



## ECOLOGICAL IMPACT ASSESSMENT REPORT

PROPOSED REHABILITATION WORKS AT  
KILMESSAN, CO. MEATH

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**Prepared for**

**RME Environmental**

**On behalf of**

**Kilsaran International**

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## 1.0 FLORA AND FAUNA

### 1.1 INTRODUCTION

Scott Cawley Ltd. was commissioned by RME Environmental on behalf of Kilsaran International Concrete Ltd. to undertake an Ecological Impact Assessment (EcIA) of the proposed rehabilitation works at Tullykane Quarry in Kilmessan, Co. Meath (Figure 1). The aims of this Ecological Impact Assessment are to:

- Establish the ecological baseline for the subject lands;
- Determine the ecological value of the identified ecological features;
- Assess the impact of the proposed development on ecological features of value;
- Recommend mitigation measures to avoid, reduce and remedy any identified ecological impacts; and,
- Identify any residual impacts of the development post-mitigation.



Source reference: Orthophotograph from ArcGIS World Imagery © Esri. Sources: Esri, Digital Globe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Figure 1: Site Location Map - red line indicates the boundary of the subject lands (i.e. Tullykane Quarry)

### 1.2 METHODOLOGY

#### 1.2.1 Relevant Legislation and Policy Context

The assessment of the likely impacts of the proposed development on ecological resources has taken account of the following policy documents and legislation, where relevant.

##### National and International Policy and Legislation

- *Wildlife Acts 1976 - 2012* (as amended); hereafter collectively referred to as the Wildlife Acts.
- *European Communities (EC) (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011)* (as amended); hereafter referred to as the Birds and Habitats Regulations.

- *EU Birds Directive 2009/147/EEC*
- *EU Habitats Directive 92/43/EEC (as amended)*
- *Flora (Protection) Order, 1999*
- *Actions for Biodiversity 2011 – 2016, Ireland’s National Biodiversity Plan*

#### Relevant Local Policies and Plans

- *National Biodiversity Plan 2011 – 2016 (Department of Arts, Heritage and the Gaeltacht, 2011);*
- *Meath Development Plan 2013-2019 (Meath County Council, 2013);*
- *Draft Meath Heritage Plan 2015-2020 (Meath County Council, 2015);*
- *Draft Meath Biodiversity plan 2015-2020 (Meath County Council, 2015); and;*
- *Eastern River Basin District, River Basin Management Plan 2009-2015.*

#### **1.2.2 Relevant Guidelines**

The baseline ecological surveys, evaluation and impact assessment have taken account of the following guidelines, where relevant.

##### General Guidance

- *Guidelines for Ecological Impact Assessment in the UK and Ireland Terrestrial, Freshwater and Coastal (CIEEM, 2016).*
- *Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009).*
- *Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2002).*
- *Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (EPA, 2003).*

##### Habitats and Flora

- *Best Practice Guidance for Habitat Survey and Mapping (Smith et al., 2011).*
- *A Guide to Habitats in Ireland (Fossitt, 2000).*
- *Ecological Guidance for Local Authorities and Developers (Scott Cawley, 2013).*

##### Fauna

- *Bat Mitigation Guidelines for Ireland (Kelleher & Marnell, 2006. NPWS).*
- *Bat Surveys: Good Practice Guidelines (Bat Conservation Trust, 2016).*
- *Environmental Planning and Construction Guidelines Series (National Roads Authority, 2005 – 2011).*

#### **1.2.3 Desk Study**

A desk study was undertaken in order to collate available information on the existing local ecological environment. The following resources and databases were consulted in the production of this report:

- Data on rare/protected/threatened species held by the National Parks and Wildlife Service (NPWS) for Irish National Grid 10km square N85 accessed online <http://www.npws.ie/mapsanddata> 18th January 2016;
- Data on designated sites was obtained from the online National Parks and Wildlife Service (NPWS) database <http://www.npws.ie/mapsanddata> 18th January 2016;

- Data on rare/protected/threatened species held by the online National Biodiversity Data Centre database, available online at <http://www.biodiversityireland.ie> 18th January 2016; and,
- Records of bat roosts in close proximity to the site were also queried using the Bat Conservation Ireland database (the precise location of these roosts is confidential).

#### 1.2.4 Field Surveys

##### Habitats and Flora

The site and its environs were surveyed on the 26<sup>th</sup> September 2016, in bright, dry conditions. All habitats were classified using the *Guide to Habitats in Ireland* (Fossitt, 2000), recording dominant species, indicator species and/or species of conservation interest as well as any invasive species. Plant nomenclature follows the *New Flora of the British Isles – Third Edition* (Stace, 2010).

##### Fauna Survey

Multi-disciplinary surveys for fauna were conducted on the 26<sup>th</sup> September 2016 during the habitat survey. The presence of fauna was substantiated through the detection of field signs such as tracks, feeding signs, and droppings, as well as by direct observation. The bat survey was conducted at the site having regard to the following guidelines:

- Bat Surveys for Professional Ecologists: Good Practice Guidelines (Bat Conservation Trust (UK), 2016)
- Bat Mitigation Guidelines for Ireland (National Parks and Wildlife Service, 2006)
- Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (National Roads Authority, 2006a)
- Design Manual for Roads and Bridges: Nature Conservation Advice in Relation to Bats (Highways Agency, 2001)

A daytime external visual assessment of the buildings located within the subject lands for the presence of bats was undertaken 26<sup>th</sup> September 2016. The assessment involved the examination of the external areas of each building, where accessible, for signs of bat activity and potential features that may be utilised by bats. None of the buildings were considered suitable for roosting bats. There were no attic spaces present and limited to no roof structures suitable for roosting bats.

Trees located across the subject lands were also examined from ground-level as potential bat roosts. They were assessed based on the presence of features commonly used by bats. Trees were categorised as being either suitable or unsuitable for use by bats, according to the presence of potential roost features as outlined below in Table 1. Other factors that were assessed along with the presence of any potential roost features, and which may affect their suitability, included the aspect of these features and their height above ground.

**Table 1: Potential Roost Features suitable for use by bats.**

Potential Roost Features	
Decay Features	Damage Features
Woodpeckers Holes	Hazard beams
Knot holes	Frost cracks
Flush cuts	Subsidence (shearing and helical splits)
Tear outs	Lightning strike
Double leaders	Impact shatter
Wounds and cankers	Desiccation fissure
Butt rot	Transverse snaps
	Lifting bark
	Unions

Potential Roost Features	
Decay Features	Damage Features
	Ivy

None of the trees located within the subject lands boundary were considered suitable for roosting bats as they did not support any potential roost features.

During the daytime survey, bird activity across the site was detected through direct observation and identification of bird calls.

### 1.2.5 Approach to Ecological Evaluation and Impact Assessment

#### Site Evaluation Criteria

The criteria used to assess the ecological value (Appendix A) followed the *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (NRA, 2009a) and was consistent with the *Guidelines for Ecological Impact Assessment* (IEEM, 2016). Valuation was informed by the conservation status of species from the “Ireland Red List No. 10: Vascular Plants” (Wyse Jackson *et al.*, 2016), the “Birds of Conservation Concern in Ireland” classification (Colhoun & Cummins, 2013), and relevant “Red-lists” for fauna groups (Marnell *et al.*, 2009; Regan *et al.*, 2010; King *et al.*, 2011).

The habitats on the site have been afforded a value according to NRA Guidance in Appendix A. A list of known records of protected species recorded within 2km of the subject site can be found in Appendix B. Information on local bat roosts (according to the Bat Conservation Ireland database) is also listed in Appendix B, however precise locations of these roosts are confidential.

#### Impact Assessment Criteria

In accordance with National Roads Authority’s guidelines (NRA, 2009), impact assessment was only undertaken of “key ecological receptors” (KER’s). These were features within the Zone of Influence (see Section 1.3.2. for further description) of the development which were “both of sufficient value to be material in decision making and likely to be affected significantly” (NRA, 2009). Features qualifying as KERs must as a minimum meet the ecological valuation criteria of “Local Importance (Higher Value)” or higher as per the NRA value criteria in Appendix A. Features of lower ecological value are excluded from the impact assessment. Mitigation measures that will be undertaken to reduce the impacts upon SER’s are discussed in Section 1.6.

### 1.2.6 Limitations/Data Deficiencies

Observations on breeding bird activity within the subject lands were noted during the walkover visit on an *ad-hoc* basis rather than during a dedicated breeding bird survey. These *ad-hoc* observations were noted during the sub-optimal period for breeding birds. It was not possible to accurately assess the use of the subject lands by over-wintering bird species as the walkover survey was undertaken outside of the optimal survey season and only consisted of one site visit. A bat activity survey was not undertaken at the subject lands. Therefore, whilst there are records of bats in the locality, the baseline levels of bat activity at the subject lands are unknown. In order to ensure that these factors didn’t limit the findings of this assessment, a precautionary approach has been applied to the results of this assessment.

The data for species records held by records centres and statutory bodies (such as National Parks and Wildlife Service) is often provided on an *ad hoc* basis by recorders. These records can only provide an indication of what species might be found in an area; they do not constitute full and complete species lists. Absence of certain species from these sources does not confirm absence of species in the area.

## 1.3 DESCRIPTION OF THE EXISTING ENVIRONMENT

### 1.3.1 Site Overview

The subject lands are located at an existing inactive rock quarry in Kilmessan, Co. Meath (Grid Reference: 689895, 756969). It is generally comprised of spoil and bare ground, recolonising bare ground, exposed rock, areas of hardstanding, dry meadows and grassy verges and artificial ponds. Calcareous groundwater-fed springs were identified within the subject lands located on top of the cliff-faces within the northern section of the site. The site's environs are agricultural in nature with small residential dwellings scattered along minor roads nearby. The village of Kilmessan is located c. 715m to the west of the site.

### 1.3.2 Zone of Influence

The zone of influence of the proposed development was regarded to be less than 1km from the site perimeter. If the mitigation outlined in this report is adhered to, the presence of the new structures and any effects of their construction upon sensitive ecological receptors will not be perceptible beyond a few hundred metres from the site.

### 1.3.3 Designated Areas for Nature Conservation

Natura 2000 sites (also known as European Sites or more commonly as Special Areas of Conservation and Special Protection Areas) are a European-wide ecological network of special areas of conservation composed of sites hosting the natural habitat types listed in Annex I and habitats of the species listed in Annex II, as well as areas for the protection of bird species listed on Annex I of the Directive, regularly occurring populations of migratory species (such as ducks, geese or waders), and areas of international importance for migratory birds. The aim of the network is to aid the long-term survival of Europe's most valuable and threatened species and habitats.

National Heritage Areas (NHAs) are designations under the Wildlife Acts 1976 & 2000 in order to protect habitats, species or geology of national importance. The boundaries of many of the NHAs in Ireland overlap with Natura 2000 sites. Although many NHA designations are not yet fully in force under this legislation (referred to as 'proposed NHAs' or pNHAs until such time), they are offered protection in the meantime under planning legislation which requires that planning authorities give recognition to their ecological value.<sup>1</sup>

The subject lands are not designated as an SAC, SPA, NHA or pNHA. The closest designated sites are the River Boyne and River Blackwater SAC (002299) and SPA (004232), which are located c. 5.4km north-west of the subject lands. See Table 4 below for further information on these designated sites and their qualifying interests, along with a list of other designated sites located within 15km of the subject lands. See Figure 2 for a map of designated sites located within 15km of the subject lands.

There are four proposed Natural Heritage Areas (pNHAs) located within 15km of the subject lands. See Figure 3 for a map of proposed NHAs located within 15km of the subject lands. The nearest of these nationally important sites is Trim pNHA (001357) which lies c. 2.9km north-east of the subject lands. This is a wetland site on the floodplain of the Boyne and is characterised by its freshwater marsh habitats.

