10 HUMAN BEINGS - NOISE

10.1 Introduction

This section contains the appraisal of potential noise impacts from the proposed development at Kilquade, Kilcoole, Co. Wicklow. A description of the project is provided in Section 3 of this EIS. The development of the site through vegetation clearance, dredge spoil placement works followed by development of the Pretty Bush Eco-park will take between 12 to 24 months. There will be no predicted noise impact during the post construction period of the Pretty Bush Eco-park therefore a noise impact appraisal was only considered necessary for the vegetation clearance and dredge spoil placement activities of the construction phase.

A background noise survey was carried out to inform the impact appraisal by collecting baseline noise levels at the nearest noise sensitive locations.

The noise impact was appraised with reference to British Standard 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites Part 1 Noise*, BS 4142: 2014 *Methods for rating and assessing industrial and commercial sound* and the typical noise emission limits contained within the Environmental Protection Agency's (EPAs) *Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities* (NG4).

The post construction phase of the development i.e. Pretty Bush Eco-park utilisation and is expected to have a very low noise impact, given the nature of the park and infrequent use of the Council yard area, therefore a noise impact appraisal is not considered necessary for the post construction phase of the development.

The requirement to assess vibration was scoped out as the proposed construction activities relating to site clearance and material placement should not generate perceptible vibration levels or levels capable of structural damage.

10.2 Explanation of Noise

Noise is defined as unwanted sound. The impacts of noise are subjective, varying from person to person. Specific factors, such as the existing background noise levels, time of day and the activities being carried out when the person experiences the noise, all affect the noise levels impacts on the receiver.

Perceived noise is quantified as sound pressure levels; the unit of sound pressure level being a decibel (dB). The smallest noise level change perceived by the human ear is 3 dB with a change of 10 dB corresponding approximately to halving (or doubling) the loudness of sound. Another property of the decibel scale is that if a noise source is more than 10 dB less than another noise source, then the total noise level is simply the louder of the two sources.

The use of A-weighted decibels, dB(A), as the basic unit for environmental noise is widely accepted as A-weighting differentiates between different frequencies in a manner similar to how a human perceives these frequencies. A-weighted sound levels emphasise the middle frequencies of the noise spectrum, putting less emphasis on the higher and lower frequencies. Typical noise levels on the A-weighted decibel scale and the subjective human response are presented in Table 10.1.

Table 10-1: Examples of Indicative Noise Levels[22]

Situation/Noise Source	Approximate Noise Level dB(A)	Sound Pressure μPa	Subjective Description
30 m from a military jet aircraft take-off	140	200,000,000	Painful, intolerable
Rock/Pop concert	105	3,500,000	
Nightclub	100	2,000,000	
Pop/Concert at mixer desk	98	1,600,000	
Passing Heavy Goods Vehicle at 7 m	90	630,000	Very noisy
Ringing Alarm Clock at 1 m	80	200,000	
Domestic Vacuum cleaner at 3 m	70	63,000	Noisy
Busy Office	60	20,000	
Normal Conversation at 1 m	55	11,000	
Reading room of the British National Museum	35	1,100	
Bedroom in a quiet area with the windows shut	30	360	Very quiet
Remote location without any identifiable sound	20	200	
Theoretical threshold of hearing	0	20	Uncanny Silence

10.3 Methodology

The noise impact appraisal was completed in accordance with and with regard to the following standards and guidance:

10.3.1 Relevant Guidance

A list of relevant guidance documents and standards used in the impact appraisal are provided below. These have been referred to where referenced or applied in the sections hereafter.

EIS/EIA Guidance:

- Guidelines on the information to be contained in Environmental Impact Statements, Environmental Protection Agency, 2002
- Advice Notes on Current Practice, Environmental Protection Agency, 2003
- Current drafts of both documents above (refer to Section 2)

Noise Modelling Standards and Technical Advice:

- British Standard BS 5228 Part 1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites Part 1 Noise*
- BS 4142:2014, *Methods for rating and assessing industrial and commercial sound*
- Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4), Environmental Protection Agency, 2004
- BAT Guidance Note on Best Available Techniques for the Waste Sector – Waste Transfer and Materials Recovery

[22] Brüel & Kjær (2000). Environmental Noise. Brüel & Kjær Sound & Vibration Measurement A/S.

Guideline Evaluation Criteria:

- British Standard BS 5228 Part 1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites Part 1 Noise*
- BS 4142:2014, *Methods for rating and assessing industrial and commercial sound*
- Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4), Environmental Protection Agency, 2004

10.3.2 Study Area

The development site is in Kilquade, Co. Wicklow at an elevation of c. 55 mOD, and is located 1 km north of Kilcoole village and 1 km south of Delgany. Greystones is also located 2.5 km from the site. The immediate vicinity of the site is rural/residential in nature, with residential dwellings and agricultural fields surrounding the site. A sports centre is located c. 500m from the site.

The development site is 5.6 ha. The main access to the site is via an existing gated entrance from the L1042 carriageway, with the junction of the L1042 and R761 being located 100m east of this gate.

10.3.3 Evaluation Criteria

Criteria for Site Clearance Activities

There is no specific Irish guidance on appropriate noise limits for construction noise, and therefore the noise limits specified in the British Standard, BS 5228:2009+A1:2014, *Code of Practice for Noise and Vibration Control on Construction and Open Sites*, have been used.

British Standard BS5228:2009 contains two example methods for assessing the significance of construction noise.

The first is based on the use of criteria defined in the Department of the Environment Advisory Leaflet (AL) 72, *Noise Control On Building Sites*[23] which sets a fixed limit of 70 dB(A) in rural, suburban and urban areas away from main roads and traffic. Noise levels are generally taken as façade L_{Aeq} values with free-field levels taken to be 3 dB lower, giving an equivalent noise criterion of 67 dB L_{Aeq}. The L_{Aeq} is the energy averaged noise level over the measurement period.

The second is based on noise change, with a 5 dB increase in overall noise considered to be significant. However, where existing noise levels are low and construction activities continue for more than one month, minimum criteria are applicable. These are 45, 55 and 65 dB L_{Aeq}, for night-time (23:00-07:00), evening and weekends, and daytime (07:00-19:00) including Saturdays (07:00-13:00) respectively.

Criteria for Material Placement

The 2012 *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)* (Environmental Protection Agency, 2012) requires that licenced sites are screened to determine whether they are a 'quiet area' in accordance to the EPA publication Environmental Quality Objectives – Noise in Quiet Areas (2003) (Step 1 of NG4 Screening) or areas of low background noise (Step 2/3 of the screening). This screening is required to determine the most applicable noise limits for sites. As the site will be subject to a waste soils recovery licence, this guidance note is applicable.

Step 1 of the screening is shown in Table 10.2 over. For the site to be in a Quiet Area, the criteria listed must be satisfied. In the case of the existing Kilquade site, the site is within the 1 km separation distance from Kilcoole and Delgany of around 4,000-5,000 inhabitants and 2.5 km from Greystones with a population of around 17,000 people (Delgany and Greystones). Since the site does not meet any criteria from the table, it is not considered to be a Quiet Area.

23 Department of the Environment, Environment Advisory Leaflet (AL) 72, Noise Control On Building Sites, 1969

Table 10-2: Quiet Area Screening Step 1

Criteria	Response
Is the site >3 km away from urban areas with a population >1,000 people?	No, within 1 km of Delgany town with a population of 5,191[24]
Is the site >10 km away from urban areas with a population >5,000 people?	No, within 1 km of Delgany town with a population of 5,191[25]
Is the site >15 km away from urban areas with a population >10,000 people?	No, within 3 km of Greystones-Delgany with a combined population of 17,468[26]
Is the site >3 km away from any local industry?	No
Is the site >10 km away from any major industry centre?	No
Is the site >5 km away from any national primary route?	No, within 2km of N11
Is the site >7.5 km away from any motorway or dual carriageway?	No

Since it is not in a Quiet Area, the NG4 document requires a screen to determine if the site is in an area of low background noise (NG4 Step 3). The background noise levels (described in Section 10.4) were examined to see if they satisfy the following criteria:

- Average Daytime Background Noise Level ≤40dB L_{AF90}, and;
- Average Evening Background Noise Level ≤35dB L_{AF90}, and;
- Average Night-time Background Noise Level ≤30dB L_{AF90}.

Based on a daytime baseline noise survey carried out in October 2015, the daytime L_{A90} values exceeded 40dB. Therefore, it can be expected that this is not an "area of low background noise" in accordance with NG4.

Based on the results from the screening and the noise limit criteria described in NG4 Table 1 'Recommended Noise Limit Criteria', the limits provided in Table 10.3 are applicable to the site.

Table 10-3: Guidance Note NG4 Recommended Noise Emission Limits

Period	Noise Limit
Daytime (07:00 to 19:00 Hrs)	55 dB(A) $L_{Ar,T}$
Evening-time (19:00 to 23:00 Hrs)	50 dB(A) $L_{Ar,T}$
Night-time (23:00 to 07:00 Hrs)	45 dB(A) $L_{Aeq,T}$

The guidance note also states that there should be no clearly audible tones and impulsive noise at all noise sensitive locations[27]. During night-time no tonal or impulsive noise from the facility should be audible at any noise sensitive location.

[24] 2006 census
[25] 2006 census
[26] 2011 census
[27] NSLs are defined as any ..."dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or area of high amenity which requires the absence of noise at nuisance levels" (EPA, 2012).

A penalty of 5 dB for tonal and/or impulsive elements is applied to the day-time measured L_{Aeq} values to determine L_{Ar} values in accordance with *ISO 1996-2:2007 'Acoustics - Description, measurement and assessment of environmental noise -- Part 2: Determination of environmental noise levels*'.

The noise impact appraisal was carried out using these noise emission limits for the waste acceptance and placement activities, provided in this report as Table 10.3.

Criteria for Subjective Noise Level Magnitude and Significance

British Standard 4142:2014, *Methods for rating and assessing industrial and commercial sound*, provides an appraisal methodology for determining the likely effects of external sound experienced at residential properties due to industrial and commercial sound sources. The standard describes a method for rating noise levels based on the difference between the level of existing background sound (in the absence of the industrial or commercial source) and the sound source level of the source at a particular receiver location (known as the specific sound level). In instances where the specific noise level exhibits an identifiable or perceived character (such as tonality, impulsiveness, intermittency or any other distinguishing characteristic) then a penalty, depending on the nature of the sound, should be added to give the rating level. The difference between the background level and the rating level (rating noise level minus the background sound level) is then used to determine the impact of the sound, as shown in Table 10.4.

Table 10-4: Extract from BS 4142:2014

Difference	Appraisal Indication
Around 10 dB or more	*'…likely to be an indication of a significant adverse impact.'*
Around 5 dB	*'…likely to be an indication of an adverse impact, depending on the context.'*
0 dB	*'… this is an indication of the specific sound source having a low impact, depending on the context.'*

However, it is acknowledged and stressed within the standard that the source of noise should be described and appraised both in terms of the margin above background sound and in the context of the existing sound environment, especially in instances where the existing environment may already have ambient (or residual) sound levels that are high in relation to background sound level and when existing sound is similar in character to the source.

In addition, the standard states that not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.

10.3.4 Scoping and Consultation Requirements

There were no further noise appraisal requirements from the scoping and consultation detailed in Section 6.

10.4 Existing Environment

10.4.1 Baseline Survey

A baseline noise assessment was carried out for the proposed development between the hours of 07:50 and 17:10 on 01 October 2015.

The monitoring was carried out using a Brüel and Kjaer 2250 Type 1 Sound Level Meter[28] and a Brüel and Kjær microphone unit Type 4189[29] with a Brüel and Kjær windscreen Type UA-0237.

The sound level meter was calibrated prior to commencing the survey using the recommended calibration procedure and a Brüel and Kjær Type 4231[30] calibrator. The meter was re-checked on completion of the survey to record drift during the course of the monitoring period. Drift is normally associated with battery fade and temperature. The unit had not drifted during the survey. Calibration certificates are provided in Appendix 11 of EIS Volume 3.

The 30-minute equivalent continuous sound level (L_{Aeq}), the 10 percentile level (L_{A10}) and 90 percentile level (L_{A90}) were recorded at each monitoring location.

The sound level meter was set to a frequency weighting of 'A' in accordance with international standard IEC 61672:2003 and various national standards relating to the measurement of sound pressure level representative of human hearing and a fast response time.

10.4.2 Baseline Survey Locations

The monitoring was undertaken at four noise sensitive locations (described as NSL1 to NSL4) in the environs of the proposed site. These locations are presented in Table 10.5 and illustrated in Figure 10.1. Photographs taken at each monitoring location are provided in Appendix 11.

Table 10-5: Coordinates of the Baseline Noise Monitoring Locations

Monitoring Location	ITM Co-ordinates	
	X	Y
NSL1	728818	709293
NSL2	728754	709056
NSL3	729028	709355
NSL4	728803	709405

10.4.3 Baseline Survey Results

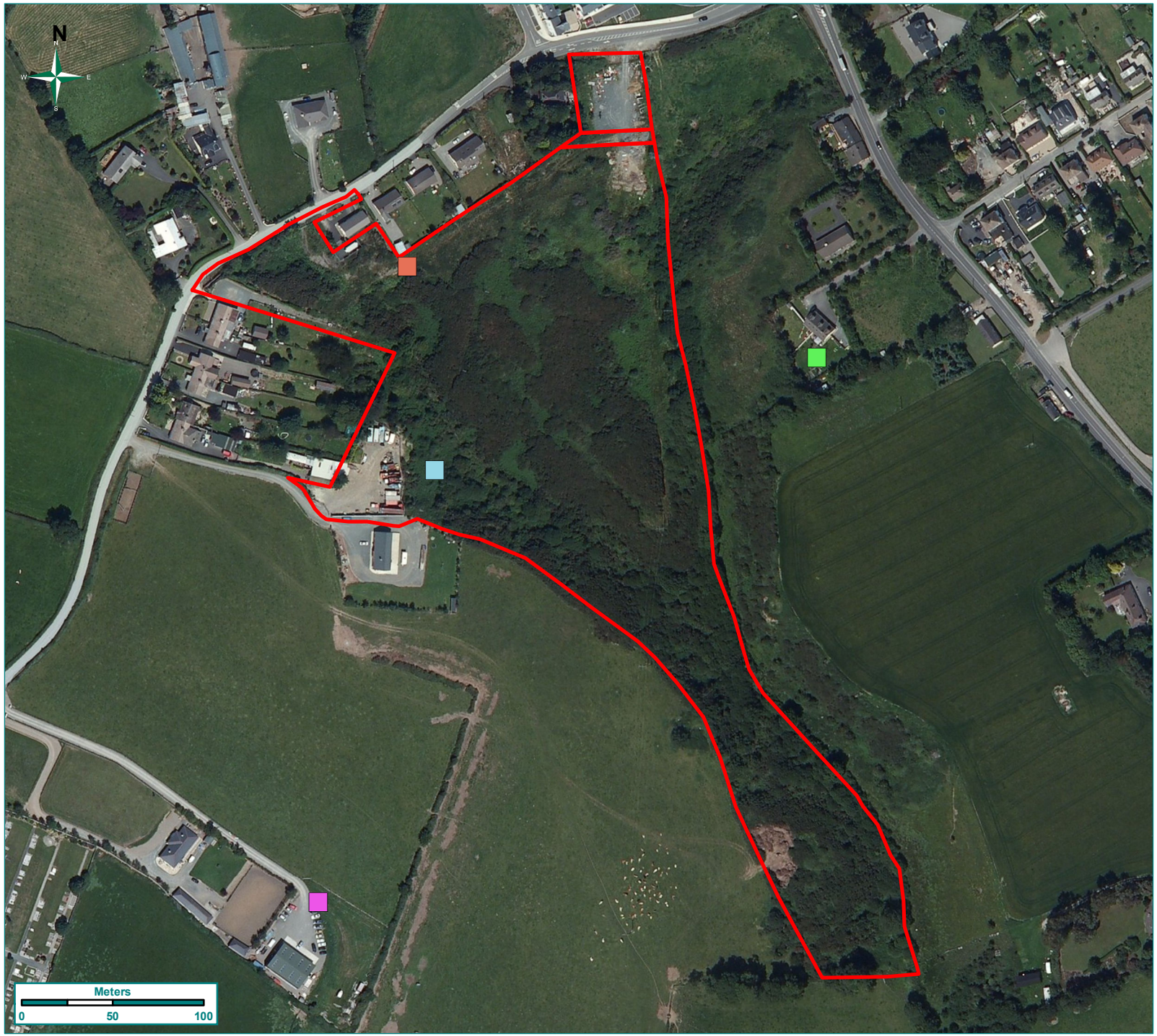
At each location 15-minute measurements were carried out during four different daytime periods. The results for each baseline noise measurement are presented in Table 10.6 over.

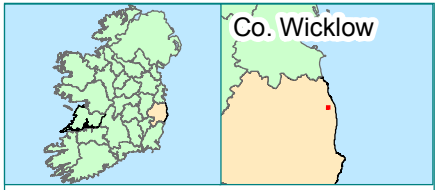
[28] Sound Level Meter - s/n 2506904; Calibration Certificate No. CKD1404820, dated 27 June 2014.
[29] Microphone - s/n 2542881; Calibration Certificate No. CKD1404820, dated 27 June 2014
[30] Calibrator - s/n 2545489; Calibration Certificate No. CDK1505588, dated 28 July 2015

Table 10-6: Results from Baseline Survey

Measurement	Time	$L_{Aeq, 15 min}$ (dB)	$L_{A10, 15 min}$ (dB)	$L_{A90, 15 min}$ (dB)	Survey Notes
NSL1					
1	07:51:23	41	44.4	35.7	Bird song, distant road traffic
2	10:42:13	42.7	45.5	34.9	Traffic, dog bark, person shouting
3	14:09:29	43	44.6	40	Wood saw, traffic
4	16:41:41	43.7	45.5	40.7	Traffic, birdsong
NSL2					
1	08:41:14	45.3	47.1	42.8	Traffic, cattle grazing
2	11:27:50	49.5	47.6	36.3	Garage machine, traffic, radio from cars
3	15:06:28	45.9	47.8	43.4	Traffic, house alarm
4	17:32:13	47	48.5	44.9	Traffic, birds, tools from garage, crows
NSL3					
1	09:06:40	55	58.5	47.4	Wood saw from carpentry works, traffic
2	10:43:00	52.6	56.1	41.3	Wood saw from carpentry works, traffic, birdsong
3	15:32:47	54.3	57.6	48.1	Dog barking, traffic, birdsong
4	18:05:15	55.7	58.8	50.8	Traffic, bus, birds
NSL4					
1	08:14:00	47.2	49.8	43.3	Peak traffic time
2	11:06:29	41.3	45.1	35.3	Traffic, plane, fan from substation
3	14:41:05	44.3	46.3	41.6	Wood saw from carpentry works, traffic, bark
4	17:09:39	44.6	46.3	42	Traffic, plane, dog, child

The general background noise sources were traffic (L1042, R761 road and N11), wood cutting and animal and domestic noises (dog barking, birds and people).





Legend

Noise Sensitive Locations

- NSL1
- NSL2
- NSL3
- NSL4

Study Boundary

Date 04/02/2016

Name Of Client

Wicklow County Council

Name Of Job

Waste Licence, Planning & EIS for Waste Soils Recovery Facility

Title Of Figure

Baseline Noise Monitoring Locations

Scale Used 1:3,000 @ A4

Figure No. 10.1

Rev A

FEHILY TIMONEY & COMPANY

CONSULTANTS IN ENGINEERING & ENVIRONMENTAL SCIENCES

Core House, Pouladuff Rd, Cork, Ireland.
T: +353-21-4964133, F: +353-21-4464

Unit 16 J5 Plaza, North Park Business Park, Dublin 11, Ireland.
T: +353-1-6583500, F: +353-1-6583501

www.fehilytimoney.ie, E: info@ftco.ie

10.5 Potential Noise Impacts

10.5.1 Summary of the Proposed Development

The proposed project is to develop a waste soils recovery facility for the placement of up to 200,000 tonnes of surplus dredge spoil material which, post construction, will be developed further as an Eco-park for community benefit. The site will be developed through three stages:

1. Vegetation cleared from the site
2. Dredge spoil material imported to site for placement
3. Subsoil and topsoil material imported to site for Eco-park development

The noise emissions during these stages will arise from the plant used to clear and deposit the spoil material on site, as well as vehicle movements associated with dredge spoil material importation. The impact appraisal of these noise emissions is provided in Section 10.5.2.

During the post construction, operational phase of the Pretty Bush Eco-park, it is considered that there will be no likely significant noise impacts.

10.5.2 Do Nothing Impact

If the proposed development were not to proceed, there would be no impact on the existing baseline noise levels and they would remain in the range of background noise indicated in Table 10.6.

10.5.3 Potential Construction Impacts – Direct & Indirect

The main scope for potential impacts may arise during the placement (construction) phases of the development. The construction will comprise three phases: clearance of vegetation from the existing site, placement of waste materials and construction of the Pretty Bush Eco-park features. Each of the construction phases will be split to describe the potential impacts and the predicted noise level on each phase.

Site Clearance Works

Approximately 80% of the existing vegetation of an area of 5.6 ha will be cleared from the site to accommodate the placement of dredge spoil. The clearance phase is divided in a sequence of 3 areas, as previously shown in Figure 3.6.

The removal of the vegetation will be carried out using a chain saw (or similar) and other hand tools. Other plant expected to be utilised are a 13.5 tonne tracked excavator, a dumper and a loading shovel with grab attachment. These are the principal sources of noise emanating during this phase. Noise levels emitted by this machinery are provided in Table 10.7.

