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APPENDICES

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4.0 ALTERNATIVES

4.1 Introduction

Annex IV(2) of the EIA Directive (Directive 2011/92/EU, as amended by Directive 2014/52/EU), identifies that all Environmental Impact Assessment Reports should include:

'A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.'

This chapter of the EIAR outlines the potential project alternatives that have been considered for the Proposed Development.

Given that the Proposed Development relates to both the Mine Development and the Community Sports Complex, the alternatives chapter has been separated into two sections to enable the comparison of alternatives specific to each activity. Alternatives have been considered in terms of location, layouts and processes.

4.2 Assessment of Alternatives

In order to consider possible alternatives to the Proposed Development, the key principles of sustainable development have been incorporated into this alternatives assessment, namely the consideration of social, environmental and economic factors which are discussed below in relation to each alternative. This provides a systematic approach to evaluate project alternatives in a robust manner, with the strengths and weaknesses of each option discussed under these principles of sustainability.

Professional judgement has been used in order to enable a comparison between the alternatives considered. **Error! Reference source not found.** sets out the rationale used for comparing the relative impact magnitude of one alternative over another. It is based on Table 2.4 of Chapter 2.0 of this EIAR, which sets out the common framework of assessment criteria and terminology in order to provide clarity on the method of assessment within the document. The assessment of alternatives is centred around magnitude of impacts rather than significance of impacts because it relates to extent of change associated with one scenario over another.

Table 4.1: Magnitude of Impact and typical Descriptions of Extent of Change between Alternatives

Magnitude of impact (change)		Typical description
High	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.
	Beneficial	Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality.
Medium	Adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.

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	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.
Low	Adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.
Negligible	Adverse	Very minor loss or alteration to one or more characteristics, features or elements.
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements.

4.2.1 Mining Alternatives

4.2.2 Location of Proposed Mining Activities

The mining activities outlined in this section relate to the consideration of alternatives for the location of the proposed Knocknacran West Mine, existing Knocknacran Mine Restoration and the use of the existing Knocknacran Processing Plant for the processing of material from the Knocknacran West Mine (the 'sites').

The Proposed Mine Development and three alternatives are presented below:

- **Proposed Mine Development** - Enables development of the sites to ensure continued extraction, processing and utilisation of a nationally important resource at an established location;
- **Alternative A** - Development of a greenfield mine site elsewhere within Ireland for the extraction and processing of gypsum for demand nationally;
- **Alternative B** - Relocation of extraction activities to another site abroad and the importation of this material to be processed at the existing factory near Kingscourt; and
- **Alternative C** – 'Do-Nothing' scenario where the Knocknacran West Mine is not developed and the Knocknacran Mine continues as currently permitted under Reg. Ref: 17/217.

The aforementioned alternatives largely consider the question of why the Current Proposal is the most favourable in terms of location for the Project. However, it is important to note that alternative options for locations are constrained by the basic principle that minerals can only be worked where they naturally occur and in land within control of the applicant.

Proposed Mine Development - Enables development of Knocknacran West Mine, existing Knocknacran Mine Restoration and continuation of use of the Knocknacran Processing Plant.

Social Considerations for the proposed Mine Development

The supply of gypsum to the market is tied to the location of the geological resource, which in Ireland, is currently only viable from the Kingscourt Gypsum Formation. Due to this, there has been long-standing mining history within the Knocknacran area, and this is an established activity within the area. The proposed

Mine Development seeks to recommence mining at the site of the former Drumgoosat Underground Mine using open-cast mining methods. Material will be extracted from the remaining pillars, overlying room beam / pillars and previously un-mined areas from both the Upper and the Lower Gypsum Units.

Compared to the existing conditions at the Knocknacran West site, which are perceived to hold an inherent risk of subsidence, the proposed Mine Development will remove underground mine workings within the site, and following restoration will allow a greater potential social amenity value than present. In accordance with Table 4.1 this is assessed as having the potential for a Medium Beneficial effect as opposed to a 'Do-Nothing' scenario or location in another area. However, there is potential for social impacts to arise from the additional duration of mining activities in the proposed new mining area closer to the village of Drumgoosat. Embedded design mitigation to ensure landscape screening of activities and minimisation of traffic, noise and dust impacts are anticipated to result in Low Adverse social effects as a result of the current proposal as opposed to a 'Do-Nothing' scenario.

Socially, extraction activities can be perceived to have an adverse landscape impact during the operational life of the development, and before final restoration is completed. However, the proposed Mine Development would see the extraction of the remaining gypsum from the former Drumgoosat Mine being balanced by the restoration of the existing open-cast Knocknacran Mine with materials stripped from the site of the former Drumgoosat Mine to bring the Knocknacran Mine back to near original ground levels. Planting, screening and restoration measures will go a significant way towards minimising any adverse visual impacts, and as planting matures, it will assist in the visual integration and screening of the working area. Within the immediate site area, there will be a permanent change in landscape, however, such change is consistent with existing activities at the facility which has a long history in this location.

The current proposals are to maintain production rates as currently permitted under the existing Planning Permission (Reg. Ref. 17/217) from the existing mine, producing a maximum of 500,000 tonnes of gypsum per annum depending on market conditions. Chapter 14.0 (Traffic) has concluded that the traffic impacts to the local road network and junction capacities will be imperceptible, therefore a Negligible impact is anticipated as a result of the selection of this alternative over a 'Do-Nothing' scenario. Furthermore, with the maintenance of these production rates it is expected that the existing levels of direct and indirect employment will be maintained which is considered to have a Medium Beneficial knock-on social effect for local communities over a 'Do-Nothing' scenario.

Environmental Considerations for the proposed Mine Development

The proposed Mine Development will incorporate relevant mitigation measures, infrastructure and site practices (which are already successfully employed at the existing Knocknacran site) will be utilised again to ensure activities do not have unanticipated and unwanted effects on the local environment. The proposed Mine Development will be operated and maintained to Saint-Gobain's independently audited and accredited ISO14001, environmental management standard. The assessments undertaken as part of this EIA process have assessed the potential for a range of environmental impacts to arise from the current proposals, and mitigation measures have been proposed to ensure that any impacts are kept to within acceptable limits. Restoration plans for the existing Knocknacran mine and the proposed Knocknacran West mine are anticipated to positively impact the environmental footprint of the site through the reinstatement of a diverse ecological habitat.

Extraction activities in the proposed Mine Development will be below the water-table and discharge to surface water will be monitored under a revised IE Licence, subject to planning being granted. In addition, the proposed Mine Development will not represent an intensification of mining production activities but

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rather a continuation of existing operations. The overall environmental effects from the current proposals compared to the 'Do-Nothing' scenario are deemed to be Low Adverse during the long-term (operational life of the mines) but Low Beneficial permanently after closure when the sites have been fully restored and workings have been removed.

Economic Considerations for the proposed Mine Development

The proposed Mine Development is for a long-term (ca. 30 to 35 years life of mine) activity in order for a known available mineral resource to be utilised. The Application Site for the current proposals benefits from good local access in terms of availability of an existing labour force with experience of mining in the area. There is potential for the current proposals, in this location, to contribute to the regional and national economy through support for other infrastructure such as the nearby Kingscourt Factory and the Irish building industry. If a national source of gypsum cannot be obtained, there is a risk that gypsum will need to be imported from abroad, which would represent a lost opportunity for the Irish economy. The support that the current proposals represent to the local, regional and national economy are anticipated to have a Medium Beneficial effect as opposed to a 'Do-Nothing' scenario or location of the development in an alternative location.

Alternative A - Development of a greenfield site elsewhere within Ireland.

As mentioned previously, it is important to acknowledge that mineral reserves can only be worked where they naturally occur. This consideration dictates a number of social, environmental and economic factors.

Social Considerations for Alternative A

This Alternative seeks to establish an extraction operation in a greenfield site elsewhere in the country.

At present, the gypsum in Co. Monaghan (and south into Cavan and Meath along strike) is the only proven reserve of gypsum in the country. The development of a greenfield site elsewhere for gypsum mining would require the establishment of extensive exploration programs which would have to 'prove-up' new gypsum reserves (to ensure their viability) before any planning/permitting application would be made. This would take several years before a viable gypsum reserve could be proven in this country, if indeed it exists.

Once reserve is proven, the establishment of a new mining operation in an area which may have no other industrial activities would require significant disruption in terms of development of infrastructure and services to a new site. Within a greenfield site, the establishment of a new mining operation would be considered a substantial change in the character of the area. Depending on the sensitivity of the receiving environment (e.g. more industrial versus rural areas) the impact of disruption to local communities in terms of setting up a new mine would be considered at least Medium Adverse compared to the 'Do-Nothing' scenario or continuing activities in a location with existing infrastructure.

Without the development of the Knocknacran West Mine, the underground workings will remain in place and the risk of further subsidence over the workings will also remain within the Application Site. This could represent a Medium Adverse effect of selecting Alternative A over the current proposals.

The social implications of entering a greenfield site necessitates the entering of third-party lands, negotiation of land sales and further land take in an area where mining is unlikely to be well established. This could be considered to be a High Adverse social effect when compared to the effects of mining in an established area.

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Environmental Considerations for Alternative A

The proposal to develop a greenfield site presents a higher level of environmental impact than the proposed Mine Development which proposes mining in an area where mining is well-established. Additional mitigation measures and infrastructure would need to be established for a greenfield site. Depending on the greenfield site and underlying geology, there may be surface water, groundwater and biodiversity features which are more sensitive than with the proposed Mine Development.

Depending on the nature of the greenfield site and sensitive receptors, Alternative A could introduce nuisance sources of dust, noise and vibration while experience of the operator at that particular site is developed.

A new establishment would operate an environmental management system which should ensure the reduction of environmental impacts to within the appropriate threshold and would also ensure best practice in operational activities. However, in terms of a conservative assessment, if an operation were to be established at a previously undisturbed greenfield site with more environmental sensitivity, the overall impact of this alternative could be considered Medium Adverse when compared to the 'Do-Nothing' scenario or alternative locations.

Economic Considerations for Alternative A

If a viable greenfield site was identified it would have the potential to provide direct and indirect employment in this area, therefore there would be an overall neutral effect on employment compared to the current proposals (but a beneficial effect compared to the 'Do-Nothing' scenario). However, the locally skilled workforce may not be available as it would with the current proposals. In addition, pursuance of a new greenfield site would mean that the valuable resource proposed at the Application Site would not be utilised.

The establishment of a new facility with associated processing infrastructure would be considerably costlier than the current proposals. Significant cost would be incurred through the exploration for suitable deposits, the acquisition of new lands, the generation of the relevant planning documents including site specific surveys and construction costs (and the demolition costs associated with the existing Plant Site at Knocknacran). Consideration would also have to be given to the transport requirements to a manufacturing facility or construction of such a facility close to the new greenfield site if transport to the existing Kingscourt facility was found not to be viable. Given this, it is considered that Alternative A would result in High Adverse economic effects in comparison with the 'Do-Nothing' scenario and alternative locations.

Alternative B - Relocation of mining operations to another existing site abroad and the importation of material to be processed at the factory site near Kingscourt.

Social Considerations for Alternative B

This Alternative seeks to import gypsum from other existing mines abroad to maintain production at the Kingscourt facility.

'Alternative B' does not require an extension in the duration of the processing activities at the mine site. This scenario is considered to have adverse effects (compared to the 'Do-Nothing' scenario or current proposals) due to the loss of jobs locally at the existing mines, leading to a reduction in social activities due to people moving from the area to find employment elsewhere. Job increases may occur at the Alternative B, which could mean a neutral overall effect in terms of employment. However, the social implications of loss of

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employment at the Application Site if Alternative B was pursued are assessed as having the potential to be Medium Adverse.

In addition, without the development of the Knocknacran West Mine, the underground workings will remain in place and the risk of further subsidence over the workings will also remain, and this is considered to have a Medium Adverse social effect if Alternative B was chosen over the 'Do-Nothing' scenario or an alternative location.

Environmental Considerations for Alternative B

It can be assumed that sourcing of gypsum from another European Country will likely be covered by a similar level of environmental regulation and accountability as is present in Ireland. The environmental standards of a gypsum mine outside of the EU could, however, present an uncertain environmental risk as it may be harder to track and regulate the extraction process. In addition, sourcing gypsum elsewhere would necessitate larger transport distances and therefore increase the carbon footprint of the supply chain for the Irish construction industry. This is considered to have potential for a Medium Adverse environmental effect should Alternative B be chosen over the current proposals or the 'Do-Nothing' scenario.

Economic Considerations for Alternative B

Not developing the Knocknacran West Mine and leaving it as a 'brownfield' site would lead to the loss of a local gypsum supply and direct loss of employment at the Application Site (although that would be balanced by increased employment at Alternative B site). It would introduce an operating cost risk to the factory near Kingscourt and would jeopardise its future in the local economy.

The economic feasibility of the Saint-Gobain factory near Kingscourt continuing to operate based on gypsum importation would be severely compromised by transport and expected Carbon tax costs. If the importation costs of gypsum were too high to maintain the viability of manufacturing at the factory site, then the factory may have to close in addition to the closure of the mine sites at Knocknacran and Drummond and the failure to utilise the reserve at Knocknacran West. This would have a potential knock-on effect on the Irish construction industry and has the potential for a High Adverse effect compared to the 'Do-Nothing' scenario and pursuit of alternative locations.

If there was no longer a requirement to operate in the Kingscourt area, the existing factory could ultimately be replaced with a Dublin based warehouse with low potential for employment opportunities.

Alternative C – 'Do-Nothing' Scenario.

Social Considerations for Alternative C

This alternative scenario assesses a 'Do-Nothing' scenario where the reserve at Knocknacran West Mine is not pursued. In the 'Do-Nothing' scenario Knocknacran Mine would be restored as outlined in the existing permitted restoration plan (Reg. Ref 17/217) which allows for the reinstatement of agricultural land at the site and for the creation of a lake within the former open-cast area.

The recently completed Community Sports Complex (Reg. Ref. 20/365) is situated on the western side of the site.

The most recently published Closure, Restoration and Aftercare Management Plan (CRAMP March 2021) for the existing site, presents that the much of the Knocknacran Plant site could alternatively be kept for future

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light industrial use. However, this would be subject to a future developer/site owner being sought to occupy the site in the run up to mine closure, in consultation with the regulatory authorities¹. A future developer would then seek the necessary planning permission for relevant (non-mining) buildings to remain on the site and for their change of use.

The restoration plan for the proposed Mine Development would see the Knocknacran Mine returned completely to agricultural land and the lake would instead be located in the Knocknacran West Open-Cast Mine area. The proposal to keep the plant site for future industrial use would remain, subject to future regulatory permitting closer to closure.

The current proposals and the 'Do-Nothing' scenario would have a neutral effect in terms of employment opportunity and social impact. The 'Do-Nothing' scenario would not remove the risk of further subsidence at the Knocknacran West site. This is considered to be a Medium Adverse social effect if the 'Do-Nothing' scenario was chosen over the current proposals.

In the 'Do-Nothing' scenario the existing Knocknacran and Drummond Mines would cease operations once the current permitted extractable reserves are exhausted. The supply of local gypsum to the Kingscourt factory for plaster product would also cease and an alternative supply of material would need to be found for the factory to remain in production, in this regard Alternatives A or B would be likely outcomes. The supply of gypsum would most likely be sourced from abroad (Alternative B), as there are currently no proven alternative sources of gypsum within the country to maintain the viability of the factory (Alternative A).

After final restoration of the Knocknacran and Drummond Mines there would be a loss of ca. 150 direct jobs in the Magheracloone and Kingscourt areas if no cost-effective alternative supply was found to maintain the viability of the factory. Indirectly the mines and factory also employ many people as subcontractors and suppliers and some of those jobs would also be lost. As with Alternative B, the economic feasibility of the Saint-Gobain factory near Kingscourt continuing to operate based on gypsum importation is likely to be limited. This is considered to be a Medium Adverse social effect in terms of local communities if the 'Do-Nothing' scenario was selected over the current proposals.

Environmental Considerations for Alternative C

In this scenario the old Drumgoosat underground mine workings would remain as a brownfield site unattractive for future development due to the presence of the underground workings and with an inherent risk of further subsidence.

In the 'Do-Nothing' scenario, where the resource at Knocknacran West Mine is not pursued, the Knocknacran Processing Plant would not continue to be used for processing and the restoration of Knocknacran Mine would not use material from Knocknacran West Mine, there would be Medium Adverse environmental effect due to the carbon footprint implications of sourcing gypsum from elsewhere.

At the existing Knocknacran Mine site there would eventually be a beneficial environmental effect once the final restoration has been implemented. However, this beneficial effect would also be realised under the current proposals. In a 'Do-Nothing' scenario the former underground workings will remain in situ beneath

¹ This is in line with how closure of another Irish mine (Galmoy Mine) occurred. The initial mine development considered full restoration and removal of the plant site. In later years consideration was then given to the continuation of light industrial use onsite, to promote (alternative) employment in the area. This was provisioned first through CRAMP revisions and then planning permission was sought during closure (i.e. planning permission was sought from the Council for select plant buildings to remain onsite for future non-mining use by a new operator).

the Knocknacran West Mine site and opportunities for enhancing ground conditions and implementing a restoration plan (with specialist ecology input) will be missed at the proposed Knocknacran West mine site.

Overall, the effects of Alternative C on environmental considerations are deemed to be Medium Adverse compared to the current proposals.

Economic Considerations for Alternative C

As noted in the sections above, the market demands nationally for plaster products, as currently serviced by Knocknacran and Drummond Mines, will remain. If the local supply of materials is not sustained, then this will increase costs for the producers and consumers of the materials. Also, in a scenario where there is no longer a compelling argument for local manufacture, the local manufacturing facilities could be replaced with warehouses, losing the benefits of the economic activity to the local and national economies.

The overall magnitude of the economic impact from a 'Do-Nothing' scenario is considered to be High Adverse when compared to the current proposals.

4.2.3 Summary of Alternatives for the Mine Development

The proposed Mine Development is considered the most favourable option. This option enables the continued extraction of gypsum at the site and allows for the ongoing restoration of the Knocknacran Mine site to near original ground contours. It also allows for the continuation of use of the existing processing plant to ensure extraction and utilisation of a valuable national resource with good local access in terms of employment; its contribution to the local and national economies; manufacture of products for sale and revenue contributions to both the local and national authorities. Knocknacran West Mine site contains good quality workable gypsum which is under the control of SGMI. Manufacturing facilities are well established and located close to the extraction activities. No intensification of mining production activities is planned for the proposed Mine Development and the extraction of material from Knocknacran West Mine will allow the site to be restored to a land use which is of benefit to the community and removes the subsidence risk.

Alternatives A and B are not considered to be viable due to their adverse social, environmental and economic impacts. The development of a greenfield site in Ireland or the relocation of mining activities overseas would necessitate the relocation of operations elsewhere. Additionally, there are numerous environmental and social impacts of closing an existing mine and developing a new site in a greenfield area. The relocation or sourcing of material from abroad may lead to less stringent environmental controls being placed on any mine operating abroad. Depending on the location of any greenfield site, increased journey lengths to/from the manufacturing facility near Kingscourt could have knock-on effects to road infrastructure and safety.

The proposed Mine Development at Knocknacran West Mine provides a source of high-quality gypsum for future infrastructural requirements nationally, in line with sustainable principles. The option to not extract materials (Alternative C) from the site is also considered unfavourable. This could mean the loss of jobs and revenue to both the local and national economies and the subsidence risk would remain over the former underground Drumgoosat underground workings in Knocknacran West.

Refer to Table 4.2 below for a summary of the magnitude of impacts from each alternative.

Table 4.2: Assessment of Current Proposal and Alternatives and Magnitude of Effect for the Mine Development

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Description of Alternatives	Social Considerations	Environmental Considerations	Economic Considerations
Proposed Mine Development - Enable development of the Application Site.	<p>Low to Medium Beneficial (removal of underground mine workings, employment to sustain community)</p> <p>Low Adverse (disturbance)</p>	<p>Low Adverse (long-term, proven environmental management practices at site)</p> <p>Low Beneficial (permanent site restoration)</p>	<p>Medium Beneficial (sustaining employment and Irish building industry)</p>
Alternative A - Development of greenfield site within Ireland.	<p>Medium to High Adverse (change of landscape/ disturbance introducing infrastructure)</p>	<p>Medium Adverse (introduction of new disturbance to environmental receptors)</p>	<p>High Adverse (costs and potential lack of skilled workers, potential threat to linked industry e.g. Kingscourt factory)</p>
Alternative B - Relocation of mining operations to another site abroad and the importation of material to be processed at the factory site near Kingscourt.	<p>Medium Adverse (community effects of lost employment at Application Site, lost opportunity to remove underground workings)</p>	<p>Medium Adverse (carbon cost of importing material)</p>	<p>High Adverse (threat to continuation of existing Kingscourt factory and knock-on effects for construction industry)</p>
Alternative C – ‘Do-Nothing’ scenario.	<p>Medium Adverse (community effects of lost employment at Application Site, lost opportunity to remove underground mine workings)</p>	<p>Medium Adverse (carbon cost of importing material, lost opportunity to remove underground mine workings)</p>	<p>High Adverse (loss of employment and threat to national economy)</p>

4.2.4 Specific Layout, Design and Process Considerations for the Mine Development

Consideration has also been given to the specific design, layout and processes relating to mining activities in the proposed Mine Development. During the mine design process, alternatives have been considered in terms of the following topics:

- Processing plant - specifically whether a new plant will be constructed at the Knocknacran West Mine or whether the Proposed Development will use the existing processing plant at the Knocknacran Mine;
- Materials handling options – specifically the internal site linkage and whether to haul the material from Knocknacran West Mine to Knocknacran Mine using a tunnel, bridge or by relocating the regional road and negating the need for a tunnel or bridge system to traverse the road;
- Diversion design;
- Material handling options – specifically whether to haul using a conveyor and truck system or only using trucks; and
- Size of the extraction area.

Processing Plant

The proposed Mine Development allows for the continuation of use of the existing processing plant at Knocknacran Mine for processing of the gypsum from Knocknacran West Mine. The construction of a new processing plant within the Knocknacran West Mine site would cause the Knocknacran Mine processing plant to become redundant, Figure 4.1. Any plant that cannot, or would not, be economically viable to be moved to Knocknacran West Mine would become obsolete and this could have a Low Adverse effect economically for SGMI. Economically it is significantly less costly to reuse the existing processing plant and construct a transfer system (i.e. conveyor system and haul roads) between the two sites.

A new plant on the Knocknacran West Mine site would also require a similar scale footprint within the site as the existing plant and this would sterilise the underlying gypsum reserve. The footprint required by the proposed Mine Development to haul material from the Knocknacran West Mine is much smaller, and would have a lesser impact on the reserve, than the relocation of the processing plant and associated infrastructure.

Both socially and environmentally the relocation of the processing plant to the Knocknacran West Mine site could increase environmental and social concerns such as dust and noise, particularly considering that the village of Drumgoosat, which includes a national school and mushroom farm, would be closer to the plant. Overall maintaining the processing plant at its current location is considered to be the best option and would have a Negligible overall effect.

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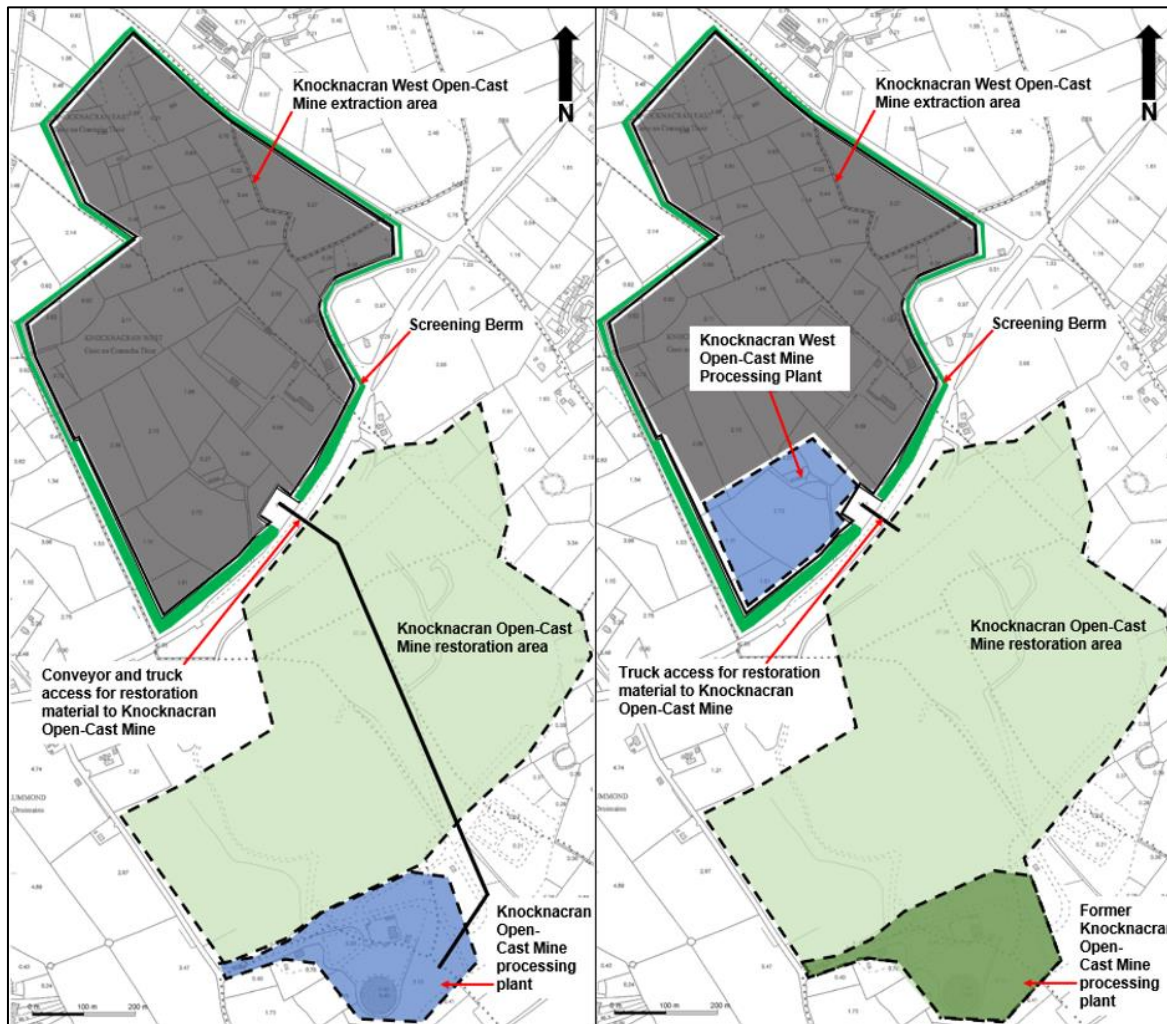


Figure 4.1: Early design ideas for the placement of the processing plant, image on the left shows the plant at its existing location on the Knocknacran Mine Site and the image on the right shows the plant area on the Knocknacran West Mine site

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Material Handling Options – Site Linkage

Consideration has been given to the internal site linkage and how to transfer gypsum for processing and material for restoration to Knocknacran Mine and processing plant from Knocknacran West Mine, as the two sites are bisected by the R179 regional road and there is currently no direct linkage between the sites.

Consideration was given early on to the relocation of the R179 which would allow for the optimisation of the geological resource, however, this would create significant disruption to the existing road network and create disturbance to the local community and so this method was discounted. Consideration was also given to a bridge traversing the R179 for transportation of restoration material to Knocknacran Mine with a pipe-jack conveyor tunnel beneath the R179 to transport gypsum. A Bailey bridge or concrete bridge were proposed as options but the potential visual impact in the area was considered to be high and so both were discounted.

The proposed Mine Development proposes the construction of a Cut-and-Cover tunnel which would create a Low Adverse effect in the short-term as this would necessitate the temporary diversion of the R179 during the construction phase. However, no permanent land-take is required for the relocation of the road and the proposed relocation would occur on lands within the ownership of SGMI. Additionally, during the operational phase the tunnel would be visually unobtrusive and have an overall Negligible effect on the community, environment and local road infrastructure.

Diversion Design

Two options for the diversion of the R179 have been considered during the project development stage. The first diversion option considered was for a design speed of 85 kmph which would allow the diversion to maintain the existing speed limit of 80 kmph for the R179. The second option considered was a design speed of 60 kmph. Both designs offer advantages and disadvantages which were considered.

The 85 kmph design speed would allow the existing speed limit (80 kmph) to be maintained and the arc of the diversion would allow the road to extend to a lesser degree into the fields to the northwest of the existing route, i.e. it would follow more closely to the existing road. However, this diversion design would cross over the existing extensometer network (which sits close to the R179) which is in place to monitor the stability of the R179. The monitoring network would still function, however, access to the instruments if maintenance is required would be more difficult. The installation of the Cut-and-Cover tunnel would be protracted with the 85 kmph design as it would require the tunnel to be constructed in two parts as the diversion crosses over the tunnel area hindering construction access. In addition, a house to the northeast of the diversion would require ramp access during the diversion. The proposed Community Sports Complex, accessed from the south with a right turn lane, along the R179, would not be directly impacted by this diversion.

In comparison, the 60 kmph design speed would increase the curvature of the diversion arc, this in turn would result in the diversion sitting further into the fields to the northwest. However, there would be less interference with the existing extensometer network and maintenance, if required, could be carried out more easily on the network. The installation of the Cut-and-Cover tunnel could be completed in one event as the arc of the 60 kmph diversion curves around the proposed Cut-and-Cover tunnel rather than passing through it. The diversion length is similar for both designs, however, the impact on the house to the northeast would be less as the earthworks are less extensive. The proposed Community Sports Complex access from the south would also not be directly impacted by this diversion design option as it would also not cross the right-hand turn lane.

There were no other environmental sensitivities identified for either option. Overall, the 60 kmph diversion design is considered the most environmentally acceptable option as it safeguards the integrity of the extensometers which continuously measure ground stability along R179, and it offers the least amount of impact on the existing road network and surrounding infrastructure.

Material Handling Options – Haulage Options

Consideration has been given to the design of the transfer system for materials (both gypsum and overburden/interburden) between the two sites to allow for maximum operational flexibility throughout the life of mine (LOM). Specifically, the haulage design compared the benefits of hauling the material by truck only or by truck with a conveyor system.

A combined truck and conveyor system was selected for the proposed Mine Development. Economically the truck only system would have a High Adverse effect for SGMI compared to the proposed truck and conveyor system as it would represent a more expensive option. Both environmentally and socially a truck only system would also be considered to have a High Adverse effect compared to the conveyor system. This is concluded due to the increased traffic movements and associated emissions and use of carbon associated with more reliance on truck movements associated with the former.

Size of the Extraction Area

Consideration has also been given to the Knocknacran West Mine footprint and the scale of the extraction area. Initially, the design of the mine was based on optimising gypsum recovery within SGMI's land holding. Consideration was then given to the social and environmental constraints on the area and how this would influence the open-cast area, **Error! Reference source not found.**2. Factors which were considered within the area were as follows:

- Proximity to the nearest third-party dwelling houses to the extraction area;
- Proximity of the extraction area to the R179 and local roads (including the L4900);
- The existing natural screening (woodland/scrubland) near Drumgoosat village; and
- Proximity to Drumgoosat village and the proposed Community Sports Complex.

Following ongoing discussions with the community and Monaghan County Council, SGMI has incorporated areas of existing hedgerow, scrub and trees into the final design for the Project. Consideration has also been given to the location of the nearest third party residences to the proposed Mine Development.

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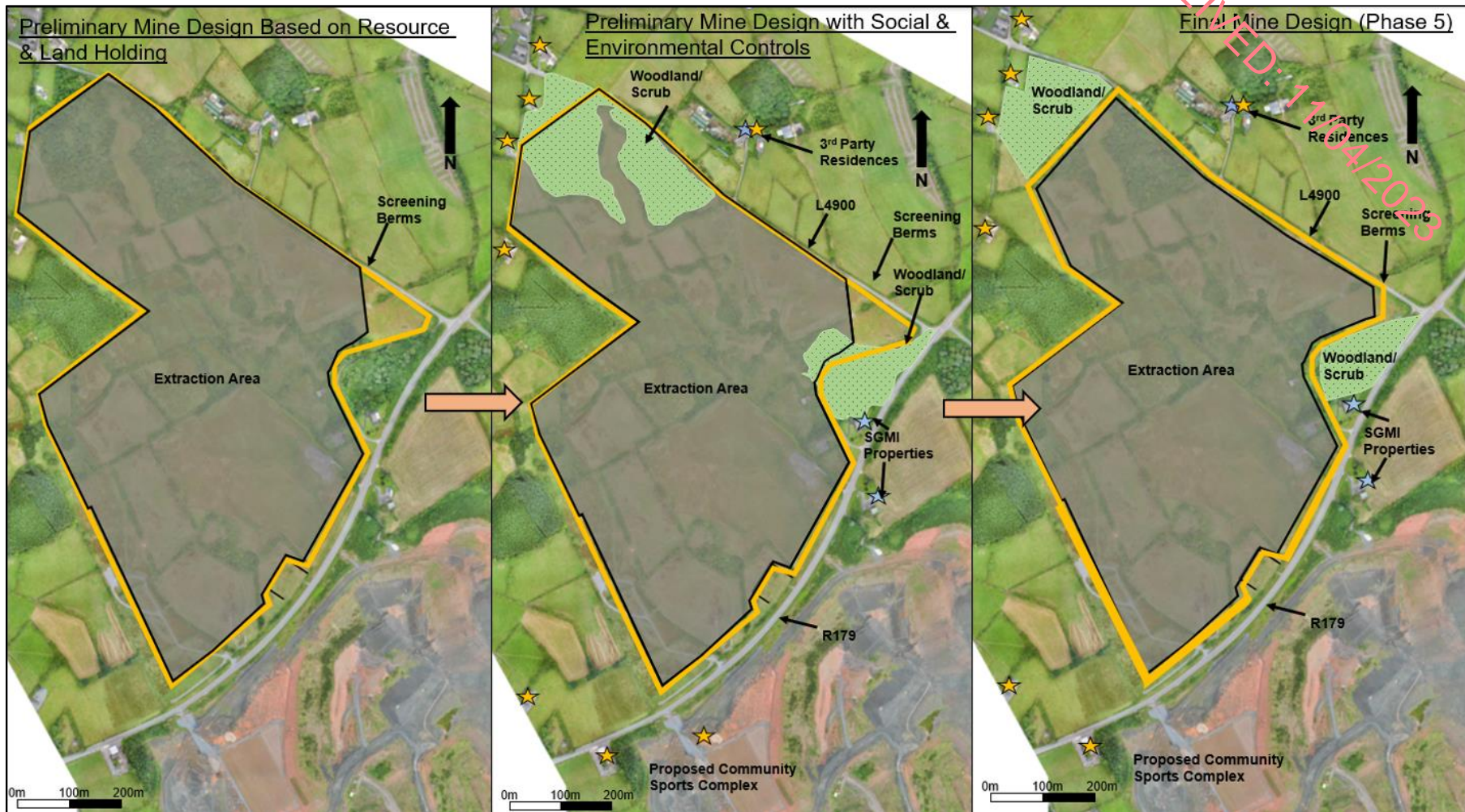


Figure 4.2: The mine design process which incorporated initial criteria based on resource and land holding and was further refined with social and environmental considerations

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4.3 Recycling of Recovered Gypsum

In addition to the considerations of alternative locations for the Mine Development (Section 4.1) and alternatives within the proposed mine development (in terms of alternative layout, design and process, Section 4.2), consideration is given here to the potential for recycling recovered gypsum as an alternative to mining of raw gypsum.

Gypsum is a material that is used in the production of cement, as a soil conditioner, as an ingredient in compost manufacture and in the production of plasterboard and plasters. Gypsum incorporated in cement and compost manufacture is not recoverable, however, gypsum used in the production of plasterboard and plasters can be recycled many times.

Recycling gypsum products is carried out by Saint-Gobain in Ireland as part of the existing (P0519-04) EPA IE Licenced activities at Saint-Gobain's manufacturing facility (near Kingscourt) in Co. Meath.

Gypsum recycling activities can be broken down into three categories:

- (i) Manufacturing by-products - the recycling of by-products of gypsum manufacturing from routine manufacturing activities;
- (ii) Construction waste – the recycling of new gypsum construction products – typically the offcuts of gypsum plasterboards from construction sites; and
- (iii) Demolition wastes – gypsum material arising from the demolition and deconstruction of buildings and structures.

In relation to gypsum by-products arising from its manufacturing activities, Saint-Gobain developed and installed its first gypsum recycling plant with an Irish partner company, that is now acknowledged as a world leader in the supply of gypsum recycling equipment, in the late 1990's. This equipment allowed damaged plasterboard products to be recycled and incorporated into a range of gypsum products produced at the company's Kingscourt factory (in Co. Meath). Since 2008 the company has recycled all scrap products from its manufacturing operations and ceased any landfilling of gypsum by-products.

In relation to construction waste recovery, in 2012 Saint-Gobain applied to the EPA for a licence to allow it to recover scrap gypsum products from construction activities in Ireland, and in 2015 upon receipt of its licence, launched a national Plasterboard Recycling Service across the island of Ireland.

Saint-Gobain partners with a number of licenced Waste Disposal companies to provide logistical support, facilitating the collection of materials from construction sites, with responsible and efficient transport to its reprocessing facility at its Kingscourt manufacturing facility. Following an extensive R&D program of trials and confirmatory testing, the recovered gypsum from this activity is now processed and incorporated into a range of plasterboards.

Some of the products developed so far allow up to 15% of the natural gypsum to be routinely replaced with recovered gypsum. The company has ambitions and an active program of work to replace up to 30% of the natural gypsum in some formulations with recovered material in the coming years.

While the manufacturing technology for gypsum products has developed to allow the incorporation of recycled gypsum into certain product formulations, the separation and collection of gypsum from general waste streams in the construction industry remains challenging. Gypsum products by their nature are brittle and tend to fracture and break down into small fragments and powders when handled by mechanical loaders

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and when processed by conventional waste handling machinery. This results in the gypsum being dispersed and lost within general site wastes.

For construction wastes, Saint-Gobain provides dedicated gypsum recycling skips and large format bags to building sites to facilitate the separation of gypsum wastes at source and aid the successful recovery of gypsum materials for incorporation into new products.

Gypsum from demolition waste remains very difficult and relatively undeveloped. Gypsum plasterboards and plasters are a relatively recent building material (since the 1940's typically in Ireland) and many buildings that incorporate gypsum products are still in use and have not reached end of life yet. Traditional building and demolition methods do not allow gypsum materials to be easily separated from other building elements. Added to concerns over potential contamination such as asbestos and lead paints in older buildings, practical concerns and a cautionary approach means that gypsum recycling from buildings at the end of their life will be reliant on the practice of deconstruction of buildings developing further with a focus on the recovery of materials for re-use.

Ultimately gypsum consuming industries expect that the overall usage of recycled gypsum will increase but does not foresee that 100% of natural gypsum can be replaced by recovered materials. At present some gypsum products can incorporate up to 30 % recycled content, whereas other products (due to processing, application or performance requirements) are not expected to incorporate more than 5% recycled content.

The cement industry indicates that low levels of recycled gypsum may be incorporated in the future. Industry experts forecast this will be limited to between 5 and 10% of the natural gypsum content. In the future, cement manufacture faces significant challenges to reduce its carbon footprint - the process adjustment foreseen in the cement industry will place significant challenges to maintaining cement potency and as such may reduce the tolerance of cement production processes to recycled materials. While it is expected that concrete usage in buildings will reduce due to the development of lightweight construction methods, concrete will remain an important building material for foundations and large infrastructure.

Gypsum used as a soil conditioner and an ingredient in specialist compost manufacture forms a small % (by weight) of formulations. It is expected that in the future significant quantities of natural gypsum will continue to be required particularly where the compost may be used in food supply chains.