The subject lands is located within the Boyne River catchment. According to the EPA Map Viewer, the Balreask stream flows directly adjacent to the northern boundary of the site for c. 1.6km until it reaches the Skane river. From the confluence of the Balreask stream and the Skane river, the Skane river flows for c. 6.5km until it reaches the River Boyne in Dowdstown. At present, the quarry void is being continuously dewatered by two existing sumps of surface water and groundwater, under a 'licence to discharge trade effluent to waters' (Register D/L 13/07, Meath County Council). A condition

<sup>1</sup> Source: NPWS Website. Available online at <http://www.npws.ie/protectedsites/naturalheritageareasnha/>. Accessed 18<sup>th</sup> January 2017

of this licence is the monthly monitoring of water quality and volume from the quarry at the discharge point and the monitoring of local surface water quality upstream and downstream of the quarry. This monitoring will continue during the backfilling phase and for a period of two years thereafter. The total flow of the Balreask Stream is predominantly made up of the water discharge from the quarry (Hydro-Environmental, 2016). Based on data collected as part of a previous planning application (Planning Permission Reference No. TA/8027131, Meath County Council), the Balreask stream is ephemeral and only flows in response to rainfall.

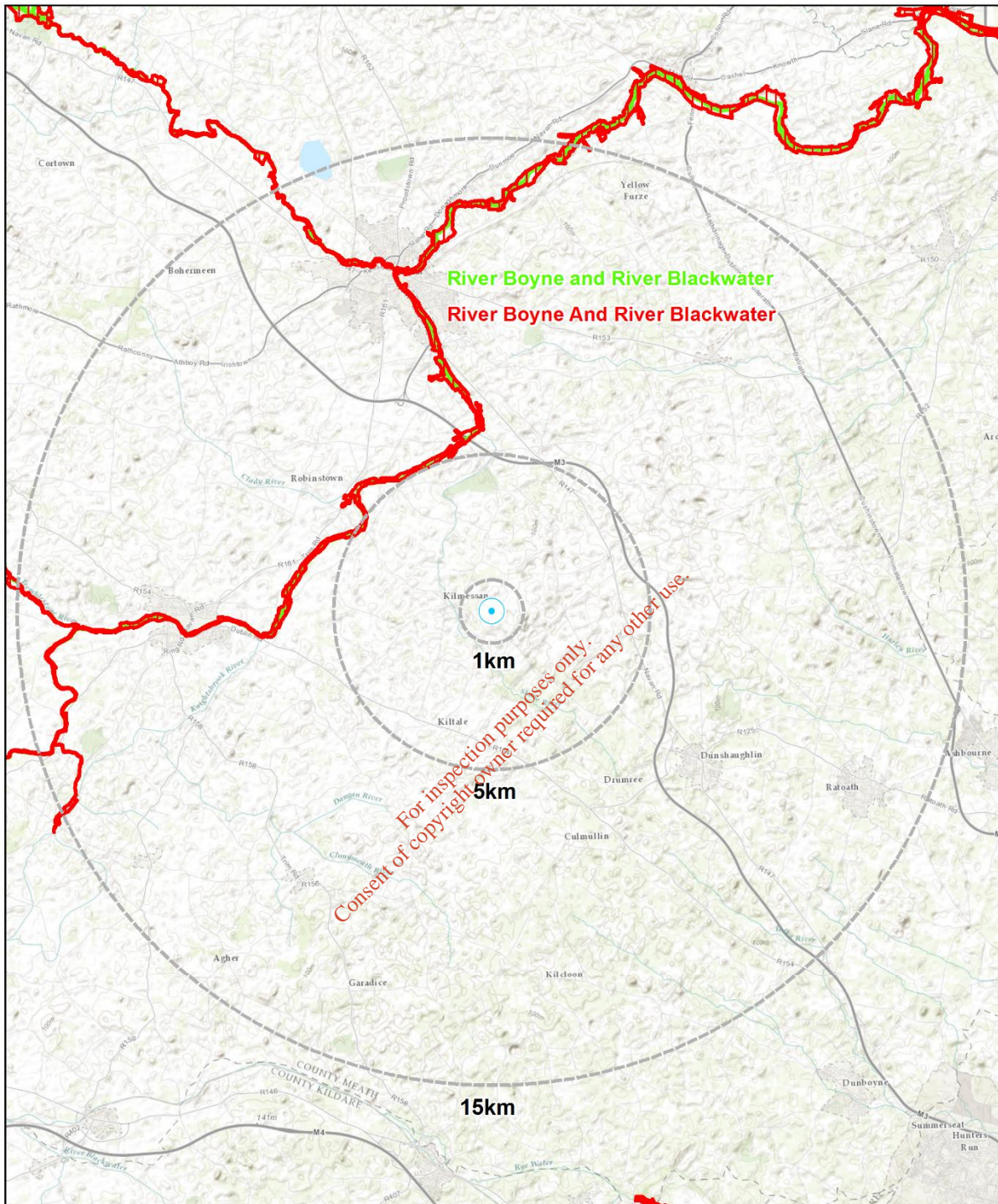
According to this monitoring data, Total Suspended Solids (TSS) and Biochemical Oxygen Demand (BOD) recorded at the discharge point are both significantly below the Freshwater Fish Directive (2006/44/EC) for both Salmonid and Cyprinid waters (i.e. 11.8mg/L TSS on average from 2001–2013 and 1.37 BOD on average from 2001 to 2006). According to the EPA Map Viewer, the water quality of the Skane river is described as 'Poor', as recorded at both the bridge north-east of Balgeeth monitoring station (located c. 2.3km downstream of the Balreask stream and Skane river confluence) and the Athronan Bridge (located c. 4.6km upstream of the Balreask stream and Skane river confluence). The groundwater body area, in which the subject lands is located, is classified as 'Trim' and is described as '*Productive fissured bedrock*'.

An Appropriate Assessment Screening Report prepared by Scott Cawley, has addressed the potential for significant effects on European Sites, and concluded that none are likely to arise as a result of the proposed development, either alone or in combination with other plans or projects.

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Figure 2: European designated sites within 1, 5 and 15 km of the proposed development



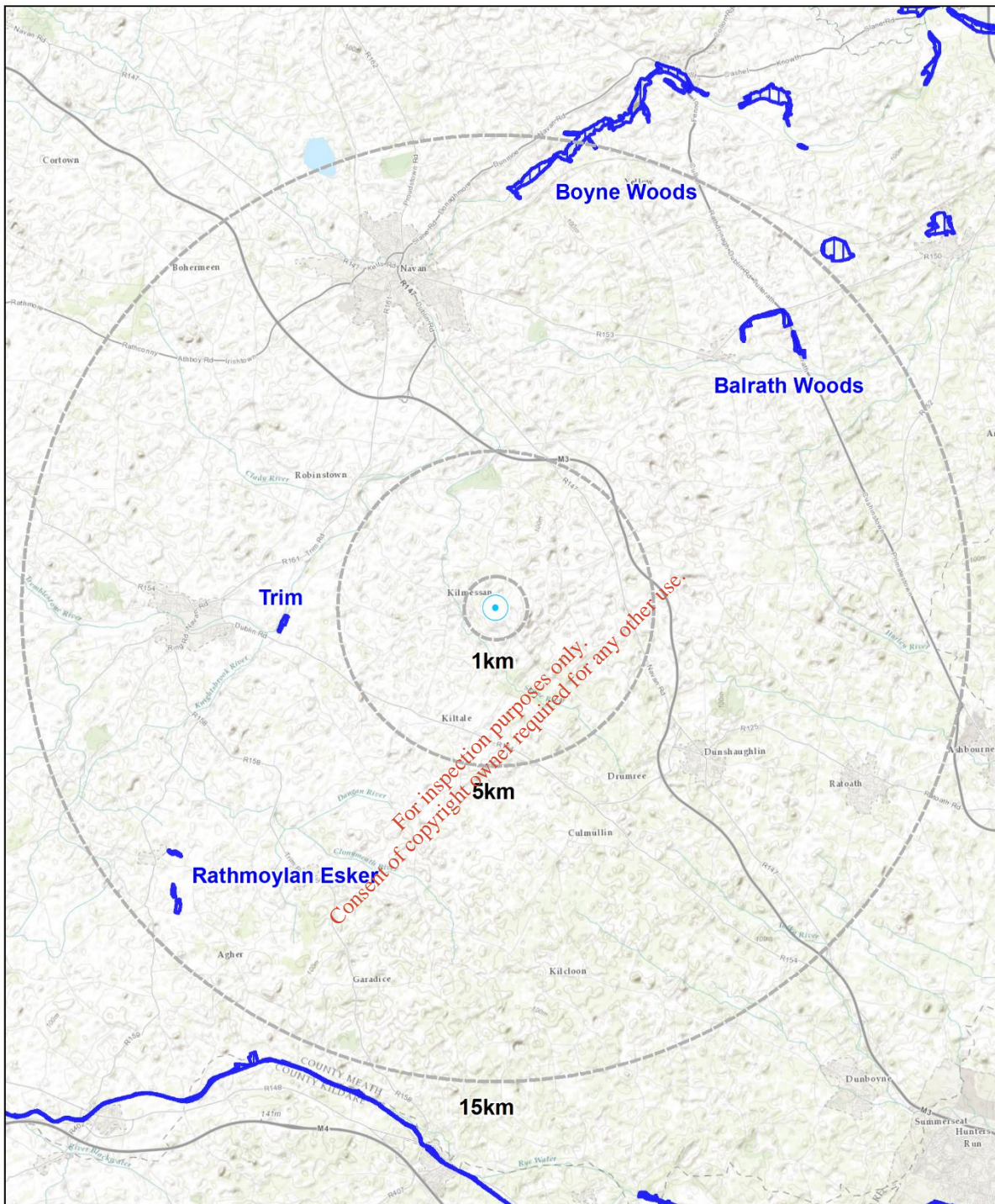
Drawing No: <b>160141/A1</b>			
Project Title: <b>160141 Kilmessan Quarry AA Screening</b>			
Client: <b>Kilsaran</b>			
Project No.:	160141	Scale:	1:165,401 @ A4
Drawn:	KMOC	Approved:	PS
Rev. No.:	00	Date:	27/09/2016
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**Legend**

- Proposed Development Site
- Special Area of Conservation
- Special Protection Area

Background Mapping from ArcGIS Online Topographic Mapping © Esri. Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, BNP, NPS, NRCAN, GEBCO, IGN, Swisstopo, MTD, CNRS, Swisstopo, Esri Japan, METI, Esri China (Hong Kong) and the GIS User Community.  
Projection: TM66 Irish Grid, Transverse Mercator.

Figure 3: Locations of proposed Natural Heritage Areas (pNHAs) within 15km of the subject lands



Drawing No: <b>160141/A1</b>			
Project Title: <b>160141 Kilmessan Quarry pNHA Map</b>			
Client: <b>Kilsaran</b>			
Project No.:	160141	Scale:	1:165,401 @ A4
Drawn:	KMOC	Approved:	PS
Rev. No.:	00	Date:	27/09/2016
		Scott Cawley Ltd. College House 71-73 College House Rock Road Blackrock Co. Dublin Ireland Tel: + 353 1 676 9815 Fax: + 353 1 676 9816	

**Legend**

- Proposed Development Site
- Proposed Natural Heritage Areas

Background Mapping from ArcGIS Online Topographic Mapping © Esri Sources: Esri, DeLorme, NAVTEQ, Swisstopo, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong) and the GIS User Community  
Projection: TM 65 Irish Grid, Transverse Mercator.