Table 10-7: Assumed Construction Plant

Equipment description	Sound Level L_{eq} dB(A) at 10m	Number of Plant Assumed	Comments
Chain saw[31]	73	3	L_{eq}(A) obtained from L_p(A). Low noise mode.
Shredder	62	1	L_{eq}(A) obtained from L_W(A) of 103 dB[32]

[31] L_{eq}(A) obtained from L_p(A). Source of L_p(A): Agriextra.eu. Stihl MS 460 Professional Chainsaw. <http://www.agriextra.eu/stihl-ms460-chainsaw.html> [accessed 08 December 2015]
[32] Doppstadt SM-518 shredder

Equipment description	Sound Level L_{eq} dB(A) at 10m	Number of Plant Assumed	Comments
Tracked excavator[33]	69	1	Site preparation Tracked excavator in BS 5228-1
Dumper[9]	77	1	Dumper 3T in BS 5228-1
Loading shovel[9]	71	1	Telescopic handler in BS 5228-1

Predicted Noise Levels

Construction noise level predictions have been calculated according to BS 5228:2009+A1:2014. The assumptions made for the calculations are: the chain saws and wood shredder are operating for 50% of the time whereas the rest are operating 100% of the time, ground reflection of 3 dB and no screening applied. A list of plant used in the site clearance and waste placement with their corresponding sound level L_{Aeq} dB at 10m is detailed at Table 10.7.

For the purposes of appraising the noise from the site clearance works, the best practice daytime limit of 65dB L_{Aeq} for construction noise as per BS 5228:2009 Part 1 was used and compared with the predicted noise levels for each of the clearance phases. The resultant predicted noise levels are shown in Table 10.8.

Table 10-8: Compliance of the Predicted Noise Levels at NSL for Site Clearance Works

Noise Sensitive Location	Baseline Noise Level L_{Aeq} (dB)	Phase Area	Distance (m)	Predicted L_{Aeq} (dB)	Compliant with BS 5228:2009 Threshold Limit of 65dB, L_{Aeq} (dB)
NSL1	41-43.7	1	150	58	Yes
		2	75	64	Yes
		3	170	57	Yes
NSL2	45.3-47	1	350	51	Yes
		2	270	53	Yes
		3	330	51	Yes
NSL3	52.6-55.7	1	125	60	Yes
		2	160	58	Yes
		3	150	58	Yes
NSL4	41.3-47.2	1	45	69	No
		2	145	59	Yes
		3	240	54	Yes

All predicted values comply with BS 5228:2009 limit with the exception of NSL4 which is within 45m of Phase 1 clearance works. For this dwelling and all which are under 55 m from the activity area (predicted level of 65 dB L_{Aeq}), mitigation measures are needed. The proposed mitigation is described in Section 10.6.

[33] BS 5228 Part 1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites

Material Placement Activities

Following site clearance, the placement of dredge spoil materials and imported topsoil will employ a tracked excavator, a dumper and a loading shovel with grab attachment. Noise levels emitted by this machinery are provided in Table 10.7. During this stage, frequent HGV movements associated with material transportation will occur.

The material filling phase is divided in a sequence of 4 areas, as previously shown in Figure 3.7.

For the purposes of assessing the material placement activities, the 55 dB L_{Aeq} daytime limit from NG4 has been used as the material placement will be a licensed activity and compared with the predicted noise levels for each of the material placement phases. The resultant predicted noise levels are shown in Table 10.9.

Table 10-9: Compliance of the Predicted Noise Levels at NSL for Waste Placement Works

Noise Sensitive Location	Baseline Noise Level L_{Aeq} (dB)	Phase Area	Distance (m)	Predicted L_{Aeq} (dB)	Compliance with NG4 Daytime Limit of 55dB, L_{Aeq} (dB)
NSL1	41-43.7	1	190	56	No
		2	100	61	No
		3	135	59	No
		4	60	66	No
NSL2	45.3-47	1	400	49	Yes
		2	300	52	Yes
		3	340	51	Yes
		4	270	53	Yes
NSL3	52.6-55.7	1	95	62	No
		2	165	57	No
		3	135	59	No
		4	130	59	No
NSL4	41.3-47.2	1	100	61	No
		2	140	59	No
		3	140	59	No
		4	45	68	No

For NSL1, NSL3 & NSL4, the predicted values exceed the 55 dB daytime limit, resulting in a direct impact at the locations and therefore mitigation measures are needed. The proposed mitigation is described in Section 10.6.

Subjective Impact Appraisal

BS 4142:2014 allows for rating of sound from industrial and/or commercial sources on residential receivers upon which the sound is incident. This rating considers the measured background noise level (L_{A90}) in the absence of the sound source and the excess of the predicted levels, if any, indicates the likelihood of adverse impact.

When the measured background levels described in Table 10.6 are viewed against the predicted values, the excess of predicted values are typically greater than 10 dB, indicating a significant direct adverse impact. While a predicted significant adverse impact would not necessarily result in complaints, mitigation is recommended to reduce the impact magnitude, described in Section 10.6.

10.5.4 Cumulative Assessment

A number of construction related projects are identified in Table 2.1, Section 2.4 that have the potential to be carried out within the same timeframe as the proposed development, and which are within the vicinity of the proposed development site. If the proposed development and another of the developments identified in Table 2.1 to be carried out at the same time, there may be potential for a resultant cumulative impact from noise in the local area.

However, given the separation distances between the proposed development and the projects identified in Table 2.1, were they to be carried out at the same time, impacts are not considered to be likely to occur.

10.6 Mitigation Measures

For the site clearance and waste placement phases, it is recommended that confirmatory noise monitoring is carried out to determine the actual noise emissions resulting from these activities at the nearest noise sensitive locations.

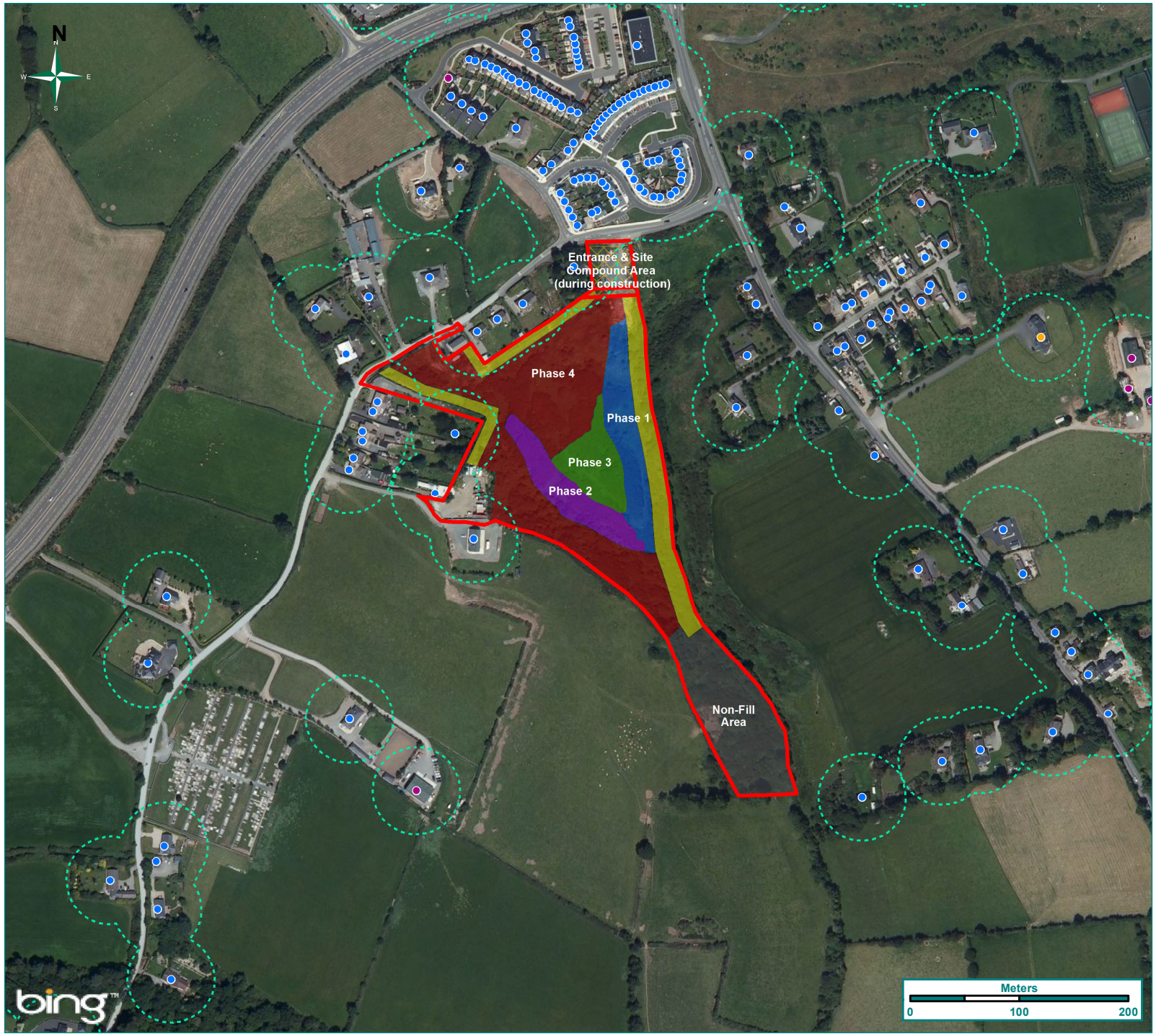
If the predicted levels described in Tables 10.8 and 10.9 occur, moveable acoustic fencing can be installed around the works area where the noise levels exceed the respective limits and/or have the potential to cause adverse impacts at the nearest residential properties. This screening can typically achieve a sound level reduction of 15 dB when installed correctly and will be sufficient to reduce the noise levels generated during the site clearance and waste placement phases to below the necessary limits.

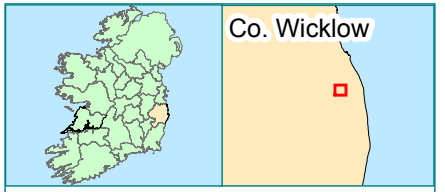
Figure 10-2 Example of construction acoustic fencing[34]

A minimum distance of 40 m from site activities combined with acoustic screens is predicted to comply with the 55 dB limit therefore movable screening will need to be installed around works areas during all the waste placement activities. 40m buffers from buildings are shown in Figure 10.3.

The use and installation of the acoustic barriers will be addressed as part of the Construction Environmental Management Plan (CEMP) to be developed for the site, the outline of which is provided in Appendix 2 to this EIS.

[34] http://www.echobarrier.com/acoustic-fencing-barriers/h2-standard-acoustic-fencing/





Legend

- Study Boundary
- 40m Buffer of Buildings
- Buffer Zones
- Entrance & Site Compound Area (during construction)
- Non-Fill
- Phase 1
- Phase 2
- Phase 3
- Phase 4

Adjacent Buildings

- Both
- Commercial
- Residential
- Unknown

Date 12/07/2016

Name Of Client

Wicklow County Council

Name Of Job

Waste Licence, Planning & EIS for Waste Soils Recovery Facility

Title Of Figure

Aerial View of Site with Phase Material Fill Areas and 40m Buffer of Buildings

Scale Used 1:5,000 @ A4

Figure No. 10.3

Rev A

FEHILY TIMONEY & COMPANY

CONSULTANTS IN ENGINEERING & ENVIRONMENTAL SCIENCES

Core House, Pouladuff Rd, Cork, Ireland.
T:+353-21-4964133, F:+353-21-4464

Unit 16 JS Plaza, North Park Business Park, Dublin 11, Ireland.
T:+353-1-6583500, F:+353-1-6583501

www.fehilytimoney.ie, E: info@ftco.ie

The 15dB reduction will also reduce the resultant sound level at the nearest noise sensitive locations to levels which are at or slightly higher than the existing L_{A90} values at these locations.

It is recommended that the local community is informed of the proposed works being carried out and the potential noise issues which may arise. A site point of contact will be made available to the local community who can regularly advise those nearest properties of the works stages and the measures being put in place. This person should also be contacted should any excessive noise levels be generated so the screening can be evaluated and further noise reduction measures be put in place such as quieter plant and/or change in site work practices.

Other management practices, in line with the recommendations of the BAT Guidance Note for the Waste Transfer and Material Recovery facilities, will be incorporated during facility development:

- During the hours of 19:00 to 07:00 no waste handling activities will happen on-site
- The speed limit on the site for all vehicles will be a maximum limit of 15 kph
- Maintenance of plant and machinery will occur on a regular basis and will ensure correct operation of these items to manufacturers' specifications.

10.7 Residual Impacts After Mitigation

The use of the proposed site for clearance and waste spoil placement will generate noise levels in excess of typical construction and EPA licensed site emission limits at distances of 100 m and 40 m respectively. The use of acoustic screens will reduce the predicted levels by approximately 15dB, reducing the impact of the site works to acceptable levels. The predicted levels will need to be confirmed with on-site monitoring to establish the placement of the screens and confirm compliance with the construction and licensed limits.

10.8 Monitoring

Monitoring of noise levels onsite will be a requirement of the EPA waste licence for the site. These limits will be applied from the commencement of acceptance of dredge spoil material at the site. Prior to dredge spoil acceptance, confirmatory noise monitoring will be undertaken during the site clearance works as per the mitigation measures proposed.

10.9 Conclusions

A noise impact appraisal was carried out for a site at Kilquade, Co. Wicklow comprising site clearance and spoil placement to allow for development of the site as an Eco-park.

Best practice noise limits for the site clearance and spoil placement activities were derived from British Standard 5228: Part 1 relating to appropriate limits for construction noise and the EPA's typical noise limits for licensable activities. The predicted noise levels from on-site plant carrying out these activities exceeded these limits at the nearest noise sensitive locations and indicated a potential for causing significant adverse impacts at the nearest locations.

However, the correct placement and installation of screening will provide a significant reduction of 15dB (estimated) on the predicted levels and compliance with the BS 5228:Part 1 construction limits and the EPA licence noise limits. This screening will also reduce the potential for significant adverse impact.

Monitoring will be carried out at the initial stages to determine the actual noise emissions from the site clearance and waste placement works. These noise levels will be used to inform the specific requirements for screening with follow up monitoring to confirm the noise level reductions, in accordance with the requirements of the EPA waste licence for the site.

10.10References

Advice Notes on Current Practice, Environmental Protection Agency, 2003

British Standard BS 5228 Part 1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites Part 1 Noise*

BS 4142:2014, *Methods for rating and assessing industrial and commercial sound*

BAT Guidance Note on Best Available Techniques for the Waste Sector – Waste Transfer and Materials Recovery

British Standard BS 5228 Part 1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites Part 1 Noise*

BS 4142:2014, *Methods for rating and assessing industrial and commercial sound*

Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4), Environmental Protection Agency, 2004

Guidelines on the information to be contained in Environmental Impact Statements, Environmental Protection Agency, 2002

Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4), Environmental Protection Agency, 2004

www.agriextra.eu

www.cso.ie

www.echobarrier.com

11 FLORA AND FAUNA

11.1 Introduction

The ecological appraisal for the project was carried out by Fehily Timoney & Company (FT) between September 2015 and November 2015 with further surveys and appraisal in between. A series of ecological surveys were carried out at the site, including habitat and botanical surveys, bird surveys, and mammal (including bats) surveys. A dedicated badger activity survey was carried out within the site as part of application process for a badger wildlife licence. Based on the results of these various studies, FT considered potential direct, indirect and cumulative impacts of the proposed development on the existing ecological receptors and proposed appropriate mitigation measures to minimise these potential impacts.

The purpose of this evaluation was to:

- undertake a desktop review of available ecological data for both the receiving environment and greater area, including a review of European sites within 15 km of the project (as part of a separate Natura Impact Statement) and nationally designated sites within 10km
- undertake ecological field surveys of the receiving environment including, where required, the proposed Pretty Bush waste soils recovery facility & Eco-park
- identify flora and fauna present within the footprint of all elements of the project
- evaluate the ecological significance of the receiving environment
- appraise the potential impacts of the project on the ecology of the receiving environment
- consider measures to mitigate the potential negative impact(s) of the project on the ecology of the receiving environment.

11.1.1 Study Area

The site is immediately bounded to the east, west and south with agricultural fields. Residential one off and multiple developments bound the site to the north and north west, while the L1042 local road and R461 form boundaries on the northern and eastern flanks of the site. The site itself, which is 5.6 ha in area, undulates between approximately 40 and 50 mOD from north to south, while two small streams run in a north to south direction along the eastern and western boundaries of the site meeting to the south. Both streams can be described as small (30-40cm wet width), overgrown with vegetation and of very low flow. Sections of these streams were dry when surveyed and are considered ephemeral in nature.

The landscape of the study area is rural in nature. The waste soil recovery area is currently semi-natural in nature. The land use classifications for the surrounding area, and as defined by the 2012 CORINE landcover dataset, are classified as 'Pasture' and 'Other Agricultural Land'.

The main soil associations within this part of County Wicklow are Acid Brown Earths (75%) with associated Gleys (15%) and Brown Podzolics (10%). The main Quaternary sediments identified in this area of County Wicklow are glacial till deposits derived from the underlying sandstone and shale which underlies the area. Additionally, limestone sands and gravels underlie the area to the southwest and southeast of the site. The site itself is underlain by shallow bedrock, with little or no quaternary overburden.

The Kilcoole stream downslope of the site has not been assigned with a WFD Status.

11.2 Methodology

11.2.1 Relevant Guidance

The methodology for this appraisal has been devised in consideration of the following relevant guidance published by the Environmental Protection Agency (EPA) including '*Guidelines on the information to be contained in Environmental Impact Statements* (2002), '*Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)*' (2003) and '*Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment*' (DoECLG, 2013).

Additional guidance available from the EU such as '*Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment'* (2013) has also been considered. The appraisal also takes account of '*Guidelines for Ecological Impact Assessment in the United Kingdom*' (2006), published by the Chartered Institute of Ecology and Environmental Management (CIEEM). The Heritage Council publication '*Best Practice Guidance for Habitat Survey & Mapping'* (Smith *et al*., 2011) is also referenced.

Relevant guidance published by the National Roads Authority (NRA) such as '*Guidelines for Assessment of Ecological Impacts of National Road Schemes*' (2009a), and '*Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes*' (2008a) have also been followed.

Documentation and guidance available from Wicklow County Council (WCC) such as '*Wicklow County Development Plan 2010 – 2016'* and the '*Greystone-Delgany & Kilcoole Local Area Plan 2013 - 2019'* has been reviewed and utilised where relevant.

To comprehensively research and so understand the existing behaviour of bats within the study areas the approach detailed in the following guidelines were followed:

- *Bat Surveys: Best Practice Guidelines* (2nd edition) (Hundt, 2012);
- *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (NRA, 2006a);*
- *Bat Surveys: Best Practice Guidelines* (2nd edition) (BCT, 2012);
- *Guidelines for the Treatment of Bats during the Construction of National Road Schemes* (NRA, 2006b).

In addition, the following guidelines and publications were used in relation to badgers:

- *NRA Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes (2006c),*
- *Harris, S., Cresswell, P. and Jefferies, D. (1989). Surveying Badger Occasional Publication No. 9. Published by the Mammal Society, Baltic Exchange buildings, 21 Bury Street, London EC3 5AU,*
- *Roper, T. J. (2010) Badger. The new naturalist Library. Published by Collins*

Relevant guidance published by the National Roads Authority (NRA), and applicable to assessing watercourses in Ireland, was also followed, including '*Guidelines for the Assessment of Ecological Impacts of National Road Schemes – Revision 2*' (NRA 2009a), '*Ecological surveying techniques for protected flora and fauna during the planning of National Road Schemes – Version 2*' (NRA 2009b) and '*Environmental Impact Assessment of National Road Schemes – A practical guide*' (NRA 2008b).

11.2.2 Legislative context

A diversity of flora and fauna, rare at a national level, are protected under the provisions of the Wildlife Act 1976, as amended, and the orders and regulations made thereunder, such as the Flora Protection Order (2015). The Habitats Directive 1992 has been transposed into Irish law, for the purposes of this application for permission by Part XAB of the Planning and Development Act 2000, as inserted. In addition, certain other obligations of the Habitat Directive have been transposed by the European Communities (Birds and Natural Habitats) Regulations 2011, as amended.

Section 171 of the Fisheries (Consolidation) Act 1959 creates the offence of throwing, emptying, permitting or causing to fall onto any waters deleterious matter. Deleterious matter is defined as not only as any substance that is liable to injure fish but is also liable to damage their spawning grounds or the food of any fish or to injure fish in their value as human food or to impair the usefulness of the bed and soil of any waters as spawning grounds or other capacity to produce the food of fish.

Under Section 3 of the Local Government (Water Pollution) Act, 1977 (as amended by Sections 3 and 24 of the 1990 Act) it is an offence to cause or permit any polluting matter to enter waters. Suspended solids would be a key parameter here. Likewise, any visual evidence of oil/fuel in the river would constitute an offence.

11.2.3 Consultation

The following bodies were consulted on the proposed project, as described in Section 6 of this document:

- National Parks and Wildlife Services (NPWS)
- Bat Conservation Ireland (BCI)
- Inland Fisheries Ireland (IFI)
- BirdWatch Ireland Wicklow Branch
- The Environmental Protection Agency (EPA)
- An Taisce.

