

Together with the Construction Management Plan (which has been prepared for both the overall residential development and construction of the bridge linking the phase 1 and Phase 2 lands), as well the Fisheries Protection/Construction Method Statement, the following Best Practice measures, where relevant based on the Irish Fisheries document '*Guidelines on Protection of Fisheries During Construction Works In and Adjacent to Waters*' and the CIRIA *Guidelines: Control of Water Pollution from Linear Construction Projects: Technical Guidance (C648)* (CIRIA, 2006) will be adopted:

- Ballyogan Stream and tributaries and the newly constructed storm water systems will be protected from ingress of silt, debris and deleterious material during all phases of construction;
- An appropriately designed silt fence will be installed along the downslope boundary of individual construction areas and the Ecopark and will be regularly maintained and retained in situ for the duration of the construction phase, until such time as all proposed permanent surface water protection measures are installed and operational;
- In addition to the silt fence, geotextile membranes, cut-off drains, temporary cut-off trenches, settlement ponds and hydrocarbon interceptors will also be employed as appropriate;
- Discharge Licences – It will not be permitted to discharge into any newly constructed storm water systems or watercourse without adhering to the conditions of the discharge licence and agreeing the same with the Site Manager and Local Authority Area Engineer;
- Discharge of surface water from the construction site will be via silt/sediment trap and temporary hydrocarbon interceptors and will be monitored to meet any requirements set by the Local Authority/Environmental Protection Agency;
- No discharge will occur where there is a risk of cement or residue in the discharge;
- Concrete Washout – The washing out of concrete trucks on site will not be permitted as they are a potential source of high alkalinity in watercourses. Consequently it is s requirement that all concrete truck washout takes place back in the ready-mix depot;

- Control of spoil and other materials to prevent spillage, and through appropriate handling and selection of spoil/material storage locations;
- No water abstraction from Ballyogan Stream;
- Careful siting and bunding of fuel storage facilities and any areas used for the storage of potentially hazardous materials;
- Appropriate construction techniques will seek to ensure that groundwater seepage into excavated areas does not take place.

The strategy for controlling and mitigating potential adverse environmental during construction will also include the following, as appropriate:

- All site clearance and landscaping works will comply with current legislative requirements and best practice. Trees to be retained, both within the site and on the boundary, will be treated in accordance with British Standard BS5837:2012 Trees in Relation to Design, Demolition and Construction' – Recommendations, with protective fencing being installed around all trees and hedgerows to be retained, prior to commencement of development;
- If required, sampling and testing of excavated spoil in order to assess the suitability of materials for reuse on site;
- The use of piling systems designed to minimise impacts on the groundwater;
- Dust suppression from soils by the regular use of water sprays during any dry conditions, sheeting of haulage vehicle loads, use of wheel washers;
- the siting of wheel wash facilities will be designed minimise associated potential safety, health and environmental risks;
- No invasive/noxious weed- type materials have been recorded on site at Clay Farm, however, should any be found, they will be treated as controlled waste and disposed of off- site at a landfill site that is licensed to receive such material;
- The storage of hazardous liquids (fuels and chemicals) will be avoided in so far as is possible. The handling and storage of any potentially hazardous liquids on site will be controlled and best practice guidance such as that published by the EPA, will be followed. Storage tank/container facilities will be appropriately bunded within designated compound areas and sited as far as possible from any watercourse or surface drain;
- If hazardous liquids escape during the works, the bunds and other protective measures will contain the spillage until remedial action, which will be taken as soon as possible;
- Procedures will be drawn up to control all potentially contaminating materials brought on site.

The implementation and effectiveness of these standard best-practice mitigation measures will be inspected and recorded regularly during the construction period and where deficiencies or faults are identified they will be remedied immediately by the contractor.

5.8.2 Operational Phase

BIO OPER 1: Foul Drainage Network

Foul sewage from the completed development will be piped to Shanganagh Wastewater Treatment Works (approximately 2km to the east) for treatment and ultimate discharge to St. George's Channel in the Irish Sea, which, according to information provided by the EPA (http://gis.epa.ie/Envision/), is classified as unpolluted.

Shanganagh Wastewater Treatment Works has been upgraded as part of the Shanganagh Bray Wastewater Project, to cater for existing and all projected future catchment development flows. It has the capacity to treat effluent from 186,000 population equivalent with the potential to increase capacity to 248,000 in the future.

The capacity available at Shanganagh Wastewater Treatment Works is sufficient to accommodate the inflow arising from the proposed development at Clay Farm Phase 2, as well as other developments in the area and it will therefore be possible to maintain the unpolluted status of the coastal waters.

BIO OPER 2: Surface Water Drainage Network

The design of the surface water drainage network for the proposed development incorporates a number of SuDS measures, including permeable paving, bio retention, green roofs (which will be applied to over 60% of the area of the apartment blocks) as well as underground storage. After attenuation it is proposed to discharge the storm water runoff from the proposed development via two separate outfalls to Ballyogan Stream. No further mitigation is required.

5.9 RESIDUAL IMPACTS

Hedgerow and scrub planting, protection and enhancement will mitigate some loss of hedgerow on the site and ecological corridors will be maintained around the boundary of the site. However, given the length of hedgerow that will be removed and the high significance of some of the hedgerows, the impacts cannot be completely mitigated. It is considered that there will be a permanent, significant negative impact at a local level as a result of the loss of hedgerow and associated habitats at this site.

The boundary hedgerows and tree lines, including the significant tree lines along the north western boundary and on the ridge between the Phase 2 and Phase 1 lands, will be retained. This habitat retention, coupled with the proposed landscaping works and ecologically sensitive planting, will ensure that impacts on nesting birds as well as on commuting and foraging bats, badgers and deer will only be of significance at the site level.

Habitat connectivity south to north, and west to east, including links to the new Ecopark (part of Clay Farm Phase 1), will be maintained. The landscaping proposed for the development, such as the green open space and the northern boundary, which will incorporate ecological planting, will serve to further link the site to open space to the east and south, including the Stepaside Golf Course and future Jamestown Park (former landfill). The planting will also include a range of species that will attract feeding invertebrates, including moths, butterflies and bees. Lighting of the proposed development will be carefully designed, and bat and swift boxes will be installed in appropriate locations on site, including within the structure of the bridge itself.

The partial loss of territory for a badger group may represent a significant negative impact at the site level. However, the badger territory is closely associated with the Ecopark and is connected, via the hedgerow network, to large areas of suitable habitat, to the south and west. No long term residual impacts are expected on this badger group.

The Ecopark that separates Clay Farm Phase 1 and Phase 2 will be a positive asset to biodiversity for the wider area. Together with Ballyogan Stream, its associated trees and hedgerows and the retained habitats that border Clay Farm Phase 2, this park will serve to maintain existing ecological connectivity along this section of the valley. Insofar as it is within the Clay Farm landholding the scheme also serves to deliver on the objectives for part of the Ecological Green Infrastructure Corridor as set out in Appendix 14 of the Dún Laoghaire-Rathdown County Development Plan.

Overall, with the exception of the permanent residual impact of the hedgerow loss, although the proposed development may have a temporary significant negative impact at the local level, this impact will fully mitigated over time to be negligible.

5.10 MONITORING

It is not expected that badger setts or bat roosts will be removed as part of the proposed Clay Farm Phase 2 development. The active badger setts present in the ridgeline to the north of the proposed development area will require monitored protection, in line with the parameters set out in the National Roads Authority's *Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes* (NRA, 2006), for the entire duration of the construction Phase. Should any additional badger setts be discovered within the Phase 2 lands (*e.g.* that establish at a later stage but prior to construction) it may be necessary to exclude and close these setts, under licence from NPWS. However, to date no such setts have been discovered.

Regular monitoring of all construction works will take place in accordance with the requirements of the Habitat Management Plan (HMP) and Fisheries Protection/Construction Method Statement (Refer to Appendix 5.1.

5.11 REINSTATEMENT

The majority of the site area to be removed comprises agricultural fields of no more than Local Importance (Lower Value), and no reinstatement of these features is required. The boundary hedgerows and tree lines (Local Importance (Higher Value)) are to be retained intact, with the exception of the short sections required to be removed in order to facilitate bridge construction, and a short section of hedgerow on the boundary with Stepaside Park, in the south western corner of the site. Habitat connectivity will be fully maintained, both between Clay Farm Phase 2 and the Ecopark and between Clay Farm Phase 2 and the wider area, including Stepaside Golf Corse and the future Jamestown Park. The majority of the internal hedgerows in Clay Farm Phase 2 (Local Importance (Higher Value)) will be removed to facilitate the development. It would not be appropriate or feasible to reinstate these features, and mitigation measures, as described in Section 5.7 will be implemented, including the extensive planting of ecologically diverse habitats where appropriate within the open space, for example in the north western part of the site, between the proposed development area and the ridge between the Phase 2 and Phase 1 lands.

In so far as is practicable, the area required for temporary construction works for the bridge within the Ecopark will be reinstated to its existing condition, with all temporary construction hardcore removed. On completion of this reinstatement work the area will be allowed to recolonise naturally, with planting undertaken in key areas, and long term habitat management measures, as contained in Appendix 5.2, will be implemented.

5.12 INTERACTIONS

At Clay Farm Phase 2 the main interactions of importance to biodiversity relate to water, with air/climate, noise/vibration, landscape and archaeology interactions 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 significant ecologically sensitive planting and utilises sustainable drainage, swales and low mounding to provide for potentially diverse habitats.

5.13 DIFFICULTIES ENCOUNTERED IN COMPILING

No difficulties were encountered in compiling the Biodiversity Chapter of the EIA Report. All surveys were undertaken to an appropriate level given the nature of the site and the proposed development.

5.14 REFERENCES & SOURCES

Bat Conservation Ireland 2010. Bats and Lighting- Guidance Notes for Planners, engineers, architects and developers. Bat Conservation Ireland. Accessed online at: http://www.batconservationireland.org/pubs/reports/BCIrelandGuidelines_Lighting.pdf

CIEEM (2016). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd edition. Chartered Institute of Ecology and Environmental Management, Winchester, United Kingdom

Council of the European Communities (1992). Council Directive of 21 May 1992 on The Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC). O. J. L 206/35, 22 July 1992

Council Directive 79/409/EEC on the Conservation of Wild Birds. (The EU Birds Directive)

Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora. (The EU Habitats Directive)

Council Directive 2000/60/EC of the European Parliament and of the Council establishing a Framework for the Community Action in the Field of Water Policy (The Water Framework Directive)

Department of Arts, Heritage and the Gaeltacht. 2011. Actions for Biodiversity 2011 – 2016. Ireland's National Biodiversity Plan

DG Environment. 2003. Interpretation Manual of European Union Habitats. European Commission

Doogue D., Nash D., Parnell J., Reynolds S., & Wyse Jackson P. 1998. Flora of County Dublin. The Dublin Naturalists' Field Club

Dún Laoghaire Rathdown County Council. 2010. Dun Laoghaire Rathdown County Development Plan 2010-2016

Dún Laoghaire Rathdown County Council. 2015. Dun Laoghaire Rathdown County Development Plan 2016-2022.

Dún Laoghaire Rathdown County Council. 2009. Treasuring our Wildlife' – a Biodiversity Action Plan for Dún Laoghaire Rathdown County Council 2009 - 2013

EPA. 2002. Guidelines on the information to be contained in Environmental Impact Statements

EPA, 2003. Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)

Environmental Protection Agency (2017). Revised Guidelines on the Information to be contained in Environmental Impact Statements (Draft). Environmental Protection Agency, Dublin

Environmental Protection Agency (2017). Advice Notes of Current Practice in the Preparation of Environmental Impact Statements (Draft). Environmental Protection Agency, Dublin

Fossitt J. 2000. A Guide to Habitats in Ireland. Heritage Council.

Foulkes, N., Fuller, J., Little, D., McCourt, S. and Murphy, P. (2013). Hedgerow Appraisal System - Best Practise Guidance on Hedgerow Survey, Data Collation and Appraisal. Woodlands of Ireland, Dublin. Unpublished Report

Hayden T. & Harrington R. 2001. Exploring Irish Mammals. Town House Dublin

Inland Fisheries Ireland (2011). Planning for Watercourses in the Urban Environment. Shannon Regional Fisheries Board, Dock Road, Limerick

Kelleher, C. and Marnell, F. 2006. Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, no. 25. National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht. Dublin.

Lynas P., Newton S.F., & Robinson J.A. 2007. The Status of birds in Ireland: an analysis of conservation concern 2008 – 2013. Irish Birds: Volume 8; Number 2

McGarrigle M., Lucey J. & Ó'Cinnéide M. 2010. Water Quality in Ireland 2007 – 2009. Environmental Protection Agency

National Parks and Wildlife Service. 2008. The Status of EU Protected Habitats and Species in Ireland. Department of Environment, Heritage and Local Government

NRA. 2009. Guidelines for Assessment of Ecological Impacts of National Road Schemes. National Roads Authority

Smith G. F., O'Donoghue P., O'Hora K. and Delaney E. 2010. Best Practice Guidance for Habitat Survey and Mapping. Heritage Council

Toner P., Bowman J., Clabby K., Lucey J., McGarrigle M., Concannon C., Clenaghan C., Cunningham P., Delaney J., O'Boyle S., MacCárthaigh M., Craig M. & Quinn R. 2005. Water Quality in Ireland 2001 – 2003. Appendix 1: Biological and Physico-Chemical Surveillance and Water Quality Assessment of Rivers. EPA

Webb D.A., Parnell J. & Doogue D. 1996. An Irish Flora. Dundalgan Press

Appendix 5.1:

Fisheries Protection/Construction Method Statement

Introduction

The purpose of this Fisheries Protection/Construction Method Statement is to ensure the protection of Ballyogan Stream and other watercourses during the construction and operation of the proposed development of Clay Farm Phase 2, Ballyogan, Dublin 18, including works associated with the development of a new road bridge over the Ballyogan Stream and Ecopark corridor, linking Clay Farm Phase 1 and Phase 2.

This document was prepared in consultation with Inland Fisheries Ireland (site visit by IFI Staff and the author, Matthew Hague CEnv MCIEEM, on 07th September 2017).

The document should be read in conjunction with the following project documents:

- Construction Management Plan (CMP) for the Clay Farm Phase 2 site (prepared by DBFL Consulting Engineers)
- Clay Farm Phase 2 Bridge Construction Management Plan (CMP) (prepared by DBFL Consulting Engineers);
- The Habitat Management Plan (HMP) (prepared by Brady Shipman Martin);
- The Biodiversity Chapter of the Clay Farm Phase 2 EIAR (prepared by Brady Shipman Martin);
- Clay Farm Ecopark updated Habitat and Ecological Management Guidelines (prepared by Brady Shipman Martin);
- Landscape design reports and drawings (prepared by Brady Shipman Martin);
- Site Specific Flood Risk Assessment for Clay Farm Phase 2 (prepared by DBFL Consulting Engineers);
- Engineering Services Report for Clay Farm Phase 2 (prepared by DBFL Consulting Engineers).

As part of the construction programme it will be the responsibility of the contractor's overall Site Manager to ensure that each element of the Statement is complied with, in consultation with the overall Project Coordinator and the contracted Project Ecologist.

All works to be undertaken will comply with the requirements of Inland Fisheries Ireland, particularly as set out in the following documents:

- *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters* (IFI, 2016):
    - http://www.fisheriesireland.ie/fisheries-management-1/624-guidelines-on-protection-of-fisheries-during-construction-works-in-and-adjacent-to-waters/file;
- *Planning for Watercourses in the Urban Environment* (SWRFB):
    - http://www.fisheriesireland.ie/fisheries-management-1/86-planning-for-watercourses-in-the-urban-environment-1/file;
- CIRIA Guidelines: *Control of Water Pollution from Linear Construction Projects: Technical Guidance* (C648) (CIRIA, 2006).

Ballyogan Stream - ecology

Ballyogan Stream, which flows through the Clay Farm Ecopark, to the north of the Phase 2 area, forms part of the catchment of the Carrickmines/Loughlinstown system, a regionally

important salmonid system. This system supports a resident population of brown trout and a migratory population of sea trout (both *Salmo trutta*). As a result the constraints relating to developments that may affect salmonid waters apply (for example the *European Communities (Quality of Salmonid Waters) Regulations* 2008 (SI no. 293 of 1988). Overall the stream system is in good condition, and is considered to be a valuable local biodiversity and fisheries resource. According to information provided by Inland Fisheries Ireland the Carrickmines system supports a resident population of Brown trout and a migratory population of Sea trout (both *Salmo trutta*). Because of extensive culverting at the former Ballyogan landfill, located immediately downstream of Clay Farm, there is limited fish transition above the old landfill. However, information provided by IFI (7th September 2017) suggests that salmonid fish may occasionally be present within the section of the Ballyogan Stream that flows through the proposed Ecopark within the adjoining Phase 1 lands.

Proposed works

The proposed development comprises substantial site clearance in the fields elevated above the Ballyogan Stream Valley as well as the construction of c.934 new residential units with associated infrastructure and landscaping. In addition, a new road bridge linking Clay Farm Phase 1 and Phase 2 will also be constructed, over Ballyogan Stream. As part of this construction, limited site clearance will be required within a c.50m corridor, to allow for the development of a temporary hardstanding platform, required for the bridge construction. A temporary bridge (a bailey bridge type structure, elevated above the stream banks) will be required over the Ballyogan Stream for the duration of the works.

On completion of the bridge construction works the temporary bridge will be removed and appropriate habitat reinstatement will take place.

The following permanent works are proposed within 10m of Ballyogan Stream itself:

- The construction of a bridge pier set 5m back from the northern bank of Ballyogan Stream. It is not proposed to divert any section of Ballyogan Stream;
- The construction of headwalls for surface water drainage outflows in two locations:
    - At one location in an area to the west of the proposed bridge;
    - At another location in the north eastern corner of the site;
    - Both headwalls will be set back a minimum of 5m from the channel, with an appropriately designed run off area between the headwall and the channel;
    - An example of this design has been constructed on the northern side of Ballyogan stream, as part of the Clay Farm Phase 1 development;
    - There may be a minor element of bank-side disturbance and vegetation removal in order to install the surface water outfalls. This work has the potential to release sediment and other contaminants to Ballyogan Stream.

Fisheries protection – proposed actions

Temporary attenuation facilities/silt ponds and permanent features such as underground surface water storage tanks will be developed, as part of the Clay Farm Phase 2 construction, and all such infrastructure will be significantly in excess of 10m from Ballyogan Stream. An appropriately designed silt fence will be installed along the downslope boundary of individual construction areas and the Ecopark. This will be regularly maintained and retained in situ for the duration of the construction phase, until such time as all proposed permanent surface water protection measures are installed and operational.

The following measures form the main approach toward mitigation of impacts on the watercourses, however reference should also be made to Section 5.7 of the EIAR:

1. Any and all instream works, should they be required, will take place from May to September only;
2. No diversions of Ballyogan Stream are proposed and passage for fish upstream and downstream will remain unimpeded at all times;
3. Details of the proposed temporary bridge crossing of Ballyogan Stream as well as the construction of permanent bridge piers will be finalised in consultation with Inland Fisheries Ireland, prior to commencement;
4. Prior to any machinery working on site for any purpose, the working area will be marked out with wooden stakes and where deemed necessary, hazard tape will be erected to identify the working limits;
5. Prior to any site clearance or earthworks, measures to prevent the release of sediment during the construction work will be installed. These include the provision of a suitably designed silt fence, to be erected along the boundary of the development area. This will remain in place for the duration of the works, until the permanent watercourse protection features are in place and fully operational.
6. In the vicinity of the permanent and temporary bridge crossings over Ballyogan stream, full protection of the channel will be maintained at all times, using appropriate techniques including but not limited to geotextile membranes and barriers to prevent accidental ingress of soil, sediment and other debris into the watercourse;
7. The silt fence and other siltation/sedimentation prevention measures will be regularly inspected, cleaned and maintained in full working order for the duration of the construction period;
8. Exclusion zones and barriers (silt fences) between earthworks, stockpiles and temporary surfaces will be provided, in order to prevent sediment washing into the receiving water environment;
9. Pumped concrete will be monitored to ensure no accidental discharge. Mixer washings and excess concrete will not be discharged to surface water;
10. No storage of hydrocarbons or any polluting chemicals will occur within 50m of the surface water network. Fuel storage tanks will be bunded to a capacity at least 110% of the volume of the storage tank (plus an allowance of 30mm for rainwater ingress). Re-fuelling of plant will not occur within 50m of the surface water network and will take place only in bunded refuelling areas;
11. Measures to minimise waste and ensure correct handling, storage and disposal of waste, will be implemented;
12. If dewatering is required as part of the proposed development, water must be treated prior to discharge. This will include treatment via petrol interceptor and treatment for silt removal either via silt trap, settlement tanks or ponds.
13. An Emergency Response Plan detailing the procedures to be undertaken in the event of flooding, a spill of chemical, fuel or other hazardous wastes, a fire, or non-compliance incident will be prepared;
14. Emergency procedures and spillage kits will be available and construction staff will be familiar with emergency procedures and trained in the implementation of the Emergency Response Plan and in the use of all relevant equipment.

Monitoring

Twice daily visual checks of Ballyogan Stream, both upstream and downstream of the works area, will be undertaken during the following works:

- Clearance of vegetation related to bridge construction in the vicinity of Ballyogan Stream
- Installation of the temporary bridge over the Ballyogan Stream, with its associated bankside protection;
- Construction of bridge piers, in particular the pier located 5m from the northern bank of the stream;
- Construction of surface water outfalls to Ballyogan Stream;

- For the duration of any other significant earthworks on the site. All such monitoring tasks will be recorded and logged for inspection.

Habitat Management Plan

Introduction

This Habitat Management Plan (HMP) has been prepared to support the planning application for proposed development at Clay Farm Phase 2, Ballyogan, Dublin 18. It is intended to provide guidance to the developers and their representatives on how to undertake the proposed developed in a manner that ensures that impacts on ecological receptors are minimised and that, where practicable, measures are undertaken that can enhance site biodiversity. The HMP details how habitats will be retained, protected and managed and reference should also be made to the following documentation.

- Fisheries Protection/Construction Method Statement;
- Construction Management Plan (CMP) for the Clay Farm Phase 2 site (prepared by DBFL Consulting Engineers)
- Clay Farm Phase 2 Bridge Construction Management Plan (CMP) (prepared by DBFL Consulting Engineers);
- The Biodiversity Chapter of the Clay Farm Phase 2 EIAR (prepared by Brady Shipman Martin);
- Clay Farm Ecopark updated Habitat and Ecological Management Guidelines (prepared by Brady Shipman Martin);
- Landscape design reports and drawings (prepared by Brady Shipman Martin);
- Site Specific Flood Risk Assessment for Clay Farm Phase 2 (prepared by DBFL Consulting Engineers);
- Engineering Services Report for Clay Farm Phase 2 (prepared by DBFL Consulting Engineers).

Measures required

This HMP requires all the commitments made in the Biodiversity Chapter of the EIAR and the planning application documentation as they apply to the protection and management of habitats and species to be fulfilled, as follows:

Habitats and flora

1. The methodologies set out in the Environmental Impact Assessment Report and in the CMPs for the proposed bridge construction and the site more generally, in relation to watercourse protection, will be fully adhered to;
2. Surface water protection measures including temporary attenuation areas, hydrocarbon interceptors, silt prevention fences and bankside protection will be regularly maintained, cleaned and kept in full working order;
3. Ballyogan Stream will be protected from ingress of silt and deleterious material during all phases of the bridge (and temporary bridge) construction. An appropriately designed silt fence will be installed along the downslope boundary of individual construction areas and the Ecopark. This will be regularly maintained and retained in situ for the duration of the construction phase, until such time as all proposed permanent surface water protection measures are installed and operational.
4. Any works related to the riparian corridor and Ballyogan Stream (for bridge construction) will be undertaken in line with the Fisheries Protection/Construction Method Statement;
5. Details of the proposed temporary bridge crossing of Ballyogan Stream as well as the construction of permanent bridge piers will be finalised in consultation with Inland Fisheries Ireland, prior to commencement;
6. No specific measures are required in relation to designated conservation areas;
7. All site clearance and landscaping works will comply with current legislative requirements and best practice. Trees and tree lines to be retained (the majority of the

site boundaries) will be treated in accordance with British Standard BS5837:2012 *Trees in Relation to Design, Demolition and Construction' – Recommendations*, with protective fencing being installed around all trees and hedgerows to be retained, prior to commencement of development;

8. Planting will, wherever possible, comprise native species and will ensure that no new invasive species are introduced to the site, as per the Landscape Specification;
9. Where feasible and practicable, the removal of trees and other features suitable for use by nesting birds will 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 will be undertaken by suitably experienced ecologists. If no active nests are recorded, vegetation clearance will take place within 24 hours. In the event that active nests are observed, an appropriately sized buffer zone will be maintained around the nest until such time as all the eggs have hatched and the birds have fledged – a period that may be three weeks from the date of the survey. Once it is confirmed that the birds have fledged and no further nests have been built or occupied, vegetation clearance may take place immediately.

Fauna

10. Passage for fauna, including badgers and otters, along Ballyogan Stream will be maintained at all times during construction and operation of the proposed bridge;
11. No bat roosts have been recorded at Clay Farm Phase 2 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 (*S.I. 477/2011). However any mature tree scheduled for removal will first be surveyed by a qualified bat specialist for the presence of bats. Any ivy-covered trees which require felling should be left to lie for 24 hours after cutting to allow any bats beneath the cover to escape. Trees with potential for bat roosting i.e. those showing cavities, should 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;
12. Six Schwegler 2F bat boxes will be erected, with advice from an experienced bat specialist, on mature trees as part of the development;
13. The lighting plan as designed by Penston MEP will be implemented in full adherence with the BCI Lighting Guidelines;
14. A minimum of eight triple cavity swift boxes (such as Schwegler 17A) will also be installed on buildings as part of the development, including four within the structure of the bridge crossing the Ecopark, provided adequate clearance is available (assuming that they can be installed a minimum of 6m from the ground);
15. No badger setts will be disturbed as a result of the development, however, in order to ensure the ongoing protection of the badger territory that is present along the ridgeline separating Phase 2 and the Ecopark, a dense habitat planting zone will be provided in the northern part of the Phase 2 area, where it abuts the Ecopark. This will be designed so as to prevent access by people to this habitat protection area.

For full details on these mitigation measures and proposals, reference is to be made to Section 5.7 (Avoidance, Remedial and Mitigation Measures) of the Environmental Impact Assessment Report.

Monitoring

Fauna

1. Bat activity will be monitored annually, and the bat boxes installed as part of the development will be inspected annually, for five years post-completion of the development in order to ensure that the proposed development has no adverse long-term impact on bat populations;

2. Light levels will be monitored and an updated light-spill report will be prepared upon completion of the development in order to demonstrate that the predicted light levels have been achieved;
3. The swift boxes installed will be monitored annually to ensure they are successfully integrated into the development;

Watercourses

4. As detailed in the Fisheries Protection/Construction Method Statement, twice daily visual checks of Ballyogan Stream, both upstream and downstream of the works area, will be undertaken during the following works:
    - Clearance of vegetation related to bridge construction in the vicinity of Ballyogan Stream
    - Installation of the temporary bridge over the Ballyogan Stream, with its associated bankside protection;
    - Construction of bridge piers, in particular the pier located 2.5m from the northern bank of the stream;
    - Construction of surface water outfalls to Ballyogan Stream;
    - For the duration of any other significant earthworks on the site. All such monitoring tasks will be recorded and logged for inspection.

APPENDIX 5.2 ECOPARK UPDATED HABITAT AND ECOLOGICAL MANAGEMENT GUIDELINES

CLAY FARM

Viscount Securities

Proposed Clay Farm Ecopark:

Habitat and Ecological Management Guidelines

Prepared in October 2015, and revised in September 2017

BSM Est. 1968
Brady Shipman Martin.
Built. Environment.

Contents Amendment Record

This report has been issued and amended as follows:

Issue	Revision	Description	Date	Prepared by	Checked by
01	04	Final	08.09.17	TB	TB

1.0 INTRODUCTION

The c.32.5 hectares that comprise the Clay Farm lands (*i.e*. Phase 1 and Phase 2 areas) are located immediately south of Ballyogan Road and are zoned for residential development and provision of open space. Clay Farm Phase 1 is currently under construction.

The Phase 1 and Phase 2 lands are separated by a steep change in level which is topped by a mature hedgerow. The Phase 1 lands, which lie north of the change in level, tend to be low-lying and relatively flat or rising slightly northwards towards Ballyogan Road. A small stream – the Ballyogan Stream – runs west to east through the lower southern portion of the Phase 1 lands. The grassland and hedgerow defined fields of the higher and drier Phase 2 lands continue to rise to the south.

2.0 THE ECOPARK

As part of the Phase 1 development, currently under construction, it is proposed to deliver an integrated 'Ecopark' on c.6.0 hectares located along the Ballyogan Stream. While the Ecopark is being delivered as part of the Phase 1 development, it will serve both Phase 1 and Phase 2 developments at Clay Farm as well as remaining as a major publicly accessible amenity for other developments in the area.

The lands comprising the proposed Ecopark are located along the stream and as such are low-lying and consequently, much of the habitat is damp grassland or wetland broken up with overgrown hedgerows or patches of scrubby woodland. While the lands were previously grazed by animals, absence of such grazing has led to an incursion of scrub in some areas. A detailed description of the habitats to be found on the site is included in Chapter 5 of the Environmental Impact Statement (EIS) that accompanied the application for the proposed Phase 1 development.

The lands along the stream have also been identified as part of Green Infrastructure Corridor 6 within the Green Infrastructure Plan for the County of Dun Laoghaire Rathdown (refer to Appendix 14 of County Development Plan).

Brady Shipman Martin's ecology and landscape team has undertaken numerous site and habitat surveys both in preparation of the Clay Farm planning applications and in order to gain a good understanding of the ecological processes involved in the formation of the habitats on the site. In addition, the developments, including the proposed Ecopark as well as other open spaces, have been designed in an integrated manner for overall best practice. In this regard, the proposed Ecopark will be one of the first such parks within the County area.