**Table 3: Designated sites located within 15km of subject lands.**

<b>Table 2 Analysis of European sites within 15km.</b>		
<b>Site name and code</b>	<b>Distance from Proposed Development (approximate)</b>	<b>Reasons for designation<sup>2</sup> (*= Priority Habitat) (Sourced from NPWS online Conservation Objectives Generic Version 5.0, unless otherwise stated). (pNHA's: taken from the Site Synopses documents (where available) <a href="http://www.npws.ie/protectedsites/">http://www.npws.ie/protectedsites/</a>).</b>
<b>Special Areas of Conservation (SACs)</b>		
River Boyne and River Blackwater SAC (002299)	Located c. 5.4km north-west of the subject lands	<b>Conservation Objectives Generic Version 5.0 (15/08/16)</b> <b>Annex I Habitats:</b> <ul style="list-style-type: none"> <li>• Alkaline Fens [7230]</li> <li>• Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae) [91E0]</li> </ul> <b>Annex II Species:</b> <ul style="list-style-type: none"> <li>• Otter <i>Lutra lutra</i> [1355]</li> <li>• Salmon <i>Salmo salar</i> [1106]</li> <li>• River Lamprey <i>Lampetra fluviatilis</i> [1099]</li> </ul>
<b>Special Protection Areas (SPAs)</b>		
River Boyne and River Blackwater SPA (004232)	Located c. 5.4km north-west of the subject lands	<b>Conservation Objectives Generic Version 5.0 (15/08/16)</b> <ul style="list-style-type: none"> <li>• Kingfisher <i>Alcedo atthis</i> [A229]</li> </ul>
<b>Proposed Natural Heritage Areas (pNHAs)</b>		
Trim pNHA (001357)	Located c. 6.6km west of the proposed development	<ul style="list-style-type: none"> <li>• Wetland site on the floodplain of the Boyne.</li> <li>• Characterised by its freshwater habitats.</li> <li>• Good diversity of plant species.</li> <li>• Presence of Strawberry Clover (<i>Trifolium fragiferum</i>) - normally only found along the coast.</li> <li>• Potential as educational resource due to proximity to town.</li> </ul>
Rathmoylan Esker pNHA (000557)	Located c. 5.2km south of the proposed development	<ul style="list-style-type: none"> <li>• One of the most easterly wooded eskers in the country.</li> <li>• Important from a biological as well as a geomorphological perspective.</li> </ul>

<sup>2</sup> "Qualifying Interests" for SACs and "Special Conservation Interests" for SPAs based on relevant Statutory Instruments for each SPA, and NPWS Conservation Objectives for SACs downloaded from [www.npws.ie](http://www.npws.ie) in January 2017.

Balrath Woods pNHA (001579)	Located c. 12km north-east of the proposed development	<ul style="list-style-type: none"> <li>Nationally-rare plant Common Wintergreen <i>Pyrola minor</i> occurs at Balrath Woods.</li> <li>These woods are of importance within a county where very few mature woodlands with any degree of natural character are to be found.</li> </ul>
Boyne Woods pNHA (001592)	Located c. 13.4km north of the proposed development	See information above for the River Boyne and River Blackwater SAC (002299)

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### 1.3.4 Records of Protected, Rare and Other Notable Flora and Fauna Species

#### NPWS & NBDC

The National Parks & Wildlife Service (NPWS) hold records for many protected species in Ireland. The online database was accessed in January 2017 for the study area, which lies within Irish National Grid Square (10km<sup>2</sup>) N85. One rare plant was historically recorded within this 10km of the subject lands, i.e. Red Hemp Nettle *Galeopsis angustifolia*.

The National Biodiversity Data Centre (NBDC) was also accessed during this desk study. Records for protected or notable mammals and amphibians can also be found in the table in Appendix B. A number of protected bird species have been recorded within 2km of the site. Notable mammal records within 2km of the site include Badger *Meles meles*, Otter *Lutra lutra* and Hedgehog *Erinaceus europaeus*.

#### Bat Conservation Ireland (BCI)

According to Bat Conservation Ireland database (please see Appendix B), there are at least 10 known bat roosts located within 10km of this site. The nearest of which was a Brown Long-eared *Plecotus auritus* roost located c. 3km north-east of the subject lands.

### 1.3.5 Field Survey Results

#### Habitat Descriptions

The following habitat types from the Heritage Council's classification system (Fossitt 2000) were identified within the subject lands, as mapped in Appendix C. Flora species lists by habitat are included in Appendix D. The habitats recorded within the subject lands (total area of c. 51.44ha) were:

- Dry Meadows and Grassy Verges (GS2)
- Wet Grassland (GS4)
- Hedgerows (WL1)
- Treelines (WL2)
- Scrub (WS1)
- Ornamental/Non-native Shrub (WS3)
- Exposed Calcareous Rock (ER2)
- Exposed Sand, Gravel or Till (ED1)
- Spoil and Bare Ground (ED2)
- Recolonising Bare Ground (ED3)
- Refuse and Other Waste (ED5)
- Buildings and Artificial Surfaces (BL3)
- Other Artificial Lakes and Ponds (FL8)
- Depositing/Lowland Rivers (FW2)
- Drainage Ditches (FW4)
- Calcareous Springs (FP1)

### *Dry Meadows and Grassy Verges (GS2)*

This habitat type was located along the peripheries of the subject lands, on top and adjacent to the existing earthen berms and next to the watercourses (see Plate 1 below). It was also identified in a mosaic with three other habitat types, which included Wet Grassland, Scrub and Ornamental/Non-native Shrub, which are described below in more detail. Dominant species identified included those typical of this habitat type, such as False Oat-grass *Arrhenatherum elatius*, Yorkshire Fog *Holcus lanatus* and Yellow Vetchling *Lathyrus pratensis*. Other abundant to frequently occurring species included grass species Creeping Bent *Agrostis stolonifera*, Crested Dog's-tail *Cynosurus cristatus* and Downy Oat-grass *Avenula pubescens* and forb species Red Clover *Trifolium pratense*, Ribwort Plantain *Plantago lanceolata*, Tufted Vetch *Vicia cracca*, and Tormentil *Potentilla erecta*. Occasional species included Lesser Trefoil *Trifolium dubium*, Harefoot Clover *Trifolium arvense*, and Self-heal *Prunella vulgaris*, while rarer species present included Common Restharrow *Ononis repens*, Thyme-leaved speedwell *Veronica serpyllifolia*, Common Sorrel *Rumex acetosa* and the non-native species invasive species Butterfly-bush *Buddleja davidii*. This habitat was assessed as being of 'Local Ecological Importance (Lower Value)'.



**Plate 1.1: Dry Meadows and Grassy Verges habitat type located along the western earthen berm. Photograph taken facing a northerly direction.**



**Plate 1.2: Dry Meadows and Grassy Verges habitat type located within the western section of the subject lands. Photograph taken facing a north-westerly direction.**

**Plate 1: Examples of Dry Meadows and Grassy Verges Habitat type located within the subject lands.**

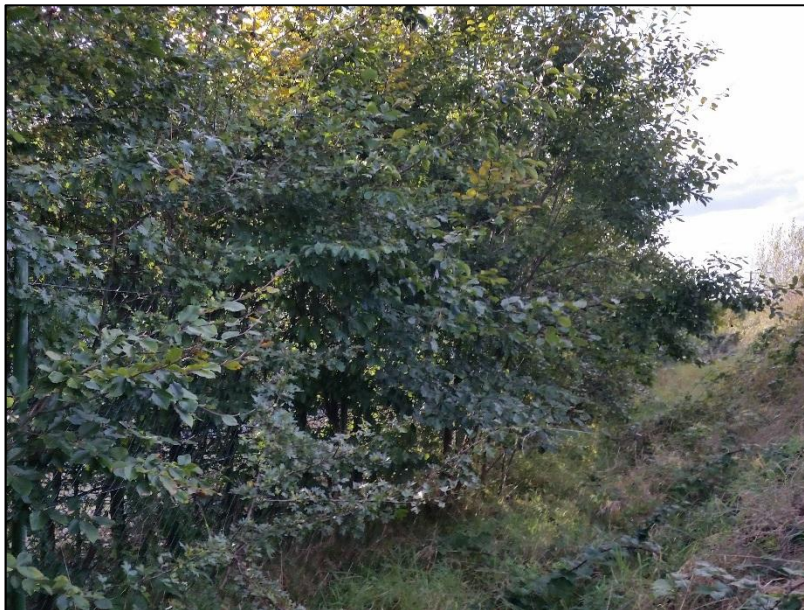
*Wet Grassland (GS4)*

This habitat type was identified in a mosaic with Dry Meadows and Grassy Verges along the northern boundary of the subject lands adjacent to the Balreask stream and within the western section of the subject lands. It was also identified in the south-eastern section of the subject lands, in association with a small patch of Willow Carr. Dominant to abundant species present included those characteristic of this damp habitat type, such as Silverweed *Potentilla anserina*, Glaucous Sedge *Carex flacca* and Compact Rush *Juncus conglomeratus*, as well as grass species associated with Dry Meadows and Grassy Verges habitat type described above such as False Oat-grass. Frequent species present included Sharp-flowered Rush *J. acutiflorus* and Field Horsetail *Equisetum arvense*, while occasional species included Marsh Ragwort *Senecio aquaticus*. This habitat was assessed as being of 'Local Ecological Importance (Lower Value)'.

*Hedgerows (WL1)*

This habitat type was recorded on the banks of the stream located along the western boundary of the subject lands and adjacent to a dry drainage ditch located along the southern boundary of the subject lands, north of Tullykane Road (see Plate 2 below). The length of each hedgerow was c. 690m and c. 290m respectively. Dominant species present included Ash *Fraxinus excelsior*, Hawthorn *Crataegus monogyna* and Beech *Fagus sylvatica*, all of which had associated Ivy *Hedera hibernica* growth, while abundant to frequently-occurring species included Blackthorn *Prunus spinosa*, Rose species *Rosa sp.* and Brambles *Rubus fruticosus* agg. The hedgerow located along the western boundary of the subject lands appears both on the 6" 1829-41 and 25" 1897-1913 historic maps<sup>3</sup>, while the other hedgerow appeared to have been planted relatively recently. The young hedgerow located along the southern boundary of the site was evaluated as being of 'Moderate Value', while the other was of 'High Value'. As such, this habitat was evaluated overall as being of 'Local Ecological Importance (Higher Value)'.

<sup>3</sup> OSI Map Viewer. Available at: <http://maps.osi.ie/publicviewer> Accessed 18th January 2017.



**Plate 2: Hedgerow (WL1) located along a dry drainage ditch (FW4) at the southern boundary of the subject lands, north of Tullykane Road. Photograph taken facing a westerly direction.**

#### *Treelines (WL2)*

This habitat type was recorded on a bank of an earthen berm directly above an area of hardstanding within the southern section of the subject lands. Dominant species present included Sycamore *Acer pseudoplatanus* and Ash, while abundant to frequently occurring species included Willow species *Salix* sp, Rose species and non-native Snowberry *Symphoricarpos albus*. This habitat was assessed as being of 'Local Ecological Importance (Lower Value)'.  
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#### *Scrub (WS1)*

Patches of Scrub (WS1) habitat type were recorded across the subject lands and in association with two other habitat types Spoil and Bare Ground and Dry Meadows and Grassy Verges. It was dominated by Brambles and Gorse *Ulex gallii*. This habitat was assessed as being of 'Local Ecological Importance (Lower Value)'.