For the foreseeable future, the primary consumers of recycled gypsum will be the producers of gypsum plaster board products. In 2021, Saint-Gobain in Ireland recycled in excess of 25,000 tonnes of gypsum by-products and construction site waste into new gypsum products, and expects that this will increase to 50,000 tonnes in the next 5 years. This would mean that recycled gypsum would represent an additional contribution to the national gypsum supply of ca. 15% of the expected annual output of the proposed mine development at Knocknacran West.

It is important to consider that no waste gypsum material is produced as part of the Applicant's current mining activities, and also, that no waste material will be produced from the mining of gypsum at the proposed Knocknacran West Open-Cast Mine. Recycling of gypsum products is not an activity proposed as part of the proposed development.

Along with developing indigenous sources of natural gypsum, the continued development of gypsum recovery technology and practices will be an important step in reducing the reliance of imported gypsum to Ireland and in particular, to the carbon footprint associated with such imports.

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4.4 Community Sports Complex Development Alternatives

One alternative, in addition to the 'Do-Nothing' scenario, has been considered for the development of a Community Sports Complex in the context of considering its social, environmental and economic impact.

The proposed Community Sports Complex and one alternative in addition to the 'Do-Nothing' scenario are presented below:

- **Proposed Community Sports Complex (Current Proposal)** – Enable development of the site to ensure the provision of suitable amenity and recreational sports facilities for the community;
- **Alternative A** – Development of a greenfield site elsewhere within the area; and
- **Alternative B** – 'Do-Nothing' Scenario

Proposed Community Sports Complex (Current Proposal) - Enable development of the site to ensure the provision of a suitable amenity and recreational sports facilities in the community.

Social Considerations for the Community Sports Complex

The initial Phase 1 Community Sports Complex has been granted and is now operational under Reg. Ref. 20/365 on a site which is located close to the former sports site. The proposed Community Sports Complex included in this EIAR and planning application provides for the completion of the development design at this site and allows for the addition of two further playing pitches (one with perimeter running track) and all-weather pitch, with associated goal posts, ball stops, dugouts, pitch fencing, flood lighting, new building to incorporate reception, meeting / club rooms, sports hall, handball alley, changing rooms and toilets, viewing gallery, part covered grandstand, additional parking.

The proposed Community Sports Complex will be visible from the R179, however, sports facilities are an intrinsic part of communities and are not necessarily considered a negative feature. Thus, there is considered to be a Low landscape impact and the visual impact of the development is deemed to be Low.

The provision of the Community Sports Complex will be of significant benefit to the local community through the provision of upgraded facilities, pitches, tracks and indoor areas. Overall, there would be a High Beneficial effect from the Proposed Development.

Environmental Considerations for the Community Sports Complex

As Phase 1 of the development has been completed and is operational, there is no further habitat change required on this site in advance of the proposed Community Sports Complex. The future closure and restoration of both Knocknacran West and Knocknacran Mine will create additional habitat adjacent to the Community Sports Complex in the long-term. Environmental effects from this proposal are deemed to be Negligible.

Economic Considerations for the Community Sports Complex

The proposed development will facilitate the construction of further sports facilities at the proposed Community Sports Complex. No underground workings are located beneath the site. Overall, there would be a Low Beneficial effect from the proposed Community Sports Complex.

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Alternative A – Development of a greenfield site elsewhere within the area.

Social Considerations for Alternative A

This Alternative seeks to construct a Community Sports Complex elsewhere in the locality. The overall social considerations for this alternative have been deemed to be Negligible.

A former Community Sports Complex had been established in a location that was central to the community with easy and safe access to the main Kingscourt to Carrickmacross road for more than 40 years, something which was very valuable to the local community. Alternative potential locations were discussed by the company with community stakeholders for a number of years concluding that the proposed location (in the Proposed Development above) was the agreed preferred option. The movement of the Community Sports Complex to another greenfield location away from the site of the Phase 1 development that is already onsite and operational, is considered to be less favourable, would create two separate Community Sports Complex sites and therefore would have less of a positive impact on the local community.

In quieter/more rural areas the effects of establishing two separate Community Sports Complex could be considered Low Adverse.

Environmental Considerations for Alternative A

The proposal to develop a greenfield site may present a higher level of environmental impact than the Current Proposal. Depending on the type of site and underlying geology, there may be surface water, groundwater and biodiversity issues which are less suitable for development than the Current Proposal which is at a site that has already been developed. In this alternative the environmental effect is considered to be Low Adverse.

Economic Considerations for Alternative A

The acquisition of a greenfield site would require more investment of resources, including time needed for investigation to determine its suitability for development. This would also mean that delivery of a full community sports complex would be significantly delayed. In this alternative the economic effect is considered to be Low Adverse.

Alternative B – 'Do-Nothing' Scenario

Consideration has not been given in detail to a 'Do-Nothing' scenario for the Community Sports Complex as SGMI has been in discussions with the local community for a number of years in relation to the replacement of the existing facilities. Prior to the 2018 subsidence event, SGMI had already given a commitment to the local community to provide a replacement facility to enable the development of Knocknacran West. Socially a 'Do-Nothing' scenario could be considered to have a High Adverse effect on the local community. Environmentally and economically a 'Do-Nothing' scenario could be considered to have a Low effect.

4.4.1 Summary of Alternatives for the Community Sports Complex

The Current Proposal is considered to be the most favourable alternative. This option enables the placement of the Community Sports Complex close to the Site of the original facility and on lands which have no underground workings.

Alternative A is not considered to be viable due to its associated social, environmental and economic impacts. The sourcing of a greenfield site, importation of materials and relocation of operations would result in such a site being situated further away from the existing Community Sports Complex. Refer to Table 4.3 below for a summary of the effects of each alternative.

Table 4.3: Assessment of Current Proposal and Alternatives and Significance of Effect for the Community Sports Complex

Description of Alternatives	Social Considerations	Environmental Considerations	Economic Considerations
Current Proposal – Enable development of the site to ensure the provision of suitable amenity and recreational sports facilities in the community	High Beneficial	Negligible	Low Beneficial
Alternative A – Development of a greenfield site elsewhere within the area	Negligible to Low Adverse	Low Adverse	Low Adverse
Alternative B – ‘Do-Nothing’ Scenario	High Adverse	Low	Low

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4.5 References

- European Union (2011) 'Directive 2011/92/EU of the European Parliament and of the Council on the assessment of the effects of certain public and private projects on the environment'. Official Journal of the European Union. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32011L0092&from=EN> (Accessed: 27th March 2023).
- European Union (2014) 'Directive 2014/52/EU of the European Parliament and of the Council, amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment'. Official Journal of the European Union. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0052&from=EN> (Accessed: 27th March 2023).

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5.0 HUMAN HEALTH AND POPULATION

5.1 Introduction

This Chapter of the EIAR describes the human environment and identifies and assesses impacts from the Proposed Development. This chapter of the EIAR considers and assesses potential effects resulting from the Proposed Development, both the Mine Development and the further development of the Community Sports Complex on the surrounding population and human health.

Effects of a development on the environment can impinge upon the surrounding human environment, directly and indirectly, positively, and negatively. Direct effects may include such matters as safety, air and water quality, noise, landscape quality and road traffic. Indirect effects pertain to such matters as ecology and biodiversity, heritage, and archaeology. These matters form discrete sections of this EIAR in their own right and corresponding mitigation measures are comprehensively provided in those sections.

5.2 Legislative and Policy Context

5.2.1 Planning Objectives and Development Plan Areas

Objectives and Policies

The town of Kingscourt is located ca. 7 km south of the Site along the R179 and the town of Carrickmacross is located ca. 7 km north of the Site along the R179. The Site is located within the administrative area of MCC and is subject to the objectives and policies contained within the Monaghan County Council Development Plan, 2019 – 2025, (MCCDP). The Site is also located within the ‘Carrickmacross – Castleblayney Municipal District’.

In the MCCDP it is identified that *‘these significant natural resources make an important contribution to the economy’*. MCC also state that it is important that these resources are safeguarded for future use whilst also ensuring that impacts on the environment and communities are acceptable.

Specific policies in the MCCDP which are relevant to the Site include:

ERP 1: To safeguard for future extraction all identified locations of major mineral deposits in the County; and

ERP 2: To promote development involving the extraction of mineral reserves and their associated processes, where the Planning Authority is satisfied that any such development will be carried out in a sustainable manner that does not adversely impact on the environment or on other land uses. Consideration in this regard shall be given to the impact of the development on the local economy.

The Plan acknowledges that applications for mineral extraction must account for issues relating to noise, dust, vibration, visual intrusion, water pollution, traffic generation, etc. Such issues can negatively affect human health, the environment and residential amenity.

Chapter 8 of the MCCDP provides objectives and policies related to ‘Environment, Energy and Climate Change’. MCC seek to manage and protect the quality of the environment through the application of the

policies identified within this chapter of the MCCDP. The overarching MCC objective to protect the environment is:

EECSO 1: To afford a high level of environmental protection in County Monaghan through the provision of quality environmental services which adhere to the precautionary principle, to provide for sustainable development through the promotion of energy efficiency and renewable energy to deliver a low carbon future for County Monaghan, to implement measures to reduce the human causes of climate change and to consider its effects when formulating development plan policies.

Further policies related to Water Protection, Water and Wastewater, Renewable Energy, Waste Management, Climate Change, Flood Risk, Surface Water Drainage, Air Quality and Noise. Of these policies, those which are applicable to the bio-physical factors (air, noise and water) which could affect human health include:

WPP 2: In assessing applications for development, the planning authority shall ensure compliance with the European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (S.I. No 272 of 2009) and the European Communities Environmental Objectives (Groundwater Regulations, 2010 (S.I. No. 9 of 2010).

WPP 17: To contribute towards the protection of existing and potential water resources, and their use by humans and wildlife, including rivers, streams, groundwater and associated habitats and species in accordance with the requirements and guidance in the EU Water Framework Directive 2000 (2000/60/EC), the European Union (Water Policy) Regulations 2003 (as amended), the European Communities Environmental Objectives (Surface Waters) Regulations 2009 (SI No. 272 of 2009), the Groundwater Directive 2006/118/EC and the European Communities Environmental Objectives (groundwater) Regulations, 2010 (S.I. No. 9 of 2010) and other relevant EU Directives, including associated national legislation and policy guidance (including any superseding versions of same). To also support the application and implementation of a catchment planning and management approach to development and conservation, including the implementation of Sustainable Drainage System techniques (SUDS) for new development.

WPP 3: To protect known and potential groundwater reserves in the county. In assessing applications for developments, the planning authority will consider the impact on the quality of water reserves and will have regard to the recommended approach in the Groundwater Protection Response Schemes published by GSI. The employment of the methodology identified in the 'Groundwater Protection Scheme Reports for County Monaghan public supply sources' (available at www.gsi.ie) and 'Guidance on the Authorisation of Discharges to Groundwater' (available at www.epa.ie) will be required where appropriate.

AQP 1: Quality and Cleaner Air for Europe (CAFE) Directive (2008/50/EC) and ensure that all air emissions associated with new developments are within Environmental Quality Standards as out in the Air Quality Standards Regulations 2011 (SI No. 180 of 2011) (or any updated/superseding documents). Promote the preservation of best ambient air quality compatible with sustainable development in accordance with the EU Ambient Air.

AQP 2: To contribute towards compliance with air quality legislation; greenhouse gas emission targets; management of noise levels; and reductions in energy usage.

NP 1: To promote the implementation of the Noise Directive 2002/49/EC and associated Environmental Noise Regulations 2006.

Development Plan Areas

In the context of the Proposed Development location in relation to surrounding urban population areas, Map 2.1 'Core Strategy Map' of the MCCDP identifies Carrickmacross as a Tier 2 settlement, with the Proposed Development site located outside the Carrickmacross area of strong urban influence, (Figure 5.1).



Figure 5.1: MCCDP Core Strategy Map with approximate Site location indicated, (Monaghan County Council, 2019)

In the context of surrounding amenity, scenic views and protected areas, Map 6.1 'Development Constraints Map' of the MCCDP identifies that the Proposed Development is not situated in close proximity to these identified areas of higher sensitivity, (Figure 5.2).

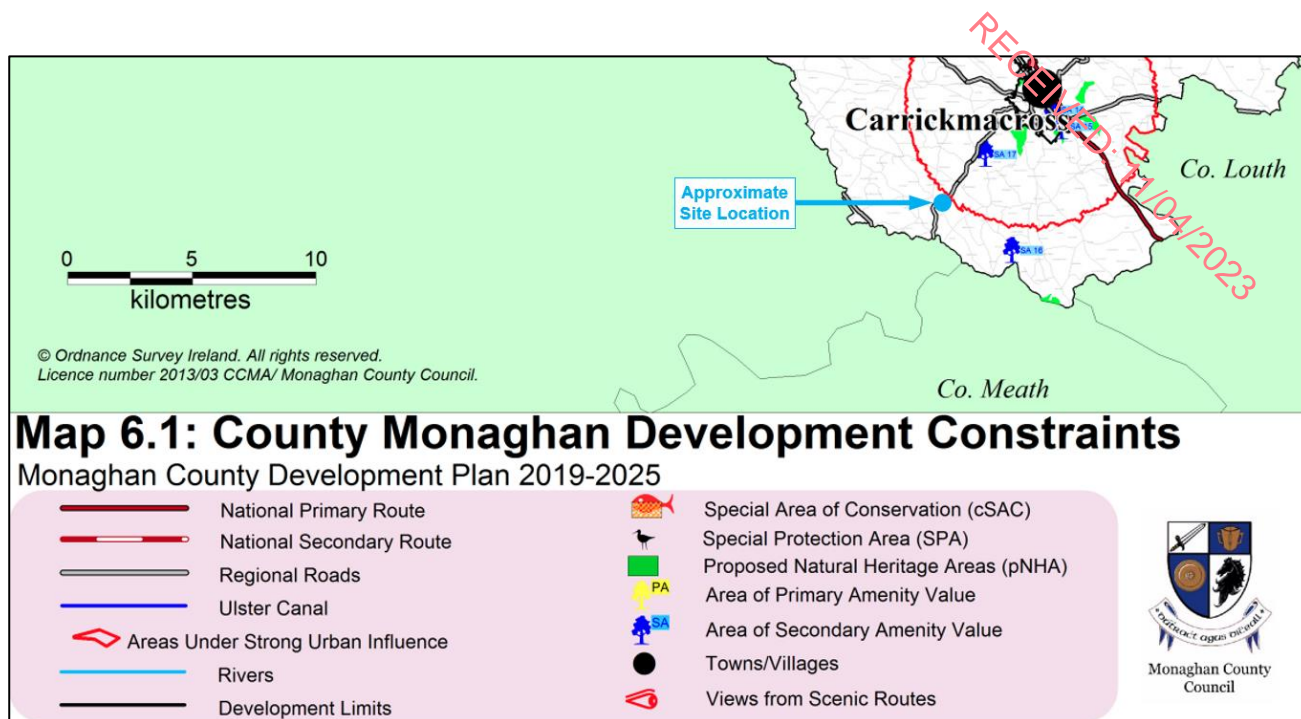


Figure 5.2: MCCDP Development Constraints Map with approximate Site location indicated, (Monaghan County Council, 2019)

5.3 Assessment Methodology and Significance Criteria

5.3.1 Technical Scope

This assessment has been made with reference to the ‘Guidelines on the information to be contained in environmental impact assessment reports’, published in ‘draft’ by the EPA in August 2017 (EPA, 2017 Draft Guidelines). These guidelines were drafted by the EPA with a view to facilitating compliance with the EIA Directive (Directive 2011/92/EU, as amended by Directive 2014/52/EU, together the ‘EIA Directive’).

The EPA’s 2022 ‘Guidelines on the information to be contained in environmental impact assessment reports’ suggest the following sub-headings under which to arrange issues; “*Employment, Human Health (considered with reference to other headings such as water and air), Amenity (e.g. effects on amenity uses of a site or of other areas in the vicinity – may be addressed under the factor of Landscape).*”

The assessment also considered ‘Advice Notes for Preparing Environmental Impact Statements’, published in ‘draft’ by the EPA in September 2015.

The Institute of Environmental Management and Assessment (IEMA) has recently issued two new guidance documents on the assessment of human health within EIA as follows:

- Effective Scoping of Human Health in EIA; and
- Determining Significance for Human Health in EIA.

Section 1.11 of the IEMA Guidance on the Effective Scoping of Human Health in EIA recommends that if there is no potential for likely significant population effect, human health should be scoped out of the EIA. The guidance makes clear that the topics of population and human health are separate technical topics. The

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assessment of socio-economic conditions addressed through the topic of ‘Population’ provides baseline information on which an assessment of sensitivity of human health can be made, therefore it is considered appropriate that both topics are covered within this chapter.

Having regard to the above guidance; particularly the 2012 EPA guidance on the information to be contained in an EIAR; the characteristics and context of the lands the subject of this EIAR; and the nature of the development, this EIAR chapter aims to identify the likely significant impacts that the Proposed Development may have on the ‘quality of life’, and these are discussed under the following headings:

- Populations;
- Employment;
- Amenity and Community;
- Land Use;
- Human health; and
- Health and safety.

5.3.2 Prediction of Impacts and Effects Prior to Mitigation

Prediction methods are required to identify and assess the significant effects of the Proposed Development on the environment. The predictive method used for this assessment is a common framework of assessment criteria and terminology based on the EPA’s ‘Guidelines on the information to be contained in environmental impact assessment reports’ with some adjustments to improve clarity.

This common framework follows a ‘matrix approach’ to environmental assessment which is based on the characteristics of the impact (magnitude and nature) and the value (sensitivity) of the receptor. The terms used in the common framework are described below. Details of how these specifically relate to the human environment are based on the UK’s Design Manual for Roads and Bridges (NBS, 2020). The sensitivity of communities and populations has been included and has been conservatively attributed a ‘High’ sensitivity. These descriptions for value (sensitivity) of receptors are provided in Table 5.1 and Table 5.2.

Table 5.1: Environmental value (sensitivity) and descriptions

Value (sensitivity) of receptor / resource	Typical description
High	High importance and rarity, national scale, and limited potential for substitution.
Medium	Medium or high importance and rarity, regional scale, limited potential for substitution.
Low	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity, local scale.

The environmental sensitivity descriptions have been assigned to receptor groups as appropriate for the assessment on the human environment. These descriptions and rankings have been provided below in Table 5.2.

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Table 5.2: Environmental value (sensitivity) and descriptions for assessment groups

Group	Receptor / resource	Designated (sensitivity) of receptor / resource
Populations / Communities	All individuals located in a particular location (this can be local, regional or at a national scale), and groups of people living in the same place or having a particular characteristic in common.	High
Private Dwellings	Residential property.	High
Community land and facilities, and other lands	Designated local green space / valued community facility.	High
	Undesignated local green space / non-essential community facility.	Low
	Derelict or unoccupied buildings or lands.	Low
Local Businesses	Businesses where viability is likely to be permanently jeopardised by a short disruption or worsening of trading conditions.	High
	Businesses where profitability may be harmed by a short- or medium-term disruption or worsening of trading conditions.	Medium
	Businesses that could continue to operate without substantial harm if affected by a disruption or worsening of trading conditions.	Low
	Businesses that could continue to operate relatively unharmed if affected by a disruption or worsening of trading conditions.	Negligible
Non-motorised users	All non-motorised users utilising roads and networks, including pedestrians, cyclists, horse-riding, etc.	High
Human health	Health receptor that would be likely or expected to be directly affected. Receptor is well placed to take advantage of beneficial impacts, and/or is not well placed to deal with any adverse impacts.	High
	Health receptor that would be likely to be indirectly affected. Average ability to maximise beneficial impacts or cope with adverse impacts.	Medium
	Health receptor that would be unlikely to be affected. Receptor is not well placed to take advantage of beneficial impacts, and/or is well placed to deal with any adverse impacts.	Low
	Health receptor that would be unlikely to be affected or effects would be temporary in nature, or which would be anticipated to have a slight or no effect on human health.	Negligible
Vehicle travellers	Public transport, motor vehicles.	Low
	R179	Medium

The descriptions for magnitude of impact are provided in Table 5.3. The numerous descriptions for both the adverse and beneficial magnitudes of impact provided below reflects the diverse range of receptor groups which may be impacted.

Table 5.3: Magnitude of impact and typical descriptions

Magnitude of impact (change)	Typical description
High	<p>Adverse</p> <ul style="list-style-type: none"> Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements; An impact that is expected to have considerable adverse socioeconomic effects. Such impacts will typically affect large numbers of businesses, workers or residents;

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		<ul style="list-style-type: none"> • Very large damage to local business which may compromise its viability; and • Adverse health impact to a large number of people and adverse impact affecting sensitive population groups.
	Beneficial	<ul style="list-style-type: none"> • Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality; • An impact that is expected to have considerable beneficial socioeconomic effects. Such impacts will typically affect large numbers of businesses, workers or residents; • Very large direct or indirect benefits for local business; and • Beneficial health impact to a large number of people and beneficial impact affecting sensitive population groups.
Medium	Adverse	<ul style="list-style-type: none"> • Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements; • Moderate magnitude impacts will typically be long-term in nature, resulting in the permanent change of the study area's baseline socio-economic conditions; • Moderate to large damage to local business, but with changes to management it should remain viable; and • Adverse impact affecting moderate number of people. Adverse impact affecting some sensitive population group(s).
	Beneficial	<ul style="list-style-type: none"> • Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality; • Moderate magnitude impacts will typically be long-term in nature, resulting in the permanent change of the study area's baseline socio-economic conditions; • Moderate to large benefits for local business; and • Beneficial impact affecting moderate number of people. Beneficial impact affecting some sensitive population group(s).
Low	Adverse	<ul style="list-style-type: none"> • Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements; • An impact that is expected to have a minor socio-economic effect. Such impacts will typically have a noticeable effect on a limited number of businesses, workers or residents, and will lead to a permanent (but not drastic) change to the study area's baseline socio-economic conditions; • Slight to moderate damage to local business, but with minor changes to management it should remain viable; and • Adverse impact affecting low-moderate number of people. Adverse impact affecting few sensitive population groups.
	Beneficial	<ul style="list-style-type: none"> • Minor benefit to, or addition of, one (maybe more) key characteristics, features, or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring; • An impact that is expected to have a minor socio-economic effect. Such impacts will typically have a noticeable effect on a limited number of businesses, workers or residents, and will lead to a permanent (but not drastic) change to the study area's baseline socio-economic conditions; • Slight to moderate benefits for local business; and • Beneficial impact affecting low-moderate number of people. Beneficial impact affecting few sensitive population groups.
Negligible	Adverse	<ul style="list-style-type: none"> • Very minor loss or alteration to one or more characteristics, features, or elements; • An impact that is expected to affect a small number of businesses, workers, or residents. Or an impact that may affect a larger number of receptors but without materially changing the study area's baseline socio-economic conditions. Such impacts are likely to be temporary in nature;

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		<ul style="list-style-type: none"> The identified impacts are predicted to have little or no damage to local business; and No or non-perceptible impact to health, population or sensitive groups.
	Beneficial	<ul style="list-style-type: none"> Very minor benefit to or positive addition of one or more characteristics, features or elements; An impact that is expected to affect a small number of businesses, workers, or residents. Or an impact that may affect a larger number of receptors but without materially changing the study area's baseline socio-economic conditions. Such impacts are likely to be temporary in nature; The identified impacts are predicted to have little or no benefit to local business; and No or non-perceptible impact to health, population or sensitive groups.

The approach followed to derive effects significance from receptor value and magnitude of impacts is shown in Table 5.4. Where includes two significance categories, evidence is provided in the topic chapters to support the reporting of a single significance category.

Table 5.4: Significance Matrix

		Magnitude of Impact (Degree of Change)			
		Negligible	Low	Medium	High
Environmental value (Sensitivity)	High	Slight	Slight moderate or	Moderate large or	Profound
	Medium	Imperceptible or slight	Slight moderate or	Moderate	Large or profound
	Low	Imperceptible	Slight	Slight	Slight moderate or
	Negligible	Imperceptible	Imperceptible or slight	Imperceptible or slight	Slight

A description of the significance categories used is provided in Table 5.5.

Table 5.5: Significance categories and typical descriptions

Significance Category	Typical Description
Profound	An effect which obliterates sensitive characteristics. Only adverse effects are usually assigned this level of significance. These factors are key issues in the decision-making and consent process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance which are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also be included in this significance category.
Large	An effect which, by its character, magnitude, duration or intensity alters a significant proportion of a sensitive aspect of the environment. These can be beneficial or adverse effects and are considered to be very important issues which are likely to be substantial in the decision-making process.

Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends. These are beneficial or adverse effects which may be important but are not likely to be central to decision-making or consent. The cumulative effects of these factors may influence consent or decision-making if they should lead to an increase in the overall adverse effect on a particular resource or receptor.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities. These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process but are important in enhancing the subsequent design of the project.
Imperceptible	An effect capable of measurement but without significant consequences. No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

The approach to assigning significance of effect includes reasoned argument and the professional judgement of competent experts. The assessment of the significance of environmental effects covered the following factors:

1. The receptors/resources (natural and human) which would have been affected and the pathways for such effects;
2. The geographic importance, sensitivity or value of receptors/resources;
3. The duration (long- or short-term); permanence (permanent or temporary) and changes in significance (increase or decrease);
4. Reversibility - e.g. is the change reversible or irreversible, permanent or temporary;
5. Environmental and health standards (e.g. local air quality standards) being threatened; and
6. Feasibility and mechanisms for delivering mitigating measures, e.g. is there evidence of the ability to legally deliver the environmental assumptions which are the basis for the assessment?

5.3.3 Information Sources

The description of the receiving environment for this EIAR is set out under the headings identified in Section 5.3.1.

In regard to Human Health the reader is reminded that other chapters of this EIAR assess effects and set down mitigation measures for other environmental factors that ultimately require emission regulation by national/international standard, or specific planning / licensing condition for reason of protection of human health and the environment. Those assessments are referenced in this chapter to address potential Human Health impacts in accordance with EPA draft guidance on the information to be contained in an EIAR; *“In an EIAR, the assessment of impacts on population & human health should refer to the assessments of those factors under which human health effects might occur, as addressed elsewhere in the EIAR e.g. under the environmental factors of air, water, soil etc. The Advice Notes [Advice Notes on Current Practice (in the preparation of Environmental Impact Statements, Sept. 2003] provide further discussion of how this can be addressed.”*

Sources of information for the assessment of potential impacts on populations and human health included the following:

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- Census Returns (Central Statistics Office (CSO), 1991, 1996, 2002, 2006, 2011 and 2016 Census). Preliminary results from the 2022 Census have been considered, where available;
- CSO labour statistics;
- Monaghan County Council Development Plan, 2019 - 2025;
- Border Regional Planning Guidelines, 2010 - 2022;
- Field surveys of the Application Site and inspection of the surrounding area;
- Ongoing community feedback provided by the Applicant;
- Desktop reviews of previous assessment from historic planning applications;
- Department of Communication, Climate Action and Environment (DCCA) Eircode maps; and
- Aerial and ordnance survey maps of the area.

The EPA's 2022 'Guidelines on the information to be contained in environmental impact assessment reports' identify that the legislation does not generally require assessment of Land Use planning, demographic issues or detailed socio-economic analysis, which should be avoided in an EIAR, unless issues such as economic or settlement patterns give rise directly to specific new developments and associated effects. As such, assessments of these topics have not been conducted as the Proposed Development is not considered likely to have impacts on the land use planning within the locality, nor is it likely to affect the local demographics or socio-economic dynamics of the area. However, baseline information on the local area has been provided to show its context to, and comparison with, the region (county) and national average. In addition, information on industrial land use in proximity to the Site has been included. The land-uses identified include: similar industry to the Proposed Development, EPA regulated and licenced facilities (such as waste or IPC/IE sites); and upper or lower tier SEVESO sites.

5.3.4 Temporal Scope

The temporal scope of the assessment covers the construction, operation and closure/restoration phases of the Proposed Development.

Temporally, the construction phase for the Community Sports Complex is ca. 2 years, while the Mine Development is ca. 1 year, there will be overlap of 1 year between these development phases. The operational phase (life-of-mine) for the Mine Development is ca. 30-35 years, depending on market conditions while the Community Sports Complex is in operation in perpetuity.

The closure phase of the Mine Development begins after the operational phase has ceased.

Once the Knocknacran West Open-Cast Mine is operational, the existing Knocknacran Open-Cast Mine will undergo restoration, as extraction will have ceased. The existing underground Drummond Mine is currently permitted until 2032.

The closure and final restoration works of the new open cast mine area will follow the cessation of mining and will form part of the Closure, Restoration and Aftercare Management Plan (CRAMP). The CRAMP will

define the decommissioning phases for the Proposed Development and will have Permanent Effects (lasting over 60 years).

5.3.5 *Geographical Scope*

The EIA directly covers the physical extent of the Site as shown in Figure 5.3. As predicted impacts on the human environment can extend beyond the immediate Site boundary, a wider 'zone of influence' has been considered.

The geographical study area for the assessment covers the development area and a zone of influence of 500 m ('study area') from the development boundary (Figure 5.4). The buffer area has been identified based on the UK's Design Manual for Roads and Bridges (Volume 11, Section 3, LA112, Revision 1, Sustainability and environment. Appraisal. Population and human health).

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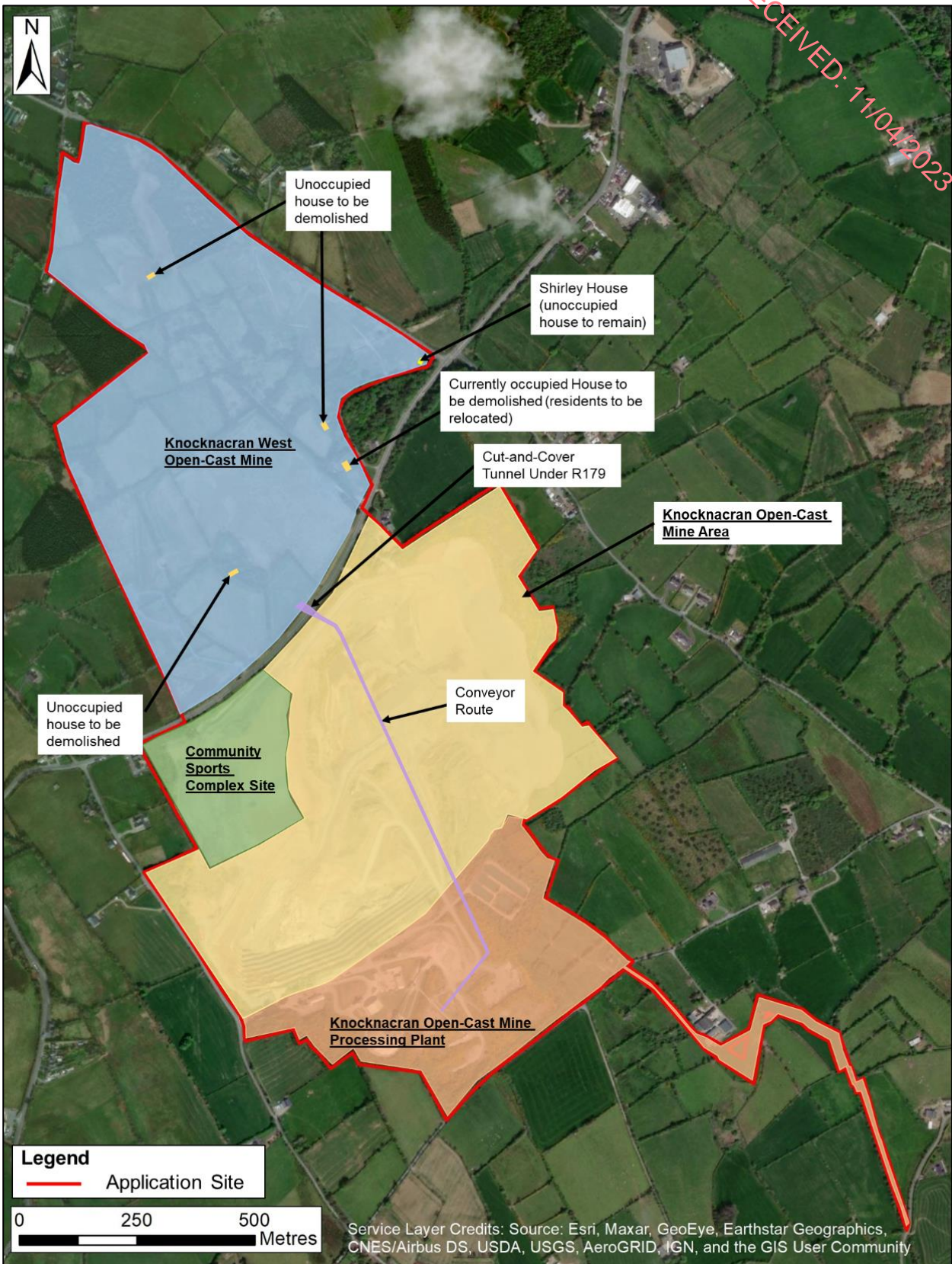


Figure 5.3: Application Site Boundary and general site layout

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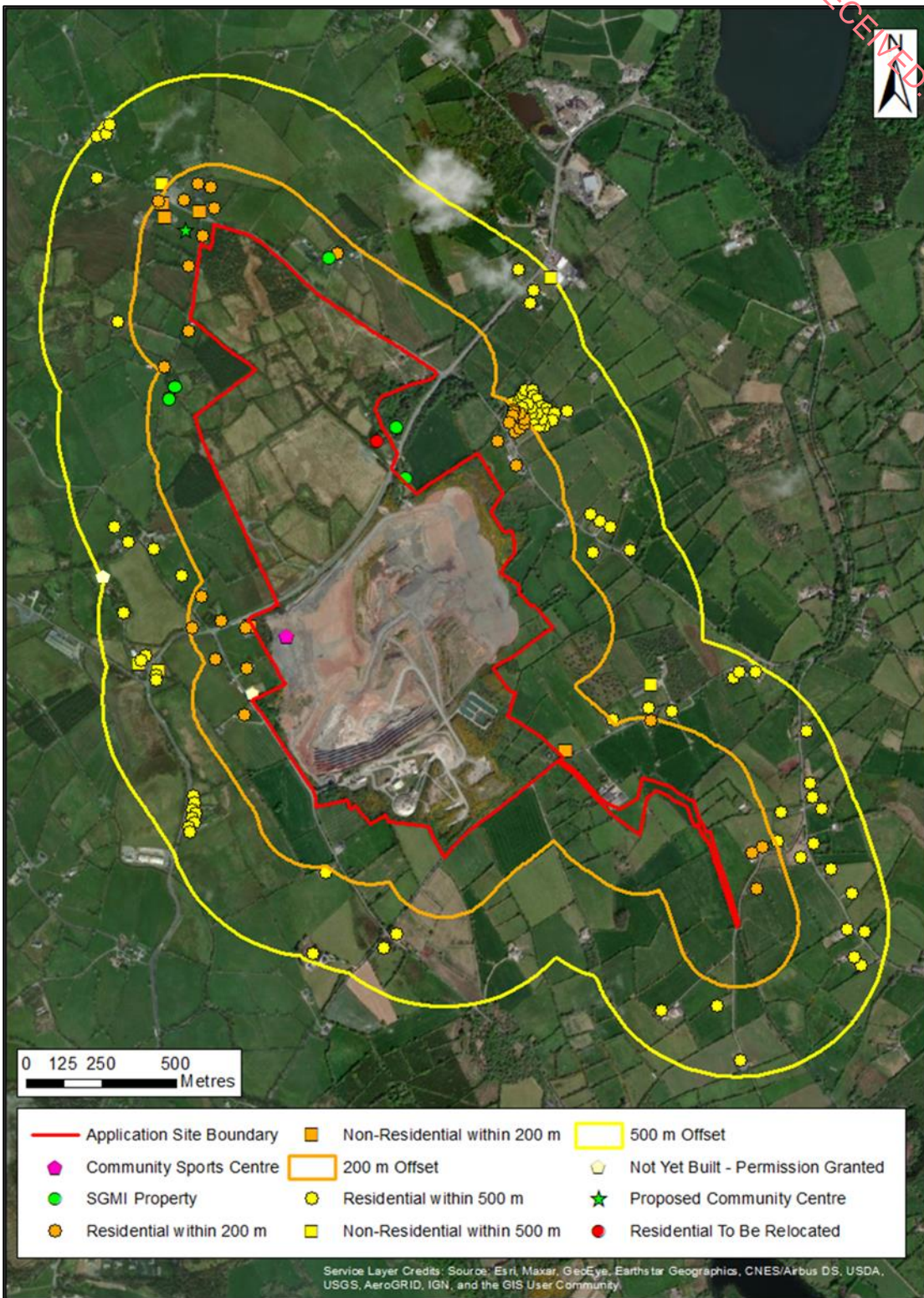


Figure 5.4: Location of one-off housing and farmsteads within 500m of the Application Site Boundary (red line)

As the Application Site predominantly falls within the Electoral Division (ED) of Enagh, population, and demographic trends from this administrative area have been reviewed and compared with county and national data. This ED includes 21 townlands. The Application Site spans seven of these: Derrynaglah,

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Derrynascobe, Drumgoosat, Drummond, Enagh, Knocknacran East and Knocknacran West (Figure 5.5). The only townland that relates to the Application Site that does not lie within Enagh is a wayleave area (relating to maintenance of the discharge pipeline) that falls in Clontrain townland (within Loughfea Electoral Division).

In the assessment of cumulative impacts, the geographical extent of the EIAR has been extended as appropriate to include relevant related or unrelated development activities that have the potential to create significant negative impacts with the Proposed Development.

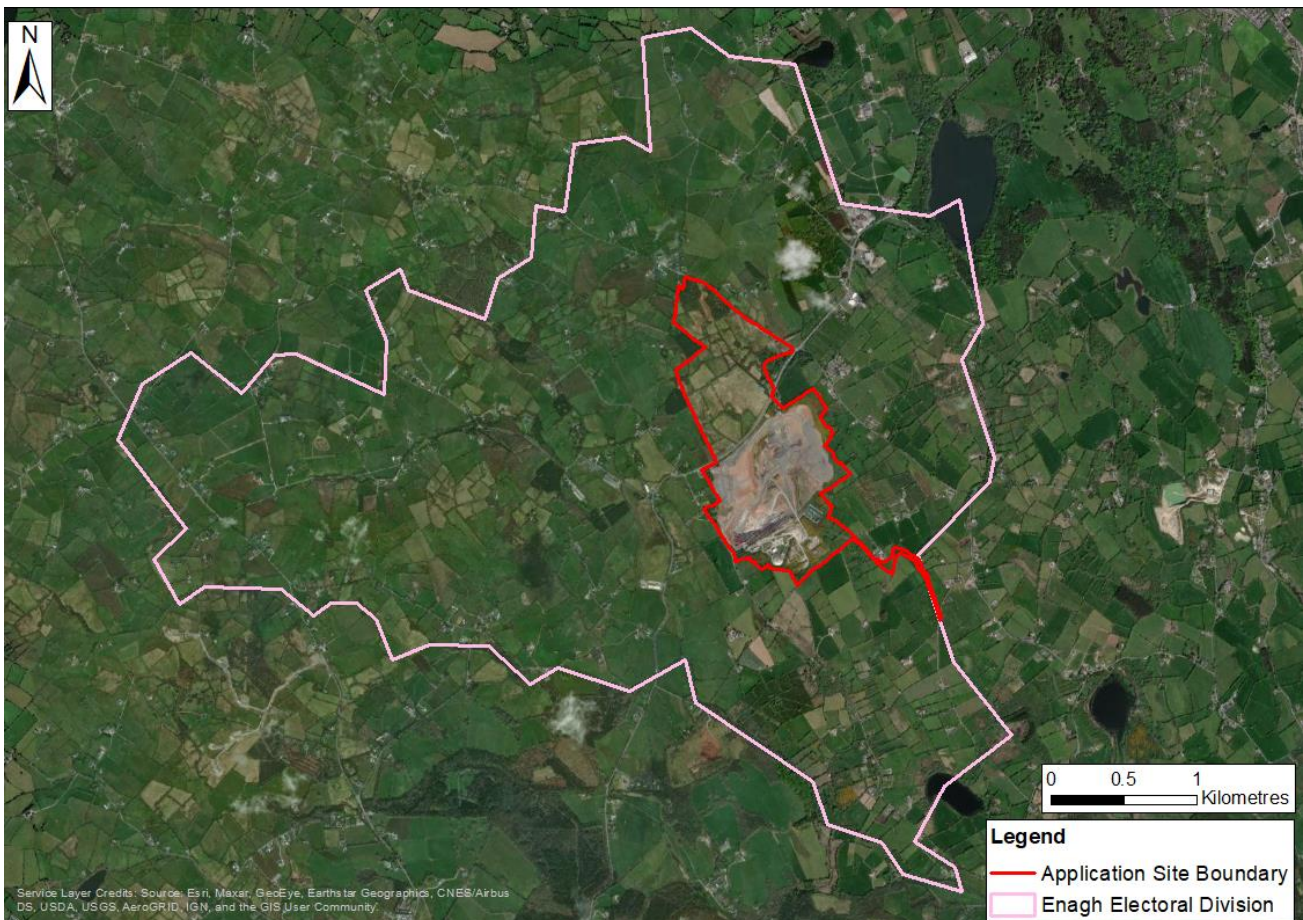


Figure 5.5: Site Location Map showing Enagh Electoral Division (ED)

5.4 Baseline

5.4.1 Surrounding Environment

The lands contiguous to the boundaries of the Site are in mixed use combining agricultural use, residential use, commercial use (a petrol station adjacent to the Site on the R179) and extractive industry (existing Drummond Underground Mine operated by SGMI which extends laterally beneath the Site to the south, and Cormey opencast Clay Pit, which is operated by Breedon Brick Ltd, ca. 1.5 km to the south of the Application Site). There are scattered residential properties in the vicinity of the Site, primarily concentrated along the Regional Road (R179) and the local road network. One residential estate (Clonsedy) is located to the northeast of the existing Knocknacran Mine site. The village of Drumgoosat is located to the northwest of the Site and contains a church and graveyard, national school, mushroom farm, shop and several residential

houses. A chicken farm is located immediately adjacent to the southwestern boundary of the Knocknacran Mine site.