The objectives and actions set out in this report relate to activities that in the delivery of the Ecopark, will be provided by the developer; and in the on-going management of the park, will be the responsibility of the planning authority following taking-in-charge.

3.0 DEVELOPMENT AND MANAGEMENT OF THE ECOPARK

This document sets out the thinking behind the development of the Ecopark and outlines the key actions required in each area aimed at improving the biodiversity of the site.

Specific attention has been given to the requirements to retain and enhance habitats, trees and hedgerows and to the populations of bats and badgers on the site.

The development and management of an Ecopark will require an integrated approach led by Dun Laoghaire Rathdown County Council, and involving the site developers, their design team and the future residents of the site. The involvement of local communities is recognised as essential in the formulation and achievement of objectives in eco or biodiverse parks. In order to meet the diverse needs of the future community some active recreation elements have been incorporated in the proposals. However these are subservient to the primary goals of the Ecopark which are based on a biodiverse agenda.

The development of any ecological park and the formulation of an appropriate habitat management plan requires a full understanding of the natural resources and the processes of change operating across the site. These form the basis for a set of objectives for the establishment and future management of the proposed Ecopark.

The steps envisaged to develop an Ecopark at Clay Farm include:

- Site, habitat and fauna survey and assessment.
- Evaluation of changes currently under way on the site.
- An understanding of future impacts on the habitats and the park area arising from proposed development.
- Formulation of clear objectives for particular areas within the park.
- Description of Implementation and Management Actions.
- Involvement of adjoining community in park management and operation.
- Regular review and readjustment of objectives and actions.

These steps range from pre-development, to implementation to on-going management into the future. Baseline or pre-development surveys and assessment have already been carried out by the landowner/developer in making the application for planning permission. Likewise the developer will be responsible for the implementation stages and thereafter the lands and on-going management actions, will be transferred to the planning authority.

4.0 EXISTING HABITATS

Incorporating a range of wildlife habitats can greatly enhance the biodiversity of any site. No major new habitat features will be provided at Clay Farm, however it will be possible to augment the existing habitats (wet and dry grassland areas, watercourses, woodland and scrub) by careful management and selected interventions including the creation of some new features. The Ballyogan Stream and associated minor streams will be retained in as natural a state as possible. Vegetation, in particular the woodland and hedgerows that are associated with the streams, will be left untouched. However, an element of scrub clearance will be required in order to open up the ecological park and to increase structural and bio-diversity.

4.1 Wetland Habitats

Where ponds are created, perhaps in the western part of the site, they should replicate natural features as far as possible. Rather than having steep sides, ponds should slope gently towards the deepest point. This will provide a gradient for different aquatic species to become established. In this way, different habitats can be created even in a relatively small pond, ranging from marshy conditions near the edge to submerged and floating species in

the deeper parts. If the pond is large enough, islands can be developed within it. These features can be of great benefit to wildlife, as they tend to be inaccessible by foxes, dogs and other disturbances to wildlife, particularly important in a densely populated new development.

Plate 1: Small Ponds and wetlands can add considerably to the biodiversity of the area providing habitats for a wide range of plants, invertebrates and birds.

Ponds need careful management to ensure they remain in good condition in the long term. This management need not be labour intensive, particularly if the pond is well designed in the beginning. Such ponds thrive with low levels of nutrient input and the planting of fringe vegetation as a buffer zone will help to prevent run-off from entering the pond. This is important if the pond is located within a highly managed development.

4.2 Woodland Habitats

Woodland and scrub habitats such as those present along the Ballyogan Stream and in other parts of Clay Farm are important for a wide range of species, including the ground flora and shrub layer, mammals and birds, invertebrates, fungi and lower plants. Woodlands and individual trees are also important landscape and amenity features, and several of these are already present at Clay Farm.

Without management, woodlands, including hedgerows, can become dense and overgrown, with a resultant loss of ground flora. Well-managed woodlands will need less management in the long-term, but some level of management will always be needed to ensure that the trees and shrubs grow well, and that the woodland habitat supports features of value to wildlife. An objective of the woodland management will be to improve the presence of native species to broaden the range of species and the age profile generally and to provide a range of woodland environments from open glades and woodland edge to major woodland trees such as oak and ash. Management options will include removing undesirable species such as sycamore and laurel that have the capacity to spread at the expense of more desirable native species. Where appropriate some trees and scrub species will be coppiced or pollarded.

Plate 2: Piles of wood / log cuttings left to provide habitat for invertebrates

Log piles are a valuable habitat for invertebrates and can easily be created with wood from felled trees. Areas on the fringes of scrub and woodland are especially suitable. Log piles should remain undisturbed to allow colonisation by invertebrates and fungi.

4.3 Grassland Habitats

Grassland habitats both wet and dry are already present at Clay Farm. The key to creating and maintaining diverse grasslands is good management. If certain areas remain uncut until late summer, for example those fields in the eastern part of the site, this will allow flowers to produce seed. Areas of long grass, with a variety of species will allow insects, birds and small mammals including bats to thrive. Paths will be mown through and along the edges of the grasslands. This will facilitate access to the habitat for pedestrians and will also ensure that the habitat looks cared for and well maintained.

Plate 3: Well managed grasslands can make a significant contribution to biodiversity.

5.0 KEY ACTIONS: HABITATS (FLORA)

In the following sections, implementation actions will be completed by the applicant. On-going management actions will become the responsibility of the local authority.

5.1 Wetland

5.1.1 Implementation Stage

- Manipulate the existing stream to encourage a variety of bank conditions.
- Ponds to have gently sloping sides that will facilitate the development of marginal species.
- If required introduce native wetland trees and scrub such as willow, and alder.
- Consider appropriate locations for development of small shallow ponds.
- Provide interpretive panels.

5.1.2 Management Stage

- Monitor Wetlands on a regular basis.
- Modify the water regime and water levels as required to enhance biodiversity objectives.
- Organize information days and field trips.

5.2 Woodland

5.2.1 Implementation Stage

- Undertake a detailed survey of woodland and identify trees and tree species to be controlled or removed and those to be encouraged in specific areas of the park.
- Undertake selective tree and scrub removal. Move or replant material to improve diversity.
- Provide log piles from felled timber to encourage invertebrates
- Where appropriate plant additional trees, scrub and woodland floor species.
- Provide bat boxes.
- Provide appropriate interpretative facilities.

5.2.2 Management Stage

- Monitor Woodland development every 5 years and modify management plan as required.
- Ongoing monitoring and removal of undesirable species

- Manage social activity within the park with ongoing engagement with adjoining residents.
- Monitor bat activity and the use of bat boxes annually.

5.3 Grassland

5.3.1 Implementation Stage

- Identify areas of grass for different cutting/management regimes to provide a range of grass land regimes within the open space.
- Control and manage scrub species presently encroaching on grass land areas in the absence of a grazing regime.
- Provide mown paths to facilitate public access.
- Provide appropriate interpretative signage

5.3.2 Management Stage

- Foster appropriate activities within the Clay Farm Ecopark that will not negatively impact on the grassland.
- Organise field trips for children and schools.

6.0 KEY ACTIONS: FAUNA

In the following sections, implementation actions will be completed by the applicant. On-going management actions will become the responsibility of the local authority.

6.1 Badgers

6.1.1 Badger Ecology

Badgers are relatively easy to identify, as although they are predominantly grey in colour they have distinctive black and white markings on their heads. They are large animals, up to 750mm in length and over 12kg in weight.

Badgers are nocturnal animals with an elusive nature. They are social, living in groups, and are well adapted for a life underground. They usually emerge from their burrows (known as setts) only after dusk. Badger setts are usually used between generations and some can be hundreds of years old, with extensive tunnel systems.

In Ireland, badgers can be found in a wide range of habitats. Setts are most commonly found in woodlands or along woodland edges, in hedgerows, scrub and earth banks, and frequently in close proximity to foraging habitat such as agricultural grassland. Badgers are omnivorous, and feed on invertebrates (particularly earthworms), fruit, cereals and, occasionally, carrion and even birds and small mammals.

Plate 4: Badger

6.1.2 Badgers within Clay Farm:

Surveys of mammal activity at Clay Farm undertaken between 2014 and 2017 have recorded the presence of a number of different species, including foxes and Sika deer. Of particular note is the presence of a number of badger setts, within the linear woodland to the south of the Ballyogan Stream. These setts all show some level of use, with at least one of these setts regularly occupied

Plate 5: Badger Trail at Clay Farm (Phase 2 lands)

Evidence of badger activity gathered to date suggests that the species is active at Clay Farm, particularly in the area along the Pale ditch and the Ballyogan Stream and throughout many of the hedgerows. They appear to commute along the stream and hedgerows to the nearby golf course and beyond.

Plate 6: Badger sett at Clay Farm

6.1.3 Badger Habitat Enhancement Measures:

Badgers are sensitive to disturbance, and many Irish badger populations are under pressure from habitat loss and disturbance. It is therefore important that appropriate measures are taken to protect the existing badger population at Clay Farm.

As a result, the proposed development at Clay Farm has been designed with the existing badger population in mind. The existing hedgerow and planting located on the ridge that contains the setts, is to be retained – providing habitat connectivity, along the Ballyogan Stream to other hedgerows and off site areas. This will ensure that badgers will continue to have appropriate access to the golf course to the south of Clay Farm, as well as land upstream, west towards Kilgobbin Woods.

Specific habitat management and enhancement measures will include the planting of scrub, such as holly, hawthorn and bramble in proximity to the badger setts, in order to discourage human access. The presence of an adequate amount of suitable habitat will help to ensure that animals do not stray onto new roads, where they are at risk of injury or death.

In accordance with best practice, it should be noted that all works that have the potential to impact on badger setts should be undertaken in accordance with the procedures set out in the NRA publication *Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes* (National Roads Authority, 2006).

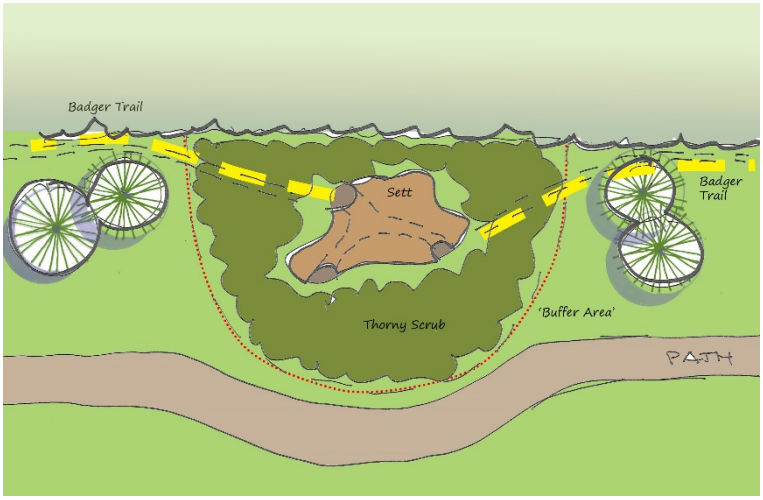


Plate 8: Diagram of Badger Sett Protection Area

6.1.4 Key Objectives

Maintain badgers on site and ensure that they can access the existing corridor along the stream / change in level between Phase 1 and Phase 2 lands.

6.1.5 Key Actions

6.1.5.1 Implementation stage

- Locate badger setts on site and define appropriate buffer areas around each site.
- Ensure that construction activity and fencing does not impact stream corridors or on hedgerows to be protected.
- Follow best practice guidelines (see NRA document mentioned above).
- Establish appropriate thorny vegetation in buffer area around the sett (if required) to deter access by the public, where appropriate.
- Provide appropriate and sensitively located interpretative signage.

6.1.5.2 Management Stage

- Monitor badger setts and activity annually.
- Maintain badger corridors.
- Organise field visits for local children and schools.

6.2 Bats

6.2.1 Bat Ecology

Bats are small, flying mammals that tend to be overlooked by most people. Despite their small size and elusive nature, bats play a significant role in human life. Among other things, they have a huge role in pest control – a single bat can eat up to 3,000

insects in one night, helping to greatly reduce mosquito numbers in summer months.

Ireland is home to at least ten different species of bat, and bats and their roosts are fully protected under Irish and European law. As a result, every effort must be made to ensure that where bats do occur they are not impacted upon by new development. However, destruction of hedgerows and poorly planned building has led to impacts on bat populations throughout Ireland in recent years.

Plate 9: Whiskered bat

6.2.2 Bats within Clay Farm

Regular bat surveys undertaken at Clay Farm between 2015 and 2017 noted good levels of bat activity throughout the site, and a number of different species, including Leisler's bat (*Nyctalus leisleri*), common pipistrelle (*Pipistrellus pipistrellus*) and soprano pipistrelle (*Pipistrellus pygmaeus*) were recorded. Of note is the presence of whiskered bat (*Myotis mystacinus*), a species that is very uncommon in Ireland, particularly in built up areas. The species likes small streams such as those found at Clay Farm.

Plate 10: Bat boxes

6.2.3 Bat Habitat Enhancement Measures

The design of the ecological park planned for Clay Farm will be key to maintaining a good bat population in the local area. Bats are sensitive to disturbance, in particular light pollution. Modern lighting design includes the use of LEDs and cowls, allowing light to be directed where it is needed – i.e. roads and footpaths. There will be no lighting within the ecological park, and where it is required in other public areas, lighting will be installed in such a way as to minimize any light overspill into the park.

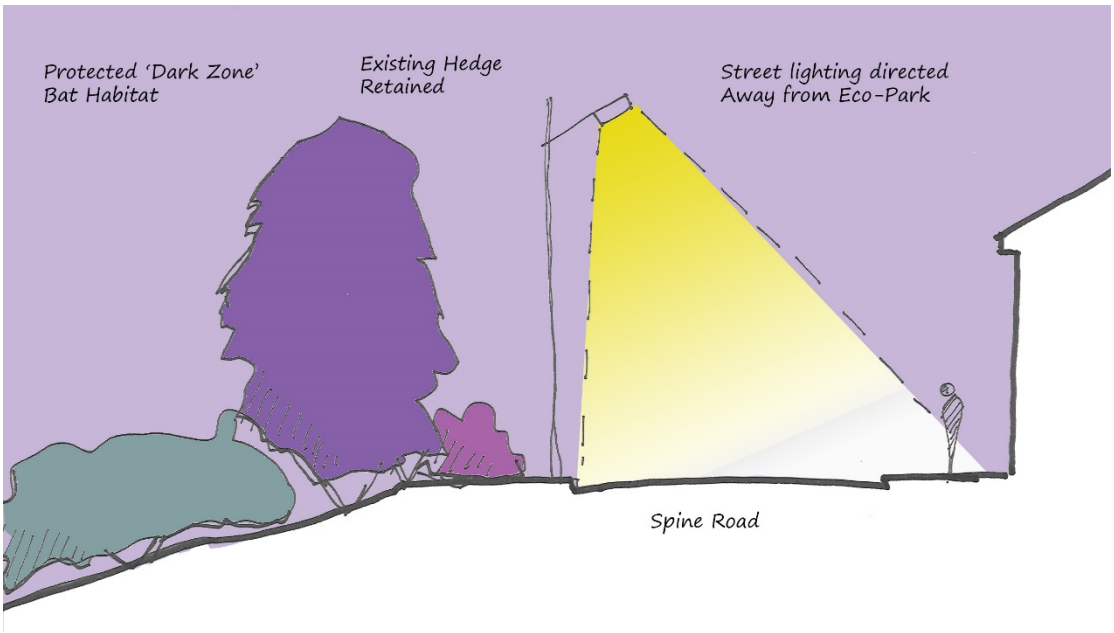


Plate 11: – Lighting organised to Protect 'Dark Area' of the Park.

In order to prevent light overspill, and to allow bats to commute safely through and around the park, trees will be planted throughout the site, but in particular along the southern edge of this phase of the proposed residential development. This tree planting will augment the existing retained hedgerows. The existing tree cover along the Ballyogan stream, which is important to the local bat population, will be retained intact, with the exception of a section, of minimal length, that will be removed to allow for the construction of the bridge linking Phase 1 and Phase 2. In addition, the new ecological park, which will be managed to ensure a wide range of habitats are present, will include areas of retained scrub, including species such as butterfly bush, which will be of benefit to invertebrates and thus bats and birds.

As part of the landscape design climbing plants such as honeysuckle as well as night scented stock, *Nicotiana* and other species of value for moths and butterflies will be planted. A variety of bat boxes will be installed within the ecology park. This will be an important way of providing alternative roosts for bats.

In accordance with best practice, all works that have the potential to impact on bats and bat habitat should be undertaken in accordance with the procedures set out in Irish Wildlife Manual No. 25 *Bat Mitigation Guidelines for Ireland* (National Parks and Wildlife Service, 2006).

6.2.4 Key Objectives

To provide for the continuation habitation of a range of bat species within the Ecopark.

6.2.5 Key Actions

6.2.5.1 Implementation Stage

- Avoid construction activity and overspill lighting within the Ecopark Area

- Provide street and public lighting in a manner that will protect the environment of the Ecopark.
- Plant or selectively manage the landscape to provide a resource of material that will assist in the ongoing development of moths and butterflies.
- Provide bat boxes.
- Provide appropriate interpretative signage

6.2.5.2 Management Stage

- Monitor bat activity and the use of bat boxes annually.
- Foster appropriate activities within the Ecopark that will not negatively impact on the bats.
- Organise night-time field trips for children and schools.

APPENDIX 5.3 CLAY FARM HEDGEROW SURVEY

CLAY FARM HEDGEROW SURVEY

September 2017

Report produced by Denyer Ecology for:
Brady Shipman Martin

11 Dargle View, Rathfarnham, Dublin, D16 XY51, Ireland
joanne@denyerecology.com

T +353 86 2379153
www.denyerecology.com

CONTENTS

1 INTRODUCTION

1.1 Background

Denyer Ecology was commissioned by Brady Shipman Martin to undertake a detailed survey of selected hedgerows at Clay Farm, Ballyogan Road, Co. Dublin. Ecological surveys are being undertaken for an Environmental Impact Assessment Report (EIAR) in relation to the proposed Phase 2 residential development at the site. The Phase 1 development is currently in progress to the north east of the Phase 2 site.

1.2 Aim

The aim of the survey was to assess the ecological value/ significance of selected hedgerows on the site and their condition. This data was then be used to assess the ecological impact of the loss of any of the hedgerows and potential mitigation measures.

1.3 Site

The site is located to the north east of Stepaside. Stepaside golf course is located immediately to the south and there is a housing development (Cruagh Wood/ Green/ Rise) to the west. To the north there is a pasture field with a large encircling hedgerow, with rough/wet grassland to the east of the hedgerow. There is a development site and ESB station to the northeast and grassland/ parkland to the southeast.

2 METHODOLOGY

2.1 Desktop data

The following resources were consulted:

- Ordnance Survey Ireland (OSI) mapping (accessed: http://map.geohive.ie/mapviewer.html)
- Aerial imagery (Bing maps)
- EPA data on watercourses (downloaded shapefiles)
- EIAR Chapter 4 Archaeology, Architectural and Cultural Heritage
- EIAR Chapter 7 Land and Soils
- EIAR Chapter 8 Water
- Clay Farm Phase 2 Tree Survey Report (08/09/2017)

2.2 Hedgerow assessment

The hedgerow survey and appraisal methodologies were based on the latest hedgerow survey guidelines: *Hedgerow Appraisal System - Best Practice Guidance on Hedgerow Survey, Data Collation and Appraisal* (Foulkes et al., 2013). The survey focused on rating the significance of the hedgerows. All of the Phase 2 site internal hedgerows were surveyed. In addition, a number of boundary hedgerows were surveyed (for comparison and where there may be potential ecological impacts from the proposed development).

The survey comprised walking both sides of each hedgerow (this was not always possible for boundary hedgerows) and recording the hedgerow flora species present and other hedgerow features. In addition, an attempt was made to survey the centre of the hedge to determine whether there is a bank, ditch or watercourse associated with the hedgerow and to survey the ground flora. This was sometimes only possible in one or two locations long the hedgerow, as the hedgerows are very mature and dense. Information was recorded from both the whole hedgerow and a 30m representative survey section. The locations of the 30m survey sections are shown on Figure 2.1.

The following information was recorded and used to assess the significance of the hedgerow:

- General description of hedgerow including dominant woody species.
- Favourable tree, shrub and woody climber species (based on list in Foulkes et al., 2013). Recorded from hedgerow length and 30m survey section.
- Unfavourable tree, shrub and woody climber species (based on list in Foulkes et al., 2013). Recorded from hedgerow length and 30m survey section.

- Herbaceous ground flora (based on list in Foulkes et al., 2013). Recorded from hedgerow length and 30m survey section.
- Additional woodland/ hedgerow flora species if not included in the list by Foulkes et al. (2013)
- GPS position of start and finish of 30m survey section.
- Historical information (from desktop data).
- Species diversity (favourable woody species, ground flora and ferns and allies).
- Presence and height of wall or bank.
- Presence of wet or dry ditch or watercourse.
- Other features of ecological importance, such as Badger Setts.
- Habitat connectivity.
- Presence of mature trees.

In addition, the following information was used to assess the condition of the hedgerow:

- Height
- Width
- Profile
- Basal density
- % gaps and gap size
- Degradation of banks and walls
- % cover of negative indicators such as Ivy *Hedera hibernica*, unfavourable woody species, ruderal species indicative of high nutrients (e.g. *Urtica dioica*)
- Habitat at margins of hedgerow (e.g. grassy or ploughed/ disturbed)

Figure 2.1. Surveyed hedgerows and location of 30m survey sections

2.3 Ecological Impact Assessment criteria

Impacts to key ecological receptors are characterised using the criteria based on the guidelines detailed in NRA (2009) and CIEEM (2016). These are summarised in Table 2.1. An impact is considered to be ecologically significant if it impacts the integrity or conservation status of a key ecological receptor within a specified geographical area.

Table 2.1: Characterisation of ecological impacts

Parameter	Definition/ categories
Magnitude	Size of an impact.
Extent	The area over which the impact will occur.
Duration	Time over which impact is predicted to continue. Relates to the ecological processes involved. E.g. Short-term; Medium-term; Long-term.
Reversibility	E.g. temporary/ permanent
Timing and frequency	Timing of impact in relation to relevant biological features (e.g. life-span) of ecological receptor.
Chance of impact occurring as predicted	Near-certain: >95% Probable: 50-95% Unlikely 5-50% Extremely unlikely: <5%

2.4 Nomenclature

Vascular plant nomenclature will follow that of the *New Flora of the British Isles*. 3rd Edition. (Stace, 2010). The bryophyte nomenclature adopted by Lockhart et al. (2012) will be used; this is based on the *Checklist of British and Irish bryophytes* (Hill et al., 2009) with minor modifications to reflect recent taxonomic changes. Ivy is referred to as Common Ivy *Hedera helix*, but there are recent suggestions that most Ivy in Ireland is in fact Atlantic Ivy *Hedera hibernica*. This does not affect the ecological assessment. Habitats were identified and classified using the *Guide to Habitats in Ireland* (Fossitt, 2000).

3 HEDGEROW EVALUATION, POTENTIAL IMPACTS AND MITIGATION

3.1 General survey summary, potential impacts and mitigation

Full details of the detailed hedgerow survey and 30m survey sections are shown in Appendix A. Key features of each hedgerow are summarised in Table 3.1 and the 'Significance' ranking of each hedgerow is shown on Figure 3.1. In addition, potential impacts and mitigation measures have been outlined in this section (Table 3.1).

Table 3.1. Summary of hedgerow survey and evaluation and potential impacts and mitigation measures

ID	Internal/ boundary[1]	Appraisal Score[2]	Hedgerow Significance	Condition Assessment[3]	Potential impacts	Possible mitigation measures
H14	Boundary	24	Highly significant (**Heritage Hedgerow**). Scores ≥16 in all appraisal categories; scores 4 in Historical significance category as part of the 'Pale boundary' and scores 4 for ground flora significance and association with a stream.	Unfavourable Scores 22/24 overall but unfavourable tree species >10% cover.	No direct habitat loss. Potential disturbance to ground flora on bank by people accessing the hedgerow. No shading impacts as there is a 'habitat creation area' between the houses and the hedgerow.	Protect hedgerow and bank during construction (e.g. by temporary fencing of hedgerow and root protection zone). Planting adjacent to the hedgerow should include dense thorny species such as Holly *Ilex aquifolium* to reduce public access to hedge bank. Interpretative signs to people of the historical significance of the hedgerow.
H15	Internal	12	Moderately significant	Favourable Scores 23/24 overall	Two thirds of the hedgerow will be lost. However, one third of the hedgerow will be retained. This is the section that has the most mature trees and is the most ecologically valuable.	Protect hedgerow to be retained during construction (e.g. by temporary fencing of hedgerow and root protection zone) during construction. Incorporate native scrub species into planting scheme. Retain boundary hedgerows to maintain ecological corridor around the site.
H16	Internal	12	Moderately significant	Favourable Scores 19/24 overall	Three quarters of the hedgerow will be lost. However, one quarter of hedgerow will be retained, where it links into the Heritage Hedgerows H14 and H17. Drainage channel will be retained as an open channel and is likely to increase in diversity, as it is currently heavily shaded.	Protect hedgerow to be retained during construction (e.g. by temporary fencing of hedgerow and root protection zone) during construction. Water channel should be designed to be as natural as possible and accessible by fauna. If possible allow the channel to colonise naturally with native species. If planting is required then avoid any invasive plants/ material potentially contaminated with invasive plants as this channel links to Ballyogan stream below.

ID	Internal/ boundary[1]	Appraisal Score[2]	Hedgerow Significance	Condition Assessment[3]	Potential impacts	Possible mitigation measures
H17	Internal	16	Highly significant (**Heritage Hedgerow**). Scores ≥16 in all appraisal categories; scores 4 in Historical significance category as part of the 'Pale boundary'	Favourable Scores 22/24 overall	A section of c50m is to be removed for bridge construction. There will be a temporary bridge during construction and a permanent bridge during operation. The bridge will create a permanent gap (c30m) in the hedgerow with the loss of the hedgebank in the bridge location	Protect hedgerow to be retained during construction (e.g. by temporary fencing of hedgerow and root protection zone) during construction. Planting around and under the bridge of suitable low native shrubs to provide a corridor linking the hedgerow either side of the bridge.
H20	Internal	11	Low significance	Favourable Scores 23/24 overall	Entire hedgerow will be lost	Incorporate native scrub species into planting scheme. Retain and enhance boundary hedgerows to maintain ecological corridor around the site.
H21	Internal	10	Low significance	Favourable Scores 20/24 overall	Entire hedgerow will be lost	Incorporate native scrub species into planting scheme. Retain and enhance boundary hedgerows to maintain ecological corridor around the site.
H22	Internal	20	Highly significant (**Heritage Hedgerow**). Scores ≥16 in all appraisal categories; scores ≥6 in historical significance category. Also associated with tufa forming spring.	Favourable Scores 24/24 overall	Entire hedgerow and spring will be lost. Not possible to retain spring as ground levels will be altered in this area.	Incorporate native scrub species into planting scheme. Retain and enhance boundary hedgerows to maintain ecological corridor around the site. No mitigation possible in relation to spring, but natural water features will be present on site.
H23	Boundary	Included with H27				
H24	Internal	9	Low significance	Unfavourable Scores 18/24 overall	Entire hedgerow will be lost	Incorporate native scrub species into planting scheme. Retain and enhance boundary hedgerows to maintain ecological corridor around the site.

ID	Internal/ boundary[1]	Appraisal Score[2]	Hedgerow Significance	Condition Assessment[3]	Potential impacts	Possible mitigation measures
H25	Internal	15	Moderately significant	Favourable Scores 20/24 overall	Entire hedgerow will be lost but drainage channel will be retained as open channel flowing to channel in H16 and providing a corridor across the site. The channel is likely to increase in diversity as currently heavily shaded.	Water channel should be designed to be as natural as possible and accessible by fauna. If possible allow the channel to colonise naturally with native species. If planting is required then avoid any invasive plants/ material potentially contaminated with invasive plants as this channel links to Ballyogan stream below.
H26	Internal	7	Low significance	Favourable Scores 18/24 overall	Entire hedgerow will be lost	Incorporate native scrub species into planting scheme. Retain and enhance boundary hedgerows to maintain ecological corridor around the site.
H27	Boundary	19	Highly significant (**Heritage Hedgerow**). Scores ≥16 in all appraisal categories; scores 4 in historical significance category	Favourable Scores 23/24 overall	No direct habitat loss. Need to ensure no damage during construction and that disturbance is minimised during operation. Potential for impacts to water quality in drainage ditch/ stream during construction and operation (e.g. changes to water quality and quantity).	Protect hedgerow and bank during construction (e.g. by temporary fencing of hedgerow and root protection zone). Standard mitigation measures to protect watercourses from pollution during construction (see EIAR, Chapter 8). Surface water system incorporating SuDS included in design to prevent operational impacts to water quality and quantity.
H28	Boundary	17	Highly significant (**Heritage Hedgerow**). Scores ≥16 in all appraisal categories; scores 4 in historical significance category	Favourable Scores 23/24 overall	A section of c30m is to be removed for road access and the hedgerow will be shortened at the southern end (c10m) for greenway access. This will create a permanent gap (c30m) in the hedgerow.	Protect hedgerow and bank during construction (e.g. by temporary fencing of hedgerow and root protection zone). Not possible to provide planting to link the hedgerow as the access road is not a bridge with a gap underneath.
H29	Boundary	10 (estimated[4])	Low significance	Favourable (estimated[4]) Scores 21/24 overall	Entire hedgerow will be lost	Incorporate native scrub species into planting scheme. Retain and enhance boundary hedgerows to maintain ecological corridor around the site.