11.2.4 Desktop study

A desk study was carried out to collate and review available information, datasets and documentation sources pertaining to the sites natural environment. Some of these sources included:

- OSI Aerial photography and 1:50000 mapping
- National Parks and Wildlife Service (NPWS)
- Irish Red Data Book for Vascular Plants (Curtis and McGough, 1988)
- Teagasc Soil area maps
- Bat Conservation Ireland (BCI)
- Geological Survey Ireland (GSI) area maps
- Environmental Protection Agency (EPA) water quality data
- Inland Fisheries Ireland and
- Eastern River Basin District (ERBD) datasets (Water Framework Directive).

11.2.5 Designated Nature Conservation Sites

Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) within 10km of the proposed site were identified as part of this ecological assessment using the Map Viewer at www.npws.ie. European (Natura 2000) sites within 10 km of this project, such as candidate Special Areas of Conservation (cSACs)[35] and Special Protection Areas for birds (SPAs) were also identified as part of this ecological assessment. A separate Natura Impact Statement (NIS) was prepared in order to appraise the potential impact on European sites. These designated sites are described in Section 11.3.2.

11.2.6 Flora and Fauna

A desktop study was undertaken to locate any records of rare or protected flora and fauna that have previously been recorded for the site and surrounding area. Records available on the NPWS and the National Biodiversity Data Centre websites were reviewed. Other data sources include Ireland's Wetlands and their Waterbirds: Status and Distribution (Crowe 2005), the Atlas of Wintering Birds in Britain and Ireland (Lack, 1986), the Atlas of Breeding Birds in Britain and Ireland (Sharrock, 1976) and the Breeding and Winter Birds of Britain and Ireland Bird Atlas 2007-11 (Balmar *et al*., 2013).

Botanical species were assessed in accordance with their occurrence on the Flora Protection Order (2015) and The Irish Red Data Book (Curtis & McGough, 1988).

11.2.7 Field Study

Habitats

The habitats within the site of the proposed facility were identified and classified, according to '*A Guide to Habitats in Ireland'* (Fossitt, 2000), during a walkover survey of the site on the 29th and 30th of September 2015. The dominant plant species present in each habitat type was recorded.

[35] Note: At present all SACs in Ireland are currently 'candidate' SACs, and referred to as cSACs. The relevant Statutory Instruments for the SACs in Ireland have not yet been made, however, these "candidate" sites must still be afforded the same level of protection as if they were SACs in accordance with the Habitats Directive.

Habitats were appraised and evaluated according to their occurrence as protected habitats under Annex I of the EU Habitats Directive (92/43/EEC) and for their capacity to support rare, threatened and endangered species. The methodology used in this report to assess the impact on habitats is based on NRA guidelines (2009).

Mammals

Mammal observations or signs were recorded during site walkovers in September and November 2015. Any signs or sightings noted during other ecological surveys on the site are also included in this report. The two small streams within the site were walked to search for potential otter holts. The conservation status of mammals within Ireland and Europe is assessed using one or more of the following documents; Wildlife Acts (1976 - 2010), the Red List of Terrestrial Mammals (Marnell *et al*., 2009) and NPWS (2013) *The Status of EU Protected Habitats and Species in Ireland*.

Badger surveys

Site walkover survey

An initial badger survey was carried out within the site during the month of September 2015. During this survey features such as feeding signs (snuffle holes and digging), latrines, trails, tracks and fur as well as setts were recorded. A GPS point of each record was taken.

During a consultation meeting with NPWS on the 19th October 2015 further badger surveys were requested including bait marking surveys to establish the territory of the badgers utilising the study area. The entire study area was resurveyed between the 9th and the 13th of November 2015. A large portion of the site is covered in dense gorse *Ulex europaeus* and bramble *Rubus fruticosus agg* scrub restricting access for surveyors. The trimming of vegetation was carried out at targeted sections of scrub to allow access to inaccessible sections of the site. This ensured that the entire study area could be surveyed effectively for badger activity. The trimming of vegetation was minimal and targeted, avoiding sensitive features (setts and mammal trails). The targeted trimming of vegetation was carried out under the supervision of an ecologist.

Bait marking survey

A bait marking survey was conducted over 5 days between the 9th and the 13th of November 2015. Bait-marking requires the placement of food (a mixture of peanuts and syrup) at a main badger sett. This bait, containing harmless indigestible plastic markers, is then consumed by the resident badgers. During subsequent defecation the badgers deposit these coloured markers in dung pits throughout their range, including other setts used by the social group, and on the boundaries of their territory. Different coloured markers are used for each main sett. Only one main sett was recorded within the proposed site.

By undertaking systematic surveys of latrine and dung-pit sites, and noting the colour of the markers contained in each, the boundaries of adjacent badger social groups can be determined. Coloured markers were left at the two entrances to the Main Sett. The site was walked daily between the 10th of the 13th of November for signs of these markers in latrines within the site and adjacent habitats.

Bats

The proposed development site was visited on the night of the 29th of September 2015. The weather on the survey night was good - dry with light winds (temp 9°C). Potentially important features for bats including mature trees, waterways, hedgerows and buildings were studied extensively for potential bat activity. Bat surveys were conducted using the Frequency Division AnaBat Detector System (AnaBat SD2 Flash Card Bat Detector). Frequency Division is a technique used to convert the inaudible bat echolocation calls to audible sounds. The AnaBat unit also uses Zero-Crossing Analysis (ZCA) to make the real-time recorded calls visible for display purposes. It is these sonograms (2-d sound pictures) that are digitally stored on the CF card and downloaded for analysis. Each time a bat is detected, an individual time-stamped (date and time to the second) file is recorded. Evidence of bat roosts was searched for and information on all potential roosts was recorded according to roost identification guidelines 'Bat Survey Guidelines: Traditional Farm Buildings Scheme', Aughney, T., Kelleher, C. & Mullen, D. (2008).

When investigating potential bat roosts, best practise methodology referred to in NRA Guidelines for the Treatment of Bats during the Construction of National Road Schemes, (NRA, 2006a) was implemented.

Avifauna

All bird species observed and heard within the study area boundary were noted during ecological surveys within the site.

Other Fauna

During the course of ecological surveys at the proposed site, other species of fauna were noted and included in the report.

Aquatic Ecology

Selection of watercourses for assessment

A desktop study was undertaken of all water courses / water bodies which could be affected directly (i.e. within the site) or indirectly (i.e. lie within 2.5km of the site boundary) were considered as part of the current appraisal. Some of the sites assessed are located greater than 2.5km from the development boundary.

The two streams within the site were walked and surveyed for their potential value for aquatic species. Generally, only streams and other watercourses shown on the 1:50,000 Discovery Series Maps were examined, as watercourses smaller than this are not normally of fisheries or aquatic ecological significance in light of their propensity to dry out.

Surveys completed were at a level required to make an evaluation of biological water quality, fisheries value, aquatic habitat value, and presence of rare / protected / notable aquatic species in the watercourses potentially affected by the proposed development. Watercourses were observed and accessed from public roads.

11.2.8 Ecological Resource Evaluation

The value of the ecological resources/receptors at the subject site was evaluated using the ecological evaluation guidance given in the NRA guidance on assessment of ecological impacts of National Road Schemes (NRA, 2009a).

This guidance provides ratings for resources based primarily on geographic context and allows for resources at International, National, County and Local (higher and lower value) levels. Key ecological receptors (for assessment) are those deemed to be above the 'Local Importance' (lower value) evaluation. Evaluation criteria are outlined below in Table 11-1 over.

Table 11-1: Ecological Resource Evaluation Criteria (from NRA, 2009)

Resource Evaluation	Defining Criteria
International Importance	'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA), candidate Special Area of Conservation (cSAC) or proposed Special Protection Area (pSPA). Sites that fulfils the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended). Features essential to maintaining the coherence of the Natura 2000 Network. Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive. Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or Species of animal and plants listed in Annex II and/or IV of the Habitats Directive. Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971). World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972). Biosphere Reserve (UNESCO Man & The Biosphere Programme). Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979). Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979). Biogenetic Reserve under the Council of Europe. European Diploma Site under the Council of Europe. Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).
National Importance	Site designated or proposed as a Natural Heritage Area (NHA). Statutory Nature Reserve. Refuge for Fauna and Flora protected under the Wildlife Acts. National Park. Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park. Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list. Site containing 'viable areas' of the habitat types listed in Annex I of the Habitats Directive.
County Importance	Area of Special Amenity. Area subject to a Tree Preservation Order. Area of High Amenity, or equivalent, designated under the County Development Plan. Resident or regularly occurring populations (assessed to be important at the County level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list.

Resource Evaluation	Defining Criteria
	Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance. County important populations of species, or viable areas of semi-natural habitats or natural heritage features identified in the National or Local BAP, if this has been prepared. Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county. Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.
Local Importance (Higher Value)	Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared; Resident or regularly occurring populations (assessed to be important at the Local level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list. Sites containing semi natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality; Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.
Local Importance (Lower Value)	Sites containing small areas of semi natural habitat that are of some local importance for wildlife; Sites or features containing non-native species that are of some importance in maintaining habitat links.

11.2.9 Assessing Impact Significance

Once the value of the identified ecological receptors (features and resources) was determined, the next step was to assess the potential effect or impact of the proposed project on the identified key ecological receptors.

This was carried out with regard to the criteria outlined in various impact assessment guidelines (NRA, 2009a; CIEEM, 2006). In line with the EPA Guidelines (EPA, 2002), the following terms are defined when quantifying duration:

- Temporary: up to 1 year
- Short-term: from 1-7 years;
- Medium-term: 7-15 years;
- Long-term: 15-60 years; and
- Permanent: over 60 years.

The impacts were assessed under a number of parameters such as magnitude, extent, duration and reversibility. The impact significance criteria (EPA, 2002) as set out in Table 11-2 over are used where applicable.

Table 11-2: Impact significance criteria

Impact Significance	Criteria
Imperceptible impact	An impact capable of measurement but without noticeable consequences
Slight impact	An impact which causes noticeable changes in the character of the environment without affecting its sensitivities
Moderate impact	An impact that alters the character of the environment in a manner that is consistent with existing and emerging trends
Significant impact	An impact which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
Profound impact	An impact which obliterates sensitive characteristics

11.3 Description of the Existing Environment

The ecology of the existing environment is described within this section.

11.3.1 Watercourses and hydrological catchment area

There are two ephemeral streams within the site that join to immediately to the south of the site and drain into the Kilcoole Stream.

The Kilcoole Stream rises at an elevation of 120 m OD in the town of Kilpedder to the west of the site. It flows in a south-easterly direction draining into Kilcoole Marsh and enters the ocean at St. Georges Channel also known as 'The Breaches' to the east of Kilcoole.

The full area of the site drains into the Kilcoole Stream downstream of site and an area of 7.57km^2 upstream drains into this waterbody. The full site at Pretty Bush is located within this catchment (based on rainfall data from Flood Studies Update opw.hydronet.com). The southern end of the site at Pretty Bush is approximately 500m from the Kilcoole Stream.

11.3.2 Designated Nature Conservation Sites

Sites of International Importance

Candidate Special Areas of Conservation (cSACs)

Candidate Special Areas of Conservation (cSACs) are protected under the European Union (EU) 'Habitats Directive' (92/43/EEC), as implemented in Ireland by the European Communities (Natural Habitats) Regulations, 1997. There are five cSACs within 10km of the proposed Eco-park study area.

Special Protection Areas (SPAs)

Special Protection Areas (SPAs) were initially designated under Directive 79/409/EEC, The Directive on the Conservation of Wild Birds ('The Birds Directive'), and are now protected as Natura 2000 Sites under the EU 'Habitats Directive'. There are two SPAs within 10km of the study area.

Sites of National Importance

Sites of National Importance in the Republic of Ireland are termed, Natural Heritage Areas (NHA) and proposed Natural Heritage Areas (pNHA).

While the Wildlife (Amendment) Act 2000 has been passed into law, pNHAs will not have legal protection until the consultative process with landowners has been completed; this process is currently ongoing. Ten pNHAs were recorded within 10 km of the study area. There are no NHAs within 10km of the proposed development. Table 11-3 summarises the characteristics of each site and details the distances of the designated sites from the proposed development. Seven sites are Natura 2000 sites (five cSACs and two SPAs). There are no sites designated as NHAs, but there are ten proposed NHAs (pNHA). The full NPWS site synopses for designated areas are available on www.NPWS.ie (see Appendix 12 in Volume 3).

Figure 11-1 shows the location of the designated sites in relation to the project. There are no designated sites within 1.9 km of the proposed site. However, three sites have hydrological links to the proposed development, namely the Murrough SPA, The Murrough Wetland cSAC and the Murrough pNHA.

An Appropriate Assessment (AA) Screening Report and Natura Impact Statement (NIS) have been completed in order to appraise the likely significant effects of the proposed development either alone or in combination with other plans or project on Natura 2000 Sites; and accompanies this EIS as Appendix 3 in Volume 3.

Table 11-3: Summary of Designated Environmental Conservation Sites within 10 km of the Project

Designated Site	Site Code	Features of Interest	Summary Description of Site	Distance from development site (km)
The Murrough Wetlands cSAC	002249	• Annual vegetation of drift lines [1210] • Perennial vegetation of stony banks [1220] • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] • Mediterranean salt meadows (*Juncetalia maritimi*) [1410] • Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210] • Alkaline fens [7230]	The Murrough is a coastal wetland complex which stretches for 15 km from Ballygannon to north of Wicklow town, and in parts, extends inland for up to 1 km. A shingle ridge stretches the length of the site and carries the mainline Dublin-Wexford railway. At the southern end of the site, Broad Lough, a brackish, partly tidal lake, has a well-developed saltmarsh community. Saltmarsh is also present in the northern end of the site in the vicinity of the Breaches. An area of fen occurs at Five Mile Point.	1.96
Glen of the Downs cSAC and pNHA	000719	• Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]	Glen of the Downs is a semi-natural oak wood situated within an impressive glacial overflow channel. It is located on the Dublin-Wexford road, about 7 km south of Bray, Co. Wicklow. The underlying rock is mostly quartzite and it outcrops in a few places. The soil is a sandy loam, brown earth to brown podzolic, and is very dry over much of the site. Most of the site has been a Nature Reserve since 1980.	2.17
The Murrough SPA	004186	• Red-throated Diver (*Gavia stellata*) [A001] • Greylag Goose (*Anser anser*) [A043] • Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] • Wigeon (*Anas penelope*) [A050] • Teal (*Anas crecca*) [A052] • Black-headed Gull (*Chroicocephalus ridibundus*) [A179]	The Murrough SPA comprises a coastal wetland complex that stretches for 13 km from Kilcoole Station, east of Kilcoole village in the north to Wicklow town in the south, and extends inland for up to 1 km in places. The site includes an area of marine water to a distance of 200m from the low water mark. A shingle ridge runs along the length of the site and carries the Dublin-Wexford railway line. At the southern end of the site, Broad Lough, a brackish, partly tidal lake, has a well-developed saltmarsh community. Saltmarsh is also present in the northern end of the site in the vicinity of the Breaches. An area of fen occurs at Five Mile Point.	2.65

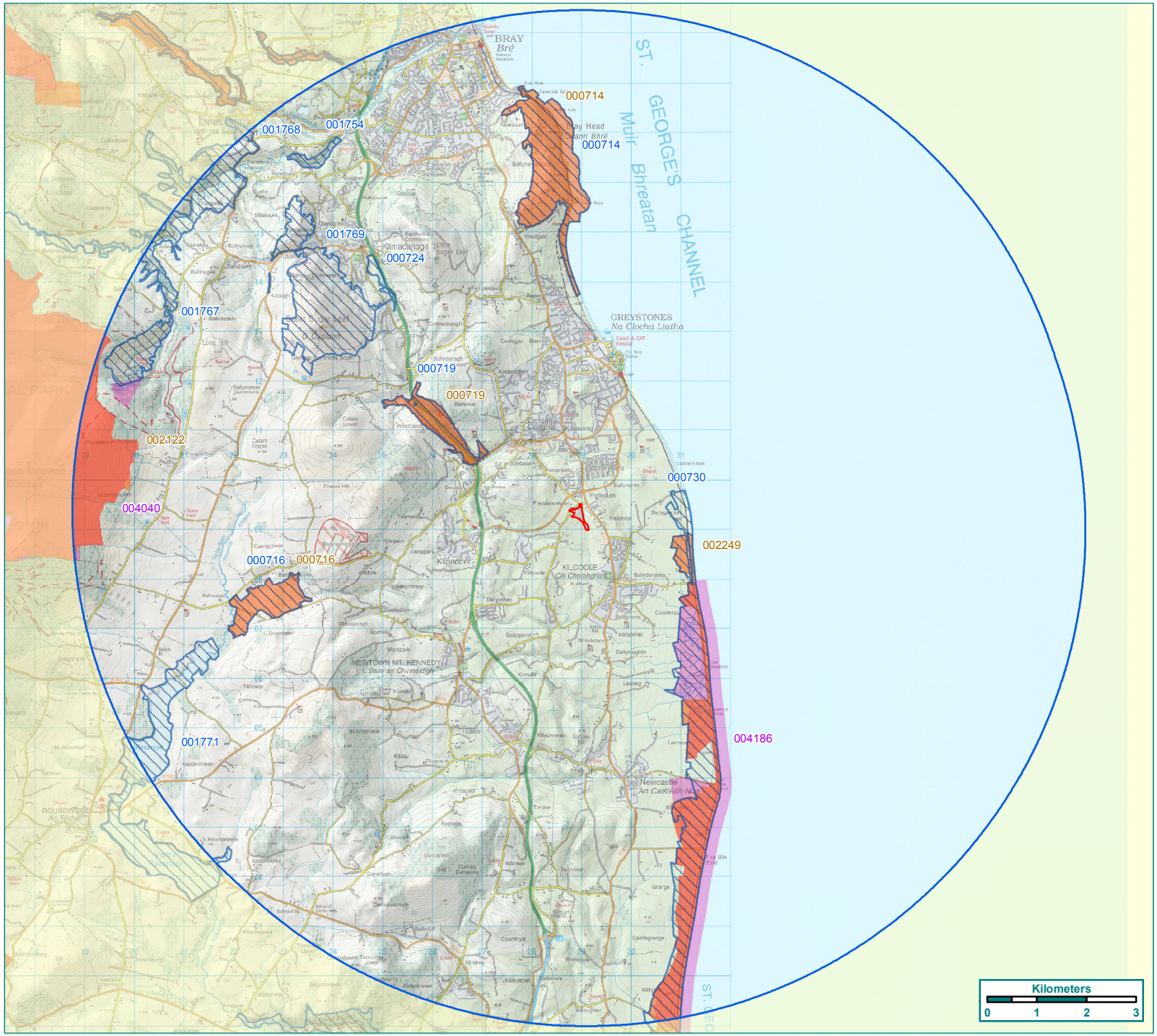
Designated Site	Site Code	Features of Interest	Summary Description of Site	Distance from development site (km)
		• Herring Gull (*Larus argentatus*) [A184] • Little Tern (*Sterna albifrons*) [A195] • Wetland and Waterbirds [A999]		
Bray Head cSAC and pNHA	000714	• Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] • European dry heaths [4030]	This coastal site is situated in the north-east of Co. Wicklow between the towns of Bray and Greystones. The bedrock geology is Cambrian quartzites and shales (with mudstones and greywackes). Bray Head consists of a plateau of high ground, with five prominent quartzite knolls and has a maximum height of 241 m. The more exposed higher ground has a covering of shallow acidic soils, with protruding bedrock and scree. Elsewhere, deeper soils are formed by drift deposits and are calcareous in character.	4.36
Carriggower Bog cSAC and pNHA	000716	• Transition mires and quaking bogs [7140]	Carriggower Bog is situated on Calary plateau at the eastern edge of the Wicklow Mountains. The site is an area of wet bog and poor fen, flanked by the Vartry River on the south-western side. The bog was exploited for peat extraction until 100 years ago and the peat cuttings are now flooded. The remaining bog vegetation is characterised by bog moss (Sphagnum spp.) hummocks.	5.66
Wicklow Mountains SPA	004040	• Merlin (*Falco columbarius*) [A098] • Peregrine (*Falco peregrinus*) [A103]	This is an extensive upland site, comprising a substantial part of the Wicklow Mountains. Most of the site is in Co. Wicklow, but a small area lies in Co. Dublin. The underlying geology of the site is mainly of Leinster granites, flanked by Ordovician schists, mudstones and volcanics. The area was subject to glaciation and features fine examples of glacial lakes, deep valleys and moraines. Most of site is over 300 m, with much ground being over 600 m; the highest peak is Lugnaquillia (925 m). The substrate over much of site is peat, with poor mineral soil occurring on the slopes and lower ground. Exposed rock and scree are features of the site. The predominant habitats present are blanket bog, heaths and upland grassland.	8.98

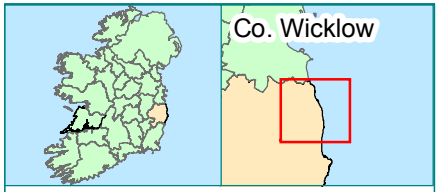
Designated Site	Site Code	Features of Interest	Summary Description of Site	Distance from development site (km)
Wicklow Mountains cSAC	002122	• Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea* [3130] • Natural dystrophic lakes and ponds [3160] • Northern Atlantic wet heaths with *Erica tetralix* [4010] • European dry heaths [4030] • Alpine and Boreal heaths [4060] • Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230] • Blanket bogs (* if active bog) [7130] • Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*) [8110] • Calcareous rocky slopes with chasmophytic vegetation [8210] • Siliceous rocky slopes with chasmophytic vegetation [8220] • Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] • *Lutra* (Otter) [1355]	See summary for Wicklow Mountains SPA above	8.99
The Murrough pNHA	000730	• Annex I bird species listed as qualifying species of the SPA • Annex I habitats listed as qualifying features	The Murrough is a coastal wetland complex which stretches for 15 km from Ballygannon to north of Wicklow town, and in parts, extends inland for up to 1 km. A shingle ridge stretches	1.75