The local residential and non-residential receptors surrounding the Site have been identified in Figure 5.4. Residential receptors (including unoccupied residences) have been identified with a circle icon, while non-residential receptors are indicated with a square icon. The numbers of each have been provided in Table 5.6. The non-residential receptors consist of commercial, industrial facilities, agricultural buildings, a church and graveyard, Community Sports Complex and Drumgoosat National School. A Community Centre has recently been granted planning permission to be located within Drumgoosat village and is considered as a reasonably foreseeable facility in the area.

Table 5.6: Local residential and non-residential receptors within various distances of the Site

0 - 200 m Residential	0 - 200 m Non-Residential	200 - 500 m Residential	200 - 500 m Non-Residential
39	4	82	7

5.4.2 Population

The Site is almost completely located within the ED of Enagh (CSO Area Code ED 34014), which has an area of 13.3 km². The census reports for 2002, 2006, 2011, 2016 and 2022 produced by the CSO presents population figures in terms of electoral divisions and their respective populations.

Population statistics for Enagh are presented in Table 5.7 and Table 5.8. The population of Enagh ED increased by 4.5% over the Census periods of 2002 to 2006 but decreased by 3.3% during the period 2006 to 2011. During the period 2011 to 2016 the population of Enagh ED has shown a small increase of 0.3%. The most recent Census period between 2016 and 2022, Enagh ED has had a larger increase of 1.9%. The overall population for Enagh has increased incrementally with time (2002 – 2022), which is consistent with Co. Monaghan, Ulster (the counties of Donegal, Cavan and Monaghan) and the State have had a consistently increasing population trend over the same period.

With reference to the Knocknacran West Mine site, there are four houses/structures within the proposed mine footprint which sit in Enagh ED and which will be demolished (Figure 5.6). Of these, three are currently unoccupied, with missing or partially missing rooves, no windows or doors and with no road access. A fifth uninhabitable house (the Shirley House to the southeast of the Knocknacran West site by the crossroads, also indicated on Figure 5.6) lies within the Site boundary but this is outside the Knocknacran West mine footprint and will not be demolished. This house will be used to mitigate potential impacts on biodiversity and provide additional habitat for bats.

Table 5.7: Populations recorded during the 1991 to 2016 census period (Central Statistics Office)

Area	1991	1996	2002	2006	2011	2016	2022
State	3,525,719	3,626,087	3,917,203	4,239,848	4,588,252	4,761,865	5,123,536
Ulster*	232,206	234,251	246,714	267,264	294,803	296,754	312,354
Monaghan	51,293	51,313	52,593	55,997	60,495	61,386	64,832
Enagh	672	656	674	704	681	683	696

*Monaghan, Cavan and Donegal

Table 5.8: Population dynamics (% change) from 1991 to 2016 (Central Statistics Office)

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Area	1991 to 1996	1996 to 2002	2002 to 2006	2006 to 2011	2011 to 2016	2016 to 2022
State	2.85	8.03	8.24	8.22	3.78	7.6
Ulster	0.88	5.32	8.33	10.30	0.66	5.26
Monaghan	0.04	2.49	6.47	8.03	1.47	5.69
Enagh	-2.38	2.74	4.45	-3.27	0.29	1.9

*Monaghan, Cavan and Donegal

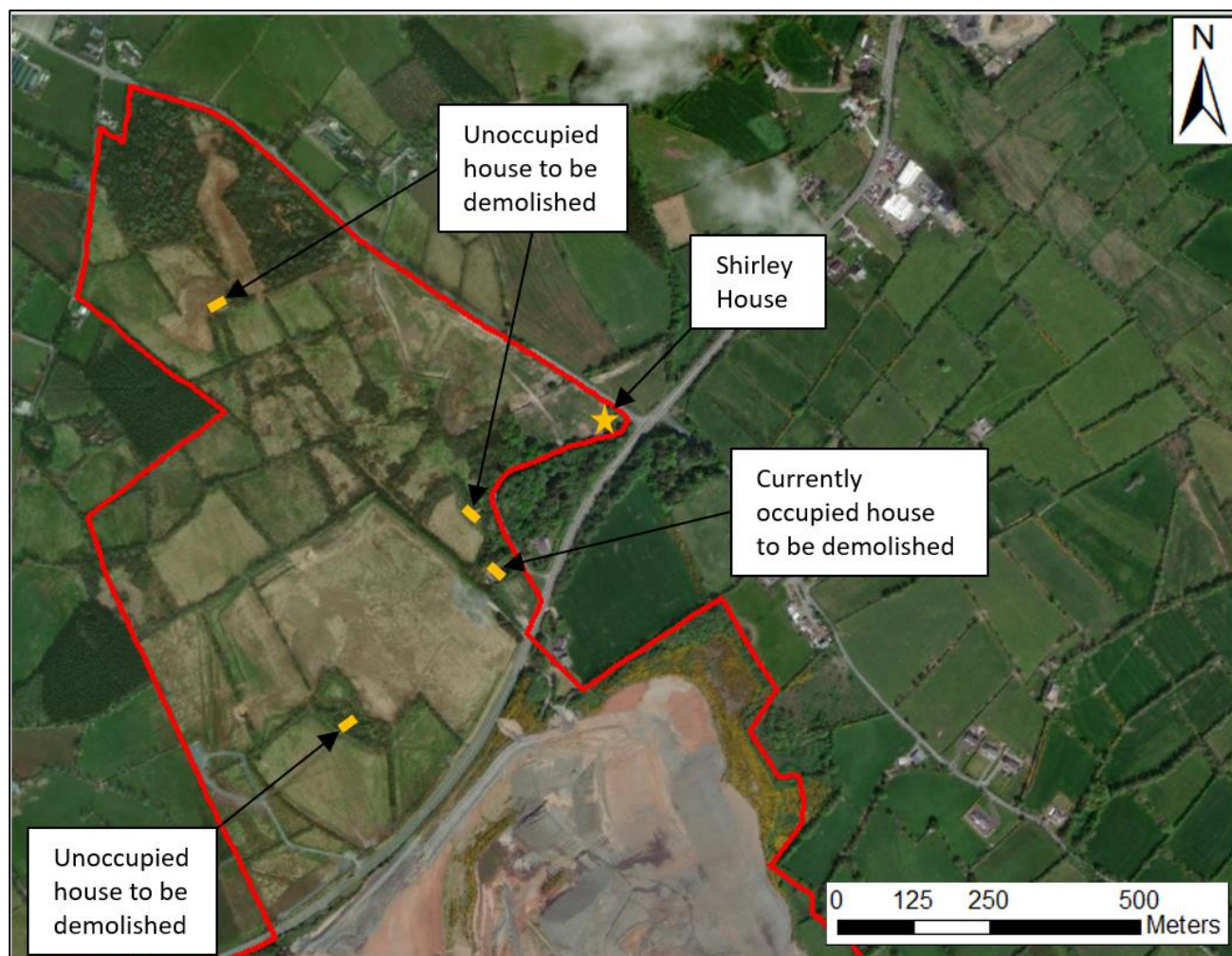


Figure 5.6: Location of houses within Site boundary

Population Age Distribution

Table 5.9 summarises the percentage population age distribution by age for the State, Monaghan and Enagh ED. The population age distributions percentages have been calculated for the Census periods of 2011 and 2016 as the preliminary 2022 Census data does not provide this level of detail yet.

It is evident from Table 5.9 that while there are minor differences in population age distribution between Enagh ED and both the State and County Monaghan, the distribution is generally consistent.

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Table 5.9: Population Age Distribution, 2011 and 2016 (Central Statistics Office)

Year	Area	% Persons Aged 0-14	% Persons Aged 15-29	% Persons Aged 30-44	% Persons Aged 45-64	% Persons Aged 65+
2011	State	21.3	20.5	23.7	22.7	11.7
2016	State	21.1	18.4	23.3	23.8	13.4
2011	Monaghan	22.3	19.7	22.3	23.4	12.3
2016	Monaghan	22.7	17	22	24.2	14
2011	Enagh ED	26.0	19.5	20.9	23.8	9.8
2016	Enagh ED	20.4	20.2	22.5	24.2	12.7

Population Density

Table 5.10 summarises population densities for the State, Ulster (the counties of Donegal, Cavan and Monaghan), Monaghan and the Enagh ED. The population densities have been calculated between the Census periods of 1991, 1996, 2002, 2006, 2011 and 2016. The preliminary 2022 Census data does not provide this level of detail yet.

As expected from the increased populations, the population densities also increased in the State, province and county areas of the Census periods. Similarly expected, the population densities within the Enagh Ed remained relatively consistent during the same period.

The population density of the Enagh ED is lower than that observed in the state but higher than Ulster (the counties of Donegal, Cavan and Monaghan) and Monaghan. This may reflect reflects the semi-rural nature of the area as it is located on the outskirts of Carrickmacross.

Table 5.10: Population Density (persons per square kilometre) from 1991 to 2016 (Central Statistics Office)

Area	Size km ²	1991	1996	2002	2006	2011	2016
State	70,273	50.2	51.6	55.7	60.3	65.3	67.8
Ulster*	8,088	28.7	29.0	30.5	33.0	36.4	36.7
Monaghan	1295	39.6	39.6	40.6	43.2	46.7	47.4
Enagh	13.3	50.5	49.3	50.7	52.9	51.2	51.4

*Monaghan, Cavan and Donegal

Households

Table 5.11 summarises the number of households and persons per household for the State, County Monaghan and Enagh ED. The statistics have been calculated for the Census periods 2011 and 2016. The preliminary 2022 Census data does not provide this level of detail yet.

It can be noted that the average size of households in Enagh ED and Monaghan are marginally above the average household sizes identified in the State for the same periods.

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Table 5.11: Households from 2011 to 2016, (Central Statistics Office)

Area	2011			2016		
	No. of Households	No. of People	Average No. Persons per Household	No. of Households	No. of People	Average No. Persons per Household
State	1,654,208	4,510,409	2.7	1,702,289	4,676,648	2.7
Monaghan	21,264	60,473	2.8	21,689	61,328	2.8
Enagh ED	227	688	3.0	237	694	2.9

5.4.3 Employment / Local Economies

Principal Status

Table 5.12 summarises the employment status of the persons aged 15 years or older in County Monaghan and Enagh ED. 53.9% of the Co. Monaghan population was 'at work' in 2016, compared with 52.2% of the Enagh ED population for the same year.

Between the periods of 2011 and 2016 it is evident that the percentage of those 'Unemployed having lost or given up previous job' has decreased within the respective populations (Table 5.12). This is consistent with the economic recovery from the downturn just prior to 2011.

Table 5.12: Principal Status of Persons 15 years and older in County Monaghan and Enagh ED, 2011 and 2016 (Central Statistics Office)

Status	Monaghan 2011 (%)	Monaghan 2016 (%)	Enagh ED 2011 (%)	Enagh ED 2016 (%)
At work	49.0	53.9	50.0	52.2
Looking for first regular job	1.0	0.7	0.6	0.6
Unemployed having lost or given up previous job	11.7	7.3	11.1	5.3
Student	10.8	10.4	11.1	15.1
Looking after home/family	9.7	8.8	12.3	8.6
Retired	12.7	14.2	9.9	13.6
Unable to work due to permanent sickness or disability	4.7	4.3	4.8	4.6
Other	0.4	0.4	0.2	0.0

The CSO Labour Force Survey for Q1 2021 identified less persons employed in the border counties in Q1 2021 compared with pre-pandemic levels for the same area, (Table 5.13). This is consistent with assumptions that the pandemic severely interrupted certain business sectors. In contrast the number of unemployed persons during the corresponding periods decreased. However, since pandemic measures have ceased, employment levels have rapidly increased in both Q1 and Q4 of 2022 while unemployment has decreased slightly.

Table 5.13: Employment status of persons aged 15 years or over in the border region. Comparison of latest CSO labour force survey versus pre-pandemic figures

Employment status	2020 Q1	2021 Q1	2022 Q1	2022 Q4
Persons aged 15 years and over in Employment	176,900	174,700	193,600	201,300
Unemployed Persons aged 15 years and over	10,300	10,000	9,800	9,300

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Employment Industry

Table 5.14 summarises the percentage of persons aged 15 years or older per employment industry in County Monaghan and Enagh ED.

Employment industries where the percentage of persons in Enagh ED are noticeably above the County average are the building and construction industries and manufacturing industries which make up 33.1% of employment industry in the area. Employment industries which are noticeably below the County average include transport and communications, public administration, and professional services.

Table 5.14: Percentage persons in work by industry, 2016 (Central Statistics Office)

Industry	State (%)	Monaghan (%)	Enagh ED (%)
Agriculture, forestry and fishing	4.4	11.2	10.1
Building and construction	5.1	6.9	12
Manufacturing industries	11.4	14.4	21.1
Commerce and trade	23.9	21.3	18
Transport and communications	8.5	5.1	3.9
Public administration	5.3	4.4	1.8
Professional services	23.5	21.5	17.6
Other	17.8	15.2	15.5

Employment at the Site

There is no consolidated methodology or practice for assessing the impact on employment in EPA guidance. The impacts of the Site on employment have therefore been assessed qualitatively based on the number of jobs which the Site has created. The Site has provided direct and indirect employment. Direct jobs include the workforce employed by the Developer and subcontracted directly at the Site. Indirect employment includes those created in the supply chain to provide input (e.g. fuels), specialist labour (e.g. contract drivers, explosives contractor) and services (e.g. equipment maintenance) for the site and workforce, as well as consulting services.

The numbers of employees which the Site has directly employed over recent years has varied due to increases and decreases of demand for aggregate products from the construction industry. In recent years the site has provided consistent employment for up to 40 staff.

Local Employment Centres

The Site is located approximately 1 km from the Monaghan/Cavan county border, northeast along the River Lagan. The economic activity and employment centres within this area are the town of Carrickmacross to the north and Kingscourt, Co. Cavan to the south.

The existing mining operation at Knocknacran (and Drummond Mine) contributes significantly to the local, regional and national economies. SGMI provides employment for approximately 40 people on a full-time basis, with up to an additional 45 people, including general contractors (ca. 10 at any given time) and earthworks contractors (ca. 35) during stripping campaigns through its mining activities at Knocknacran, which supports an additional ca. 150 jobs at the company's plasterboard factory at Kingscourt. Activities at both the mine and plasterboard factory generate significant indirect employment in various service and supply industries, including during the phased stripping and restoration phases at the mine site.

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A number of other industries operate in the wider Kingscourt, Carrickmacross and surrounding areas, which contribute to the thriving local economy. These include Kingspan, Rye Valley Foods, Kerry Group, Terex-MDS International, ADN Plastics, Mac Fab Systems and ExCel Plastics. ADN Plastics is seeking planning permission for revisions to their existing facilities at the time of writing this EIAR.

5.4.4 *Amenity and Community*

The former Magheraclaone Mitchells Gaelic Football Club was situated on the Knocknacran West site prior to the subsidence of September 2018. The facilities included a number of playing fields, a clubhouse, changing rooms and toilets, Community Centre and parking.

Following the subsidence event of September 2018, the facilities at the site were demolished and the site was remediated to grassland.

Due to the subsidence on the Knocknacran West site and subsequent damage and demolition of the sports facilities on this site, Magheraclaone Mitchells Gaelic Football Club were granted permission on 5 December 2018 (Reg. Ref. 18/506) to construct a temporary training facility in an area approximately 1 km west of the former facilities which were damaged by the subsidence event. The temporary facility is currently in use and includes two training pitches, dressing rooms and toilets, road entrance, parking area, waste water treatment system and percolation area, and associated site works in the townlands of Lisnakeeney and Camaghy, Magheraclaone.

Within the Proposed Development site, in an area devoid of underground mine workings or historical subsidence events, planning permission has already been granted for one new playing pitch, dressing rooms, waste-water treatment system, water attenuation, entrance from R179 and associated site works (Reg. Ref. 20/365) have been recently constructed and are being operated.

There are no other community amenity lands or facilities within 500 m of the Site.

The Monaghan County Development Plan 2019 - 2025 outlines the importance of the tourism sector to the internal economy of the county and local areas. Since 2010, Monaghan has been part of Failte Ireland Midlands East administrative region which includes counties Louth, Meath, Kildare, Laois, Westmeath, Longford, Offaly and Wicklow.

Tourism makes an important contribution to the economy of County Monaghan with income derived from tourist activity being distributed across a wide range of economic sectors. Tourism can also be of particular significance in the diversification of the rural economy and in the regeneration of certain towns and villages.

The nearest population centres at Carrickmacross and Kingscourt provide a variety of restaurants, pubs, hotels and B&Bs. Further tourism amenities in the locality include:

- Dun na Rí Forest Park;
- Carrickmacross Lace Gallery;
- Patrick Kavanagh Centre in Inniskeen;
- Numerous angling and fishing locations (e.g. Lough Fea, Rahan's Lake);
- Treacy's Hotel;

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- Cabra Castle;
- Shirley Arms Hotel;
- Carrickmacross Workhouse; and
- Nuremore Hotel and Country Golf Club, and Mannan Golf Course.

There is a church and graveyard in the village of Drumgoosat, to the north of the Site.

5.4.5 Land Use

Lands within the Site are currently used for mining activities to the south of the R179 and as a Community Sports Complex on lands adjacent to Knocknacran Mine. As noted in the previous section, since the subsidence event of September 2018, lands to the north of the R179, (which are under the control of the Applicant), are not used for agricultural or amenity purposes and have remained idle. The area of subsidence to the north of the R179 has been remediated, with the removal of buildings, sports 'furniture' and profiling of the lands. The Proposed Development has been identified as a means of bringing the old mine workings under full engineering control and the only method of removal of the perceived hazard of the old underground workings.

The existing topography in the vicinity of the Site is undulating in nature and varies in level from approximately 40 to 70 m OD.

The overriding land use surrounding the Site can be characterised as rural in nature, with land uses in the vicinity of the Site being predominantly agricultural and single-house residential. Industrial and commercial activities are also found within the surrounding area.

The lands contiguous to the boundaries of the Site are in mixed use combining agricultural use, a chicken farm, residential use, commercial use (a petrol station adjacent to the Site on the R179) and extractive industry (existing Drummond Underground Mine which extends laterally to the south). There are scattered residential properties in the vicinity of the Site, primarily concentrated along the Regional Road (R179) and the local road network, Figure 5.4. One residential estate (Clonsedy) is located to the northeast of the existing Knocknacran Mine site. The village of Drumgoosat is located to the northwest of the Site and contains a church and graveyard, national school, mushroom farm, shop and several residential houses.

Within 1 km of the Site, there are approximately 150 residential houses (includes unoccupied houses), ca. 3 recent grants of permission to build residences and ca. 18 non-residential units, Table 5.15 (Monaghan County Council, 2021).

A breakdown of the 18 non-residential activities taking place within 1 km of the Site is shown in Table 5.15.

Table 5.15: Non-residential activities within 1 km of the Site

Activity	Type	Quantity	Licensed Activity
Agricultural	Poultry sheds/poultry farms	4	Yes (1)
Commercial	Petrol Station with deli and seating area	1	No
Commercial	Auto-services	1	No
Commercial	Motor vehicle dealership	2	No
Hospitality	Hotel	1	No
Industrial	Plastic manufacturing	1	No
School	National school	1	No
Commercial/Food	Mushroom farm	1	No
Commercial	Local shop	1	No
Ecclesiastical	Church and graveyard	2	No
Industrial	Waste management services	1	No
Recreational	Magheracloone Mitchells GAA Club	1	No
Industrial	Drummond Mine	1	Yes

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The agricultural industry is evident within the local area, however, it is more difficult to quantify individual farmsteads, particularly for pastoral farming, in this case Corinne land use mapping (2018) has been referred to. Within 1 km of the Site, according to Corinne land use mapping, pastoral agriculture is the only land use in the area.

In addition to the existing IE Licence (IE Licence No. P0519-04) in place for the existing mine site, there is one other licenced facility within 1 km of the Site, Figure 5.7. This is an IE Licenced facility for the rearing of poultry in installations where the capacity exceeds 40,000 places (IE Licence No. P0866-01).

Other licenced facilities within 5 km of the Site include:

- Kingspan Building Products Limited, (EPA Licence No. P0065-01), ca. 3.7 km to the southwest. Original Application made in October 1995. Licence for the production of organic chemicals, such as plastic materials (polymers, synthetic fibres and cellulose-based fibres) (production means the production on an industrial scale by chemical or biological processing).
- Breedon Brick Limited, (EPA Licence No. P0528-01), ca. 4.3 km to the south. Original Application made in November 1999. Licence for the manufacture of coarse ceramics including refractory bricks, stoneware pipes facing and floor bricks and roof tiles.
- Rye Valley Foods Limited, (EPA Licence No. P0806-01), ca. 4.9 km to the north. Original Application made in September 2006. Licence for treatments or processes for the purposes of the production of food products from animal raw materials (other than milk) with a finished product production capacity greater than 75 tonnes per day.

Within 5 km of the Site, there are five consented Section 4 discharges¹:

¹ Licences issued under Section 4 of the Local Government (Water Pollution) Act 1977, as amended in 1990, in respect of the discharge of trade effluent to surface water or groundwater.

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- Justin O'Rourke, Magheracloone Service Station, WP 18/13, ca. 100 m west;
- Kingscourt Castle Ltd, SS/W013/06, ca. 2.6 km to the south;
- O'Reilly Concrete Limited, SS/W006/12, ca. 3.9 km southwest;
- Nuremore Hotel, WP 06/02, ca. 4.9 km northeast; and
- John Power Transport Ltd., 07/05, ca. 4.3 km southwest.

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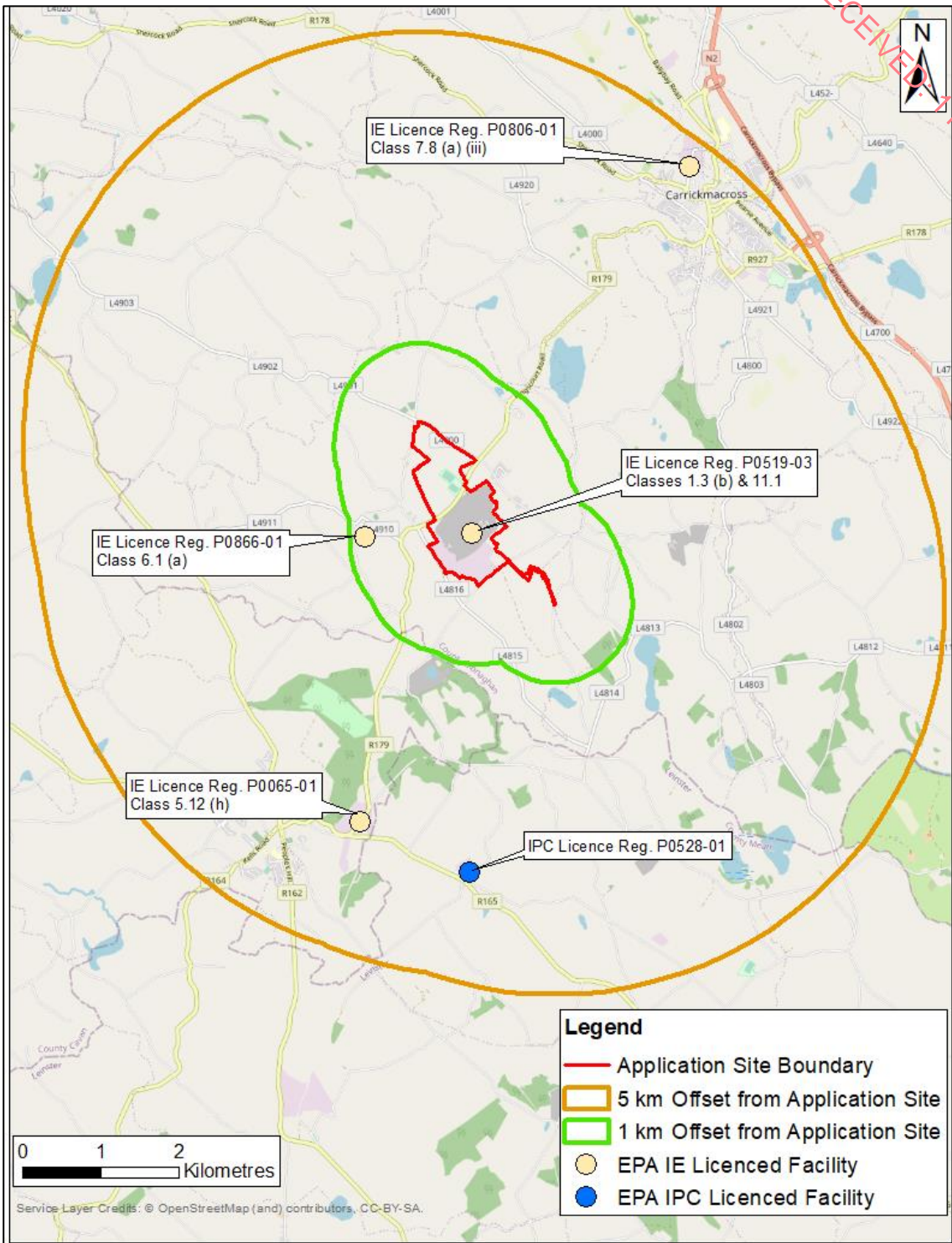


Figure 5.7: EPA Licenced Facilities and Section 4 Discharges within 5 km of the Site

Seveso Sites are defined as industrial sites that, because of the presence of dangerous substances in sufficient quantities they are required to be regulated under the Seveso III Directive (2012/18/EU) through the Chemicals Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015 (S.I. No. 209 of 2015), (the “COMAH Regulations”). There are no upper-tier or lower-tier Seveso sites within 10 km of the Proposed Development.

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5.4.6 Human Health

Table 5.16 summarises the general health of the percentage of persons in the State, Monaghan and Enagh ED. In the 2016 Census there was a slightly greater percentage of persons in Enagh ED (88.2%) who classified themselves as being in ‘Good’ or ‘Very Good’ health in comparison with the average for the State (87.0%) or County Monaghan (87.6%).

The percentage of persons who classified themselves as being in ‘Bad’ or ‘Very Bad’ health was also lower in Enagh ED (0.7%) in comparison with the average for the State (1.6%) or County Monaghan (1.3%).

The preliminary 2022 Census data does not provide this level of detail yet.

Table 5.16: General Health percentage of the population 2016 (Central Statistics Office)

General Health	State (%)	Monaghan (%)	Enagh ED (%)
Very good	59.4	59.6	66.7
Good	27.6	28.0	21.5
Fair	8.0	8.6	8.2
Bad	1.3	1.1	0.6
Very bad	0.3	0.2	0.1
Not stated	3.3	2.5	2.9

5.4.7 Health and Safety

SGMI is committed to health and safety at their existing mine operations. SGMI prioritise the health and safety of its staff and all stakeholders who may be affected directly and indirectly by the site’s existing operations at Knocknacran and Drummond Mines.

The Mine Manager is the overall person responsible for safety management on the Site. The Manager is also responsible for the working environment, traffic management, emergency procedures, first-aid arrangements, and safe systems of work. The Site’s Health and Safety Manager is in charge of the day-to-day health and safety operations on the site.

The Site is required to meet conditions of existing consents (MCC and EPA) and certain statutes. In particular, the relevant Health & Safety legislation (Safety, Health & Welfare at Work Act, 2005, the Mines and Quarries Act, 1965) and subsequent Health and Safety Regulations and relating to health and safety, training, and appropriate site management.

SGMI maintain an independently audited safety management system which places a great focus on behavioural safety. The site’s health and safety risks are mitigated and managed in accordance with a site-specific safety statement and associated risk assessments.

This program has been very successful with very few injuries and near misses occurring in its operations at Knocknacran and Drummond in recent years. Incidents which require first aid, medical intervention or incur lost time, are recorded in the SGMI safety system as TF3, TF2 and TF1 incidents, respectively. In the past 10 years one such incident was recorded, (TF3 – first aid), where a delivery driver tripped on a stairs.

The existing site is fully enclosed with any entrance permanently closed and locked. Boundaries are inspected at regular intervals during the operation and the Mine Manager actions repairs as appropriate.

The main vehicular entrance in operation to the mine site is that from the L4816. Another entrance to mine site is located on the R179, however this is used less frequently and remains locked at other times. The lands are remotely secured via CCTV cameras with 24-hour monitoring. The Knocknacran site has alarm systems installed on the office, workshops and other enclosed buildings. The entrance to the site is secured by an electric gate. Site lighting is provided to enable safe surface operations on the Knocknacran Processing Plant site and to ensure that site security can be maintained after dark. This consists, largely, of lighting along the entrance roadway, exterior light fittings at strategic locations on the principal buildings and operational lighting at the main activity areas. Lighting will be extinguished when the site is closed thus causing no external light pollution. Lighting associated with the Community Sports Complex is screened by proposed and existing landscaping and also located at some distance from residential properties.

5.5 Key Characteristics of the Proposed Development

5.5.1 Construction Phase: Community Sports Complex

During this phase, the existing Community Sports Complex will be further developed. The initial phase of this development has been constructed (Reg. Ref.: 20/365), and the next phase will involve extending the Community Sports Complex with the construction of two further playing pitches, one with a perimeter running track, an all-weather pitch, a new club building, including a sports hall, a handball alley, changing rooms & toilets, a viewing gallery, a part-covered grandstand, additional parking and associated siteworks.

5.5.2 Construction Phase: Mine Development

During this phase:

- Screening berms will be constructed;
- Planting (including bolstering and retention of the existing perimeter hedgerow which sits in front of/is separate to the proposed planted screening berms) will be carried out;
- Perimeter fencing, will be installed;
- One residential house and three unoccupied houses and sheds on the Knocknacran West site will be demolished;
- A temporary diversion of the R179 will be constructed to maintain traffic flow while a Cut-and-Cover Tunnel is constructed; and
- A new vehicular entrance will be constructed to the existing mine site from the L4816.

5.5.3 Operational Phase: Community Sports Complex

During this phase, the Community Sports Complex will be in operation.

5.5.4 Operational Phase: Mine Development

The proposed phased extraction of gypsum by open-cast mining methods at Knocknacran West is to expose and recover the Upper and Lower gypsum seams/units remaining after the cessation of mining from the

Drumgoosat underground mine in 1989. In parallel, the Knocknacran Mine will be backfilled and remediated to near original ground.

During this phase:

- Open Cast mining will be undertaken to allow extraction of the Gypsum from the Drumgoosat Underground mine area closed in 1989. The gypsum extracted will maintain a continuous supply of mineral as the current Knocknacran mine will be exhausted as the new mine is brought into operation.
- The proposed Mine Development amounts to the replacement of the loss of mining of gypsum at the Knocknacran Open-Cast Mine with the mining of gypsum at Knocknacran West Open-Cast Mine. Both mine sites are comparable in size and nature of operations;
- Overburden and Interburden) will be stripped to expose the Gypsum Mineral at the new Knocknacran West Open cast mine.; The stripping of the site will be undertaken in a series of campaigns at specific times and last for defined periods of time (typically < 6 months) over the life of the proposed Mine Development. The stripping earthworks will be undertaken by a specialist contractor following a tender process.
- The gypsum remaining in the former Drumgoosat Underground Mine will be extracted by open-cast mining methods;
- The existing Knocknacran Mine will be restored to near original ground level;
- The existing processing plant on the existing Knocknacran Open-Cast Mine site will be refurbished;
- The existing plant site will process and despatch the extracted gypsum;
- The existing Drumgoosat dewatering pump, will be relocated to an existing borehole on the Knocknacran West site to continue to provide dewatering;
- The depth of mining will be to a depth to which the base of the Lower gypsum bed extends in the open-cast area which is ca. - 53 m OD; and
- The stripping of the site will be undertaken in a series of campaigns at specific times and last for defined periods of time (typically < 6 months) over the life of the proposed Mine Development. The stripping earthworks will be undertaken by a specialist contractor following a tender process.

5.5.5 *Restoration/Closure Phase: Community Sports Complex*

There is no proposal to close the Community Sports Complex development, and this phase is therefore not applicable in this case.

5.5.6 *Restoration/Closure Phase: Mine Development*

During this phase:

- The new Knocknacran West site will be returned to grassland and a waterbody;

- The existing Knocknacran site will be returned to near original ground level;
- The existing Knocknacran Plant site will be partially dismantled whereby mine plant is removed; and
- In line with the current CRAMP it is presented that here that a suitable developer would be sought to utilise the general buildings existing on the existing site for a light industrial usage into the future. This would be subject to a future developer seeking the necessary permits for continuation of use and change of use from mining to a non-mining use.

5.6 Potential Effects

The main potential impacts and associated effects considered in the assessment relate to the following:

- Activities or events that may impact size, density and composition of the local population or community;
- Activities or events which may impact or disrupt local employment and businesses surrounding the Site;
- Activities or events which may impact local amenity including: tourism attractions, local sport and recreation areas, designated and undesignated community lands, and religious centres, including severance to these;
- Activities or events which could impact local land use including agriculture, other industry and uses identified in local plans;
- Activities or events which could impact local populations or at-risk members of the local community. As identified in guidance documents from the European Commission and the Department of Housing, Planning and Local Government (DHPLG) the assessment of impacts on population and human health should focus on health issues and environmental hazards resulting from other environmental factors (those identified in Article 3(1) of the EIA Directive (2014/52/EU)), and does not require a wider consideration of human health effects which do not relate to those factors. The EPA's 2017 draft 'Guidelines on the information to be contained in environmental impact assessment reports' also identify that *'the assessment of impacts on population & human health should refer to the assessments of those factors under which human health effects might occur, as addressed elsewhere in the EIAR e.g. under the environmental factors of air, water, soil etc'*; and
- Activities or events which could impact persons employed at the site (direct staff and contractors) and members of the community, including non-motorised road users.

These potential impacts for the Proposed Development are considered and assessed in the following sections.

The occurrence of major accidents and disasters has been considered in Chapter 17.0 (Major Accidents and Disasters) of this EIAR.

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5.6.1 *Potential Effects: Construction Phase: Community Sports Complex*

5.6.1.1 **Potential Effects: Construction Phase: Community Sports Complex: Population**

The populations within the surrounding area and Enagh ED have shown small fluctuations over recent years. These increases and decreases over the census period have generally maintained the population at a consistent level. Local population changes due to construction workers migrating to the local area is possible, however it is anticipated that workers will travel from existing population centres in the Border area.

The construction of this complex will be short-term in duration. The magnitude of impact on the local community is considered to be Negligible (Adverse) and the sensitivity is considered to be High. The significance of the effect is considered to be Slight.

5.6.1.2 **Potential Effects: Construction Phase: Community Sports Complex: Employment / Local Economies**

Potential Effects: Construction Phase: Community Sports Complex: Employment / Local Economies: Employment at the Site

The receptor which has potential to experience employment effects is the workforce at the site and the surrounding area. This includes the construction industry and the local supply chain.

A short term increase in construction work will be created during the construction phase of the Community Sports Complex.

It is considered that the proposed construction of the Community Sports Complex will have a Negligible (Beneficial) impact on employment. No sensitivity values are assigned to receptors with potential to experience employment effects.

Potential Effects: Construction Phase: Community Sports Complex: Employment / Local Economies: Local Economies

Two developments are adjacent to the Community Sports Complex site, a petrol station and the existing mine site. It is considered that these businesses could continue to operate without substantial harm from the operations of the proposed Community Sports Complex thereby classifying them with a Low environmental sensitivity value. It is considered that the magnitude of direct environmental impacts from the Proposed Development on these local businesses, in terms of dust and noise will be Negligible (Adverse) and the effect to be Slight.

With regards to wider local business, overall, there will be a small increase locally on community services such as the adjacent petrol station through indirect purchasing of meals, creating a positive impact to the economic activity of Enagh ED.

These impacts are expected to have a minor socio-economic effect, with benefits to a limited number of businesses, workers, or residents, as such these impacts are deemed to be Low (Beneficial). The effect is considered to be Slight.

Potential Effects: Construction Phase: Community Sports Complex: Employment / Local Economies: Rural Enterprise

As there is no prescriptive guidance, a qualitative assessment of the potential impact of the proposed Community Sports Complex on rural enterprises has been undertaken using professional judgement. Several agricultural land holdings that operate as rural enterprises have been identified within the study area. The main potential impact is from noise and dust. It is considered that rural enterprise uses have a relatively low sensitivity to impacts arising from noise and dust as they are of a nature which could continue to operate without substantial harmed if affected by such disruption from the proposed construction of the Community Sports Complex.

The proposed Community Sports Complex will not create permanent changes to the spatial relationship of rural enterprises to any key infrastructure which could result in damage to the enterprises and compromise their viability, therefore it is considered that the impact will be Negligible (Adverse) and the significance to be Imperceptible.

5.6.1.3 Potential Effects: Construction Phase: Community Sports Complex: Amenity and Community

As noted, factors such as air quality, noise nuisance, traffic and landscape and visual impacts can impact the amenity of an area. These issues have been assessed separately in the respective chapters of this EIAR. Specific impacts on surrounding Material Assets have also been assessed in a dedicated chapter.

As the existing Community Sport Complex lands are a designated local green space and valued community facility they are valued with a High sensitivity.

The magnitude of impact from disturbance during the construction phase is considered to be Negligible (adverse), the sensitivity is considered to be High, and the significance is considered to be Slight.

Potential Effects: Construction Phase: Community Sports Complex: Amenity and Community: Severance

During the construction of the proposed Community Sports Complex works will be adjacent to the existing and operational Community Sports Complex.

There will be no severance to other amenity sites in the area during the construction phase of the proposed Community Sports Complex. Construction work areas on the site will be separated from the existing operational areas. Construction traffic will utilise the existing site entrance and wider road network, however, as outlined in the Traffic Chapter (Chapter 16.0), the entrance and junctions will operate within capacity. This will result in a temporary very minor alteration to the feature with no perceptible impact to health, population, or sensitive groups, therefore it is considered that the magnitude of impact is Negligible (adverse), the sensitivity is considered to be High, and the significance is considered to be Slight.