ID	Internal/ boundary[1]	Appraisal Score[2]	Hedgerow Significance	Condition Assessment[3]	Potential impacts	Possible mitigation measures
H31	Internal	6	Low significance	Favourable Scores 21/24 overall	Entire hedgerow will be lost	Incorporate native scrub species into planting scheme. Retain and enhance boundary hedgerows to maintain ecological corridor around the site.
H32	Boundary	n/a	n/a	n/a	No direct habitat loss. Need to ensure no damage during construction and that disturbance is minimised during operation.	Protect hedgerow and bank during construction (e.g. by temporary fencing of hedgerow and root protection zone).
H34	Boundary	23	Highly significant (**Heritage Hedgerow**). Scores ≥16 in all appraisal categories; scores 4 in structural significance category	Unfavourable Scores 23/24 overall but alien invasive species (*Lysichiton americanus*[5]) present	A section of c50m is to be removed for bridge construction. There will be a temporary bridge during construction and a permanent bridge during operation. The bridge will prevent trees regenerating, which will create a permanent canopy gap, but ground flora will continue under bridge providing an ecological link. The bridge structures will be set back from the stream to avoid damage to the stream and ground flora. There will be no diversion of the stream during construction.	Protect hedgerow to be retained, watercourse and ground flora in the vicinity of the bridge construction zone (e.g. by temporary fencing of hedgerow and root protection zone) during construction. Minimise disturbance to ground flora and bank under the bridge and, if possible, allow natural recolonisation of hedgerow flora. Create management plan to control and prevent spread of *Lysichiton americanus* during and after construction. This should include a pre-construction survey of this hedgerow.

[1]Internal hedgerow or boundary hedgerow in relation to the Phase 2 site
[2]Maximum possible score = 40
[3]Maximum possible score = 24
[4]No 30m section surveyed as originally included with H28. However, of lower significance than H28 due to lower hedgerow height, local dominance of *Rubus fruticosus* agg., proximity of fence and houses on NW side and presence of non-native planted trees near fence.
[5]Listed on Invasive Alien Species of Union concern (3 Aug 2016)

Figure 3.1. Map showing Hedgerow Significance

3.2 Impact on tufa forming spring in Hedgerow H22

The tufa forming (calcareous) spring in Hedgerow H22 is considered to have affinity to the Annex I priority habitat 'Petrifying springs with tufa formation', but not to be a good example of this habitat (Appendix A). The field boundary has been present since at least 1843 and the hedgerow is also likely to be this age. However, there is only a small amount of tufa present in the spring and only a small amount of one species (the bryophyte *Cratoneuron filicinum*) typical of the Annex I priority habitat (Appendix A). There were no signs of degradation in the spring, so it is considered to be in a good condition but naturally species-poor, presumably due to shading within the hedgerow. There is no significant tufa formation (e.g. cascade or stream crust), which might be expected from an older spring. This may be due to spring flow, chemistry and shading.

The spring is located in an area that will be a corridor of open landscaped ground running roughly the line of the current hedgerow H22. Soil excavation will be required in the area of the spring for the proposed underground surface water attenuation system (EIAR, Chapters 7 and 8). Soil excavation will not be deep enough to impact the underlying bedrock. However, the upper 300mm of topsoil will be stripped in the initial development of the site and excavation for the proposed surface water storage structures will be up to approximately 750mm below existing ground level. For this reason it will not be possible to retain and protect the spring during construction. It is unlikely to arise in the same location post construction due to the changes in land levels. There is no possible mitigation with the current development design. Therefore the worst-case scenario has been assumed that this spring will be permanently lost.

The spring does not correspond to the Annex I priority habitat, although it is possible that if it were located in the open (and unshaded), it would develop a typical tufa spring flora. However, it is still of biodiversity importance as a tufa forming spring. Tufa springs are fairly frequent in Co. Dublin and

there are excellent examples at nearby Special Areas of Conservation (SACs): Glenasmole Valley SAC (c 10km W); Ballyman Glen SAC (c5.5km SE) and Knocksink Wood SAC (c4.5km S). Within a 5km radius of the Phase 2 site spring, there are two known main areas of tufa springs (undesignated) at Bride's Glen/ Ticknick (c3km SE) and Cherrywood (3.5km E). One of the Cherrywood springs is considered an excellent example of the Annex I priority habitat. The loss of the spring at the Phase 2 spring would therefore not be a significant impact at a county level, but would be a **permanent, significant negative impact at a local level**.

3.3 Site level assessment of impacts on hedgerows

3.3.1 Low Significance Hedgerows

The proposed development will result in the loss of five hedgerows considered to be of low significance (H20, H21, H24, H26 and H31; Table 3.1 and Figure 3.1). Although these are of low significance, they do provide wildlife habitat and act as a corridor for movement. Their loss would be considered to be a probable **permanent, significant negative impact at a site level**. However, if the boundary hedges are enhanced and maintained and there is sufficient replacement native scrub planting on the site, then there would be **no residual impact** from the loss of these hedgerows.

3.3.2 Moderate Significance Hedgerows

The proposed development will result in the loss of part/ all three hedgerows considered to be of moderate significance (H15, H16 and H25; Table 3.1 and Figure 3.1). One quarter of H15 and one third of H16 will be retained; these are the sections with the most mature trees in these hedgerows. All of H25 will be lost, but the drainage channel associated with H25 and H16 will be maintained as an open channel. The loss of these hedgerows would be considered to be a probable **permanent, significant negative impact at a local level**. However, the drainage channel is currently of low diversity as it is heavily shaded and opening it up is likely to be a probable **positive permanent impact** on the channel. If the water channel is suitably designed (see Table 3.1); the boundary hedges are enhanced and maintained and there is sufficient replacement native scrub planting on the site, then there would be a probable **permanent, significant negative impact at a site level**.

3.3.3 High Significance Hedgerows

There are six high significance hedgerows (Heritage Hedgerows) on the Phase 2 site. Of these, two **H14, H27** (including H23) will have no direct habitat loss and appropriate enhancement and management will be undertaken. Enhancement planting should include thorny or spiny species such as *Ilex aquifolium, Prunus spinosa* and native *Rosa* sp. to protect the hedgerows from recreational access/ disturbance. Therefore there will be **no significant impacts** to these hedgerows.

One hedgerow (**H28**) will have a canopy gap created of c30m. This is required to allow the Planning Authority to provide an access road connecting Clay Farm Phase 2 to the adjacent Cruagh Wood development (this access is part of the requirements of the planning permission for the Cruagh Wood development). In addition, c10m is required to allow the Planning Authority to develop the proposed greenway from the Clay Farm Phase 2 boundary through to Cruagh Wood. The latter opening will be located close to the existing gateway, in an area that is already disturbed. This may shorten the hedgerow, but will not create an actual gap in the hedgerow. The creation of the c30m gap to allow access to Cruagh Wood will result in a permanent gap with loss of hedgerow, ground flora and bank. In the east of the site, two hedgerows (**H17** and **H34**) will have a canopy gap (c50m) created during construction for temporary (construction) and permanent (operation) bridges which may also cause disturbance to ground flora. After construction, planting should reduce the canopy gap to c30m. **H34**: The temporary bridge will be raised to reduce disturbance to the hedgerow ground flora, stream and hedge bank in H34. The permanent bridge through H34 will have a 3m minimum clearance above the stream. Although this will not be high enough for trees to grow under, low scrub and ground flora should persist under the bridge maintaining the wildlife corridor. During construction there is a risk of non-native alien species spread, and during operation the hedgerow will be at risk from recreational use and disturbance. **H17**: The bridge over H17 will not be

raised above the hedge bank due to ground levels in this area. The bridge will create a permanent gap in the hedgerow ground flora and canopy and a section of bank ('Pale ditch') will be lost in this area. Suitable planting of low native shrubs at the edges and under the bridge will provide a link between the hedgerow sections either side of the bridge gap. The ground flora was relatively species-poor in this hedgerow and its local loss is not considered significant. During operation there is a risk of disturbance/ damage to the hedgerows from recreational use and disturbance. In the absence of mitigation, there would be a probable **permanent, significant negative impact at a local level** on these hedgerows. However, the hedgerows to be retained will be protected during construction (including an invasive species management plan for H34), the stream and ground flora in H34 will be protected during bridge construction and suitable planting will maintain a wildlife corridor (although not a hedgerow). The hedgerows will be protected and enhanced as part of an 'eco-park' in this area. Additional planting to enhance the hedgerows should include thorny or spiny species such as *Ilex aquifolium, Prunus spinosa* and native *Rosa* sp. to protect the hedgerow. The creation of permanent single gaps in hedgerows **H17, H28** and **H34** that are over 5m will mean that the hedgerows will be considered to be in 'unfavourable' condition (Foulkes et al., 2013). Therefore there will be a probable **permanent, significant negative impact at a site level** on these hedgerows.
The final high significance hedgerow **H22** will be completely removed and the calcareous spring associated with it will be lost due to excavation and disturbance during construction (see Section 3.2). No mitigation is possible for the loss of the spring, although native scrub planting and enhancement to boundary hedges will offset some loss of scrub species within the hedgerow. This will therefore be a **permanent, significant negative impact at a local level**.

3.4 Overall residual impact

Hedgerow and scrub planting, protection and enhancement will mitigate some loss of hedgerow on the site and ecological corridors will be maintained around the boundary of the site. However, given the length of hedgerow that will be removed and the high significance of some of the hedgerows, the impacts cannot be completely mitigated. It is considered that there will be a **permanent, significant negative impact at a local level** as a result of the loss of hedgerow and associated habitats (e.g. spring) at this site.

REFERENCES

BBS (2009). *Checklist of British and Irish bryophytes*. The British Bryological Society, Stafford, U.K.

CIEEM (2016). *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal*, 2nd edition. Chartered Institute of Ecology and Environmental Management, Winchester.

Fossitt, J.A. (2000). *A guide to habitats in Ireland.* Heritage Council.

Foulkes, N., Fuller, J., Little, D., McCourt, S. and Murphy, P. (2013). *Hedgerow Appraisal System - Best Practise Guidance on Hedgerow Survey, Data Collation and Appraisal*. Woodlands of Ireland, Dublin. Unpublished Report.

Lockhart, N., Hodgetts, N. & Holyoak, D. (2012) *Ireland Red List No.8: Bryophytes*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

NRA (2009). *Guidelines for Assessment of Ecological Impacts of National Roads Schemes*.National Roads Authority, Dublin.

Stace, C.A. (2010). *New Flora of the British Isles.* 3rd Edition. Cambridge University Press, Cambridge.

Site name: Clay Farm Phase 2	**Hedgerow/ treeline no.:** H14
Survey date: 07/09/17	**Fossitt:** WL1

Hedgerow description:

A mature hedgerow located at the boundary of the site, which is considered likely to be part of the 'Pale boundary'. It has a grassy field to the SW and scrub/ rough grassland to the NE. The hedgerow is located on the top of a bank (3-4m high), which slopes down to the NE, where the ground level is lower. The main canopy species is *Fraxinus excelsior*, with frequent *Fagus sylvatica* and *Acer pseudoplatanus.* The bank supports woodland ground flora and has a path along the top in places. This hedgerow has the most species-rich hedgerow ground flora of all hedgerows surveyed on the Phase 2 site. Species present within/ adjacent to the hedgerow, but not included in the standard lists below, include *Cirsium arvense, Poa pratensis, Heracleum sphondylium,* and *Brachypodium sylvaticum.* Bryophytes are generally sparse with *Kindbergia praelonga* and *Plagiomnium undulatum* the most frequent. There is a dry ditch in the SE section of the hedgerow and the Ballyogan/ Barnaculla stream runs along a short section of the NW. There is some localised dumping at the base of the bank and a mature tree has been used as a swing.

Photo 1.1. Hedgerow H14 (view to N)

Photo 1.2. Large hedgebank with woodland vegetation

Favourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Alnus glutinosa			*Prunus padus*		
Betula pendula			*Prunus spinosa*	x	x
Betula pubescens			*Pyrus communis*		
Castanea sativa			*Quercus petraea*		
*Clematis vitalba**			*Quercus robur*		
Cornus sanguinea			*Rhamnus catharticus*		
Corylus avellana	x	x	*Rosa* sp.	x	x
Crataegus monogyna	x	x	*Rubus fruticosus* agg.*	x	x
Cytisus scoparius			*Rubus idaeus*		
Euonymus europaeus			*Salix aurita*		
Fraxinus excelsior	x	x	*Salix caprea*		
Hedera helix	x	x	*Salix cinerea oleifolia*		
Ilex aquifolium	x	x	*Salix pentandra*		
Juglans regia			*Salix triandra*		
Ligustrum vulgare			*Sambucus nigra*	x	x
Lonicera periclymenum			*Solanum dulcamara*		
Malus domestica			*Sorbus aria*		
Malus sylvestris			*Sorbus hibernica*		
Myrica gale			*Sorbus aucuparia*		
Pinus sylvestris			*Taxus baccata*		

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Populus nigra			*Ulex europaeus*		
Populus tremula			*Ulmus glabra*		x
Prunus avium			*Ulmus procera*		
Prunus cerasus			*Viburnum opulus*		
Prunus domestica					

*****Not included in original species list by Foulkes et al. (2013)

Unfavourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
All coniferous species*			*Lonicera nitida*		
Acer campestre			*Populus alba*		
Acer pseudoplatanus	x		*Prunus laurocerasus*		
Aesculus hippocastanum			*Salix alba*		
Carpinus betulus			*Salix fragilis*		
Clematis alba			*Prunus laurocerasus*		
Fagus sylvatica			*Syringa vulgaris*		
Fuchsia magellanica			*Tilia* spp.		
Laburnum anagyroides			*Viburnum lantana*		
Ligustrum ovalifolium					

*except *Pinus sylvestris*

Herbaceous Ground Flora

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Ajuga reptans			*Lapsana communis*		
Alliaria petiolata			*Lathraea squamaria*		
Allium ursinum			*Luzula sylvatica*		
Anemone nemorosa			*Lysimachia nemorum*		
Anthriscus sylvestris	x	x	*Neottia nidus-avis*		
Arum maculatum			*Oxalis acetosella*	x	x
Chrysosplenium oppositifolium			*Potentilla sterilis*		
Conopodium majus			*Primula vulgaris*	x	x
Digitalis purpurea			*Sanicula europaea*		
Epipactis helleborine			*Stachys sylvatica*		
Ficaria verna			*Stellaria holostea*		
Fragaria vesca			*Veronica montana*		
Galium odoratum			*Viola* spp.	x	x
Geranium robertianum	x	x			
Geum urbanum	x	x			
Glechoma hederacea	x	x			
Hyacinthoides non-scripta					
Hypericum androsaemum	x	x			

Ferns and allies

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Asplenium scolopendrium	x		*Dryopteris aemula*		
Athyrium lix-femina			*Dryopteris carthusiana*		
Blechnum spicant			*Polystichum setiferum*		x
Dryopteris filix-mas			*Polypodium spp.*		
Dryopteris dilatata			*Equisetum telmateia*		
Dryopteris affinis			*Equisetum sylvaticum*		

Hedgerow significance assessment

0	1	2	3	4
Low significance	**Slightly significant**	**Moderately significant**	**Significant**	**Highly significant**
Historical Significance				
Recently Established (0-25 years)	Internal Field Boundary	Roadside / Rail / Canal Boundary: Farm boundary etc	Boundary appears on 1st Edition O.S	Townland Parish / County Boundary: Shown as, or connected to, woodland on 1st Edition O.S. map: Connects to feature on Sites and Monuments Record
			3	4
	Past evidence of laying or coppicing		Non-linear (excluding roadside)	
Species Diversity Significance				
Tree / Shrub / Climber Species Count/ 30m strip:				
1-3 species	4-5 species	6-7 species	8-9 species	10+ species
			3	
Ground Flora Significance				
Dominated by ruderal species* - nettles/ docks/ thistles/ cleavers				
Species Count (from list)/ 30m strip:				
<2 species	2-3 species	4-5 species	6-7 species	>7 species
				4
Pteridophytes from list/ 30m strip:				
			3-5 species	>5 species
Structure, Construction & Associated Features				
	Wall / Bank < 0.5m (height / depth)	Wall / Bank 0.5 - 1m	Wall / Bank > 1m	Double Ditch
			3	
		Dry Ditch	Wet Ditch / Drain	Stream / River
		x		4
		Badger Sett		
		2		
		Green Lane		
Habitat Connectivity Significance				
No connection with other semi-natural habitat	Single link with semi-natural habitat including hedgerow	Multiple links with semi-natural habitats, including other hedgerows	Link with woodland / forest habitat	Link with designated area, particularly woodland
		2		
Landscape Significance				
	Wind shaped	Mature Hedgerow Trees		Area covered by Landscape designation
		2		
Other factors of significance				
Considered likely to be part of the 'Pale boundary' = Historical significance				
				Total Signficance Score = 24

Hedgerow condition assessment

	0 **Unfavourable**	1 **Adequate**	2 **Favourable**	3 **Highly favourable**
Structural variables				
Height	<1.5m	1.5 - 2.5m	2.5 - 4m	>4m
				3
Width	<1m	1 - 2m	2 - 3m	>3m
				3
Profile	Remnant; Derelict	Wind-shaped; Losing base structure	Boxed / A-shaped; Straight sided	Overgrown; Top heavy/ undercut; Outgrowths at base
				3
Basal density / porosity to light of woody shrubs	Open	Semi-translucent	Semi-opaque	Opaque / Dense
				3
Continuity				
% gaps	>10%	5-10%	<5%	Continuous
				3
Specific gaps	Individual Gap > 5m	Individual gap <5m	No gaps	No gaps
				3
Negative Indicators/ Degradation / Issues affecting long-term viability				
Bank / Wall	>20% of the length of the hedge degraded	<20% of the length of the hedge degraded	Minor degradation	No degradation
				3
% of canopy dominated by Ivy	>25%			
Unfavourable species composition: % woody growth volume comprised of unfavourable species	>10%			
	0			
Ground Flora / Hedge Base: % ground layer showing evidence of Herbicide Use	>20%			
Ground Flora / Hedge Base: % Noxious weeds/ Nutrient Rich Species	>20%			
Ground Flora / Hedge Base: Alien invasive species	Present			
Degraded Margin	Ploughing up to base of hedge shrubs or Poaching/erosion		(grassy) margin (2 m or greater on one side of the hedge)	(grassy) margins (2 m or greater on both sides of the hedge)
			2	
				Total Condition Assessment Score = 22

Site name: Clay Farm Phase 2	**Hedgerow/ treeline no.:** H15
Survey date: 07/09/17	**Fossitt:** WL1

Hedgerow description:

A mature hedgerow located in the north of the site. There are frequent mature trees (*Fraxinus excelsior* dominant), which become more dominant in the hedgerow towards the site boundary. The hedgerow grades into a line of *Rubus fruticosus* agg. scrub on the NE side, which runs most of the length of the hedgerow with *Ulex europaeus* also becoming abundant in the S. Presumably this results from lack of management. On the SW side of the hedgerow the field is grazed by horses (3) and these have reduced scrub on this side of the hedgerow. However the hedgerow is not overgrazed or damaged in this area. There was no ground flora recorded from the hedgerow, this is probably because of the dense *Rubus fruticosus* agg. shading the ground.

Photo 2.2. Hedgerow H15 (view to NW)

Photo 2.2. Hedgebank c1m high with dry ditch

Favourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Alnus glutinosa			*Prunus padus*		
Betula pendula			*Prunus spinosa*		x
Betula pubescens			*Pyrus communis*		
Castanea sativa			*Quercus petraea*		
*Clematis vitalba**		x	*Quercus robur*		
Cornus sanguinea			*Rhamnus catharticus*		
Corylus avellana			*Rosa* sp.	x	x
Crataegus monogyna	x	x	*Rubus fruticosus* agg.*	x	x
Cytisus scoparius			*Rubus idaeus*		
Euonymus europaeus			*Salix aurita*		
Fraxinus excelsior	x	x	*Salix caprea*		
Hedera helix			*Salix cinerea oleifolia*		
Ilex aquifolium		x	*Salix pentandra*		
Juglans regia			*Salix triandra*		
Ligustrum vulgare			*Sambucus nigra*	x	x
Lonicera periclymenum			*Solanum dulcamara*		
Malus domestica			*Sorbus aria*		
Malus sylvestris			*Sorbus hibernica*		
Myrica gale			*Sorbus aucuparia*		
Pinus sylvestris			*Taxus baccata*		
Populus nigra			*Ulex europaeus*	x	x

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Populus tremula			*Ulmus glabra*		
Prunus avium			*Ulmus procera*		
Prunus cerasus			*Viburnum opulus*		
Prunus domestica					

*****Not included in original species list by Foulkes et al. (2013)

Unfavourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
All coniferous species*			*Lonicera nitida*		
Acer campestre			*Populus alba*		
Acer pseudoplatanus		x	*Prunus laurocerasus*		
Aesculus hippocastanum			*Salix alba*		
Carpinus betulus			*Salix fragilis*		
Clematis alba			*Prunus laurocerasus*		
Fagus sylvatica			*Syringa vulgaris*		
Fuchsia magellanica			*Tilia* spp.		
Laburnum anagyroides			*Viburnum lantana*		
Ligustrum ovalifolium					

*except *Pinus sylvestris*

Herbaceous Ground Flora

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Ajuga reptans			*Lapsana communis*		
Alliaria petiolata			*Lathraea squamaria*		
Allium ursinum			*Luzula sylvatica*		
Anemone nemorosa			*Lysimachia nemorum*		
Anthriscus sylvestris			*Neottia nidus-avis*		
Arum maculatum			*Oxalis acetosella*		
Chrysosplenium oppositifolium			*Potentilla sterilis*		
Conopodium majus			*Primula vulgaris*		
Digitalis purpurea			*Sanicula europaea*		
Epipactis helleborine			*Stachys sylvatica*		
Ficaria verna			*Stellaria holostea*		
Fragaria vesca			*Veronica montana*		
Galium odoratum			*Viola* spp.		
Geranium robertianum					
Geum urbanum					
Glechoma hederacea					
Hyacinthoides non-scripta					
Hypericum androsaemum					

Ferns and allies

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Asplenium scolopendrium		x	*Dryopteris aemula*		
Athyrium lix-femina			*Dryopteris carthusiana*		
Blechnum spicant			*Polystichum setiferum*		x
Dryopteris filix-mas		x	*Polypodium spp.*		
Dryopteris dilatata			*Equisetum telmateia*		
Dryopteris affinis			*Equisetum sylvaticum*		

Hedgerow significance assessment

0	1	2	3	4
Low significance	**Slightly significant**	**Moderately significant**	**Significant**	**Highly significant**
Historical Significance				
Recently Established (0-25 years)	Internal Field Boundary	Roadside / Rail / Canal Boundary: Farm boundary etc	Boundary appears on 1st Edition O.S	Townland Parish / County Boundary: Shown as, or connected to, woodland on 1st Edition O.S. map: Connects to feature on Sites and Monuments Record
			3	
	Past evidence of laying or coppicing		Non-linear (excluding roadside)	
Species Diversity Significance				
Tree / Shrub / Climber Species Count/ 30m strip:				
1-3 species	4-5 species	6-7 species	8-9 species	10+ species
		2		
Ground Flora Significance				
Dominated by ruderal species* - nettles/ docks/ thistles/ cleavers				
Species Count (from list)/ 30m strip:				
<2 species	2-3 species	4-5 species	6-7 species	>7 species
0				
Pteridophytes from list/ 30m strip:				
			3-5 species	>5 species
Structure, Construction & Associated Features				
	Wall / Bank < 0.5m (height / depth)	Wall / Bank 0.5 - 1m	Wall / Bank > 1m	Double Ditch
			3	
		Dry Ditch	Wet Ditch / Drain	Stream / River
		2		
		Badger Sett		
		Green Lane		
Habitat Connectivity Significance				
No connection with other semi-natural habitat	Single link with semi-natural habitat including hedgerow	Multiple links with semi-natural habitats, including other hedgerows	Link with woodland / forest habitat	Link with designated area, particularly woodland
		2		
Landscape Significance				
	Wind shaped	Mature Hedgerow Trees		Area covered by Landscape designation
		2		
Other factors of significance				
				Total Signficance Score = 12

Hedgerow condition assessment

	0 Unfavourable	1 Adequate	2 Favourable	3 Highly favourable
Structural variables				
Height	<1.5m	1.5 - 2.5m	2.5 - 4m	>4m
			2	
Width	<1m	1 - 2m	2 - 3m	>3m
				3
Profile	Remnant; Derelict	Wind-shaped; Losing base structure	Boxed / A-shaped; Straight sided	Overgrown; Top heavy/ undercut; Outgrowths at base
				3
Basal density / porosity to light of woody shrubs	Open	Semi-translucent	Semi-opaque	Opaque / Dense
				3
Continuity				
% gaps	>10%	5-10%	<5%	Continuous
				3
Specific gaps	Individual Gap > 5m	Individual gap <5m	No gaps	No gaps
				3
Negative Indicators/ Degradation / Issues affecting long-term viability				
Bank / Wall	>20% of the length of the hedge degraded	<20% of the length of the hedge degraded	Minor degradation	No degradation
				3
% of canopy dominated by Ivy	>25%			
Unfavourable species composition: % woody growth volume comprised of unfavourable species	>10%			
Ground Flora / Hedge Base: % ground layer showing evidence of Herbicide Use	>20%			
Ground Flora / Hedge Base: % Noxious weeds/ Nutrient Rich Species	>20%			
Ground Flora / Hedge Base: Alien invasive species	Present			
Degraded Margin	Ploughing up to base of hedge shrubs or Poaching/erosion		(grassy) margin (2 m or greater on one side of the hedge)	(grassy) margins (2 m or greater on both sides of the hedge)
				3
				Total Condition Assessment Score = 23

Site name: Clay Farm Phase 2	**Hedgerow/ treeline no.:** H16
Survey date: 07/09/17	**Fossitt:** WL1

Hedgerow description:

A mature hedgerow located towards the NE of the site and joining to hedgerows H14 and H17, which are considered likely to be part of the Pale Boundary. Mature trees are frequent, with *Fraxinus excelsior* dominant. Some of the mature trees have high cover of *Hedera helix* on their trunks. The hedgerow slopes down to the NE. The understorey is dense and the ground flora difficult to access and species-poor due to shading. Some old edition OSI maps and data from the EPA (http://gis.epa.ie/Envision) show a stream arising at the SW end of H25, which then flows down through H16 to the Ballyogan/ Barnaculla Stream. No stream/ wet ditch was recorded within H16, but the centre of the hedgerow was difficult to access due to a dense understorey. The watercourse in this hedgerow is currently classified as a wet ditch (DLRCC Water and Drainage Department).

Photo 3.1. Hedgerow H14 (view to NE)

Photo 3.2. Gap in hedgerow, towards SW end

Favourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Alnus glutinosa			*Prunus padus*		
Betula pendula			*Prunus spinosa*	x	x
Betula pubescens			*Pyrus communis*		
Castanea sativa			*Quercus petraea*		
*Clematis vitalba**	x	x	*Quercus robur*		
Cornus sanguinea			*Rhamnus catharticus*		
Corylus avellana			*Rosa* sp.		
Crataegus monogyna	x	x	*Rubus fruticosus* agg.*	x	x
Cytisus scoparius			*Rubus idaeus*		
Euonymus europaeus			*Salix aurita*		
Fraxinus excelsior	x	x	*Salix caprea*		x
Hedera helix	x	x	*Salix cinerea oleifolia*		
Ilex aquifolium			*Salix pentandra*		
Juglans regia			*Salix triandra*		
Ligustrum vulgare			*Sambucus nigra*		x
Lonicera periclymenum			*Solanum dulcamara*		
Malus domestica			*Sorbus aria*		
Malus sylvestris			*Sorbus hibernica*		
Myrica gale			*Sorbus aucuparia*		
Pinus sylvestris			*Taxus baccata*		
Populus nigra			*Ulex europaeus*		
Populus tremula			*Ulmus glabra*		

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Prunus avium			*Ulmus procera*		
Prunus cerasus			*Viburnum opulus*		
Prunus domestica					

*Not included in original species list by Foulkes et al. (2013)

Unfavourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
All coniferous species*			*Lonicera nitida*		
Acer campestre			*Populus alba*		
Acer pseudoplatanus			*Prunus laurocerasus*		
Aesculus hippocastanum			*Salix alba*		
Carpinus betulus			*Salix fragilis*		
Clematis alba			*Prunus laurocerasus*		
Fagus sylvatica			*Syringa vulgaris*		
Fuchsia magellanica			*Tilia* spp.		
Laburnum anagyroides			*Viburnum lantana*		
Ligustrum ovalifolium					

*except *Pinus sylvestris*

Herbaceous Ground Flora

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Ajuga reptans			*Lapsana communis*		
Alliaria petiolata			*Lathraea squamaria*		
Allium ursinum			*Luzula sylvatica*		
Anemone nemorosa			*Lysimachia nemorum*		
Anthriscus sylvestris			*Neottia nidus-avis*		
Arum maculatum			*Oxalis acetosella*		
Chrysosplenium oppositifolium			*Potentilla sterilis*		
Conopodium majus			*Primula vulgaris*		
Digitalis purpurea			*Sanicula europaea*		
Epipactis helleborine			*Stachys sylvatica*		x
Ficaria verna			*Stellaria holostea*		
Fragaria vesca			*Veronica montana*		
Galium odoratum			*Viola* spp.		
Geranium robertianum					
Geum urbanum					
Glechoma hederacea					
Hyacinthoides non-scripta					
Hypericum androsaemum					

Ferns and allies

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Asplenium scolopendrium			*Dryopteris aemula*		
Athyrium lix-femina			*Dryopteris carthusiana*		
Blechnum spicant			*Polystichum setiferum*		
Dryopteris filix-mas			*Polypodium spp.*		
Dryopteris dilatata			*Equisetum telmateia*		
Dryopteris affinis			*Equisetum sylvaticum*		

Hedgerow significance assessment

0	1	2	3	4
Low significance	**Slightly significant**	**Moderately significant**	**Significant**	**Highly significant**
Historical Significance				
Recently Established (0-25 years)	Internal Field Boundary	Roadside / Rail / Canal Boundary: Farm boundary etc	Boundary appears on 1st Edition O.S	Townland Parish / County Boundary: Shown as, or connected to, woodland on 1st Edition O.S. map: Connects to feature on Sites and Monuments Record
			3	
	Past evidence of laying or coppicing		Non-linear (excluding roadside)	
Species Diversity Significance				
Tree / Shrub / Climber Species Count/ 30m strip:				
1-3 species	4-5 species	6-7 species	8-9 species	10+ species
		2		
Ground Flora Significance				
Dominated by ruderal species* - nettles/ docks/ thistles/ cleavers				
Species Count (from list)/ 30m strip:				
<2 species	2-3 species	4-5 species	6-7 species	>7 species
0				
Pteridophytes from list/ 30m strip:				
			3-5 species	>5 species
Structure, Construction & Associated Features				
	Wall / Bank < 0.5m (height / depth)	Wall / Bank 0.5 - 1m	Wall / Bank > 1m	Double Ditch
		Dry Ditch	Wet Ditch / Drain	Stream / River
			3	
		Badger Sett		
		Green Lane		
Habitat Connectivity Significance				
No connection with other semi-natural habitat	Single link with semi-natural habitat including hedgerow	Multiple links with semi-natural habitats, including other hedgerows	Link with woodland / forest habitat	Link with designated area, particularly woodland
		2		
Landscape Significance				
	Wind shaped	Mature Hedgerow Trees		Area covered by Landscape designation
		2		
Other factors of significance				
				Total Signficance Score = 12

Hedgerow condition assessment

	0 Unfavourable	1 Adequate	2 Favourable	3 Highly favourable
Structural variables				
Height	<1.5m	1.5 - 2.5m	2.5 - 4m	>4m
			2	
Width	<1m	1 - 2m	2 - 3m	>3m
			2	
Profile	Remnant; Derelict	Wind-shaped; Losing base structure	Boxed / A-shaped; Straight sided	Overgrown; Top heavy/ undercut; Outgrowths at base
				3
Basal density / porosity to light of woody shrubs	Open	Semi-translucent	Semi-opaque	Opaque / Dense
				3
Continuity				
% gaps	>10%	5-10%	<5%	Continuous
			2	
Specific gaps	Individual Gap > 5m	Individual gap <5m	No gaps	No gaps
		1		
Negative Indicators/ Degradation / Issues affecting long-term viability				
Bank / Wall	>20% of the length of the hedge degraded	<20% of the length of the hedge degraded	Minor degradation	No degradation
				3
% of canopy dominated by Ivy	>25%			
Unfavourable species composition: % woody growth volume comprised of unfavourable species	>10%			
Ground Flora / Hedge Base: % ground layer showing evidence of Herbicide Use	>20%			
Ground Flora / Hedge Base: % Noxious weeds/ Nutrient Rich Species	>20%			
Ground Flora / Hedge Base: Alien invasive species	Present			
Degraded Margin	Ploughing up to base of hedge shrubs or Poaching/erosion		(grassy) margin (2 m or greater on one side of the hedge)	(grassy) margins (2 m or greater on both sides of the hedge)
				3
				Total Condition Assessment Score = 19

Site name: Clay Farm Phase 2	**Hedgerow/ treeline no.:** H17
Survey date: 07/09/17	**Fossitt:** WL1

Hedgerow description:

A mature hedgerow located at the boundary of the site, which is considered likely to be part of the 'Pale boundary'. The hedgerow is located on the top of a bank, which slopes down to the NE, where the ground level is lower. Mature trees (mainly *Fraxinus excelsior*) are abundant, with locally frequent *Hedera helix* on some trees. There is a grassy field (regular cut or mown) to the SW and an unmanaged, overgrown field with wet grassland in a depression to the NE. The ground flora is relatively species-poor with dense *Hedera helix*. Species present within/ adjacent to the hedgerow, but not included in the standard lists below, include *Cirsium arvense, Centaurea nigra, Holcus lanatus, Poa pratensis, Potentilla reptans, Plantago lanceolata, Ranunculus repens, Trifolium pratense, Urtica dioica* and *Vicia sepium.* The non-native shrub *Symphoricarpos albus* was present occasionally. Bryophytes are generally sparse with *Kindbergia praelonga* and *Oxyrhynchium hians* the most frequent.