#### *Ornamental/Non-native Shrub (WS3)*

This habitat type was identified in the existing car park. Dominant species present included non-native species *Escollonia* sp. and Laurel species *Prunus* sp., and non-native invasive species Wall Cotoneaster *Cotoneaster horizontalis*. This habitat was assessed as being of 'Local Ecological Importance (Lower Value)'.

#### *Exposed Calcareous Rock (ER2)*

This habitat type consisted of the exposed north-facing cliff face located in the south-eastern section of the quarry floor (see Plate 3 below). There was a limited number of plant species associated with this habitat type. Those identified included species typically found on rock or disturbed/waste ground such as Fern-grass *Catapodium rigidum*, Dandelion *Taraxacum officinale* agg., and Broad-leaved Willowherb *Epilobium montanum*. This habitat was assessed as being of 'Local Ecological Importance (Lower Value)'.





**Plate 3: Exposed Calcareous Rock (ER2) habitat type of the exposed north-facing cliff face located within the south-eastern section of the subject lands.**

*Exposed Sand, Gravel or Till (ED1)*

This habitat type was located on the quarry floor adjacent to existing buildings and machinery on site (see Plate 4 below). There were a very limited number of plants associated with this type as it consisted almost entirely of rock and fine gravel, exposed as a result of previous quarrying activities at the subject lands. This habitat was assessed as being of 'Local Ecological Importance (Lower Value)'.



**Plate 4: Exposed Sand, Gravel or Till (ED1) habitat type. Photograph taken facing an easterly direction.**

*Spoil and Bare Ground (ED2)*

This was the most common habitat type located within the subject lands (see Plate 5 below). It was identified on the quarry floor, on the cliff tops and partially on the earthen berms located in the eastern section of the subject lands. There were a limited number of plant species associated with this habitat type. Those present included *Weld Reseda luteola*, Colt's-foot *Tussilago farfara* and Blue Fleabane

*Erigeron acris*, all of which are typical of disturbed ground. This habitat type was also found in association with Scrub (WS1) at the existing entrance to the quarry floor, where there was a large, steep pile of rubble with Brambles and some scattered trees, mainly Ash and Sycamore, growing throughout.

Blue Fleabane is listed on the vascular plant Red List for Ireland (Wyse Jackson et al, 2016). According to Parnell & Curtis (2012), it is a rare species that is chiefly found in the centre and south-east of the country. It is categorised as being of 'Least Concern' (Wyse Jackson et al., 2016) and as a result is considered to be 'a taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in the category' (Wyse Jackson et al., 2016). It was previously described as a 'Vulnerable' species in Curtis & McGough (2005). As such, this habitat was assessed as being of 'Local Ecological Importance (Higher Value)'.



**Plate 5: Spoil and Bare Ground (ED2) habitat type located within quarry floor of the subject lands. Photograph taken facing a north-easterly direction.**

#### Recolonising Bare Ground (ED3)

This was a common habitat type located within the subject lands (see Plate 6 below). It was identified mainly on the earthen berms located in the northern, eastern and southern sections of the subject lands. There were also patches of this habitat type noted on a number of relatively small sand heaps located on the quarry floor (see Plate 6 below). A variety of different plant species with varying abundance levels were noted. These included those typical of disturbed, waste-ground such as Weld, Colt's-foot, Scarlet Pimpernel *Anagallis arvensis*, Blue Fleabane, Common Centaury *Centaureum erythraea* and non-native invasive species Winter Heliotrope *Petasites fragrans*. Other dominant to abundant species present included Yorkshire Fog, Herb Robert *Geranium robertianum*, Smooth Sowthistle *Sonchus oleraceus* and Daisy *Bellis perennis*. Occasionally occurring species included Broad-leaved Willowherb *Epilobium montanum* and Black Medick *Medicago lupulina*, while rarer species identified were Oxeye Daisy *Leucanthemum vulgare*, Autumn Hawkbit *Leontodon autumnalis* and the non-native invasive species Butterfly-bush. Species only identified growing on the small sand heaps included those typical of disturbed ground such as Beet *Beta vulgaris*, Scentless Mayweed *Tripleurospermum inodorum*, Needle Spike-rush *Eleocharis acicularis*, Restharrow *Ononis repens*, Procumbent Pearlwort *Sagina procumbens* and Bristly Oxtongue *Helminthotheca echioides*. One unidentified Orchid species *Dactylorhiza sp.* was noted growing in this habitat type.

Blue Fleabane and Bristly Oxtongue are both listed on the vascular plant Red List for Ireland (Wyse Jackson et al, 2016). They are categorised as being of ‘Least Concern’ (Wyse Jackson et al., 2016) and as a result are considered to be ‘a taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in the category’ (Wyse Jackson et al., 2016). Whilst Blue Fleabane was previously described as a ‘Vulnerable’ species, Bristly Oxtongue was previously described as being of ‘Least Concern’ (Curtis & McGough, 2005). According to Parnell & Curtis (2012), Bristly Oxtongue is very rare and is mainly found in the eastern half of the country. As such, this habitat was assessed as being of ‘Local Ecological Importance (Higher Value)’. This habitat was assessed as being of ‘Local Ecological Importance (Higher Value)’.



Plate 6.1: Recolonising Bare Ground (ED3) habitat type identified on top of an earthen berm located in the northern section of the subject lands. Photograph taken facing an easterly direction.



Plate 6.2: Recolonising Bare Ground (ED3) habitat type on sand heaps located within the northern section of the quarry floor. Photograph taken facing a south-westerly direction.

**Plate 6: Examples of Recolonising Bare Ground (ED3) habitat type located within the subject lands.**

*Refuse and Other Waste (ED5)*

This habitat type was limited to a few relatively small patches located in the north-western section of the subject lands. It consisted of materials associated with the previous quarrying activity. There were no plant species present. This habitat was assessed as being of 'Local Ecological Importance (Lower Value)'.

#### *Buildings and Artificial Surfaces (BL3)*

This habitat type consisted of a number of existing disused buildings and services, which included a workshop, soil store, weighbridge, wheelwash, pre-fabricated offices, canteen and WC, ESB substation and switch house, a paved entrance roadway and other areas of hardstanding (see Plate 7 below). This habitat was assessed as being of 'Local Ecological Importance (Lower Value)'.



**Plate 7: Buildings and Artificial Surfaces (BL3) habitat type located along the southern boundary of the subject lands, which includes disused prefabricated buildings and areas of hardstanding. Photograph taken facing an easterly direction.**

#### *Other Artificial Lakes and Ponds (FL8)*

This habitat type consisted of: a large artificial pond (c. 11.6ha in area) located in the eastern section of the quarry floor that was created as a result of rainfall collecting in the quarry floor; two sumps located in the centre of the quarry floor; and, a settlement pond located in the north-western section of the subject lands south of the Balreask Stream (see Plate 8 below). There were a limited number of plant species associated with this habitat type. Those noted included Almond Willow *Salix triandra*, Yorkshire Fog, Duckweed species *Lemna sp.* and an unidentified charophyte species *Nitella sp.* This habitat was assessed as being of 'Local Ecological Importance (Lower Value)'.



**Plate 8.1: Artificial pond located in the eastern section of the quarry floor. Photograph taken facing an easterly direction.**



**Plate 8.2: Sump located within the centre of the quarry floor. Photograph taken facing a south-easterly direction.**

***Plate 8: Examples of Other Artificial Lakes and Ponds (FL8) habitat type located within the subject lands.***

***Depositing/Lowland Rivers (FW2)***

This habitat type consisted of both the Balreask stream located along the northern and eastern boundaries of the subject lands (c. 1km in length) and an unnamed stream located along the western boundary of the subject lands (c. 614m in length), adjacent to the hedgerow habitat type described above. The Balreask stream had steep banks that were densely vegetated (see Plate 9 below). The stream itself was dominated by Fool's-water-cress *Apium nodiflorum*, while those identified growing on the banks of the Balreask stream included plants typically found on damp marshy ground such as

Meadowsweet *Filipendula ulmaria*, Iris Yellow *Iris pseudacorus*, Common Reed *Phragmites australis*, Water Mint *Mentha aquatica* and Square-stalked St. John's-wort *Hypericum tetrapterum*. This habitat was assessed as being of 'Local Ecological Importance (Lower Value)'.



**Plate 9: Depositing/Lowland Rivers (FW2), referred to as Balreask Stream on the EPA Envision Map Viewer, located along the northern boundary of the site.**

#### Drainage Ditches (FW4)

There were three Drainage Ditches located within the subject lands (see Plate 10 below). One was located within the eastern section of the subject lands and was surrounded by recolonising bare ground habitat type described above. It is c. 320m in length, c. 1m wide and between c. 5-10cm deep. It appeared to ultimately drain to the Balreask stream in the east. Another drainage ditch (c. 290m in length) was located along the southern boundary of the site, surrounded by a mosaic of dry meadows and grassy verges and scrub habitat types to the north and a hedgerow to the south. This ditch was dry on the day of the survey. Another drainage ditch (c. 50m in length) was identified within the north-western section of the subject lands, connecting the existing settlement pond to the Balreask stream as part of the existing surface water management system in place at the quarry. Plant species observed growing within and directly adjacent to the drainage ditch located in the eastern section included typical species of damp conditions such as Bulrush species *Typha sp.*, Square-stalked St. John's-wort, an unidentified *Chara* species and Sharp-flowered Rush. This habitat was assessed as being of 'Local Ecological Importance (Lower Value)'.



**Plate 10: Drainage ditch (FW4) located within the eastern section of the subject lands, surrounded by recolonising bare ground (ED3) habitat type. Photograph taken facing a southerly direction.**

#### *Calcareous Springs (FP1)*

This habitat type was identified on the northern, eastern and southern earth berms adjacent to Recolonising Bare Ground (ED3) habitat type. One of these springs, located on the northern berm, had associated extensive tufa formation (see Plate 11). Many of the plant species found growing within this habitat type were also associated with Recolonising Bare Ground (ED3) habitat type, such as Colt's-foot and Yorkshire Fog. Other species included Creeping Bent and Soft Rush *Juncus effusus*, the latter of which is a negative indicator species of the Annex I habitat (Lyons & Kelly, 2016).

In the absence of a detailed botanical study, it is not possible to definitively state whether or not this spring with associated tufa formation is an Annex I Priority Habitat 'Petrifying Springs with Tufa Formation [7220]'; however it is considered unlikely due to the lack of positive indicator plant species noted during the site walkover (Lyons & Kelly, 2016). It is highly likely that these springs were created as a consequence of past quarrying activities and as such are artificial in origin. Considering this and in line with a precautionary approach, this habitat was assessed as being of 'Local Ecological Importance (Higher Value)'.



**Plate 11: Drainage Ditch (FW4) located within the eastern section of the subject lands, either side of Recolonising bare ground (ED3) habitat type. Photograph taken facing a southerly direction.**

#### Rare Flora

No protected flora were identified within the subject lands. Two rare flora species listed in the Irish Red Data Book (Wyse Jackson, 2016) were recorded during the site walkover survey, i.e. Blue Fleabane and Bristly Oxtongue. The conservation status of these species are considered to be of 'Least Concern' (Wyse Jackson, 2016).

#### Invasive Flora

Three invasive species were recorded within the subject lands, as described in Section 1.3.5 above. These included Wall Cotoneaster, Butterfly-bush and Winter Heliotrope, the former two of which are considered to be 'Medium Risk' invasive species, while the latter species is considered to be of 'Low Risk' (Kelly, J. et al., 2013).

#### Fauna

A Red fox's *Vulpes vulpes* den was noted in the small sand heaps located in the northern section of the quarry floor. Footprints and feeding remains of fox were noted adjacent to the entrances of the den. A number of small mammal paths, most likely created by Rabbit *Oryctolagus cuniculus* or Red fox, were noted along the southern boundary and within the western section of Dry Meadows and Grassy Verges. No evidence of badgers was noted during the survey.