Designated Site	Site Code	Features of Interest	Summary Description of Site	Distance from development site (km)
			the length of the site and carries the mainline Dublin-Wexford railway. At the southern end of the site, Broad Lough, a brackish, partly tidal lake, has a well-developed saltmarsh community. Saltmarsh is also present in the northern end of the site in the vicinity of the Breaches. An area of fen occurs at Five Mile Point.	
Kilmacanoge Marsh pNHA	000724	• A diversity of species-rich wetland habitats within a relatively small area • Scare fly species *Oxycera falleni* (Order Diptera) • Scare fly species *Oxycera morrisii* (Order Diptera) • Scare fly species *Parhelophilus consimilis* (Order Diptera)	This site is located off the main Dublin to Wexford road, just south of Kilmacanoge and at the base of the Great Sugarloaf. A small stream links the site to the Great Sugarloaf NHA. The site is a well-developed mosaic of wet woodland surrounded by poor fen and wet grassland. A stream flows through the site in a northerly direction. The whole area is very wet due to the presence of numerous springs and seepage areas, arising from run-off from the Sugarloaf on the western side of the site and Kilmurry on the eastern side.	5.63
Great Sugar Loaf pNHA	001769	• A rare liverwort, *Cryptothallus mirabilis* • Heath • Wet oak woodland known as the Quill	The Great Sugar Loaf is situated about 5 km southwest of Bray. It is a steep mountain, 501 m above sea level, and has been modified greatly by glacial erosion. It stood as a nunatak which was scoured by the Ivernian, Midland and Mountain ice sheets. Its profile thus contrasts with those of a Bray Head and Howth, both over-ridden by ice sheets and flat on top. The main habitats of the site are dry mountain heath and upland grassland. The lower slopes are dominated by Gorse.	5.44
Vartry Reservoir pNHA	001771	• A diversity of habitats, from wetland vegetation to heathland and woodland • Six-stamened Waterwort (*Elatine hexandra*) • Water-purslane (*Lythrum portula*) • Great Crested Grebe (*Podiceps cristatus*) • Little Grebe (*Tachybaptus ruficollis*)	The Vartry Reservoir is located to the east of Roundwood, in the upper catchment of the Vartry River. The lower reservoir was constructed in the 1860s and the upper reservoir completed in 1924. Both are owned and managed by Dublin Corporation. The annual fluctuation in water levels is in the order of 4 or 5 metres. Lowest levels are generally reached in September/October, and maximum levels between February and May. With the exception of Poulaphouca Reservoir, Vartry is the largest inland waterway in the southeast of Ireland.	7.75

Designated Site	Site Code	Features of Interest	Summary Description of Site	Distance from development site (km)
		• Lapwing (*Vanellus vanellus*) • Teal (*Anas crecca*) • Greylag Geese (*Anser anser*)		
Dargle River Valley pNHA	001754	• Red Data Book species, Yellow Archangel (*Lamiastrum galeobdolon*) • A mature Oak (*Quercus petraea*) woodland	This site is located about 2 km south-east of Enniskerry. It is a section of the River Dargle with steep wooded banks. At one point along the river a well exposed series of Ordovician volcanic rocks are faulted against well-exposed Bray group Cambrian strata. Such a clear exposed junction is not seen elsewhere in Co. Wicklow. The area is dominated by mature Oak (*Quercus petraea*) woodland, with some Hazel (*Corylus avellana*), Beech (*Fagus sylvatica*), Birch (*Betula* spp.) and Holly (*Ilex aquifolium*). Pockets of mature conifers occur in places.	8.68
Powerscourt Waterfall pNHA	001767	• Steep waterfall, • Rare and scarce flowering plants, ferns, bryophytes and lichens including historic records of Killarney Fern (*Trichomanes speciosum*) and Myxomycete fungus, *Diderma lucidum*.	This site is located at the eastern edge of the Wicklow mountains, about 6 kilometres from Enniskerry. The main feature of the site is a steep waterfall, approximately 100m high, and down which the Dargle River cascades. At the base of the waterfall there is a small corrie and associated small moraines. The waterfall is fringed on both sides by steeply sloping ground covered with a heathy vegetation.	9.05
Powerscourt Woodland pNHA	001768	• Mixed broadleaved woodland • Well-developed fern and moss floras • A rare species of Myxomycete fungus, *Didymium clavus*	Powerscourt Woodland is located about 2 km south-west of Enniskerry. It is largely contained within the two large demesnes of Powerscourt and Charleville, and includes a 4 km stretch of the Dargle River. The topography of the area is rolling hillside sloping down to the river. The site includes some parkland with large specimen trees. Mixed woodland covers most of the site and includes both native and introduced species.	9.28

Doc: R:\Map Production\2015\LW15\247\01\Workspace\MXD\LE15-247-01_Figure11.1_DesignatedSitesWithin10km_A4.mxd





Legend

- Study Boundary
- 10km Buffer of Study Boundary
- Natural Heritage Areas
- Proposed Natural Heritage Areas
- Special Areas of Conservation
- Special Protection Areas

Special Protection Areas

004040, Wicklow Mountains SPA
004186, The Murrough SPA

Special Areas of Conservation

000714, Bray Head SAC
000716, Carriggower Bog SAC
000719, Glen Of The Downs SAC
002122, Wicklow Mountains SAC
002249, The Murrough Wetlands SAC

Proposed Natural Heritage Areas

000714, Bray Head
000716, Carriggower Bog
000719, Glen Of The Downs
000724, Kilmacanoge Marsh
000730, The Murrough
001754, Dargle River Valley
001767, Powerscourt Waterfall
001768, Powerscourt Woodland
001769, Great Sugar Loaf
001771, Vartry Reservoir
004040, Wicklow Mountains SPA
004186, The Murrough SPA

Date 15/10/2015

Name Of Client

Wicklow County Council

Name Of Job

Waste Licence, Planning & EIS for Waste Soils Recovery Facility

Title Of Figure

Designated Sites within 10 km of the Proposed Development

Scale Used 1:110,000 @ A4

Figure No. 11.1

Rev A

FEHILY TIMONEY & COMPANY

CONSULTANTS IN ENGINEERING & ENVIRONMENTAL SCIENCES

Core House, Pouladuff Rd, Cork, Ireland.
T: +353-21-4964133, F: +353-21-4464

Unit 16 JS Plaza, North Park Business Park, Dublin 11, Ireland.
T: +353-1-6583500, F: +353-1-6583501

www.fehilytimoney.ie, E: info@ftco.ie

11.3.3 Rare or protected Flora

The protected plant species listed in Table 11-4 have been recorded within the 10 km grid square (O20) in which the proposed development is located. No rare or protected species were recorded during the surveys.

Table 11-4: Historical records of protected flora within 10 km grid square (O20) of the proposed site

SPECIES	DETAILS OF RECORD	GRID REFERENCE	STATUS	FAVOURED HABITAT AND DISTRIBUTION IN IRELAND[36]	POTENTIAL HABITAT WITHIN THE FOOTPRINT OF THE DEVELOPMENT AND RECORDS OF THE SPECIES DURING SURVEYS
Cornflower *Centaurea cyanus*	Kilpedder, Co. Wicklow Road from Willow Grove to Altidore (1941)	O20	Irish Red Data Book (1988) IUCN = Vulnerable; IRDB TN = Extinct Proposed Red Data List (2005) Classified as being 'Endangered'	Upland pastures and damp, sandy places; mainly in the north; rare and decreasing.	Species not recorded during surveys. Species extinct on the mainland of Ireland. Rediscovered on Aran in 1988.
	Kilpedder (1941)				
Blue Fleabane *Erigeron acer*	Ballygarret quarry, Newtownmountkennedy, Co. Wicklow (24/10/2007)	O27117 07014	Irish Red Data Book (1988) IUCN = Vulnerable; IRDB TN = 9 (Vulnerable) Proposed Red Data List (2005) Classified as being 'Endangered'	Dry pastures, eskers and sandy or gravelly places, chiefly in centre and south-east; rare and local.	Species not recorded during surveys. Potential habitat within the site is limited. Ballygarret quarry is located 2.6km from the site.
		O27168 07101			
Small Cudweed (Slender Cudweed) *Filago minima*	Killesky to Ballyduff road (1924)	O20	Irish Red Data Book (1988) IUCN = Rare; IRDB TN = 7 (Rare)	Sandy and gravelly places, frequent in the north, south east and south west (of Ireland); rare elsewhere.	Species not recorded during surveys. Potential habitat within the site is limited. However, the latest record dates from

[36] Parnell, J; Curtis, T; and Cullen, E. (2012): Webb's an Irish Flora. Hardback, 8th Edn (March 2012), Trinity College Dublin.

SPECIES	DETAILS OF RECORD	GRID REFERENCE	STATUS	FAVOURED HABITAT AND DISTRIBUTION IN IRELAND[36]	POTENTIAL HABITAT WITHIN THE FOOTPRINT OF THE DEVELOPMENT AND RECORDS OF THE SPECIES DURING SURVEYS
	Road between Killesky/Ballyduff (1924)	O20	Flora Protection Order Species (2015) Proposed Red Data List (2005) Classified as being 'Vulnerable'		1924 and the records are greater than 8km from the site.
Heath Cudweed (Wood Cudweed) *Gnaphalium sylvaticum*	Ashford, Co. Wicklow (1925)	O20	Irish Red Data Book (1988) IUCN = Rare; IRDB TN = 7 (Rare) Flora Protection Order Species (2015) Proposed Red Data List (2005) Classified as being 'Vulnerable'	Sandy and gravelly places, frequent in the north, south east and south west (of Ireland); rare elsewhere.	Species not recorded during surveys. Some potential habitat within the site. However, the latest record dates from 1932 and the records are greater than 5km from the site.
	Ballyvolan Glen (1932)	O20			
	Dry slopes west of Ballyvolan Glen (1932)	O20			
	Quarry 4 km north of Ashford (1925)	O20			
	Quarry 2 miles north of Ashford (29/08/1925)	O20			
Greater Broomrape *Orobanche rapum-genistae*	Altidore Glen (1874)	O20	Irish Red Data Book (1988) IUCN = Rare; IRDB TN = 7 (Rare) Proposed Red Data List (2005) Classified as being 'Vulnerable'	On roots of *Ulex* and *Cytisus*; fairly frequent near the south and east coasts; very rare	Species not recorded during surveys. Both host species were recorded within the site. However, the latest record dates from 1874 and Altidore Glen is located greater than 4km from the site.

SPECIES	DETAILS OF RECORD	GRID REFERENCE	STATUS	FAVOURED HABITAT AND DISTRIBUTION IN IRELAND[36]	POTENTIAL HABITAT WITHIN THE FOOTPRINT OF THE DEVELOPMENT AND RECORDS OF THE SPECIES DURING SURVEYS
Killarney Fern *Trichomanes speciosum*	Hermitage Glen (1805)	O242078	Annex II and IV species Irish Red Data Book (1988) IUCN = Rare; IRDB TN = 8 (Rare) Flora Protection Order Species (2015) Proposed Red Data List (2005) Classified as being 'Vulnerable'	Beside waterfalls, in crevices between bounders, under overhanging rocks, on tree trunks and in damp, usually dark, sheltered situations.	The species was not recorded during surveys. There are no waterfalls either within or downstream of the site and records are considerably old (1805).
	Newtown Mount Kennedy, Co. Wicklow (1805)	O20			

11.3.4 Description of Existing Habitats

Scrub (WS1)

The most dominant habitat within the study area was scrub. Dense stands of common gorse (*Ulex europaeus*) were recorded throughout the site particularly on the central ridge between the two streams. Brambles (*Rubus fruticosus* agg.) was commonly recorded throughout. Other species recorded included spinose plants such as hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*), in addition to a number of willows (*Salix* spp.), elder (*Sambucus nigra*), stunted hazel (*Corylus avellana*) and broom (*Cytisus scoparius*). These species were particularly present on the ridges along the western and eastern boundaries of the site.

Dense bracken (HD1)

There are patches of dense bracken (*Pteridium aquilinum*) around the centre of the site in open sections of gorse scrub. This habitat is considered to be of relatively low conservation value and is dominated by the fern species.

Grassy verges (GS2)

Grassland habitat was recorded in open sections of scrub. Grassland was linear in form found along trails through the site and along the verges of the two streams. The most dominant grassland present within the site was Grassy Verges (GS2). A broad diversity of species were recorded particularly along the edges of scrub including white clover (*Trifolium repens*), broad-leaved dock (*Rumex obtusifolius*), common knapweed (*Centaurea nigra*), common mouse-ear (*Cerastium fontanum*), common ragwort (*Senecio jacobaea*), creeping buttercup (*Ranunculus repens*), creeping thistle (*Cirsium arvense*), daisy (*Bellis perennis*), dandelion sp. (*Taraxacum officinale* agg.), herb-robert (*Geranium robertianum*), hogweed (*Heracleum sphondylium*), lesser stitchwort (*Stellaria graminea*), meadow buttercup (*Ranunculus acris*), red clover (*Trifolium pratense*), germander speedwell (*Veronica chamaedrys*) and ribwort plantain (*Plantago lanceolate*).Grass species included cocksfoot (*Dactylis glomerata*), false oat-grass (*Arrhenatherum elatius*), common bent (*Agrostis capillaris*), creeping bent (*Agrostis stolonifera*) and annual meadow-grass (*Poa annua*). In more disturbed section common nettle (*Urtica dioica*) was noted.

Wet Grassland (GS4)

Sections of Wet Grassland (GS4) habitat were not extensive and were confined to wetter area along the banks of the stream with species recorded including Yorkshire fog (*Holcus lanatus*), soft rush (*Juncus effusus*), cuckoo flower (*Cardamine pratensis*), field horsetail (*Equisetum arvense*), lesser spearwort (*Ranunculus flammula*), marsh thistle (*Cirsium palustre*), meadowsweet (*Filipendula ulmaria*), water forget-me-not (*Mysotis scorpoides*), water horsetail (*Equisetum fluviatile*), water mint (*Mentha aquatic*), water speedwell (*Veronica anagallis-aquatica*), water-cress (*Rorippa nastutium-aquatica*), wild angelica (*Angelica sylvestris*) with occasional yellow iris (*Iris pseudacorus*) and tutsan (*Hypericum androsaemum*)

Neutral Grassland (GS1)

Sections of neutral grassland were recorded along a pathway/clearing through gorse scrub in the northern section of the site. There grassy clearings were typically linear in shape and generally species poor dominated by a short sward of creeping bent (*Agrostis stolonifera*), annual meadow-grass (*Poa annua*), Yorkshire fog (*Holcus lanatus*) and white clover (*Trifolium repens*).

Riparian woodland (WN5)

Sections of riparian woodland were recorded along the banks of the narrow stream within the site. Species recorded included grey willow (*Salix cinerea*) and goat willow (*Salix caprea*). Other broad leaved tree species recorded included elder (*Sambucus nigra*), hazel (*Corylus avellana*) and ash (*Fraxinus excelsior*). Primrose (*Primula vulgaris*), water-cress (*Rorippa nastutium-aquatica*), wild angelica (*Angelica sylvestris*), yellow iris (*Iris pseudacorus*), water mint (Mentha aquatic) and tutsan (*Hypericum androsaemum*) were recorded within the undergrowth.

Treelines (WL2)

Treelines were recorded along the southern and eastern boundaries of the site. Species recorded included common ash (*Fraxinus excelsior*), elder (*Sambucus nigra*), grey willow (*Salix cinerea*), oak (*Quercus* spp.) and blackthorn (*Prunus spinosa*). Sycamore (*Acer pseudoplatanus*) was recorded to the south of the site. Common ivy (*Hedera helix*), foxglove (*Digitalis purpurea*), hard fern (*Blechnum spicant*) and hart's tongue (*Asplenium scolopendrum*) were recorded in the undergrowth.

Spoil and bare ground (ED2)

Area of recent and ongoing disturbance with exposed ground and little vegetation were classified as Spoil and bare ground (ED2).

Habitat Classification

- FW1, Eroding/upland rivers
- WL2, Treelines
- BL3, Buildings and artificial surfaces
- ED2, Spoil and bare ground
- GS1, Dry calcareous and neutral grassland
- GS1/WS1, Dry calcareous and neutral grassland / Scrub
- GS2, Dry meadows and grassy verges
- GS2/WS1/ED2, Dry meadows and grassy verges / Scrub / Soil and bare ground
- GS4, Wet grassland
- HD1, Dense bracken
- WN5, Riparian woodland
- WS1, Scrub
- WS1/GS1/HD1, Scrub / Dry calcareous and neutral grassland / Dense braken

Legend

Study Boundary

Date 15/02/2016

Name Of Client

Wicklow County Council

Name Of Job

Waste Licence, Planning & EIS for Waste Soils Recovery Facility

Title Of Figure

Habitat Map

Scale Used 1:3,000 @ A4

Figure No. 11.2

Rev A

FEHILY TIMONEY & COMPANY

CONSULTANTS IN ENGINEERING & ENVIRONMENTAL SCIENCES

Core House, Pouladuff Rd, Cork, Ireland.
T: +353-21-4964133, F: +353-21-4464

Unit 16 J5 Plaza, North Park Business Park, Dublin 11, Ireland.
T: +353-1-6583500, F: +353-1-6583501

www.fehilytimoney.ie, E: info@ftco.ie

11.3.5 Bats

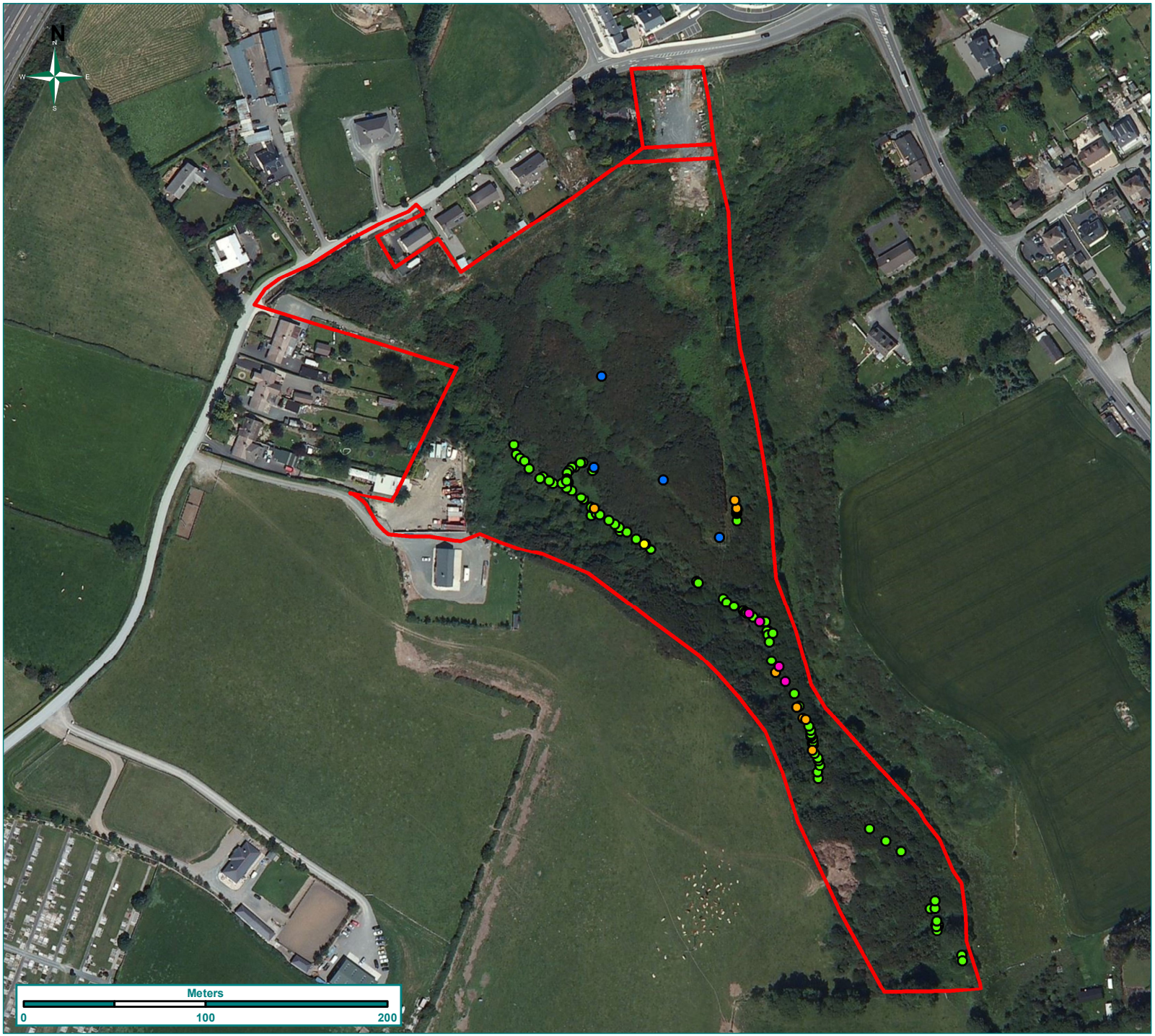
Table 11-5 below list the species recorded during the bat survey conducted on the night of the 29th of September 2015. Figure 11-3 present the locations of bat calls for each species within the proposed site.