Photo 4.1. Hedgerow H17 (view to SE from W side)

Photo 4.2. Dense *Hedera helix* in groundflora

Favourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Alnus glutinosa			*Prunus padus*		
Betula pendula			*Prunus spinosa*	x	x
Betula pubescens			*Pyrus communis*		
Castanea sativa			*Quercus petraea*		
*Clematis vitalba**	x	x	*Quercus robur*		
Cornus sanguinea			*Rhamnus catharticus*		
Corylus avellana			*Rosa* sp.	x	x
Crataegus monogyna	x	x	*Rubus fruticosus* agg.*	x	x
Cytisus scoparius			*Rubus idaeus*		
Euonymus europaeus			*Salix aurita*		
Fraxinus excelsior	x	x	*Salix caprea*		x
Hedera helix	x	x	*Salix cinerea oleifolia*		
Ilex aquifolium	x	x	*Salix pentandra*		
Juglans regia			*Salix triandra*		
Ligustrum vulgare			*Sambucus nigra*	x	x
Lonicera periclymenum			*Solanum dulcamara*		
Malus domestica			*Sorbus aria*		
Malus sylvestris			*Sorbus hibernica*		
Myrica gale			*Sorbus aucuparia*		
Pinus sylvestris			*Taxus baccata*		
Populus nigra			*Ulex europaeus*		

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Populus tremula			*Ulmus glabra*		x
Prunus avium			*Ulmus procera*		
Prunus cerasus			*Viburnum opulus*		
Prunus domestica					

*****Not included in original species list by Foulkes et al. (2013)

Unfavourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
All coniferous species*			*Lonicera nitida*		
Acer campestre			*Populus alba*		
Acer pseudoplatanus		x	*Prunus laurocerasus*		
Aesculus hippocastanum			*Salix alba*		
Carpinus betulus			*Salix fragilis*		
Clematis alba			*Prunus laurocerasus*		
Fagus sylvatica			*Syringa vulgaris*		
Fuchsia magellanica			*Tilia* spp.		
Laburnum anagyroides			*Viburnum lantana*		
Ligustrum ovalifolium					

*except *Pinus sylvestris*

Herbaceous Ground Flora

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Ajuga reptans			*Lapsana communis*		
Alliaria petiolata			*Lathraea squamaria*		
Allium ursinum			*Luzula sylvatica*		
Anemone nemorosa			*Lysimachia nemorum*		
Anthriscus sylvestris			*Neottia nidus-avis*		
Arum maculatum			*Oxalis acetosella*		
Chrysosplenium oppositifolium			*Potentilla sterilis*		
Conopodium majus			*Primula vulgaris*		
Digitalis purpurea			*Sanicula europaea*		
Epipactis helleborine			*Stachys sylvatica*		
Ficaria verna			*Stellaria holostea*		
Fragaria vesca			*Veronica montana*		
Galium odoratum			*Viola* spp.		
Geranium robertianum					
Geum urbanum					
Glechoma hederacea					
Hyacinthoides non-scripta					
Hypericum androsaemum					

Ferns and allies

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Asplenium scolopendrium	x	x	*Dryopteris aemula*		
Athyrium lix-femina			*Dryopteris carthusiana*		
Blechnum spicant			*Polystichum setiferum*		
Dryopteris filix-mas			*Polypodium spp.*		
Dryopteris dilatata			*Equisetum telmateia*		
Dryopteris affinis			*Equisetum sylvaticum*		

Hedgerow significance assessment

0	1	2	3	4
Low significance	**Slightly significant**	**Moderately significant**	**Significant**	**Highly significant**
Historical Significance				
Recently Established (0-25 years)	Internal Field Boundary	Roadside / Rail / Canal Boundary: Farm boundary etc	Boundary appears on 1st Edition O.S	Townland Parish / County Boundary: Shown as, or connected to, woodland on 1st Edition O.S. map: Connects to feature on Sites and Monuments Record
				4
	Past evidence of laying or coppicing		Non-linear (excluding roadside)	
Species Diversity Significance				
Tree / Shrub / Climber Species Count/ 30m strip:				
1-3 species	4-5 species	6-7 species	8-9 species	10+ species
			3	
Ground Flora Significance				
Dominated by ruderal species* - nettles/ docks/ thistles/ cleavers				
Species Count (from list)/ 30m strip:				
<2 species	2-3 species	4-5 species	6-7 species	>7 species
0				
Pteridophytes from list/ 30m strip:				
			3-5 species	>5 species
Structure, Construction & Associated Features				
	Wall / Bank < 0.5m (height / depth)	Wall / Bank 0.5 - 1m	Wall / Bank > 1m	Double Ditch
			3	
		Dry Ditch	Wet Ditch / Drain	Stream / River
		2		
		Badger Sett		
		Green Lane		
Habitat Connectivity Significance				
No connection with other semi-natural habitat	Single link with semi-natural habitat including hedgerow	Multiple links with semi-natural habitats, including other hedgerows	Link with woodland / forest habitat	Link with designated area, particularly woodland
		2		
Landscape Significance				
	Wind shaped	Mature Hedgerow Trees		Area covered by Landscape designation
		2		
Other factors of significance				
Considered likely to be part of the 'Pale boundary' = Historical significance				
				Total Signficance Score = 16

Hedgerow condition assessment

	0 Unfavourable	1 Adequate	2 Favourable	3 Highly favourable
Structural variables				
Height	<1.5m	1.5 - 2.5m	2.5 - 4m	>4m
				3
Width	<1m	1 - 2m	2 - 3m	>3m
				3
Profile	Remnant; Derelict	Wind-shaped; Losing base structure	Boxed / A-shaped; Straight sided	Overgrown; Top heavy/ undercut; Outgrowths at base
				3
Basal density / porosity to light of woody shrubs	Open	Semi-translucent	Semi-opaque	Opaque / Dense
				3
Continuity				
% gaps	>10%	5-10%	<5%	Continuous
			2	
Specific gaps	Individual Gap > 5m	Individual gap <5m	No gaps	No gaps
		2		
Negative Indicators/ Degradation / Issues affecting long-term viability				
Bank / Wall	>20% of the length of the hedge degraded	<20% of the length of the hedge degraded	Minor degradation	No degradation
				3
% of canopy dominated by Ivy	>25%			
Unfavourable species composition: % woody growth volume comprised of unfavourable species	>10%			
Ground Flora / Hedge Base: % ground layer showing evidence of Herbicide Use	>20%			
Ground Flora / Hedge Base: % Noxious weeds/ Nutrient Rich Species	>20%			
Ground Flora / Hedge Base: Alien invasive species	Present			
Degraded Margin	Ploughing up to base of hedge shrubs or Poaching/erosion		(grassy) margin (2 m or greater on one side of the hedge)	(grassy) margins (2 m or greater on both sides of the hedge)
				3
				Total Condition Assessment Score = 22

Site name: Clay Farm Phase 2	**Hedgerow/ treeline no.:** H20
Survey date: 07/09/17	**Fossitt:** WL1

Hedgerow description:

A mature hedgerow located in the SE of the site. It may have originally connected to H23/ H27 to the S but there is now a track between the hedgerows. There are grassy fields on either side of the hedgerow. The W side of the hedgerow appears to have been recently managed, as the hedgerow is very straight sided. However the E side is more overgrown with locally abundant dominant *Clematis vitalba. Prunus spinosa* is dominant in the shrub layer with one mature *Acer pseudoplatanus* and some younger *Fraxinus excelsior* trees. There was a remnant section of old wall in the very NW of the hedgerow, near where it joins H21. No other wall, bank or ditch was observed. Species present within/ adjacent to the hedgerow, but not included in the standard lists below, include *Achillea millefolium, Urtica dioica* and *Vicia cracca.* The ground flora was relatively species-poor and dominated by *Hedera helix*.

Photo 5.1. Hedgerow H20 (view to SW, W side)

Photo 5.2. Ground flora dominated by *Hedera helix*

Favourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Alnus glutinosa			*Prunus padus*		
Betula pendula			*Prunus spinosa*	x	x
Betula pubescens			*Pyrus communis*		
Castanea sativa			*Quercus petraea*		
*Clematis vitalba**	x	x	*Quercus robur*		
Cornus sanguinea			*Rhamnus catharticus*		
Corylus avellana			*Rosa* sp.		
Crataegus monogyna	x		*Rubus fruticosus* agg.*	x	x
Cytisus scoparius			*Rubus idaeus*		
Euonymus europaeus			*Salix aurita*		
Fraxinus excelsior	x	x	*Salix caprea*		
Hedera helix	x		*Salix cinerea oleifolia*		
Ilex aquifolium		x	*Salix pentandra*		
Juglans regia			*Salix triandra*		
Ligustrum vulgare			*Sambucus nigra*		
Lonicera periclymenum			*Solanum dulcamara*		
Malus domestica			*Sorbus aria*		
Malus sylvestris			*Sorbus hibernica*		
Myrica gale			*Sorbus aucuparia*		
Pinus sylvestris			*Taxus baccata*		
Populus nigra			*Ulex europaeus*		

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Populus tremula			*Ulmus glabra*		x
Prunus avium			*Ulmus procera*		
Prunus cerasus			*Viburnum opulus*		
Prunus domestica					

***Not included in original species list by Foulkes et al. (2013)

Unfavourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
All coniferous species*			*Lonicera nitida*		
Acer campestre			*Populus alba*		
Acer pseudoplatanus		x	*Prunus laurocerasus*		
Aesculus hippocastanum			*Salix alba*		
Carpinus betulus			*Salix fragilis*		
Clematis alba			*Prunus laurocerasus*		
Fagus sylvatica			*Syringa vulgaris*		
Fuchsia magellanica			*Tilia* spp.		
Laburnum anagyroides			*Viburnum lantana*		
Ligustrum ovalifolium					

*except *Pinus sylvestris*

Herbaceous Ground Flora

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Ajuga reptans			*Lapsana communis*		
Alliaria petiolata			*Lathraea squamaria*		
Allium ursinum			*Luzula sylvatica*		
Anemone nemorosa			*Lysimachia nemorum*		
Anthriscus sylvestris	x	x	*Neottia nidus-avis*		
Arum maculatum			*Oxalis acetosella*		
Chrysosplenium oppositifolium			*Potentilla sterilis*		
Conopodium majus			*Primula vulgaris*		
Digitalis purpurea			*Sanicula europaea*		
Epipactis helleborine			*Stachys sylvatica*		
Ficaria verna			*Stellaria holostea*		
Fragaria vesca			*Veronica montana*	x	
Galium odoratum			*Viola* spp.		
Geranium robertianum					
Geum urbanum					
Glechoma hederacea	x				
Hyacinthoides non-scripta					
Hypericum androsaemum					

Ferns and allies

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Asplenium scolopendrium			*Dryopteris aemula*		
Athyrium lix-femina			*Dryopteris carthusiana*		
Blechnum spicant			*Polystichum setiferum*		
Dryopteris filix-mas			*Polypodium spp.*		
Dryopteris dilatata			*Equisetum telmateia*		
Dryopteris affinis			*Equisetum sylvaticum*		

Hedgerow significance assessment

0	1	2	3	4
Low significance	**Slightly significant**	**Moderately significant**	**Significant**	**Highly significant**
Historical Significance				
Recently Established (0-25 years)	Internal Field Boundary	Roadside / Rail / Canal Boundary: Farm boundary etc	Boundary appears on 1st Edition O.S	Townland Parish / County Boundary: Shown as, or connected to, woodland on 1st Edition O.S. map: Connects to feature on Sites and Monuments Record
			3	
	Past evidence of laying or coppicing		Non-linear (excluding roadside)	
Species Diversity Significance				
Tree / Shrub / Climber Species Count/ 30m strip:				
1-3 species	4-5 species	6-7 species	8-9 species	10+ species
		2		
Ground Flora Significance				
Dominated by ruderal species* - nettles/ docks/ thistles/ cleavers				
Species Count (from list)/ 30m strip:				
<2 species	2-3 species	4-5 species	6-7 species	>7 species
	1			
Pteridophytes from list/ 30m strip:				
			3-5 species	>5 species
Structure, Construction & Associated Features				
	Wall / Bank < 0.5m (height / depth)	Wall / Bank 0.5 - 1m	Wall / Bank > 1m	Double Ditch
	1			
		Dry Ditch	Wet Ditch / Drain	Stream / River
		Badger Sett		
		Green Lane		
Habitat Connectivity Significance				
No connection with other semi-natural habitat	Single link with semi-natural habitat including hedgerow	Multiple links with semi-natural habitats, including other hedgerows	Link with woodland / forest habitat	Link with designated area, particularly woodland
		2		
Landscape Significance				
	Wind shaped	Mature Hedgerow Trees		Area covered by Landscape designation
		2		
Other factors of significance				
				Total Signficance Score = 11

Hedgerow condition assessment

	0 Unfavourable	1 Adequate	2 Favourable	3 Highly favourable
Structural variables				
Height	<1.5m	1.5 - 2.5m	2.5 - 4m	>4m
				3
Width	<1m	1 - 2m	2 - 3m	>3m
				3
Profile	Remnant; Derelict	Wind-shaped; Losing base structure	Boxed / A-shaped; Straight sided	Overgrown; Top heavy/ undercut; Outgrowths at base
			2	
Basal density / porosity to light of woody shrubs	Open	Semi-translucent	Semi-opaque	Opaque / Dense
				3
Continuity				
% gaps	>10%	5-10%	<5%	Continuous
				3
Specific gaps	Individual Gap > 5m	Individual gap <5m	No gaps	No gaps
				3
Negative Indicators/ Degradation / Issues affecting long-term viability				
Bank / Wall	>20% of the length of the hedge degraded	<20% of the length of the hedge degraded	Minor degradation	No degradation
				3
% of canopy dominated by Ivy	>25%			
Unfavourable species composition: % woody growth volume comprised of unfavourable species	>10%			
Ground Flora / Hedge Base: % ground layer showing evidence of Herbicide Use	>20%			
Ground Flora / Hedge Base: % Noxious weeds/ Nutrient Rich Species	>20%			
Ground Flora / Hedge Base: Alien invasive species	Present			
Degraded Margin	Ploughing up to base of hedge shrubs or Poaching/erosion		(grassy) margin (2 m or greater on one side of the hedge)	(grassy) margins (2 m or greater on both sides of the hedge)
				3
				Total Condition Assessment Score = 23

Site name: Clay Farm Phase 2	**Hedgerow/ treeline no.:** H21
Survey date: 07/09/17	**Fossitt:** WL1

Hedgerow description:

A mature hedgerow located in the east of the site. There are grassy fields on both sides. There are few mature trees and *Crataegus monogyna* and *Prunus spinosa* are the main shrubs, with locally dominant *Clematis vitalba*. The ground flora is species-poor (due to a dense shrub layer) and is dominated by *Hedera helix*. There is a small bank but no obvious ditch. The hedgerow appeared to have been cut in the last 1-2 years on the S side. Species present within/ adjacent to the hedgerow, but not included in the standard lists below, include *Holcus lanatus, Heracleum sphondylium,* and *Urtica dioica.*

Photo 6.1. Hedgerow H21 (view to E, from S side)

Photo 6.2. Hedgebank with animal path

Favourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Alnus glutinosa			*Prunus padus*		
Betula pendula			*Prunus spinosa*		x
Betula pubescens			*Pyrus communis*		
Castanea sativa			*Quercus petraea*		
*Clematis vitalba**	x	x	*Quercus robur*		
Cornus sanguinea			*Rhamnus catharticus*		
Corylus avellana			*Rosa* sp.		
Crataegus monogyna	x	x	*Rubus fruticosus* agg.*	x	x
Cytisus scoparius			*Rubus idaeus*		
Euonymus europaeus			*Salix aurita*		
Fraxinus excelsior			*Salix caprea*		
Hedera helix			*Salix cinerea oleifolia*		
Ilex aquifolium			*Salix pentandra*		
Juglans regia			*Salix triandra*		
Ligustrum vulgare			*Sambucus nigra*	x	x
Lonicera periclymenum			*Solanum dulcamara*		
Malus domestica			*Sorbus aria*		
Malus sylvestris			*Sorbus hibernica*		
Myrica gale			*Sorbus aucuparia*		
Pinus sylvestris			*Taxus baccata*		
Populus nigra			*Ulex europaeus*		
Populus tremula			*Ulmus glabra*		

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Prunus avium			*Ulmus procera*		
Prunus cerasus			*Viburnum opulus*		
Prunus domestica					

*Not included in original species list by Foulkes et al. (2013)

Unfavourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
All coniferous species*			*Lonicera nitida*		
Acer campestre			*Populus alba*		
Acer pseudoplatanus			*Prunus laurocerasus*		
Aesculus hippocastanum			*Salix alba*		
Carpinus betulus			*Salix fragilis*		
Clematis alba			*Prunus laurocerasus*		
Fagus sylvatica			*Syringa vulgaris*		
Fuchsia magellanica			*Tilia* spp.		
Laburnum anagyroides			*Viburnum lantana*		
Ligustrum ovalifolium					

*except *Pinus sylvestris*

Herbaceous Ground Flora

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Ajuga reptans			*Lapsana communis*		
Alliaria petiolata			*Lathraea squamaria*		
Allium ursinum			*Luzula sylvatica*		
Anemone nemorosa			*Lysimachia nemorum*		
Anthriscus sylvestris			*Neottia nidus-avis*		
Arum maculatum			*Oxalis acetosella*		
Chrysosplenium oppositifolium			*Potentilla sterilis*		
Conopodium majus			*Primula vulgaris*		
Digitalis purpurea			*Sanicula europaea*		
Epipactis helleborine			*Stachys sylvatica*		
Ficaria verna			*Stellaria holostea*		
Fragaria vesca			*Veronica montana*		
Galium odoratum			*Viola* spp.		
Geranium robertianum					
Geum urbanum					
Glechoma hederacea					
Hyacinthoides non-scripta					
Hypericum androsaemum					

Ferns and allies

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Asplenium scolopendrium			*Dryopteris aemula*		
Athyrium lix-femina			*Dryopteris carthusiana*		
Blechnum spicant			*Polystichum setiferum*		
Dryopteris filix-mas			*Polypodium spp.*		
Dryopteris dilatata			*Equisetum telmateia*		
Dryopteris affinis			*Equisetum sylvaticum*		

Hedgerow significance assessment

0	1	2	3	4
Low significance	**Slightly significant**	**Moderately significant**	**Significant**	**Highly significant**
Historical Significance				
Recently Established (0-25 years)	Internal Field Boundary	Roadside / Rail / Canal Boundary: Farm boundary etc	Boundary appears on 1st Edition O.S	Townland Parish / County Boundary: Shown as, or connected to, woodland on 1st Edition O.S. map: Connects to feature on Sites and Monuments Record
			3	
	Past evidence of laying or coppicing		Non-linear (excluding roadside)	
Species Diversity Significance				
Tree / Shrub / Climber Species Count/ 30m strip:				
1-3 species	4-5 species	6-7 species	8-9 species	10+ species
	1			
Ground Flora Significance				
Dominated by ruderal species* - nettles/ docks/ thistles/ cleavers				
Species Count (from list)/ 30m strip:				
<2 species	2-3 species	4-5 species	6-7 species	>7 species
0				
Pteridophytes from list/ 30m strip:				
			3-5 species	>5 species
Structure, Construction & Associated Features				
	Wall / Bank < 0.5m (height / depth)	Wall / Bank 0.5 - 1m	Wall / Bank > 1m	Double Ditch
		2		
		Dry Ditch	Wet Ditch / Drain	Stream / River
		Badger Sett		
		Green Lane		
Habitat Connectivity Significance				
No connection with other semi-natural habitat	Single link with semi-natural habitat including hedgerow	Multiple links with semi-natural habitats, including other hedgerows	Link with woodland / forest habitat	Link with designated area, particularly woodland
		2		
Landscape Significance				
	Wind shaped	Mature Hedgerow Trees		Area covered by Landscape designation
		2		
Other factors of significance				
				Total Signficance Score = 10

Hedgerow condition assessment

	0 Unfavourable	1 Adequate	2 Favourable	3 Highly favourable
Structural variables				
Height	<1.5m	1.5 - 2.5m	2.5 - 4m	>4m
			2	
Width	<1m	1 - 2m	2 - 3m	>3m
			2	
Profile	Remnant; Derelict	Wind-shaped; Losing base structure	Boxed / A-shaped; Straight sided	Overgrown; Top heavy/ undercut; Outgrowths at base
			2	
Basal density / porosity to light of woody shrubs	Open	Semi-translucent	Semi-opaque	Opaque / Dense
			2	
Continuity				
% gaps	>10%	5-10%	<5%	Continuous
				3
Specific gaps	Individual Gap > 5m	Individual gap <5m	No gaps	No gaps
				3
Negative Indicators/ Degradation / Issues affecting long-term viability				
Bank / Wall	>20% of the length of the hedge degraded	<20% of the length of the hedge degraded	Minor degradation	No degradation
				3
% of canopy dominated by Ivy	>25%			
Unfavourable species composition: % woody growth volume comprised of unfavourable species	>10%			
Ground Flora / Hedge Base: % ground layer showing evidence of Herbicide Use	>20%			
Ground Flora / Hedge Base: % Noxious weeds/ Nutrient Rich Species	>20%			
Ground Flora / Hedge Base: Alien invasive species	Present			
Degraded Margin	Ploughing up to base of hedge shrubs or Poaching/erosion		(grassy) margin (2 m or greater on one side of the hedge)	(grassy) margins (2 m or greater on both sides of the hedge)
				3
				Total Condition Assessment Score = 20

Site name: Clay Farm Phase 2	**Hedgerow/ treeline no.:** H22
Survey date: 07/09/17	**Fossitt:** WL1

Hedgerow description:

A mature hedgerow, linking with H15 to run across the site from NW to SE. There are frequent mature trees (*Fraxinus excelsior*) in the S end of the hedgerow. The hedgerow is bordered by grassy fields on both sides. This is the only non-linear hedgerow on the site. It may be that the hedgerow was previously associated with a stream (although this is not shown on old mapping). There is a ditch that runs along the centre of the hedgerow, this is dry in the NW section. About 1/3 from the S end the ditch becomes wet with water flowing to the south. There is some tufa formation in the stream in this area, including some deposits on bryophytes. However, there was only a small amount of one species (*Cratoneuron filicinum*) typical of the Annex I priority habitat 'Petrifying springs with tufa formation'. As water appears to be arising within the hedgerow, with tufa formation, this suggests that there is a spring located within the hedgerow. The hedgerow has been present since at least 1843 so it is considered that this spring is naturally species-poor, presumably due to shading. There is no significant tufa formation (e.g. cascade or stream crust), which might be expected from an older spring. This is likely to be due to spring flow, chemistry and shading. There were no signs of degradation in the spring. The spring is therefore considered to only have affinity to the Annex I priority habitat 'Petrifying springs with tufa formation'.

Photo 7.1. Hedgerow H22 (view to E showing non-linear line of hedgerow)

Photo 7.2 Dry ditch (with animal trampling) in N section of hedgerow

Photo 7.3. Tufa formation (oncoids & ooids) within chanel of wet ditch in S section

Photo 7.4. Tufa formation at base of the bryophyte *Cratoneuron filicinum* wihtin the wet ditch section

Favourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Alnus glutinosa		x	*Prunus padus*		
Betula pendula			*Prunus spinosa*	x	x
Betula pubescens		x	*Pyrus communis*		
Castanea sativa			*Quercus petraea*		
*Clematis vitalba**		x	*Quercus robur*		
Cornus sanguinea			*Rhamnus catharticus*		
Corylus avellana		x	*Rosa* sp.		
Crataegus monogyna	x	x	*Rubus fruticosus* agg.*	x	x
Cytisus scoparius			*Rubus idaeus*		
Euonymus europaeus			*Salix aurita*		
Fraxinus excelsior	x	x	*Salix caprea*		
Hedera helix	x		*Salix cinerea oleifolia*	x	x
Ilex aquifolium	x		*Salix pentandra*		
Juglans regia			*Salix triandra*		
Ligustrum vulgare			*Sambucus nigra*	x	x
Lonicera periclymenum			*Solanum dulcamara*		
Malus domestica			*Sorbus aria*		
Malus sylvestris			*Sorbus hibernica*		
Myrica gale			*Sorbus aucuparia*		
Pinus sylvestris			*Taxus baccata*		
Populus nigra			*Ulex europaeus*	x	x
Populus tremula			*Ulmus glabra*		
Prunus avium			*Ulmus procera*		
Prunus cerasus			*Viburnum opulus*		
Prunus domestica					

***Not included in original species list by Foulkes et al. (2013)

Unfavourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
All coniferous species*			*Lonicera nitida*		
Acer campestre			*Populus alba*		
Acer pseudoplatanus			*Prunus laurocerasus*		
Aesculus hippocastanum			*Salix alba*		
Carpinus betulus			*Salix fragilis*		
Clematis alba			*Prunus laurocerasus*		
Fagus sylvatica			*Syringa vulgaris*		
Fuchsia magellanica			*Tilia* spp.		
Laburnum anagyroides			*Viburnum lantana*		
Ligustrum ovalifolium					

*except *Pinus sylvestris*

Herbaceous Ground Flora

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Ajuga reptans			*Lapsana communis*		
Alliaria petiolata			*Lathraea squamaria*		
Allium ursinum			*Luzula sylvatica*		
Anemone nemorosa			*Lysimachia nemorum*		
Anthriscus sylvestris	x		*Neottia nidus-avis*		
Arum maculatum			*Oxalis acetosella*		
Chrysosplenium oppositifolium			*Potentilla sterilis*		

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Conopodium majus			*Primula vulgaris*		
Digitalis purpurea			*Sanicula europaea*		
Epipactis helleborine			*Stachys sylvatica*		
Ficaria verna			*Stellaria holostea*		
Fragaria vesca			*Veronica montana*		
Galium odoratum			*Viola* spp.		
Geranium robertianum	x				
Geum urbanum					
Glechoma hederacea					
Hyacinthoides non-scripta					
Hypericum androsaemum					

Ferns and allies

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Asplenium scolopendrium	x	x	*Dryopteris aemula*		
Athyrium lix-femina			*Dryopteris carthusiana*		
Blechnum spicant			*Polystichum setiferum*	x	x
Dryopteris filix-mas			*Polypodium spp.*		
Dryopteris dilatata			*Equisetum telmateia*		
Dryopteris affinis			*Equisetum sylvaticum*		

Hedgerow significance assessment

0	1	2	3	4
Low significance	**Slightly significant**	**Moderately significant**	**Significant**	**Highly significant**
Historical Significance				
Recently Established (0-25 years)	Internal Field Boundary	Roadside / Rail / Canal Boundary: Farm boundary etc	Boundary appears on 1st Edition O.S	Townland Parish / County Boundary: Shown as, or connected to, woodland on 1st Edition O.S. map: Connects to feature on Sites and Monuments Record
			3	
	Past evidence of laying or coppicing		Non-linear (excluding roadside)	
			3	
Species Diversity Significance				
Tree / Shrub / Climber Species Count/ 30m strip:				
1-3 species	4-5 species	6-7 species	8-9 species	10+ species
			3	
Ground Flora Significance				
Dominated by ruderal species* - nettles/ docks/ thistles/ cleavers				
Species Count (from list)/ 30m strip:				
<2 species	2-3 species	4-5 species	6-7 species	>7 species
	1			
Pteridophytes from list/ 30m strip:				
			3-5 species	>5 species
Structure, Construction & Associated Features				
	Wall / Bank < 0.5m (height / depth)	Wall / Bank 0.5 - 1m	Wall / Bank > 1m	Double Ditch
			3	
		Dry Ditch	Wet Ditch / Drain	Stream / River
			3	
		Badger Sett		
		Green Lane		
Habitat Connectivity Significance				
No connection with other semi-natural habitat	Single link with semi-natural habitat including hedgerow	Multiple links with semi-natural habitats, including other hedgerows	Link with woodland / forest habitat	Link with designated area, particularly woodland
		2		
Landscape Significance				
	Wind shaped	Mature Hedgerow Trees		Area covered by Landscape designation
		2		
Other factors of significance				
				Total Signficance Score = 20

Hedgerow condition assessment

	0 Unfavourable	1 Adequate	2 Favourable	3 Highly favourable
Structural variables				
Height	<1.5m	1.5 - 2.5m	2.5 - 4m	>4m
				3
Width	<1m	1 - 2m	2 - 3m	>3m
				3
Profile	Remnant; Derelict	Wind-shaped; Losing base structure	Boxed / A-shaped; Straight sided	Overgrown; Top heavy/ undercut; Outgrowths at base
				3
Basal density / porosity to light of woody shrubs	Open	Semi-translucent	Semi-opaque	Opaque / Dense
				3
Continuity				
% gaps	>10%	5-10%	<5%	Continuous
				3
Specific gaps	Individual Gap > 5m	Individual gap <5m	No gaps	No gaps
				3
Negative Indicators/ Degradation / Issues affecting long-term viability				
Bank / Wall	>20% of the length of the hedge degraded	<20% of the length of the hedge degraded	Minor degradation	No degradation
				3
% of canopy dominated by Ivy	>25%			
Unfavourable species composition: % woody growth volume comprised of unfavourable species	>10%			
Ground Flora / Hedge Base: % ground layer showing evidence of Herbicide Use	>20%			
Ground Flora / Hedge Base: % Noxious weeds/ Nutrient Rich Species	>20%			
Ground Flora / Hedge Base: Alien invasive species	Present			
Degraded Margin	Ploughing up to base of hedge shrubs or Poaching/erosion		(grassy) margin (2 m or greater on one side of the hedge)	(grassy) margins (2 m or greater on both sides of the hedge)
				3
				Total Condition Assessment Score = 24

Site name: Clay Farm Phase 2	**Hedgerow/ treeline no.:** H24
Survey date: 07/09/17	**Fossitt:** WL1

Hedgerow description:

This hedgerow is relatively low in height compared to the other hedgerows on the site. There are a few mature trees with a low hedge of *Prunus spinosa* with *Sambucus nigra,* which are very overgrown with *Clematis vitalba*. The Groundflora (where visible) is dominated by *Hedera helix*, due to heavy shading. There is no obvious bank or ditch, although it is difficult to access the centre of the hedgerow.