Crevice in the cliff face could possibly be of use for bats but due to the time of year and lack of safe access to these areas, the use of such potential roost sites could not be confirmed. A precautionary approach has therefore been applied to the presence of these protected species.

Only six bird species were recorded within the boundaries of the subject lands; one of which is Red-listed birds (i.e. Meadow Pipit *Anthus pratensis*), another is Amber-listed (i.e. Lesser Black-backed Gull *Larus fuscus*), while the remaining four are Green-listed birds (i.e. Blackbird *Turdus merula*, Hooded Crow *Corvus cornix*, Rook *Corvus frugilegus* and Wren *Troglodytes troglodytes*), as per the *Birds of Conservation Concern in Ireland* (Colhoun & Cummings 2013). A flock of c. 40 Lesser Black-backed Gulls was observed flying out of and into the quarry floor and loafing in the pond. Sand Martin *Riparia riparia*



burrows (over 100 entrances) were noted in steep gravel banks located in the western section of the quarry (see Plate 12 below). The scrub habitat and scattered trees located along the within the subject lands are all considered to be suitable breeding passerine bird habitat.



**Plate 12: Sand martin burrows (as indicated by red arrow) present in the gravel pits located within the western section of the quarry.**

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### 1.3.6 Site Evaluation

Table 4 provides an ecological evaluation of all identified Key Ecological Receptors (KER's) at this particular site. KER's have been identified as at risk of potentially significant impacts via a source-pathway-receptor link. Impact significance here is defined as producing a change in conservation status at a specified geographic level in line with NRA and CIEEM guidance. KER's are valued as Local (high) or above per the criteria set out in Appendix A, which takes into consideration legal protection, conservation status and local abundance of ecological features.

<b>Table 4 Ecological Evaluation of Key Ecological Receptors in Relation to the Subject Site</b>		
<b>Habitat / Species</b>	<b>Highest Ecological Valuation Level</b>	<b>Key Ecological Receptor?</b>
<b>Designated Sites</b>		
SACs and SPAs	International	Yes
pNHAs	National	Yes
<b>Protected Species</b>		
<b>Bat species (Roosting/Foraging/Commuting)</b>	<b>Local (High)</b>	<b>Yes</b>
<b>Bird species</b>	<b>Local (High)</b>	<b>Yes</b>
<b>Habitats &amp; Flora</b>		
<b>Blue Fleabane <i>Erigeron acris</i></b>	<b>Local (High)</b>	<b>Yes</b>
<b>Bristly Oxtongue <i>Helminthotheca echioides</i></b>	<b>Local (High)</b>	<b>Yes</b>
Dry Meadows and Grassy Verges (GS2)	Local (Low)	No
Wet Grassland (GS4)	Local (Low)	No
Hedgerows (WL1)	Local (High)	No
Treelines (WL2)	Local (Low)	No
Scrub (WS1)	Local (Low)	No
Ornamental/Non-native Shrub (WS3)	Local (Low)	No
Exposed Calcareous Rock (ER2)	Local (Low)	No
Exposed Sand, Gravel or Till (ED1)	Local (Low)	No
Spoil and Bare Ground (ED2)	Local (Low)	Yes
Recolonising Bare Ground (ED3)	Local (Low)	Yes
Refuse and Other Waste (ED5)	Local (Low)	No
Buildings and Artificial Surfaces (BL3)	Local (Low)	No
Other Artificial Lakes and Ponds (FL8)	Local (Low)	No
Depositing/Lowland Rivers (FW2)	Local (Low)	No
Drainage Ditches (FW4)	Local (Low)	No
<b>Calcareous Springs (FP1)</b>	<b>Local (High)</b>	<b>Yes</b>

## 1.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

### 1.4.1 Brief Description of the Project

The proposed development comprises of backfilling c. 46.5ha of the current quarry void with inert soil and stone (EU Waste Class 17 05 04<sup>4</sup>) under a Waste License, which will be applied for from the Environmental Protection Agency. The backfilling will be undertaken at a rate of c. 400,000 tonnes per annum over a 14 year period and a total of c. 5.6 million tonnes of inert soil and stone will be

<sup>4</sup> Defined as 'soil and stones other than those mentioned in 17 05 03', i.e. which are 'soil and stones containing hazardous substances' (EPA, 2015). The definition of inert waste from Article 2 of the Landfill Directive is as follows: 'waste that it does not undergo any significant physical, chemical or biological transformations. Inert waste will not dissolve, burn or otherwise physically or chemically react, biodegrade or adversely affect other matter with which it comes into contact in a way likely to give rise to environmental pollution or harm human health. The total leachability and pollutant content of the waste and the ecotoxicity of the leachate must be insignificant, and in particular not endanger the quality of surface water and/or groundwater'. Therefore, no harmful/toxic contaminants are expected to be present.

imported to the site over that period. A small quantity of concrete/bricks/tiles and ceramics/mixed construction & demolition material will also be accepted to be used to construct internal roads to facilitate the placing of the soil and stones. A small quantity of concrete (EWC Code 17 01 01<sup>5</sup>) will also be used to construct internal roads into the proposed community park 'The Skane Valley Amenity Park', which will be located in the south-western section of the proposed site. Temporary haul roads entering the existing quarry will also be constructed with materials categorised as EWC Code 17 01 01, 17 01 02, 17 01 03 and 17 01 07<sup>6</sup>). The proposed park will be for local amenity use and will include a playground, a playing pitch, other green areas, vehicular entrance, paved car parks and paved walk ways throughout. In the event where a properly constituted body does not come forward to take ownership of the park prior to construction, within a predefined period, the area will remain undeveloped and will be reclaimed to an agricultural use in keeping with the balance of the reclaimed quarry.

The quarry void is currently being continuously dewatered by two existing sumps of surface water and groundwater, which are then discharged into the Balreask Stream under a 'licence to discharge trade effluent to waters' (Register D/L 13/07, Meath County Council). As part of the proposed development, these sumps will be upgraded and all existing quarry floor drains that feed into the sumps will be blocked in order to ensure that during the backfilling process only groundwater will enter the sumps. Surface water drains will be constructed to divert stormwater into a series of constructed settlement ponds for removal of suspended sediments. Settlement ponds will be constructed from low permeability imported soils. As the backfilling operations raise the ground in the quarry void, new settlement ponds will be constructed. Treated surface water from the settlement ponds will be pumped to the existing final settlement pond, oil interceptor and v-notch weir before discharging via the outflow channel. It will then be discharged to the Balreask Stream. (Hydro-Environmental Services, 2016). Once the backfilling is completed, the groundwater level will be allowed to recover to its natural level. It is estimated that the final fill level will be at least c. 8-10m above the recovered groundwater level (Hydro-Environmental Services, 2016)

There is an existing wastewater treatment system located at the subject lands, which treats foul effluent arising from the site office via a secondary treatment system and percolation area and then discharges it to groundwater. The predicted hydraulic loading (i.e. 0.3m<sup>3</sup>/day) during the construction phase and proposed treatment will ensure that there are no potential impacts on groundwater or surface water quality arising from foul effluent (Hydro-Environmental Services, 2016).

Once the backfilling process has been completed, the area will be seeded for the establishment of a grassland. This will be completed as soon as possible in order to avoid erosion.

As part of the proposed monitoring plan, the existing network of wells at the subject lands will be monitored quarterly for groundwater levels and quality to demonstrate that any proposed future backfilling is not impacting on local groundwater quality. It is proposed that the current monitoring of surface water will be continued during the backfilling phase and for a period of two years hereafter.

## 1.5 POTENTIAL IMPACTS OF THE DEVELOPMENT

As per the relevant guidelines, likely significant impacts have only been assessed for Key Ecological Receptors, as listed in the table above. An impact is considered to be ecologically significant if it is predicted to affect the integrity or conservation status of a Key Ecological Receptor at a specified geographical scale. All impacts are described in the absence of mitigation.

In addition to the above guidance, the EPA's (2002) definitions of duration have been employed as follows:

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<sup>5</sup> Defined as 'concrete' (EPA, 2015).

<sup>6</sup> Defined as 'concrete' (EPA, 2015).

<sup>6</sup> Defined as '17 01 02 bricks, 17 01 03 tiles and ceramics and 17 01 07 mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06' (EPA, 2015)

- 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.

### 1.5.1 Do-Nothing Scenario

In event where the proposed development application to backfill and restore the quarry is unsuccessful, Kilsaran International Concrete Ltd. intends to recommence blasting and quarrying at the site. This would result in an increase in level of disturbance to the existing habitats and fauna that utilise the site, which would likely result in negative impacts.

### 1.5.2 Potential Impacts on Designated Areas for Nature Conservation

There are no designated areas for nature conservation directly impacted by the proposed development. The Balreask stream runs along the northern site boundary, while an unnamed stream flows along the western site boundary. There are three drainage ditches located within the site, two of which were wet on the day of the survey. These water features have the potential to carry surface waters generated during construction and operation into the local surface water drainage system which discharges into the River Boyne.

It is our professional opinion that there will be no likelihood of significant effects on any European sites during the construction or operation of the proposed development, in combination with other plans or projects. This judgement was reached on the basis that:

- According to the Site Synopsis for the River Boyne and River Blackwater SAC (002299) (NPWS, 2014), the main areas of the Annex I habitat Alkaline Fens [7230] are located in the vicinity of Lough Shesk, Freehan Lough and Newtown Lough. These three lakes are located in a different groundwater to that of the subject lands and as such are not hydrogeologically connected to the proposed development body (i.e. Athboy in the case of Lough Shesk and Freehan Lough and GWSTE Newtown Lough Fen SAC 002299)
- Any unlikely pollution event during backfilling would not be of such a magnitude that it could have significant adverse effects on the Qualifying Interest/Special Conservation Interests of the European sites. This is due to the following specific measures:
  - Sourcing material that is proven to be inert prior to transport to the Tullykane site;
  - Pre-agreed source sites for inert material ensuring; no pollutants, unauthorised material, invasive species.
  - The site will operated under an Environmental Management System
  - All required pollution prevention measures will be implemented at the site.
  - The operator will prepare and implement an Emergency response procedure.
  - The operator will complete environmental monitoring, including local groundwater and surface water monitoring.
  - A phased restoration of the site will be implemented, and end with the closure of site.
  - The operator will have a documented waste recording procedure for all material entering the site.
  - No unauthorised dumping of waste will be allowed at the site.
- The significant distance of the subject lands from the European site (i.e. c. 5.4km) and significant dilution and mixing within the receiving waters

The Appropriate Assessment Screening Report which accompanies the planning application for this proposed development has assessed the potential for likely significant effects on European Sites. It

has identified that a number of European Sites lie within the potential zone of influence of water discharges from the proposed development. However, following evaluation and a detailed analysis, no European Sites are deemed to be at risk of likely significant effects from construction or operation of the proposed development for the reasons stated above.

Based on the information provided above and in applying the precautionary principle it is the professional opinion of the authors of this report that it is possible to rule out likely significant effects on European Sites arising from the proposed development either alone or in combination with other plans or projects. Full details of this assessment and the conclusion reached are provided in the Appropriate Assessment Screening Report.

The subject lands are not designated as either pNHA or NHA. There is only one nationally designated site located within 5km of the subject lands, which is Trim pNHA (001357). No potential impacts on this pNHA are predicted due to the same reasons outlined above for European Sites.