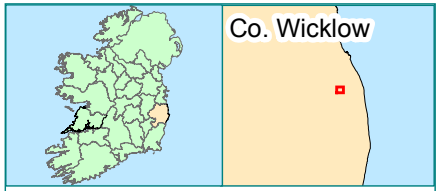
Table 11-5: Bat species recorded during the bat survey on the 29th of September 2015 within the study area of Pretty Bush waste soils facility and Eco-park

Species	Number of calls recorded during the survey
Common Pipistrelle *Pipistrellus pipistrellus*	120
Soprano Pipistrelle *Pipistrellus pygmaeus*	11
Leisler's Bat *Nyctalus leisleri*	4
Natterer's Bat *Myotis nattereri*	4
Daubenton's Bat *Myotis daubentonii*	1

The most common species recorded over the course of the survey was common pipistrelle (120 calls). Common pipistrelle were recorded along the narrow linear clearing bounding the western stream within the site. Soprano pipistrelle was the second most common species recorded and were recorded in clearings in the south east and west of the site. There were four call each recorded of both Leisler's bat and natterer's bat. Leisler's bat were recorded foraging over the gorse scrub on the central ridge in the site. Natterers bat were recorded along the treeline in the southern section of the site. A single call from a Daubenton's bat was recorded along the western stream.

The scrub dominated habitat within the infill area does not hold suitable roosting habitat for bats. The treeline along the eastern edge of the study may offer some roosting habitat particularly ivy covered tree however no obvious crack, crevices or holes were noted during the survey. Similarly there were no dead trees recorded within the study area. These treelines are outside the footprint of the proposed infill area and shall not be effected. The activity survey and site walkover survey within the site indicates that bat do forage within the site but are roosting elsewhere.





Legend

Study Boundary

Bat Species

- Daubenton's Bat (Myotis daubentonii)
- Natterer's Bat (Myotis nattereri)
- Leisler's Bat (Nyctalus leisleri)
- Soprano Pipistrelle (Pipistrellus pygmaeus)
- Common Pipistrelle (Pipistrellus pipistrellus)

Date 05/05/2016

Name Of Client

Wicklow County Council

Name Of Job

Waste Licence, Planning & EIS for Waste Soils Recovery Facility

Title Of Figure

Bat Survey

Scale Used 1:3,000 @ A4

Figure No. 11.3

Rev A

FEHILY TIMONEY & COMPANY

CONSULTANTS IN ENGINEERING & ENVIRONMENTAL SCIENCES

Core House, Pouladuff Rd, Cork, Ireland.
T:+353-21-4964133, F:+353-21-4464

Unit 16 JS Plaza, North Park Business Park, Dublin 11, Ireland.
T:+353-1-6583500, F:+353-1-6583501

www.fehilytimoney.ie, E: info@ftco.ie

11.3.6 Terrestrial Mammals

Records for terrestrial mammals were retrieved from the NPWS and the National Biodiversity Data Centre online mapping. The proposed development lies within the 10km OS grid squares O20. A number of protected native mammal species are recorded from these 10km squares. Observations and other signs of mammal species including droppings and tracks are also included. Table 11-6 below lists these, and summarises their protected status and potential for occurrence within the study area.

Table 11-6: Terrestrial mammal species recorded during the desktop study and surveys including their potential to utilise the site

Species	Indication of National Distribution	Known / Likely / Possible Locations	Level of Protection
Badger (*Meles meles*)	Throughout Ireland	A family of badgers are **known** to utilise the site currently. One main sett was recorded within the site. This sett is considered to be a breeding sett. Five other sub setts were recorded within the study area and an additional sett was recorded outside the site boundary along the south eastern edge.	Irish Red Data Book: 'Least Concern'. Wildlife (Amendment) Act (2000).
Hedgehog (*Erinaceus europaeus*)	Throughout Ireland	Several records within the greater surrounding of the site mainly as part of the *Road Kill Survey*. The closest record of the species is located approximately 1km south of the site near the village of Kilcoole (O296079 – recorded as part of the *Road Kill Survey* found dead on the R761 on the 25/04/2009) Habitats within the site offer potential foraging and nesting habitat for the species. While no evidence of hedgehog were recorded during surveys it is considered **likely** that the species utilises the site.	Irish Red Data Book: 'Least Concern'. Wildlife (Amendment) Act (2000). Berne Convention Appendix III.
Irish stoat (*Mustela erminea*)	Throughout Ireland	Scattered records in the surrounding area including a record 1.7km south west of the site at O277066 - 18/04/2011 sighting of road kill recorded near a cultivated field (source *Atlas of Mammals in Ireland 2010-2015*). It is **likely** that the species may occur within the site.	Irish Red Data Book: 'Least Concern'. Wildlife (Amendment) Act (2000). Berne Convention Appendix III.
Pine marten (*Martes martes*)	Throughout Ireland	Pine marten have been recorded at within 2km of the site at Druids Glen Golf Course to the south in 2006 by E. Mullen. There are records of the species also approximately 2km north west of the site in the Glen of Downs however connectivity to the Glen of the Downs woodland is limited due to the dominance of agricultural grassland dividing the two sites. Pine marten could **possibly** occur within the site however there is a limited number of mature trees within the site and connectivity to sections of mature woodland is limited.	Irish Red Data Book: 'Least Concern'. Wildlife (Amendment) Act (2000). Habitats Directive Annex V

Species	Indication of National Distribution	Known / Likely / Possible Locations	Level of Protection
Pygmy shrew (*Sorex minutus*)	Throughout Ireland	It is **possible** that the species forages within clearings in the site and along the margins of the site. There is a recent record approximately 2.7km south east of the site of an individual killed by a domestic cat. O297060 - 21/04/2015 (source *Atlas of Mammals in Ireland 2010-2015*)	Irish Red Data Book: 'Least Concern'. Wildlife (Amendment) Act (2000). Berne Convention Appendix III.
Otter (*Lutra lutra*)	Throughout Ireland	The two streams within the site do not offer suitable habitat for Otter. However these stream drain south into the Kilcoole Stream. There is a historic record of otter utilising this stream approximately 1.75km west of the site. Otter spraints were recorded on the 07/05/1980 at a bridge crossing now part of the N11 (O270090) as part of the Otter survey of Ireland 1982 (Chapman and Chapman, 1982). There are also several more recent records at Webb's field, the breaches and the surrounding wetlands south of Kilcoole railway station. The streams within the site are not considered optimal habitat for the species. However otter are **Likely** to be utilising Kilcoole Stream particularly the section downstream of Kilcoole village.	Irish Red Data Book 'Near Threatened'. Habitats Directive Annex II and IV. Berne Convention Appendix III. Wildlife (Amendment) Act (2000).

Overview of badger activity within the site

One main sett was recorded within the study area. The main badger sett is made up of at least four entrances and is located on the western ridge of the raised bank in the middle of the site. Three entrances are located within a stand of bracken (*Pteridium aquilinum*) with a fourth entrance located under a dense stand of gorse immediately to the north. It is considered likely that this sett extends further to the immediate north and south under this dense layer of gorse scrub. Recent activity was noted around three of the entrances (two within the stand of bracken and the third within a stand of gorse). Recent signs of digging activity and badger prints were noted at these entrances. Fresh droppings were noted in a latrine immediately adjacent to the main sett. Feeding activity including snuffle holes and digging (for invertebrates, earthworms and plant tubers) was noted along a well-established network of trails emanating from the main sett. All feeding signs were in relatively close proximity to the main sett.

Five other sub setts were recorded within the study area and an additional sett was recorded outside the site boundary along the south western edge. The coordinates of this sett were also retrieved via the Department of Agriculture following consultation with Enda Mullen (NPWS District Conservation Officer Wicklow and North Wexford). Sett A is located within a section of gorse along the eastern boundary of an improved agricultural grassland (GA12) field. The western side of sett A is bounded to the west by elder Sambucus nigra trees and a section of grassland dominated by common nettle Urtica dioica. Recent signs of feeding activity were noted in close proximity to the sett, however these signs were more typical of rabbits rather than badger, with three rabbits recorded within the agricultural field in close proximity to the sett. Rabbit droppings were also recorded in the area immediately surrounding the signs of digging activity.

Of the five other setts recorded during the survey two setts were deemed active - an annex sett and outlier 1. The annex sett was discovered on the 12th of November 2015 following the trimming of vegetation in close proximity to a large badger trail under gorse scrub to the south east of the main sett. The sett is made up of two entrances, one older entrance that had partially collapsed and another large entrance that showed recent signs of use. Trails and feeding activity were recorded within a stand of bracken to the east of the sett.

Outlier 1 showed recent signs of activity. Outlier 1 is a single entrance sett recorded within the stream valley at the north western side of the site. Freshly excavated soil and badger prints were noted at the entrance to outlier sett 1. It was clear that the sett was occupied during the survey period between the 9th and the 13th of November 2015.

Outlier sett 2 is a two entrance sett recorded within the section of broadleaved woodland along the western boundary of the site. The sett is located within 1m of an agricultural field to the west of the site. A network of well-established trails were noted between sett entrances and extending north and south of the sett.

Bait marking survey

A bait marking survey was carried out over five days from the 9th to the 13th of November 2015. Bait consisting of peanuts and golden syrup marked with red plastic pellets (non-toxic badger bait marking pellets) were left daily over the five-day survey period at two active entrances in the main badger sett. The density of vegetation within the site limited the number of latrines recorded over the survey period. However, badgers within the main sett consumed the bait regularly with all bait consumed on the first night following the commencement of the survey. A breakdown of the bait marking survey results are presented in Table 11-7 below.

Latrine 1 is located beside the main sett. The red bait markers were observed within the latrine following the first night of activity. The concentration of bait markers within the latrine intensified and the survey progressed. The bait markers were noticed within latrine 2 on the third day of surveys. This latrine is located on the western side of the site downslope from a commercial property. Bait markers were recorded in latrine 3 and 4 on the fourth day of surveys. Latrine 3 is located near the subsidiary sett. The latrine is located along a badger trail approximately 100m from the main sett. Latrine 4 is located along a clearing adjacent to three residential houses along the northern boundary of the site. The latrine is located approximately 50m from outlier sett 1 and approximately 125m from the main sett. The boundaries of the surrounding agricultural fields were walked each day of the five-day survey and no further latrines were recorded.

Table 11-7: Results of bait marking survey between the 9th and the 13th of November 2015

Latrine number	Latrine location	10/11/2015	11/11/2015	12/11/2015	13/11/2015
1	N 53.11867 W -6.07498	x	x	x	x
2	N 53.118589 W -6.075613		x	x	x
3	N 53.11834 W -6.073615			x	x
4	N 53.119792 W -6.075052			x	x

'X' indicates positive result for bait markers within a latrine

Conclusion

The results of surveys indicate that one family group occupy the study area. This group are considered to be utilising the main sett for breeding. The level of activity during the bait marking survey was considered to be low and confined predominantly to a radius of 125m from the main sett. Weather during the survey period was mixed but mild and night time temperatures were greater than 6OC on average with scattered showers. Similarly feeding activity was confined predominantly to the same radius. The annex sett and outlier sett 1 were also in use over the survey period.

Other terrestrial mammals recorded within the study area

Red fox (*Vulpes vulpes*) and European rabbit (*Oryctolagus cuniculus*) droppings were recorded within the site. There are several records of these species within the surrounding area (NBDC, 2016).

There are accounts from a local landowner of grey squirrel (*Sciurus carolinensis*) an invasive species being observed within the site. Records retrieved from the Biodiversity Ireland website show that the species has been recorded in close proximity to the site. Three separate records of the species were recorded within 1km east of the site in a residential area known as the 'Russian Village'.

11.3.7 Avifauna

Desktop Study

Table 11-8 over gives a list of bird species within the 2km grid square O20Z encompassing the proposed site as part of the Breeding Bird Atlas 2007 - 2011 along with records retrieved from the Biodiversity Ireland. Species highlighted in red represent species that are Red-listed. They are Red-listed because they are of Global Conservation Concern. Species highlighted in orange represent species that are of European Conservation Concern. They are Amber-listed because of their unfavourable conservation status but not concentrated in Europe. The remaining species are Green-listed, species of favourable conservation status (Colhoun and Cummins, 2013). No Annex I species listed under the Birds Directive (Directive 2009/147/EC), have been recorded within the site. Annex I species require the greatest protection and must have SPAs (Special Protection Areas) designated for them.

Table 11-8: Bird species recorded within the 2km grid square O20Z encompassing the proposed site as part of the Breeding bird atlas 2007 - 2011 along with records retrieved from the Biodiversity Ireland

Common Name	Latin Name
Blackbird	*Turdus merula*
Buzzard	*Buteo buteo*
Goldfinch	*Carduelis carduelis*
Great Tit	*Parus major*
Hooded Crow	*Corvus cornix*
Jackdaw	*Corvus monedula*
Kestrel	*Falco tinnunculus*
Linnet	*Carduelis cannabina*
Long-eared Owl	*Asio otus*
Magpie	*Pica pica*
Mistle Thrush	*Turdus viscivorus*
Pheasant	*Phasianus colchicus*
Pied Wagtail	*Motacilla alba subsp. yarrellii*
Raven	*Corvus corax*
Rook	*Corvus frugilegus*
Sparrowhawk	*Accipiter nisus*
Starling	*Sturnus vulgaris*
Stonechat	*Saxicola torquata*
Yellowhammer	*Emberiza citrinella*

Yellowhammer is the only red listed species recorded within the 2km grid square in which the site is located. The species is red listed due to a high population decline. Formerly a widespread breeding species in Ireland, it is now restricted mainly to the east and south. The species was not recorded during surveys at the site. Yellowhammer are strongly linked with the cultivation of cereals and has declined in areas where these are no longer grown. The species requires a minimum amount of cereal in the landscape to maintain a population (Balmer *et al*. 2013). There are no cereal fields directly adjacent to the site and the main land use in the greater area is pastures for cattle.

An examination of land use within the greater study area was carried via aerial photography from 1995[37] to present day[38]. An extensive area of arable crops was present to the north east of the site in the townland of Charlesland and in Priestsnewtown in the west. However, the construction of the R774 and house estates at Farrankelly and particularly Charlesland has resulted a significant loss of this resource locally.

Six amber listed species have been recorded within the 2km square in which the site is located. Two raptor species sparrowhawk and kestrel along with linnet, stonechat, starling and mistle thrush. There is potential nesting habitat for all of these species within the proposed site.

[37] http://map.geohive.ie/mapviewer.html accessed July, 2016
[38] https://www.bing.com/maps/ accessed July, 2016

Avian species recorded during ecological surveys

Avian species both observed and heard calling during ecological surveys were noted. Tables 11-9 below lists the species noted during ecological surveys in both September and November 2015.

Table 11-9: Bird species noted during ecological surveys in both September and November 2015

Common Name	Latin Name
Blackbird	*Turdus merula*
Blue tit	*Cyanistes caerulus*
Bullfinch	*Pyrrhula pyrrhula*
Chaffinch	*Fringilla coelebs*
Coal tit	*Periparus ater*
Dunnock	*Prunella modularis*
Goldcrest	*Regulus regulus*
Goldfinch	*Carduelis carduelis*
Great tit	*Parus major*
Hooded crow	*Corvus cornix*
Jackdaw	*Corvus monedula*
Magpie	*Pica pica*
Pied wagtail	*Motacilla alba*
Robin	*Erithacus rubecula*
Rook	*Corvus frugilegus*
Song thrush	*Turdus philomelos*
Stonechat	*Saxicola turquatus*
Starling	*Sturnus vulgaris*
Willow Warbler	*Phylloscopus trochilus*
Woodpigeon	*Columba polambus*

No red listed bird species were noted within the site during surveys. Three passerine 'Amber listed' species were recorded namely goldcrest, robin and stonechat. All three species were upgraded from Green to Amber in the latest BOCCI list (Colhoun and Cummins, 2013). The extensive scrub and section of broadleaved trees offer potential nesting and foraging habitat for these species within the site.

Barn owl

The Barn Owl (*Tyto alba*) is a characteristic farmland bird which has undergone a documented decline in its geographical range in recent times. They are a Red-listed Bird of Conservation Concern in Ireland due to a decline of over 50% in their population during the past 25 years (Colhoun and Cummins, 2013). They are also listed as a Species of European Conservation Concern (SPEC3) having an unfavourable conservation status in Europe.

The reasons for the Barn Owls decline are not fully understood, but can most likely be attributed to the loss of suitable habitat due to various aspects of agricultural intensification and the increased use of harmful second generation anti-coagulant rodenticides. Other factors that have been implicated in their decline are the loss of suitable nest sites, an expansion of major road networks and the increased severity of winters.

Consultation with National Park and Wildlife indicated that there is a barn owl roost within the local area. Roosting habitat for the species was not noted within the site during surveys however potential foraging habitat was noted particularly within rough grassland clearings. Areas of dense scrub dominate the habitats within the site and would not be deemed optimal foraging habitat. However, these areas do provide shelter for small mammals offering potential prey for barn owl.

11.3.8 Atlantic Salmon

The Atlantic salmon is listed under Annexes II and V of the EU Habitats Directive and Appendix III of the Bern Convention. It is an economically important species and salmon recreational and commercial fisheries occur throughout Ireland. Atlantic salmon are an anadromous species, meaning they are spawned in freshwater habitats and then migrate to the sea. Salmon habitats are usually fast flowing riffle and glide habitats with cobble or gravel substrates. Salmon angling areas are usually located on main river channels or small rivers in deep glides of 1.5m depth or more.

Crisp (2000) notes that salmonid spawning site selection is governed by a complex of environmental factors including intra-gravel flow, gravel size, water depth as well as stream velocity and cover, which are all essential for successful spawning, egg survival and hatching.

One of the most important factors for salmon egg survival is oxygen supply, which is dependent upon dissolved oxygen concentration and inter-gravel flow. High concentrations of suspended solids in the river are undesirable as they are likely to result in infilling of the gravel pores with fine material (Cowx and Fraser, 2003).

The small streams within the site are deemed to be mainly ephemeral in nature, with a low flow and overgrown with vegetation. They do not offer suitable habitat for fish species. Kilcoole stream is highly modified particularly around the village of Kilcoole and is not deemed to be of high value for Atlantic salmon. There upper reaches of the stream are however less modified and may offer potential habitat for the species. Atlantic salmon populations in Ireland have been recently assessed as being 'unfavourable - inadequate' by NPWS in the 2013 Article 17 Conservation Status Assessments (2013). A review of the NPWS distribution map of the species in Ireland indicated that the 10km grid square that encompasses the site (O20) is located within the range but not the distribution of the species.

11.3.9 White-clawed crayfish

The streams within the site and the Kilcoole Stream do not lie within the range or distribution of white-clawed crayfish in Ireland. Therefore, the species is not considered to be within the site or downstream of the site.

11.3.10 Brook, River and Sea Lamprey

Three species of lamprey have been recorded in Ireland brook, river and sea lamprey. All three are listed in Annex II of the Habitats Directive and also in Appendix III of the Bern Convention. Kilcoole stream or and the proposed site do not lie within the range or known distribution of sea lamprey (NPWS, 2013). These feature are located within the range but not distribution of both Brook and River lamprey. A review of Kurtz and Costelloe, (1999), *An outline of the biology, distribution and conservation of lampreys in Ireland. Irish Wildlife Manuals No. 5* was undertaken to assess the potential for lamprey to utilise habitats downstream of the site.

The proposed site and watercourses downstream of the site is located in hydrometric area 10. However, there is no mention of lamprey species within Kilcoole Stream.

The Brook lamprey is the smallest of the three lampreys native to Ireland and it is the only one of the three species that is non-parasitic and spends all its life in freshwater (Maitland and Campbell, 1992). Brook lampreys are the most common and widespread of the three Irish lamprey species (Kurtz and Costello, 1999). Brook lampreys live for up to five years burrowed into silt deposits in rivers.

They metamorphose into adults and spawn in the early spring in fast flowing streams with gravel substrates. Unlike the other two Irish lamprey species they are not parasitic as adults, and undertake only localised migrations.

Although still common in Ireland they are under significant threat from drainage and navigation maintenance works and also from water quality deterioration. Brook lampreys are also doing less well across the rest of the European Union. In this regard Irish populations of Brook Lampreys are of International Importance. Ireland has failed to protect lampreys with a close season for instream works during their spawning season so they are vulnerable due to the lack of this type of protection. Responsibility for protecting lampreys in Ireland falls within the remit of Inland Fisheries Ireland; although there are no (and never have been any) fisheries for this species in Ireland. Brook Lamprey populations in Ireland have been recently assessed as being 'favourable' by NPWS in the 2013 Article 17 Conservation Status Assessments (2013). Taking account of the generally poor to sub-optimal larval habitats for lampreys in the watercourses potentially affected by the proposed development, it is unlikely that lampreys would be adversely affected.

11.3.11 European Eel (*Anguilla anguilla*)

The European eel *Anguilla anguilla* is a native fish of significant ecological importance. In recent decades, this species has undergone a dramatic decline throughout its range. In response to the decline in European eel populations European Council Regulation 1100/2007 "Establishing Measures for the Recovery of the Stock of European Eel" has now been adopted in member states. European eel is listed as 'Critically endangered' and is now 'Red Listed' according to the recently published 'Red List No. 5: Amphibians, Reptiles & Freshwater Fish' (King *et al*., 2011).