Photo 8.1. Hedgerow H24 (view to W from N side)

Photo 8.2. Hedgerow view to E from N side)

Favourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Alnus glutinosa			*Prunus padus*		
Betula pendula			*Prunus spinosa*		x
Betula pubescens			*Pyrus communis*		
Castanea sativa			*Quercus petraea*		
*Clematis vitalba**	x	x	*Quercus robur*		
Cornus sanguinea			*Rhamnus catharticus*		
Corylus avellana			*Rosa* sp.		
Crataegus monogyna		x	*Rubus fruticosus* agg.*	x	x
Cytisus scoparius			*Rubus idaeus*		
Euonymus europaeus			*Salix aurita*		
Fraxinus excelsior	x	x	*Salix caprea*		
Hedera helix	x		*Salix cinerea oleifolia*		
Ilex aquifolium			*Salix pentandra*		
Juglans regia			*Salix triandra*		
Ligustrum vulgare	x	x	*Sambucus nigra*		x
Lonicera periclymenum			*Solanum dulcamara*		
Malus domestica			*Sorbus aria*		
Malus sylvestris			*Sorbus hibernica*		
Myrica gale			*Sorbus aucuparia*		
Pinus sylvestris			*Taxus baccata*		
Populus nigra			*Ulex europaeus*		
Populus tremula			*Ulmus glabra*		
Prunus avium			*Ulmus procera*		

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Prunus cerasus			*Viburnum opulus*		
Prunus domestica					

*Not included in original species list by Foulkes et al. (2013)

Unfavourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
All coniferous species*			*Lonicera nitida*		
Acer campestre			*Populus alba*		
Acer pseudoplatanus	x	x	*Prunus laurocerasus*		
Aesculus hippocastanum			*Salix alba*		
Carpinus betulus			*Salix fragilis*	x	x
Clematis alba			*Prunus laurocerasus*		
Fagus sylvatica			*Syringa vulgaris*		
Fuchsia magellanica			*Tilia* spp.		
Laburnum anagyroides			*Viburnum lantana*		
Ligustrum ovalifolium					

*except *Pinus sylvestris*

Herbaceous Ground Flora

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Ajuga reptans			*Lapsana communis*		
Alliaria petiolata			*Lathraea squamaria*		
Allium ursinum			*Luzula sylvatica*		
Anemone nemorosa			*Lysimachia nemorum*		
Anthriscus sylvestris		x	*Neottia nidus-avis*		
Arum maculatum			*Oxalis acetosella*		
Chrysosplenium oppositifolium			*Potentilla sterilis*		
Conopodium majus			*Primula vulgaris*		
Digitalis purpurea			*Sanicula europaea*		
Epipactis helleborine			*Stachys sylvatica*		
Ficaria verna			*Stellaria holostea*		
Fragaria vesca			*Veronica montana*		
Galium odoratum			*Viola* spp.		
Geranium robertianum					
Geum urbanum					
Glechoma hederacea					
Hyacinthoides non-scripta					
Hypericum androsaemum					

Ferns and allies

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Asplenium scolopendrium			*Dryopteris aemula*		
Athyrium lix-femina			*Dryopteris carthusiana*		
Blechnum spicant			*Polystichum setiferum*		
Dryopteris filix-mas			*Polypodium spp.*		
Dryopteris dilatata			*Equisetum telmateia*		
Dryopteris affinis			*Equisetum sylvaticum*		

Hedgerow significance assessment

0	1	2	3	4
Low significance	**Slightly significant**	**Moderately significant**	**Significant**	**Highly significant**
Historical Significance				
Recently Established (0-25 years)	Internal Field Boundary	Roadside / Rail / Canal Boundary: Farm boundary etc	Boundary appears on 1st Edition O.S	Townland Parish / County Boundary: Shown as, or connected to, woodland on 1st Edition O.S. map: Connects to feature on Sites and Monuments Record
			3	
	Past evidence of laying or coppicing		Non-linear (excluding roadside)	
Species Diversity Significance				
Tree / Shrub / Climber Species Count/ 30m strip:				
1-3 species	4-5 species	6-7 species	8-9 species	10+ species
		2		
Ground Flora Significance				
Dominated by ruderal species* - nettles/ docks/ thistles/ cleavers				
Species Count (from list)/ 30m strip:				
<2 species	2-3 species	4-5 species	6-7 species	>7 species
0				
Pteridophytes from list/ 30m strip:				
			3-5 species	>5 species
Structure, Construction & Associated Features				
	Wall / Bank < 0.5m (height / depth)	Wall / Bank 0.5 - 1m	Wall / Bank > 1m	Double Ditch
		Dry Ditch	Wet Ditch / Drain	Stream / River
		Badger Sett		
		Green Lane		
Habitat Connectivity Significance				
No connection with other semi-natural habitat	Single link with semi-natural habitat including hedgerow	Multiple links with semi-natural habitats, including other hedgerows	Link with woodland / forest habitat	Link with designated area, particularly woodland
		2		
Landscape Significance				
	Wind shaped	Mature Hedgerow Trees		Area covered by Landscape designation
		2		
Other factors of significance				
				Total Signficance Score = 9

Hedgerow condition assessment

	0 Unfavourable	1 Adequate	2 Favourable	3 Highly favourable
Structural variables				
Height	<1.5m	1.5 - 2.5m	2.5 - 4m	>4m
		1		
Width	<1m	1 - 2m	2 - 3m	>3m
		1		
Profile	Remnant; Derelict	Wind-shaped; Losing base structure	Boxed / A-shaped; Straight sided	Overgrown; Top heavy/ undercut; Outgrowths at base
			2	
Basal density / porosity to light of woody shrubs	Open	Semi-translucent	Semi-opaque	Opaque / Dense
			2	
Continuity				
% gaps	>10%	5-10%	<5%	Continuous
				3
Specific gaps	Individual Gap > 5m	Individual gap <5m	No gaps	No gaps
				3
Negative Indicators/ Degradation / Issues affecting long-term viability				
Bank / Wall	>20% of the length of the hedge degraded	<20% of the length of the hedge degraded	Minor degradation	No degradation
				3
% of canopy dominated by Ivy	>25%			
	0*			
Unfavourable species composition: % woody growth volume comprised of unfavourable species	>10%			
Ground Flora / Hedge Base: % ground layer showing evidence of Herbicide Use	>20%			
Ground Flora / Hedge Base: % Noxious weeds/ Nutrient Rich Species	>20%			
Ground Flora / Hedge Base: Alien invasive species	Present			
Degraded Margin	Ploughing up to base of hedge shrubs or Poaching/erosion		(grassy) margin (2 m or greater on one side of the hedge)	(grassy) margins (2 m or greater on both sides of the hedge)
				3
				Total Condition Assessment Score = 18

**Clematis vitalba* dominating hedgerow and preventing shrub growth

Site name: Clay Farm Phase 2	**Hedgerow/ treeline no.:** H25
Survey date: 07/09/17	**Fossitt:** WL1

Hedgerow description:

A mature hedgerow running across the centre of the site and linking to hedgerows H22 and H16 to link to the E and S of the site. The shrub layer is dominated by *Prunus spinosa* and *Rubus fruticosus* agg. and there is one mature *Fraxinus excelsior* tree. The understorey is dense and the ground flora difficult to access. The ground flora is dominated by *Hedera helix*, due to high shading. A wet ditch with some water flow to the NE was recorded in the centre of the hedgerow. There was no aquatic flora due to heavy shading and it was difficult to access. Some old edition OSI maps and data from the EPA (http://gis.epa.ie/Envision) show a stream arising at the SW end of H25, which then flows down through H16 to the Ballyogan/ Barnaculla Stream. The watercourse in this hedgerow is currently classified as a wet ditch (DLRCC Water and Drainage Department). The water flows to the NE where it forms a slight pool at the junction of H25, H22 and H16. This was less shaded and had *Apium nodiflorum* in the channel.

Photo 9.1. Hedgerow H25 (view to NE on N side)

Photo 9.2. Wet ditch with slight flow to NE

Favourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Alnus glutinosa			*Prunus padus*		
Betula pendula			*Prunus spinosa*	x	x
Betula pubescens			*Pyrus communis*		
Castanea sativa			*Quercus petraea*		
*Clematis vitalba**	x	x	*Quercus robur*		
Cornus sanguinea			*Rhamnus catharticus*		
Corylus avellana			*Rosa* sp.		
Crataegus monogyna	x	x	*Rubus fruticosus* agg.*	x	x
Cytisus scoparius			*Rubus idaeus*		
Euonymus europaeus			*Salix aurita*		
Fraxinus excelsior	x	x	*Salix caprea*		
Hedera helix	x	x	*Salix cinerea oleifolia*		
Ilex aquifolium		x	*Salix pentandra*		
Juglans regia			*Salix triandra*		
Ligustrum vulgare			*Sambucus nigra*	x	x
Lonicera periclymenum			*Solanum dulcamara*		
Malus domestica			*Sorbus aria*		
Malus sylvestris			*Sorbus hibernica*		
Myrica gale			*Sorbus aucuparia*		
Pinus sylvestris			*Taxus baccata*		

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Populus nigra			*Ulex europaeus*		x
Populus tremula			*Ulmus glabra*		x
Prunus avium			*Ulmus procera*		
Prunus cerasus			*Viburnum opulus*		
Prunus domestica					

*****Not included in original species list by Foulkes et al. (2013)

Unfavourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
All coniferous species*			*Lonicera nitida*		
Acer campestre			*Populus alba*		
Acer pseudoplatanus			*Prunus laurocerasus*		
Aesculus hippocastanum			*Salix alba*		
Carpinus betulus			*Salix fragilis*		
Clematis alba			*Prunus laurocerasus*		
Fagus sylvatica			*Syringa vulgaris*		
Fuchsia magellanica			*Tilia* spp.		
Laburnum anagyroides			*Viburnum lantana*		
Ligustrum ovalifolium					

*except *Pinus sylvestris*

Herbaceous Ground Flora

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Ajuga reptans			*Lapsana communis*		
Alliaria petiolata			*Lathraea squamaria*		
Allium ursinum			*Luzula sylvatica*		
Anemone nemorosa			*Lysimachia nemorum*		
Anthriscus sylvestris			*Neottia nidus-avis*		
Arum maculatum			*Oxalis acetosella*		
Chrysosplenium oppositifolium			*Potentilla sterilis*		
Conopodium majus			*Primula vulgaris*		
Digitalis purpurea			*Sanicula europaea*		
Epipactis helleborine			*Stachys sylvatica*		
Ficaria verna			*Stellaria holostea*		
Fragaria vesca			*Veronica montana*		
Galium odoratum			*Viola* spp.		
Geranium robertianum	x	x			
Geum urbanum					
Glechoma hederacea	x	x			
Hyacinthoides non-scripta					
Hypericum androsaemum					

Ferns and allies

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Asplenium scolopendrium			*Dryopteris aemula*		
Athyrium lix-femina			*Dryopteris carthusiana*		
Blechnum spicant			*Polystichum setiferum*		x
Dryopteris filix-mas		x	*Polypodium spp.*		
Dryopteris dilatata			*Equisetum telmateia*		
Dryopteris affinis			*Equisetum sylvaticum*		

Hedgerow significance assessment

0	1	2	3	4
Low significance	**Slightly significant**	**Moderately significant**	**Significant**	**Highly significant**
Historical Significance				
Recently Established (0-25 years)	Internal Field Boundary	Roadside / Rail / Canal Boundary: Farm boundary etc	Boundary appears on 1st Edition O.S	Townland Parish / County Boundary: Shown as, or connected to, woodland on 1st Edition O.S. map: Connects to feature on Sites and Monuments Record
			3	
	Past evidence of laying or coppicing		Non-linear (excluding roadside)	
Species Diversity Significance				
Tree / Shrub / Climber Species Count/ 30m strip:				
1-3 species	4-5 species	6-7 species	8-9 species	10+ species
		2		
Ground Flora Significance				
Dominated by ruderal species* - nettles/ docks/ thistles/ cleavers				
Species Count (from list)/ 30m strip:				
<2 species	2-3 species	4-5 species	6-7 species	>7 species
	1			
Pteridophytes from list/ 30m strip:				
			3-5 species	>5 species
Structure, Construction & Associated Features				
	Wall / Bank < 0.5m (height / depth)	Wall / Bank 0.5 - 1m	Wall / Bank > 1m	Double Ditch
		2		
		Dry Ditch	Wet Ditch / Drain	Stream / River
			3	
		Badger Sett		
		Green Lane		
Habitat Connectivity Significance				
No connection with other semi-natural habitat	Single link with semi-natural habitat including hedgerow	Multiple links with semi-natural habitats, including other hedgerows	Link with woodland / forest habitat	Link with designated area, particularly woodland
		2		
Landscape Significance				
	Wind shaped	Mature Hedgerow Trees		Area covered by Landscape designation
		2		
Other factors of significance				
				Total Signficance Score = 15

Hedgerow condition assessment

	0 Unfavourable	1 Adequate	2 Favourable	3 Highly favourable
Structural variables				
Height	<1.5m	1.5 - 2.5m	2.5 - 4m	>4m
				3
Width	<1m	1 - 2m	2 - 3m	>3m
				3
Profile	Remnant; Derelict	Wind-shaped; Losing base structure	Boxed / A-shaped; Straight sided	Overgrown; Top heavy/ undercut; Outgrowths at base
			2	
Basal density / porosity to light of woody shrubs	Open	Semi-translucent	Semi-opaque	Opaque / Dense
				3
Continuity				
% gaps	>10%	5-10%	<5%	Continuous
				3
Specific gaps	Individual Gap > 5m	Individual gap <5m	No gaps	No gaps
				3
Negative Indicators/ Degradation / Issues affecting long-term viability				
Bank / Wall	>20% of the length of the hedge degraded	<20% of the length of the hedge degraded	Minor degradation	No degradation
				3
% of canopy dominated by Ivy	>25%			
Unfavourable species composition: % woody growth volume comprised of unfavourable species	>10%			
Ground Flora / Hedge Base: % ground layer showing evidence of Herbicide Use	>20%			
Ground Flora / Hedge Base: % Noxious weeds/ Nutrient Rich Species	>20%			
Ground Flora / Hedge Base: Alien invasive species	Present			
Degraded Margin	Ploughing up to base of hedge shrubs or Poaching/erosion		(grassy) margin (2 m or greater on one side of the hedge)	(grassy) margins (2 m or greater on both sides of the hedge)
				3
				Total Condition Assessment Score = 20

Site name: Clay Farm Phase 2	**Hedgerow/ treeline no.:** H26
Survey date: 07/09/17	**Fossitt:** WL1

Hedgerow description:

A mature hedgerow in the SE of the site. Unlike most of the hedgerows on the site, this boundary is not marked on the 1st Edition O.S. map (1843), but is shown on the 2nd Edition (1874) (refer to Figures 4.5 a and 4.5b, Chapter 4). The shrub layer is dominated by *Crataegus monogyna* and *Sambucus nigra*, with *Ilex aquifolium* and some mature trees of *Fraxinus excelsior* and *Acer pseudoplatanus.* There was a slight depression in the centre of the hedgerow, but no obvious bank or ditch and no water visible. There are some areas where the vegetation (e.g. *Rubus fruticosus* agg. and *Chamerion angustifolium*) appears to have grown over an old opening or gateway. Species present within/ adjacent to the hedgerow, but not included in the standard lists below, include *Arrhenatherum elatius, Brachypodium sylvaticum, Chamerion angustifolium, Cirsium arvense, Poa pratensis, Urtica dioica* and *Vicia sepium.*

Photo 10.1. Hedgerow H26 (view to S, from W side)

Photo 10.2. Ground flora within hedgebank

Favourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Alnus glutinosa			*Prunus padus*		
Betula pendula			*Prunus spinosa*	x	x
Betula pubescens			*Pyrus communis*		
Castanea sativa			*Quercus petraea*		
*Clematis vitalba**	x	x	*Quercus robur*		
Cornus sanguinea			*Rhamnus catharticus*		
Corylus avellana			*Rosa* sp.		
Crataegus monogyna	x	x	*Rubus fruticosus* agg.*	x	x
Cytisus scoparius			*Rubus idaeus*		
Euonymus europaeus			*Salix aurita*		
Fraxinus excelsior		x	*Salix caprea*		
Hedera helix	x	x	*Salix cinerea oleifolia*		x
Ilex aquifolium	x	x	*Salix pentandra*		
Juglans regia			*Salix triandra*		
Ligustrum vulgare	x	x	*Sambucus nigra*	x	
Lonicera periclymenum			*Solanum dulcamara*		
Malus domestica			*Sorbus aria*		
Malus sylvestris			*Sorbus hibernica*		
Myrica gale			*Sorbus aucuparia*		
Pinus sylvestris			*Taxus baccata*		
Populus nigra			*Ulex europaeus*		

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Populus tremula			*Ulmus glabra*		
Prunus avium			*Ulmus procera*		
Prunus cerasus			*Viburnum opulus*		
Prunus domestica					

*****Not included in original species list by Foulkes et al. (2013)

Unfavourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
All coniferous species*			*Lonicera nitida*		
Acer campestre			*Populus alba*		
Acer pseudoplatanus	x	x	*Prunus laurocerasus*		
Aesculus hippocastanum			*Salix alba*		
Carpinus betulus			*Salix fragilis*		
Clematis alba			*Prunus laurocerasus*		
Fagus sylvatica			*Syringa vulgaris*		
Fuchsia magellanica			*Tilia* spp.		
Laburnum anagyroides			*Viburnum lantana*		
Ligustrum ovalifolium					

*except *Pinus sylvestris*

Herbaceous Ground Flora

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Ajuga reptans			*Lapsana communis*		
Alliaria petiolata			*Lathraea squamaria*		
Allium ursinum			*Luzula sylvatica*		
Anemone nemorosa			*Lysimachia nemorum*		
Anthriscus sylvestris	x	x	*Neottia nidus-avis*		
Arum maculatum			*Oxalis acetosella*		
Chrysosplenium oppositifolium			*Potentilla sterilis*		
Conopodium majus			*Primula vulgaris*		
Digitalis purpurea			*Sanicula europaea*		
Epipactis helleborine			*Stachys sylvatica*		
Ficaria verna			*Stellaria holostea*		
Fragaria vesca			*Veronica montana*		
Galium odoratum			*Viola* spp.		
Geranium robertianum					
Geum urbanum					
Glechoma hederacea					
Hyacinthoides non-scripta					
Hypericum androsaemum					

Ferns and allies

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Asplenium scolopendrium			*Dryopteris aemula*		
Athyrium lix-femina			*Dryopteris carthusiana*		
Blechnum spicant			*Polystichum setiferum*		
Dryopteris filix-mas			*Polypodium spp.*		
Dryopteris dilatata			*Equisetum telmateia*		
Dryopteris affinis			*Equisetum sylvaticum*		

Hedgerow significance assessment

0	1	2	3	4
Low significance	**Slightly significant**	**Moderately significant**	**Significant**	**Highly significant**
Historical Significance				
Recently Established (0-25 years)	Internal Field Boundary	Roadside / Rail / Canal Boundary: Farm boundary etc	Boundary appears on 1st Edition O.S	Townland Parish / County Boundary: Shown as, or connected to, woodland on 1st Edition O.S. map: Connects to feature on Sites and Monuments Record
	1			
	Past evidence of laying or coppicing		Non-linear (excluding roadside)	
Species Diversity Significance				
Tree / Shrub / Climber Species Count/ 30m strip:				
1-3 species	4-5 species	6-7 species	8-9 species	10+ species
			3	
Ground Flora Significance				
Dominated by ruderal species* - nettles/ docks/ thistles/ cleavers				
Species Count (from list)/ 30m strip:				
<2 species	2-3 species	4-5 species	6-7 species	>7 species
0				
Pteridophytes from list/ 30m strip:				
			3-5 species	>5 species
Structure, Construction & Associated Features				
	Wall / Bank < 0.5m (height / depth)	Wall / Bank 0.5 - 1m	Wall / Bank > 1m	Double Ditch
0				
		Dry Ditch	Wet Ditch / Drain	Stream / River
0				
		Badger Sett		
		Green Lane		
Habitat Connectivity Significance				
No connection with other semi-natural habitat	Single link with semi-natural habitat including hedgerow	Multiple links with semi-natural habitats, including other hedgerows	Link with woodland / forest habitat	Link with designated area, particularly woodland
	1			
Landscape Significance				
	Wind shaped	Mature Hedgerow Trees		Area covered by Landscape designation
		2		
Other factors of significance				
				Total Signficance Score = 7

Hedgerow condition assessment

	0 Unfavourable	1 Adequate	2 Favourable	3 Highly favourable
Structural variables				
Height	<1.5m	1.5 - 2.5m	2.5 - 4m	>4m
			2	
Width	<1m	1 - 2m	2 - 3m	>3m
			2	
Profile	Remnant; Derelict	Wind-shaped; Losing base structure	Boxed / A-shaped; Straight sided	Overgrown; Top heavy/ undercut; Outgrowths at base
			2	
Basal density / porosity to light of woody shrubs	Open	Semi-translucent	Semi-opaque	Opaque / Dense
Continuity				
% gaps	>10%	5-10%	<5%	Continuous
				3
Specific gaps	Individual Gap > 5m	Individual gap <5m	No gaps	No gaps
				3
Negative Indicators/ Degradation / Issues affecting long-term viability				
Bank / Wall	>20% of the length of the hedge degraded	<20% of the length of the hedge degraded	Minor degradation	No degradation
				3
% of canopy dominated by Ivy	>25%			
Unfavourable species composition: % woody growth volume comprised of unfavourable species	>10%			
Ground Flora / Hedge Base: % ground layer showing evidence of Herbicide Use	>20%			
Ground Flora / Hedge Base: % Noxious weeds/ Nutrient Rich Species	>20%			
Ground Flora / Hedge Base: Alien invasive species	Present			
Degraded Margin	Ploughing up to base of hedge shrubs or Poaching/erosion		(grassy) margin (2 m or greater on one side of the hedge)	(grassy) margins (2 m or greater on both sides of the hedge)
				3
				Total Condition Assessment Score = 18

Site name: Clay Farm Phase 2	**Hedgerow/ treeline no.:** H27 (including H23)
Survey date: 07/09/17	**Fossitt:** WL1/ WD2

Hedgerow description:

A mature hedgerow that forms the southern boundary of the site. There is a recent path/ disturbed ground to the north and a golf course to the south. In some places the hedgerow is almost 10m wide and the vegetation resembles woodland. Mature trees are abundant, *Fraxinus excelsior* is the dominant native tree and there are frequent planted non-native trees such as *Populus alba, Acer platanoides, Chamaecyparis* cf *lawsoniana, Pinus* cf *nigra* and *Pinus* cf *contorta* ssp. *latifolia*. *Corylus avellana* is locally dominant in the broad wooded sections. The ground flora is heavily shaded and dominated by *Hedera helix*. There is a large hedgebank and wet ditch in the eastern 2/3 of the hedgerow. Two 30m sample sections were recorded in this hedgerow. In addition to being on the 1st Edition O.S. map, the hedgerow also links to archaeological feature (Chapter 4, Figure 4.6 and 4.7).