5.6.1.4 Potential Effects: Construction Phase: Community Sports Complex: Land Use

With respect to social considerations, there will be little or no change to local activities in the vicinity of the proposed Community Sports Complex or of land use onsite. The site is an existing operational Community Sports Complex with areas of barren ground where the further development would be constructed.

Previously, some of the land was part of the extraction area for Knocknacran Open-Cast Mine which has since been backfilled, no underground workings are located on this site. These scrubland areas within the existing Community Sports Complex site are valued with a Low environmental sensitivity. With the construction of

the Community Sports Complex (a High valued community facility), these lands will be changed to an amenity/recreational use which is Beneficial change of use. Addition of the complex is considered a Medium impact as it results in an improvement of attribute quality and the beneficial impact will effect a moderate number of people locally. The significance of the effect is considered to be Large (beneficial).

5.6.1.5 Potential Effects: Construction Phase: Community Sports Complex: Human Health, and Health and Safety

Potential Effects: Construction Phase: Community Sports Complex: Human Health, and Health and Safety: Human Health

During previous consultation periods with the former application (Reg. Ref. 22/34), a query was raised around the concept of “solastalgia” and its implications for the Proposed Development. Consideration is given here to the concept for the Community Sports Complex.

The concept of Solastalgia was invented by Dr. Glen Albrecht and originally reported from research carried out in late 2003 in rural/regional areas of New South Wales, Australia. Solastalgia was defined by Albrecht as a recognition of distress within an individual or at a community level resulting from the loss of a sense of place.

Solastalgia is a relatively new concept and papers continue to be published that seek to develop the concept and how it can be used in a world where human activity continuously modifies the environment. There is no guidance on its consideration or its quantification in EIA.

The further development of the Community Sports Complex will create a change in the existing landscape. It is noted that the site the Community Sports Complex is located on, is an existing and recently built structure. Prior to the construction of the initial sports complex, the site was part of the Knocknacran Open-Cast Mine for ca. 30 years. This site has undergone several changes in recent times.

It is noted by the author of the concept that the means to reduce distress associated with land degradation is through empowerment and restoration of a sense of place.

It is considered that the further development of the Community Sports Complex site will create a positive amenity facility for the community and help to provide a sense of place through a community facility.

Potential Effects: Construction Phase: Community Sports Complex: Human Health, and Health and Safety: Air Quality

The impacts of the construction phase of the Community Sports Complex on the air quality of the surrounding environs and receptors (both residential and non-residential) have been considered in Chapter 10.0 of this EIAR.

The assessment defined the potential dust emission magnitudes (relating to earthworks, construction and track-out), and the sensitivity of the area, and combined these to define the risk of unmitigated dust impacts in terms of human health, (as well as dust soiling and ecological impact). The assessment found that the mitigated risk to human health will be Negligible to Slight during the construction phase.

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Potential Effects: Construction Phase: Community Sports Complex: Human Health, and Health and Safety: Noise

Evaluation of the predicted noise levels against the limiting value for all Noise Sensitive Receptors during the construction period for the Community Sports Complex are within target levels by at least 5.5 dB for the daytime period, (Chapter 11.0 Noise). Some construction activities will take place on Saturday afternoons and occasional evenings. The limiting value for evenings and weekends is met by at least 0.5 dB.

Residual noise effects have been assessed in Chapter 11.0 as not significant.

Potential Effects: Construction Phase: Community Sports Complex: Human Health, and Health and Safety: Water

The impact from the proposed Community Sports Complex on the local hydrology and hydrogeology of the surrounding area has been assessed in Chapter 8.0. The assessment considered that fuel and other substance leaks or spills from stored substances or from machinery/equipment used during the construction of the Community Sports Complex could affect the chemistry of the soil during construction activities or could infiltrate to the groundwater through the bedrock or enter the surface water network indirectly. It also considered that the proposed Community Sports Complex will have an independent wastewater infrastructure and no impact is envisaged on the groundwater resource in the area. The assessment considers that it is proposed that surface water management during the construction will be routed through the existing mine water management system (due to suspended solids being allowed to settle out through the mine's water management system).

The water chapter has assessed that residual effects on water from this phase will not be significant.

Potential Effects: Construction Phase: Community Sports Complex: Human Health, and Health and Safety: Public Health

No additional utilisation of the local health care facilities is likely to arise from the construction phase of the Community Sports Complex.

Local health care facilities are considered to have a High sensitivity. It is considered that the proposed Community Sports Complex could have a Negligible (adverse) impact and a Slight effect. It is anticipated that there will be no significant effect on such services.

Potential Effects: Construction Phase: Community Sports Complex: Human Health, and Health and Safety: Health and Safety

The predominant health and safety concerns for the human environment surrounding the Community Sports Complex relates to the potential for human to stray into the working mine area which is adjacent. No underground mine workings underlie the site. Fencing and a screening berm are in place to prevent access to the mine site and it is considered unlikely that a potential impact will occur.

Staff and local populations are both valued with a High sensitivity. It is considered that the proposed Community Sports Complex will have a Negligible (adverse) impact and a Slight direct or indirect effect on health and safety.

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5.6.2 Potential Effects: Construction Phase: Mine Development

5.6.2.1 Potential Effects: Construction Phase: Mine Development: Population

A direct impact of the proposed Mine Development includes the removal of a currently occupied house. Further to this, three unoccupied house/structures will be removed to also enable development of the Site (Figure 5.6, above). The structure on land known as the Shirley Estate (to the west of the of L4900/R179 crossroads) will remain in place and unimpacted by the operations. The occupied dwelling has been valued with a High environmental sensitivity, (Table 5.2). The removal of the occupied dwelling will cause a loss of a key residential feature in the surrounding area. The impact is expected to have a minor socio-economic effect, as it will have a noticeable effect on a limited number of residents, and will lead to a permanent (but not drastic) change to the study area's baseline socio-economic conditions as a result; it is therefore considered that this Adverse impact affecting a low-moderate number of people is Low. The significance of the effect is considered to be Slight. Dwellings to be removed as part of the Proposed Development are in the ownership of SGMI. The other three unoccupied houses/structures are in various states of ruin and are not suitable as residences without significant remediation works.

The Applicant and the residents currently living in the occupied house have been in lengthy discussions with regards to the Proposed Development and its implications for the property. These residents will be relocated in close proximity to an adjacent townland where a new house has been granted planning permission. This location and move will ensure that established links to the local community are maintained.

The populations within the surrounding area and Enagh ED have shown small fluctuations over recent years. These increases and decreases over the census period have generally maintained the population at a consistent level. Local population changes due to construction workers migrating to the local area is possible, however it is anticipated that workers will travel from existing population centres in the Border area. Given the nature of mining activities within the area, the initial construction period for Knocknacran West Mine will be similar to stripping campaigns which have occurred periodically throughout the life of Knocknacran Mine and will also occur periodically throughout the life of Knocknacran West Mine. Therefore, it is considered that the proposed Mine Development will have a Negligible and Adverse direct or indirect impact on the population size, age distribution, density, and household composition in the study area or in the Enagh ED. The significance of effect is considered to be Imperceptible.

Potential impacts from the site which may affect local populations include nuisance from noise, dust, disruption to views and potential environmental emissions. The potential extent of these will be limited to the local community surrounding the Site. As identified in Section 5.3.5, the geographical study area for the assessment covers the development area and a buffer zone of 500 m from the EIAR study boundary. Assessment of potential impacts to the population of this local community has been based on residents living closest to the Site and within this 500 m buffer area. These potential impacts have been assessed in the respective chapters of: Land, Soils and Geology (Chapter 7.0), Water (Chapter 8.0), Climate (Chapter 9.0), Air Quality (Chapter 10.0), Noise (Chapter 11.0), and Landscape and Visual (Chapter 13.0). These receptors are valued with a High sensitivity. Based on the assessment of environmental impacts (identified above) in other chapters of this EIAR it is considered that the magnitude of impact on the local community from the proposed Mine Development will be Negligible and Adverse during the construction phase. The significance of effect is considered to be Imperceptible.

To avoid nuisance environmental impacts on air, noise, and water these activities will be managed in accordance with a Construction Environmental Management Plan (CEMP).

5.6.2.2 Potential Effects: Construction Phase: Mine Development: Employment / Local Economies

Potential Effects: Construction Phase: Mine Development: Employment / Local Economies: Employment at the site

The receptor which has potential to experience employment effects is the workforce at the site and the surrounding area. This includes the construction industry and the local supply chain. No sensitivity values are assigned to receptors with potential to experience employment effects.

A short term increase in construction work will be created during the construction phase of the Mine Development.

It is considered that the construction phase of the proposed Mine Development will have a Negligible (Beneficial) impact on employment.

Potential Effects: Construction Phase: Mine Development: Employment / Local Economies: Local Economies

Given the distance from the construction phase Mine Development areas and the nature of the small number of local businesses within the surrounding study area, it is considered that these businesses could continue to operate without substantial harm if affected by disruption such as from the temporary R179 road diversion and Cut-and-Cover tunnel construction, thereby classifying them with a Low environmental sensitivity value. It is considered that the magnitude of direct environmental impacts from the construction phase of the Mine Development on these local businesses, in terms of dust and noise will be Negligible (Adverse). The significance of effect is considered to be Imperceptible.

Potential Effects: Construction Phase: Mine Development: Employment / Local Economies: Rural Enterprise

As there is no prescriptive guidance, a qualitative assessment of the potential impact of the proposed Mine Development on rural enterprises has been undertaken using professional judgement. Several agricultural land holdings that operate as rural enterprises have been identified within the study area. The main potential impact is from noise and dust. It is considered that rural enterprise uses have a relatively Low sensitivity to impacts arising from noise, and dust as they are of a nature which could continue to operate without substantial harm if affected by such disruption from the proposed construction phase of the Mine Development.

The construction phase of the Mine Development will not create permanent changes to the spatial relationship of rural enterprises to any key infrastructure which could result in damage to the enterprises and compromise their viability, therefore it is considered that the proposed Mine Development would have a Negligible (Adverse) impact and an Imperceptible effect.

5.6.2.3 Potential Effects: Construction Phase: Mine Development: Amenity and Community

As noted, factors such as air quality, noise nuisance, traffic and landscape and visual impacts can impact the amenity of an area. These issues have been assessed separately in the respective chapters of this EIAR. Specific impacts on surrounding Material Assets have also been assessed in a dedicated chapter.

Although part of the overall Proposed Development, activities from the Mine Development have the potential to impact the directly adjacent Community Sports Complex. It is considered that impacts to other

community and recreation areas/lands will be lesser given their more distant proximity to the construction phase of the Mine Development and the temporary nature of works during this phase.

The construction phases of Mine Development will not have a direct impact on amenity features such as the Dun na Rí Forest Park. Given the distance and the general setting including the screened nature of the sites, an impact is considered unlikely.

It is considered that the activities could have a Negligible (adverse) magnitude of impact on the adjacent Community Sports Complex although these two uses have co-existed for many years successfully. As the existing Community Sport Complex lands are a designated local green space and valued community facility they are valued with a High sensitivity. The significance of the effect is considered to be Slight.

Potential Effects: Construction Phase: Mine Development: Amenity and Community: Severance

During the construction of the proposed Community Sports Complex, which is an existing and operational Community Sports Complex, there will be a requirement to construct a Cut-and-Cover Tunnel beneath the R179 for the Mine Development construction phase. The R179 is a regional road and given its importance on a regional scale (with limited potential for substitution) it is assigned a Medium receptor sensitivity. The construction of a Cut-and-Cover tunnel will necessitate the temporary diversion of the R179 to the north. The removal of roadways has the potential to cause severance, which is the extent to which members of communities are able (or not able) to move around their community and access services/facilities, (e.g., places of work, places of education, community and recreational facilities, and commercial areas).

The design of the proposed Mine Development, and in particular the design and staging of the Cut-and-Cover tunnel, will include the provision of a temporary alternative road diversion along the lands to the north of the existing R179. It is proposed that this diversion will be in place for a period of ca. 6 months. The temporary re-routing of the R179 will result in a temporary very minor alteration to the feature with no perceptible impact to health, population, or sensitive groups, therefore it is considered that the magnitude of impact is Negligible (adverse) and the effect is Imperceptible.

5.6.2.4 Potential Effects: Construction Phase: Mine Development: Land Use

With respect to social considerations, there will be little or no change to local activities in the vicinity of the proposed Mined Development as a result of the construction phase. The mainstay of local activities will remain agriculturally based.

The land use within the Knocknacran West Mine site primarily comprises brownfield, idle land which overlies underground mining workings, the sensitivity of the land is considered to be Low and the area is subject to ongoing monitoring and management. Land use associated with the occupied house that is to be demolished is considered to be High. There is an Adverse impact on this existing household who will be relocated to a neighbouring townland to enable the development of the open-cast area.

The magnitude of impact on the idle land is considered to be Negligible and the magnitude of impact on the residential land use is considered to be Low. The significance of effect is therefore considered to be Imperceptible to Slight.

5.6.2.5 Potential Effects: Construction Phase: Mine Development: Human Health, and Health and Safety

Potential Effects: Construction Phase: Mine Development: Human Health, and Health and Safety: Human Health

During previous consultation periods with the former application (Reg. Ref. 22/34), a query was raised around the concept of “solastalgia” and its implications for the Proposed Development. Consideration is given here to the concept for the Mine Development.

The concept of Solastalgia was invented by Dr. Glen Albrecht and originally reported from research carried out in late 2003 in rural/regional areas of New South Wales, Australia. Solastalgia was defined by Albrecht as a recognition of distress within an individual or at a community level resulting from the loss of a sense of place.

Solastalgia is a relatively new concept and papers continue to be published that seek to develop the concept and how it can be used in a world where human activity continuously modifies the environment. There is no guidance on its consideration or its quantification in EIA.

The construction phase for the Mine Development will involve the preparation of the Knocknacran West site to become an open-cast mine. It is considered that while mining for the resource (gypsum) will not commence in this phase, the construction phase will be considered the initial change from idle lands to mining by the wider community. Consideration is given here in the construction phase to the concept of solastalgia for the Mine Development, as this represents the initial change from existing environment to a mine environment and the appropriate phase to consider the concept.

The Knocknacran West site, like the Community Sports Complex, has had changing land uses over time. Between the 1950s and 1980s, the site contained the working underground Drumgoosat Mine, which had an above ground processing plant along the L4900 and near the village of Drumgoosat. The former Magheraclaone Mitchells GAA grounds were located in the south of the mine site. After closure of the former underground, the former plant site was removed, and the lands were returned to agricultural use. In recent times, the notable 2018 subsidence event caused the displacement of the GAA grounds, and the lands are currently in idle use and monitored and managed by SGMI.

A review of the development proposed in this application on Solastalgia was commissioned from Dr. Emmet Power MB BCH BAO MRCPsych MCPsychI in response to a query raised as Further Information by Monaghan County Council to the withdrawn planning application 20/365. This review is included as Appendix 5.1.

The review notes the following:

“In conclusion, distress around environmental change is a valid social concept; however, quantification of these effects is not yet easy or reliable. Ethnographic studies of populations living close to large-scale mining operations are compelling; however, the direct applicability of these findings to the proposed development is unwarranted.

Commercial Gypsum mining is not new in this community and has been part of this community for over 80 years.

The development has many positive aspects including the continuation of an ongoing activity in the area, economic value, the enhancement of community facilities and the stabilisation of land that has

become a source of concern regarding ongoing subsidence. The development is balanced in this regard. It is an evolution of development in the area.

People naturally have a concern with change and particularly with unknowns. The development proposed is a change in the area and it is important therefore that fear is mitigated by transparency and engagement with the community, that shows recognition of the local residents as stakeholders in the community.

In the case of the development that is the subject of the current planning application, SGMI has taken steps to engage with the community and seek feedback on the proposed development. The proposed development has been explained in detail through the appointment of a community liaison officer, the holding of open forums where residents were invited to see plans and meet representatives and designers of the works proposed, and through the publication of a community brochure widely distributed in the community.”

Mine developments are unique developments in that they are not permanent features given the finite nature of the resource. It is considered here that the proposed Mine Development is a continuation and evolution of an industry which has been in the community for decades.

Engagement with the community is a key cornerstone when it comes to addressing potential solastalgia. The review (Appendix 5.1) made the following recommendations in how to help alleviate potential effects:

- Continued dialogue with the local community on the progress of the development and land rehabilitation plans.
- Clear communications around how the company complies with environmental regulations.
- Communication and dialogue with local stakeholders on mitigation measures that will reduce noise pollution, dust, and enhance the areas visual amenity.

These will form part of the commitments SGMI implement for the Mine Development.

Following a preplanning consultation meeting with the Monaghan Heritage Officer for this application, SGMI also seek to recognise that a change to the sense of place will arise from their proposed development.

In the event of a grant of permission and subsequent development, SGMI undertake to develop a records pack that will create a permanent record of the of the area to be developed.

This records pack aims to recognise create a record of that place, will include ground level and aerial photographs of the area as it currently exists, topographical surveys of the area, habitat surveys of plants and hedgerows, historical records that have been discovered as part of the planning process. This records pack will be presented to the Monaghan County Library, Carrickmacross Historical Society and Magheraclone Community Centre for retention and future consultation by the public.

Potential Effects: Construction Phase: Mine Development: Human Health, and Health and Safety: Material Assets

As detailed in Chapter 16.0 (Material Assets) asbestos has been confirmed in three of the structures to be demolished on the Knocknacran West site, in insulation board, slate strips on gables, gaskets, pipe and cowl,

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roof sheeting and gutter. A specialist asbestos contractor will be engaged to remove this material during demolition works.

A specialist demolition waste contractor will also be appointed to oversee the removal, collection and segregation waste streams on the site and their appropriate and authorised removal from Site during demolition works.

Asbestos recovered during the demolition works of the structures will be removed by a licenced waste specialist (Enva). They will be responsible for collection, transport and properly disposal of the waste.

The sensitivity is considered to be Low and the magnitude of impact is considered to be Negligible (Adverse). Therefore, the effect is considered to be Imperceptible.

Potential Effects: Construction Phase: Mine Development: Human Health, and Health and Safety: Air Quality

The impacts of the proposed Mine Development on the air quality of the surrounding environs have been considered in Chapter 10.0 of this EIAR.

The assessment defined the potential dust emission magnitudes (relating to demolition, earthworks, construction and track-out), and the sensitivity of the area (relating to both people and property, and human health), and combined these to define the risk of unmitigated dust impacts in terms of dust soiling, human health and ecological impact.

The risk of unmitigated dust impacts from the construction areas (mine development, road diversion, tunnel and site entrance) are predicted to be Negligible apart from earthworks activities associated with the road diversion and the tunnel, which are predicted to be Low and dust soiling impacts associated with the mine development earthworks, which are predicted to be Medium. With the application of the proposed mitigation, all impacts are predicted to be Not Significant.

During periods of simultaneous construction related works, the combined activities likely to generate the greatest impacts on human health are all low impacts which will occur for a maximum of 5 months, although it will only be applicable during simultaneous earthworks activities. The combined activities likely to generate the greatest impacts on dust soiling are medium impacts which will occur for a maximum of 5 months, although it will only be applicable during simultaneous earthworks activities. During the overlap of earthwork activities, there is the potential for up to a medium to large risk of unmitigated dust impacts. To manage this potential in combination impacts, mitigation will be applied, as detailed in Section 10.7.2 of Chapter 10.0 and Appendix 10.1.

Potential Effects: Construction Phase: Mine Development: Human Health, and Health and Safety: Noise and Vibration

The impacts of the Proposed Development on the noise and vibration quality of the surrounding environs have been considered in Chapter 11.0 (Noise) and Chapter 12.0 (Vibration).

The noise assessment considered that the proposed temporary road diversion on the R179, the construction of the Cut-and-Cover tunnel, the construction of the screening berms and the relocation of the mine entrance will not cause traffic flows to change significantly during the duration of diversion and therefore this has been scoped out of further assessment.

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Consideration has been given to the potential risk of subsidence caused by personnel or plant on the mine site working over areas above the former underground mine during construction. SRK conclude in their technical memorandum (Appendix 7.14) that ground vibrations initiated by equipment (during construction) are unlikely to cause any new subsidence on the Site.

As the closest residential receptor is ca. 100 m from any potential source of vibration associated with the movement of overburden and interburden, the analysis indicates that the level of vibration necessary to cause damage to residential property will be contained to within 1 m of the operating plant. The receptor sensitivity is considered to be High, the impact magnitude to be negligible (adverse) and the effect to be Slight.

Potential Effects: Construction Phase: Mine Development: Human Health, and Health and Safety: Water

The impact from the proposed Mine Development on the local hydrology and hydrogeology of the surrounding area has been assessed in Chapter 8.0.

Potential fuel and or leaks from machinery or items stored on site have the potential to impact the underlying soils, subsoils and bedrock during the construction activities. Any spills or leaks would be contained and removed quickly onsite and the natural subsurface material would inhibit rapid percolation at this location. Plant and machinery will be regularly maintained and inspected for leaks or spills and bunds will be placed onsite around items required a bund for both the tunnel, diversion and new entrance works. The magnitude of the impact on groundwater or surface from potential leaks and spills is considered to be Negligible (Adverse). The sensitivity of the groundwater is considered to be Negligible while the sensitivity of the surface water is Medium. The significance of effect for surface water is considered to be Imperceptible while the significance of effect to groundwater is considered to be Imperceptible.

The construction phase will not cause an increase in flow to the existing lagoons on the Knocknacran Mine site. Rather, the flow from the site will remain similar to the baseline of ca. 3,625 m³/d during the construction period for the proposed Mine Development. The existing settlement lagoons will therefore have sufficient capacity to treat the volume of water during the construction phase of the development compared to the baseline conditions.

The magnitude of the impact on groundwater or surface from water management onsite is considered to be Negligible (Adverse). The sensitivity of the groundwater is considered to be Negligible while the sensitivity of the surface water is Medium. The significance of effect for surface water is considered to be Imperceptible while the significance of effect to groundwater is considered to be Imperceptible.

Potential Effects: Construction Phase: Mine Development: Human Health, and Health and Safety: Public Health

No additional utilisation of the local health care facilities is likely to arise from the construction phase of the Mine Development.

Local health care facilities are considered to have a High sensitivity. It is considered that the proposed Mine Development could have a Negligible (adverse) impact and a Slight effect. It is anticipated that there will be no significant effect on such services.

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Potential Effects: Construction Phase: Mine Development: Human Health, and Health and Safety: Health and Safety

The predominant health and safety concerns for the human environment surrounding the construction phase of the proposed Mine Development relates to the potential for humans and livestock to stray into the working area. Security fencing will be established around works areas to prevent egress.

With regard to the health and safety of workers on the site, activities are subject to health and safety legislation such as the Safety, Health & Welfare at Work Act (2005, as amended), along with the secondary legislation or statutory instruments under that Act, including the Safety, Health and Welfare at Work (General Application) Regulations 2007- 2021, and the Safety, Health and Welfare at Work (Mines) Regulations 2018.

A comprehensive employee Health and Safety programme (OHSAS 18001) is in place and maintained by SGMI at the facility. A strong emphasis on safety training and safety awareness is in place at the site and appropriate safety equipment and practices are rigorously employed in all aspects of the operation. Appropriate safety equipment and practices are employed in all aspects of the existing operation.

All site employees, contractors and subcontractors are required to wear a minimum personal protective equipment (PPE) whilst on-site, these are steel toed boots and a high visibility jacket or vest. Other task and area specific PPE are used at the Application Site, which includes safety glasses/goggles, hard hats, gloves and hearing protection.

Staff and local populations are both valued with a High sensitivity. It is considered that the proposed Mine Development will have a Negligible (adverse) impact and a Slight direct or indirect effect on health and safety.

Separately, consideration is given in Chapter 17.0 (Major Accidents and Disasters) to the significance of a subsidence event occurring beneath a public road or beneath lands overlying the mine workings. The residual effect is considered to be Not Significant.

5.6.3 Potential Effects: Operational Phase: Community Sports Complex

5.6.3.1 Potential Effects: Operational Phase: Community Sports Complex: Population

It is not considered likely that once the Community Sports Complex is operational, that there will be an impact of the population within the area. A community sports complex has been present in the area for several decades and it is considered unlikely that the new development will influence population loss or gain in the area. This has been scoped out for further consideration.

5.6.3.2 Potential Effects: Operational Phase: Community Sports Complex: Employment / Local Economies

Potential Effects: Operational Phase: Community Sports Complex: Employment / Local Economies: Employment at the site

The receptor which has potential to experience employment effects is the workforce at the site and the surrounding area. No sensitivity values are assigned to receptors with potential to experience employment effects.

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A community sports complex has been present in the area for several decades and it is considered unlikely that the new development will increase or decrease employment in the area substantially, given the nature of the development.

It is considered that the proposed Community Sports Complex will have a Negligible (Beneficial) impact on employment.

Potential Effects: Operational Phase: Community Sports Complex: Employment / Local Economies: Local Economies

Two developments are adjacent to the Community Sports Complex site, a petrol station and the existing mine site. It is considered that these businesses could continue to operate without substantial harm from the operations of the proposed Community Sports Complex thereby classifying them with a Low environmental sensitivity value.

The operation of the Community Sports Complex will support continued revenue in the commercial and food industries.

These impacts are expected to have a minor socio-economic effect, with benefits to a limited number of businesses, workers, or residents, as such these impacts are deemed to be Low (Beneficial) and the effect to be Slight.

Potential Effects: Operational Phase: Community Sports Complex: Employment / Local Economies: Rural Enterprise

As there is no prescriptive guidance, a qualitative assessment of the potential impact of the Proposed Development on rural enterprises has been undertaken using professional judgement. Several agricultural land holdings that operate as rural enterprises have been identified within the study area. There is no direct impact from the proposed Community Sports Complex and rural enterprise. Rural enterprise may be indirectly impacted by the proposed Community Sports Complex in a positive way as an amenity site workers may use. It is considered that rural enterprise uses have a relatively Negligible sensitivity to impacts arising from the development.

The proposed Community Sports Complex will not create permanent changes to the spatial relationship of rural enterprises to any key infrastructure which could result in damage to the enterprises and compromise their viability, rather, it may indirectly have a positive impact as an amenity facility. Therefore, it is considered that the proposed Community Sports Complex would have a Negligible (Beneficial) impact and an Imperceptible effect.

5.6.3.3 Potential Effects: Operational Phase: Community Sports Complex: Amenity and Community

As the existing Community Sport Complex lands are a designated local green space and valued community facility they are valued with a High sensitivity.

The operational phase of the proposed Community Sports Complex will provide an increase in amenity in the area. The provision of these amenity areas will have Beneficial long-term/permanent effects. With regards to the amenity of local clubs and businesses which benefit from tourism and recreation it is considered that the development of a high-standard Community Sports Complex will also have a positive effect. The magnitude of impact is considered Medium (beneficial) given the improvement of attribute quality, the sensitivity is considered to be High, and the significance is considered to be Moderate (beneficial).

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Potential Effects: Operational Phase: Community Sports Complex: Amenity and Community: Severance

It is not considered likely that once the Community Sports Complex is operational, that there will be severance associated with the development. This has been scoped out for further consideration.

5.6.3.4 Potential Effects: Operational Phase: Community Sports Complex: Land Use

Land use for the Community Sports Complex site will be changed long-term, or permanently, during the operational phase. Previously, some of the land was part of the extraction area for Knocknacran Open-Cast Mine which has since been backfilled, no underground workings are located on this site. The remaining land was composed of scrub land within the mine area. These derelict unoccupied lands are valued with a Low environmental sensitivity. With the operation of the Community Sports Complex (a High valued community facility), these lands will be changed to an amenity/recreational use which is Beneficial change of use. Addition of the complex is considered a Medium impact as it results in an improvement of attribute quality and the beneficial impact will effect a moderate number of people locally. The significance of the effect is considered to be Large (beneficial).

5.6.3.5 Potential Effects: Operational Phase: Community Sports Complex: Human Health, and Health and Safety

Potential Effects: Operational Phase: Community Sports Complex: Human Health, and Health and Safety: Human Health

The concept of solastalgia for the Community Sports Complex has been considered in Section 5.6.1.5 (Community Sports Complex construction phase – human health) above. The initial trigger point for change will occur during the construction phase.

It is considered that the further development of the Community Sports Complex site will create a positive amenity facility for the community and help to provide a sense of place through a community facility.

Once the Community Sports Complex is operational, it is considered the development represents a facility which can be used to have a positive impact and improve human health in the locality. The sensitivity of the Community is considered to be High, the impact magnitude to be Medium (Beneficial) and the significance of the effect to be Large (Beneficial).

Potential Effects: Operational Phase: Community Sports Complex: Human Health, and Health and Safety: Air Quality

It is not considered likely that once the Community Sports Complex is operational, that there will be a significant air quality impact from the development. The traffic flows associated with the operation of the sports complex are not yet defined, but due to the type and nature of the development the associated traffic flows are anticipated to be below this screening criteria, and therefore no detailed assessment is required, and traffic emissions have been screened out of this assessment as Not Significant.

Potential Effects: Operational Phase: Community Sports Complex: Human Health, and Health and Safety: Noise

It is not considered likely that once the Community Sports Complex is operational, that there will be a significant noise impact from the development. A community sports complex has been present in the area

for several decades and it is considered unlikely that the new development will increase noise in the area. This has been scoped out for further consideration.

Potential Effects: Operational Phase: Community Sports Complex: Human Health, and Health and Safety: Water

The impact from the Proposed Development on the local hydrology and hydrogeology of the surrounding area has been assessed in Chapter 8.0.

The predicted impacts likely to be associated with the Community Sports Complex will be the management of surface runoff from the site and the maintenance of the waste water treatment system which are currently permitted under Reg. Ref. 20/365. The existing (Reg. Ref. 20/365) wastewater treatment system was sized to accommodate a further development of the Community Sports Complex. The sensitivity of the groundwater receptor is considered to be Negligible, the sensitivity of the surface water in the area is considered to be Medium. The magnitude of impact from the further development is considered to be Negligible (adverse) and there will be no direct impact. The effect of this on the groundwater and surface water site is considered to be Imperceptible.

Potential Effects: Operational Phase: Community Sports Complex: Human Health, and Health and Safety: Public Health

No additional utilisation of the local health care facilities will arise from the operational phase of the Community Sports Complex. It is anticipated that there will be no significant effect the local health care facilities due to the operational phase of the Community Sports Complex. This has been scoped out for further consideration.

Potential Effects: Operational Phase: Community Sports Complex: Human Health, and Health and Safety: Health and Safety

The predominant health and safety concerns for the human environment surrounding the Community Sports Complex relates to the potential for human to stray into the working mine area which is adjacent. No underground mine workings underlie the site. Fencing and a screening berm are in place to prevent access to the mine site and it is considered unlikely that a potential impact will occur.

Staff and local populations are both valued with a High sensitivity. It is considered that the proposed Community Sports Complex will have a Negligible (adverse) impact and a Slight direct or indirect effect on health and safety.

5.6.4 Potential Effects: Operational Phase: Mine Development

5.6.4.1 Potential Effects: Operational Phase: Mine Development: Population

This is a continuation of existing mining in the area in line with current permitted extraction volumes. Therefore, it is considered that the proposed Mine Development will have a Negligible (Adverse) direct or indirect impact on the population size, age distribution, density, and household composition in the study area or in the Enagh ED. The significance of effect is considered to be Imperceptible on the population size, age distribution, density, and household composition (High sensitivity).

Potential impacts from the site which may affect local populations include nuisance from noise, vibration, dust, disruption to views and potential environmental emissions. The potential extent of these will be limited

to the local community surrounding the site. As identified in Section 5.3.5, the geographical study area for the assessment covers the development area and a buffer zone of 500 m from the EIAR study boundary. Assessment of potential impacts to the population of this local community has been based on residents living closest to the Site and within this 500 m buffer area. These potential impacts have been assessed in the respective chapters of: Land, Soils and Geology (Chapter 7.0), Water (Chapter 8.0), Climate (Chapter 9.0), Air Quality (Chapter 10.0), Noise (Chapter 11.0), Vibration (Chapter 12.0); and Landscape and Visual (Chapter 13.0). These receptors are valued with a High sensitivity. Based on the assessment of environmental impacts (identified above) in other chapters of this EIAR it is considered that the magnitude of impact on the local community from the proposed Mine Development will be Low (Adverse). The significance of effect is considered to be Slight.

5.6.4.2 Potential Effects: Operational Phase: Mine Development: Employment / Local Economies

Potential Effects: Operational Phase: Mine Development: Employment / Local Economies: Employment at the site

The receptor which has potential to experience employment effects is the workforce at the site and the surrounding area. This includes the construction industry (indirectly during the operational phase as the mine produces gypsum which is vital to the construction industry) and the local supply chain. No sensitivity values are assigned to receptors with potential to experience employment effects.

The numbers of employees which the mine has directly employed over time has varied due to increases and decreases of demand for gypsum products from the construction industry. The mine site has provided consistent employment for staff and currently the site employs up to 40 on a full-time basis, with a number of additional sub-contractors (up to ca. 45 at any one time) depending on operational needs. Indirect site employment is generated by contract overburden removal, contract drilling and blasting, suppliers of products and services such as fuel and oil and machinery suppliers. It is expected that this variable trend in employment will continue for the operational phase for the Mine Development. According to 2016 Census data (on which Table 5.12 is based), the total population in Enagh aged over 15 and at work is 284, out of a total population of 544 within the ED. Hence the level of employment provision to be continued as part of the Mine Development is substantial.

In conclusion, given the size, nature, duration of the site's operation, and the creation of long-term employment in the surrounding area, it is considered that the proposed Mine Development will have a Low (Beneficial) impact on employment.

Potential Effects: Operational Phase: Mine Development: Employment / Local Economies: Local Economies

Given the distance from the Mine Development and the nature of the small number of local businesses within the surrounding study area, it is considered that these businesses could continue to operate without substantial harm if affected by disruption such as from the short-term increase during stripping campaigns, thereby classifying them with a Low environmental sensitivity value. It is considered that the magnitude of direct environmental impacts from the proposed Mine Development on these local businesses, in terms of dust, vibration and noise will be Negligible (Adverse). The significance of effect is considered to be Imperceptible.

With regards to wider local business, overall, the mining activities will continue to provide a long-term, positive impact to the economic activity of Enagh ED. The continuation of mining activities will support continued revenue in the manufacturing and service sectors in addition to the revenue generated from mining activities to the local and national economies.

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The Mine Development will continue to provide gypsum as a raw material to the Applicants' manufacturing plant near Kingscourt and to a number of industrial customers, and as such, provides down-stream employment to many different parts of the construction and building industry. It is therefore considered that the operation of the proposed Mine Development will have a positive impact on economic activity in the local area and nationally.

These impacts are expected to have a minor socio-economic effect, with benefits to a limited number of businesses, workers, or residents, as such these impacts are deemed to be Low (Beneficial) and the significance of effect is considered to be Slight.

Potential Effects: Operational Phase: Mine Development: Employment / Local Economies: Rural Enterprise

As there is no prescriptive guidance, a qualitative assessment of the potential impact of the proposed Mine Development on rural enterprises has been undertaken using professional judgement. Several agricultural land holdings that operate as rural enterprises have been identified within the study area. The main potential impact is from noise, vibration and dust. These issues are and will continue to be strictly controlled under EPA Licence. It is considered that rural enterprise uses have a relatively Low sensitivity to impacts arising from noise, vibration, and dust as they are of a nature which could continue to operate without substantial harmed if affected by such disruption from the proposed Mine Development.

The proposed Mine Development will not create permanent changes to the spatial relationship of rural enterprises to any key infrastructure which could result in damage to the enterprises and compromise their viability, therefore it is considered that the proposed Mine Development could have a Negligible (Adverse) impact and an Imperceptible effect.

5.6.4.3 Potential Effects: Operational Phase: Mine Development: Amenity and Community

As noted, factors such as air quality, noise nuisance, vibration, traffic and landscape and visual impacts can impact the amenity of an area. These issues have been assessed separately in the respective chapters of this EIAR. Specific impacts on surrounding Material Assets have also been assessed in a dedicated chapter.

Commercial mining has been part of the history of this area since the 1950's and open-cast mining has been present since the 1980's. Mining activity has co-existed with the community for all of that time. Since the open-cast mine at Knocknacran commenced operations, a number of private dwellings have been constructed in very close proximity to the facility and very recently, planning permission has been sought and granted for a private residence directly adjacent to the existing open-cast and underground mine site boundary. SGMI in the course of its activities in the area has been presented with property valuations for development land carried out by Valuers acting for parties other than SGMI. These land valuations made by recognised local property professionals indicate that land values in the area remain unaffected by the potential development.

Care has been taken in the design of Knocknacran West Open-Cast Mine and in preparing operational plans to preserve the amenity that people will enjoy in their own homes. A number of specific design features have been incorporated to minimise the potential impact on properties outside the development area, these include the decision to incorporate a Cut-and-Cover tunnel to ensure no additional traffic is placed on the local road network.

The majority of the wooded area to the south of Drumgoosat village will be retained. This will ensure that no aspect of the proposed Mine Development will be visible from the village, including the school, residences and church (VP7 in Chapter 13.0 refers to this viewpoint).

In recent times, the subsidence of the old mine workings (Drumgoosat Mine) has proven to be concerning and disturbing for local residents. The development of the open-cast mine seeks to bring these old workings under engineering control and in so doing help to alleviate the hazard and concerns about the stability of those grounds in the future.

The development provides the potential to access the mine workings that pass under the public roadways along the R179 and LP4900, and to carryout backfilling of the mine workings that become accessible.

Although part of the overall Proposed Development, activities from the Mine Development have the potential to impact the directly adjacent Community Sports Complex. It is considered that impacts to other community and recreation areas/lands will be lesser given their more distant proximity to the Application Site. As the Community Sport Complex lands will be a designated local green space and valued community facility they are valued with a High sensitivity. The operation of the Site will be carried out under an EPA Industrial Emissions Licence and in accordance with Saint-Gobain's environmental management practices. It is considered that these activities could have a Low (Adverse) magnitude of impact on the adjacent Community Sports Complex although these two uses have co-existed for many years successfully. The significance of effect is considered to be Slight.

The operational phases of Mine Development could result in an Adverse impact on amenity features such as the Dun na Rí Forest Park (High sensitivity). However, given the distance and the general setting including the screened nature of the sites, this is considered unlikely. It is considered that these activities could have a Low (Adverse) magnitude of impact and that the significance of effect could be considered to be Slight.

Potential Effects: Operational Phase: Mine Development: Amenity and Community: Severance

It is not considered likely that once the Mine Development is operational, that there will be severance associated with the development. This has been scoped out for further consideration.

5.6.4.4 Potential Effects: Operational Phase: Mine Development: Land Use

With respect to social considerations, there will be little or no change to local activities in the vicinity of the Mine Development as a result of the proposed continuation of mining activities. The mainstay of local activities will remain agriculturally based.

The land use within the Knocknacran West Mine site primarily comprises brownfield, idle land which overlies underground mining workings and is considered to have a Low sensitivity. The area is subject to ongoing monitoring and management. The change in land use from its current use to mining will provide a long-term benefit, which will remove underground workings and significantly decrease the hazard and perceived risk of future subsidence. The magnitude of impact is considered to be Medium (beneficial) and the significance of effect to be Slight.

5.6.4.4 Potential Effects: Operational Phase: Mine Development: Human Health, and Health and Safety

Potential Effects: Operational Phase: Mine Development: Human Health, and Health and Safety: Human Health

The concept of solastalgia has been considered in Section 5.6.2.5 (within the Mine Development construction phase – human health) and is discussed in Appendix 5.1. It is considered in the construction phase of the Mine Development as it is considered that the construction phase will represent the point at which the Knocknacran West site will be seen by the community to change from idle lands to an open-cast mine.