There are no records of European eels within the Kilcoole stream. However, there are records of the species within two other watercourse that drain into Kilcoole Marsh. There is a single record was recorded on the Newtownmountkennedy Stream (O295062) by the EPA on the 16th of July 2009. Two records of the species have also been recorded on the stream north of Newcastle (O303041) again by the EPA. The records both at the same location date from 2006 and 2009. Due to the location of the species within the greater catchment with connectivity to Kilcoole Marsh and based on the precautionary principal there is the potential for the species to occupy at least the lower reaches of the Kilcoole stream.

11.3.12 Other Invertebrates

Butterfly species Small Tortoiseshell (*Aglais urticae*), Meadow Brown (*Maniola jurtina*), Speckled Wood (*Pararge aegeria*), Common Blue (*Polyommatus Icarus*), Red Admiral (*Vanessa atalanta*) and Painted Lady (*Vanessa cardui*) has all been recorded within the greater area. Other invertebrate species recorded include 7-spot Ladybird (*Coccinella septempunctata*), Common Blue Damselfly (*Enallagma cyathigerum*), Four-spotted Chaser (*Libellula quadrimaculata*) and Large Red Damselfly (*Pyrrhosoma nymphula*).

A review of species recorded within 2km[39] of the proposed site showed records of *Andrena scotica*, Small Garden Bumble Bee (*Bombus hortorum*), Large Red Tailed Bumble Bee (*Bombus lapidarius*), Common Carder Bee (*Bombus pascuorum*) and Slender Mining Bee (*Lasioglossum calceatum*).

11.3.13 Habitat Evaluation

Habitat Evaluation Summary

The following summary table outlines the ecological resources in the form of habitat types found at the proposed development site. Key receptors as per NRA guidance (NRA, 2009a), for which impact assessment is to be carried out, are also indicated.

The habitats within the proposed development site are dominated by scrub (WS1) with stands of bracken (HD1), grassy verges (GS2) in clearings and small strips of riparian woodland (WN5). There are two small ephemeral streams within low flows classified as eroding upland streams (FW1) which meet to the south of the site and flow into the Kilcoole Stream. Treeline were noted along the eastern and southern boundaries of the site.

[39] www.biodiversityireland.ie accessed January 2016

Table 11-10: Summary of Habitat Evaluations, Habitats by Area and Key Receptors

Habitat (Fossitt Code)	Area in Hectares (ha)	% of Total Area	Evaluation	Key Receptor
Buildings and artificial surfaces (BL3)	0.28	5	Local Importance (Lower Value)	No
Spoil and Bare ground (ED2)	0.23	4.11	Local Importance (Lower Value)	No
Neutral grassland (GS1)	0.08	1.43	Local Importance (Lower Value)	No
Neutral grassland / scrub (GS1/WS1)	0.22	3.93	Local Importance (Higher Value)	Yes
Dry meadows and grassy verges (GS2)	0.37	6.61	Local Importance (Higher Value)	Yes
Dry meadows and grassy verges / scrub / Spoil and Bare ground (GS2/WS1/ED2)	0.11	1.96	Local Importance (Higher Value)	Yes
Wet grassland (GS4)	0.02	0.36	Local Importance (Higher Value)	Yes
Dense bracken (HD1)	0.16	2.86	Local Importance (Lower Value)	No
Riparian woodland (WN5)	0.73	13.04	Local Importance (Higher Value)	Yes
Scrub (WS1)	3.2	57.14	Local Importance (Higher Value)	Yes
Scrub / Dry calcareous and neutral grassland / Dense bracken (WS1/GS1/HD1)	0.2	3.57	Local Importance (Higher Value)	Yes
Total	**5.6**	**100**		
Linear Habitats (Fossitt Code)	**Length (M)**		**Evaluation**	**Key Receptor**
Treeline (WL2)	696.98		Local Importance (Higher Value)	Yes
Eroding/upland rivers (FW1)	552.48		Local Importance (Higher Value)	Yes

11.3.14 Non-Avian Fauna Evaluation

The basis of impact assessment should be a determination of which ecological resources within the zone of influence of the proposed development are of sufficient value to be material in decision making and therefore, included in the assessment (NRA, 2009a and CIEEM, 2006). Table 11-11, over, outlines the key receptors selected for assessment and the rationale for same; taken from NRA guidance (NRA, 2009a).

Table 11-11: Evaluation of Fauna

Common name	Conservation Status	NRA Evaluation	Rationale	Key Ecological Receptor
European Otter	EU Habitats Directive Annex II; Protected Species: EU Habitats Directive Annex IV; Wildlife Act (Amendment) 2000	National Importance	Limited potential within the site but the Kilcoole stream may offer potential habitat for the species.	Yes
Bats	EU Habitats Directive Annex IV; Wildlife Act (Amendment) 2000	National Importance	Legal status and ecological sensitivity	Yes
Eurasian Badger	Wildlife Act (Amendment) 2000	County Importance	Recorded as present. A number of setts located including a main sett.	Yes
Hedgehog	Berne Convention Appendix III; Wildlife (Amendment) Act (2000)	County Importance	Potential habitat for the species within the site and there are recorded of the species nearby	Yes
Irish stoat	Berne Convention Appendix III; Wildlife (Amendment) Act (2000)	County Importance	Potential habitat for the species within the site and there are recorded of the species nearby	Yes
Pine marten	Habitats Directive Annex V; Wildlife (Amendment) Act (2000).	County Importance	Potential habitat for the species within the site and there are recorded of the species nearby	Yes
Pygmy shrew	Berne Convention Appendix III; Wildlife (Amendment) Act (2000)	County Importance	Potential habitat for the species within the site and there are recorded of the species nearby	Yes
River and Brook Lamprey	Annex II, Wildlife Act (Amendment) 2000	National Importance	Recorded within catchment area of the proposed project	Yes
Sea Lamprey	Annex II, Wildlife Act (Amendment) 2000	National Importance	Not considered likely to be within the study area	No
Atlantic Salmon	Annex II, Wildlife Act (Amendment) 2000	National Importance	No records of the species within the catchment however the upper reaches of the Stream could offer potential habitat for the species	Yes
European Eel	Wildlife Act (Amendment) 2000	National Importance	Potentially present within Kilcoole Stream	Yes

Common name	Conservation Status	NRA Evaluation	Rationale	Key Ecological Receptor
White-clawed Crayfish	Annex II & V, Wildlife Act (Amendment) 2000	National Importance	This species is highly unlikely to occur in the study area.	No

11.3.15 Avifauna Evaluation

The basis of impact assessment should be a determination of which ecological resources within the zone of influence of the proposed development are of sufficient value to be material in decision making and therefore, included in the assessment (NRA, 2009a and CIEEM 2006). Table 11-12, below, outlines the key receptors selected for assessment and the rationale for same based on NRA guidance (NRA, 2009a).

Table 11-12: Avifauna Key Receptor Evaluations

Common name	Conservation Status	NRA Evaluation	Rationale	Key Receptor
Yellowhammer	Protected Species: Wildlife Acts, Red Listed	National Importance	Not recorded during surveys but there is a local population which may potentially use the site	Yes
Barn Owl	Protected Species: Wildlife Acts, Red Listed	National Importance	Not recorded during surveys but there is a local population which may potentially use the site	Yes
Kestrel	Protected Species: Wildlife Acts, Amber Listed	Local Importance (Higher Value)	It is considered highly likely that this species utilises the site. However, foraging habitat is limited.	Yes
Goldcrest	Protected Species: Wildlife Acts; Amber Listed	Local Importance (Higher Value)	Species recorded during survey and considered to be breeding within the site.	Yes
Robin	Protected Species: Wildlife Acts; Amber Listed	Local Importance (Higher Value)	Species recorded during survey and considered to be breeding within the site.	Yes
Sparrowhawk	Protected Species: Wildlife Acts; Amber Listed	Local Importance (Higher Value)	Not recorded during surveys but there are records of the species within the 2km square occupying the site. It is considered highly likely that this species utilises the site.	Yes
Linnet	Protected Species: Wildlife Acts; Amber Listed	Local Importance (Higher Value)	Not recorded during surveys but there are records of the species within the 2km square occupying the site. It is considered highly likely that this species utilises the site.	Yes
Starling	Protected Species: Wildlife Acts; Amber Listed	Local Importance (Higher Value)	Species recorded during survey and considered to utilise the site.	Yes
Mistle Thrush	Protected Species: Wildlife Acts; Amber Listed	Local Importance (Higher Value)	Not recorded during surveys but there are records of the species within the 2km square occupying the site. It is	Yes

Common name	Conservation Status	NRA Evaluation	Rationale	Key Receptor
			considered likely that this species breeds within the site.	
Stonechat	Protected Species: Wildlife Acts; Amber Listed	Local Importance (Higher Value)	Species recorded during survey and considered to be breeding within the site.	Yes

11.4 Do Nothing Scenario

If the proposed development does not proceed, the 'do nothing' scenario is that the existing environment and key receptors identified in Section 11.3 are likely to remain as described previously.

11.5 Potential Impacts on Ecology

The potential impacts of the project are addressed below in terms of potential impacts arising in both the construction and post-construction phases.

11.5.1 Construction Phase Impacts – Direct & Indirect

European sites

There are no designated European sites within the proposed development area therefore no direct impacts are predicted during construction. European sites hydrologically linked to the proposed development site have the potential to be indirectly impacted due to hydrological changes and impacts such as increased siltation, nutrient release and/or contaminated run-off through drainage channels and watercourses.

Hydrological impacts are more likely to occur during the construction phase but could also occur during the post-construction phase. A Natura Impact Statement (NIS) has been prepared for the proposed development and has been submitted with the documentation. The NIS addresses potential effects on European sites resulting from the proposed development.

Natural Heritage Areas or Proposed Natural Heritage Areas

Four pNHA's lie within the boundary of a Natura 2000 Site and therefore are considered as part of the Natura Impact Statement. The proposed Natural Heritage Areas are as follows:

- Glen of the Downs cSAC and pNHA (000719)
- Bray Head cSAC and pNHA (000714)
- Carriggower Bog cSAC and pNHA (000716)
- The Murrough pNHA (000730) lies almost entirely within the boundary of two Natura 2000 sites the Murrough Wetlands cSAC (002249) and the Murrough SPA (004186)

Six proposed Natural Heritage Areas located within 10km of the project do not lie within the boundary of a Natura 2000 site namely:

- Kilmacanoge Marsh pNHA (000724)
- Great Sugar Loaf pNHA (001769)
- Vartry Reservoir pNHA (001771)
- Dargle River Valley pNHA (001754)
- Powerscourt Waterfall pNHA (001767)
- Powerscourt Woodland pNHA (001768)

Potential Direct Impacts

The proposed development site is not within the boundaries of any designated nature conservation site.

All other NHAs or pNHAs previously described are outside the footprint of the project and, therefore, no direct impacts are predicted.

Potential Indirect Impacts

Natural Heritage Areas or proposed Natural Heritage Areas with hydrological links to the proposed development site could have the potential to be indirectly impacted due to hydrological changes and impacts such as increased siltation, nutrient release and/or contaminated run-off through drainage channels and watercourses. This is detailed further in Section 13 Hydrology and Water Quality. However, the only pNHA linked to the site hydrologically to the proposed project is the Murrough pNHA (000730) which lies almost entirely within the boundary of two Natura 2000 sites; the Murrough Wetlands cSAC (002249) and the Murrough SPA (004186). This site is considered under the higher degree of legislative protection afforded to these two Natura 2000 sites evaluated in the separate Natura Impact Statement.

Habitats

Habitats within the site are listed in order of ecological importance i.e. habitats of National Importance shall be discussed first, followed by habitats of County Importance, etc. Table 11-13 summarises the habitat loss as a result of the proposed development.

Table 11-13: Habitat loss as a result of the proposed project

Habitat	Evaluation	Total area within project Site (Ha)	Total Habitat Loss (Ha)	Percentage (%) habitat loss of each habitat type
Neutral grassland / scrub (GS1/WS1)	Local Importance (Higher Value)	0.22	0.15	68.18
Dry meadows and grassy verges (GS2)	Local Importance (Higher Value)	0.37	0.31	83.78
Dry meadows and grassy verges / scrub / Spoil and Bare ground (GS2/WS1/ED2)	Local Importance (Higher Value)	0.11	0.08	72.73
Wet grassland (GS4)	Local Importance (Higher Value)	0.02	0.02	100
Riparian woodland (WN5)	Local Importance (Higher Value)	0.73	0.18	24.66
Scrub (WS1)	Local Importance (Higher Value)	3.2	2.2	68.75
Scrub / Dry calcareous and neutral grassland / Dense bracken (WS1/GS1/HD1)	Local Importance (Higher Value)	0.2	0.18	90
Buildings and artificial surfaces (BL3)	Local Importance (Lower Value)	0.28	0.02	7.14

Habitat	Evaluation	Total area within project Site (Ha)	Total Habitat Loss (Ha)	Percentage (%) habitat loss of each habitat type
Spoil and Bare ground (ED2)	Local Importance (Lower Value)	0.23	0.16	69.56
Neutral grassland (GS1)	Local Importance (Lower Value)	0.08	0.03	37.5
Dense bracken (HD1)	Local Importance (Lower Value)	0.16	0.16	100
Total area		5.6	3.49	62.32
Linear Habitats	**Evaluation**	**Total length within project Site (m)**	**Total Habitat Loss (m)**	**Percentage (%) habitat loss of each habitat type**
Treeline (WL2)	Local Importance (Higher Value)	696.98	53.74	7.71
Eroding/upland rivers (FW1)	Local Importance (Higher Value)	552.48	241.12	43.64

The infilling of the site within inert dredge material and vegetation clearance will result in habitat damage and loss.

The footprint of the proposed development will be 3.49 ha or 62.32 % of the total area of the site. The most abundant habitat type within the development area is scrub (WS1) which on its own accounts for 57.14 % (3.2ha) of the study area of habitats and 66.6% (3.73 ha) when combined with habitat mosaics with other habitat types. These habitats have been lost from the surrounding landscape due to agricultural practise, development and land reclamation widespread in the wider landscape. These mosaics of semi-natural habitats offer a local reservoir for flora and fauna in a landscape that has become dominated by human practices.

The profile of the stream flowing along the western side of the site shall be raised due to infilling on the valley in which the stream is located. Water within the stream shall be diverted via piping within the area of works for the duration of infilling. Once infilling has been completed the stream shall be reinstated at a higher level. Suitable natural stone material shall be used to reinstate the bed of the stream in order to minimise potential erosion along the stream channel. This could result in a short term significant impact on this habitat locally and if unmitigated result in the run off of sediment to watercourses downstream of the site. The landscaping and tree planting associated with the proposed eco-park shall increase the ecological value of the profiled stream as vegetation matures.

Terrestrial Mammals (excluding Badger)

The construction phase of the development may result in a short term (see Section 11.2.9) impact to fauna during vegetation clearance and infilling works, however as this will be short term in duration (lasting for a maximum of two years), and given the habitats present in the wider environment, affected mammals will be able to move to other locations in the wider area until the disturbance has ceased. The development of the Pretty Bush Eco-park following infilling works shall create new habitat for fauna to utilise and it is considered highly likely that mammals displaced from the area of works shall return to the area following replanting and landscaping.

Badger

The proposed development will result in the destruction of five setts (a main sett, an annex sett, a subsidiary sett and three outlier setts), and construction work in close proximity to two other setts. The main sett is considered to be a breeding sett. A derogation licence (DER/BADGER 2015-70 Amended) for badgers has been granted for works to be carried out as part of the proposed project. The conditions of the licence include the construction of an artificial sett south of the site, activity surveys and sett exclusions prior to sett destructions.

There will be some loss of foraging habitat (grassland, woodland and scrub) within the footprint of the proposed development. It is proposed to strip the vegetation from the infill area prior to the commencement of works. This shall involve the removal of scrub and vegetation around five setts within the site.

These habitats offer a reservoir of semi natural habitat in an area dominated by agricultural grassland fields and residential properties. A 15m strip of vegetation (treelines, scrub and boundary ditches) around the infill area shall remain to be maintained for the duration of the project. The section of woodland, scrub and grassland to the south of the site shall also remain untouched for the duration of the project.

The resultant loss of foraging habitat and sett without mitigation would result in a significant impact to badgers utilising the site. However, with the implementation of conditions laid out in the derogation licence the potential impact is considered to be a short term slight impact.

Bats

Bat activity within the study area was relatively high particularly along the riparian woodland strips and narrow section of open grassland along the western side of the site. The site offers potential foraging habitat for four bat species. There is however very limited roosting habitat available within the footprint of the proposed infilling works. There are no building or underground caves within the site and mature trees with crack, holes, crevices or ivy favoured for roosting are limited to treelines along the margins of the site and small cluster to the south of the site. These trees are outside the footprint of the area of works and shall remain untouched for the duration of the proposed project. A 15m buffer of vegetation shall remain around the margins of the site which shall further reduce the risk to bat species.

Foraging or commuting bats may suffer disturbance impacts during the infilling phase of the development through increased noise and lighting on the site. However, mitigation measures such as restrictions on night-time working and use of appropriate lighting will minimise or avoid these impacts.

Avifauna

With regard to impacts on bird species, it is considered that the main potential source of impacts on avian fauna will be as a result of vegetation clearance works and the associated loss of habitat,

The potential likely impact of the proposed project on birds may be considered as:

- Possible loss or deterioration of habitats; and
- Disturbance or displacement of birds.

Consideration of the survey data against Table 11-12 indicates that two 'High' sensitivity species may occupy the project study area:

- Yellowhammer (Red-listed)
- Barn owl (Red-listed)

Medium sensitivity species are considered in this assessment. The most relevant species potentially within the project study area are:

- Robin (Amber-listed)
- Mistle thrush (Amber-listed)
- Goldcrest (Amber-listed)
- Kestrel (Amber-listed)
- Sparrowhawk (Amber-listed)
- Linnet (Amber-listed)
- Starling (Amber-listed)
- Stonechat (Amber-listed)

Habitat Loss or Alteration

Vegetation clearance and infilling works will result in some habitat damage and loss. Approximately 3.49 ha of non-linear habitats will be lost and will be the total area proposed for infilling. Habitat that will be lost will be dominated by scrub with sections of grassland clearings.

The loss of trees and scrub shall result in a reduction of potential nesting and foraging habitat for birds. This loss shall be short term with replanting proposed after the infilling works has been completed. The proposed works shall take a maximum of two years. Only native species shall be used for the proposed Pretty Bush Eco-park.

Yellowhammer

Yellowhammer were not recorded during surveys within the site, however there are records of the species in the greater area. Yellowhammer are strongly linked with the cultivation of cereals and the species has declined in areas where these are no longer grown. The species requires a minimum amount of cereal in the landscape to maintain a population (Balmer *et al*. 2013). There are no cereal fields directly adjacent to the site and the main land use in the greater area is pastures for cattle and sheep. Yellowhammer frequent hedgerows on arable farmland, woodland edges, overgrown scrub and gorse slopes, and conifer plantations. The species nests on the ground in overgrown bases of hedges and brambles. The scrub and gorse habitat within the site offers potential nesting habitat for the species and the proposed project would result in the loss of potential nesting habitat. However, scrub habitat to the south and east of the site shall remain including a 15m buffer around the perimeter of the area of works. There shall be no loss of hedgerows or treelines as a result of the proposed development. As works shall be carried out over a maximum of 2 years and the site shall be replanted with native species to develop an Eco-park following the infilling works, the proposed project shall have a short term, moderate negative impact on yellowhammer as further habitat is available outside the site. If vegetation clearance is carried out during the nesting season this could result in a significant impact to the species if nesting within the site. However, it is worth noting that the species was not recorded within the site during surveys and there are no arable fields immediately adjacent to the site, therefore these evaluations are based on the precautionary principal.

Barn owl

There are no records of barn owl roosting within the site; however, there is a known barn owl nest within the local area. The stripes of grassy verges within the site offer potential foraging habitat for the species. This habitat type is not extensive within the site, mainly confined to two sections of open habitat along either stream within the site. The majority of the vegetative coverage within the site is enclosed scrub. The development of an open grassland habitat within the Pretty Bush Eco-park would offer a larger area of potential foraging habitat than currently within the site. There were no dead, hollowed out trees or mature trees with holes sufficient to be utilised by barn owl within the site. Mature trees were recorded along treelines along the eastern boundary and to the south of the site outside the footprint of the development and these shall remain post-construction. The resultant impact to Barn Owl as a result of habitat loss and/or alteration is considered to be a short-term, slight, negative impact.

Amber-listed species

Passerines

This group includes Robin, Mistle Thrush, Goldcrest, Linnet, Starling and Stonechat. The loss of habitat due to the construction of the project has the potential to affect passerines. This can result in reduced feeding and nesting opportunities for birds. However, section of vegetation and scrub shall remain around the margins of the site and to the south.

It is therefore, not expected that the development will cause any reduction in the baseline population of passerines as the area of nesting/foraging habitat lost will be of short-term, slight impact. If vegetation clearance is carried out during the nesting season this could result in a significant impact to these Amber-listed species.

Birds of Prey

The proposed development would result in the loss of potential foraging habitat for Kestrel and Sparrowhawk. Mature trees within the study area offering potential nesting sites for the species shall not be lost as a result of the proposed project. Given the availability of foraging habitat within the greater area the resultant impact is considered to be a short-term, slight impact to these species.

Disturbance and/or Displacement

Another potential impact during construction is disturbance of nesting or wintering birds by human activity, infilling works, the operation of machinery and vegetation clearance. The proposed works shall take a maximum of two years. Work taking place during the summer months could cause disturbance to breeding birds and could lead to short-term displacement of some birds from the site during construction.