### 1.5.3 Construction Phase

#### Flora & Habitats

##### *Rare Plant Species*

The proposed infilling has the potential to result in the loss of the two rare plant species Blue Fleabane and Bristly Oxtongue, as it would result in the direct loss of the habitat types in which these plant species found - i.e. in case of Blue Fleabane, Spoil and Bare Ground (ED2) and Recolonising Bare Ground (ED3) and in the case of Bristly Oxtongue (ED3) Recolonising Bare Ground. This would have a significant negative impact on both plant species at a local geographic scale.

##### *Calcareous Springs (FP1)*

The proposed infilling has the potential to result in the loss of the Calcareous Springs (FP1) habitat located within the subject lands. In the case of the spring with associated tufa formation, this would result in a significant negative impact on the habitat type at a local geographic scale.

#### Protected Fauna

##### *Bats*

It is possible that bats may be using the cliff face within the subject lands to roost in. It is also possible that bats may use the subject lands (especially the more vegetated areas) as foraging and commuting habitat. Following the precautionary approach, the proposed backfilling of the existing quarry, which would result in the blocking of the cliff face, may have the potential to result in a negative impact on roosting bats, if present. Temporary lighting required during the infilling process could illuminate previously unlit foraging and commuting habitat making it unsuitable for bats. All proposed lighting units used during the backfilling process will be switched off at the end of the working day (i.e. at c. 6pm). The existing pole mounted lighting will remain at the existing quarry entrance/car park. This lighting is on sensors and switches on during hours of darkness. Although, some bat species such as Leisler's bat may tolerate some lighting of feeding areas, other bat species for example Whiskered bat, are considered to be adversely affected by strong lighting. Therefore, the overall potential impact on bats is predicted to be significant at the local geographic scale.

##### *Breeding Birds*

If vegetation clearance of trees and shrubs located across the subject lands is undertaken during the breeding bird season (i.e. from the 1<sup>st</sup> March to the 31<sup>st</sup> August), it could have a potential negative impact on breeding birds at the local geographic scale.

Noise, vibration and increased human presence associated with the infilling process is likely to result in a disturbance impact to local breeding bird populations during the bird breeding season and has the potential to result in reduced breeding success of birds in suitable habitats located within or directly

adjacent to the construction zone. Following implementation of measures outlined in the Noise Impact Assessment (RME Environmental, 2017), the predicted noise emissions from the proposed backfilling process will be below recommended criteria levels as set by the EPA and will be contained within the proposed development site.

If the infilling of the quarry floor takes place from April to September, it could result in the direct mortality of Sand Martins that may be utilising their existing burrows within the subject lands. The infilling of the quarry floor would result in the removal of existing suitable breeding habitat for Sand Martin. In consideration of their Amber status (Colhoun & Cummins, 2013) and the records of Sand Martins in the locality, it is anticipated that these potential scenarios would result in a significant impact on Sand Martins at a local geographic scale.

#### **1.5.4 Operational Phase**

##### Habitats

There is potential for biodiversity gains in the locality as part of the proposed remediation works. Planting wild bird seed or nectar mixes or other cover crops could benefit birds and other wildlife, providing food for pollinating insects during the summer months and for wild birds through the winter. Therefore, the operational impact of this development on habitats is deemed to be a potential positive impact at the local geographic scale.

##### Protected Fauna

###### *Bats*

As no lighting is proposed for the development, there are no predicted lighting impacts on local bats in the area.

The planting of native trees and shrubs as part of the proposed park may have positive impacts on bats in the locality, as it will provide them with additional foraging habitat, when compared to existing grassland dominated habitat located within this area of the subject lands.

###### *Breeding Birds*

The planting of native trees and shrubs as part of the proposed park may have positive impacts on birds in the locality, as it will provide them with additional suitable nesting and foraging habitat, when compared to the existing grassland dominated habitat located within this area of the subject lands.

#### **1.5.5 Cumulative Impacts**

Proposed and permitted development in the area has the potential to act in-combination with the proposed development upon sensitive ecological receptors. The most likely of these potential impacts are the combined construction noise impacts and additional drainage from developments in the vicinity.

There are no predicted significant effects on any European sites during the construction or operation of the proposed development, in combination with other plans or projects. This judgement was reached on the basis that:

- It is an objective of the Meath County Development Plan 2013-2019 that all new developments within County Meath will include the use of Sustainable Urban Drainage Systems to minimise surface water discharges and that surface water runoff is adequately treated prior to discharge to the existing local drainage network;
- According to the site synopsis for the River Boyne and River Blackwater SAC (002299) (NPWS, 2014), the main areas of the Annex I habitat Alkaline Fens [7230] are located in the vicinity of Lough Shesk, Freehan Lough and Newtown Lough. These three lakes are located in a different groundwater to that of the subject lands and as such are not hydrogeologically connected to

the proposed development body (i.e. Athboy in the case of Lough Shesk and Freehan Lough and GWSTE Newtown Lough Fen SAC 002299).

- Any unlikely pollution event during construction would not be of such a magnitude that it could have significant adverse effects on the Qualifying Interest/Special Conservation Interests of the European sites; and,
- The significant distance of the subject lands from the European site and significant dilution and mixing within the receiving waters.

The potential cumulative impacts upon local flora and fauna include loss of foraging, resting and commuting habitat and construction noise. Habitat loss at this site, and in combination with development in the environs, is considered to be significant at a local geographic scale.

There are a number of proposed projects that have been granted planning permission within the local vicinity which could potentially act in combination with the proposed development. However, these applications are mainly for small residential developments and alterations to existing buildings and as such no cumulative impact is predicted.

## 1.6 AVOIDANCE, REMEDIAL OR REDUCTIVE MEASURES

All of the mitigation measures described in this section are in accordance with current best practice guidance, as detailed in Section 1.2. Mitigation measures are proposed in relation to those receptors where the predicted impact significance can be further reduced by their implementation.

### 1.6.1 Construction Phase

#### Mitigation Measure 1: Measures to reduce the impacts on rare plant species

It is proposed that the two rare plant species Blue Fleabane and Bristle Oxtongue, currently growing within the proposed development site, will be translocated to areas of suitable land prior to works commencing. These areas of land will contain habitat conditions suitable for the plants to successfully grow in and will either be located adjacent to the proposed community park or improved grassland. It is recommended that a site specific translocation plan is prepared in agreement with the local authority and implemented prior to works commencing. This plan will outline how these plants will be translocated from the site to the new areas of land and will include details on:

- how the existing topsoils and subsoils from the earthen berms, which contain the seed bank, will be removed, stored and reinstated;
- how the possible removal and storage of individual plants and their seeds will be carried out, if deemed necessary;
- how the proposed new locations for the two rare species will be prepared to ensure that they contain suitable habitat conditions for the plants to successfully grown in; and,
- how the site will be monitored after the translocation is completed.

#### Mitigation Measure 2: Measures to reduce the impacts of invasive species

The invasive species Wall Cotoneaster, Butterfly-bush and Winter Heliotrope will be appropriately managed (aiming for eradication) prior to any vegetation clearance works occurring along the hedgerow where these species were identified.

Planting on site will avoid using non-native, invasive species such as Rhododendron (*Rhododendron ponticum*), Japanese Knotweed (*Fallopia japonica*) and Cherry laurel (*Prunus laurocerasus*) or other plants listed on:

<http://invasivespeciesireland.com/background/legislation/ireland/third-schedule-part-1-plants/>

### Mitigation Measure 3: Measures to reduce the potential risk of impacts to water quality in receiving waterbodies

The following measures will be strictly adhered onsite in order to reduce the likelihood of an accidental pollution event at the site occurring (Hydro-Environmental, 2016):

- Sourcing material that is proven to be inert prior to transport to the Tullykane site;
- Pre-agreed source sites for inert material ensuring; no pollutants, unauthorised material, invasive species.
- The site will operated under an Environmental Management System
- All required pollution prevention measures will be implemented at the site.
- The operator will prepare and implement an Emergency response procedure.
- The operator will complete environmental monitoring, including local groundwater and surface water monitoring.
- A phased restoration of the site will be implemented, and end with the closure of site.
- The operator will have a documented waste recording procedure for all material entering the site.
- No unauthorised dumping of waste will be allowed at the site.

### Mitigation Measure 4: Measures to Reduce the Impact on Bats

It is recommended that as a precautionary approach that 3 no. bat activity surveys are undertaken by a suitably qualified bat ecologist in the period May-September prior to works commencing in order to establish the level of bat activity within the subject lands and to ascertain whether or not bats are roosting in any cracks and crevices of the cliff face. If bats are found to be roosting in crevices in the cliff face, a derogation licence may have to be obtained and specific mitigation measures implemented prior to works commencing.

All temporary lighting at the subject lands will be installed so as to minimise light spill onto adjoining tree or scrub habitats. The lighting design for the proposed works should follow guidance outlined in '*Bats & Lighting – Guidance Notes for: Planners, engineers, architects and developers*' (Bat Conservation Ireland, 2010) and '*Bats and Lighting in the UK. Bats and the Built Environment Series*' BCT (2008). It should ensure that it takes into account any potential foraging areas for bats, such as hedgerows, treelines, scrub and watercourses.

### Mitigation Measure 5: Measures to Reduce the Impact on Birds

Clearance of woody vegetation will be undertaken outside the breeding bird season (i.e. 1<sup>st</sup> March to 31<sup>st</sup> August) to avoid any potential impacts on nesting birds.

Infilling works at the gravel pits where the existing Sand Martin colony is located will be undertaken outside their breeding season (i.e. April to September, Ferguson-Lees *et al.*, 2011) in order to avoid any potential risk of direct mortality of Sand Martins.

### Mitigation Measure 6: Measures to Enhance Biodiversity

Native tree and shrub species will be planted within the proposed park. It is recommended that native Irish wildflower mixes, containing a diverse mixture of flower and grass species, are sown in the place of improved grassland type seed mixes, where possible. This will result in positive impacts on local biodiversity with ecological benefits for invertebrates in the locality.

## **1.7 PREDICTED RESIDUAL IMPACT**

### Habitat Loss – Calcareous Springs (FP1)



The proposed development will result in the loss of the Calcareous Springs habitat type. In the case of the calcareous spring with associated tufa formation, this is predicted to be a significant residual impact on this habitat type at a local level. This may act in-combination with habitat loss arising from other projects in the locality.

#### Sand Martins

The proposed development will result in the loss of existing suitable breeding habitat for Sand Martin. This is predicted to be a significant negative residual impact on this species at a local level.

#### Habitat Enhancement

There will be some positive impacts on local biodiversity as a consequence of the planting of native tree and shrub species and Irish wildflower mixes.

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**APPENDIX A: CRITERIA FOR ECOLOGICAL EVALUATION**

<b>Ecological Valuation Criteria</b>
<p><b>International Importance:</b></p> <ul style="list-style-type: none"> <li>• 'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation.</li> <li>• Proposed Special Protection Area (pSPA).</li> <li>• Site that fulfils the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended).</li> <li>• Features essential to maintaining the coherence of the Natura 2000 Network.<sup>7</sup></li> <li>• Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive.</li> <li>• Resident or regularly occurring populations (assessed to be important at the national level)<sup>8</sup> of the following: <ul style="list-style-type: none"> <li>○ Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and / or</li> <li>○ Species of animal and plants listed in Annex II and/or IV of the Habitats Directive.</li> </ul> </li> <li>• Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971).</li> <li>• World Heritage Site (Convention for the Protection of World Cultural &amp; Natural Heritage, 1972).</li> <li>• Biosphere Reserve (UNESCO Man &amp; The Biosphere Programme).</li> <li>• Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979).</li> <li>• Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979).</li> <li>• Biogenetic Reserve under the Council of Europe.</li> <li>• European Diploma Site under the Council of Europe.</li> <li>• Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).</li> </ul>
<p><b>National Importance:</b></p> <ul style="list-style-type: none"> <li>• Site designated or proposed as a Natural Heritage Area (NHA).</li> <li>• Statutory Nature Reserve.</li> <li>• Refuge for Fauna and Flora protected under the Wildlife Acts.</li> <li>• National Park.</li> <li>• 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.</li> <li>• Resident or regularly occurring populations (assessed to be important at the national level)<sup>10</sup> of the following: <ul style="list-style-type: none"> <li>○ Species protected under the Wildlife Acts; and/or</li> <li>○ Species listed on the relevant Red Data list.</li> </ul> </li> <li>• Site containing 'viable areas'<sup>11</sup> of the habitat types listed in Annex I of the Habitats Directive.</li> </ul>

<sup>7</sup> See Articles 3 and 10 of the Habitats Directive.