HUMAN HEALTH AND POPULATION 5.0

As discussed in Section 5.6.2.4, it is important that communication with the community is undertaken during mining to help alleviate or prevent any potential impact caused by the Mine Development. SGMI commit to continuing to implement communications with the community and the recommendations below:

- Continued dialogue with the local community on the progress of the development and land rehabilitation plans.
- Clear communications around how the company complies with environmental regulations.
- Communication and dialogue with local stakeholders on mitigation measures that will reduce noise pollution, dust, and enhance the areas visual amenity;
- SGMI will continue to recognise that a change to the sense of place is arising from the Mine Development. SGMI will update the records pack that will be started in the construction phase, over the life of the mine to provide a record of the change onsite.

Potential Effects: Operational Phase: Mine Development: Human Health, and Health and Safety: Air Quality

The impacts of the proposed Mine Development on the air quality of the surrounding environs have been considered in Chapter 10.0 of this EIAR. This assessment reviewed the site monitoring of a number of air quality standards. The monitoring conducted included dust deposition monitoring, ambient air monitoring for total particulates (PM₁₀ and PM_{2.5}), and ambient nitrogen dioxide, (NO₂).

The assessment defined the potential dust emission magnitudes (relating to earthworks, construction and track-out), and the sensitivity of the area, and combined these to define the risk of unmitigated dust impacts in terms of human health, (as well as dust soiling and ecological impact). The assessment found that the mitigated risk to human health will be Negligible and Adverse during both the construction and operational phase of the Proposed Development.

The fine particulate contributions were assessed in the Air Quality chapter using the calculation of concentration and the distance from appropriate sources, (for conservatism the Site boundary was used).

When the assessment combined the likely concentration with the average historical background value, the maximum annual PM₁₀ predicted environmental concentration would be below the relevant air quality standard. Similarly, the annual PM_{2.5} predicted environmental concentration would also be below the relevant air quality standard, at the closest receptor.

Existing NO₂ monitoring show that the annual and hourly average ambient concentrations of NO₂ in and around the proposed Knocknacran West Site are below the respective AQS limits. The greatest average concentrations were recorded at the 'DMS9' monitoring location; with an annual average of 30.5% of the AQS limit, and an hourly average of 12.2% of the AQS limit. The results recorded at 'DMS9' are around twice those recorded at the remaining monitoring locations. This is highly likely to be a result of the location of 'DMS9', as it is directly adjacent to the R179 regional road, and as a result will account for traffic contributions of NO₂. The monitoring shows that the current ambient concentrations of NO₂, which includes the existing mining and agricultural activities in the area, are within the specified limit values. The continued extraction activities are not proposing to increase NO₂ emissions.

The overall impact from the operation of the Site, in terms of dust emissions and fine particulates, and considering mitigation, is considered Negligible to the air environment and Not Significant.

Potential Effects: Operational Phase: Mine Development: Human Health, and Health and Safety: Noise and Vibration

The impacts of the Proposed Development on the noise and vibration quality of the surrounding environs have been considered in Chapter 11.0 (Noise) and Chapter 12.0 (Vibration).

Noise emissions from the proposed operation will be consistent in type to the existing mining operation which has been in operation since 1988. Over this time period feedback from neighbours has informed the company's operations and amendments have been made to the companies operating procedures to mitigate adverse noise impacts.

For noise associated with mobile plant most activity takes place during larger scale overburden and interburden removal operations which occur sporadically and infrequently during the life of the open-cast mine.

During the initial overburden and interburden stripping campaigns, equipment is operating at existing ground level where noise may be heard at nearby neighbouring properties. As the mine develops activities take place below existing ground level within the open-cast pit. Experience over more than 30 years in the area has indicated no noise complaints from "in-pit" activities.

Main operations within the proposed open-cast extension on any given day will be crushing (using semi-mobile equipment) and associated mobile plant (excavators, loaders, haul trucks etc.) and conveyors. Drill rigs will be in operation onsite prior to blasting. Operational noise within the plant area will be consistent with existing activities.

Most of the noise reported by neighbours relates to sounds arising from equipment operating at existing ground level, such as the artificial sounds of reversing alarms particularly early in the morning. Protocols developed over time have addressed these issues by delaying starting times until after 8 am, and ensuring operations cease by 8 pm. Where it is necessary to utilise pumps and mobile generators at existing ground level, equipment is housed in noise abating structures.

Blasting is scheduled to take place normally on or about 4 pm after school hours, but still during working hours and before social evening activities take place.

Chapter 11.0 (Noise) describes the modelling and scenarios that have been considered for noise impacts during construction and ongoing mining activities. Data collected from baseline measurements and the long term mine monitoring program have been used to inform the modelling.

The predicted noise levels (daytime, evening and night-time) due to the proposed Mine Development are predicted to be below the noise guidance limits at all the closest sensitive receptors. Given the mitigation measures to be employed and the distances from the proposed Mine Development to the sensitive locations, the development will not impact adversely on the surrounding residential amenity or health of the local communities. The sensitivity of receptors in the area is considered to be High, the impact magnitude to be no change to low and the significance of effect to be neutral to Slight (adverse).

Blasting practices at both the existing underground and open-cast mines has shown an excellent compliance record with the relevant limits. Blasting practices will not differ from those of the existing operation. It is considered that with the maintenance of these practices and the implementation of appropriate mitigation measures set out in Chapter 12.0 (Vibration) there will be no deterioration in amenity of the overlying lands or health of local communities as a result of vibration at the Knocknacran West site.

The impact magnitude of these blast events is considered to be Low – Negligible while the sensitivity of the receptor is considered Medium – High and the significance of effect is considered to be Imperceptible to Slight.

Potential Effects: Operational Phase: Mine Development: Human Health, and Health and Safety Water

The impact from the Proposed Development on the local hydrology and hydrogeology of the surrounding area has been assessed in Chapter 8.0. The assessment identifies a key issue for the proposed new excavation is to ensure there is proper protection of any local or community water supply sources and quality.

A key hydrogeological point is that the Knocknacran West site, is already a dewatered site. The existing and closed Drumgoosat Underground Mine is being dewatered by the Applicant at present and has been since the 1950s, when Drumgoosat was originally opened. This will continue during the operational life of the proposed Mine Development.

The footprint area of the proposed new open cast will be largely within the footprint area of existing Drumgoosat Underground Mine and the existing Knocknacran Open-Cast Mine. The existing mines operate within a well-established drawdown zone of contribution which has been in existence since the mid-1960s since the time of development of the Drumgoosat Mine (a period of nearly 60 years). The mines are not located within a Source Protection Area of a public water supply scheme. The level of activity proposed for the Knocknacran West open cast will be in keeping with the level of activity previously taking place at Knocknacran Open-Cast.

The proposed Mine Development also does not seek any change to the current limits that it operates to, with respect to water discharges to the River Bursk. The proposed Mine Development is the same type of development that has taken place in the existing Knocknacran Open-Cast Mine since 1988, and which has been licenced by the EPA since 2002.

SGMI's mining operations do not utilise water as part of the mining process. However, existing mine operations do require water to be moved. This will continue for the proposed Mine Development. The water moved from operating areas is naturally occurring and will not have had any chemicals added or been involved in any industrial process. It will be released to the nearby River Bursk via an EPA controlled discharge licence.

Because of the natural geology at the site (the Gypsum Kingscourt Formation has inherently elevated sulphate levels), the groundwater that will be encountered and moved during mining operations has naturally occurring high concentrations of sulphate. To ensure that the elevated sulphate in the mine water does not compromise the water quality of the surface waters it is discharged to, SGMI will continue to monitor the receiving water of the River Bursk and control the quantity of water it discharges to ensure compliance with the EPA licence sulphate limits.

All historical and current extraction activities at the site have occurred beneath the water-table, therefore water is pumped, treated and discharged from the site. These abstractions have the potential to affect surrounding water supplies. Groundwater entering the existing Drumgoosat underground workings is pumped from a borehole to a series of settlement ponds which drain through an oil interceptor prior to being discharged to an existing licensed receiving water discharge point in the River Bursk. Groundwater and surface water entering the existing Knocknacran Open-Cast Mine is pumped from a sump located on the existing pit floor and routed through the same system. Groundwater from the adjacent operating underground Drummond Mine also passes through the settlement ponds prior to discharge. The settlement ponds are located within the Application Site. It is proposed to update the existing and permitted pumping,

treatment, and discharge activity for the duration of this development, including the planned water management arrangement for the proposed Knocknacran West Mine. Other site activities, if not managed correctly, have the potential to impact underlying water quality.

A groundwater monitoring programme (in compliance with IE Licence P0519-04) is in place on Site and has been documented in Chapter 8.0. This programme will be maintained in order to ensure compliance with the appropriate standards and that the operation does not have any significant impacts on local receptors, including the supply schemes; thereby ensuring there are no consequential effects on human health from a deterioration in water chemistry. For the purposes of this assessment, it is considered that water quality will continue to be managed in accordance with existing EPA Licencing arrangements, therefore impacts will be neutral.

Known water supply systems in the area surrounding the mine sites are discussed in Chapter 8.0. In addition to the identified water supply schemes a domestic groundwater supply survey (September 2019), identified a total of 22 third-party wells (and springs) within 500 m of the Application Site. Based on the available information, it is apparent that all existing local and community water supply schemes are hydrogeologically disconnected and isolated from the gypsum mining areas. No impacts have been observed to date, and it is not expected that the proposed extraction and restoration activities at Knocknacran and Knocknacran West mines will have any future impact on any water supply systems.

Because of the low permeability nature of the glacial till, and the fact that superficial water levels have become decoupled from drawdown in the underlying Kingscourt Gypsum sequence, the propagation of drawdown towards these wells as a result of the planned Knocknacran West open cast excavation would not be expected.

The sensitivity of the groundwater resource (which the domestic wells are abstracting from) is considered to be Negligible, the magnitude of impact due to the proposed Mine Development is considered to be Negligible (adverse). The significance of the effect is considered to be Imperceptible.

Potential Effects: Operational Phase: Mine Development: Human Health, and Health and Safety: Public Health

No additional utilisation of the local health care facilities will arise from the continuation of mining operations at the Application Site.

Local health care facilities are considered to have a High sensitivity. It is considered that the proposed Mine Development could have a Negligible (adverse) impact and a Slight effect. It is anticipated that there will be no significant effect on such services.

Potential Effects: Operational Phase: Mine Development: Human Health, and Health and Safety: Health and Safety

The Applicant as business owner is ultimately responsible for the health and safety management of the proposed Mine Development. The predominant health and safety concerns for the human environment surrounding the operational phase of the proposed Mine Development relates to the potential for humans and livestock to stray into the site and also from blast related activity. Security fencing will be established around works areas to prevent access.

In terms of safety measures on the open-cast benches, the overall open-cast mine design is based on the analyses and modelling of the geotechnical parameters of the materials underlying the site and from experience gained in mining the existing Knocknacran Open-Cast Mine over the past 30 years.

As part of this geotechnical modelling, a total of 8 representative cross-sections around the perimeter of the proposed open-cast mine were selected for stability analyses (using modelling software SLOPE-W) to meet the design criteria for a Factor of Safety (FoS) of 1.5 .

The design criteria for the proposed open-cast mine follows the HSA's 'Guidelines to the Safety, Health and Welfare at Work (Quarries) Regulations 2008' (April 2020). In terms of bench design and safety, the following criteria have been used:

- 6 m high benches with 6 m benches widths, and a 45° batter angle on bench faces in the interburden (and a batter angle of 27° in the overburden);
- The installation of drainage channels on each bench to form part of the overall water management system for the excavation throughout its life;
- Maintaining bench height where design, ground/geotechnical conditions and regulations/guidelines allow; and
- Providing safety berms/edge protection designed at 1.5 x or higher than the radius of the largest wheel/tyre.

With regard to the health and safety of workers on the site, activities are subject to health and safety legislation such as the Safety, Health & Welfare at Work Act (2005, as amended), the Safety, Health and Welfare at Work (General Application) Regulations 2007- 2021, and the Safety, Health and Welfare at Work (Mines) Regulations 2018.

A comprehensive employee Health and Safety programme (OHSAS 18001) is in place and maintained by SGMI at the facility. A strong emphasis on safety training and safety awareness is in place at the site and appropriate safety equipment and practices are rigorously employed in all aspects of the operation. Appropriate safety equipment and practices are employed in all aspects of the existing operation.

All site employees, contractors and subcontractors are required to wear a minimum personal protective equipment (PPE) whilst on-site, these are steel toed boots and a high visibility jacket or vest. Other task and area specific PPE are used at the Application Site, which includes safety glasses/goggles, hard hats, gloves and hearing protection.

The site's existing Emergency Response Plan for Knocknacran and Drummond mines will be adapted to include Knocknacran West. The plan will describe the design features that must be included for all works during the development of the Knocknacran West open-cast mine to ensure pit slope stability.

The assessment of mine stability (underground mine stability) is detailed in Chapter 7.0 (Land, Soils and Geology). The assessment considers that the change in stability by the mining of Knocknacran West or the placement of the cut and cover tunnel (impacts considered for workers and people in the area such as road users with a High sensitivity) is Negligible (adverse) and the significance of the effect is Slight.

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Staff and local populations are both valued with a High sensitivity. It is considered that overall, the proposed Mine Development will have a Negligible (adverse) impact and a Slight direct or indirect effect on health and safety.

Separately, consideration is given in Chapter 17.0 (Major Accidents and Disasters) to the significance of a subsidence event occurring beneath a public road or beneath lands overlying the mine workings. The residual effect is considered to be Not Significant.

5.6.5 *Potential Effects: Closure/Restoration Phase: Community Sports Complex*

No closure phase is proposed for the Community Sports Complex, therefore the potential impact and effect from this phase is not considered further. It is scoped out for consideration in this phase.

5.6.6 *Potential Effects: Closure/Restoration Phase: Mine Development*

5.6.6.1 **Potential Effects: Closure/Restoration Phase: Mine Development: Population**

It is considered that the closure/restoration phase of the Mine Development will be similar to the construction phase of the Mine Development in the short term as temporary construction (demolition) workers may migrate to the area, although in small volumes. Therefore, it is considered that the proposed Mine Development will have a Negligible (adverse) direct or indirect impact on the population size, age distribution, density, and household composition in the study area or in the Enagh ED and that the sensitivity is considered to be High. The significance of effect is considered to be Imperceptible.

Potential impacts from the site which may affect local populations include nuisance from noise, dust, disruption to views and potential environmental emissions. The potential extent of these will be limited to the local community surrounding the site. As identified in Section 5.3.5, the geographical study area for the assessment covers the development area and a buffer zone of 500 m from the EIAR study boundary. Assessment of potential impacts to the population of this local community has been based on residents living closest to the site and within this 500 m buffer area. It is considered that during the closure phase, there may be more receptors within the area given the length of time until closure, however, it is considered that the appropriate most proximal receptors to the site are already captured in the baseline assessment. These potential impacts have been assessed in the respective chapters of: Land, Soils and Geology (Chapter 7.0), Water (Chapter 8.0), Climate (Chapter 9.0), Air Quality (Chapter 10.0), Noise (Chapter 11.0), and Landscape and Visual (Chapter 13.0). These receptors are valued with a High sensitivity. Based on the assessment of environmental impacts (identified above) in other chapters of this EIAR it is considered that the magnitude of impact on the local community from the proposed Mine Development will be Negligible (adverse) during the closure/restoration phase. The significance of effect is considered to be Imperceptible.

To avoid nuisance environmental impacts on air, noise, and water these activities will be managed in accordance with a Construction (Demolition) Environmental Management Plan (CEMP).

The physical closure works will be followed by a period of monitoring, during which time SGMI will carry out monitoring and measurements to demonstrate that the closure works have been successful, and that all environmental metrics for the site are stable. This will be controlled by the EPA through the IE Licencing procedure. Following this, it is envisaged that the former mining areas will transition to an aftercare period, which will be of reduced scope and intensity to the monitoring carried out during the closure works.

5.6.6.2 Potential Effects: Closure/Restoration Phase: Mine Development: Employment / Local Economies

Potential Effects: Closure/Restoration Phase: Mine Development: Employment / Local Economies: Employment at the site

Over time, and once restoration of Knocknacran West is completed, ceasing the extraction activities onsite will result in a loss of extractive industry related jobs but a short-term increase in construction related jobs during decommissioning of the plant site and refurbishment for future industrial use.

SGMI will engage with the relevant government agencies (e.g., Enterprise Ireland and The Irish Development Agency) to promote the site and attract replacement industry to reuse the existing infrastructure on the plant site (subject to a future planning permission to be sought and granted by a future developer) which will replace some or all of the mining jobs that will be lost when the mine closes.

No sensitivity values are assigned to receptors with potential to experience employment effects.

A report commissioned by the Department of Environment, Climate and Communications and carried out by AECOM (2020) titled “Social, Environmental and Economic Assessment of Galmoy and Lisheen Mines” noted that both the former Lisheen and Galmoy Mines had a positive impact on employee’s education, training and providing upskilling programmes in preparation for closure. The study found that in general, there were low levels of long-term unemployment and that the redundancy payments enabled workers to transition into new work.

As outlined in the Closure, Restoration and Aftercare Management Plan (Sections 10.1.3 and 11.4 of the CRAMP, included in Appendix 3.3 of the EIAR) to mitigate the potential effects of loss of existing mine related jobs, each year the Applicant will review and revise its life of mine, in which it identifies the mineral resource and reserve, and projects the rate of mining required to adequately work the gypsum deposit. As such there will always be a good understanding of the life of mine.

Having an understanding of when the operations are going to cease will give management the opportunity to implement programmes well in advance of the closure date to help employees prepare for closure and to assist them with the transition into new employment.

A number of different mechanisms will be put in place by SGMI to keep its staff informed of changes in the business environment. This information will be part of the overall communications programme operated by SGMI for all its Irish employees. This includes passive means such as emails, notice boards and newsletters, as well as active communication from line management to their teams.

The impact magnitude is considered to be Low (Adverse).

Potential Effects: Closure/Restoration Phase: Mine Development: Employment / Local Economies: Local Economies

During the restoration phase of the development potential impacts to local economies surrounding the development may result from noise and dust (from earthworks and demolition works) generated by restoration (such as removal of plant and machinery onsite) activities within the site in the short term.

The physical closure works will be followed by a period of monitoring, during which time SGMI must carry out monitoring and measurements to demonstrate that the closure works have been successful, and that all environmental metrics for the site are stable. This will be controlled by the EPA through the IE Licencing

procedure. Following this, it is envisaged that the former mining areas will transition to an aftercare period, which will be of reduced scope and intensity to the monitoring carried out during the closure works.

The local receptors which may be affected are considered to have a Low sensitivity. It is considered that the magnitude of impact is Low, given the level of construction activity proposed. This results in a Slight short term adverse effect for local services during the restoration phase.

Potential Effects: Closure/Restoration Phase: Mine Development: Employment / Local Economies: Rural Enterprise

As there is no prescriptive guidance, a qualitative assessment of the potential impact of the Proposed Development on rural enterprises has been undertaken using professional judgement. Several agricultural land holdings that operate as rural enterprises have been identified within the study area. The main potential impact is from noise and dust. These issues are and will continue to be strictly controlled under EPA Licence. It is considered that rural enterprise uses have a relatively Low sensitivity to impacts arising from noise and dust as they are of a nature which could continue to operate without substantial harmed if affected by such disruption from the closure/restoration of the Mine Development.

The physical closure works will be followed by a period of monitoring, during which time SGMI must carry out monitoring and measurements to demonstrate that the closure works have been successful, and that all environmental metrics for the site are stable. This will be controlled by the EPA through the IE Licencing procedure. Following this, it is envisaged that the former mining areas will transition to an aftercare period, which will be of reduced scope and intensity to the monitoring carried out during the closure works.

The proposed Mine Development will not create permanent changes to the spatial relationship of rural enterprises to any key infrastructure which could result in damage to the enterprises and compromise their viability, therefore it is considered that the proposed Mine Development could have a Negligible (Adverse) impact and an Imperceptible effect.

5.6.6.3 Potential Effects: Closure/Restoration Phase: Mine Development: Amenity and Community

As noted, factors such as air quality, noise nuisance, vibration, traffic and landscape and visual impacts can impact the amenity of an area. These issues have been assessed separately in the respective chapters of this EIAR. Specific impacts on surrounding Material Assets have also been assessed in a dedicated chapter.

The restoration plan for Knocknacran West Mine and Knocknacran Mine will provide areas of increased biodiversity and amenity in the area. Specifically, the extraction and subsequent restoration of Knocknacran West Mine will restore the site to a use which will be an amenity to the community and removes the risk of further subsidence on the site. The provision of these amenity areas will have Beneficial long-term/permanent effects. The duration of these effects is deemed to be in the long-term (15 - 60 years), or permanent (over 60 years). The magnitude of impact is considered Medium (beneficial impact which will affect a moderate number of people locally) given the improvement of attribute quality, the sensitivity of the receptor to be High and the significance of effect is considered to be Large (beneficial).

Potential Effects: Closure/Restoration Phase: Mine Development: Amenity and Community: Severance

It is not considered likely that once the Mine Development is in the restoration phase, that there will be severance associated with the development. This has been scoped out for further consideration.

5.6.6.4 Potential Effects: Closure/Restoration Phase: Mine Development: Land Use

The long-term restoration plans for the Mine Development will return land for amenity, agricultural, light industrial and enhanced biodiversity uses.

A restoration plan is currently in place for the existing Knocknacran Mine under Reg. Ref. 17/217, this allows for the restoration of the site to mixed use agricultural land and a lake. The proposed restoration of Knocknacran Mine presented in this EIAR would revise the restoration plan currently permitted, to allow the Knocknacran Mine to be restored to agricultural land. A mixed-use area comprising agricultural land, woodland and a waterbody is proposed to be located on the Knocknacran West Mine site upon restoration. A phased restoration approach will be implemented to minimise the extent and duration of the final restoration works. The restoration of the Knocknacran West Mine and Knocknacran Mine is considered to have a permanent Beneficial and Medium impact on land use through the final restoration to both agricultural and amenity lands, and the removal of the underground workings. Restoration impacts to these lands are also discussed as appropriate in Chapter 7, Land Soils and Geology and Chapter 6, Biodiversity.

The magnitude of impact has been classified as Medium (beneficial), particularly given the fact that the areas overlying the 2018 subsidence event are currently unavailable for use. The sensitivity of the land is considered to be Low and the significance of effect to be Slight (beneficial).

5.6.6.5 Potential Effects: Closure/Restoration Phase: Mine Development: Human Health, and Health and Safety

It is considered that the closure/restoration phase of the Mine Development will create a beneficial afteruse through the removal of underground workings beneath the site and restoration of habitat and the creation of new, non-mining habitat.

It is important that communication with the community is undertaken during restoration to help alleviate or prevent any potential negative impact. SGMI commit to continuing to implement communications with the community and the recommendations below:

- Continued dialogue with the local community on the progress of the development and land rehabilitation plans.
- Clear communications around how the company complies with environmental regulations.
- Communication and dialogue with local stakeholders on mitigation measures that will reduce noise pollution, dust, and enhance the areas visual amenity; and
- SGMI will continue to recognise that a change to the sense of place is arising from the Mine Development. SGMI will update the records pack that will be started in the construction phase, to provide a record of the change onsite.

Potential Effects: Closure/Restoration Phase: Mine Development: Human Health, and Health and Safety: Air Quality

The impacts of the closure/restoration phase of the proposed Mine Development on the air quality of the surrounding environs have been considered in Chapter 10.0 of this EIAR.

In the longer term, on completion of the site restoration, the concentration of airborne dust would be expected to be reduced from operational levels as the result of covering and seeding of exposed, un-vegetated soil surfaces. This will most likely constitute a minor positive impact for the local environment.

The overall effect from the operation of the Site, in terms of dust emissions and fine particulates, and considering mitigation, is considered Negligible (adverse) to the air environment in the short term and Negligible (beneficial) in the long term and Not Significant.

Potential Effects: Closure/Restoration Phase: Mine Development: Human Health, and Health and Safety: Noise

The impacts of the Proposed Development on the noise of the surrounding environs has been considered in Chapter 11.0 (Noise).

Main operations on any given day will be associated mobile plant (excavators, loaders, haul trucks etc.). The sensitivity of receptors in the area is considered to be High, the impact magnitude to be no change to low and the significance of effect to be neutral to Slight (adverse).

Existing baseline noise levels will be restored and possibly reduced with the cessation of mine activity as closure progresses. Closure activities will be controlled by the EPA through the IE licencing procedure and any other future operations at the Application Site will be subject to future assessment and control.

Given the mitigation measures to be employed and the distances from the proposed Mine Development to the sensitive locations, the closure and restoration of the development will not impact adversely on the surrounding residential amenity or health of the local communities.

Potential Effects: Closure/Restoration Phase: Mine Development: Human Health, and Health and Safety: Water

The impact from the closure/restoration phase of the proposed Mine Development on the local hydrology and hydrogeology of the surrounding area has been assessed in Chapter 8.0.

Upon eventual completion of mining and placement of backfill, the dewatering pumps in Knocknacran West open-cast and the dewatering well will be permanently shut down and the water levels within the open-cast void will start to rise. The proposed placement of low permeability backfill (mudstone) within the existing Knocknacran open-cast will have the positive benefit of reducing any hydraulic connection in the gypsum strata and effectively isolating the Drumgoosat / Knocknacran West mining areas from the Drummond Mine to the south.

The sensitivity of groundwater is considered to be Negligible the magnitude of impact is considered to be Negligible (adverse) on groundwater, and the significance of effect is considered to be Imperceptible.

During the restoration phase, the level of the water body in the open cast is expected to rise slowly with time to a final level of 38-39 m OD, when the lake will overflow into the original Corduff Stream on the northeast side. The predicted area of the water body is approximately 26 ha, or about 15% of the current Corduff stream catchment upstream of monitoring point "SW Flow F". The presence of the waterbody will increase the effective catchment of the Corduff stream by about 11 ha, extending the Corduff catchment area to Lough Fea from about 169 hectares to about 180 hectares.

The sensitivity of surface water is considered to be Medium, the impact magnitude of a surface water body on the Knocknacran West site (including chemistry considerations) rather than the Knocknacran site in the restoration phase is considered to be Negligible (beneficial).. The significance of the effect is considered to be Slight (beneficial).

Potential Effects: Closure/Restoration Phase: Mine Development: Human Health, and Health and Safety: Public Health

No additional utilisation of the local health care facilities is anticipated to arise from the closure/restoration phase of mining operations at the Application Site.

Local health care facilities are considered to have a High sensitivity. It is considered that the proposed Mine Development could have a Negligible (adverse) impact and a Slight effect. It is anticipated that there will be no significant effect on such services.

Potential Effects: Closure/Restoration Phase: Mine Development: Human Health, and Health and Safety: Health and Safety

Provisions for safety are provided in the draft CRAMP (Section 4.5 of Appendix 3.3) and will be updated and refined during the operational life of the development and in advance of closure.

The CRAMP identifies that there are two key aspects with respect to open-cast mine safety that are discussed below:

1. Geotechnical Stability of the Open-Cast Mine during and Post Closure; and
2. Management of Access to the Open-Cast Post Closure.

Geotechnical Stability of the Open-Cast Mine during and Post Closure

The geotechnical setting of Knocknacran West is well understood, with the characteristics of the site and the materials underlying the site having been well established by previous work. During 2018 and 2019 Golder conducted additional borehole sampling and laboratory testing to confirm the stratigraphy and material parameters associated with the proposed Knocknacran West Mine. A total of 9 representative cross-sections around the perimeter of the proposed Knocknacran West Mine were selected for stability analyses to meet the design criteria for a Factor of Safety (FoS) of 1.5 for the overall open-cast slope.

The site's existing Emergency Response Plan for Knocknacran and Drummond mines will be adapted to include Knocknacran West. The plan will describe the design features that must be included for all works during the development of the Knocknacran West open-cast mine to ensure pit slope stability. The plan will continue into the closure phase to ensure that closure works enhance the stability of the open pit.

Management of Access to the Open-Cast Post Closure

Despite the implementation of a robust closure plan certain hazards will remain at the open-cast once the mine is rehabilitated. In particular there is a risk associated with deep open water that remains, in the event of unauthorised access. SGMI will reprofile the open-cast walls to provide a stable landform and minimise any high walls. However, the landform, like many natural landforms may pose a slip and trip hazard to people in the event of unauthorised access.

The solution to be adopted by SGMI to manage this risk is to secure the area to prevent access by unauthorised people. A fence will be put in place around the entire perimeter of the area and signage will be erected warning people of the hazard. The fence will be checked on a scheduled basis and if necessary, repairs will be carried out. As part of the checks, observations will be made to establish if there is evidence of access being gained. In the event that it becomes apparent that access is being gained the company will explore, in conjunction with the relevant State Agency, what additional measures may be taken.

Close liaison with the appropriate statutory authorities and emergency services has been had in health and safety planning for the site.

Staff and local populations are both valued with a High sensitivity. Based on the assessment of impacts (identified above) and embedded management measures employed at the site, it is considered that the proposed Mine Development will have a Negligible (adverse) impact on health and safety and a Slight (adverse) effect.

5.7 Mitigation and Management

5.7.1 *Mitigation and Management: Construction Phase: Community Sports Complex*

Best practice construction methods will be employed during the construction of the facility,

No mitigation measures other than those detailed in the below chapters (both embedded and additional) of this EIAR are required:

- Section 7.7.1, Chapter 7.0 – Land, Soils and Geology;
- Section 8.7.1, Chapter 8.0 – Water;
- Section 9.7.1, Chapter 9.0 – Climate;
- Section 10.7.1, Chapter 10.0 – Air Quality;
- Section 11.7.1, Chapter 11.0 – Noise;
- Section 13.7.1, Chapter 13.0 – Landscape and Visual Impact;
- Section 14.7.1, Chapter 14.0 – Traffic and Transport;
- Section 17.7, Chapter 17.0 – Major Accidents and Disasters; and
- Chapter 19.0 – Mitigation and Monitoring.

5.7.2 *Mitigation and Management: Construction Phase: Mine Development*

- During the construction of the mine mitigation will be implemented as follows:
- Continued dialogue with the local community on the progress of the development and land rehabilitation plans;
- Clear communications around how the company complies with environmental regulations;

- Communication and dialogue with local stakeholders on mitigation measures that will reduce noise pollution, dust, and enhance the areas visual amenity; and
- Following a preplanning consultation meeting with the Monaghan Heritage Officer for this application, SGMI also seek to recognise that a change to the sense of place will arise from their proposed development. In the event of a grant of permission and subsequent development, SGMI will undertake to develop a records pack that will create a permanent record of the of the area to be developed. This records pack aims to recognise create a record of that place, will include ground level and aerial photographs of the area as it currently exists, topographical surveys of the area, habitat surveys of plants and hedgerows, historical records that have been discovered as part of the planning process. This records pack will be presented to the Monaghan County Library, Carrickmacross Historical Society and Magheraclone Community Centre for retention and future consultation by the public.

No additional mitigation measures other than those detailed in the below chapters (both embedded and additional) of this EIAR are required:

- Section 7.7.2, Chapter 7.0 – Land, Soils and Geology;
- Section 8.7.2, Chapter 8.0 – Water;
- Section 9.7.2, Chapter 9.0 – Climate;
- Section 10.7.2, Chapter 10.0 – Air Quality;
- Section 11.7.2, Chapter 11.0 – Noise;
- Section 13.7.2, Chapter 13.0 – Landscape and Visual Impact;
- Section 14.7.2, Chapter 14.0 – Traffic and Transport;
- Section 16.7.2, Chapter 16.0 – Material Assets;
- Section 17.7, Chapter 17.0 – Major Accidents and Disasters; and
- Chapter 19.0 – Mitigation and Monitoring.

The Applicant will continue to undertake community consultation through its Community Liaison Officer, updates on the company's website and community events as required.

5.7.3 *Mitigation and Management: Operational Phase: Community Sports Complex*

No mitigation measures other than those detailed in the below chapters (both embedded and additional) of this EIAR are required:

- Section 7.7.3, Chapter 7.0 – Land, Soils and Geology;
- Section 8.7.3, Chapter 8.0 – Water;
- Section 9.7.3, Chapter 9.0 – Climate;

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- Section 10.7.3, Chapter 10.0 – Air Quality;
- Section 11.7.3, Chapter 11.0 – Noise;
- Section 13.7.3, Chapter 13.0 – Landscape and Visual Impact;
- Section 14.7.3, Chapter 14.0 – Traffic and Transport;
- Section 17.7, Chapter 17.0 – Major Accidents and Disasters; and
- Chapter 19.0 – Mitigation and Monitoring.

5.7.4 *Mitigation and Management: Operational Phase: Mine Development*

- Continued dialogue with the local community on the progress of the development and land rehabilitation plans.
- Clear communications around how the company complies with environmental regulations.
- Communication and dialogue with local stakeholders on mitigation measures that will reduce noise pollution, dust, and enhance the areas visual amenity; and
- SGMI will continue to recognise that a change to the sense of place is arising from the Mine Development. SGMI will update the records pack over the life of the mine.

No additional mitigation measures other than those detailed in the below chapters (both embedded and additional) of this EIAR are required:

- Section 7.7.4, Chapter 7.0 – Land, Soils and Geology;
- Section 8.7.4, Chapter 8.0 – Water;
- Section 9.7.4, Chapter 9.0 – Climate;
- Section 10.7.4, Chapter 10.0 – Air Quality;
- Section 11.7.4, Chapter 11.0 – Noise;
- Section 12.7.4, Chapter 12.0 – Vibration;
- Section 13.7.4, Chapter 13.0 – Landscape and Visual Impact;
- Section 14.7.4, Chapter 14.0 – Traffic and Transport;
- Section 17.7, Chapter 17.0 – Major Accidents and Disasters; and
- Chapter 19.0 – Mitigation and Monitoring.

5.7.5 *Mitigation and Management: Restoration/Closure Phase: Community Sports Complex*

There is no proposed decommissioning of the Community Sports Complex and so this is not considered further.

5.7.6 *Mitigation and Management: Restoration/Closure Phase: Mine Development*

- Continued dialogue with the local community on the progress of the development and land rehabilitation plans.
- Clear communications around how the company complies with environmental regulations.
- Communication and dialogue with local stakeholders on mitigation measures that will reduce noise pollution, dust, and enhance the areas visual amenity; and
- SGMI will continue to recognise that a change to the sense of place is arising from the Mine Development. SGMI will update the records pack that will be started in the construction phase, to provide a record of the change onsite.

No additional mitigation measures other than those detailed in the below chapters (both embedded and additional) of this EIAR are required:

- Section 6.7.6, Chapter 6.0 – Biodiversity;
- Section 7.7.6, Chapter 7.0 – Land, Soils and Geology;
- Section 8.7.6, Chapter 8.0 – Water;
- Section 9.7.6, Chapter 9.0 – Climate;
- Section 10.7.6, Chapter 10.0 – Air Quality;
- Section 11.7.6, Chapter 11.0 – Noise;
- Section 13.7.6, Chapter 13.0 – Landscape and Visual Impact;
- Section 14.7.6, Chapter 14.0 – Traffic and Transport;
- Section 17.7, Chapter 17.0 – Major Accidents and Disasters; and
- Chapter 19.0 – Mitigation and Monitoring.

5.8 Monitoring

5.8.1 *Monitoring: Construction Phase: Community Sports Complex*

The chapters identified in the above Section 5.7.1 have included monitoring measures as appropriate (including water, air, noise, and vibration). On this basis, no specific monitoring is required in relation to population and human health during the construction of the proposed Community Sports Complex.

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5.8.2 *Monitoring: Construction Phase: Mine Development*

The chapters identified in the above Section 5.7.2 have included monitoring measures as appropriate (including water, air, noise, and vibration). On this basis, no specific monitoring is required in relation to population and human health during the construction of the proposed Mine Development.

5.8.3 *Monitoring: Operational Phase: Community Sports Complex*

It has been assessed that no specific monitoring is required in relation to population and human health during operation of the Community Sports Complex.

5.8.4 *Monitoring: Operational Phase: Mine Development*

The chapters identified in the above Section 5.7.4 have included monitoring measures as appropriate (including water, air, noise, and vibration). On this basis, no specific monitoring is required in relation to population and human health during the operation of the proposed Mine Development.

5.8.5 *Monitoring: Restoration/Closure Phase: Community Sports Complex*

There is no proposed decommissioning of the Community Sports Complex and so this is not considered further here.

5.8.6 *Monitoring: Restoration/Closure Phase: Mine Development*

The chapters identified in the above Section 5.7.6 have included monitoring measures as appropriate (including water, air, noise, and vibration). On this basis, no specific monitoring is required in relation to population and human health during the restoration/closure phase of the Mine Development.

5.9 Residual Effects

5.9.1 *Community Sports Complex*

Once the identified mitigation measures, appropriate design standards and operational infrastructure management plans are adhered to, it is considered that any negative effects surrounding the Community Sports Complex will be **Not Significant**.

Beneficial effects were identified in the assessment, primarily concerned with the provision of the Community Sports Complex (an amenity facility).

5.9.2 *Mine Development*

Once the identified mitigation measures, appropriate design standards and operational infrastructure management plans are adhered to, it is considered that any effects surrounding the Mine Development will be Not Significant.

Beneficial effects were identified in the assessment, primarily concerned with the removal of the underground workings.

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5.10 Cumulative Effects

5.10.1 *The Project – Community Sports Complex and Mine Development*

The construction phases of the Community Sports Complex and the Mine Development occur simultaneously, however, no significant effects are identified for either and it is considered that there is no potential for cumulative effects between the two developments.

The construction phase of the Community Sports Complex overlaps with the first year of the operational life of the Mine Development, however, no significant effects are identified for either and it is considered that there is no potential for cumulative effects between the two developments.

The operational phase of the Community Sports Complex and mine development overlap, however, no significant adverse effects are identified for either and it is considered that there is no potential for cumulative effects between the two developments.

The restoration phase of the mine development overlaps with the operational phase of the Community Sports Complex, however, no significant effects are identified for either and it is considered that there is no potential for cumulative effects between the two developments.

5.10.2 *The Project and Other Offsite Projects*

Consideration has been given to the potential cumulative effect due to the Project and the existing Drummond Mine. As the Project is to all intents a replica of the activity that has been carried out in Knocknacran open cast mine since 1988, there is essentially no change to the existing situation. Gypsum is transported by covered conveyor from the underground workings to the homogenizer on the Site, minimising the dust potential from the site.

There are a four extractive industry sites located within 5 km of the Project. These are Corney Clay Pit Breedon Brick Ltd open-cast clay quarry, located ca. 1.5 km south of the Site (with an additional associated site located ca. 4 km south of the Site), Limestone Industries Ltd limestone quarry, located ca. 2 km west of the Site, and Roadstone Barley Hill open-cast quarry located ca. 4 km southeast of the Site. Given the nature and size of the activities at the Project, it is not anticipated that any noticeable cumulative effects will arise relating to air quality and the climatic environment that could be attributed to the interaction of several extractive industries in close proximity to each other.

Losset ADN Materials Ltd. have a planning application under consideration (Reg. Ref. 22/254) and are located ca. 1 km to the north of the Project site. Based on a review of the current planning file data (to date 27th March 2023), there will be no cumulative effect due to this development. A community centre will be located in the village of Drumgoosat by the time the Project would be operational. However, it is considered that there is no potential for cumulative effects between the Mine Development and this development and that any potential cumulative effect between the Community Sports Complex would be positive.

Other existing developments in the area include a mushroom farm, chicken farm, school and industrial/commercial facilities (e.g. car dealership). There will be no cumulative effect between the Project and these developments.

The cumulative effects are deemed **Not Significant** between the Project and other offsite Projects.

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5.11 'Do-Nothing' Scenario

If consent was not achieved, then the reserve at Knocknacran West Mine would not be pursued. In the 'Do-Nothing' scenario Knocknacran Mine would be restored as outlined in the existing permitted restoration plan (Reg. Ref 17/217) which allows for the reinstatement of agricultural land at the site and for the creation of a lake within the former open-cast area. With no further works carried out within the site, this would remove the potential for impacts from bio-physical factors affecting the human environment surrounding the Site (water, air quality, noise and vibration). It is considered that such impacts would be Negligible, given the successful management of these issues through EPA Licencing that is currently employed.