Yellowhammer

Once the vegetation within the site has been cleared the site shall be of limited value for nesting yellowhammer. The remaining buffer of scrub around the margins and to the south of the site as well as hedgerows in the greater area shall offer potential nesting habitat for the species. The resultant disturbance and/or displacement of yellowhammer from the site is considered to be a short-term, slight negative impact to the species.

Barn Owl

Once the vegetation within the site has been cleared the site shall be of limited value for foraging barn owl. Works shall be limited to daylight hours predominantly avoiding the period when barn owl are active. The resultant disturbance and displacement of Barn Owl from the site is considered to be a short-term, slight, negative impact to the species.

Amber-listed species

Passerines

Some disturbance to breeding passerines could be expected if construction work takes place in the breeding season. Potentially, this could be of low significance at the site owing to the availability of similar habitats in the greater surroundings. The resultant impact is considered to be a short-term, slight, negative impact to the species.

Birds of Prey

Mature trees offering nesting habitat for Sparrowhawk and Kestrel shall remain with a sufficient buffering distance from construction works. The resultant impact is considered to be a short-term, slight, negative impact to the species.

Aquatic species and habitats

Potential Direct Impact

The profile of the stream flowing along the western side of the site shall be raised due to infilling on the valley in which the stream is located. Water within the stream shall be diverted via piping within the area of works for the duration of infilling. Once infilling has been completed the stream shall be reinstated at a higher level. Suitable natural stone material shall be used to reinstate the bed of the stream in order to minimise potential erosion along the stream channel. This could result in a short term significant impact on this habitat locally and if unmitigated result in the run off of sediment to watercourses downstream of the site. This stream is of low value for aquatic species within the exception of common frog. If works were time during the spawning period this could result in a potential significant impact to this species due to the loss of tadpoles or spawn due to the drying out of the stream along the western side of the site or the siltation of both streams due to runoff.

The landscaping and tree planting associated with the proposed eco-park shall increase the ecological value of the profiled stream as vegetation matures.

Potential Indirect Impacts

The most likely potential impact during the construction phase of the proposed project on receiving watercourses and aquatic habitats arises indirectly via impacts affecting water quality, such as accidental releases of silt laden runoff. Siltation of watercourses during construction leading to increased sediment loading and pollution of watercourses in the vicinity of the development could lead to negative impacts on aquatic flora and fauna by impeding growth and reproduction of these aquatic organisms.

Other potential impacts affecting aquatic ecology during infilling works could also occur as a result of accidental spillage of hydrocarbons stored on site impacting upon water quality within the two streams in the vicinity of the proposed development, which in turn drain into Kilcoole Stream and Kilcoole Marsh. Waste from on-site toilets and wash facilities could also potentially impact on aquatic ecology.

11.5.2 Post Construction Phase Impacts

The post construction (operational) phase will have a lesser potential impact on the local ecology than the construction phase. Following the completion of the infill works, the area shall be landscaped and developed into an Eco-park. This shall form the post construction phase of the development. The park shall remain in situ for the foreseeable future with occasional maintenance works in the form of landscaping works and mowing of the wildflower meadow. The Pretty Bush Eco-park shall form a recreational amenity for visitors with walking trails and a viewing area. There shall be no further habitat loss during the post construction phase of the proposed project, and therefore no further impacts on habitats; hence they are not discussed further.

European sites

A Natura Impact Statement (NIS) has been prepared for the proposed development and accompanies the Environmental Impact statement. The NIS addresses potential impacts on European sites resulting from the proposed development.

Natural Heritage Areas or Proposed Natural Heritage Areas

No resultant impact is envisaged upon pNHAs or NHAs outside Natura 2000 sites during the post-construction phase of the proposed Pretty Bush Eco-park. The impact of the proposed project on Natura 2000 sites (and indirectly on pNHA's covered by these designations) is considered separately in the Natura Impact Statement.

Mammals

The level of human activity associated with the proposed Pretty Bush Eco-park will be frequent but minimal given the nature of human activity at parks. A large section of gorse scrub shall be planted within the park to discourage people from accessing areas of the park. This shall offer a potential sett location for badgers and shelter for other mammal species. As a result, any negative impact to terrestrial fauna during the post construction phase of the project will be *Imperceptible*.

Badger

The creation of new scrub area and planting of native species will offer new habitat for foraging and shelter (setts). It is considered likely that badgers will reutilise the area following the completion of the Pretty Bush Eco-park. As vegetation (grassland, scrub and trees) matures their value of the site shall grow. As a result, any negative impact to badger during the post construction phase of the project will be *slight*. The creation of a new artificial sett south of the site shall also offer potential new shelter for the species within the study area during works and allow the new habitats within to mature and become more optimal for badger.

Bats

The use of only native species for planting within the park shall ensure that a good diversity of invertebrate prey items are available to foraging bats utilising habitats within the park. Lighting which can discourage bats from utilising the site at night is not proposed within the park. This shall ensure that all sections of the Pretty Bush Eco-park shall be available to bats for foraging and roosting. As a result, any negative impact to bats during the post construction phase of the project will be *Imperceptible*.

Birds

The use of only native species for planting within the park shall offer good nesting and foraging habitat for birds. As the Pretty Bush Eco-park matures these habitats shall be of greater value. The inclusion of an open section of rough grassland shall offer potential foraging habitat for kestrel and barn owl in particular. There shall be greater human activity within the park during the post construction phase than currently within the site however given the nature of park in general this would be considered to be minimal. As a result, any negative impact to birds during the post construction phase of the project will be *Imperceptible*.

Aquatic species and habitats

Infill material shall be shaped and revegetated (landscaped) to develop an Eco-park. Replanting with native species shall further sure up dredge material. There shall be not further excavation works required during the post-construction phase of the project and as a result no further impact is envisaged.

11.5.3 Potential Impacts during the Decommissioning of the Project

Decommissioning is not envisaged. The Pretty Bush Eco-park will be present in perpetuity.

11.5.4 Potential Cumulative Impacts on Ecology

The EC (2001) guidelines on the provision of Article 6 of the Habitats' Directive state that the phrase 'in combination with other plans or projects' in Article 3(3) of the Habitats Directive refers to the cumulative impacts due to plans or projects 'that are currently under consideration together with the effects of any existing or proposed projects or plans.

It can be difficult to predict cumulative impacts of developments on feature of ecological interest, prior to their construction. Cumulative impacts will also depend on species present, number and frequency of occurrence of birds observed at the proposed site and at adjacent proposed and existing development. The timing of the construction phase can also have a bearing on the magnitude of the impact. It is also dependent on distance of the proposed development in relation to other existing and proposed development and habitats present between same or their linkage to European sites downstream of the proposed development site.

A cumulative impact arises from incremental changes caused by other past, present or reasonably foreseeable actions together with the proposed development. The surrounding environment is dominated by agricultural land, residential and farming properties.

The main damaging operations and threats to the greater regions ecological resources are agriculture, overgrazing, fertilisation and water pollution. Overgrazing by cattle is also another problem. The above operations are the most extensive but other threats and potentially damaging operations to valuable habitats include land drainage and reclamation, fertilisation and dumping. The proposed development will not add to these damaging operations and threats.

Agriculture

Agriculture is the most extensive landuse within the greater area. Bush Poultry Farm is located immediately north of the proposed site in Priestsnewtown. Grazing cattle were noted within pasture fields immediately to the south east and the north east of the site. Sheep were noted grazing within two fields immediately west of the site. While cattle and sheep farming dominate the land use in the surrounding area, arable farming has also been noted. An examination of land use within the greater study area was carried out via aerial photography from 1995[40] to present day[41]. An extensive area of arable crops was present to the north east of the site in the townland of Charlesland and in Priestsnewtown in the west. However, the construction of the R774 and house estates at Farrankelly and particularly Charlesland has resulted a significant loss of arable land locally.

[40] http://map.geohive.ie/mapviewer.html accessed July, 2016

[41] https://www.bing.com/maps/ accessed July, 2016

The main potential impacts would be in terms of a potential increase in nutrient levels of local watercourses. There is the potential for the proposed development to contribute to a cumulative impact on water quality in the ephemeral streams within the site and local watercourses further downstream of the site through the potential of sedimentation and other pollutants entering the watercourses as a result of vegetation clearance, infilling activities, excavation together with farming operations. It is considered that without proper mitigation a negative cumulative impact to water quality may ensue.

Land management practices associated with agriculture including land reclamation, drainage, reseeding, fertilisation and intensive grazing have reduced dramatically the coverage of semi-natural habitats within the greater area.

Areas of semi-natural grassland, woodland, scrub, hedgerows, etc., have been ploughed, cleared and drained to provide land for agriculture. The site is surrounded by perennial rye-grass (*Lolium perenne*) dominated fields with very low species diversity. The loss of these habitats has reduced the ecological value of the greater area.

The existing scrub, riparian woodland and semi-natural grassland within the site offers a refuge for local ecology. The loss of these habitats along with ongoing agricultural practises could result in a significant cumulative impact on local ecology. However, with the creation of an Eco-park following infilling works this area of wilderness shall remain in perpetuity.

Other developments

Table 11-14 below, lists granted planning applications for construction of new houses/developments for the last 5 years within the townlands encompassing the proposed development site and the surrounding area including the Kilcoole Stream and Kilcoole Marsh downstream of the site, namely Priestsnewtown, Ballydonarea and Kilcoole. These townlands all located in County Wicklow were searched using the online Planning Enquiry System on the Wicklow County Council Website[42]. Section 2.4 of this report also references other sizable project proposed/ongoing in the vicinity of the proposed development site.

Table 11-14: Relevant planning applications granted in the last five years within the townlands of Ballydonarea, Kilcoole and Priestsnewtown in County Wicklow

Townland	General description of the permitted planning applications	Number of planning applications permitted	Details of developments
Priestsnewt-own	Alteration to existing residential property	1	-
Kilcoole	Alteration to existing residential property including extensions and minor modifications.	42	-
	New residential dwellings	32	-
	construction and demolition waste recovery facility to include the recovery of construction and demolition waste	1	-
	New Commercial developments	5	A crèche facility and 4 applications for industrial warehouse, retail and offices units.
	Alterations to existing commercial properties	5	-
	Educational - works to St. Brigid's National School	3	-

[42] http://www.wicklow.ie/online-enquiries accessed July, 2016

Townland	General description of the permitted planning applications	Number of planning applications permitted	Details of developments
	Amenity	3	The building of a concrete hurling wall, alterations and extension to existing Parish Centre and the insertion of floodlighting on the main pitch at St. Patricks GAA Club
	Nursing home	1	Two storey nursing home, consisting of 77 single bedrooms, 3 double bedrooms and 1 high care ward
	Commercial Signage	2	-
	Telecommunications	1	ESB 38kV Sub-station – Application for the continued use of the existing 24m high, free standing monopole type communications structure.
Ballydonarea	Alteration to existing residential property including extensions and minor modifications.	1	-
	New residential dwellings	3	-

The townlands of Priestsnewtown (the location of the proposed project) and Ballydonarea are predominantly rural in nature and form the hinterlands of the village of Kilcoole. This is reflected by the low number of planning applications that have received planning in the last five years. Only one planning application has received planning in the last 5 years (File Number: 126347) in the townland of Priestsnewtown within which the proposed development is located. This application consisted on an alteration to an existing residential property which received planning in 2012.

The Kilcoole Marsh and Stream are located within the townland of Ballydonarea. This townland is located to the east of Kilcoole Village. Planning was granted for three new residential dwellings in the last 5 years within this townland. The closest dwelling is located 250m from Kilcoole Marsh. The planning application was to demolish an existing single storey property and for the construction of another single storey property. Planning was granted in 2015 (File Number: 142053). Two of these applications (File Numbers: 142053 and 141601) involve the demolition of an existing property and the construction of a similar property in its place. The third application was for two no. two storey properties granted planning in 2012 (File Number: 126592) located in a housing estate C.940m west of Kilcoole marsh. None of this properties are located within either designated site boundary. They are however within the catchment area of Kilcoole Stream.

The townland of Kilcoole had significantly more planning applications granted over the last five years. This would be expected as it includes the village of Kilcoole. Planning was granted for thirty-two new residential properties and forty-two for alternations to residential properties (extensions and minor amendments to existing properties). Five new commercial properties were granted planning with five alterations to existing commercial properties. The new properties included a crèche facility and four applications for industrial warehouse, retail and offices units. There was also permission granted for a nursing home in 2015.

As well as the main street within the village there are three main industrial/business estates namely Bullford Business Campus, Kilcoole Industrial Estate and Network Business Park all within 1.5km of Kilcoole Marsh. Three golf courses are located to the south of the village namely Kilcoole Golf Course, Druids Glen Golf Course and Druids Heath Golf Course. While none of these developments are located within the boundary of a designated site but they are located within the greater catchment of these sites. These developments can add pressure to these European site due to the reduction in water quality.

The main potential impacts would be in terms of a potential increase in nutrient levels of local watercourses. There is the potential for the proposed development to contribute to a cumulative impact on water quality in the ephemeral streams within the site and local watercourses further downstream of the site through the potential of sedimentation and other pollutants entering the watercourses as a result of vegetation clearance, infilling activities, excavation together along with other developments. It is considered that without proper mitigation a negative cumulative impact to water quality may ensue.

11.6 Mitigation Measures for Ecology

Mitigation measures are described below which will avoid, reduce and, where possible, offset likely significant impacts arising in relation to ecology from the construction, operation and decommissioning of the site.

11.6.1 Mitigation measures during the Construction phase

Introduction

Construction of this project is expected to cause temporary (disturbance) adverse impacts on the local ecology, as outlined in the impact appraisal above. The mitigation measures described below will reduce these impacts significantly.

Project Ecologist

It is recommended that a Project Ecologist with appropriate experience and expertise will be employed for the duration of the construction phase to ensure that all the mitigation measures outlined in relation to the environment are implemented. The Project Ecologist will be awarded a level of authority and will be allowed to stop construction activity if there is potential for significant adverse ecological effects to occur.

Habitats and Flora

The area of the proposed works will be kept to the minimum necessary, including all site clearance works, to minimise disturbance to habitats and flora. In this case, the footprint of the proposed development has been kept to the minimum necessary, including the use of layout design methods to minimise clearance works.

No disturbance to habitats or flora outside the proposed development area will occur. All works and temporary storage of materials will be restricted to the immediate footprint of the development, which will be wholly within the development site boundary. Designated access points will be established within the site and all construction traffic will be restricted to these locations.

Invasive species

No invasive plant species were recorded within the study area during surveys. However Japanese knotweed (*Fallopia japonica*) and giant hogweed (*Heracleum mantegazzianum*) have been recorded along the banks of the River Dargle.

Japanese Knotweed (*Fallopia japonica*)

Japanese knotweed was not recorded at the proposed site during ecological surveys. However, the species has been recorded along the banks of the Dargle River where the dredge material proposed for infilling shall be derived. An Invasive Species Management Plan has been put in place as part of the separate planning application for the proposed dredge works within the River Dargle. While it is extremely important and more efficient to contain invasive species at the point of infestation, care shall also be taken to ensure the plan shall also be adhered to at the site of the proposed Pretty Bush waste soil facility and Eco-park, as an extra precautionary measure.

Ecological walkover surveys shall be undertaken by a qualified ecologist, at intervals over the construction phase of the project to examine the study area for newly established invasive species. If an invasive species is recorded within the site NPWS and Wicklow County Council shall be informed immediately and an invasive species management plan drawn up.

The following recommendations will be adhered to as part of that plan, in that event:

- Japanese knotweed root systems can extend for up to 7m underground from stands of the plants visible above the ground. Staff shall be made aware of this buffer zone when working within areas of infestation.
- Areas of infestation to be fenced from other works areas including a buffering distance of up to 7m around the areas of infestation.
- Areas of infestation shall be treated on site by injecting stems of Japanese knotweed with herbicides.
- Care will need to be taken areas of infestation recorded in close proximity to the two streams on site to avoid the potential contamination of watercourses.
- The continual monitoring of areas of infestation will be required for the successful treatment of Japanese knotweed. Herbicides may need to be applied on more than one occasion to completely eradicate the species on site. New stands of invasive species may also occur over the course of the project.
- No works to take place in these areas without supervision.
- All machinery and vehicles operating within areas of infestation to be thoroughly checked and if necessary cleaned prior to leaving the area due protect against further spreading of Japanese knotweed.
- During vegetation clearance and the removal of rubbish and other waste materials from infested areas care must be taken to ensure that Japanese knotweed is not carried with these materials out of the site. Japanese knotweed plants (or other invasive species) should not be removed along with other vegetation during clearance works.
- No material shall be taken from areas of infestation.
- All staff shall be made aware of nature of threat.
- Wheel washes shall be put in place at entry and exit points. Waste water from these facilities will need to stored and treated to avoid further outbreaks.
- If operating within an area of known infestation all machinery, vehicles, equipment, foot ware and clothing will need to cleaned thoroughly (if necessary using steam cleaners) in a contained area to avoid further contamination.

Giant Hogweed (*Heracleum mantegazzianum*)

Giant hogweed has been recorded along the banks of River Dargle. The species has not been recorded within the proposed site during surveys. However, it is best practise to ensure that it does not spread to the proposed Pretty Bush waste soil facility and Eco-park. Appendix 12 provides an account of the species, health and safety issues, impacts and methods of treatment (extracted from the invasive species Ireland website[43]).
The following provides a summary of the key impacts of the species:

- Harmful to humans due to toxic sap making the skin sensitive to UV light.
- Can lead to the closure of public amenity areas.
- Excludes native species.
- Dies back in winter leaving river banks vulnerable to erosion.
- Has subsequent potential sedimentation impacts on fish spawning areas.
- Reports suggest that its leaves can be harmful to young wildfowl.

Giant hogweed seeds are dispersed over short distances by wind but considerably longer distances by rivers and streams. The seeds, which readily germinate, can also be transported in soil adhering to shoes, machinery and other contaminated objects. Seeds can remain viable for up to 15 years after their initial dispersal.

[43] http://invasivespeciesireland.com/ accessed July 2016

Control measures for giant hogweed

The following measures are recommended for the control of giant hogweed:

Non-chemical control:

- Digging: A shallow excavation to about 20cm will remove the growing crown. This should be done in April or May. Spoil should be disposed of by deep burial or gathering on site into one area to be monitored for any regrowth.
  Any regrowth should subsequently be treated with a recommended herbicide. Any waste taken to a licensed landfill site must be done so following the guidance in the legislation section.

Chemical control
In order to be effective, spraying must be carried out before (March – June) the plant flowers and sets seed, otherwise there will be thousands of additional seeds on the ground ready to grow at some point in the future. Following the early season spray checks should be carried out on a monthly basis for any late germinating seeds which are spot sprayed as necessary.

Glyphosate based products can be successful in controlling this species between March and May / June when the plants are smaller to enable them to worked more safely around. Herbicides such as Glyphosate based products can be applied as a spot treatment to individual plants, using hand-held equipment, or as an overall spray using machine mounted spray booms.

The only herbicides known to control giant hogweed and with the necessary approval for use in or near water are glyphosate based products. A few products which contain 2,4-d amine are also approved for use near water. Glyphosate based products are sold under a number of brand names (some of which may not be licenced for use near water).

Other invasive species

Care shall also be taken to ensure that other invasive species particularly those associated with aquatic habitats shall not be spread to the site including Himalayan balsam (*Impatiens glandulifera*), Curly waterweed (*Lagarosiphon major*) and New Zealand pigmyweed (*Crassula helmsii*) along with more terrestrial species like giant rhubarb (*Gunnera tinctoria*). Toolbox talks shall be undertaken with all personnel accessing the site to ensure that the details of the invasive species management plan are adhered to and to raise awareness of the potential treat of invasive species.

Biosecurity (Invasive species management)

Measures will be taken to prevent the entrance of invasive species and disease into the streams on-site. All equipment and all footwear/waders that will be placed within the water shall be steam-cleaned prior to arrival on site to prevent the spread of invasive species or disease entering the water and after use to prevent the spread to other catchments in accordance with IFI guidelines (see PDFs provided). A sign off sheet should be maintained to confirm cleaning. The use of equipment that has been used in known infested waters should be avoided.

Guidance in relation to Invasive species management in aquatic environments provided by http://invasivespeciesireland.com/ and http://www.fisheriesireland.ie/ shall be adhered to at all times.

Particular attention shall be given the recent outbreak of the crayfish plague on River Bruskey (a tributary of the River Erne) at Killydoon, near Ballinagh, Co. Cavan. Over 600 dead freshwater crayfish were detected by Inland Fisheries Ireland (IFI) staff along a stretch of the river in 2015. The disease could potentially have a devastating effect on the white-clawed crayfish population in Ireland if spread to other river systems. The disease has not been recorded within the river catchment in which the proposed works are taking place. Best practice biosecurity measures are required to prevent the spread of the disease in Ireland along with other invasive species. The crayfish plague disease can be carried on wet equipment so ALL equipment (clothing and fishing gear) that has been in freshwater must be treated with a disinfectant and then completely dried before moving to another area. This will avoid the accidental spread of the disease to other areas.

A Check – Dry – Clean approach shall be adopted for all site personnel.

Check

- Check you are not unknowingly carrying any water, living organism (including plant fragments) on your equipment or clothing
- Pay particular attention to those areas that retain water, remain damp or are hard to inspect

Clean

- Clean equipment, footwear and clothes thoroughly after water-based activity
- Pieces of plants, seeds and organisms that get caught up in, or attach themselves to your equipment must be thoroughly removed from all hidden corners, inside clothing and other surfaces
- Where available, use pressure washers and hoses to wash equipment and clothing
- Ensure washings and any water that has collected in equipment are left in the cleaning area. Alternatively, empty them onto land away from other watercourses and not into another watercourse, drain or ditch

Dry

- All equipment and clothing should be dried thoroughly
- Where possible, air dry for 48 hours in order to kill any aquatic organisms
- In slightly moist conditions, some species can live for many days. New research from the Environment Agency has shown that a killer shrimp can survive in the moist fold of a wader for up to 15 days.