<sup>8</sup> It is suggested that, in general, 1% of the national population of such species qualifies as an internationally important population. However, a smaller population may qualify as internationally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

<sup>9</sup> Note that such waters are designated based on these waters' capabilities of supporting salmon (*Salmo salar*), trout (*Salmo trutta*), char (*Salvelinus*) and whitefish (*Coregonus*).

<sup>10</sup> It is suggested that, in general, 1% of the national population of such species qualifies as a nationally important population. However, a smaller population may qualify as nationally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

<sup>11</sup> A 'viable area' is defined as an area of a habitat that, given the particular characteristics of that habitat, was of a sufficient size and shape, such that its integrity (in terms of species composition, and ecological processes and function) would be maintained in the face of stochastic change (for example, as a result of climatic variation).

<b>Ecological Valuation Criteria</b>
<p><b>County Importance:</b></p> <ul style="list-style-type: none"> <li>• Area of Special Amenity.<sup>12</sup></li> <li>• Area subject to a Tree Preservation Order.</li> <li>• Area of High Amenity, or equivalent, designated under the County Development Plan.</li> <li>• Resident or regularly occurring populations (assessed to be important at the County level)<sup>13</sup> of the following: <ul style="list-style-type: none"> <li>○ Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;</li> <li>○ Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;</li> <li>○ Species protected under the Wildlife Acts; and/or</li> <li>○ Species listed on the relevant Red Data list.</li> </ul> </li> <li>• 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.</li> <li>• County important populations of species, or viable areas of semi-natural habitats or natural heritage features identified in the National or Local Biodiversity Action Plan (BAP) if this has been prepared.</li> <li>• 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.</li> <li>• Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.</li> </ul>
<p><b>Local Importance (higher value):</b></p> <ul style="list-style-type: none"> <li>• Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared;</li> <li>• Resident or regularly occurring populations (assessed to be important at the Local level)<sup>14</sup> of the following: <ul style="list-style-type: none"> <li>○ Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;</li> <li>○ Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;</li> <li>○ Species protected under the Wildlife Acts; and/or</li> <li>○ Species listed on the relevant Red Data list.</li> </ul> </li> <li>• 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;</li> <li>• 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.</li> </ul>
<p><b>Local Importance (lower value):</b></p> <ul style="list-style-type: none"> <li>• Sites containing small areas of semi-natural habitat that are of some local importance for wildlife;</li> <li>• Sites or features containing non-native species that are of some importance in maintaining habitat links.</li> </ul>

The hedgerow evaluation criteria shown in table below have been adapted from various sources, including the 'Ecological criteria for evaluation of hedgerows' (NRA guidance), UKBAP priority habitat description and the Hedgerow Regulations 1997 (England and Wales).

A hedgerow is defined as any boundary line of trees or shrubs over 20m long and less than 5m wide, and where any gaps between the trees or shrub species are less than 20m wide. Any bank, wall, ditch or tree within 2m of

<sup>12</sup> It should be noted that whilst areas such as Areas of Special Amenity, areas subject to a Tree Preservation Order and Areas of High Amenity are often designated on the basis of their ecological value, they may also be designated for other reasons, such as their amenity or recreational value. Therefore, it should not be automatically assumed that such sites are of County importance from an ecological perspective.

<sup>13</sup> It is suggested that, in general, 1% of the County population of such species qualifies as a County important population. However, a smaller population may qualify as County importance where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

<sup>14</sup> It is suggested that, in general, 1% of the local population of such species qualifies as a locally important population. However, a smaller population may qualify as locally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

the centre of the hedgerow is considered to be part of the hedgerow habitat, as is herbaceous vegetation within 2m of the centre of the hedgerow.

For each hedgerow an assessment is made of the 14 features listed in the table below. The hedgerow is then valued according to the category for which it contains the most features. Mature treelines (or very overgrown hedgerows) were separately recorded as such and these are considered to be of high value.

<b>Hedgerow ecological evaluation criteria</b>			
<b>Feature</b>	<b>High value (County Importance)</b>	<b>Moderate value (Local Importance – higher value)</b>	<b>Low value (Local Importance – lower value)</b>
1. Average shrub canopy height (excluding treelines)	> 5m	2-5m	<2m
2. Average width at ground level	>4m	2-4m	<2m
3. Ground cover	Dense	Patchy	Little or none
4. Mature standard trees per 50m length	> 5	1-5	None
5. Gaps per 50m length	< 10%	10-30%	>30%
6. Connection to other hedges	>4	2-3	<2
7. Dominant tree and shrub species	Mainly native or naturalised* species	Mixed native or naturalised species and non-native species	Mainly non-native species
8. Hedge acting as a wildlife corridor linking adjacent semi-natural habitats that would otherwise be isolated	Yes	Yes	No
9. Diversity of tree or shrub species per 50m length	>7	4-7	<3
10. Ground flora	Typical diverse woodland flora present	Some woodland ground flora present	No woodland ground flora present
11. Epiphytic flora (e.g. bryophytes & lichens)	Diverse epiphytic flora present	Some epiphytic flora present	No epiphytic flora
12. Associated stream or drain	With permanent water	With seasonal water only	No
13. Associated hedge bank height	>1m in height	0.5-1m	None
14. Age	Veteran hedge (approx. >50 yrs) with high landscape value	Mature hedge (approx. 10-50 yrs) with some landscape value	Recent hedge (approx. <10yrs) with little landscape value
<b>Total</b>	<b>/14</b>	<b>/14</b>	<b>/14</b>

## APPENDIX B: SPECIES RECORDS

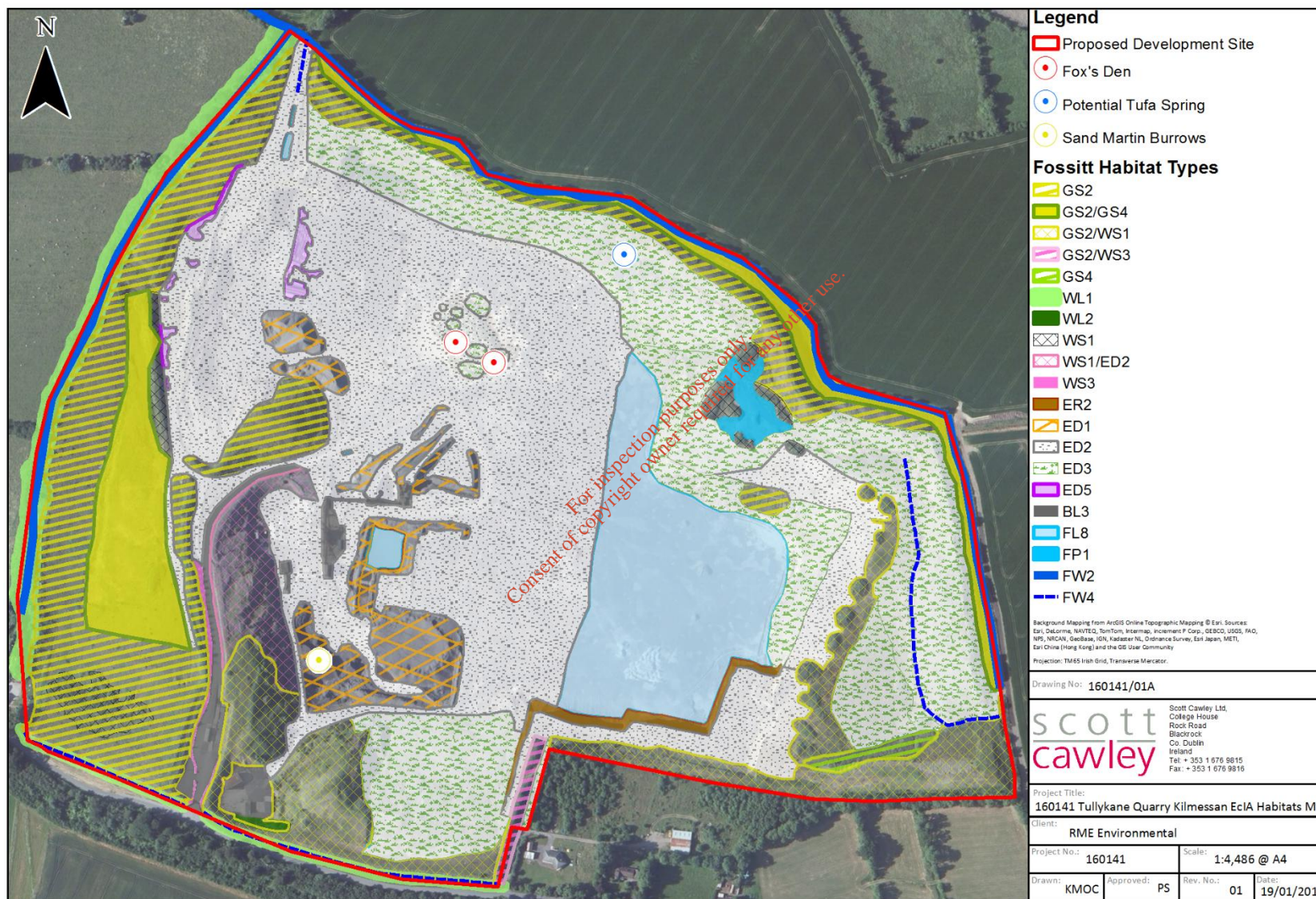
Records of Protected, Rare and other Notable Flora and Fauna Species <sup>15</sup> within 2km – 10km of the Site				
Common Name	Scientific Name	Protection <sup>16</sup>	Red-Listing Status <sup>17</sup>	Nearest Location (Year if known)
<b>Flora</b>				
Red Hemp Nettle	<i>Galeopsis angustifolia</i>	FPO	Endangered	Kilmessan N8050 (1896)
<b>Fauna - Amphibians</b>				
Smooth Newt	<i>Lissotriton vulgaris</i>	WA	Least Concern	Located c. 1.6km south-east of the subject lands in Dunsany (2012)
<b>Fauna - Birds</b>				
Greenfinch	<i>Carduelis chloris</i>	WA	Amber listed on BoCCI	Partially located within the subject lands (1988-1991 Bird Atlas, record has a precision of 2km)
Grey Wagtail	<i>Motacilla cinerea</i>	WA	Red listed on BoCCI	Located c. 800m south of the subject lands (1988-1991 Bird Atlas, record has a precision of 2km)
House Martin	<i>Delichon urbicum</i>	WA	Amber listed on BOCCI	Partially located within the subject lands (1988-1991 Bird Atlas, record has a precision of 2km)
House Sparrow	<i>Passer domesticus</i>	WA	Amber listed on BOCCI	Partially located within the subject lands (1988-1991 Bird Atlas, record has a precision of 2km)
Kestrel	<i>Falco tinnunculus</i>	WA	Amber listed on BoCCI	Located c. 800m south of the subject lands (2007-2011 Bird Atlas, record has a precision of 2km)
Mistle Thrush	<i>Turdus viscivorus</i>	WA	Amber listed on BOCCI	Partially located within the subject lands (1988-1991 Bird Atlas, record has a precision of 2km)
Robin	<i>Erithacus rubecula</i>	WA	Amber listed on BoCCI	Located c. 1.6km north-east of the subject lands in Tara Hill (2015)
Sand Martin	<i>Riparia riparia</i>	WA	Amber listed on BOCCI	Partially located within the subject lands (1988-1991 Bird Atlas, record has a precision of 2km)
Starling	<i>Sturnus vulgaris</i>	WA	Amber listed on BoCCI	Located within the subject lands (1988-1991 Bird Atlas, record has a precision of 2km)
Swallow	<i>Hirundo rustica</i>	WA	Amber listed on BoCCI	Partially located within the subject lands (1988-1991 Bird Atlas, record has a precision of 2km)
Swift	<i>Apus apus</i>	WA	Amber listed on BoCCI	Located c. 455m north of the subject lands (1988-1991 Bird Atlas, record has a precision of 2km)
Yellowhammer	<i>Emberiza citrinella</i>	WA	Red listed on BoCCI	Located c. 800m south of the subject lands (2007-2011 Bird Atlas, record has a precision of 2km)
<b>Fauna - Mammals</b>				
Badger	<i>Meles meles</i>	WA	Least Concern	Located c. 1.1km north-west of the subject lands (2008)
Brown Long-eared bat	<i>Plecotus auritus</i>	WA, HD IV	Least Concern	Within 10km of the subject site
Common Pipistrelle bat	<i>Pipistrellus pipistrellus</i>	WA, HD IV	Least Concern	Within 10km of the subject site
Daubenton's Bat	<i>Myotis daubentonii</i>	WA, HD IV	Least Concern	Within 10km of the subject site
Leisler's bat	<i>Nyctalus leisleri</i>	WA, HD IV	Vulnerable	Located c. 1km south-east of the subject lands (2010)
Otter	<i>Lutra lutra</i>	WA, HD II	-	Located c. 1.5km west of the subject lands on the River Skane Kilmessan (1980)
Pipistrelle sp.	<i>Pipistrellus sp.</i>	WA, HD IV	Least Concern	Located c. 1km south-east of the subject lands (2014)
Soprano Pipistrelle bat	<i>Pipistrellus pygmaeus</i>	WA, HD IV	Least Concern	Located c. 1km south-east of the subject lands (2007)
West European Hedgehog	<i>Erinaceus europaeus</i>	WA	Least Concern	Located c. 1.8km south-east of the subject lands in Dunsany (2014)