Photo 11.1. Hedgerow H27/H23 (view to E from N side)

Photo 11.2 Large hedgebank and wet ditch

Photo 11.3. Inside hedgerow – in some areas the hedgerow is 10m wide and resembles woodland

Photo 11.4. Hedgerow H27/H23 (view to W from S side)

Species	**30m strip**		**Hedgerow**	**Species**	**30m strip**		**Hedgerow**
Alnus glutinosa				*Pyrus communis*			
Betula pendula		x		*Quercus petraea*			
Betula pubescens				*Quercus robur*			
Castanea sativa				*Rhamnus catharticus*			
Cornus sanguinea				*Rosa* sp.	x		x

Species	**30m strip**		**Hedgerow**	**Species**	**30m strip**		**Hedgerow**
Corylus avellana	x	x	x	*Rubus idaeus*			
Crataegus monogyna	x			*Rubus fruticosus* agg.*	x	x	x
Cytisus scoparius				*Salix aurita*			
Euonymus europaeus				*Salix caprea*			
Fraxinus excelsior	x	x	x	*Salix cinerea oleifolia*	x	x	x
Hedera helix	x	x	x	*Salix pentandra*			
Ilex aquifolium	x		x	*Salix triandra*			
Juglans regia				*Sambucus nigra*	x	x	x
Ligustrum vulgare				*Solanum dulcamara*			
Lonicera periclymenum				*Sorbus aria*			
Malus domestica				*Sorbus hibernica*			
Malus sylvestris				*Sorbus aucuparia*			
Myrica gale				*Taxus baccata*			
Pinus sylvestris			x	*Ulex europaeus*		x	x
Populus nigra	x		x	*Ulmus glabra*			
Populus tremula				*Ulmus procera*			
Prunus avium				*Viburnum opulus*			
Prunus cerasus							
Prunus domestica							
Prunus padus							
Prunus spinosa							

*Not included in original species list by Foulkes et al. (2013)

Unfavourable tree, shrub and woody climber species

Species	**30m strip**		**Hedgerow**	**Species**	**30m strip**		**Hedgerow**
All coniferous species*				*Lonicera nitida*			
Acer campestre				**Pinus* cf *nigra*	x		x
Acer platanoides	x		x	**Pinus* cf *contorta*		x	x
Acer pseudoplatanus	x	x	x	*Populus alba*	x	x	x
Aesculus hippocastanum	x		x	*Prunus laurocerasus*			
Carpinus betulus				*Salix alba*			
**Chamaecyparis lawsoniana*	x		x	*Salix fragilis*			
Clematis alba				*Prunus laurocerasus*			
Fagus sylvatica	x	x	x	*Syringa vulgaris*			
Fuchsia magellanica				*Tilia* spp.			
Laburnum anagyroides				*Viburnum lantana*			
Ligustrum ovalifolium							

*except *Pinus sylvestris*

Herbaceous Ground Flora

Species	**30m strip**		**Hedgerow**	**Species**	**30m strip**		**Hedgerow**
Ajuga reptans				*Hyacinthoides non-scripta*			
Alliaria petiolata				*Hypericum androsaemum*			
Allium ursinum				*Neottia nidus-avis*			
Anemone nemorosa				*Oxalis acetosella*			
Anthriscus sylvestris				*Potentilla sterilis*			
Arum maculatum				*Lapsana communis*			
Chrysosplenium oppositifolium				*Lathraea squamaria*			
Conopodium majus				*Luzula sylvatica*			
Digitalis purpurea				*Lysimachia nemorum*			
Epipactis helleborine				*Primula vulgaris*			

Species	30m strip		Hedgerow	Species	30m strip		Hedgerow
Ficaria verna				*Sanicula europaea*			
Fragaria vesca				*Stachys sylvatica*			
Galium odoratum				*Stellaria holostea*			
Geranium robertianum	x		x	*Veronica montana*			
Geum urbanum				*Viola* spp.			
Glechoma hederacea							

Ferns and allies

Species	30m strip		Hedgerow	Species	30m strip		Hedgerow
Asplenium scolopendrium				*Dryopteris aemula*			
Athyrium lix-femina				*Dryopteris carthusiana*			
Blechnum spicant				*Polystichum setiferum*		x	x
Dryopteris filix-mas				*Polypodium spp.*			
Dryopteris dilatata				*Equisetum telmateia*			
Dryopteris affinis				*Equisetum sylvaticum*			

Hedgerow significance assessment

0	1	2	3	4
Low significance	**Slightly significant**	**Moderately significant**	**Significant**	**Highly significant**
Historical Significance				
Recently Established (0-25 years)	Internal Field Boundary	Roadside / Rail / Canal Boundary: Farm boundary etc	Boundary appears on 1st Edition O.S	Townland Parish / County Boundary: Shown as, or connected to, woodland on 1st Edition O.S. map: Connects to feature on Sites and Monuments Record
				4
	Past evidence of laying or coppicing		Non-linear (excluding roadside)	
Species Diversity Significance				
Tree / Shrub / Climber Species Count/ 30m strip:				
1-3 species	4-5 species	6-7 species	8-9 species	10+ species
				4
Ground Flora Significance				
Dominated by ruderal species* - nettles/ docks/ thistles/ cleavers				
Species Count (from list)/ 30m strip:				
<2 species	2-3 species	4-5 species	6-7 species	>7 species
0	1			
Pteridophytes from list/ 30m strip:				
			3-5 species	>5 species
Structure, Construction & Associated Features				
	Wall / Bank < 0.5m (height / depth)	Wall / Bank 0.5 - 1m	Wall / Bank > 1m	Double Ditch
			3	
		Dry Ditch	Wet Ditch / Drain	Stream / River
			3	
		Badger Sett		
		Green Lane		
Habitat Connectivity Significance				
No connection with other semi-natural habitat	Single link with semi-natural habitat including hedgerow	Multiple links with semi-natural habitats, including other hedgerows	Link with woodland / forest habitat	Link with designated area, particularly woodland
		2		
Landscape Significance				
	Wind shaped	Mature Hedgerow Trees		Area covered by Landscape designation
		2		
Other factors of significance				
				Total Signficance Score = 19

Hedgerow condition assessment

	0 Unfavourable	1 Adequate	2 Favourable	3 Highly favourable
Structural variables				
Height	<1.5m	1.5 - 2.5m	2.5 - 4m	>4m
				3
Width	<1m	1 - 2m	2 - 3m	>3m
				3
Profile	Remnant; Derelict	Wind-shaped; Losing base structure	Boxed / A-shaped; Straight sided	Overgrown; Top heavy/ undercut; Outgrowths at base
				3
Basal density / porosity to light of woody shrubs	Open	Semi-translucent	Semi-opaque	Opaque / Dense
				3
Continuity				
% gaps	>10%	5-10%	<5%	Continuous
				3
Specific gaps	Individual Gap > 5m	Individual gap <5m	No gaps	No gaps
				3
Negative Indicators/ Degradation / Issues affecting long-term viability				
Bank / Wall	>20% of the length of the hedge degraded	<20% of the length of the hedge degraded	Minor degradation	No degradation
				3
% of canopy dominated by Ivy	>25%			
Unfavourable species composition: % woody growth volume comprised of unfavourable species	>10%			
Ground Flora / Hedge Base: % ground layer showing evidence of Herbicide Use	>20%			
Ground Flora / Hedge Base: % Noxious weeds/ Nutrient Rich Species	>20%			
Ground Flora / Hedge Base: Alien invasive species	Present			
Degraded Margin	Ploughing up to base of hedge shrubs or Poaching/erosion		(grassy) margin (2 m or greater on one side of the hedge)	(grassy) margins (2 m or greater on both sides of the hedge)
			2	
				Total Condition Assessment Score = 23

Site name: Clay Farm Phase 2	**Hedgerow/ treeline no.:** H28
Survey date: 07/09/17	**Fossitt:** WL1/ WS1

Hedgerow description:

A mature hedgerow located on the western boundary of the site. It has a grassy field to the east and housing developments/ built land to the west. It is non-linear and is shown on the 1st Edition O.S. map (Chapter 4, Figure 4.5a). *Fraxinus excelsior* is the main mature tree, with some *Acer pseudoplatanus.* The shrub layer is dominated by *Salix cinerea* and this is forming a band of scrub out from the main hedgerow line. There is a large bank on the western boundary. The understorey is dense and difficult to access with locally abundant *Rubus fruticosus* agg. and *Hedera helix*.

Photo 12.1. Hedgerow H28 (view to N from E side)

Photo 12.2. Hedgerow shrub layer and groundflora

Favourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Alnus glutinosa			*Prunus padus*		
Betula pendula			*Prunus spinosa*		
Betula pubescens			*Pyrus communis*		
Castanea sativa			*Quercus petraea*		
*Clematis vitalba**			*Quercus robur*		
Cornus sanguinea			*Rhamnus catharticus*		
Corylus avellana			*Rosa* sp.		
Crataegus monogyna			*Rubus fruticosus* agg.*	x	x
Cytisus scoparius			*Rubus idaeus*		
Euonymus europaeus			*Salix aurita*		
Fraxinus excelsior	x	x	*Salix caprea*	x	x
Hedera helix	x	x	*Salix cinerea oleifolia*	x	x
Ilex aquifolium	x	x	*Salix pentandra*		
Juglans regia			*Salix triandra*		
Ligustrum vulgare			*Sambucus nigra*		x
Lonicera periclymenum			*Solanum dulcamara*		
Malus domestica			*Sorbus aria*		
Malus sylvestris			*Sorbus hibernica*		
Myrica gale			*Sorbus aucuparia*		x
Pinus sylvestris			*Taxus baccata*		
Populus nigra			*Ulex europaeus*		x
Populus tremula			*Ulmus glabra*		

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Prunus avium			*Ulmus procera*		
Prunus cerasus			*Viburnum opulus*		
Prunus domestica					

*Not included in original species list by Foulkes et al. (2013)

Unfavourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
All coniferous species*			*Lonicera nitida*		
Acer campestre			*Populus alba*		
Acer pseudoplatanus		x	*Prunus laurocerasus*		
Aesculus hippocastanum			*Salix alba*		
Carpinus betulus			*Salix fragilis*		
Clematis alba			*Prunus laurocerasus*		
Fagus sylvatica			*Syringa vulgaris*		
Fuchsia magellanica			*Tilia* spp.		
Laburnum anagyroides			*Viburnum lantana*		
Ligustrum ovalifolium					

*except *Pinus sylvestris*

Herbaceous Ground Flora

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Ajuga reptans			*Lapsana communis*		
Alliaria petiolata			*Lathraea squamaria*		
Allium ursinum			*Luzula sylvatica*		
Anemone nemorosa			*Lysimachia nemorum*		
Anthriscus sylvestris			*Neottia nidus-avis*		
Arum maculatum			*Oxalis acetosella*		
Chrysosplenium oppositifolium			*Potentilla sterilis*		
Conopodium majus			*Primula vulgaris*	x	x
Digitalis purpurea			*Sanicula europaea*		
Epipactis helleborine			*Stachys sylvatica*		
Ficaria verna			*Stellaria holostea*		
Fragaria vesca			*Veronica montana*		
Galium odoratum			*Viola* spp.		
Geranium robertianum	x	x			
Geum urbanum					
Glechoma hederacea					
Hyacinthoides non-scripta					
Hypericum androsaemum					

Ferns and allies

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Asplenium scolopendrium			*Dryopteris aemula*		
Athyrium lix-femina			*Dryopteris carthusiana*		
Blechnum spicant			*Polystichum setiferum*		
Dryopteris filix-mas			*Polypodium spp.*		
Dryopteris dilatata			*Equisetum telmateia*		
Dryopteris affinis			*Equisetum sylvaticum*		

Hedgerow significance assessment

0	1	2	3	4
Low significance	**Slightly significant**	**Moderately significant**	**Significant**	**Highly significant**
Historical Significance				
Recently Established (0-25 years)	Internal Field Boundary	Roadside / Rail / Canal Boundary: Farm boundary etc	Boundary appears on 1st Edition O.S	Townland Parish / County Boundary: Shown as, or connected to, woodland on 1st Edition O.S. map: Connects to feature on Sites and Monuments Record
			3	
	Past evidence of laying or coppicing		Non-linear (excluding roadside)	
			3	
Species Diversity Significance				
Tree / Shrub / Climber Species Count/ 30m strip:				
1-3 species	4-5 species	6-7 species	8-9 species	10+ species
		2		
Ground Flora Significance				
Dominated by ruderal species* - nettles/ docks/ thistles/ cleavers				
Species Count (from list)/ 30m strip:				
<2 species	2-3 species	4-5 species	6-7 species	>7 species
	1			
Pteridophytes from list/ 30m strip:				
			3-5 species	>5 species
Structure, Construction & Associated Features				
	Wall / Bank < 0.5m (height / depth)	Wall / Bank 0.5 - 1m	Wall / Bank > 1m	Double Ditch
			3	
		Dry Ditch	Wet Ditch / Drain	Stream / River
		2		
		Badger Sett		
		Green Lane		
Habitat Connectivity Significance				
No connection with other semi-natural habitat	Single link with semi-natural habitat including hedgerow	Multiple links with semi-natural habitats, including other hedgerows	Link with woodland / forest habitat	Link with designated area, particularly woodland
	1			
Landscape Significance				
	Wind shaped	Mature Hedgerow Trees		Area covered by Landscape designation
		2		
Other factors of significance				
				Total Signficance Score = 17

Hedgerow condition assessment

	0 Unfavourable	1 Adequate	2 Favourable	3 Highly favourable
Structural variables				
Height	<1.5m	1.5 - 2.5m	2.5 - 4m	>4m
				3
Width	<1m	1 - 2m	2 - 3m	>3m
				3
Profile	Remnant; Derelict	Wind-shaped; Losing base structure	Boxed / A-shaped; Straight sided	Overgrown; Top heavy/ undercut; Outgrowths at base
				3
Basal density / porosity to light of woody shrubs	Open	Semi-translucent	Semi-opaque	Opaque / Dense
				3
Continuity				
% gaps	>10%	5-10%	<5%	Continuous
				3
Specific gaps	Individual Gap > 5m	Individual gap <5m	No gaps	No gaps
				3
Negative Indicators/ Degradation / Issues affecting long-term viability				
Bank / Wall	>20% of the length of the hedge degraded	<20% of the length of the hedge degraded	Minor degradation	No degradation
				3
% of canopy dominated by Ivy	>25%			
Unfavourable species composition: % woody growth volume comprised of unfavourable species	>10%			
Ground Flora / Hedge Base: % ground layer showing evidence of Herbicide Use	>20%			
Ground Flora / Hedge Base: % Noxious weeds/ Nutrient Rich Species	>20%			
Ground Flora / Hedge Base: Alien invasive species	Present			
Degraded Margin	Ploughing up to base of hedge shrubs or Poaching/erosion		(grassy) margin (2 m or greater on one side of the hedge)	(grassy) margins (2 m or greater on both sides of the hedge)
			2	
				Total Condition Assessment Score = 23

Site name: Clay Farm Phase 2	**Hedgerow/ treeline no.:** H31
Survey date: 07/09/17	**Fossitt:** WL1

Hedgerow description:

A mature hedgerow in the NE of the site. It has grassy fields to the NW and SE and the NW side was grazed by horses at the time of survey. Unlike most of the hedgerows on the site, this boundary is not marked on the 1st (1843), 2nd (1874) or 3rd (1912) Edition O.S. maps (refer to Figures 4.5 a to 4.5c, Chapter 4). There are no mature trees. *Crataegus monogyna* is frequent with locally dominant *Ilex aquifolium* and *Sambuca nigra*. The SW section is largely dominated by *Rubus fruticosus* and *Ulex europaeus.* The understorey is dense and the ground flora difficult to access. In the areas accessed, there was no obvious bank or ditch and the ground flora was dominated by *Hedera helix.*

Photo 13.1. Hedgerow H31 (view to SW from N side)

Photo 13.2. Ground flora dominated by *Hedera helix*

Favourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Alnus glutinosa			*Prunus padus*		
Betula pendula			*Prunus spinosa*	x	x
Betula pubescens			*Pyrus communis*		
Castanea sativa			*Quercus petraea*		
*Clematis vitalba**			*Quercus robur*		
Cornus sanguinea			*Rhamnus catharticus*		
Corylus avellana			*Rosa* sp.	x	x
Crataegus monogyna	x	x	*Rubus fruticosus* agg.*	x	x
Cytisus scoparius			*Rubus idaeus*		
Euonymus europaeus			*Salix aurita*		
Fraxinus excelsior			*Salix caprea*		
Hedera helix	x	x	*Salix cinerea oleifolia*		
Ilex aquifolium	x	x	*Salix pentandra*		
Juglans regia			*Salix triandra*		
Ligustrum vulgare			*Sambucus nigra*	x	x
Lonicera periclymenum			*Solanum dulcamara*		
Malus domestica			*Sorbus aria*		
Malus sylvestris			*Sorbus hibernica*		
Myrica gale			*Sorbus aucuparia*		
Pinus sylvestris			*Taxus baccata*		
Populus nigra			*Ulex europaeus*	x	x

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Populus tremula			*Ulmus glabra*		
Prunus avium			*Ulmus procera*		
Prunus cerasus			*Viburnum opulus*		
Prunus domestica					

***Not included in original species list by Foulkes et al. (2013)**

Unfavourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
All coniferous species*			*Lonicera nitida*		
Acer campestre			*Populus alba*		
Acer pseudoplatanus			*Prunus laurocerasus*		
Aesculus hippocastanum			*Salix alba*		
Carpinus betulus			*Salix fragilis*		
Clematis alba			*Prunus laurocerasus*		
Fagus sylvatica			*Syringa vulgaris*		
Fuchsia magellanica			*Tilia* spp.		
Laburnum anagyroides			*Viburnum lantana*		
Ligustrum ovalifolium					

*except *Pinus sylvestris*

Herbaceous Ground Flora

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Ajuga reptans			*Lapsana communis*		
Alliaria petiolata			*Lathraea squamaria*		
Allium ursinum			*Luzula sylvatica*		
Anemone nemorosa			*Lysimachia nemorum*		
Anthriscus sylvestris			*Neottia nidus-avis*		
Arum maculatum			*Oxalis acetosella*		
Chrysosplenium oppositifolium			*Potentilla sterilis*		
Conopodium majus			*Primula vulgaris*		
Digitalis purpurea			*Sanicula europaea*		
Epipactis helleborine			*Stachys sylvatica*		
Ficaria verna			*Stellaria holostea*		
Fragaria vesca			*Veronica montana*		
Galium odoratum			*Viola* spp.		
Geranium robertianum					
Geum urbanum					
Glechoma hederacea					
Hyacinthoides non-scripta					
Hypericum androsaemum					

Ferns and allies

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Asplenium scolopendrium			*Dryopteris aemula*		
Athyrium lix-femina			*Dryopteris carthusiana*		
Blechnum spicant			*Polystichum setiferum*		
Dryopteris filix-mas			*Polypodium spp.*		
Dryopteris dilatata			*Equisetum telmateia*		
Dryopteris affinis			*Equisetum sylvaticum*		

Hedgerow significance assessment

0	1	2	3	4
Low significance	**Slightly significant**	**Moderately significant**	**Significant**	**Highly significant**
Historical Significance				
Recently Established (0-25 years)	Internal Field Boundary	Roadside / Rail / Canal Boundary: Farm boundary etc	Boundary appears on 1st Edition O.S	Townland Parish / County Boundary: Shown as, or connected to, woodland on 1st Edition O.S. map: Connects to feature on Sites and Monuments Record
	1			
	Past evidence of laying or coppicing		Non-linear (excluding roadside)	
Species Diversity Significance				
Tree / Shrub / Climber Species Count/ 30m strip:				
1-3 species	4-5 species	6-7 species	8-9 species	10+ species
			3	
Ground Flora Significance				
Dominated by ruderal species* - nettles/ docks/ thistles/ cleavers				
Species Count (from list)/ 30m strip:				
<2 species	2-3 species	4-5 species	6-7 species	>7 species
0				
Pteridophytes from list/ 30m strip:				
			3-5 species	>5 species
Structure, Construction & Associated Features				
	Wall / Bank < 0.5m (height / depth)	Wall / Bank 0.5 - 1m	Wall / Bank > 1m	Double Ditch
0				
		Dry Ditch	Wet Ditch / Drain	Stream / River
0				
		Badger Sett		
		Green Lane		
Habitat Connectivity Significance				
No connection with other semi-natural habitat	Single link with semi-natural habitat including hedgerow	Multiple links with semi-natural habitats, including other hedgerows	Link with woodland / forest habitat	Link with designated area, particularly woodland
		2		
Landscape Significance				
	Wind shaped	Mature Hedgerow Trees		Area covered by Landscape designation
0				
Other factors of significance				
				Total Signficance Score = 6

Hedgerow condition assessment

	0 Unfavourable	1 Adequate	2 Favourable	3 Highly favourable
Structural variables				
Height	<1.5m	1.5 - 2.5m	2.5 - 4m	>4m
			2	
Width	<1m	1 - 2m	2 - 3m	>3m
			2	
Profile	Remnant; Derelict	Wind-shaped; Losing base structure	Boxed / A-shaped; Straight sided	Overgrown; Top heavy/ undercut; Outgrowths at base
			2	
Basal density / porosity to light of woody shrubs	Open	Semi-translucent	Semi-opaque	Opaque / Dense
				3
Continuity				
% gaps	>10%	5-10%	<5%	Continuous
				3
Specific gaps	Individual Gap > 5m	Individual gap <5m	No gaps	No gaps
				3
Negative Indicators/ Degradation / Issues affecting long-term viability				
Bank / Wall	>20% of the length of the hedge degraded	<20% of the length of the hedge degraded	Minor degradation	No degradation
				3
% of canopy dominated by Ivy	>25%			
Unfavourable species composition: % woody growth volume comprised of unfavourable species	>10%			
Ground Flora / Hedge Base: % ground layer showing evidence of Herbicide Use	>20%			
Ground Flora / Hedge Base: % Noxious weeds/ Nutrient Rich Species	>20%			
Ground Flora / Hedge Base: Alien invasive species	Present			
Degraded Margin	Ploughing up to base of hedge shrubs or Poaching/erosion		(grassy) margin (2 m or greater on one side of the hedge)	(grassy) margins (2 m or greater on both sides of the hedge)
				3
				Total Condition Assessment Score = 21

Site name: Clay Farm Phase 2	**Hedgerow/ treeline no.:** H34
Survey date: 07/09/17	**Fossitt:** WL1

Hedgerow description:

A mature hedgerow located at the boundary of the site and associated with the Ballyogan (also known as Barnacullia) Stream. It has wet grassland on the southern side and a development site to the north. The stream is c2m wide (although this varies) and there is a bank associated with the stream in some locations. To the north of the stream there is also a small dry ditch. There is a relatively diverse woodland ground flora within the hedgerow. The non-native invasive species *Lysichiton americanus* was recorded in one location (Listed on EC Invasive Alien Species of Union concern, 3 Aug 2016). Woodland species present within the hedgerow, but not included in the standard lists below, include *Brachypodium sylvaticum, Carex remota* and *Vicia sepium.*

Photo 14.1. Hedgerow H34 (view to SE from S side)

Photo 14.2. Ballyogan Stream within hedgerow

Favourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Alnus glutinosa			*Prunus padus*		
Betula pendula			*Prunus spinosa*	x	x
Betula pubescens			*Pyrus communis*		
Castanea sativa			*Quercus petraea*		
*Clematis vitalba**			*Quercus robur*		
Cornus sanguinea			*Rhamnus catharticus*		
Corylus avellana			*Rosa* sp.		
Crataegus monogyna	x	x	*Rubus fruticosus* agg.*		x
Cytisus scoparius			*Rubus idaeus*		
Euonymus europaeus			*Salix aurita*		
Fraxinus excelsior	x	x	*Salix caprea*	x	x
Hedera helix	x	x	*Salix cinerea oleifolia*		
Ilex aquifolium	x	x	*Salix pentandra*		
Juglans regia			*Salix triandra*		
Ligustrum vulgare			*Sambucus nigra*		
Lonicera periclymenum			*Solanum dulcamara*		
Malus domestica	x	x	*Sorbus aria*		
Malus sylvestris			*Sorbus hibernica*		
Myrica gale			*Sorbus aucuparia*	x	x
Pinus sylvestris			*Taxus baccata*		
Populus nigra			*Ulex europaeus*		

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Populus tremula			*Ulmus glabra*	x	x
Prunus avium			*Ulmus procera*		
Prunus cerasus			*Viburnum opulus*		
Prunus domestica					

***Not included in original species list by Foulkes et al. (2013)**

Unfavourable tree, shrub and woody climber species

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
All coniferous species*			*Lonicera nitida*		
Acer campestre			*Populus alba*		
Acer pseudoplatanus	x	x	*Prunus laurocerasus*		
Aesculus hippocastanum			*Salix alba*		
Carpinus betulus			*Salix fragilis*		
Clematis alba			*Prunus laurocerasus*		
Fagus sylvatica	x	x	*Syringa vulgaris*		
Fuchsia magellanica			*Tilia* spp.		
Laburnum anagyroides			*Viburnum lantana*		
Ligustrum ovalifolium					

*except *Pinus sylvestris*

Herbaceous Ground Flora

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Ajuga reptans			*Lapsana communis*		
Alliaria petiolata			*Lathraea squamaria*		
Allium ursinum			*Luzula sylvatica*		
Anemone nemorosa			*Lysimachia nemorum*		
Anthriscus sylvestris	x	x	*Neottia nidus-avis*		
Arum maculatum			*Oxalis acetosella*		
Chrysosplenium oppositifolium			*Potentilla sterilis*		
Conopodium majus			*Primula vulgaris*		
Digitalis purpurea			*Sanicula europaea*		
Epipactis helleborine			*Stachys sylvatica*		
Ficaria verna			*Stellaria holostea*		
Fragaria vesca			*Veronica montana*		
Galium odoratum			*Viola* spp.		
Geranium robertianum	x	x			
Geum urbanum					
Glechoma hederacea					
Hyacinthoides non-scripta					
Hypericum androsaemum	x	x			

Ferns and allies

Species	30m strip	Hedgerow	Species	30m strip	Hedgerow
Asplenium scolopendrium	x	x	*Dryopteris aemula*		
Athyrium lix-femina			*Dryopteris carthusiana*		
Blechnum spicant			*Polystichum setiferum*	x	x
Dryopteris filix-mas	x	x	*Polypodium spp.*		
Dryopteris dilatata	x	x	*Equisetum telmateia*		
Dryopteris affinis			*Equisetum sylvaticum*		

Hedgerow significance assessment

0	1	2	3	4
Low significance	**Slightly significant**	**Moderately significant**	**Significant**	**Highly significant**
Historical Significance				
Recently Established (0-25 years)	Internal Field Boundary	Roadside / Rail / Canal Boundary: Farm boundary etc	Boundary appears on 1st Edition O.S	Townland Parish / County Boundary: Shown as, or connected to, woodland on 1st Edition O.S. map: Connects to feature on Sites and Monuments Record
			3	
	Past evidence of laying or coppicing		Non-linear (excluding roadside)	
			3	
Species Diversity Significance				
Tree / Shrub / Climber Species Count/ 30m strip:				
1-3 species	4-5 species	6-7 species	8-9 species	10+ species
			3	
Ground Flora Significance				
Dominated by ruderal species* - nettles/ docks/ thistles/ cleavers				
Species Count (from list)/ 30m strip:				
<2 species	2-3 species	4-5 species	6-7 species	>7 species
	1			
Pteridophytes from list/ 30m strip:				
			3-5 species	>5 species
			3	
Structure, Construction & Associated Features				
	Wall / Bank < 0.5m (height / depth)	Wall / Bank 0.5 - 1m	Wall / Bank > 1m	Double Ditch
		2		
		Dry Ditch	Wet Ditch / Drain	Stream / River
		2		4
		Badger Sett		
		Green Lane		
Habitat Connectivity Significance				
No connection with other semi-natural habitat	Single link with semi-natural habitat including hedgerow	Multiple links with semi-natural habitats, including other hedgerows	Link with woodland / forest habitat	Link with designated area, particularly woodland
		2		
Landscape Significance				
	Wind shaped	Mature Hedgerow Trees		Area covered by Landscape designation
		2		
Other factors of significance				
				Total Signficance Score = 23

Hedgerow condition assessment

	0 Unfavourable	1 Adequate	2 Favourable	3 Highly favourable
Structural variables				
Height	<1.5m	1.5 - 2.5m	2.5 - 4m	>4m
				3
Width	<1m	1 - 2m	2 - 3m	>3m
				3
Profile	Remnant; Derelict	Wind-shaped; Losing base structure	Boxed / A-shaped; Straight sided	Overgrown; Top heavy/ undercut; Outgrowths at base
				3
Basal density / porosity to light of woody shrubs	Open	Semi-translucent	Semi-opaque	Opaque / Dense
				3
Continuity				
% gaps	>10%	5-10%	<5%	Continuous
				3
Specific gaps	Individual Gap > 5m	Individual gap <5m	No gaps	No gaps
				3
Negative Indicators/ Degradation / Issues affecting long-term viability				
Bank / Wall	>20% of the length of the hedge degraded	<20% of the length of the hedge degraded	Minor degradation	No degradation
				3
% of canopy dominated by Ivy	>25%			
Unfavourable species composition: % woody growth volume comprised of unfavourable species	>10%			
Ground Flora / Hedge Base: % ground layer showing evidence of Herbicide Use	>20%			
Ground Flora / Hedge Base: % Noxious weeds/ Nutrient Rich Species	>20%			
Ground Flora / Hedge Base: Alien invasive species	Present			
	0			
Degraded Margin	Ploughing up to base of hedge shrubs or Poaching/erosion		(grassy) margin (2 m or greater on one side of the hedge)	(grassy) margins (2 m or greater on both sides of the hedge)
			2	
				Total Condition Assessment Score = 23

APPENDIX 5.4 BAT ASSESSMENT

A Bat Assessment of Clay Farm In Relation To The Phase 2 Housing Proposal

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

July 2017

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. 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. Changes to a site may reduce the lands available to bats as a feeding site and in some cases, may even destroy their dwelling place through or during the partial or total demolition, restoration and renovation of buildings, clearance activities and the subsequent construction.

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 of the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

The site at Clay Farm, Ballyogan, County Dublin will undergo a clearance of much of the internal vegetation (hedgerow and crops) but no buildings. This assessment will address the potential for bats roosting in trees and farm building within the site and within the surrounding area that will be flanked by the proposed housing and the significant alteration of the site from its current state as overgrown forestry and grassland.

Previous evaluations in the south Dublin - Wicklow area including house visits, ad hoc observations and survey data recorded by Bat Conservation Ireland have determined the presence of common pipistrelles, soprano pipistrelles, Daubenton’s bats, Natterer’s bats, brown-long eared bats and Leisler’s bats.

Other species in surrounding areas include one of the first records of Nathusius’s pipistrelles on the Blessington Reservoir and the only record of Brandt’s bat in Ireland in Glendalough.

While these would appear considerable distances from the site, these are two species that show highly migratory habits in other European countries. Previous surveys at Clay Farm in 2015 have shown the presence of several bat species including of common pipistrelles, soprano pipistrelles, Natterer's bats, brown-long eared bats and Leisler's bats with a possibility of whiskered bats.

Methodology

SM2Bat+ monitors X 2 (SM2), Anabat SD2 monitor (SD2)
Pettersson D240x heterodyne and time expansion bat detector (D240X)
EchoMeter 3 (EM3) real time expansion bat monitor with Garmin GPS attachment
Head torch and hand torch

The lands that make up the proposed Phase 2 Clay Farm development were examined in June 2015 and again in August 2016 to identify the species of bat present within the site, to identify roost sites or potential roost sites and to determine the value of the site as a feeding and commuting area. Surveying commenced prior to dusk on each survey night and continued for no less than 1.5 hours. Pre-dawn surveys were also undertaken on subsequent days. In 2016, the pre-dawn survey was undertaken on two consecutive mornings to cover different survey areas that could not be addressed in a single survey period.

Bat detectors were either hand held (EM3, D240X, SD2) or placed in a venue likely to identify bat activity. One was placed at the gate of the farmyard of Clay Farm (SM2 6787) in 2016 and a second was placed along hedgerow north of the only house within the site (SM2 6771). Monitors were placed at the red barn within the site, along the stream and hedgerow to the north of the site (the eco-park location) and along a perpendicular hedge in 2015.

On all nights, survey temperatures and all other conditions favoured good bat activity (e.g. at 22.00 hours on June 20th 2015 a temperature of 14.20C. Wind speed = 0.9 m/s, maximum 3.4 m/s, June 26th to 27th 2015 Very mild and dry, August 5th 2016, mild and dry).

Existing Environment

Bat fauna roosting within the site

None

In 2016, soprano pipistrelles were noted to return to a beech tree outside the northernmost corner of the site prior to dawn on 7th August 2016. This was a relatively small roost and it is likely to be non-breeding bats, possibly male bats establishing mating roosts.

All bats moved from the proposed development site prior to dawn and from this assessment and previous surveys, bats returning to roosts were noted heading in north-westerly and northerly directions while it was noted that *Myotis* bats and pipistrelles were associated with the farm yard to the west and adjoining the site. There was no evidence of bats emerging or returning to the house that will be nearest to the development.