The cessation of activities and restoration of the Knocknacran site would result in an adverse effect on those workers who are directly and indirectly employed by the site. The supply of local gypsum to the Kingscourt factory for plaster product would also cease and an alternative supply of material would need to be found for the factory to remain in production. After cessation and restoration of Knocknacran and Drummond Mines there would be a loss of ca. 150 direct jobs in the Magheraclone and Kingscourt areas if no cost-effective alternative supply was found to maintain the viability of the factory. Indirectly the mines and factory also employ many people as subcontractors and suppliers and some of those jobs would also be lost. This Adverse impact would affect moderate number of people, it is therefore considered that such impacts would be Medium and would result in effects of Moderate or Large significance to this workforce (High sensitivity). The overall classification would be depended on the extent of indirect employment loss. The 'Do-Nothing' scenario would result in no new Community Sports Complex for the local community, which would be considered an Adverse effect.

Without the development of the Knocknacran West Mine, the underground workings will remain in place and the risk of further subsidence over the workings will also remain within the Application Site and the opportunity to backfill workings beneath the L4900 and R179 and bring the site under full engineering control would be lost.

The complete cessation of activities in a 'Do-Nothing' scenario would still require SGMI to maintain appropriately secure site boundaries to restrict access in accordance with the existing CRAMP. The impacts of the site on the surrounding health and safety are therefore considered to be Low (Adverse) and would result in effects of Slight significance to the local populations and communities (High sensitivity).

5.12 Difficulties Encountered

There is a lack of complete census data from the interim period of 2016 to the present, which means that the latest population and demographic trends are slightly outdated. The full 2022 Census dataset is due to be released in April 2023. While it is important to note the lack of up-to-date data, the 2016 data is still considered recent enough to give a general indication of conditions in the local area, compared to the national situation.

No other particular difficulties were encountered in the preparation of this chapter of the EIAR.

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APPENDIX 5.1

Evaluation of the Relevance of “Solastalgia” in the Context of the Proposed Development of the Former (Drumgoosat) Underground Mine by Open-Cast Mining

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EVALUATION OF THE
RELEVANCE OF
“SOLASTALGIA” IN THE
CONTEXT OF THE PROPOSED
DEVELOPMENT OF THE
FORMER (DRUMGOOSAT)
UNDERGROUND MINE BY
OPEN-CAST MINING

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1.0 Introduction

This review aims to summarize the potential applicability of the concept of Solastalgia to a development in south County Monaghan. This development includes a number of elements, a road tunnel, a refurbished processing plant, a community sports facility and the extension of open-cast mining of gypsum into a previous underground mining site. This review of Solastalgia will focus on the open-cast mining element of the development to be known as Knocknacran West Open-Cast Mine.

Commercial underground mining of gypsum has previously been undertaken on the site between the 1950's and the 1980's. The site where the mining development (Knocknacran West) has been proposed consists of three unoccupied residential houses, one occupied household and farmland. Of note, the land in the area has been degraded by a series of subsidence events and crown holes appearing above the former underground mine workings (Drumgoosat). This has led to restrictions on use of the land and safety concerns in the community.

During the development of Knocknacran West, Saint-Gobain Mining Ireland (SGMI) has indicated that the existing Knocknacran Open-Cast Mine will be decommissioned and will undergo land restoration to near original ground levels (based on historical ground level contours).

As part of the planning application Monaghan County Council made the following observations in a Request for Further Information – Item 17.b.

“The Population and Human Impact Chapter shall consider the effects of “solastalgia” a term coined by Dr Glen Abrecht. This phenomenon is the impact people feel living in a home environment perceived to be the subject of negative environmental change. This impact can result in emotional and psychological displacement, dislocation and avoidance of the landscapes concerned. Given the scale of the development proposed it is incumbent on the applicant to consider these types of impacts.”

2.0 About the Author

The author of this paper is Dr. Emmet Power MB BCh BAO MRCPsych MCFsychl., currently employed as a clinical research fellow in psychiatric epidemiology and youth mental health at the Royal College of Surgeons in Ireland, primarily undertaking research on modifiable risk factors for mental disorders amongst young people.

I have extensively published in national and international peer reviewed publications. I've presented my work at national and international academic meetings in academic discipline areas of population health, neuroscience, youth mental health and psychiatry. The areas of interest that I publish in, include climate change & mental health, biomarkers of stress, unemployment, marginalization, substance use, childhood trauma, and substance use disorder, risk factors for psychosis, mental health service development for young people and risk behaviors in adolescence. I am a member of the Royal College of Psychiatrists (UK), and also a member of the College of Psychiatrists of Ireland.

Consultancy fees have been waived in lieu of a donation to Cavan-Monaghan Education & Training Board to support ongoing youth work projects.

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3.0 Background

Solastalgia is a term invented by Dr. Glen Albrecht and originally reported from research carried out in late 2003 in rural/regional areas of New South Wales, Australia. Dr. Albrecht is an environmental philosopher with both theoretical and applied interests in the relationship between ecosystem and human health.

Dr. Albrecht investigated the effects of open-cast coal mining on rural and indigenous communities in the Hunter Valley in New South Wales (NSW), Australia.

Coalmining has been previously estimated to contribute about 4.2% to Australian gross domestic product. Open-cast coal mines in NSW dominate Australia's export production of coal (estimated at one point in the last 10 years to be at 95% of Australia's export value of coal). Newcastle has been previously named as the world's largest coal mining port.

Mining operations in the Upper Hunter Valley cover at a conservative estimate of ca. 315 square kilometre expanse of the Upper Hunter Valley floor (some estimates vary). Mining licenses covering 64% of the Upper Hunter Valley floor area extend to ca. 1280 square kilometres.

The health-related effects of coalmining have been extensively documented throughout the 19th and 20th centuries. A number of chronic fatal diseases result from coal mining, notably pneumoconiosis, an occupational chronic lung disease.

Such health-related effects are specific to coal dust and are not associated with Gypsum mining.

Particulate matter and other potential health related risk factors for the Knocknacran West Project are subject to National environmental regulations and are expected to be monitored by means of an Emissions License issued and overseen by the EPA.

Albrecht's initial research question was to investigate whether individuals living in the Upper Hunter Valley area experienced distress from land degradation associated with coal mining. He further wished to investigate whether those with a high sense of place identity and attachment, experienced greater distress when land underwent a change of use [1].

Solastalgia was defined by Albrecht as a recognition of distress within an individual or at a community level resulting from the loss of a sense of place. Solastalgia originates as a neologism of the word 'solace' and the suffix -algia. Solace meaning approximately "comfort" from the latin word *sōlācium*, -algia is a suffix denoting pain or ache which is commonly used in medical terminology. Solastalgia is a philosophical concept bridging perceptions of health, identity, place and environment. Specifically, Solastalgia is not a disease, illness or mental disorder.

Albrecht described that the contributing factors to Solastalgia may be natural in origin, i.e., from drought, wildfires or flooding or through artificial factors such as agriculture, mining or other types of development that lead to a change in land use. He described that the means to reduce distress associated with land degradation was through empowerment and restoration of a sense of place [1].

The methodology by which Solastalgia can be quantitatively measured is through the environmental distress scale [2]. This is currently the only available measure that is validated to describe Solastalgia, this survey instrument was developed through multi-informant semi-

structured interviews. Furthermore, exploratory and confirmatory factor analyses have demonstrated that it has valid psychometric properties [2, 3].

The initial findings of qualitative research by Albrecht and colleagues indicated a number of concerns perceived by the residents of the coal mining industry in the Hunter Valley.

These concerns included:

1. Questions around what would happen to the sites after exploitation.
2. Concerns around the impact of mining and associated coal powered plants with direct health effects.
3. Concerns around health threats that would be classed as "unknown unknowns".
4. Loss of biodiversity.
5. Disempowerment.

These shortcomings were contextualized by a broader set of sociocultural factors perceived by the residents:

1. Perceptions of poor consultation between residents in the Hunter Valley, government and industry.
2. A lack of research on the impact of mining on aspects of health in the area.
3. Perceptions from local residents that the available evidence does not appropriately reflect a reduction in quality of life by those living proximal to mining operations.

Higgenbotham described that environmental distress was greater in those living in settlements that were more proximal to the mining industry in the Hunter Valley and was measurement invariant across differing demographic groups [2]. Luce described that a shorter modified version of the Environmental Distress Scale was likely to display a marginally better model fit [3]. Of note, both samples used for validation are not representative. One limitation concerning the Environmental Distress Scale is the population samples used in its development. Higgenbotham obtained a 47% response rate in initial work validating the Environmental Distress Scale, whilst Luce utilized convenience samples recruited through sampling individuals using social media [2, 3]. As a result of both of these sampling strategies, we cannot extrapolate the effects of either of these studies to the local population in Knocknacran, Co. Monaghan, as mining activity in county Monaghan is less than 1/3rd of 1% of the scale of mining activity in the Hunter Valley.

4.0 Research Literature Prior to 2019

Galway and colleagues completed a scoping review of the literature surrounding Solastalgia up to 2019 [4]. Whilst the main focus of this review is contextualized by climate change and the review questions do not specifically address gypsum mining activities, they discuss a number of articles about proposed broad relationships between mining (mainly coal mining) and Solastalgia [1, 2, 5-11]. Galway et al. found 29 papers published up to and including 2018 focusing on Solastalgia. 59% were empirical original research, other papers were either reviews or conceptual/theory papers. Solastalgia as a concept was in use in a number of disciplines including health, geography, anthropology and philosophy. From a geographical perspective 70% of papers came from research groups in Australia or the United States [4]. Primarily, Galway et al. find that Solastalgia relates to conceptualizing land as a social-ecological construct, and the importance of valuing natural landscapes as a resource for mental, emotional and spiritual health. The author presents a summary of empirical research on mining and mental/emotional health below.

Canu et al. found that individuals living in counties with active mountain top removal in coal strip mining in Kentucky had increased odds of presenting to emergency departments with depressive symptoms and substance use disorders after adjusting for baseline sociodemographic factors [10]. This paper however only analyses hospital presentation data. Absolute differences in proportions of mental health related presentations between mountain top removal counties and control counties however were small (0.5% or less), and control variables were both censored into intervals and varied widely between mountain top removal counties and control counties. Both these factors in tandem may implicate measurement error. Characteristics of mountain top removal counties (distance to healthcare facilities which is unmeasured) may also influence rates of presentation to Emergency Departments between mountain top removal counties and control counties. Rates of presentation to Emergency Departments for mental and behavioural problems may also be attributable to a low number of providers at primary care level rather than increased rates of mental disorders in the community.

Hendryx et al. examined rates of self-reported depressive symptoms in a cross-sectional analysis of the 2006 Behavioral Risk Factor Surveillance System in Appalachia. They found modestly increased odds of mild to moderate but not severe depressive symptoms in areas with mountain top removal coal mining in Appalachia [8]. Their analysis was non-standard in that when they imputed data for missing variables, they assigned weights to each person in each imputed dataset as opposed to utilizing Rubin's Rules which is a more widely accepted method of obtaining coefficients and standard errors in imputed datasets. The results of this study do also not conclude a dose-response relationship with exposure, which is a generally accepted criteria for causal inference. Another issue with this analysis was to dichotomization of income into a high versus low classification when income has the strongest relationship of all variables with depressive symptoms and varies significantly by whether a research subject is in the exposure versus control group. This again introduces the risk of measurement error.

Connor et al. used ethnography to capture the views of key stakeholders in the Upper Hunter Valley region to examine perceptions of residents around increased open-cut coal mining activity. They found that residents were significantly emotionally distressed around mining related pollution, pollution related health effects and their perceived powerlessness to conserve local landscapes from industry and political forces [6].

5.0 More Recent Thinking on Solastalgia Since 2019

An updated scoping review of the available literature on mining and Solastalgia has been carried out by the author. I aim to provide an updated scoping review from years 2019 to present to systemically investigate any further research on Solastalgia and mining specifically. I have used the search strategy "solastalgia" AND "mining". In addition, the 9 papers previously mentioned above that focused on mining and Solastalgia were screened by citation lists.

One researcher (EP) screened two databases (PUBMED and Google Scholar) by title and abstract to selected studies. Full text articles in English were considered.

I specified in our inclusion criteria that papers must be original research and contain health-related outcomes.

I excluded conceptual papers that lacked health outcome data.

Searches of PUBMED revealed 4 results of which 1 result was relevant for inclusion. Searches of Google Scholar revealed 693 results of which 0 were relevant.

The single additional paper focuses on the effects of brown lignite coal mine expansion in the Rhineland area in western Germany. Kruger et al. investigated rates of psychological distress in villagers living in villages threatened by relocation, relocated villagers and villagers living proximal (within 7 km) to mining activity [12]. They found that rates of psychological symptoms experienced by villagers in these areas are elevated substantially (between 2 and 7.5-fold above population averages). The sample size was large, with 620 respondents. Particularly in villagers at risk of resettlement – respondents reported high place attachment; the majority reported concerns about financial impact or resettlement, and high levels of distress. Although the response rate to the survey was low in comparison to overall population levels the high levels of distress reported by the those who responded and their attributions of their distress to mining expansion is relevant.

These factors of concern, financial impact or resettlement are not evident in the submissions made by the community in Magheracloone in response to the planning application.

6.0 Discussion

Overall, there is no evidence of the expansion of mining, on emotional and mental health. The available evidence reviewed in this study is of overall low quality. There is no longitudinal, interrupted time series, quasi-experimental or case control research. Such research studies would be better able to delineate cause and effect. Response rates in studies were generally low.

I was not able to find any research on the scale or type of mining relevant to the development proposed. The relevance of the research literature focused on much larger scale coal mining to the proposed expansion in Knocknacran, Co. Monaghan is questionable.

Highly compelling ethnographic studies exist in areas that have been obviously affected by much larger scale mining operations (more than 100-fold larger than that proposed in Monaghan in terms of the size of the area affected). These developments included forced relocation of communities, very different to the proposal in Monaghan that includes enhanced community facilities that will support and enhance the local communities remaining in the area.

It would be remiss to extrapolate those findings to the proposed developments in south Monaghan.

The findings of my review show that place-based loss is significantly correlated with poor emotional health, and those individuals who experienced place dislocation have strong concerns about their emotional and psychological health and concerns about the impact of relocation on their personal finances. Relocated individuals report fewer psychological symptoms than those awaiting relocation. Whilst we cannot conclude that it is the process of relocating that is the primary cause of psychological symptoms and when that process is removed psychological symptoms decrease, the data presented by Kruger et al. is suggestive of that. Longitudinal research would help answer that question, however a large enough sample size with an appropriate response rate would be required.

In the development proposed in the planning application under consideration, there are no relocations being enforced. Facilities that are being relocated (all be it in response to a previous subsidence event rather than directly because of the proposed development) are being moved very short distances. A community poll of people living in the local area suggests that the vast majority of people (over 90%) are supportive of the plans for the relocated community facilities.

Can Previous Research Adequately Inform Planning Policy?

The vast majority of research focuses on coal mining and has investigated areas that have much larger mining operations than that proposed at Knocknacran West.

Research carried out in the Hunter Valley of NSW is also contextualized by the existence of 3 coal-fired power plants which cause significant air pollution in the area.

In contrast to the proposed effects of Solastalgia on mental health, the evidence concerning particulate matter and health is conclusive. Particulate matter is almost certainly likely to be a causative factor in neurodegeneration processes and neuropsychiatric illness [13].

Legislation controls this by means of regulation of industrial activities and clear national standards exist around air quality as evidenced by the trend to reduce and control all types

of emissions to air by diverse means such as "smoky coal" bans, to industrial emissions licensing.

This is a potential confounding factor concerning the research in NSW and its applicability to the current proposed development.

Notwithstanding, the visual impact of the development on the local community and the visual amenity experienced by the local community is of high importance to health also. Again, there is significant evidence to support relationships between high quality visual amenity and good mental health and well-being [14].

Other environmental factors such as noise and vibration may also impact on mental health and emotional well-being [15].

Water quality is also of importance as water ways may be a recreation amenity for the local community.

All these factors are addressed by statutory regulation.

It is also notable that the development proposed represents a continuation of an activity that has been carried out in the community for over 80 years. It is part of the living culture, history and lived memory of this area. As such the development proposed is not an alien or new environmental change in an area as one would imagine a new large-scale coal mine might be.

It is also noted that the development has a net positive climate impact, by the reduction of Carbon Dioxide (CO₂) emissions that would be associated with the importation of gypsum to Ireland were the development not to go ahead. This is a direct opposite to climate change, an Albrecht trigger for Solastalgia.

Is Solastalgia an Illness?

Some of the research literature uses medicalized language around Solastalgia, specifically Albrecht denotes it a "psychoterric illness". It should be noted that Dr. Albrecht is a philosopher and not a medical doctor. Health institutions (as opposed to philosophers) usually define definitions of illness.

Illness and definitions of illness are social constructs used to leverage power and resources (treatments, social assistance etc.). The broad purpose of defining Solastalgia as an illness by Albrecht was to leverage power to traditional custodians of the land (farmers and indigenous peoples in NSW) in a dispute. Although environmental issues constitute the most serious and long-term social issue of this century, and distress around environmental change is both real and quantifiable, Solastalgia is not an illness but a social factor influencing population health and wellbeing [16, 17].

7.0 Conclusion

In conclusion, distress around environmental change is a valid social concept; however, quantification of these effects is not yet easy or reliable. Ethnographic studies of populations living close to large-scale mining operations are compelling; however, the direct applicability of these findings to the proposed development is unwarranted.

Commercial Gypsum mining is not new in this community and has been part of this community for over 80 years. The development has many positive aspects including the continuation of an ongoing activity in the area, economic value, the enhancement of community facilities and the stabilisation of land that has become a source of concern regarding ongoing subsidence. The development is balanced in this regard. It is an evolution of development in the area.

People naturally have a concern with change and particularly with unknowns. The development proposed is a change in the area and it is important therefore that fear is mitigated by transparency and engagement with the community, that shows recognition of the local residents as stakeholders in the community.

In the case of the development that is the subject of the current planning application, SGMI has taken steps to engage with the community and seek feedback on the proposed development. The proposed development has been explained in detail through the appointment of a community liaison officer, the holding of open forums where residents were invited to see plans and meet representatives and designers of the works proposed, and through the publication of a community brochure widely distributed in the community.

8.0 Recommendations

It is recommended that the developer engages in;

- Continued dialogue with the local community on development of the project and land rehabilitation plans.
- Clear communications around how the company complies with environmental regulations.
- Communication and dialogue with local stakeholders on mitigation measures that will reduce noise pollution, dust, and enhance the area's visual amenity.

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APPENDIX

Appendix 6.1: Knocknacran West Project Habitat Survey August 2021

Appendix 6.2: Knocknacran West Mine Project Ecology Surveys 2022

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Appendix 6.3: Knocknacran West Hedgerow Survey

Appendix 6.4: Tree Protection Management Plan

Appendix 6.5: Knocknacran West Project Ecology Surveys 2021

Appendix 6.6: Aquatic Baseline Report for the Corduff Stream, Knocknacran West Project, Co. Monaghan

Appendix 6.7: Proposed Habitat Management Plan - Knocknacran West Project

Appendix 6.8: Landscape Plan - Boundary Treatment Plan Community Sports Complex

Appendix 6.9: Landscape Management Plan Knocknacran West Site

Appendix 6.10: Environmental Management Plan

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6.0 BIODIVERSITY

6.1 Introduction

This assessment presents a summary of ecological and biodiversity features which are, or have the potential to be, ecological constraints to the Proposed Development (details of which are given in Chapter 3.0). It evaluates the importance of the ecological resources present and defines the degree of significance of potential impacts resulting from the Proposed Development. The report also identifies appropriate mitigation measures and defines residual impacts.

A Natura Impact Statement (NIS) has been carried out and is included as a separate report with the application. This report concludes that no significant impacts would occur to any Natura 2000 sites as a result of the Proposed Development.

6.2 Legislative and Policy Context

This section addresses the legislation and guidance that has been considered when preparing this chapter, and key policy context relevant to biodiversity. The overarching EIA legislation under which this assessment is required is addressed separately in Chapter 2.0 (Scope and Methodology).

Legislation

- The Planning & Development Act 2000 & the Planning and Development (Amendment) Act, 2010 (as amended) hereafter referred to as the Planning Acts;
- The Wildlife Act 1976 as amended by the Wildlife (Amendment) Act; 2000 (as amended) hereafter referred to as the Wildlife Acts;
- The EIA Directive (Directive 2011/92/EU as amended by Directive 2014/52/EU), the Planning and Development Acts 2000-2018, and the Planning and Development Regulations, 2001-2018;
- European Communities (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018);
- European Commission (EC) Habitats Directive 92/43/EEC (as amended);
- EC Birds Directive 2009/147/EC;
- European Communities (Birds and Natural Habitats) Regulations 2011 (as amended) hereafter referred to as the Birds and Habitats Regulations;
- Flora (Protection) Order, 2015;
- Environment (Miscellaneous Provisions) Act 2011;
- The Fisheries (Consolidation) Act 1959; and
- The Local Government (Water Pollution) Act, 1977 (as amended by Sections 3 and 24 of the 1990 Act.).

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Relevant Policies and Plans

- National Biodiversity Plan, 2017 - 2021;
- Ireland's National Strategy for Plant Conservation;
- All Ireland Pollinator Plan 2021 - 2025;
- Monaghan Biodiversity and Heritage Strategic Plan 2020 - 2025; and
- Monaghan County Development Plan 2019 - 2025.

Relevant Guidance

- Invasive Species in Ireland (NPWS, 2004);
- Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland: Terrestrial, Freshwater and Coastal Environments (CIEEM, 3rd Edition 2018);
- Circular Letter PL 1/2017 - Implementation of Directive 2014/52/EU on the Effects of Certain Public and Private Projects on the Environment (EIA Directive), 15 May 2017;
- Key Issues Consultation Paper - Transposition of 2014 EIA Directive (2014/52/EU) in the Land Use Planning and EPA Licencing Systems, 2 May 2017;
- Environmental Impact Assessment of Projects - Guidance on the Preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU). European Commission of the European Union 2017;
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Environmental Protect Agency, 2022);
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Environment, Community and Local Government, 2018);
- Environmental Impact Assessment of National Road Schemes – A Practical Guide (NRA, 2008);
- Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009);
- National Roads Authority (NRA) Environmental Assessment and Construction Series Guidelines (NRA, 2005- 2009);
- A Guide to Habitats in Ireland (Fossitt, 2000);
- Bat Surveys: Good Practice Guidelines (Collins, 2016);
- Bat Mitigation Guidelines for Ireland, Irish Wildlife Manuals No. 25 (Kelleher & Marnell, 2006); and
- Bats & Lighting Guidance Notes for Planners, engineers, architects and developers (Bat Conservation Ireland, December 2010).

6.2.1 Site Description

The Site is located in the townlands of Knocknacran (East & West), Drumgoosat, Derrynascobe, Enagh, Derrynaglah, Clontrain and Drummond, Co. Monaghan. To the south of the R179, the Site is dominated by the existing open-cast and processing plant at Knocknacran Mine, with other habitats around the periphery of the mine including a small, wooded copse and recolonising ground.

The area of the Site to the north of the R179 is dominated by former agricultural fields (now overgrown as no cutting or grazing occurs), bound by hedgerows, with some small pockets of woodland. There are areas of remediated land which is in the process of recolonisation. Beneath the surface, this area was previously exploited by underground mining from the 1950s to 1980s. Remediation works have taken place since 2019 to remove all structures associated with the former GAA site and community centre and to infill and regrade subsidence areas.

6.3 Assessment Methodology and Significance Criteria

6.3.1 Desk Study

A desktop review was conducted of available published and unpublished information, including a review of data available on the National Parks and Wildlife Services (NPWS) and National Biodiversity Data Centre web-based databases, in order to identify key habitats and species that may be present, in particular those protected by legislation. In order to assess the likely current status of species in the vicinity of the Site, the search included a radius of 5 km around the Site boundary and was limited to records returned from within the last 20 years.

The National Biodiversity Data Centre was reviewed for relevant data, specifically i) existing species records for the 10 km square in which the Site is located (N89) and ii) an indication of the relative importance of the wider landscape in which the Site is located, based on Model of Bat Landscapes for Ireland (Lundy *et al.* 2011). In the latter, the index ranges from 0 to 100, with 0 being least favourable and 100 most favourable for bats.

Bat Conservation Ireland (BCI) conducted a search of available bat records within 10 km of the study area on 5th August 2021 at the request of O'Donnell Environmental on behalf of Golder.

6.3.2 Designated Nature Conservation Site Assessment

Sites of international importance, including Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) are collectively known as Natura 2000 sites. These sites contain examples of some of the most important natural and semi-natural ecosystems in Europe. Designated sites, which also include Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) were also searched for. The designated search area was taken as 15 km from the Application Site for Natura 2000 designations, and 5 km for NHA, and pNHA designations.

In the subsequent analysis of designated sites, particular attention was given to potential for the development to influence a designated site. In other words, potential ecological pathways were identified; these pathways can be hydrological, physically overlapping or exhibiting habitat and species synergies that could result in temporary or residual effects being afforded to a designated site.

6.3.3 Ecological Surveys

Habitats

Walkover surveys of the Site (Fossitt) were conducted to record the habitats and flora in the area within and adjacent to the development Site, and to detect the potential presence of protected species, and any suitable habitat for those species. The initial walkover survey was conducted by Golder on 12 July 2018 and included the area of the site to the north of the R179. The remainder of the Site (to the south of the R179) was surveyed by Golder on 21 May 2019.

A Phase 1 habitat and flora assessment was carried out by Eamonn Delaney BSc MSc MCIEEM CEcol (Delichon Ecology) on 12th August 2021 in accordance with the Heritage Council's guidelines (Smith *et al.* 2011). The dominant habitats present were classified according to Fossitt (2000) and key botanical species were identified. Any other records of interest (e.g., invasive plant species) were also marked on field maps and/or locations were recorded. The principal aim of the field survey was to identify and map habitats and their component plant species within the Knocknacran West Site and lands located to the north. The botanical survey was conducted in-parallel with the habitats survey, where botanical species were identified and recorded according to dominant habitat type. Any other records of interest (e.g., invasive plant species) were also marked on field maps and locations were recorded using GPS handheld units.

The conservation status of habitats and flora was also considered. The conservation status of habitats and flora within Ireland and Europe is indicated by inclusion in one or more of the following: Irish Red Data Book for Vascular Plants (Wyse Jackson *et al.*, 2016); Flora Protection Order (1999 as amended 2015); the EU Habitats Directive (92/43/EEC).

The findings of the habitat surveys are provided in Section 6.4.4 and Appendix 6.1 of this chapter includes the field survey findings for the August 2021 survey work. The study was also concerned with identifying the need for further (more specialist) surveys as applicable. Habitats are named and described following *A guide to Habitats in Ireland* (Fossitt, 2000).

A Phase 1 habitat and flora assessment update was carried out by Eamonn Delaney on 13th July 2022 in accordance with the Heritage Council's guidelines (Smith *et al.* 2011). The dominant habitats present were classified according to Fossitt (2000) and key botanical species were identified. The field survey findings are included in Appendix 6.2.

A hedgerow survey appraisal was completed in June 2022 by Eamonn Delaney (Appendix 6.3). The survey identified and surveyed all linear woodland habitats (i.e., treelines and hedgerows) within the proposed Knocknacran West site. The hedgerow survey methodology was undertaken in accordance with the guidelines and parameters outlined in *Hedgerow Appraisal System Best Practise Guidance on Hedgerow Surveying, Data Collation and Appraisal* (Foulkes *et al.*, 2013). This allowed for a detailed and systematic assessment of each hedgerow within the area surveyed following fixed assessment criteria based on hedgerow management, growth form, integrity, structure and adjacent land use.

Habitat Assessment follows the Joint Nature Conservation Committee (JNCC) Phase One Habitat Survey methodology (JNCC, 1990, revised 2010). Additionally, aerial photographs (satellite imagery) and Site mapping (including surface water where applicable) assisted the habitat survey.

The survey also aimed to identify any invasive species which may occur on the Site. However, this type of survey is not designed to replace specialist knowledge of invasive species recognition or eradication which should be undertaken by specialist contractors.

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Tree Management and Protection

A tree management and protection plan was commissioned from Holly Arboriculture for the Knocknacran West site (Appendix 6.4). Trees were classed in terms of their relative quality.

Fauna

Bat Survey

Bat survey work at the Site was based upon guidance set out within ‘Bat Mitigation Guidelines for Ireland’ (Kelleher & Marnell, 2006), and ‘Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes’ (NRA, 2006), with reference to good practice guidelines set out by the Bat Conservation Trust (Collins, 2016). Bat survey work began in 2019 and has continued to 2022, the following subsections detail the findings of all surveys during this period. Survey details are included in Appendices 6.2 and 6.5.

Visual Examination

Visual inspections for bat roosting potential were initially carried out on 30th April and 1st May 2019 in order to search for any features of bat roosting potential in buildings or trees. Inspections were carried out within daylight hours, using binoculars where necessary. Daytime visual assessments were again carried out on target buildings on 23rd June 2022 to identify signs of bat use, and particularly signs of maternity roosting such as accumulation of droppings or evidence of vocalisation. The target buildings consisted of four buildings which were identified in 2019 (Golder) and 2021 (O’Donnell Environmental) as being used by roosting bats or having some potential for maternity roosting.

Examples of the type of features searched for is outlined below:

- **Buildings.** Presence or absence of loft voids; lifted or missing tiles; gaps in barge boards or soffit boxes; any lifted lead flashing; gaps or cracks in brickwork/mortar; and any other potential crevices.
- **Trees.** Split limbs; rot holes; woodpecker holes; lifted bark; cracks; and dense or mature ivy cover. Where trees were of a size and age that features could be present out of site, these were also recorded.
- **Evidence of Bats.** Evidence for the presence of bats themselves was also searched for, including any audio cues, scratch marks, urine staining, or droppings.
- Based on these factors, an assessment was made of whether the Site might support bats, and the type and number of roosts that might be present. Buildings and trees were then assigned a level of bat roosting potential, based upon guidance set out by the Bat Conservation Trust (Collins, 2016) (Table 6.1).

Table 6.1: Guidelines for Assessing the Potential Suitability of Buildings and Trees for Roosting Bats (Collins, 2016)

Suitability	Description
Negligible	Negligible features likely to be used by roosting bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space,

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	<p>shelter, protection, appropriate conditions, and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation).</p> <p>A tree of sufficient size and age to contain potential roosting features, but with none seen from the ground or features seen with only very limited roosting potential.</p>
Moderate	<p>A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat, but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).</p>
High	<p>A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis, and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.</p>

Trees due to be removed in accordance with the project were inspected as part of the Holly Arboriculture report undertaken at the site in September 2022. During this assessment Tom O’Donnell accompanied Holly Arboriculture and summary notes in accordance with Table 6.1 above were made where pertinent. In addition, the bat roosting potential of trees within the Site was assessed as a whole, in woodland that was lower bat roosting risk (e.g. immature woodland).

It is considered that this level of survey is proportionate and allows a suitable mitigation strategy to be formed where necessary. In any case, given that the mining development is scheduled to take place over a number of phases (see Project Description, Chapter 3.0), and given the transitory nature of bat roosts (bats will regularly move into new roosting sites), it is considered that conducting detailed survey work at the relevant stage prior to the clearance of each phase would provide better, more up to date information on the status of roosting bats on the mining sites, and what the appropriate mitigation for this would be. Principles which this mitigation will follow are set out in Section 6.7.2 and 6.7.4 below.

Preliminary Roost Assessments

Preliminary roost assessments were carried out by Tom O’Donnell BSc (Hons) MSc CEnv MCIEEM, to identify the suitability of identified man-made structures at Knocknacran West for roosting bats in 2021. This built on the 2019 survey work. The relevant structures are identified as B2 to B6 on Figure 6.1, Building B1 was demolished as part of the remediation works after the subsidence event, it had been present in 2019 during the original survey works.

These preliminary roost assessments were carried out on 10th, 11th and 12th August 2021 and followed guidance set out in Collins (2016). The surveys were non-destructive, and relevant Potential Roost Features (PRFs) were visually inspected from ground level to identify any evidence of bat roosting. Where accessible, potential roosting features were investigated using an endoscope. Signs of bat use include bat droppings, feeding remains, potential bat access points identified by characteristic staining and scratches, noise made by bats etc.

Emergence Survey Work

Building locations and their relative potential to support roosting bats that were assessed in 2019, 2021 and 2022 are displayed at Figure 6.1 below. As stated previously, Building B1 has since been demolished for health and safety reasons.



Figure 6.1: Building Locations (Building B1 was demolished in 2019)

Dusk emergence surveys were carried out in July and August 2019 and August 2021. All surveyors are experienced in the use of bat detectors and are familiar with undertaking this type of work. Echometer Touch (EMT) 2, EMT 2 Pro, and Anabat SD1 detectors were used to record bat echolocation, and these were subsequently analysed using *Analook* and *Kaleidoscope* software.

Dusk bat emergence surveys were again carried out on 12th, 13th and 14th July 2022 and 8th August 2022 at the four structures (Table 2.1 of Appendix 6.2). The surveys were carried out by three surveyors: Tom O'Donnell BSc (Hons) MSc CEnv MCIEEM, Noel Linehan BSc (Hons) and Colm Breslin. Surveyors were positioned at suitable points to detect bat emergence from the target structures. The surveys were carried out by visual means primarily, with the aid of Echo Meter Touch Pro full spectrum ultrasonic detectors. Guide IR Pro thermal imaging cameras and a 'Nightfox Red' infrared camera were utilised to record bat activity which occurred at the target structures, in accordance with recent BCI guidelines. Emergence and re-entry surveys were carried out during suitable weather conditions and followed guidelines set out in Collins (2016).

In addition, thermal imaging cameras were also used in August 2021 and July and August 2022 to assist with the detection of bats emerging or re-entering buildings. Details of survey timings, buildings surveyed, and weather conditions are given in Table 6.2 and Table 6.3.

Table 6.2: Initial Emergence Survey Details 2019

Date	Sunset time	Building Surveyed ¹	Equipment Used	Weather Conditions	Comments
02.07.19	21:56	B6 (derelict residential house and associated barn)	EMT2 Pro, Anabat SD1	11°C, 10% cloud cover (CC), BF2*, dry	Survey conducted by 2 surveyors under direction of licence holder 2015-10663-CLS-CLS.
03.07.19	21:56	B2 (farmhouse & sheds)	EMT2 Pro, Anabat SD1	14-16°C, 100% cloud cover (CC), BF1, dry	Survey conducted by 2 surveyors under direction of licence holder 2015-10663-CLS-CLS.
15.08.19	20:57	B6	EMT2, EMT2 Pro	16°C, 40% cloud cover (CC), BF1, dry	Survey conducted by 2 surveyors under direction of licence holder 2016-26609-CLS-CLS.

* BF = Beaufort Scale

Active bat surveys were also carried out from 10 to 12 August 2021 inclusive in order to characterise bat activity in the area and to seek to identify any behaviour indicative of bat roosting. Details of times and conditions are set out in Table 6.3 and the findings are discussed in Section 6.4.4. The surveys were carried out by three surveyors: Tom O’Donnell BSc (Hons) MSc CEnv MCIEEM, Donnachadh Powell BSc (Hons) and Tiernan O’Ceallaigh BSc (Hons). Surveyors were positioned at suitable points to detect bat emergence or re-entry from the target structures. The surveys were carried out by visual means primarily, with the aid of Echo Meter Touch Pro full spectrum ultrasonic detectors. A Guide IR Pro thermal imaging camera was utilised to record bat activity which occurred at the target structures. Emergence and re-entry surveys were carried out during suitable weather conditions and followed guidelines set out in Collins (2016).

Table 6.3: Emergence and Re-entry Survey Details (covering all buildings) 2021 and 2022

Date	Survey	Sunset / sunrise	Survey times	Weather Conditions
10.08.21	Dusk emergence survey	21:06	20:55 to 22:45	Temp: 18°C; Wind: F0 or 1; Precipitation: None; Visibility: Good
11.08.21	Dawn re-entry survey	05:58	04:30 to 06:00	Temp: 15°C; Wind: F 1; Precipitation: None; Visibility: Good
11.08.21	Dusk emergence survey	21:04	20:55 to 22:35	Temp: 15°C; Wind: F0 or F1; Precipitation: None; Visibility: Good
12.08.21	Dawn re-entry survey	05:59	04:35 to 06:05	Temp: 9°C; Wind: F0 or F1; Precipitation: None; Visibility: Good
12.08.21	Dusk emergence survey	21:02	20:55 to 22:37	Temp: 18°C; Wind: F0 or F1; Precipitation: None; Visibility: Good

¹ As per Section 6.3.4, these were the only buildings accessible at this time.

12.07.22	Dusk Emergence survey (B4 & B3)	21:57	21:45 to 23:35	Temp: 16°C; Wind: F2 or 3; Precipitation: None; Visibility: Good
13.07.22	Dusk Emergence survey (B6)	21:56	21:40 to 23:30	Temp: 18°C; Wind: F1; Precipitation: None; Visibility: Good
14.07.22	Dusk Emergence survey (B2)	21:55	21:40 to 23:30	Temp: 17°C; Wind: F0 or F1; Precipitation: None; Visibility: Good
08.08.22	Dusk Emergence survey (B3 & B6)	21:14	21:00 to 22:50	Temp: 17°C; Wind: F0; Precipitation: None; Visibility: Good

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Passive Detector Surveys 2021 and 2022

Wildlife Acoustics Song Meter Mini Bat (full spectrum) ultrasonic bat detectors were deployed to passively record bat activity at four locations within the Site for a total of 3 nights from 10 August 2021 to the 12 August 2021 inclusive (Figure 6.13). The detectors were programmed to record from 30 minutes before sunset, to 30 minutes after sunrise.

Between August and October 2022, a passive detector survey was carried out to investigate bat usage of the active mine at two locations. Two Wildlife Acoustics Song Meter Mini Bat (full spectrum) ultrasonic bat detectors were deployed at safely accessible, strategic locations considered likely to detect bats travelling to deeper areas of the underground mine workings from the main mine entrances (see Figure 3.3). Both detectors were programmed to record from 30 minutes before sunset until 30 minutes after sunrise (when triggered) during the August survey, and they were set to record 24 hours a day (when triggered) during the October survey.

Extraction of gypsum from the active Knocknacran mine site periodically exposes old, buried underground mine workings (in the southern face of the Knocknacran open-cast) which could also provide access for bats to the mine, but these areas are not safely accessible. The survey aimed to detect any evidence of ‘autumn swarming’ in particular which may indicate possible use of the underground Drummond areas by hibernating bats.

Data Analysis

Bat sonograms were analysed using Kaleidoscope automatic analysis and identifications were manually verified following Russ (2012).

Survey for non-volant mammals

These surveys were undertaken by Tom O’Donnell on 23rd June 2022 and 12th, 13th and 14th July 2022 with additional visits in August and September 2022. Surveys involved a walkover of the site to identify any mammal species present or signs of mammal activity such as droppings, tracks, burrows etc. Observations

were recorded using field notes and/or handheld GPS units. Techniques used to identify mammal activity followed recognised guidelines (e.g., Clark 1988, Sutherland 1996, Bang & Dahlstrom 2004 and JNCC 2004). The study area included the Knocknacran West site plus additional areas outside this boundary which fall within 150 m of the area in which blasting may potentially be carried out (Figure A of Appendix 6.2).

Bird surveys

These surveys were carried out by Noel Linehan (BSc) on 23rd June 2022, 13th and 14th July 2022 and 8th and 9th August 2022. Timings of and weather conditions are presented in Tables 2.2 – Table 2.4 of Appendix 6.2. Transect and point count surveys were carried out to characterise the general breeding bird community.

The transect survey methodology was based on that used for the Countryside Bird Survey (e.g. Coombes et al., 2009). Birds were recorded in three distance bands from the transect route (0-25 m, 25-100 m and > 100 m), with overflying birds recorded separately. Point counts were carried following the methodology used in the BIOFOREST project (Wilson et al., 2005). Each point count was of ten minutes duration.

Birds noted during other site visits, including ecological walkover surveys were also recorded.