<sup>15</sup> Data from a combination of the following sources; NPWS Research Branch Records, www.npws.ie and NBDC online maps <http://maps.biodiversityireland.ie> Data is quoted as obtained from these sources.

<sup>16</sup> HDII/IV/V = Habitats Directive Annexes II/IV/V; FPO = Flora Protection Order; WA = Wildlife Acts; BD I = Birds Directive Annex I.

<sup>17</sup> Mammal Red-list from Marnell *et al.*, 2009. Birds from *Birds of Conservation Concern in Ireland 2014–2019* (Colhoun & Cummins, 2013); Vascular Flora from the Irish Red Data Book 1 Vascular Plants (Curtis & McGough 2005); Fish, Amphibians and Reptiles from (King *et al.*, 2011); Bryophytes Red List from Lockhart *et al.* 2012; Cetaceans conservation status from NPWS (2013b).

**APPENDIX C: HABITAT MAP (REFER TO SECTION 1.3.5 FOR THE CORRESPONDING FOSSITT TITLES FOR EACH CODE LISTED BELOW)**





**APPENDIX D: FLORA SPECIES LIST**

**Dry Meadows and Grassy Verges (GS2)**

<b>Common Name</b>	<b>Scientific Name</b>
Butterfly-bush	<i>Buddleja davidii</i>
Cock's-foot	<i>Dactylis glomerata</i>
Colt's-foot	<i>Tussilago farfara</i>
Common Ragwort	<i>Senecio jacobaea</i>
Common Restharrow	<i>Ononis repens</i>
Common Sorrel	<i>Rumex acetosa</i>
Common Vetch	<i>Vicia sativa</i>
Creeping Bent	<i>Agrostis stolonifera</i>
Crested Dog's-tail	<i>Cynosurus cristatus</i>
Downy Oat-grass	<i>Avenula pubescens</i>
False Oat-grass	<i>Arrhenatherum elatius</i>
Harefoot Clover	<i>Trifolium arvense</i>
Lesser Trefoil	<i>Trifolium dubium</i>
Red Clover	<i>Trifolium pratense</i>
Red Fescue	<i>Festuca rubra</i>
Ribwort Plantain	<i>Plantago lanceolata</i>
Self-heal	<i>Prunella vulgaris</i>
Thyme-leaved speedwell	<i>Veronica serpyllifolia</i>
Tormentil	<i>Potentilla erecta</i>
Tufted Vetch	<i>Vicia cracca</i>
Yellow Vetchling	<i>Lathyrus pratensis</i>
Yorkshire Fog	<i>Holcus lanatus</i>

**Wet Grassland (GS4)**

<b>Common Name</b>	<b>Scientific Name</b>
Compact Rush	<i>Juncus conglomeratus</i>
Glaucous Sedge	<i>Carex flacca</i>
Marsh Ragwort	<i>Senecio aquaticus</i>
Sharp-flowered Rush	<i>Juncus acutiflorus</i>
Silverweed	<i>Potentilla anserina</i>
Soft Rush	<i>Juncus effusus</i>
Willow species	<i>Salix sp.</i>
Yorkshire Fog	<i>Holcus lanatus</i>

**Hedgerows (WL1)**

<b>Common Name</b>	<b>Scientific Name</b>
Ash	<i>Fraxinus excelsior</i>
Beech	<i>Fagus sylvatica</i>
Blackthorn	<i>Prunus spinosa</i>
Brambles	<i>Rubus fruticosus</i> agg.
Bush Vetch	<i>Vicia sepium</i>
Great Willowherb	<i>Epilobium hirsutum</i>
Hawthorn	<i>Crataegus monogyna</i>
Ivy	<i>Hedera hibernica</i>
Oak species	<i>Quercus sp.</i>
Rose species	<i>Rosa sp.</i>
Rosebay Willowherb	<i>Chamerion angustifolium</i>
Sycamore	<i>Acer pseudoplatanus</i>

**Treelines (WL2)**

Common Name	Scientific Name
Ash	<i>Fraxinus excelsior</i>
Snowberry	<i>Symphoricarpos albus</i>
Sycamore	<i>Acer pseudoplatanus</i>
Willow species	<i>Salix sp.</i>

**Scrub (WS1)**

Common Name	Scientific Name
Brambles	<i>Rubus fruticosus</i> agg.
Gorse	<i>Ulex gallii</i>
Nettles	<i>Urtica dioica</i>

**Ornamental/Non-native Shrub (WS3)**

Common Name	Scientific Name
Escollonia species	<i>Escollonia sp.</i>
Laurel species	<i>Prunus sp.</i>
Wall Cotoneaster	<i>Cotoneaster horizontalis</i>

**Exposed Calcareous Rock (ER2)**

Common Name	Scientific Name
Broad-leaved Willowherb	<i>Epilobium montanum</i>
Dandelion	<i>Taraxacum officinale</i> agg.
Fern-grass	<i>Catapodium rigidum</i>

**Spoil and Bare Ground (ED2)**

Common Name	Scientific Name
Blue Fleabane	<i>Erigeron acris</i>
Colt's-foot	<i>Tussilago farfara</i>
Weld	<i>Reseda luteola</i>

**Recolonising Bare Ground (ED3)**

Common Name	Scientific Name
Autumn Hawkbit	<i>Leontodon autumalis</i>
Beet	<i>Beta vulgaris</i>
Black Medick	<i>Medicago lupulina</i>
Blue Fleabane	<i>Erigeron acris</i>
Brambles	<i>Rubus fruticosus</i> agg.
Bristly Oxtongue	<i>Helminthotheca echioides</i>
Broad-leaved Willowherb	<i>Epilobium montanum</i>
Butterfly-bush	<i>Buddleja davidii</i>
Common Centaury	<i>Centaurium erythraea</i>
Common Ragwort	<i>Senecio jacobaea</i>
Creeping bent	<i>Agrostis stolonifera</i>
Creeping Thistle	<i>Cirsium arvense</i>
Daisy	<i>Bellis perennis</i>
Dandelion	<i>Taraxacum officinale</i> agg.
Fern-grass	<i>Catapodium rigidum</i>
Field Horsetail	<i>Equisetum arvense</i>
Great Willowherb	<i>Epilobium hirsutum</i>
Hard Rush	<i>Juncus inflexus</i>
Herb Robert	<i>Geranium robertianum</i>

Meadow buttercup	<i>Ranunculus acris</i>
Needle Spike-rush	<i>Eleocharis acicularis</i>
Nettle	<i>Urtica dioica</i>
Oilseed Rape	<i>Brassica napus</i>
Orchid species	<i>Dactylorhiza sp.</i>
Oxeye Daisy	<i>Leucanthemella vulgare</i>
Procumbent Pearlwort	<i>Sagina procumbens</i>
Redshank	<i>Persicaria maculosa</i>
Restharrow	<i>Ononis repens</i>
Ribwort Plantain	<i>Plantago lanceolata</i>
Scarlet Pimpernel	<i>Anagallis arvensis</i>
Scentless Mayweed	<i>Tripleurospermum inodorum</i>
Smooth Hawk's-beard	<i>Crepis capillaris</i>
Smooth Sowthistle	<i>Sonchus oleraceus</i>
Sticky Mous-ear	<i>Cerastium glomeratum</i>
Sycamore	<i>Acer pseudoplatanus</i>
Winter Heliotrope	<i>Petasites fragrans</i>
Yorkshire Fog	<i>Holcus lanatus</i>

#### Other Artificial Lakes and Ponds (FL8)

Common Name	Scientific Name
Almond Willow	<i>Salix triandra</i>
Unidentified Nitella species	<i>Nitella sp.</i>
Duckweed species	<i>Lemna sp.</i>
Yorkshire Fog	<i>Holcus lanatus</i>

#### Depositing/Lowland Rivers (FW2)

Common Name	Scientific Name
Common Hogweed	<i>Heracleum sphondylium</i>
Common Reed	<i>Phragmites australis</i>
Fool's-water-cress	<i>Apium nodiflorum</i>
Iris Yellow	<i>Iris pseudacorus</i>
Meadowsweet	<i>Filipendula ulmaria</i>
Soft Rush	<i>Juncus effusus</i>
Soft Shield-fern	<i>Polystichum setiferum</i>
Square-stalked St. John's-wort	<i>Hypericum tetrapterum</i>
Timothy	<i>Phleum pratense</i>
Water Mint	<i>Mentha aquatica</i>

#### Drainage Ditches (FW4)

Common Name	Scientific Name
Bulrush species	<i>Typha sp.</i>
Sharp-flowered Rush	<i>Juncus acutiflorus</i>
Square-stalked St. John's-wort	<i>Hypericum tetrapterum</i>
Unidentified <i>Chara</i> species	<i>Chara sp.</i>

#### Calcareous Springs (FP1)

Common Name	Scientific Name
Colt's-foot	<i>Tussilago farfara</i>
Yorkshire Fog	<i>Holcus lanatus</i>
Creeping Bent	<i>Agrostis stolonifera</i>
Soft Rush	<i>Juncus effusus</i>