Bat fauna feeding and commuting within and through the site -

Leisler's's bat	*Nyctalus leisleri*
Common pipistrelle	*Pipistrellus pipistrellus*
Soprano pipistrelle	*Pipistrellus pygmaeus*
Brown long-eared bat	*Plecotus auritus*
Myotis sp(p)	*Myotis nattereri? mystacinus?*

Bat activity was high in the western corner of the site at dusk (close to the Clay Farm yard) in August 2016 and bats were noted here prior to dawn both in 2015 and 2016. Due to a limit to access, it was not possible to determine whether bats were roosting within these buildings. It is highly probable that these are roost sites for bats including *Myotis* bats of an unconfirmed species.

Bat activity throughout the site was moderate with occasional Leisler's bat activity, both widespread pipistrelle species and occasional *Myotis* bat signals. Remote monitors also identified the presence of brown long-eared bats. These are rarely heard in bat detector surveys during active monitoring except where a roost is extremely close and they are often rare in passive recordings. Of several hundred bat signals recorded, only 2 brown long-eared bat signals were noted.

Bats avail of the hedgerow as feeding and commuting corridors and bats were noted over the two years of survey over much of the site. The main areas for bat activity were the hedgerow and stream to the north, the area around the red barn but with *Myotis* activity also noted along the golf course boundary at the southern end of the site.

Thus, several species avail of the site to each end from north to south and with roost potential highest in the west and lesser bat value to the east.

The hedgerow to the north creates an important connection across the site with another good hedge running approximately parallel to this further south through the site. Bat activity including all species present have been recorded along these two bands of hedgerow.

Modifications or Features of the proposed development

- Building Demolition - Farm building
- Vegetation Clearance - Grassland and tree lines
- New construction including overbridge - Housing and access roads
- Lighting - Security and Access

Impacts Of The Proposed Development

Potential Loss of Roost Sites And Risk to Bats

The removal of mature trees may reduce the roost potential of the site. No bat roosts were noted within the site in August 2016 but this does not rule out occasional use or seasonal use of these sites by bats. Roosts may be used for as little as a day at a time and for several months or permanently for some bats. The mobility and secrecy of bats renders it impossible to rule out a structure without repeat assessment and considerable effort. Where doubt exists, it is safest to consider that a structure has roost potential if the features of benefit to bats exist.

The loss of a roost may create a long-term moderate negative impact. Bats within a roost when it is removed (felled or demolished) may be injured or killed if their presence goes undetected and appropriate measures are not in place.

Disturbance from lighting

Lighting will be increased for two different functions: 1) Access and safety 2) Security and policing

The former is to allow ease of use at night. The latter is to ensure a perceived higher security level.

This may affect bat species, in particular, light-intolerant bat species (such as *Myotis* species and brown long-eared bats) during foraging and if directed at emergence points would affect all bat species, even those that will feed in illuminated areas. This may be an issue created by the proposed bridge crossing above the eco-park.

However, there are no roosts known within the site (while there are trees very close to the perimeter) and therefore illumination would only affect commuting and feeding rather than roosting.

At worst, it would be a permanent slightly negative impact.

Reduced Feeding

The feeding opportunities are provided by the stream, tree lines and mature vegetation with the grassland probably contributing less to insect availability. There will be a removal of some of these trees for housing. There will therefore be a permanent slight negative impact upon the local bat fauna through the removal of the vegetation. Feeding around lighting will potentially increase for Leisler's bats but the insect population will be reduced by loss of habitat and this will lead to an actual decrease in feeding levels albeit that there may appear to be higher bat activity by concentration of Leisler's bat activity into lit areas.

Feeding sites for some species such as *Myotis* species and long-eared bats may be affected and these species may be hindered in reaching feeding sites by loss of hedgerow and darkness to commute between roost sites and feeding areas.

Proposed Mitigation

Examination of mature trees prior to felling and timing of felling

All mature trees shall be examined by a bat specialist prior to felling. The extent of tree roost potential shall be established by a bat specialist prior to any felling.

A bat specialist must undertake an examination of any mature, hollow / damaged trees prior to removal. Trees with good bat roost shall be inspected to ensure that bats are not present prior to felling. Where this assessment is undertaken at a period when bats are inactive (i.e. either seasonally or due to poor weather conditions), the trees will be inspected with a fibrescope and with height access to rule out the presence of bats.

If bats are present, then the tree is protected under the Wildlife Act as a resting place of a bat and a derogation must be sought from National Parks and Wildlife Service. A licence will be issued once appropriate measures are proposed to protect bats and provide alternative roosting opportunities.

A scientific agent will be required to ensure correct implementation. In most circumstances, this will be the bat specialist undertaking the examination of the trees. Felling should preferably be undertaken after August and prior to late November to ensure that bats are not in hibernation and are not within maternity roosts.

If trees are felled in winter, additional care in examining for bats must be taken to ensure that no bats are placed at risk. This may require access and the use of fibrescopes and lighting.

Lighting

As lighting is one of the most significant impacts upon bats from the cumulative effects of development it is proposed that no constant security lighting should be employed around the future housing at night. All security lighting should be motion-activated and adjusted to respond to larger movements associated with human entry rather than bird or bat activated.

In relation to security, it is recommended that infra-red lighting and infra-red cameras are employed to record anti-social activity to assist in crime solving and prevention.

This would not raise the visible light levels that would affect mammals and birds to a much greater extent. It is still entirely adequate for monitoring and identification. The source of light should be Light Emitting Diodes (LEDs) as this is a narrow beam highly directional highly energy efficient light source. The lighting should allow for a light level of no greater than 3 lux at ground level. It is easier to control the direction and light level of low lighting because it is so close to the target area (if using bollard lighting).

In summary, the following is proposed:

(1) No floodlighting should be used – this causes a large amount of light spillage into the sky. The spread of light should be kept below the horizontal.
(2) Hoods, louvres, shields or cowls should be fitted on the lights to reduce light spillage if high intensity lighting is required or to protect trees or other potential roosts from light overspill.

(3) Lights should be of low intensity. It is better to use several low intensity lights than one strong light spilling light across the entire area.

(4) Lights away from essential areas such as major roads should be motion sensitive rather than permanently lit and attached to a timer system to switch off quickly in the absence of sustained movement.

(5) Narrow spectrum lighting should be used with a low UV component. Glass also helps reduce the UV component emitted by lights.

Enhancement of Feeding sites and Commuting Corridors

Provision of suitable feeding sites for bats would be easily achieved by planting lines of vegetation including trees or shrubs within gardens and common areas. An avenue of trees at the southern golf course interface would be beneficial as it would create a shelter and habitat for insects that would in turn benefit bats and birds within the site. Planting along the western perimeter would also enhance the dark corridor linking to the northern wet ditch and Ecology Park.

Wherever feasible, native plant species of local provenance should be employed including typical plants such as hawthorn, blackthorn, elder, gorse, bramble, in addition to other species such as dog rose and *Clematis* attractive to moths. As has been outlined previously for Clay Farm, planting around car park areas and new and modified buildings may avail of window boxes, roof gardens, herbaceous borders etc.

Plants such as *Lonicera periclymenum* (honeysuckle) are beneficial to moths and other nocturnal insects while *Hebe* (*Buddleja* is no longer planted intentionally) are beneficial to daytime Lepidoptera and some night insects. Bees would benefit from lavender, jasmine, rosemary, violets, thyme, blue bells, wisteria, cone flowers and sunflowers.

The presence of the proposed ponds and birch at the Ecology Park to the north will enhance insect diversity and provide feeding for bats as well as ensuring a commuting corridor for bats.

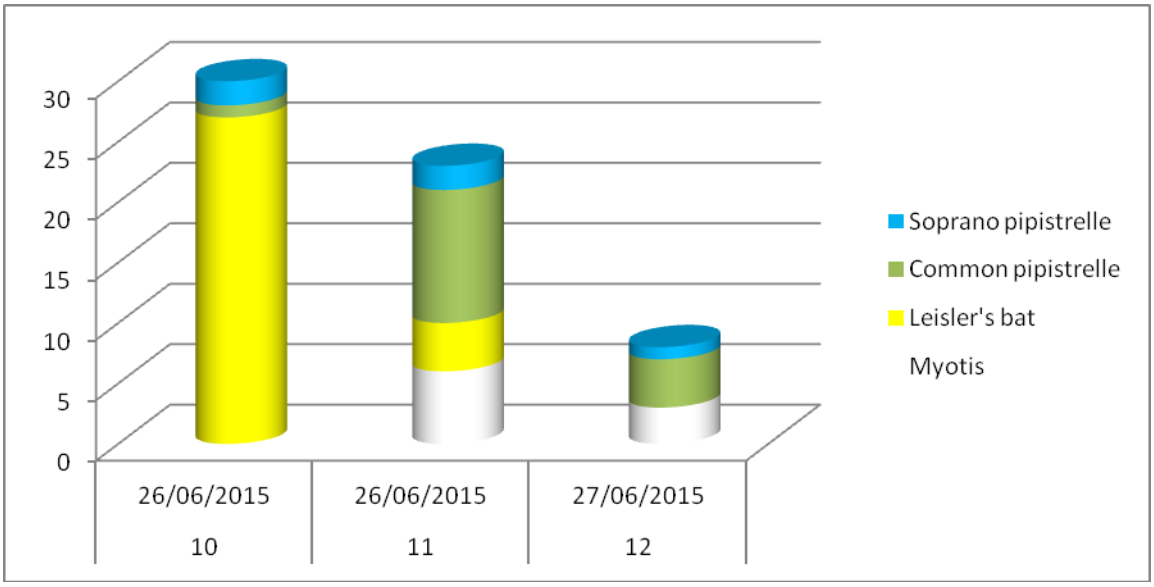
It is essential that the area around the Ecology Park is free from light pollution and wide breaks in vegetation (no breaks shall be in excess of 3 metres unless there is a road requirement and here a dark corridor must be ensured to allow bat movement).

Bat boxes

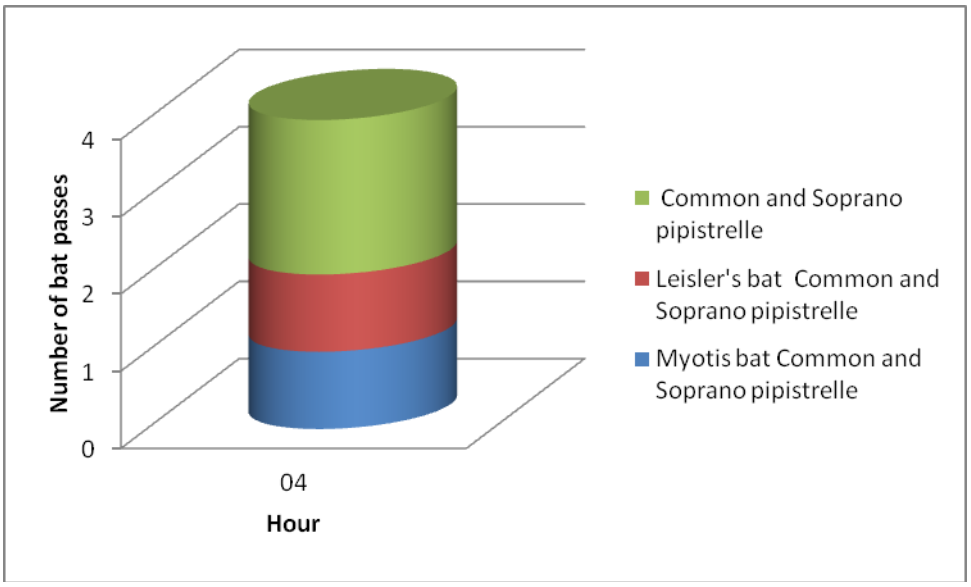
Six Schwegler 2F bat boxes shall be erected on mature trees or on unlit walls at a height of no less than 2.5 metres to provide roosting opportunities for bats. These should not be in dense scrub or facing directly on to a road.

IMPACTS OF THE DEVELOPMENT AFTER MITIGATION

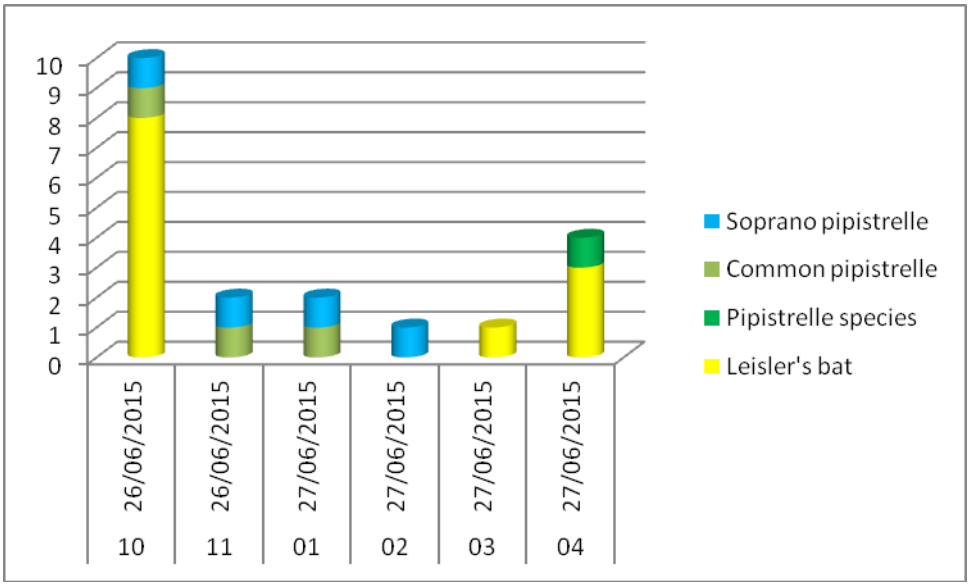
It is predicted that there will be no overall effects upon the conservation status of the bat species discussed in this report from the proposed development in the long term. The removal of vegetation is the most likely measure to reduce the value of the site for a small number of bats but this measure will be lessened in time by the establishment of planting or native plant re-establishment. There are no roosts deemed to be lost by the development and the impacts on bats will be minor but cumulative in association with all other construction within the surrounding area. Lighting control and planting will reduce the impacts greatly.



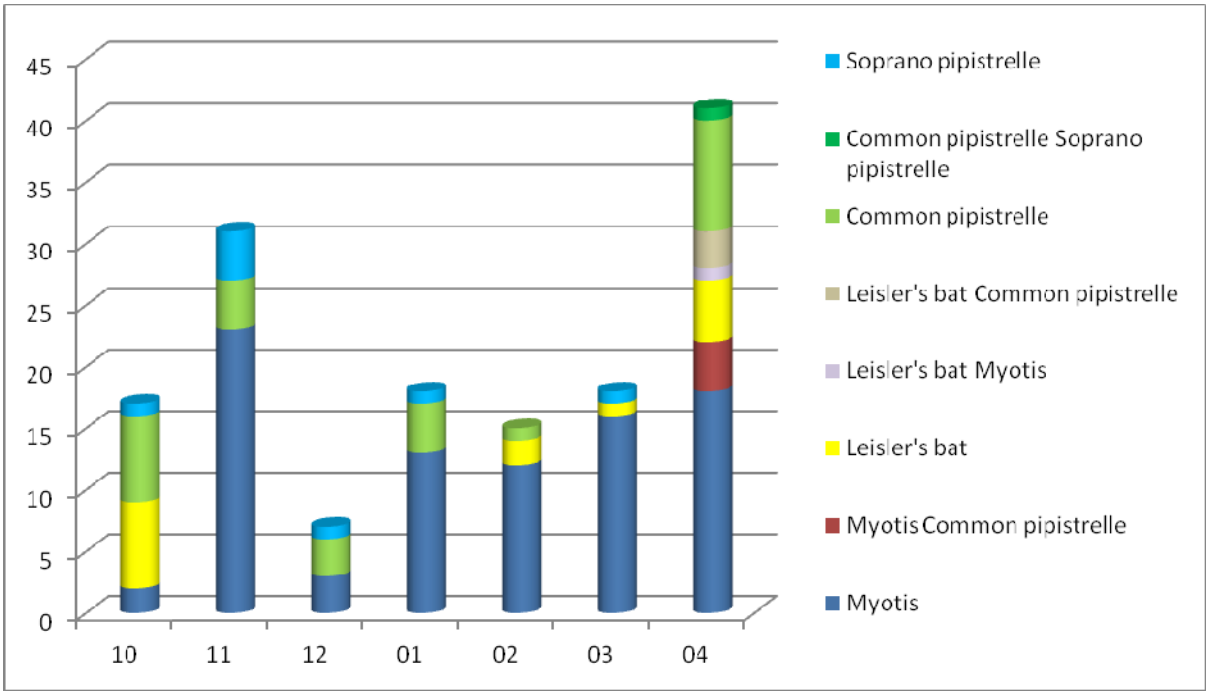
Bat activity at dusk 26th June 2015 within Phase 2 of the proposed development area at Clay Farm, Dublin



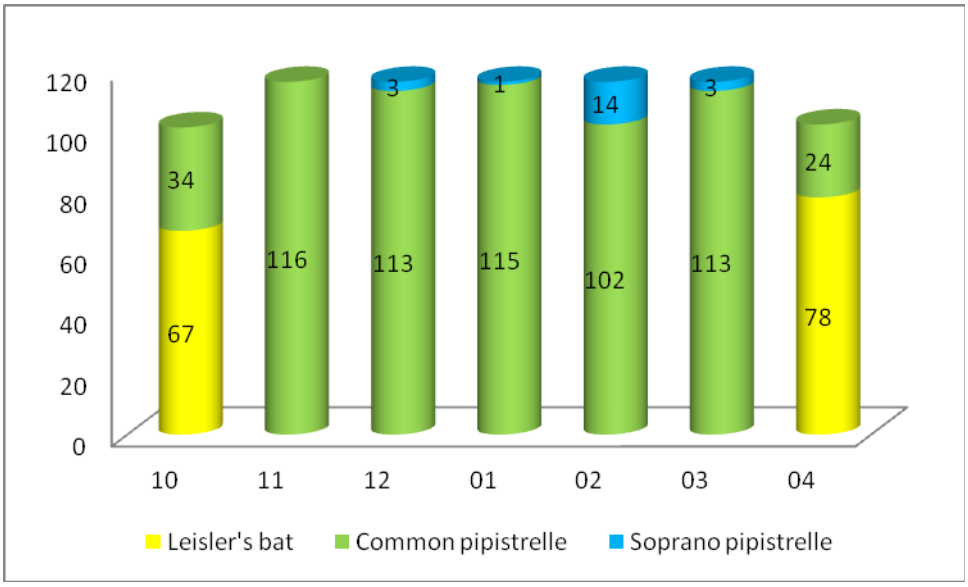
Bat activity at dawn 27th June 2015 within Phase 2 of the proposed development area at Clay Farm, Dublin



Bat activity through the night 26th June 2015 within the Phase 2 of the proposed development area at Clay Farm, Dublin recorded by an SM2



Bat activity recorded at a corrugated barn in the southwestern boundary of the Phase 2 development by an Anabat SD2, June 2015



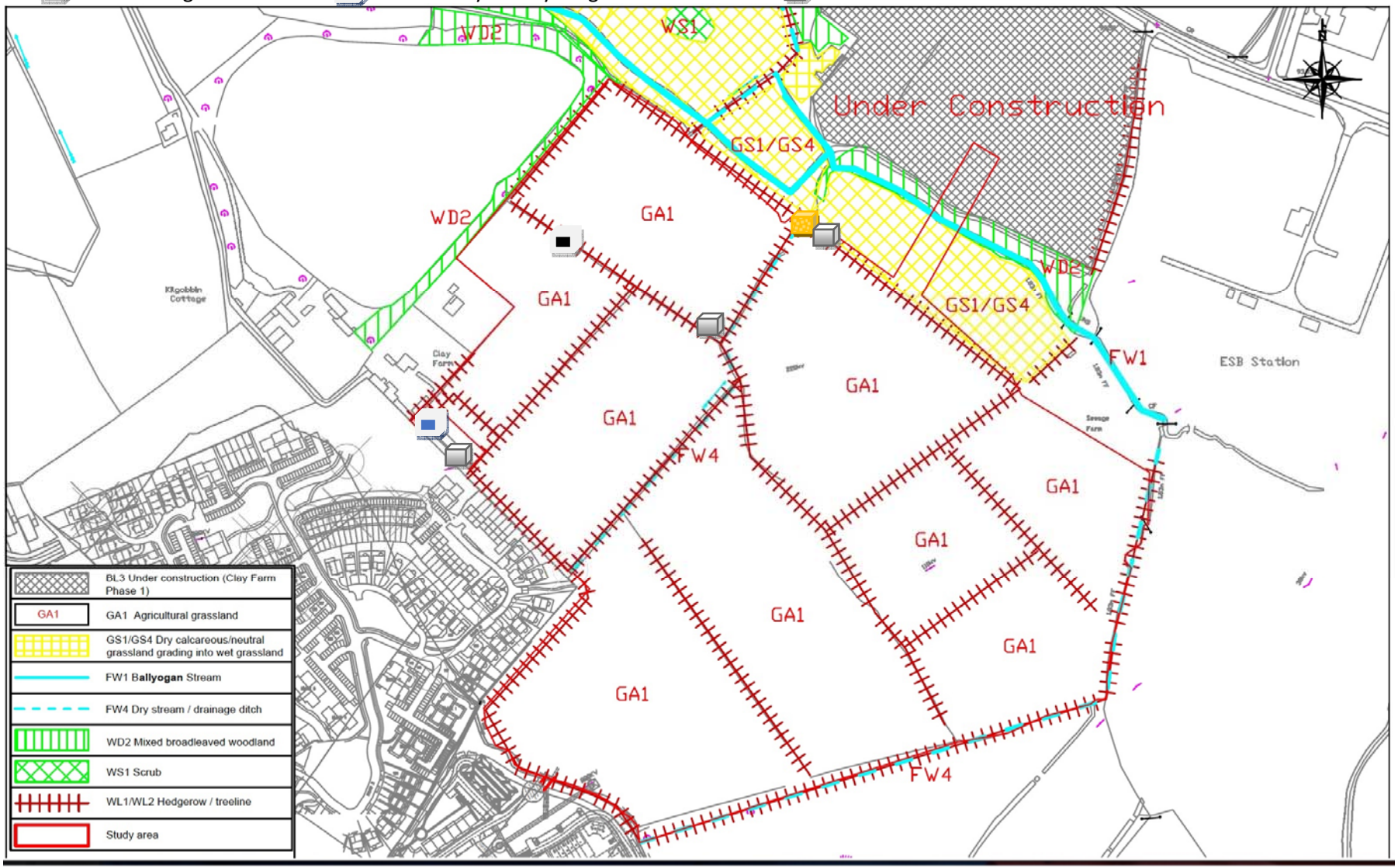
June 20th 2015 Song Meter 2 recording monitor placed overnight at a fence beside the stream passing between Phases 1 and 2

Activity levels for Leisler's bats were high after dusk and prior to dawn while common pipistrelle activity averaged 2 passes per minute for most of the night in particular later at night and earlier in the morning than Leisler's bats.

Dawn transect June 27th 2015 showing *Myotis* bats (white symbol), common pipistrelle (green symbol), Leisler's bat (yellow symbol) and soprano pipistrelle (blue symbol)

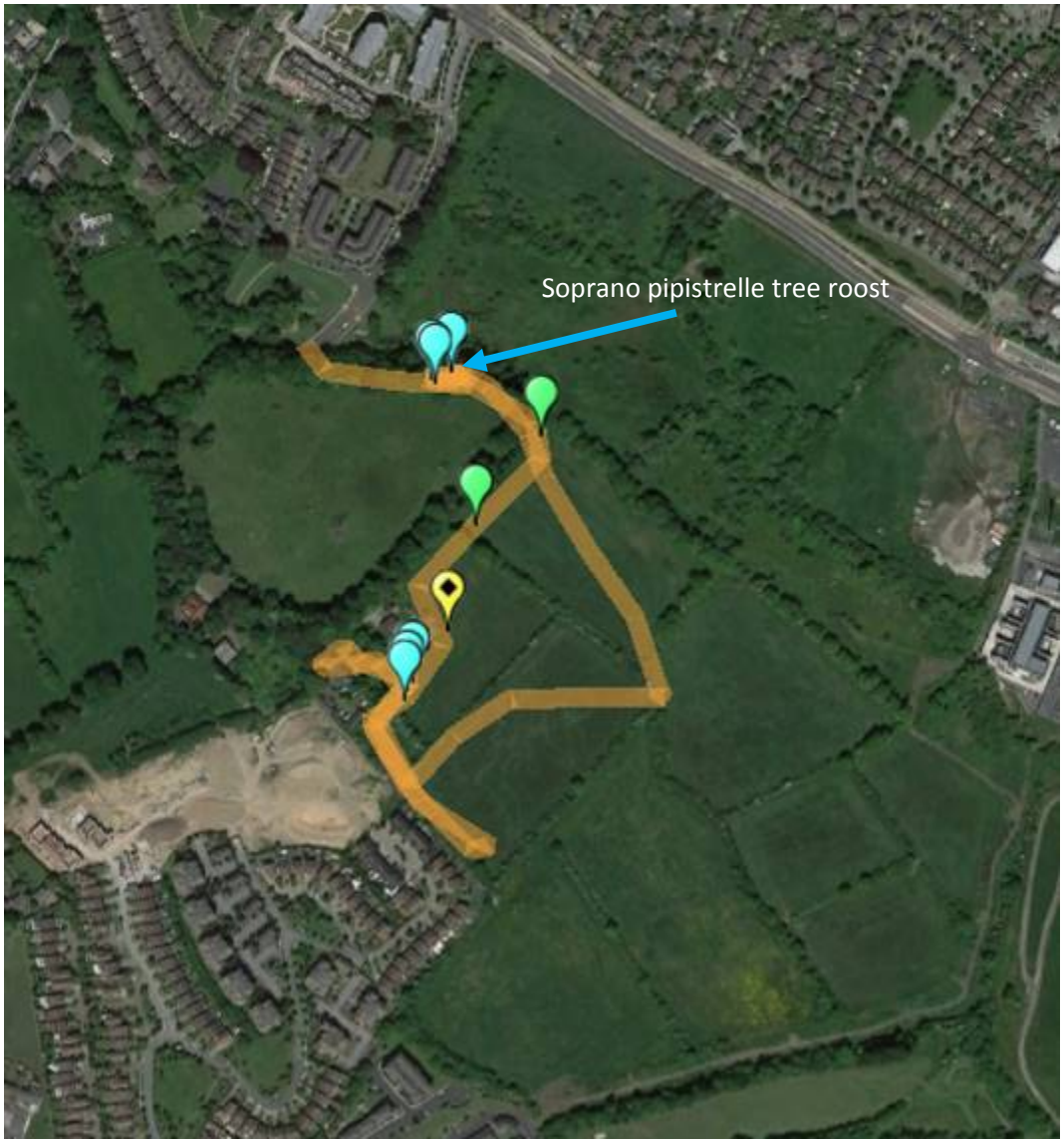
Figure 1: Habitat map of Clay Farm showing bat monitor locations

SM2 at hedge 2016 SM2 at Clay Farm yard gate 2016 SM2 locations 2015

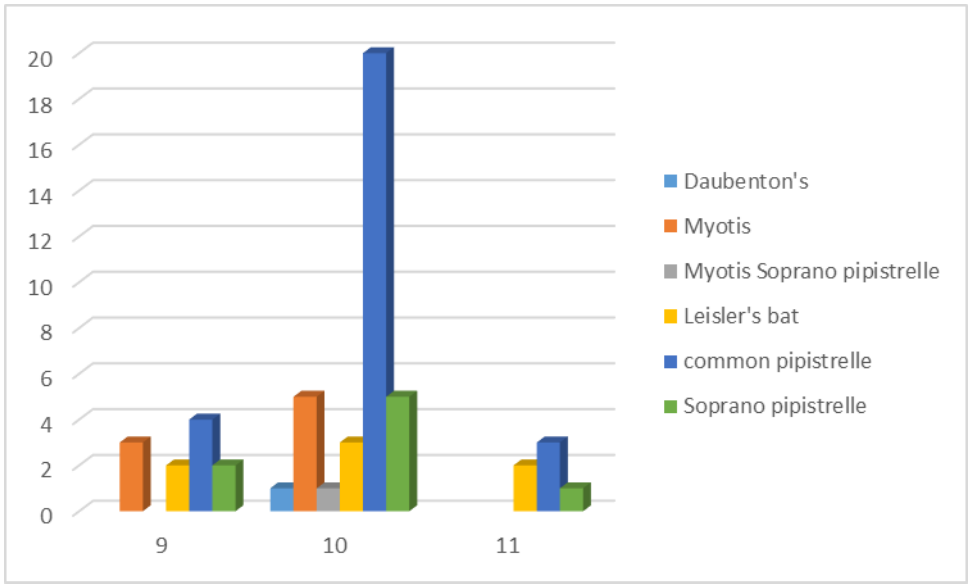


Bat activity at Clay Farm August 11th 2015

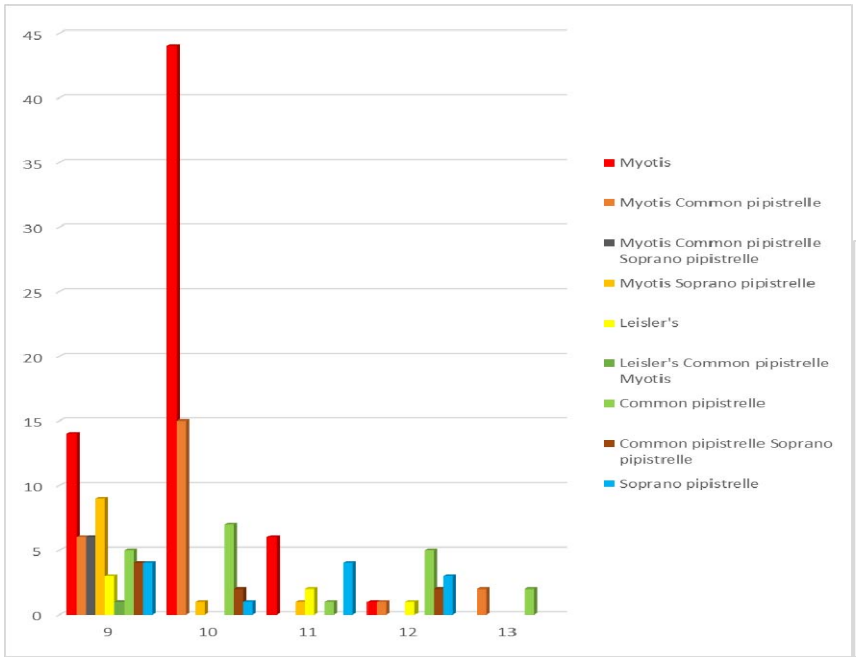
The transect followed at dusk and prior to dawn are shown with locations where bat signals were recorded. The yellow paddles denote Leisler's bat activity. Green paddles denote common pipistrelle and light blue denote soprano pipistrelle activity.
White paddles are signals from a *Myotis* species

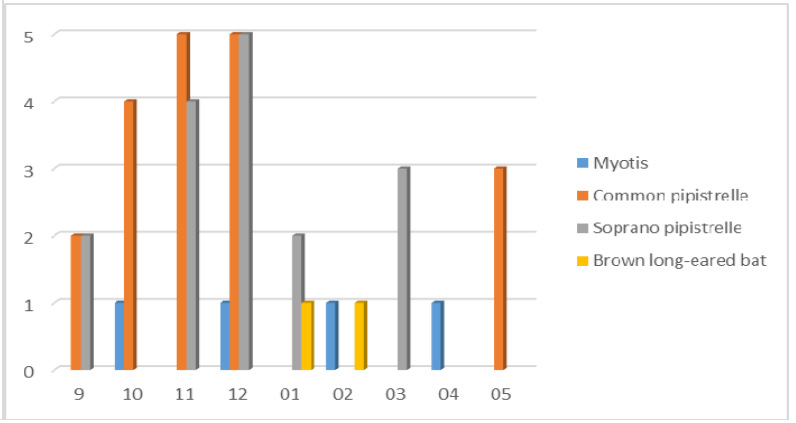


Bat activity noted prior to dawn on 7th August 2016 at Clay Farm
The yellow paddles denote Leisler's bat activity. Green paddles denote common pipistrelle and light blue denote soprano pipistrelle activity.