Mammals (excluding bats)

An ecologist will supervise areas where vegetation, scrub and hedgerow removal will occur prior to and during construction as appropriate (e.g., an ecologist may be required during some clearance works of areas where vegetation is too dense to check beforehand). This will ensure that any site specific issues in relation to wildlife not currently present (e.g. further Badger setts) on site will be confirmed prior to commencement of works so as to allow appropriate mitigation measures to be put in place. In the event that an issue arises, the NPWS will be updated, consulted with and the relevant guidelines will be implemented as appropriate (e.g. NRA guidelines).

Construction operations within the proposed project will take place during the hours of daylight to minimise disturbances to faunal species at night.

A badger derogation licence (Licence No. Der/Badger 2015-70 amended) has been received from NPWS in relation to the destruction of badger setts within the footprint of the development. A copy of the derogation licence in presented in Appendix 13. All conditions attached to the licence shall carried out in full. The following is a summary of key measures to be carried out under the terms of the licence:

- An artificial sett must be constructed on site a minimum of four months in advance of the exclusion and destruction of setts. The design and location of this sett have been be agreed with Enda Mullen DCO NPWS.
- Exclusion of badger setts on site must take place for a minimum period of three weeks before sett destruction.
- Exclusion and destruction of setts must occur between either

  - 1st July 2016 and 30th November 2016,
  - 1st July 2017 and 30th November 2017 or
  - 1st July 2018 and 30th November 2018.

Toolbox talks shall be given the all construction staff entering the site to ensure that they are made aware of the potential impact to badgers and the local ecology of the site.

A pre-construction mammal survey will be undertaken within the footprint of the development in order to confirm the existing environment as described in the EIS and, in the event that a new sett is discovered outside the remit of the current licence the derogation licence shall be amended and approved by both NPWS licencing section and regional staff.

Bats

The following mitigation measures for bats are recommended:

- An ecologist will supervise areas where vegetation, scrub and hedgerow removal will occur prior to and during construction as appropriate (e.g., ecologist may be required during some clearance works of areas where vegetation is too dense to check beforehand).
  This will ensure that any site specific issues in relation to wildlife not currently present (e.g., Bat roost locations) on site will be discovered prior to commencement of works to allow appropriate mitigation measures to be put in place. In the event that an issue arises, the NPWS will be informed and the relevant guidelines will be implemented as appropriate (e.g. NRA guidelines).
- Infilling operations will take place during the hours of daylight to minimise disturbances to faunal species at night.
- Lighting shall be kept to the minimum necessary for the safe operation of the project. Directional lighting shall be used where possible to minimise light spillage to the surrounding environment, thereby minimising disturbance to foraging bats.
- There shall be no lighting within the park during the post-construction phase.

Avifauna

Subject to other environmental concerns (e.g., run-off), the removal of vegetation and scrub will be undertaken outside of the bird breeding season (March 1st to August 31st inclusive) as much as possible. This will help protect nesting birds.

Construction operations will take place during the hours of daylight to minimise disturbances to roosting birds, or active nocturnal bird species. Toolbox talks will be undertaken with construction staff on disturbance to key species during construction. This will help minimise disturbance.

Water Quality Measures during the Construction Phase

- Re-profiling of the stream in the west of the site, using suitable material, shall take place in dry weather only as far as possible, in order to minimise the disturbances to any waters which may flow through this ditch.

- The re-profiling of the stream through the site shall be carried out in small stages and shall start at the upstream end, working towards the downstream end. No material will be placed at the rise of the stream, and re-profiling works will take place outside of the designated buffer zones only. The diverted stream channel bed shall be constructed using suitable stone material to protect imported material from erosion. Measures such as erosion control matting will be utilised where necessary to protect the stream banks while vegetation establishes.

- Any flows present in the existing stream during re-profiling works shall be diverted via overland temporary pipes around areas where active works are taking place.

- A settlement pond shall be constructed in line with the re-profiled stream during the construction phase to ensure that any suspended solids from the placed material are removed from the runoff before being discharged off site.

- A buffer zone including riparian habitat of 15m metre shall be maintained from the eastern streams within the site. No excavation, storage or trafficking shall be permitted within these buffer zone for the duration of works.

- Buffer zones, silt traps and stilling ponds which are proposed will be put in place in advance as construction progresses across the site.

- Construction staff vehicle and works shall remain within the site boundary only. There shall be no encroachment, storage of vehicles or machinery outside of the site boundary for the duration of works.

- Temporary material storage areas will be monitored to manage any potential loss of suspended solids to surface waters. These areas will be surrounded by silt fences to filter sediment from the surface water run-off from excavated material.

- The proposed drainage of the material storage areas is being described in Section 13.6 above and includes the provision of a settlement pond to reduce the concentration of suspended solids in the run-off from this area, and the addition of silt fencing where deemed necessary. Overland flows will be diverted around this area;

- Cognisance has been taken of the findings in Section 13 surface Water Quality and Drainage and Section 12 Soils and Geology in the location of stilling ponds to ensure that these facilities are located in suitable areas. The main stilling pond will be constructed at the south of the site, outside of the areas of 'Extreme' groundwater vulnerability;

- All vegetation shall be removed from the site following vegetation clearance.

- Vegetation once cleared shall not be stockpiled near the two streams.

- Outflows from stilling ponds will discharge to overland flow to achieve additional settlement of discharge waters prior to reaching watercourses.

- A dry wheel clean facility will be located at the site entrance from the public road to the north of the site. The dry wheel clean facility will reduce construction traffic fouling public roads.

- Construction activities will be located away from watercourses and flood plains. The contractor will ensure that trafficking on site will be kept to a minimum. Where works are to be carried out adjacent to stream buffer zones, silt fencing will be used to protect the watercourse.

- Surfaces will be planted/landscaped as soon as practicably possible to cover exposed subsoils and as such reduce the potential concentration of suspended solids being conveyed in the run-off.

- Any diesel or fuel oils stored on site will be bunded to 110 % of the capacity of the storage tank. Design and installation of fuel tanks will be in accordance with best practice guidelines BPGCS005 (Oil Storage Guidelines).

- Mobile bowsers, tanks and drums will be stored in secure, impermeable storage area, away from drains and open water.

- Fuel containers will be stored within a secondary containment system e.g. bund for static tanks or a drip tray for mobile stores.

- Ancillary equipment such as hoses, pipes will be contained within the bund.

- Taps, nozzles or valves will be fitted with a lock system.

- Fuel and oil stores including tanks and drums will be regularly inspected for leaks and signs of damage.

- Only designated trained operators will be authorised to refuel plant on site and emergency spill kits will be present at equipment for all refuelling events.

- Procedures and contingency plans will be set up on-site to deal with emergency accidents or spills.

- An emergency spill kit with, absorbers etc. is to be kept on site in the event of an accidental spill.

- To avoid any risk of groundwater contamination resulting from the foul drainage for the site, portaloos and/ or containerised toilets and welfare units will be used to provide toilet facilities for site personnel. Sanitary waste will be removed from site via a licenced waste disposal contractor.

General ecological enhancement measures in relation to the proposed Pretty Bush Eco-park

The proposed landscaping plan is shown in Figure 3.9 and details are provided in Section 3.3.6 above. The following measures shall be implemented as part of the design of the proposed Pretty Bush Eco-park to enhance the ecological value of the site.

- Only native plant species shall planted within the site. The landscaping within the Eco-park shall where possible match the current plant species mix currently within the site.
- *Proposed Native Broadleaved Tree Planting* - It is proposed to plant 7 oak and 27 hawthorn and mountain ash of varying standard as applicable.
- *Proposed Hedgerows* - It is proposed to plant 30m of native hedgerow. The proposed hedgerows will be planted as a double staggered row of plants (6 plants per linear metre). Species will include c. 100 hawthorn, c. 40 holly and c. 40 blackthorn. Plants will be a minimum of 90cm tall when planted. Any plants that die will be replaced.
- *Planting Mix 1* - Areas of gorse, elder, guelder rose. - These areas will be planted with a mixture of gorse, elder, guelder rose. C. 1,100 of each species will be planted in groups of 50. Total number of plants c. 4,400. Elder in particular shall be planted within the Eco-park. It is tree species strongly associated with badger setts and it is a common species within the site at present.
- *Planting Mix 2* - Areas of shrubby willow, elder, hazel and blackthorn. - These areas will be planted with a mixture of shrubby willow, elder, hazel and blackthorn. c. 2,300 of each species will be planted in groups of 50. Total number of plants c.9,200.
- *Planting Mix 3 - Areas of wildflower* - These areas (10,000 m^2) will be sown with pure Irish native wildflower (no grasses) seed mix at a rate of 3g per metre squared (30 kg). Final meadow will be cut and removed every 1 to 3 years. Open sections grassland (a wildflower meadow) shall be created within the Eco-park in favour of an amenity grassland area. This shall increase the biodiversity of the site offering potential habitat for invertebrates and various foraging species including bats, barn owl, badger, etc.
- Five barn owl, five kestrel boxes and thirty bird nesting boxes shall be mounted at suitable locations within the site.

(Source: RSPB)
Plate 11-1: Example of a Kestrel Box

(Source RSPB)
Plate 11-2: Example of a Barn Owl Box

- Between five and ten insect hotels shall be constructed within the Eco-park. The insect hotels will be made from recycled materials pallets, bamboo, old carpet, wire mesh. Each hotel will consist of several different sections that provide insects with nesting facilities – particularly during winter, offering shelter or refuge for many types of insects. Insect hotels are used as nest sites by insects including solitary bees and solitary wasps. These insects drag prey to the nest where an egg is deposited. Sections of these hotels will be specifically designed to allow the insects to hibernate, notable examples include ladybirds and butterflies.

Plate 11-3: Example of an Insect Hotel

Source: www.bbcwildlife.org.uk

- Ten bat boxes shall be mounted at suitable locations within the site.

Plate 11-4: Example of a Bat Box

Source: Paul van Hoof

- The locations of barn owl, kestrel, bird and bat boxes as well as insect hotels shall be decided by the project ecologist.

- There shall be no lighting installed within the Pretty Bush Eco-park to discourage its utilisation by nocturnal species including bats, barn owls and badger.
- Mature trees present to the south and east of the site area shall be left in situ.
- Pathways shall be provided for visitors using the park. Large stands of gorse scrub shall be planted within the Pretty Bush Eco-park. The inclusion of pathways shall encourage people to use these features predominantly rather than traversing areas of semi-natural habitat. The planting of gorse scrub shall discourage people for utilising sections of the Pretty Bush Eco-park which shall remain undisturbed for wildlife.

Wildlife ponds

Silt ponds shall be installed to manage sediment runoff from exposed areas of soil and drainage during the construction phase of the proposed development. It is proposed that a number of suitable silt ponds are kept *in situ* once construction has been completed as these ponds could provide optimum habitat for dragonfly and damselfly species and other insects, birds and amphibians. Health and safety issues will have to be taken into consideration.

Some modification may be required to make selected ponds suitable. Most animals (insects, birds and amphibians) prefer the shelter provided by the vegetation which grows in very shallow water around the margins of ponds. Therefore, the best wildlife ponds will have very gently sloping sides, providing extensive areas of very shallow water (just a few centimetres in depth). This enables a wide band of emergent vegetation to become established around the margins of the pond (See Figure 11-4). If the pond is large enough, it will have a deep central area at least 2m deep (see Figure 11-5). This deep area will help prevent emergent vegetation from taking over the pond completely.

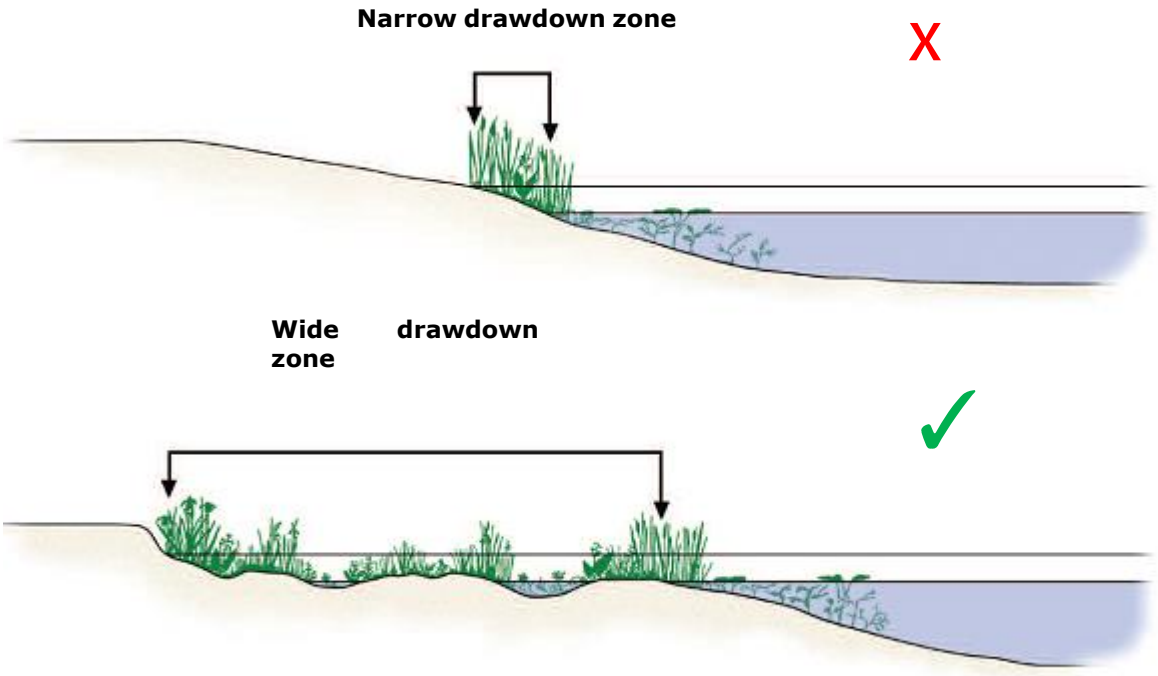


Figure 11-4: Create broad undulating drawdown zones – they are one of the most valuable areas for wildlife (Pond Conservation, 2016)

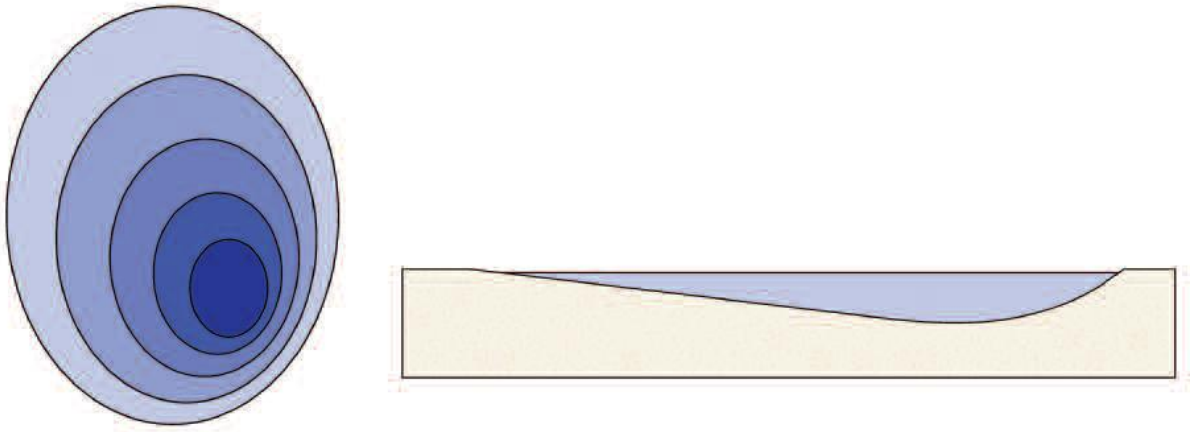


Figure 11-5: Asymmetric profile – useful to combine shallow water areas with greater depth (Pond Conservation, 2016)

11.6.2 Mitigation measures during the Post Construction Phase

No mitigation measures required for the post construction phase of the development.

11.7 Residual Ecological Impacts after Mitigation

With the implementation of the above mitigation measures, and in circumstances where it is considered that the proposed project adequately considers the relevant ecological issues in its design and its impact on the existing environment, the proposed development will result in an overall *Imperceptible* to *slight* negative residual impact on ecology.

11.8 Conclusion & Summary

With the implementation of the above mitigation measures, and in circumstances where it is considered that the proposed project adequately considers the relevant ecological issues in its design and its impact on the existing environment, the proposed development will result in an overall *Imperceptible* to *slight* negative residual impact on ecology. The development of an eco-park shall add to the biodiversity of the site as it matures and protect the site against further development, encroachment or disturbance.

11.9 References

Aughney, T., Kelleher, C. & Mullen, D. (2008). Bat Survey Guidelines: Traditional Farm Buildings Scheme. The Heritage Council, Áras na hOidhreachta, Church Lane, Kilkenny.

Balmer, D., Gillings, S., Caffrey, B., Swann, B., Downie, I. and Fuller, R. (2013). Bird Atlas 2007-2011. The breeding and wintering birds of Britain and Ireland (British Trust for Ornithology) Hardcover – 15 Nov 2013

Bat Conservation Trust, (2012). Bat Surveys: Best Practice Guidelines (2nd edition). Bat Conservation Trust.

CIEEM. (2006). Guidelines for Ecological Impact Assessment in the United Kingdom. CIEEM.

Colhoun, K. and Cummins, S. (2013). *Birds of Conservation Concern in Ireland 2014-2019*. BirdWatch Ireland.

Cowx IG & Fraser D (2003). Monitoring the Atlantic Salmon. Conserving Natura 2000 Rivers Monitoring Series No. 7, English Nature, Peterborough.

Crisp TJ (2000). Trout and Salmon. Ecology, Conservation and Rehabilitation. Blackwell Science, Oxford. 212pp.

Crowe, O. (2005) *Ireland's Wetlands and their Waterbirds: Status and Distribution,* Birdwatch Ireland, Newcastle, Co. Wicklow

Curtis T.G.F. & McGough H.N. (1988). The Irish Red Data Book 1 Vascular Plants, Stationery Office, Dublin.

Department of Environment Community and Local Government [DoECLG], (2013). Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment

EC, (2001). Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC. Luxembourg: Office for Official Publications of the European Communities.

EPA (2002). *Guidelines on the Information to be contained in Environmental Impact Statement,* Environmental Protection Agency

EPA (2003). *Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)*. Johnstown Castle Estate, Co. Wexford: EPA.

Fossitt J.A. (2000). A Guide to Habitats in Ireland. Heritage Council, Kilkenny

Hundt, L. (2012). *Bat Survey Guidelines: Best Practice Guidance- 2nd Edition.* Bat Conservation Trust.

King, J.L., Marnell, F., Kingston, N., Rosell, R., Boylan, P., Caffrey, J.M., FitzPatrick, Ú., Gargan, P.G., Kelly, F.L., O'Grady, M.F., Poole, R., Roche, W.K. & Cassidy, D. (2011) Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Kurz, I. and Costello, M.J. (1999).*An outline of the biology, distribution and conservation of lampreys in Ireland*. F. Marnell (ed.), Irish Wildlife Manuals, No. 5.

Lack P. (1986). *The Atlas of Wintering Birds in Britain and Ireland*. T. & A.D. Poyser Ltd., London

Maitland RN, and Campbell PS. (1992). Freshwater fishes of the British Isles. Harper Collins, 1992.

Marnell, F., Kingston, N. and Looney, D., (2009). *Ireland Red List No. 3, Terrestrial Mammals*. National parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin

NBDC. (2016). National Biodiversity Data Centre online mapping. http://maps.biodiversityireland.ie/Map.aspx. Accessed July 2016

NPWS (2013). *The Status of EU Protected Habitats and Species in Ireland. Species Assessments Volume **3**, Version 1.0*. Unpublished Report, National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

NRA, (2006a). *Best Practice Guidelines for the conservation of Bats in National Road Schemes.* National Roads Authority.

NRA, (2006b). *Guidelines for the Treatment of Bats during the construction of National Road Schemes.* NRA.

NRA (2008a). *Guidelines for the Crossing of Watercourses during the construction of National Road Schemes*. National Roads Authority.

NRA (2008b). *Environmental Impact Assessment of National Road Schemes – A practical guide.* NRA.

NRA (2009a). *Guideline for the Assessment of Ecological Impacts of National Road Schemes,* National Roads Authority

NRA (2009b). *Ecological surveying techniques for protected flora and fauna during the planning of National Road Schemes – Version 2*

Parnell, J: Curtis, T; and Cullen, E. (2012). Webb's an Irish Flora. Hardback, 8th Edn (March 2012), Trinity College Dublin.

Pond Conservation, (2016). The million ponds project, pond creation toolkit sheet 4, pond design. Available at www.pondconservation.org.uk/millionponds accessed January 2016.

Sharrock, J.T.R. (1976). *The Atlas of Breeding Birds in Britain and Ireland,* T. & A.D. Poyser, Calton

Smith, G., O'Donoghue, P., O'Hora, K., and Delaney, E. (2011). *Best Practice Guidance for Habitat Survey and Mapping.* Kilkenny,Ireland.: The Heritage Council.