Wildlife Acoustics

Song Meter detectors with acoustic microphones were deployed to passively record acoustic sound (e.g., bird calls) overnight at three locations, proximal to B2, B4 and B6, for a total of 2 nights from 12th July 2022 to 14th July 2022 inclusive. Night-time acoustic surveys aimed to detect evidence of Barn Owl in particular. A detector was similarly redeployed from 1st to 7th August 2022 in proximity to building 'B2' where Barn Owl has previously been recorded. The detectors were programmed to record from 30 minutes before sunset, to 30 minutes after sunrise.

The resulting WAV files were analysed using 'Audacity' and visually and aurally identified by Mr. Mark Shorten. No filters were used on the files as the recording environment was generally benign. Validation of the identification of a subset of recordings was carried out using <https://birdnet.cornell.edu/api/> and was used to confirm identification. An estimation of the number of individual birds in each file was made where possible.

Reptile survey

The Common (or Viviparous) Lizard (*Zootoca vivipara*) is Ireland's only native species of reptile. Targeted surveys were carried out which sought to identify the presence or absence of this species on the proposed site. The Survey methodology follows 'Froglife' (1999). This UK based methodology is adapted for use in an Irish context given our lesser diversity of reptile species. Visual surveys were used as the primary means of survey of this species, as they are less likely to respond to artificial refugia than other reptiles (Froglife, 1999), which are also considered in UK based guidance.

During walkover surveys carried out in June, July and August 2022, visual searching 3 – 4 m ahead of the Surveyor were carried out in order to observe any Common Lizard which may be basking on exposed structures such as logs, rocks and fencing posts, alongside areas of open ground proximal to vegetation. Care was taken not to cast shadows on the observing area whilst facing away from direct sunlight.

As a complimentary method, artificial refugia (known as 'tins') made of black roofing felt cut to 50 cm x 50 cm squares were used. Locations were chosen based on proximity to suitable reptile areas such as along hedgerows or walls, alongside site road etc. Much of the site contains dense, lodged grassland which has

developed in the last number of years following cessation of agriculture activities, and these areas do not provide optimal habitat for Common Lizard. Tins were placed on short or flattened vegetation. The tins were deployed on 23rd June 2022 and checked for the presence of reptiles on 13th and 14th July; 8th August 2022, and 9th and 22nd September 2022.

Aquatic habitat appraisals and macro-invertebrate assessment

Surveys were carried out at two locations (one onsite and one offsite) on the Corduff Stream. Survey work was carried out on 8th September 2022. Findings of the survey work are included in Appendix 6.6. Survey effort focused on both instream and riparian habitats at each aquatic sampling location (Table 1 & Figure 1 of Appendix 6.6). Surveys at each of these sites included a fisheries habitat appraisal, macrophyte and aquatic bryophyte survey, and biological water quality sampling (Q-sampling).

Surveys were also cognisant of aquatic invasive species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011-2021 (S.I. 477/2011) or high-risk invasive species in Ireland (after O' Flynn et al., 2014). This survey approach ensured that any habitats and species of high conservation value would be detected to best inform mitigation for the development.

In addition to the ecological characteristics of the site, a broad aquatic and riparian habitat assessment was conducted utilising elements of the methodology given in the Environment Agency's 'River Habitat Survey in Britain and Ireland Field Survey Guidance Manual 2003' (EA, 2003), and the Irish Heritage Council's 'A Guide to Habitats in Ireland' (Fossitt, 2000). This broad characterisation helped define the watercourses' conformity or departure from naturalness. All sites were assessed in terms of:

- Physical watercourse/waterbody characteristics (i.e. width, depth etc.) including associated evidence of historical drainage
- Substrate type, listing substrate fractions in order of dominance (i.e. bedrock, boulder, cobble, gravel, sand, silt etc.)
- Flow type by proportion of riffle, glide and pool in the sampling area
- An appraisal of the macrophyte and aquatic bryophyte community at each site
- Riparian vegetation composition

6.3.4 Survey Constraints or Limitations

Access

During the initial walkover survey of the Site (on 12th July 2018), the Site had not been subject to the partial collapse of the old gypsum workings. As such, the Site was largely accessible. Further walkover and habitat surveys undertaken during August 2019 were constrained as much of the northern part of the Site had been significantly affected by collapses of the gypsum mine pillars. This meant that only buildings B2 and B6 were accessible for dusk / dawn bat survey work. In addition, access was not provisioned for building B3. Habitat surveying and ecological walkover work undertaken during August 2021 was largely free from access constraints though buildings were not entered on safety or access grounds. Walkover surveys in 2022 were free from access constraints. Bat surveys in 2022 included provision of access to attics which enabled a more exhaustive assessment to be made.

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Habitats

It is acknowledged that due to the seasonality of various floral species, not all species will be apparent at any one time in the year. However, the habitat surveys were carried out in the optimal season for such work, and accordingly it is considered that the survey work undertaken is sufficient to assign broad habitat types and assess their relative value in the local setting.

Invasive Species

Throughout survey work the opportunity was taken to record the presence of any invasive non-native species. However, the detectability of such species can vary throughout the year and depending on their life stage or recent management. In addition (as outlined above), this type of survey is not designed to replace specialist knowledge of invasive species recognition which should be undertaken by specialist contractors. Accordingly, absence of an invasive non-native species should not be assumed even if it was not recorded during the survey work. Equally, where the presence of any invasive non-native species has been identified, absence in the remainder of the site should not be assumed.

Bat Surveys

With the exception of bat surveys in 2022 internal inspection of all buildings was not possible due to access constraints, including health and safety considerations. Nevertheless, emergence / re-entry survey work was carried out on all buildings (offering low to high potential for roosting bats).

The development is set to take place on a phased basis. Accordingly, in order to provide the most up to date information on the status of bats (and other fauna) in the relevant area at the time each phase is implemented, detailed survey work will be carried out on a phase-by-phase basis, prior to the commencement of works within each phase.

6.3.5 Impact Assessment Method

Habitats and species were assessed in accordance with the guidance contained in the document 'Guidelines for Ecological Impact Assessment for the United Kingdom and Ireland (CIEEM, 2018), which recommends that the value of an ecological resource be determined within a defined geographical context.

Defining Importance: The relative importance of each ecological feature has been defined on a geographical scale, from international importance, to having relevance only in the context of the Site boundary. The definitions employed for the basis of the evaluation are presented in Table 6.4. It should be noted that professional judgement has been employed in the allocation of a level of importance to each feature as it occurs on the Site. In other words, the value of the feature is presented in the context of its actual status within the Site. Therefore, a single individual of a species which is protected under the EU Habitats Directive would not automatically be of European (international) Importance but would be evaluated in the context of its relationship to the overall population.

Defining Impact: The impacts to ecological features are defined by their geographical significance in terms of the likely effect and the defined importance of the feature being affected. It is not possible in this system to have an impact greater than the overall geographical importance of the feature (e.g., the maximum possible impact to a feature of regional importance would be one which is of regional significance).

Impacts which do not have significance beyond the immediate area (the Site) will be managed through the implementation of construction and habitat management plans, refer to Section 6.6 Mitigation Measures. One exception to this is the case of impacts on Protected Species, where any impact would result in the implementation of mitigation measures.

Defining Magnitude of Change: Considering the potential for impacts as defined above, an assessment of the magnitude of change is established. This is based on the table below and relies on professional subjective judgement in deciding the level of magnitude of change.

Table 6.4: Criteria for Assessing Magnitude of Change

Impact Levels	Description
Severe Impact	Ecological effects of a scale or magnitude which would result in permanent, total loss of an irreplaceable species or habitat of international or national importance (occasionally of local importance), or which would result in the substantial loss of a protected/rare habitat or a population of a protected/rare species. They represent key factors in the decision-making process. Typically, mitigation measures would be unlikely to remove such effects.
Major Impact	These effects are likely to relate to permanent impacts at a regional or local level, or temporary impacts at an international or national level, and could be potential concerns to the project depending upon the relative importance attached to the issue during the decision-making process. The effects are likely to be large in scale or magnitude and result in substantial medium-term loss of protected/rare species or habitats. Mitigation and detailed design work are unlikely to eliminate all ecological effects.
Moderate Impact	These effects are usually only at local or regional level, and may be short- or medium-term only, or temporary impacts on a small part of an international site. However, the cumulative effects of such issues may lead to an increase in the overall effect on ecological features. They represent issues where effects will be experienced, but mitigation measures and detailed design work may ameliorate/enhance some of the consequences upon affected interests, but some residual effects will still arise.
Minor Impact	These effects are likely to be local issues only; or small magnitude impacts at the regional and national level, they are usually temporary, and are unlikely to be of importance in the decision-making process. However, they are of relevance in enhancing the subsequent design of the development and consideration of mitigation measures.
Not Significant / No Impact	No perceivable impacts on ecological features (habitat or species). Impacts may be beneath levels of perception, within normal bounds of variation, within the margin of forecasting error, or impacting on exceptionally poor baseline conditions.
Beneficial / Positive Impact	These effects are those, which through implementation, would be anticipated to benefit the ecology of the Site. They may advance the objectives of local, national or international species or habitats.

Outlining mitigation, compensation, and enhancement measures: Receptors subject to significant impacts (those which have the potential to affect the ecological resource outside of the immediate Site boundary)

are the focus of provision of mitigation measures which have been formulated according to the mitigation hierarchy (avoid, reduce / minimise, compensate). All proposed mitigation measures follow industry best practice. Those for protected species follow the prescribed regulatory protocols.

Defining residual impact: Following the application of mitigation measures, impacts to each ecological feature are reassessed, and any residual impacts are reported. As stated by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018), *'the value or potential value of a feature/receptor should be determined within a defined geographical context'*. Accordingly, each feature has been assessed based on the scale described in Table 6.5 below.

Table 6.5: Criteria for Establishing Receptor Sensitivity / Importance

Importance	Ecological Valuation
International	Sites, habitats or species protected under international legislation e.g. Habitats and Species Directive. These include, amongst others: SAC's, SPA's, Ramsar Sites, Biosphere Reserves, including sites proposed for designation, plus undesignated sites that support populations of internationally important species.
National	Sites, habitats or species protected under national legislation e.g. Wildlife Act 1976 and amendments. Sites include designated and proposed NHAs, Statutory Nature Reserves, National Parks, plus areas supporting resident or regularly occurring populations of species of national importance (e.g. 1% national population) protected under the Wildlife Acts, and rare (Red Data List) species.
Regional	Sites, habitats or species which may have regional importance, but which are not protected under legislation (although Local Plans may specifically identify them) e.g. viable areas or populations of Regional Biodiversity Action Plan habitats or species.
Local/County	Areas supporting resident or regularly occurring populations of protected and red data listed-species of county importance (e.g. 1% of county population), Areas containing Annex I habitats not of international/national importance, County important populations of species of habitats identified in county plans, Areas of special amenity or subject to tree protection constraints.
Local (Higher and Lower, as per NRA)	Areas supporting resident or regularly occurring populations of protected and red data listed-species of local importance (e.g. 1% of local population), Undesignated sites or features which enhance or enrich the local area, Sites containing viable area or populations of local Biodiversity Plan habitats or species, local Red Data List species etc.
Site	Habitats or species of very low importance and rarity; and/or Ecological features of no significant value beyond the Site boundary.

6.4 Baseline

6.4.1 Designated Nature Conservation Sites

Natura 2000 sites

The desk-based assessment, as previously described, provided the following results. There are no Natura 2000 designated sites within the desk study area. The closest Natura 2000 site is ca. 20 km east and is

known as the Stabannan-Braganstown SPA. The next closest Natura 2000 site is the Kilconny Bog SAC ca. 20 km in a south-westerly direction. The Dundalk Bay SAC/SPA is situated ca. 29 km away to the east (Figure 6.2). All distances are ‘as the crow flies’ and hydrological connectivity exists over a much greater distance than the straight-line measurement.

Further details on the specific conservation interests of these designations, along with an outline of the potential effects have been addressed in the accompanying NIS.

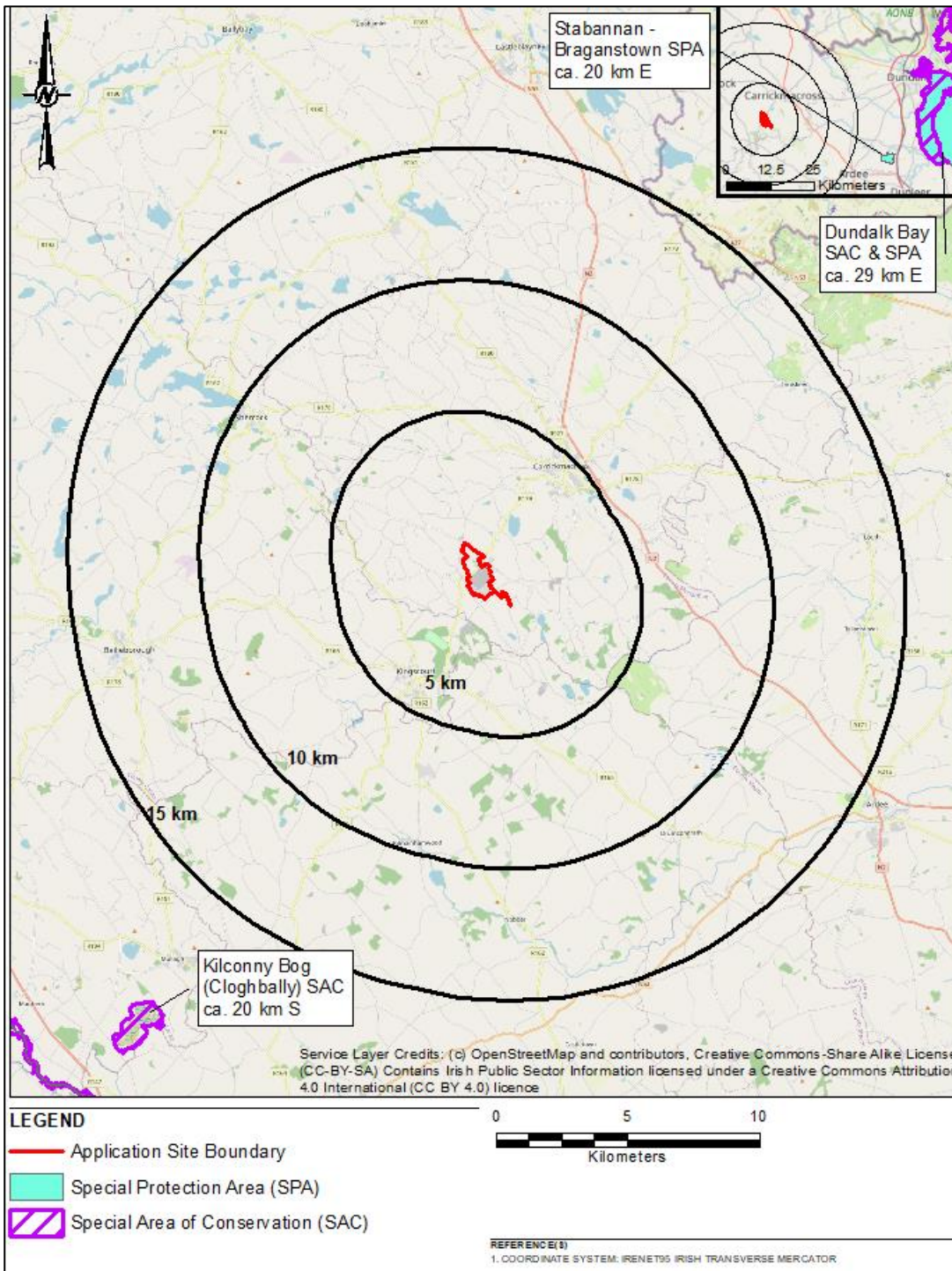


Figure 6.2: Map of Natura 2000 sites (all located outside of the Desk Study Area)

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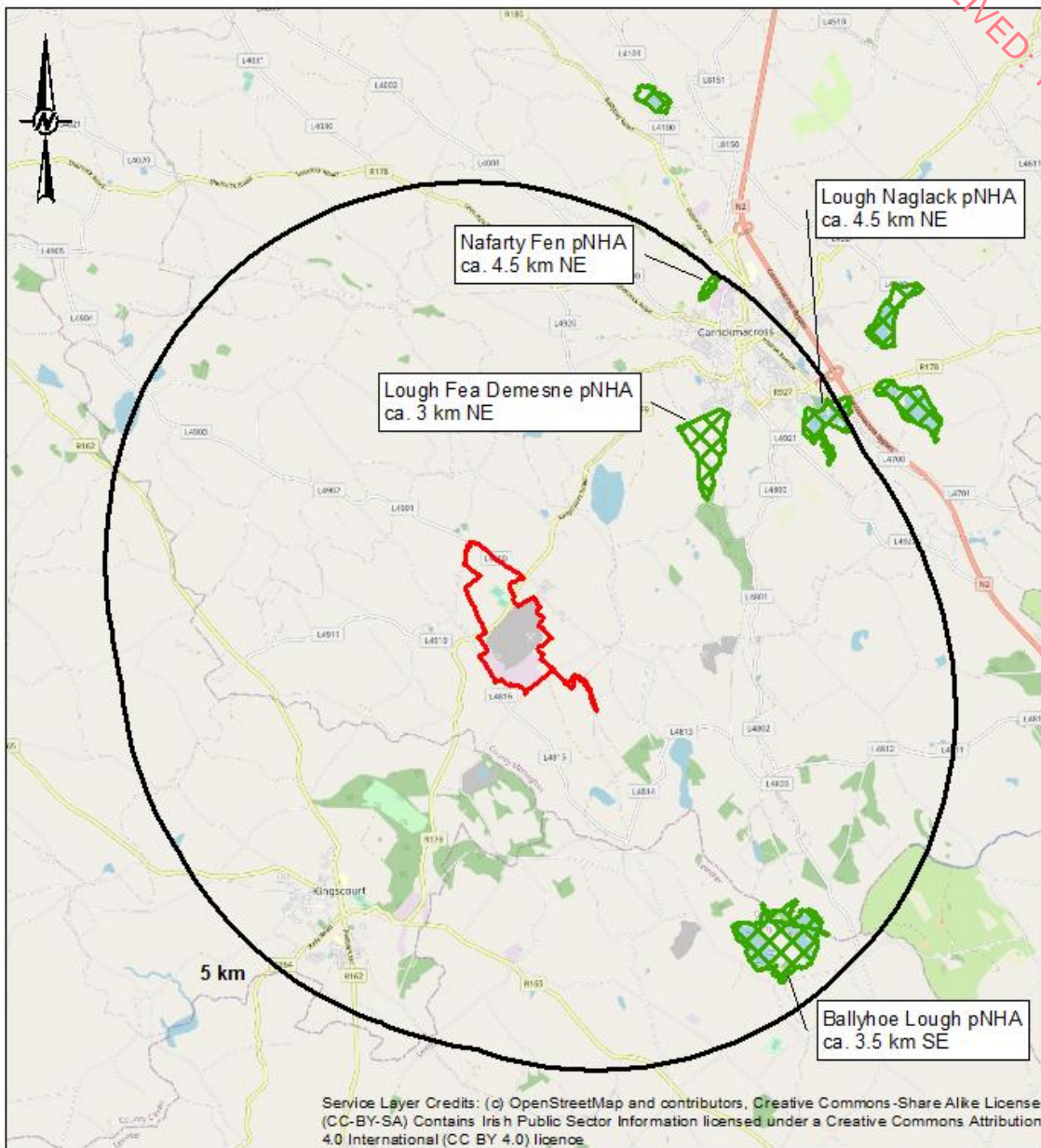


Figure 6.3: Non-statutory designations within 5 km of the Site

Lough Naglack pNHA, Nafarty Fen pNHA and Lough Fea Demesne pNHA are situated along the River Glyde upstream of the confluence with the River Bursk with no aquatic ecological connectivity (Figure 6.3). Ballyhoe Lough pNHA is situated along the River Glyde downstream of the confluence with the River Bursk offering potential ecological connectivity. The verbatim description for Ballyhoe Lough pNHA is provided below (NPWS, 2021):

Ballyhoe Lough pNHA

Description

The verbatim description for this pNHA is provided below:

“Ballyhoe Lough is located on the Monaghan/Meath border and is a fairly acid, peaty lough, contrasting markedly to most of the loughs in County Meath, which are calcareous. The lake is a very popular fishing lake and has a good stock of coarse fish.

The lough is now divided in two by a narrow strip of land covered by willow (Salix spp.) trees, Common Reed (Phragmites australis) and Alder (Alnus glutinosa). Around the edge is a fringe of Common Reed with some Common Club-rush (Schoenoplectus lacustris) and White Water-lily (Nymphaea alba). There is a peninsula, which cuts the lake in two, included in the site and it contains fields of wet grassland which are dominated by Soft Rush (Juncus effusus). The islands in the lough are covered with trees and shrubs and like the lakeshore fringed by Common Reed. They are believed to be crannógs.

The lough is of local importance mainly because it is acid and peaty, in contrast to most loughs in County Meath. In addition, the bird populations present are of great interest and this combination of interests makes the lake one of the more unusual lakes in the county. Ecological interest is supplemented by the discovery of bones, mainly skulls and antlers, of the Irish Giant Deer (Megaloceros giganteus) which have been found in and around the lough. The majority of the finds were located in the narrow neck of land dividing the loughs. It is thought that the deer used to cross at this point in the valley to the hills towards the south-west.”

Evaluation

Ballyhoe Lough pNHA is located ca. 4.5 km southeast of the Site. This pNHA is comprises a lake, split in two by a strip of wet grassland, the lough is of local important due to its acid and peaty properties. Ballyhoe Lough pNHA is well removed from the Site and separated by open agricultural land and rural road networks. Accordingly, it is not anticipated that this pNHA will be subject to any direct effects as a result of development (e.g., as a result of land take). Equally, given the distance and separation from the Site, it is considered unlikely that the development will result in any indirect effects, such as from an increase in noise levels or dust deposition. However, a search of EPA mapping sources has identified potential hydrological connectivity between the Site and Ballyhoe Lough pNHA.

Indeed, the mine water from the active mine currently discharges into the River Bursk, and Ballyhoe Lough lies downstream of this discharge point. In line with the terms of the licence, the water quality 70 m downstream of the discharge point complies with the Salmonid Regulations, and waters for abstraction regulations. The river is subject to regular monitoring to ensure the maintenance of water quality of the river. The EPA inspector’s report for the most recent IE licence review (Reg. Ref. P0519-04) notes the following regarding the mine discharge and the revised limit the discharge currently complies with:

“Taken together along with the EPA biologists assessment, the above indicates that the current discharge is not impacting on the biological quality or on the drinking water quality of the River Bursk or the River Glyde into which it flows.”

And

“Having assessed those potential effects, I have concluded as follows:

Assessment on discharges to water and river data has demonstrated that the discharges will not cause an exceedance of water quality standards and will ensure protection of aquatic life. Mine water discharges to the River Bursk will be mitigated through imposing emission limit values to ensure compliance with environmental quality standards.”

Figure 6.4 presents the relationship of the hydrological networks between the Site and surrounding pNHAs.

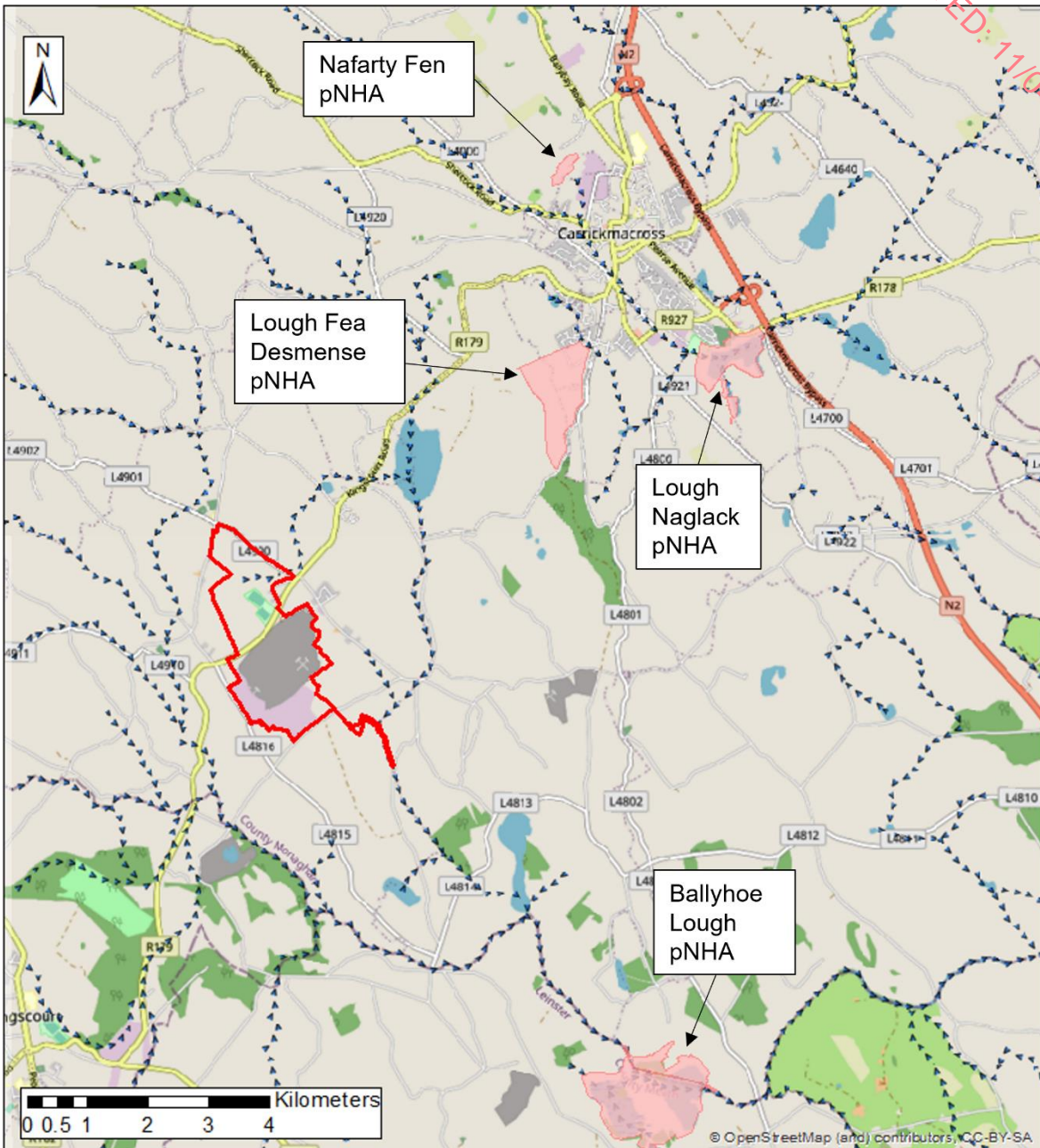


Figure 6.4: Hydrological Networks between the Site (red outline) and surrounding pNHAs (orange outline)

6.4.2 Habitat Assessment

The Site was first visited on 12 July 2018. The weather was dry and sunny, with a light wind and an average temperature of 19 degrees Celsius (°C) recorded. This initial survey just covered the Site boundary where it lies to the north of the R179. The remainder of the site (to the south of the R179) was surveyed at a later date, on 21 May 2019. During August 2021 the entire Site footprint was surveyed again. A third survey was carried out in July 2022 in order to present the baseline in a more recent context. The results of the 2022

habitat survey found no additional area of invasive species. The 2021 habitat survey was validated and no changes in habitat classification or significance were necessary.

In 2022, the Site footprint supports an existing open-cast mine, the existing Community Sports Complex (Reg. Reg. 20/365) and materials handling facility located to the south of the R179 regional road, in addition to an area of recently unmanaged pastoral land, areas of scrub and woodland located to the north of the R179. The mine site comprised open, expansive areas of quarried and excavated ground, that are served by access tracks, hard standing areas and associated offices, welfare facilities, access roads and parking areas. The dominant habitats (Fossit, 2000) at this part of the site include active quarries and mines (ED4) and buildings and artificial surfaces (BL3).

Semi-natural habitats within the mine footprint are restricted to the margins and field boundaries and include area of gorse scrub (WS1), young broadleaved woodland (WD1) established as screen planting, and nascent growth of ruderal plant species recolonising areas of bare or previously disturbed ground (ED3). The quarry site also supports a number of tailings / settlement ponds that are fringed by tall aquatic macrophytes and areas of dense gorse scrub.

The lands located to the north of the R179 differs support a network of pastoral land (GA1), wet grassland (GS4), hedgerows (WL1), tree lines (WL2), scrub (WS1) and mixed broadleaved woodland (WD1). This area also includes the lands that previously supported Magheraclone Mitchells GAA. These lands have been rehabilitated / reinstated and now support unmanaged grassland that is in transition toward dry meadows and grassy verge grassland (GS2). The lands to the north of the R179 have received little or no ongoing management in the short- to medium- term as evidenced by the overgrown and rush dominated nature of the wet grassland habitats that are commonplace throughout. Areas of drier grassland are in transition or currently represent the dry meadows and grassland verge grassland habitat type.

The northernmost section of the Site supports an area of wet woodland and scrub mosaic, while the footprint of the previous mine and quarry area, near the Site's northeastern boundary, supports an area of scrub in transition to woodland. The lands to the north of the R179 support drainage channels along the field margins. The upper reaches of the Glyde_030 watercourse (IE_NB_06G020400) are located near the eastern boundary, and originate within areas of poor draining, low lying lands supporting rank, rush dominated wet grassland. The lands located to the north of the R179 do not support habitats of high botanical diversity, however they do represent a continuum of semi-improved or unmanaged habitats that in turn may provide suitable refuge and foraging habitat for a range of breeding avifauna, mammals (volant and non-volant) and invertebrates.

The main habitats recorded within Site are listed below and shown in Figure 6.5 and Figure 6.6 below.

- Active Mine (ED4);
- Improved Grassland (GA1);
- Amenity Grassland (GA2);
- Semi-Natural Grassland (GS4);
- Hedgerows (WL1);
- Semi-Natural Broadleaved Woodland (WN6), and Scattered and Dense Scrub (WS1);

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- Buildings and hardstanding (BL3);
- Recolonising Bare Ground (ED3); and
- Aquatic Habitat (Ditches and Ponds) (FW4 & FL4).

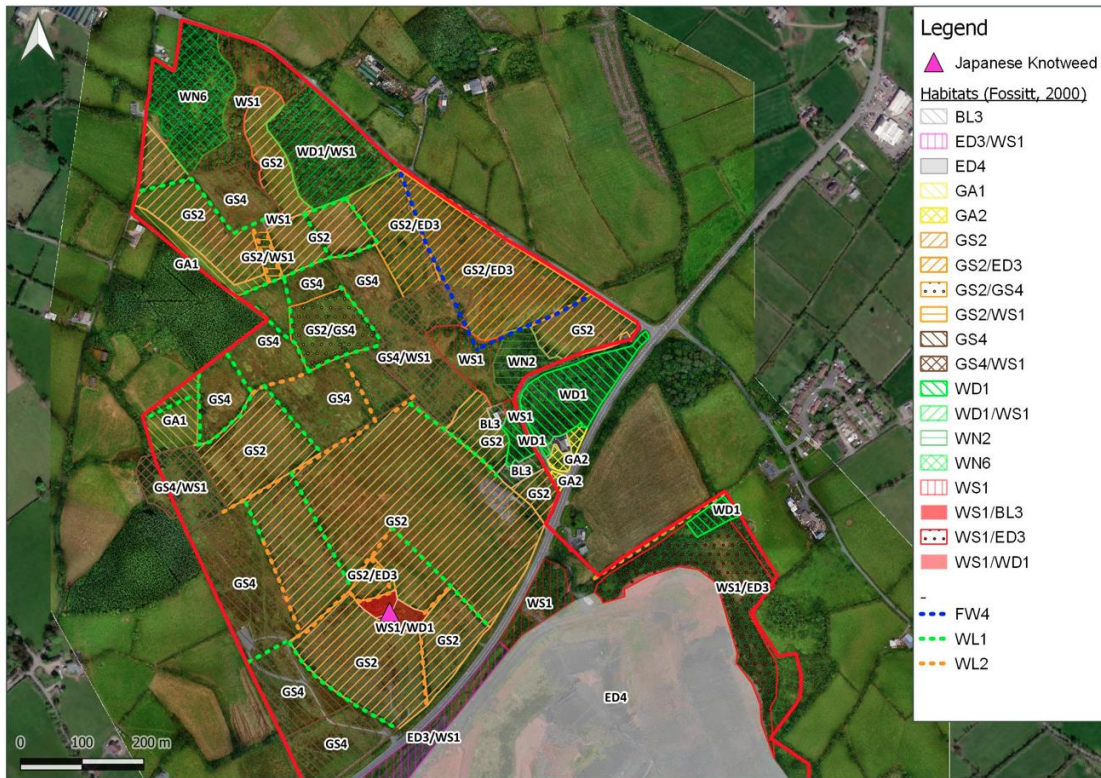


Figure 6.5: Habitat Map (North)

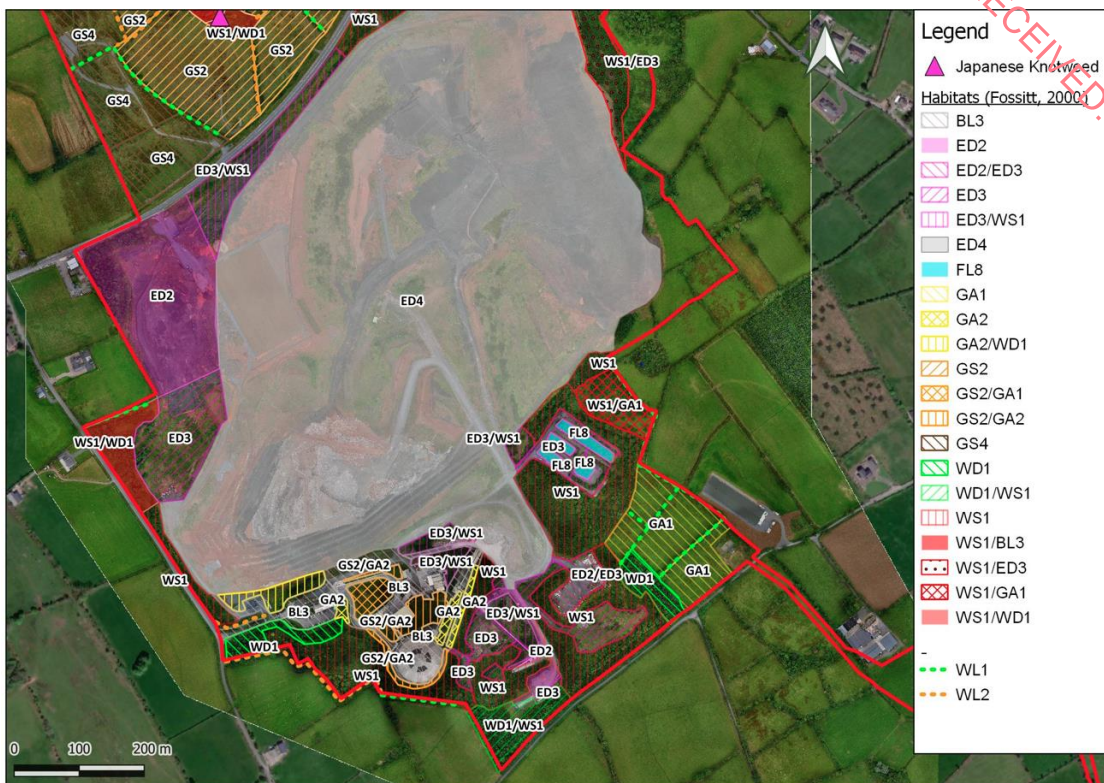


Figure 6.6: Habitat Map (South)

Detailed descriptions of the habitats within the Site are provided below, along with photographs of typical conditions within them (Figure 6.7). The potential of these habitats to support protected faunal species is discussed in Section 6.3.3. The footprint of the Site includes extensive areas of active mines and quarries (ED4) in addition to buildings and artificial surfaces (BL3), recolonising bare ground (ED3), artificial lakes ponds (FL8), recolonising bare ground (ED3), scrub (WS1) and young mixed broadleaved woodland plantations established as screen planting (WD1).

The lands to the north of the R179 support extensive areas of unmanaged pastoral lands, in addition to areas of reinstated lands that are currently or have recolonised (ED3) to dry semi-natural grassland (GS2). These pastoral lands are fringed throughout by unmanaged hedgerows (WL1) and some treelines (WL2). The northernmost section of the Knocknacran Open-Cast Mine site and proposed Knocknacran West Open-Cast Mine site support extensive scrub (WS1) and wet willow-alder-ash woodland (WN6).

Improved Agricultural Grassland (GA1)

Improved agricultural grassland occurs at the southeastern margins of the Knocknacran site boundary and not within or immediate adjacent to the mine and quarry areas. These lands support beef farming and are highly improved and consequently support abundant perennial rye grass (*Lolium perenne*) and accompanying agricultural herbs including creeping buttercup (*Ranunculus repens*), mouse-ear chickweed (*Cerastium fontanum*) and broadleaved dock (*Rumex obtusifolius*).

These lands are fringed by unmanaged hedgerow habitats comprising young ash (*Fraxinus excelsior*) trees and hawthorn (*Crataegus monogyna*) shrubs.

Evaluation: Local Importance – Lower Value.

Amenity Grassland (GA2)

Small areas of amenity grassland are located around the services buildings, offices and car parking areas associated with the Knocknacran quarry and mine Facility. Some of these areas have been unmanaged in recent years and are classified under the dry meadows and grassy verge grassland habitat category. Those areas that have undergone recent maintenance support recently mown grass swards and support perennial rye grass, red fescue (*Festuca rubra*) dandelion (*Taraxacum officinale* agg.), white clover (*Trifolium repens*) and localised abundances of the moss *Rhytidiadelphus squarrosus*.

Evaluation: Negligible

Dry Meadows and Grassy Verge Grassland (GS2)

Within the quarry and active mine site, this habitat is present locally along the margins of access roads and tracks and on areas of unmanaged amenity grassland. Plant species composition includes cock's-foot (*Dactylis glomerata*), creeping bent (*Agrostis stolonifera*), Yorkshire fog, ragwort (*Senecio jacobaea*), nettle and bush vetch (*Vicia sepium*).

Dry meadows and grassy verge grassland (GS2) are more extensive in its distribution to the north of the R179, where it has established due to the recent lack of management of pastoral lands. Plant species composition typically comprises Yorkshire fog (*Holcus lanatus*), false oat grass (*Arrhenatherum elatius*), common couch grass (*Elytrigia repens*), common rush (*Juncus effusus*), creeping bent (*Agrostis stolonifera*), common bent (*Agrostis capillaris*), broadleaved dock, ribwort plantain (*Plantago lanceolata*) and sweet vernal grass (*Anthoxanthum odoratum*).

The lands that once supported Magheraclone GAA pitch have been reinstated and reseeded to form a pastoral grassland. However, this area hasn't been managed through grazing or mowing in recent years and has therefore transitioned to a dry meadow type grassland habitat, exhibited by an establishing sward comprising, tall and overgrown grasses. Plant species composition includes abundant perennial rye grass (*Lolium perenne*), creeping bent, creeping buttercup (*Ranunculus repens*), white clover (*Trifolium repens*), greater bird's foot trefoil (*Lotus pedunculatus*), broad-leaved dock, red clover (*Trifolium pratense*) and Yorkshire fog.

This habitat also occurs in mosaic with areas of recolonising bare ground, near the eastern boundary of the site, north of the R179. This area has been recently reclaimed and reinstated and has been left unmanaged in recent years. As a result, a mosaic of recolonising bare ground and dry meadows and grassy verge grassland habitats has established. Plant species composition includes creeping bent, common bent, Yorkshire fog, false oat grass, greater bird's foot trefoil, marsh thistle (*Cirsium palustre*), sweet vernal grass, ribwort plantain, compact rush (*Juncus conglomeratus*), common rush, red bartsia (*Odontites vernus*), common knapweed (*Centaurea nigra*), meadow vetchling (*Lathyrus pratensis*), creeping cinquefoil (*Potentilla reptans*) and lesser stitchwort (*Stellaria graminea*).