Bat activity as noted by an Anabat SD2 within the survey area August 5th 2016

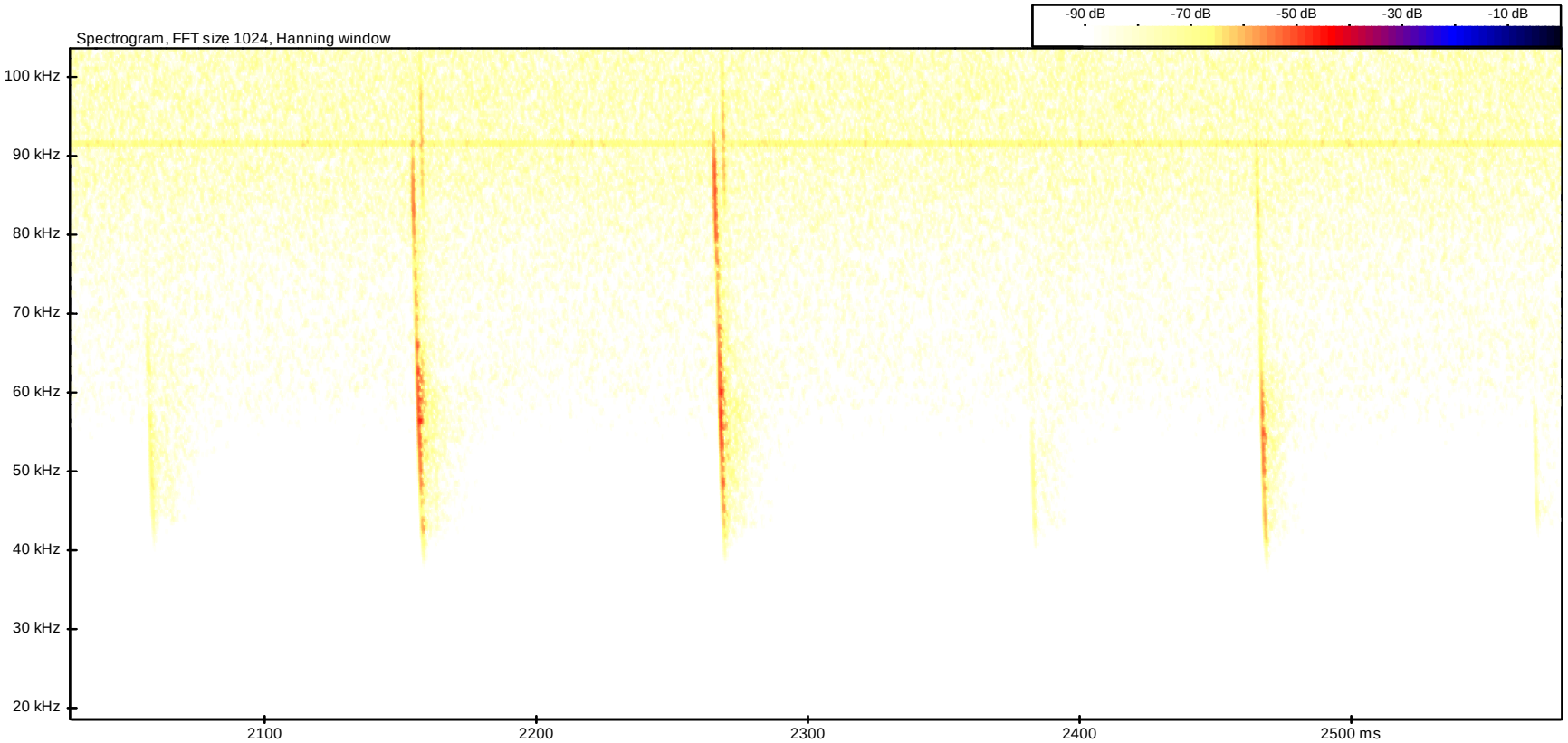




Left - Bat activity around gate recorded by a SM2 (6787) August 5th 2016

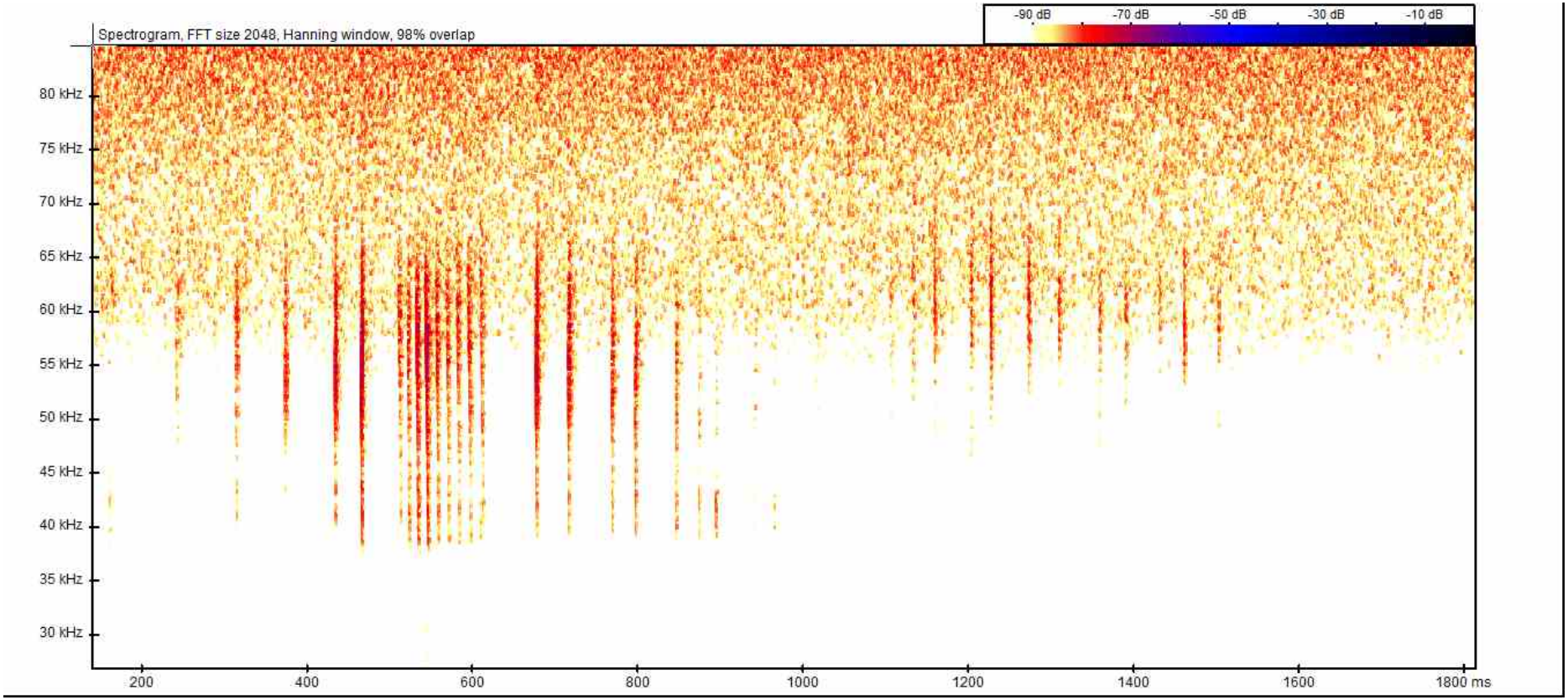
Right - Number of bat passes close to hedgerow within the site as recorded by a SM2Bat+ (6771) on August 5th-6th 2016

The above graphs are at different scales and the second graph is approximately one fifth the scale of the first. The difference in activity closer to the farm yards indicates a gretaer likelihood that this is a likely roost site for some of the bats observed



Spectrogram of signal recorded by SM2 along hedgerow within the site at 22.57 hours August 5th 2016

This is a *Myotis* species potentially a Natterer's bat based on the signals



Faint feeding buzz of *Myotis* bat species at 00.21 hours within the site August 5th 2016

APPENDIX 5.5 BREEDING BIRD SURVEY

Breeding Bird Survey at Clay Farm Lands, Ballyogan Road, Dublin 18.

(Photo. J Fox)

Summary:

A breeding bird survey was undertaken on the lands known as Clay Farm, Ballyogan Road, Dublin 18. For practicality the lands were subdivided into two sections, northern and southern. Each section was visited on three separate dates during the month of June 2015. The lands were walked slowly over a four hour period on each visit. The route walked focused primarily on hedges, areas of scrub and wooded areas. Bird Species that were heard or seen were recorded, their position noted and a breeding status assigned to them. Data from the three visits were amalgamated and approximate positions for the birds as seen or heard were plotted on aerial photographs. Approximate populations, a breeding status and conservation status were assigned to each species. Species tables and final maps for the northern and southern sections of the site were prepared.

A total of 33 common bird species of Ireland, were recorded on the site, of which 12 were confirmed as breeding. No species of high conservation concern were recorded, however 11 species of medium conservation concern were, of which 3 were confirmed to breed on the site. The remaining species recorded were of least conservation concern, 9 of which were confirmed to breed on the site. Several of the species recorded were seen in flight only and most probably were not breeding on the site.

Introduction:

This survey of the breeding birds present at Clay Farm was commissioned by Brady Shipman Martin in June 2015. The survey was undertaken during the month of June 2015.

The overall site is approximately 32.5 hectares of mixed habitat types, including agricultural grassland, dry calcareous grassland, wet grassland, mixed broadleaf/coniferous woodland, hedgerow, scrub and some artificial surfaces.

The Ballyogan stream bisects the site roughly into northern and southern sections flowing through areas of mixed woodland and wet grassland.

The northern section of the site is quite flat and is currently being grazed by cattle. The southern section rises to the South and is being farmed as agricultural grassland/meadow. Several of the fields were cut for silage or hay during the survey period.

Many recently fledged birds were observed during the first visit, an indication that dispersal was already under way at that time.

This survey aims to describe the distribution and abundance of breeding birds occurring on the lands know as Clay farm as outlined on the aerial photography at Figure 1.

Figure 1. Clay Farm. Overall site aerial photography. Yellow line encloses approximate extent of lands surveyed

Methodology:

The site was visited on three occasions during June 2015. The first visit was undertaken on 10th June commencing at 11.00 and finishing at 14.55. This visit was undertaken to reconnoitre the site, plot a walking route and to gather any available relevant data. The timing of this visit was not optimal as early morning is preferred for such survey work, however it was felt that a site visit should be made as early as possible in June as breeding would already be well under way.

Two subsequent visits were made on 22nd and 29th of June at the optimal time of between 05.30 and 10.00 when the bulk of data was gathered. Each of the two early morning visits was for a minimum of four hours duration. Normally a period of two weeks would be allowed between visits but because of the late starting date within the breeding season, this period was reduced to one week. No visits were made after dark and thus no nocturnal species were recorded during this survey.

The site was divided into two separate zones (Northern and Southern), roughly along the hedge/tree line running Northwest to Southeast from Castle Court to the Carrickmines Electricity Transformer station's South-western corner, as indicated by a yellow line on the attached aerial photography Figure 4 and Figure 5.

All observations took place when weather conditions were suitable for surveying. All species present were recorded and breeding status was determined by observation of bird behaviour against a series of standardised behavioural indicators.

The site was entered from Castle Court. Each field boundary was walked, wooded areas were entered where possible and all birds seen and heard were recorded, together with any information about their breeding status on aerial photography of the site. Weather conditions were also noted at the start of each site visit, including rainfall, cloud cover, wind speed and visibility.

Figure 2. Mistle Thrush (Turdus viscivorus). **Confirmed Breeding. (Photo. J Fox)**

Results:

A total of 33 bird species were recorded on the site with 26 species recorded in the northern section and 31 recorded in the southern section.

No riverine bird species were recorded on the site along the Ballyogan stream.

Conservation Status: A list of "Birds of Conservation Concern in Ireland 2014 to 2019" (Colhoun and Cummins 2013) indicates three categories of concern as follows. See appendix 1 for more detail.

- Red list species (high conservation concern).
- Amber list species (medium conservation concern).
- Green list species (least conservation concern).

These statuses have been assigned to all regularly occurring species in Ireland. The criteria on which they have been assessed is based on, their international conservation status, historical breeding declines, recent population declines, European conservation status, breeding rarity, localised distribution and the international importance of populations.

No Red Listed species were recorded on the site.

Eleven Amber listed species were recorded on the site and are indicated with amber text on Tables 1 and 2 and Figures 4 and 5 below. Of these eleven species only three were confirmed as breeding species during the survey. Robin, Stonechat and Mistle Thrush. Four species were identified as possible breeding, Stock Dove, Goldcrest, Starling and House Sparrow. The remaining four species, Great Black-backed Gull, Swallow, House Martin and Swift are identified as non breeding on the site.

Figure 3. Robin (*Erithacus rubecula*). Confirmed Breeding. (Photo. J Fox)

Breeding Status Indicators: The following breeding status indicators were used to establish breeding status.

1. **Confirmed Breeding**: Eggs/nest, Occupied nest, Adult carrying faecal sac or food for young or recently fledged young.
2. **Probable Breeding**: Paired birds seen, Agitated behaviour, Permanent territory, Courtship or display, Nest building or Visiting a nest site.
3. **Possible Breeding**: Species in suitable habitat during breeding season or Singing male present.

4. **Non Breeding**: Birds present but not likely breeding due to a lack of suitable nesting habitat and no behavioural evidence to suggest breeding on the site.

Additionally mammals, including Fox, Deer (probably Sika) and Rabbit were observed on the site. Frog tadpoles were observed in a pool on the first visit which on subsequent visits had dried out. Several species of Butterfly were observed including Ringlet, Small Tortiseshell and Speckled Wood.

Table 1. Northern Section, Clay Farm, Dublin 18. Bird Species Identified, Numbers Present and Breeding Status, June 2015.

Common Name	BTO Code	Species	Breeding Status	Numbers Present
Buzzard	BZ	*Buteo buteo*	Non Breeding	1 bird flying over.
Gt. Black-backed Gull	GB	*Larus marinus*	Non Breeding	1 bird flying over
Woodpigeon	WP	*Columba palmubus*	Probable Breeding	10 to 14 pairs
Swallow	SL	*Hirundo rustica*	Non Breeding	4 bird flying over
Wren	WR	*Troglodytes troglodytes*	Confirmed Breeding	12 to 16 pairs
Dunnock	D.	*Prunella modularis*	Confirmed Breeding	2 to 3 pairs
Robin	R.	*Erithacus rubecula*	Confirmed Breeding	5 to 8 pairs
Song Thrush	ST	*Turdus philomelos*	Confirmed Breeding	1 to 2 pairs
Mistle Thrush	MT	*Turdus pilaris*	Possible Breeding	1 pairs
Blackbird	B.	*Turdus merula*	Confirmed Breeding	7 to 13 pairs
Blackcap	BC	*Sylvia atricapilla*	Confirmed Breeding	3 to 5 pairs
White-throat	WH	*Sylvia communis*	Possible Breeding	1 pair
Willow Warbler	WW	*Phylloscopus trochilus*	Possible Breeding	1 pair
Chiffchaff	CC	*Phylloscopus collybiitta*	Confirmed Breeding	1 to 2 pairs
Goldcrest	GC	*Regulus regulus*	Possible Breeding	1 pair
Great Tit	GT	*Parus major*	Probable Breeding	2 to 3 pairs
Coal Tit	CT	*Parus ater*	Possible Breeding	1 pair
Blue Tit	BT	*Parus caeruleus*	Confirmed Breeding	7 to 11 pairs
Magpie	MG	*Pica pica*	Confirmed Breeding	4 to 7 pairs
Jackdaw	JD	*Corvus monedula*	Probable Breeding	3 pair
Hooded Crow	HC	*Corvus corone cornix*	Probable Breeding	2 to 4 pairs
Starling	SG	*Sturnus vulgaris*	Confirmed Breeding	1 to 2 pairs
Chaffinch	CH	*Fringilla coelebs*	Possible Breeding	7 to 9 pairs
Lesser Redpoll	LR	*Carduelis flammea*	Possible Breeding	1 pair
Goldfinch	GO	*Carduelis carduelis*	Possible Breeding	1 pair
Bullfinch	BF	*Pyrrhula pyrrhula*	Possible Breeding	1 pair

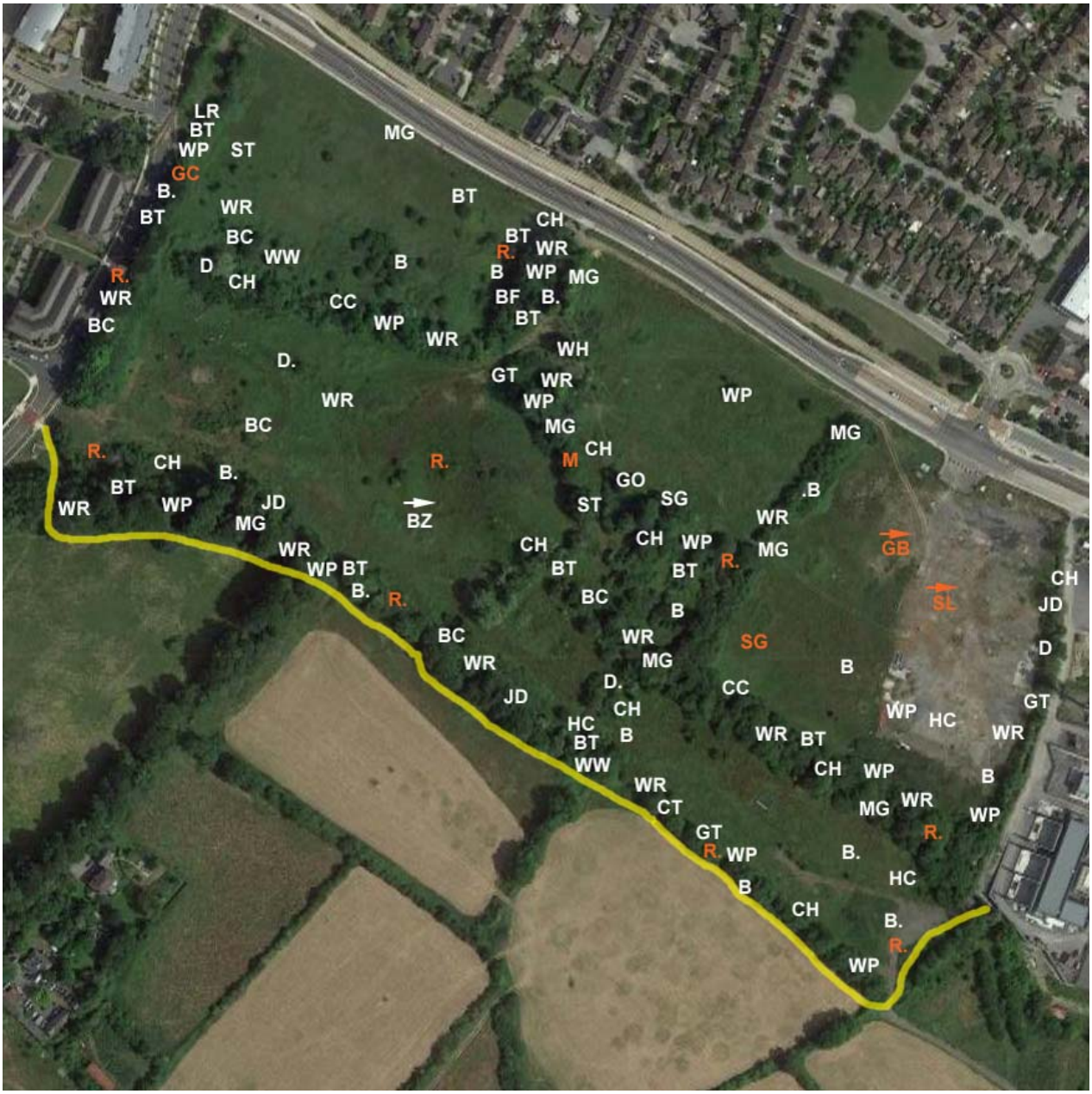


Figure 4. Bird Location Map, Northern Section, Clay Farm, Dublin 18. June 2015. (For BTO Codes see Table 1).

Table 2. Southern Section, Clay Farm, Dublin 18. Bird Species Identified, Numbers Present and Breeding Status, June 2015.

Common Name	BTO Code	Species	Breeding Status	Numbers Present
Pheasant	PH	*Phasianus colchicus*	Possible Breeding	1 to 3 pairs
Herring Gull	HG	*Larus argentatus*	Non Breeding	3 birds flying over
Stock Dove	SD	*Columba oenas*	Possible Breeding	2 birds flying over
Woodpigeon	WP	*Columba palmubus*	Probable Breeding	4 to 8 pairs
Swift	SI	*Apus apus*	Non Breeding	9 birds flying over
Swallow	Sl	*Hirundo rustica*	Non Breeding	15 birds flying over
House Martin	HM	*Delichon urbica*	Non Breeding	21 birds flying over
Wren	WR	*Troglodytes troglodytes*	Confirmed Breeding	15 to 22 pairs
Dunnock	D.	*Prunella modularis*	Confirmed Breeding	8 to 12 pairs
Robin	R.	*Erithacus rubecula*	Confirmed Breeding	5 to 10 pairs
Stonechat	SC	*Saxicola torquata*	Confirmed Breeding	1 pair
Song Thrush	ST	*Turdus philomelos*	Confirmed Breeding	1 to 2 pairs
Mistle Thrush	M.	*Turdus pilaris*	Confirmed Breeding	1 to 2 pairs
Blackbird	B.	*Turdus merula*	Confirmed Breeding	8 to 17 pairs
Blackcap	BC	*Sylvia atricapilla*	Confirmed Breeding	6 to 12 pairs
Willow Warbler	WW	*Phylloscopus trochilus*	Possible Breeding	1 pair
Chiffchaff	CC	*Phylloscopus collybiitta*	Possible Breeding	1 pair
Goldcrest	GC	*Regulus regulus*	Possible Breeding	1 to 2 pairs
Great Tit	GT	*Parus major*	Confirmed Breeding	2 to 4 pairs
Coal Tit	CT	*Parus ater*	Possible Breeding	1 pair
Blue Tit	BT	*Parus caeruleus*	Confirmed Breeding	8 to 14 pairs
Long-tailed Tit	LT	*Aegithalos caudatus*	Confirmed Breeding	2 pairs
Magpie	MG	*Pica pica*	Probable Breeding	5 to 8 pairs
Jackdaw	JD	*Corvus monedula*	Possible Breeding	1 pair
Hooded Crow	HC	*Corvus corone cornix*	Probable Breeding	2 to 5 pairs
Starling	SG	*Sturnus vulgaris*	Possible Breeding	1 to 2 pairs
House Sparrow	HS	*Passer domesticus*	Possible Breeding	4 to 8 pairs
Chaffinch	CF	*Fringilla coelebs*	Possible Breeding	4 pairs
Lesser Redpoll	LR	*Carduelis flammea*	Possible Breeding	1 pair
Goldfinch	GO	*Carduelis carduelis*	Probable Breeding	3 to 7 pairs
Bullfinch	BF	*Pyrrhula pyrrhula*	Confirmed Breeding	3 to 5 pairs

Figure 5. Bird Location Map, Southern Section, Clay Farm, Dublin 18. June 2015. For BTO Codes see Table 2.

Discussion:

As no previous bird surveys of the site were found, no comparisons could be made or conclusions drawn about increases or declines in the species breeding, or population trends within this site.

The species encountered on the site are all widespread common birds of Ireland. The majority of species are currently green listed, I.e. species of least conservation concern in Ireland. Eleven species were found that are currently amber listed, ie. species of medium conservation concern. Of these eleven, three were confirmed to breed on the site. They are Robin, Mistle Thrush and Stonechat.

Fig 6. Recently fledged Stonechat (*Saxicola torquatus*). Confirmed Breeding. (Photo. J Fox)

Two recently fledged Stonechat were observed on the site close to the southern boundary to the electricity substation. They were seen on the first visit only and no adult birds were found. It is therefore possible that these recently fledged birds may have come from a nest outside the site.

Adult Robin and Mistle Thrush were however observed feeding young on the site well away from site boundaries confirming breeding within the site. Of the other seven amber listed species, only five are possible breeders, those being Goldcrest, House Sparrow, Starling, Buzzard and Stock Dove. Suitable nesting habitat is available within the site for those species. However as Buzzard and Stock Dove were only seen in flight on one occasion, during one site visit each, it is unlikely that either were breeding on the site during the survey period. It is likely however that those species may be breeding on near-by or adjoining land and may use the site to hunt and forage.

Three amber listed species, Swallow, House Martin and Swift most probably do not breed on the site as they are species that generally use manmade structures for their nest sites. No such suitable structures or buildings are currently present on site.

Two of the three remaining amber listed species, Starling and House Sparrow, identified as possible breeders are more probably breeding on adjoining lands in near-by structures as they tend to be hole nesters. House Sparrow in particular was most frequently encountered at the Southern and South Western edge of the site close to existing housing developments, where they would more commonly nest.

The final amber listed species, Goldcrest is a possible site breeder with much suitable nesting habitat on the site. No conclusive evidence however was found to confirm breeding for this species.

Willow Warbler, Chiffchaff and Blackcap all green listed migratory species were found on the site. Chiffchaff and Blackcap were confirmed to breed while Willow Warbler was a possible breeder.

Had this survey been carried out earlier in the breeding season, more conclusive evidence of breeding species might have been acquired, additional species encountered and perhaps a more accurate assessment of the numbers of breeding pairs present could be established.

Conclusion:

A good number of species typical of the type of habitats were recorded on the site. Of the 33 species recorded 12 were confirmed to have bred, additionally 4 probably bred and a further 9 possibly bred. The remaining 8 species most probably did not breed on the site but many may have bred on lands, buildings or structures close to the site. The site is probably used by those species for foraging or hunting.

The wooded areas and mature hedge rows are the habitats of most importance for the breeding birds present on the site. These habitats should be retained where possible and augmented with native species planting, as part of a site management plan. Any hedge, scrub or woodland removal should only be undertaken outside the breeding season. The Ballyogan stream is of importance as it provides fresh drinking water and probable bathing areas for the birds. It should not be culverted except in short sections if absolutely necessary. Future careful management of the stream and other important areas of habitat could see them used by increased numbers of birds, including species not recorded during the survey period, further increasing overall biodiversity.

The site may also support many wintering species not commonly found in Ireland during the breeding season. These may include thrushes such as Fieldfare and Redwing, finches such as Siskin and Brambling as well as Snipe and Woodcock to name but a few.

Appendix 1.

Birds of Conservation of Concern in Ireland (BoCCI)

The first comprehensive analysis of the population status of birds on the island which identified those species most in need of conservation was published 16 years ago. (Newton et al 1999). It was an initial review followed the publication of the Irish Red Data Book by Wilde in 1993. A further review followed several years later (Lynas et al 2007), which include data for the first time on an all Ireland basis. The third review of BoCCI (Colhoun and Cummin 2013) forms the basis for BoCCI statuses assigned in this report.

Seven quantitative criteria have been adopted to determine population status for birds in Ireland. These include, assessments of global and European conservation status, recent population decline (both in terms of numbers and distribution), historical population decline, breeding rarity, localised distribution and international importance.

The status of 185 regularly-occurring species in Ireland was assessed against each of the chosen criteria. Of these 37 species, were assigned to the Red List. A further 90 species were assigned to the Amber List. The remaining 58 species were assigned to the Green List. In terms of conservation concern the Red listed species are species of immediate conservation concern, Amber are of medium term concern while Green listed species are currently of least conservation concern.

References:

- Colhoun, K. and Cummins, S. 2013. Birds of Conservation Concern in Ireland 2014-2019. Irish Birds, 9: 523 - 544. Birdwatch Ireland, Kilcoole Co Wicklow.
- Lynas, P., Newton, S.F, & Robinson, J.A., 2007. The Status of Birds in Ireland: an analysis of conservation concern 2008 – 2013. Irish Birds 8:149 – 166.
- Newton, S.F., Donaghy, A., Allen, D. & Gibbons, D.1999. Birds of Conservation Concern in Ireland. Irish Birds 6: 333 – 344.