Evaluation: Local Importance – Lower Value.

Wet Grassland (GS4)

Wet grassland occurs throughout much of the study area, north of the R179 where it occurs near the centre and southwest. Like most of the pastoral lands located to the north R179, these wet grassland habitats have been unmanaged in recent years resulting in the development of dense rushy swards, most of which are dominated by common rush. In addition to common rush other species occur locally and include Yorkshire fog, greater bird's-foot trefoil, sweet vernal grass, creeping bent, marsh thistle, meadowsweet

(*Filipendula ulmaria*), marsh willowherb (*Epilobium palustre*), angelica (*Angelica sylvestris*), silverweed (*Potentilla anserina*), jointed rush (*Juncus articulatus*), compact rush and meadow vetchling.

Wet grassland also occurs in mosaic with scrub, where the lack of recent management has resulted in the colonisation and spread of scrub species including bramble (*Rubus fruticosus agg.*), grey willow (*Salix cinerea subsp. oleifolia*) and gorse (*Ulex europaeus*).

Evaluation: Local Importance – Lower Value.

Spoil and Bare Ground (ED2)

This habitat is located within the quarry and mine facility, occurring in mosaic with recolonising bare ground or along the immediate margins of the quarry and mine site's access tracks. During the site visit, this habitat occurred within the footprint of the recently permitted (Reg. Ref. 20/365) Community Sports Complex site, which is under construction. Plant species assemblage is sparse and includes localised and individual occurrences of those species identified for the recolonising bare ground habitat described below.

Evaluation: Local Importance – Lower Value.

Recolonising Bare Ground (ED3)

This habitat occurs as large, relatively extensive areas within the Knocknacran Quarry and mine site as well as occurring in mosaic with (or in transition from) areas of spoil and bare ground. To the north of the R179, this habitat occurs in mosaic with dry meadows and grassy verge grassland, where it has established and transitioned from recently regraded and reinstated lands. It represents one of the more species rich areas within the study including a range of ephemeral, wetland, and dry grassland plant species.

Within the quarry site, areas of recolonising bare ground occur along access tracks margins and within the sections of the quarry footprint that are starting to recolonise with ruderal plant species. Areas of recolonising bare ground and nascent scrub also occur on sloping quarry faces and margins near the north and northwest, that have not been worked in the recent past. Plant species composition includes colt's-foot (*Tussilago farfara*), Yorkshire fog, broad leaved willowherb (*Epilobium montanum*), yarrow (*Achillea millefolium*), wild carrot (*Daucus carota*), greater bird's foot trefoil, lesser trefoil (*Trifolium dubium*), ribwort plantain, cock's-foot, mayweed (*Matricaria chamomilla*), common bent, cat's ear (*Hypochaeris radicata*), sweet vernal grass, field horsetail (*Equisetum arvense*), ox-eye daisy (*Leucanthemum vulgare*), rosebay willowherb (*Chamerion angustifolium*), weld (*Reseda luteola*), creeping thistle (*Cirsium arvense*), black medick (*Medicago lupulina*), black knapweed (*Centaurea nigra*), common centaury (*Centaureum erythraea*), silverweed (*Potentilla anserina*), prickly sow thistle (*Sonchus asper*) and redshank (*Persicaria maculosa*).

Evaluation: Local Importance – Lower Value.

Other Artificial Lakes and Ponds (FL8)

This habitat relates to the network of attenuation pond cells located near the southeastern corner of the Knocknacran quarry and mine site. These ponds are active and continually receive turbid water from the mine and quarry works. As a result, instream aquatic macrophytes are not abundant. However, the margins of these habitats support emergent aquatic macrophytes including bulrush (*Typha latifolia*), greater willowherb (*Epilobium hirsutum*), rosebay willowherb, wild carrot and angelica. These ponds also support wetland waterbirds including Coot and Mallard. Another area of standing water occurs near the northern boundary of the quarry void and includes bulrush. A disused attenuation pond also occurs near the southern boundary of the mine and quarry site and supports emergent bulrush and fringing grey willow and gorse.

Evaluation: Local Importance – Lower Value.

Reed and Large Sedge Swamp (FS1)

This habitat occurs in mosaic with the extensive attenuation ponds located near the southeastern corner of the Knocknacran Mine site. Species composition includes bulrush (*Typha latifolia*) with accompanying aquatic emergent macrophytes as listed above.

Evaluation: Local Importance – Lower Value.

Mixed Broadleaved Woodland (WD1)

The boundaries of the Knocknacran quarry and mine facility support young mixed broadleaved woodland blocks that have been established for screening and landscaping purposes. This includes young ash plantations at the southeastern and northeastern boundary of the mine facility. Other areas of mixed broadleaved woodland are located to the southwest of the mine offices and weighbridge and located to the east of the local access road serving the western boundary of the mine and quarry site. These are young woodland habitats with undeveloped shrub and ground layers. Plant species composition includes ash (*Fraxinus excelsior*), cherry (*Prunus sp.*), pubescent birch (*Betula pubescens*), sycamore (*Acer pseudoplatanus*) and hybrid poplar (*Populus sp.*).

Mixed broadleaved woodland also occurs in mosaic with scrub on those lands located to the north of the R179. One area occurs immediately south of a ruined farmhouse and outbuildings and has formed from an overgrown garden and converging hedgerows and treelines and comprises semi-mature ash and Lawson cypress (*Chamaecyparis lawsoniana*) trees and underlying elder (*Sambucus nigra*), hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*), grey willow, plum (*Prunus sp.*) and apple (*Malus sp.*) trees. Another area of mixed broadleaved woodland in mosaic with scrub, occurs near the northeastern boundary of the site, north of the R179. These habitats have colonised the footprint of an old quarry site and now support pubescent birch, grey willow, sycamore and ash overtopping more extensive gorse (*Ulex europaeus*) scrub.

Evaluation: Local Importance – Lower Value.

Wet Willow-Alder-Ash Woodland (WN6)

A small copse of wet-willow-alder-ash woodland has developed at the northernmost location of the study area. This is a recently developed woodland habitat comprising young ash and grey willow, with gorse and bramble in the understorey.

Evaluation: Local Importance – Higher Value.

Oak-Ash-Hazel Woodland (WN2)

A small area of developing semi-natural woodland comprising pedunculate oak (*Quercus robur*) and ash is located near the eastern boundary of the study area, north of the R179. This woodland supports pedunculate oak, ash and occasional pubescent birch in the canopy. The shrub and ground layers are poorly developed, with localised holly (*Ilex aquifolium*), regenerating ash, ivy (*Hedera hibernica*) and bramble.

Evaluation: Local Importance – Higher Value.

Scrub (WS1)

Localised pockets of scrub occur throughout the study area and include gorse, grey willow and bramble. These habitats occur singularly or in mosaic with other habitats such as wet grassland, dry meadows and grassy verge grassland and mixed broadleaved woodland.

Areas of dense gorse scrub with some grey willow has established within the mine and quarry site, its immediate environs and site boundary. Dense gorse, willow and broom (*Cytisus scoparius*) scrub occur on the fringes of the silt ponds located near the southeastern boundary of the site, while the southern, western and northeastern fringes of the quarry void support gorse dominated scrub.

The lands located to the north of the R179 support localised areas of gorse and grey willow scrub, in addition to areas of scrub occurring in mosaic with mixed broadleaved woodland.

Evaluation: Local Importance – Lower Value.

Drainage Ditches (FW4)

Poorly defined, narrow and sinuous drainage channels are located toward the centre and northeast of the Knocknacran site, north of the R179. These drainage channels supported shallow water and little to no waterflow. These drainage channels are contributory watercourses of the Glyde_030 river (IE_NB_06G020400).

Evaluation: Local Importance – Higher Value.

Hedgerows (WL1)

Hedgerows occur along the boundaries of the unused pastoral fields located north of the R179. Like the pastoral field networks, these hedgerows have been unmanaged over the short- to medium-term. Hawthorn is the most common and dominant shrub species within these linear woodland habitats. Other regularly occurring species include elder, blackthorn (*Prunus spinosa*), grey willow, gorse, wych elm (*Ulmus glabra*) and young ash trees. Nearer the ruined and abandoned farmhouses and outbuildings, species such as apple, plum, cherry and elm occur.

A detailed appraisal report on the existing hedgerows has been completed and is included in Appendix 6.3.

The results indicate that the majority of hedgerows and treelines surveyed were single line hedges, and were located upon small earth banks which were typically less than 1.0 m in height. Many of the hedgerows and treelines surveyed were unmanaged and overgrown, supporting routine gaps at their base, with a localised proliferation of bramble within the shrub layer. Ground flora at the base of the hedgerow and treeline structures were poorly developed, with little evidence of diverse vernal forb and grass species present.

Most hedgerow shrubs within the study area are overgrown, with the average hedgerow height measuring between ca. 1.5 m and ca. 4.0 m. Hedgerows were 'gappy' within the Knocknacran West site. In addition, many of the hedgerows within the study area have not received management in the recent past. The majority of hedgerows surveyed were classified as either relict or overgrown.

Evaluation: Local Importance – Higher Value.





Treelines (WL2)

Similar to hedgerows, treeline habitats typically occur to the north of the R179 along the boundaries of abandoned farm buildings, on the margins of the old Magheracloone GAA field and where overgrown hedgerows have formed into treeline habitats. Treelines around the old Magheracloone GAA field include tall hybrid poplar trees. Hybrid poplar trees also fringe the northeastern boundary of the study area, north of the R179. Where treelines border the pastoral lands north of the R179, they mostly comprise semi-mature ash trees occurring with or overtopping hawthorn and blackthorn trees.

Evaluation: Local Importance – Higher Value.

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<p>Rank, rush dominated wet grassland (GS4) located north of the R179</p>	<p>Rehabilitated lands on the former Magheracloone GAA ground, supporting rank, unmanaged grassland</p>
	
<p>Internal access tracks at the quarry site</p>	<p>Silt pond (FL8) located near the southeastern boundary of the mine site</p>

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<p>Knocknacran Quarry void (ED4) with recolonising bare ground (ED3)</p>	<p>Knocknacran Quarry void (ED4), with localised ponding water (FL8) and revegetating / recolonising ground (ED3)</p>
	
<p>Mine entrance, near the southern boundary of the Knocknacran site</p>	<p>Abandoned farm house and outbuilding (BL3) north of the R179</p>

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Japanese knotweed fringing an abandoned farmhouse and outbuilding, north of the R179



Dry meadows and grassy verge grassland (GS2) on regraded lands, north of the R179



Mixed broadleaved woodland (WD1) copse immediately north of the R179



Dry meadows and grassy verge grassland (GS2) near the northern boundary of the site

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<p>Abandoned farm dwelling (BL3) near the northern boundary of the site</p>	<p>Rank wet grassland (GS4) and dry meadows and grassy verge grassland (GS2) mosaic</p>

Figure 6.7: Photos of habitats at the Knocknacran Site

Aquatic Habitat FW4 & FL4

A site visit was undertaken on 8th September 2022 to carry out an aquatic habitat appraisal and macro-invertebrate assessment (Appendix 6.6). The aquatic survey area was focused on the Corduff Stream catchment (EPA code: 06C70), that drains the Drumgoosat/ Knocknacran West area, rising above the old Drumgoosat mine workings and flows north-east into Lough Fea Figure 6.8.

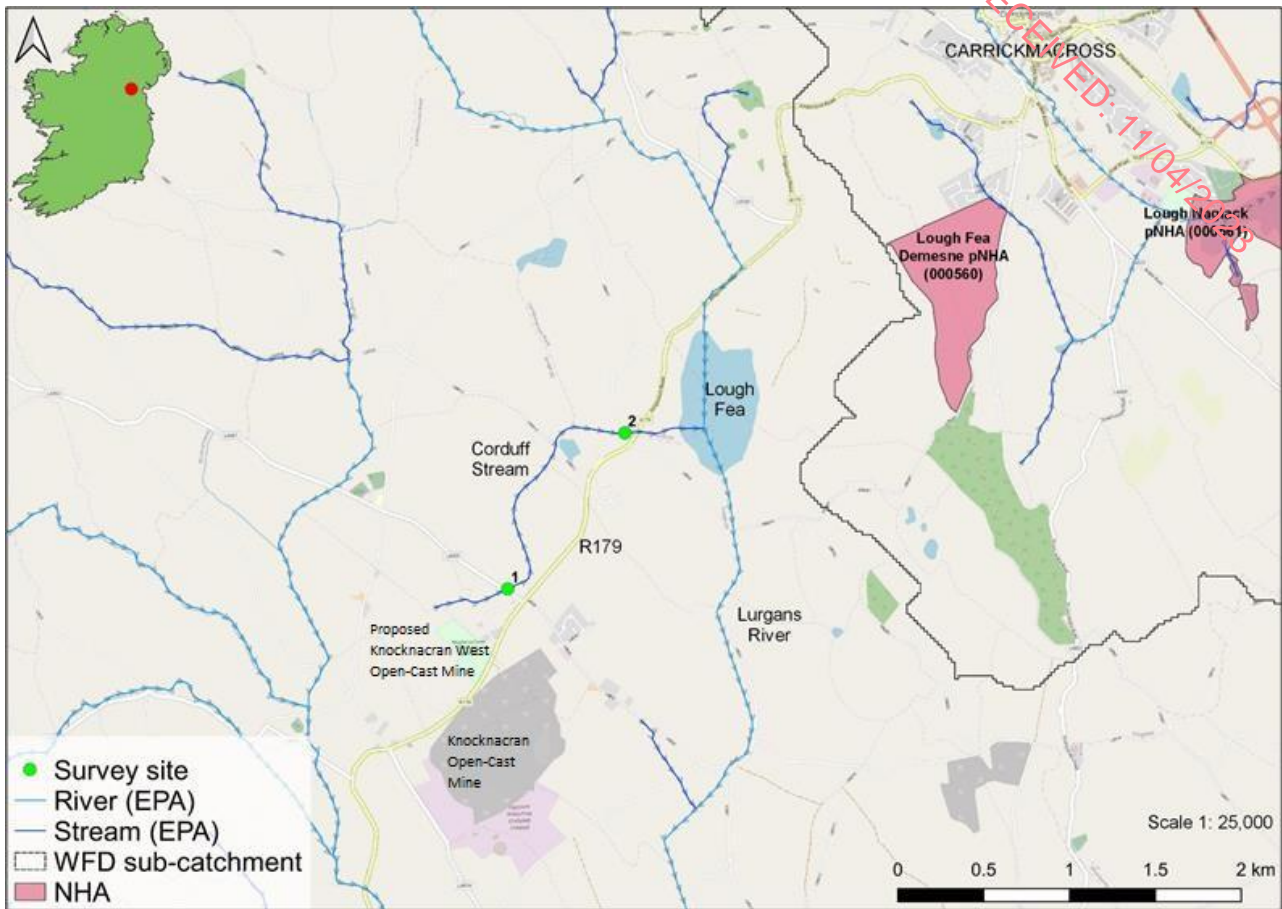


Figure 6.8: Locations of aquatic survey sites on the Corduff Stream

A fisheries appraisal of the Corduff Stream was undertaken at the two survey locations at Drumgoosat (Site 1 - onsite) and Corrybrackan (Site 2 - offsite – downstream), west of Lough Fea (Figure 6.8).

At Site 1 (Figure 6.9), the stream was evidently historically deepened as part of drainage works. The stream was between 0.3 m and 0.7 m deep, with stagnant water at the time of the survey. The channel was 1 - 1.5 m wide with 1 - 2 m bank heights, being trapezoidal in shape. The stream had a deep silt and clay bed with no hard substrata. The silt was anoxic (black) in places when disturbed. The stream supported several common macrophyte species including abundant fool's watercress (*Apium nodiflorum*) with localised branched bur-reed (*Sparganium erectum*) and brooklime (*Veronica beccabunga*). Common duckweed (*Lemna minor*) was also frequent in the stream indicating enrichment. The riparian areas supported mature hawthorn (*Crataegus monoygna*), oak (*Quercus* sp.) and ivy (*Hedera hibernica*) with heavily scrubbed over understories with species including hedge bindweed (*Calystegia sepium*), bramble (*Rubus fruticosus*), great willowherb (*Epilobium hirsutum*), nettle (*Urtica dioica*) and wild angelica (*Angelica sylvestris*).

The Corduff Stream at Site 1 was not of any value to salmonids due to the absence of flows, heavy enrichment and siltation. The bed was too compacted due to the clay content and with insufficient flows (being stagnant at the time of the survey) to support lamprey. It was considered to be of low value to eel given the absence of coarse substrata, limited deeper pool and heavily vegetated nature of the channel. The channel was not of value to crayfish given poor riverine conditions i.e. absence of flow, enrichment, heavy siltation and the absence of coarse substrata.



Figure 6.9: Site 1 on the Corduff Steam – onsite location

Biological water quality, based on Q-sampling, was calculated tentatively as Q2-3 (poor status). No macro-invertebrate species of conservation value greater than ‘least concern’, according to national red lists, were recorded via Q-sampling. Given the absence of any aquatic species of high importance or of any significant fisheries value at Site 1, the aquatic ecological evaluation was of local importance (lower value).

Site 2 (Figure 6.10) was located on the Corduff Stream, west of Lough Fea and the R179 road crossing (Figure 6.8). The Corduff Stream at the survey area was a 3 m wide, heavily modified lowland depositing channel (FW2). The channel was 0.3 m - 0.6 m deep with steep 5 - 8 m bank heights and had a trapezoidal channel profile. The channel had evidently been historically extensively deepened and had a deep silt and clay bed. Large accumulations of silt and clay were visible on the bed of the stream and on entry into the channel silt plumes were visible indicating gross siltation. The stream supported no macrophytes apart from frequent common water starwort (*Callitriche stagnalis*) and abundant invasive least duckweed (*Lemna minuta*). The riparian areas were densely scrubbed over with bramble, nettle, cleavers (*Galium aparine*), great willowherb and ivy with scattered mature sycamore (*Acer pseudoplatanus*) and crack willow (*Salix fragilis* agg.). The bordering land uses were of built land. The stream was a poor salmonid nursery due to gross siltation and enrichment but likely supports a small residual adult brown trout (*Salmo trutta*) population. The stream bed may support a small brook lamprey (*Lampetra planeri*) population due to suitable lamprey ammocoete burial habitat, albeit spawning habitat was absent. The stream was considered to be of limited value for European eel (*Anguilla anguilla*) but a small population may exist given the species presence in downstream connecting Lough Fea. The stream had no suitability for crayfish due to gross enrichment, siltation and very limited hard substrata.

Biological water quality, based on Q-sampling, was calculated tentatively as Q2-3 (poor status). No macro-invertebrate species of conservation value greater than ‘least concern’, according to national red lists, were recorded via Q-sampling. Given that the Corduff Stream at site 2 may support brook lamprey and a small trout population and or European eel, the aquatic ecological evaluation was of local importance (higher value).



Figure 6.10: Site 2 on the Corduff Stream (offsite and downstream)

The Corduff Stream in the vicinity of the Project and through much of its course as far as Lough Fea has been historically modified (including straightening, deepening, road culverts and bank reinforcements), with resulting impacts to hydromorphology and the quality of aquatic habitats present. Furthermore, the stream suffers from low seasonal flow (particularly at Site 1 near Knocknacran West), with siltation and water quality enrichment pressures evident. Both survey sites achieved Q2-3 (poor status) water quality in September 2022, with no rare or protected macro- invertebrates recorded as been present.

As described by Aecom (2020) the River Bursk and River Glyde support the following notable species that may be affected by mine water discharge: Atlantic salmon *Salmo salar*; and brook lamprey *Lampetra planeri* (both Habitats Directive Annex II, requiring establishment of SACs for their protection and indicating importance on a European scale), brown trout *Salmo trutta*, and European eel (critically endangered by IUCN criteria).

A variety of other species that are not protected or notable are also present, known to include perch *Perca fluviatilis*, pike *Esox lucius*, roach *Rutilus rutilus*, stone loach *Cobitis elongatoides* and three-spined stickleback *Gasterosteus aculeatus* in the watercourses, and also bream *Abramis brama* and tench *Tinca tinca* at Rahans Lough. The upper reaches of the River Bursk are reported to contain salmonid spawning and nursery habitat. However, downstream of the mine water discharge point there is reported to be cyprinid and coarse fish habitat but no salmonid spawning and nursery habitat (IFI, 2019; SLR, 2019). All the notable fish species (salmon, trout, lamprey and European eel) are migratory species, meaning they migrate up and downstream to complete their life cycle, and therefore connectivity between spawning, feeding and refuge habitat is important.

The electrofishing survey carried out by SLR (2019) on 28 August 2019 identified brown trout, European eel, brook lamprey, stone loach, perch, and three-spined stickleback upstream of the mine water discharge. At the mine water discharge point itself, European eel, roach and perch were recorded; whilst 70 m downstream at Compliance Point CP-1 brown trout and perch were recorded. At D4-SW5 in the River Bursk (1.7 km downstream of the discharge point) perch and pike were recorded. Downstream in the River Lagan / Glyde the water was too deep to carry out electrofishing (AECOM, 2020).

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6.4.3 Tree Survey

The majority of hedgerows within the site have lapsed meaning they have not been maintained for a number of years and as a result many tree species (mostly ash) have been left to grow into trees. The species diversity in these hedgerows is limited, the bulk being hawthorn and ash. An arboricultural review is included in Appendix 6.4; a summary of the baseline findings from the review is included here.

The majority of the trees on the site are category 'C' in accordance with the cascade chart illustrated in Table 1 of BS 5837:2012. Category 'C' trees are of low quality/value with a minimum of 10 years life expectancy or of a young age class/size.

These trees would be seen as having the potential to provide tree cover for the short to medium term or if of a young age class, or small size to develop to form part of the future tree cover and possibly move from a category C to A or B. This category consists of trees of all age classes from young to mature.

Trees on site which would be categorised as B or A would be those within Zone 1 (to the east, largely to be retained), Poplar trees to be retained along the north by the L4900, and some examples but not many in Zones 2 and 3 (to the northwest).

6.4.4 Fauna

The presence, or potential presence, of species on the Site was identified from the desk study and Phase 1 Habitat survey. In addition, specific survey work was carried out in respect of roosting bats, as outlined below.

6.4.4.1 Bats

Desk Study

National Biodiversity Data Centre holds previous records of bat presence from within the 10 km square (N89) in which the proposed site is located.

These records are for Common Pipistrelle (*Pipistrellus pipistrellus*), Soprano Pipistrelle (*Pipistrellus pygmaeus*), Daubenton's Bat (*Myotis daubentonii*), Brown Long-eared Bat (*Plecotus auritus*) and Leisler's Bat (*Nyctalus leisleri*). It is important to note that an absence of other bat species records is reflective of a lack of surveys undertaken to date rather than absence of bat species.

The overall bat suitability index value (39.67) according to 'Model of Bat Landscapes for Ireland' (Lundy *et al.* 2011) suggests the landscape in which the locality of the study area is of high suitability for bats in general. Species specific scores are provided in Table 6.6.

Table 6.6: Suitability of the study area for the bat species according to 'Model of Bat Landscapes for Ireland' (Lundy *et al.* 2011)

Common Name	Scientific Name	Suitability Index
All bats		39.67
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>	54

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Brown long-eared bat	<i>Plecotus auritus</i>	46
Common pipistrelle	<i>Pipistrellus pipistrellus</i>	54
Lesser horseshoe bat	<i>Rhinolophus hipposideros</i>	4
Leisler's bat	<i>Nyctalus leisleri</i>	56
Whiskered bat	<i>Myotis mystacinus</i>	27
Daubenton's bat	<i>Myotis daubentonii</i>	51
Nathusius pipistrelle	<i>Pipistrellus nathusii</i>	19
Natterer's bat	<i>Myotis nattererii</i>	46

Bat Conservation Ireland (BCI) conducted a search of their records database at the request of O'Donnell Environmental on 05 August 2021. The relevant search area included a 10 km radius from the development application boundary. Bat roosts have been identified in seven 1 km grid squares within the search area (see Table 6.7 and Figure 6.11). No roost data exists within or in close proximity to the proposed site.

Table 6.7: Bat Conservation Ireland (BCI) bat roost records from a 10km search area surrounding the proposed site

Ref	Grid Ref. (IG)	Comment
R_01	N7190	Soprano Pipistrelle, Common Pipistrelle, Brown Long-eared Bat, Leisler's Bat
R_02	H8502	Daubenton's Bat, Leisler's Bat
R_03	N8396	Common Pipistrelle
R_04	N8597	Soprano Pipistrelle, Common Pipistrelle, Brown Long-eared Bat
R_05	H7103	Common Pipistrelle
R_06	N7991	Unidentified bat
R_07	H7300	Soprano Pipistrelle, Common Pipistrelle, Brown Long-eared Bat

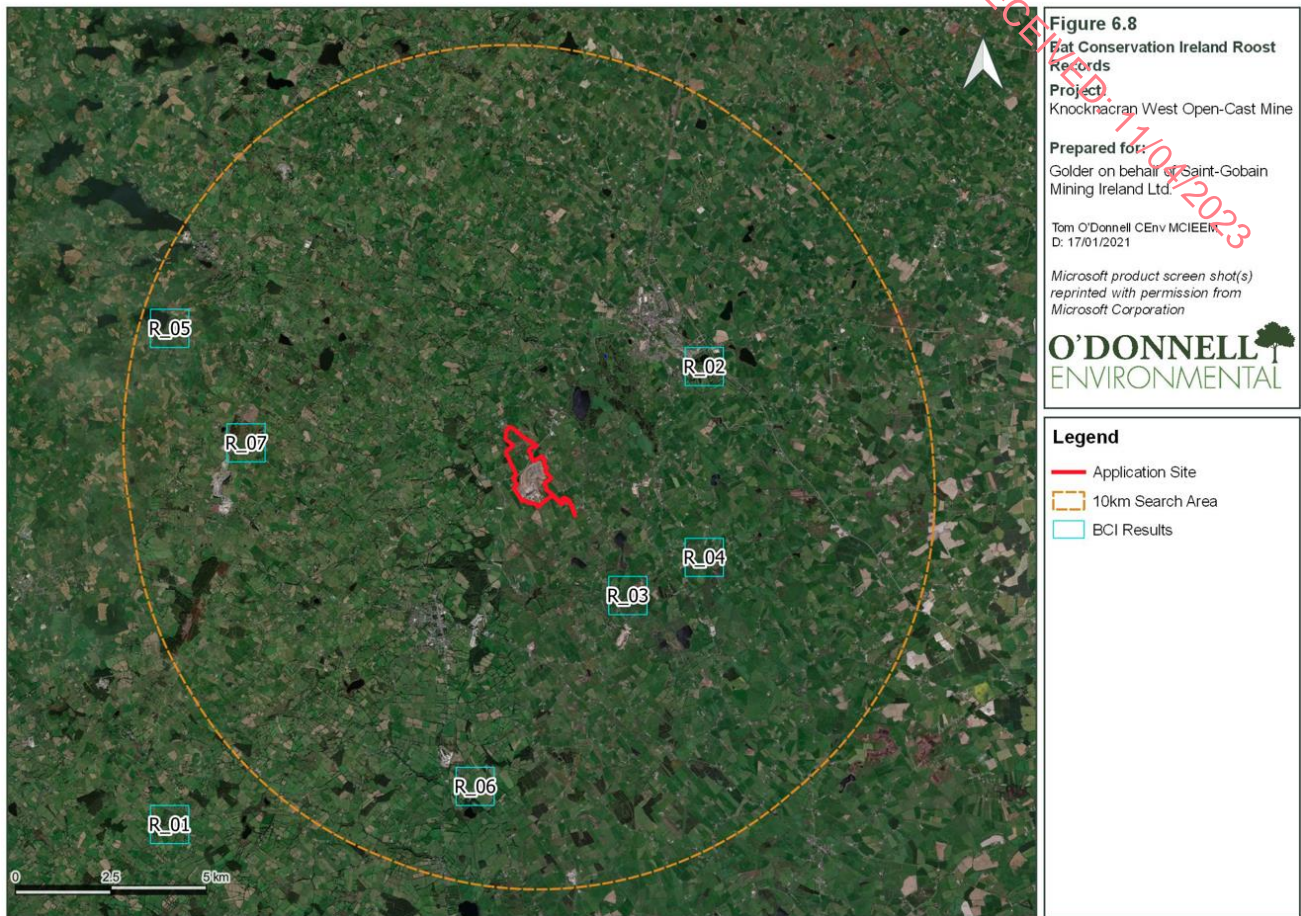


Figure 6.11: Desk Study Bat Roost Results

Buildings - Visual Inspections

A number of buildings are currently present within the Site boundary (Figure 6.12). Accordingly, a detailed visual assessment was carried out on these buildings, in order to assess their potential to support roosting bats. Buildings range from occupied residences to agricultural barns. Generally, buildings on Site are constructed from traditional building materials such as stone which provides roosting opportunities for bats within cracks and crevices especially where weather damage has occurred.

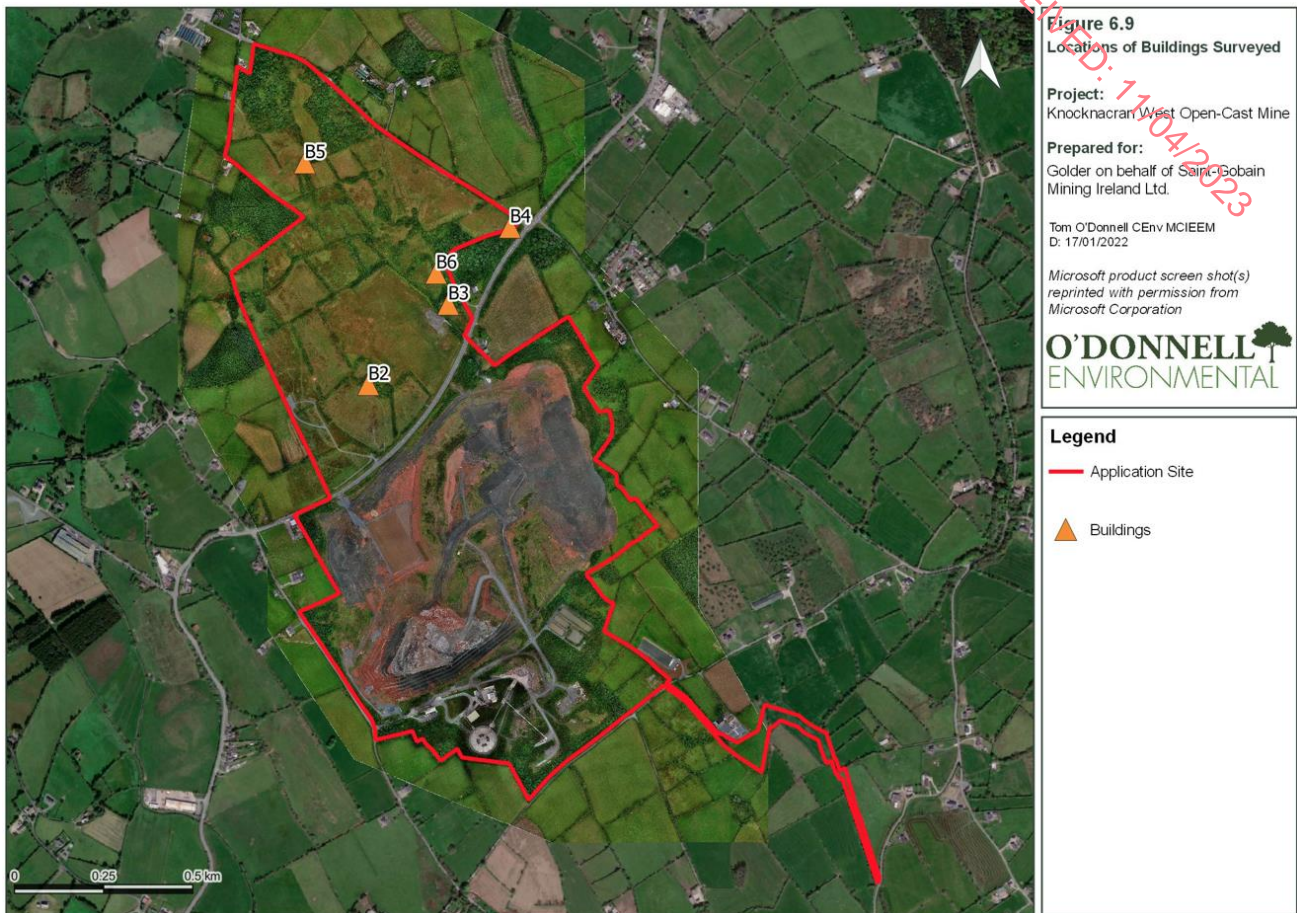


Figure 6.12: Buildings Identified with Bat Roosting Potential on Site (2021 Aerial drone survey)

Potential Bat Roost Assessments

The suitability of man-made structures for roosting bats was considered. Daytime visual assessments were carried out at all remaining man-made structures in the Knocknacran West site (Figure 6.1) in order to identify any bat roosting potential which may exist associated with these structures.

Following the initial visual assessments, active bat surveys were carried out following Collins (2016) to seek to identify any behaviour indicative of bat roosting and to characterise bat activity in the area. Buildings were surveyed at either dusk or dawn for signs of bat emergence/re-entry (Table 6.2).

Bat roosting was confirmed at four of the five buildings surveyed; B2, B3, B4 and B6 with Soprano Pipistrelles observed emerging from these buildings at dusk or re-entering at dawn in all cases.

Structure B2

B2 is a derelict residence and associated outbuildings. Potential roosting features include small gaps between slate roof tiles and a partially intact attic space. Access to the upper floors of this building was not possible due to the degradation of the staircase. Based on visual inspection of accessible areas of the structures, B2 is considered to be of ‘Moderate’ suitability to roosting bats (following Collins, 2016).

B2 was surveyed twice at dusk on 11 and 12 August 2021. Bat emergence was confirmed during the survey on 12 August. Soprano Pipistrelles were observed emerging from the apex on the eastern gable of B2, immediately below the ridge tiles. Soprano and Common Pipistrelles were observed foraging within the immediate environs of B2, between the building and the surrounding treelines, for several minutes during both surveys.

An additional visual assessment of the building was carried out on 23rd June 2022 to identify signs of bat use, and particularly signs of maternity roosting such as significant accumulation of droppings or evidence of vocalisation. B2 did not change in terms of its ecological context and was considered to remain as being of 'Moderate' suitability to roosting bats (following Collins, 2016).

B2 was surveyed at dusk on 14th July 2022 by two Surveyors utilising two thermal cameras. No emergence was detected on this occasion, but the building should be considered to be a bat roost following the aforementioned recording of Soprano Pipistrelle emergence in 2021.

Structure B3

B3 is a residential dwelling that is currently occupied and an associated outbuilding. The dwelling house is a bungalow with intact tile roof. An outbuilding is located to the rear of the residence which is block built and has an intact tile roof. The attic of the residence was not accessed. Based on visual inspection of accessible areas of the structures, B3 is considered to be of 'Moderate' suitability to roosting bats (following Collins, 2016).

This building was surveyed on 10 August 2021. Surveyors were positioned at the front and back (east and west respectively) of the house. A thermal camera was positioned at the front of the house (east). Five Soprano Pipistrelles were observed emerging from under the ridge tiles on the roof at the front side of the house at approximately 21:30 (Plate A.10).

Further visual assessment of the building was carried out on 23rd June 2022 to identify signs of bat use, and particularly signs of maternity roosting such as significant accumulation of droppings or evidence of vocalisation. B3 did not change in terms of its ecological context and is considered to remain as being of 'Moderate' suitability to roosting bats (following Collins, 2016).

Additionally, this building was surveyed on 12th July 2022 and 8th August 2022 and on each occasion one Surveyor was positioned mostly at the rear (west) of the property. A thermal camera was positioned at the front of the house (east) and covered the known bat emergence point. The camera recorded continuously throughout the survey periods.

On 12th July 2022 two Soprano Pipistrelles emerged from the previously identified roosting location on the eastern site of the roof of this residence and flew in a northerly direction. There was no other evidence of bat emergence.

Structure B4

B4 (Shirley House) is a derelict former residence. The building was not accessible internally as all windows and doorways on the ground floor were blocked. Suitable roosting features such as a roof with gaps between the slate tiles, gaps between the external masonry, and dense ivy cover on the eastern side of the house were present. The upper floor was examined through an open window on the eastern side. It was noted that the upper floor had low light ingress and loose internal roofing membrane which could be

utilised by crevice dwelling bats. Based on visual inspection of accessible areas of the structures, B3 is considered to be of 'Moderate' suitability to roosting bats (following Collins, 2016).

B4 was surveyed at dawn on 11 August 2021 by two surveyors and a thermal camera was positioned at the northern side of the building and included potential access/egress points. Bat roosting was confirmed when two Soprano Pipistrelles were observed re-entering under gaps in the roof overhang on the northern side of the building (Plate A.9), as well as in the dense ivy on the eastern side of the house to the left of the open window on the upper floor.

Supplementary visual assessment of the building was carried out on 23rd June 2022 to identify signs of bat use, and particularly signs of maternity roosting such as significant accumulation of droppings or evidence of vocalisation. B4 did not change in terms of its ecological context and is considered to remain as being of 'Moderate' suitability to roosting bats (following Collins, 2016). Internally, the building is in poor condition with water and light ingress occurring from a number of holes in the roof. The bitumen felt which underlies the slate tiles is significantly deteriorated and torn in most areas.

This building was surveyed on 12th July 2022 by one Surveyor who was positioned mostly at the western side of the property. A thermal camera was positioned which covered the east gable and south elevation of the building (including both previously recorded roosting locations). No emergence was detected on this occasion, but the building should be considered to be a bat roost following the previously mentioned recording of Soprano Pipistrelle re-entry in 2021.

Structure B5

B5 is a former residence and an associated outbuilding which is in an advanced state of dereliction, with large gaps in roof and partially collapsed internal ceilings causing high levels of light and wind ingress internally. The building was examined externally for signs of bat roosting. Based on visual inspection of accessible areas of the structures, B5 is considered to be of 'Low' suitability to roosting bats (following Collins, 2016).

This building was surveyed at dawn and dusk on 11th and 12th August 2021 respectively. Two surveyors were positioned at the north and south sides of B5 during the dawn survey on 11 August. One surveyor was positioned at the southern side of B5 during the dusk survey on 12 August and a thermal camera was positioned to cover the north of the building. During both surveys and the field of view of the thermal camera included a number of potential access/egress points including open windows and holes in the roof. No evidence of bat roosting was recorded.

Structure B6

B6 is a former residence and associated outbuildings that is unoccupied but appears in good repair. The building was inspected internally, but access to the attic space was not possible. Surveys carried out by Golder on 2nd July 2019 identified roosting by small numbers of pipistrelle bats which were accessing the attic of the residence through small gaps between roosting tiles.

B6 was surveyed 11th August 2021 and during the survey a thermal camera was positioned on the southeast of the residence, with views over the southern side of the roof. One Soprano Pipistrelle emergence was recorded at 21:39 (Plate A.11) and a Soprano Pipistrelle re-entry was also recorded at the southern side of the main residence at B6 via a gap beneath a roof tile (Plate A.12).

Further visual assessment of the building was carried out on 23rd June 2022 to identify signs of bat use, and particularly signs of maternity roosting such as significant accumulation of droppings or evidence of vocalisation. B6 did not change in terms of its ecological context and is considered to remain as being of ‘high’ suitability to roosting bats (following Collins, 2016).

B6 was surveyed on 13th July 2022 by three Surveyors and on the 8th August 2022 by two Surveyors. During the survey of 13th July 2022 one thermal camera was positioned on the south-west of the residence, with views over the southern side of the roof and some of the detached shed while a second thermal camera was positioned on the north-west of the residence. On 8th August 2022 one thermal camera was positioned on the south-west of the residence, with views over the southern side of the roof and some of the detached shed. An infrared camera and associated infrared lighting was positioned to view the eastern face of the detached agricultural shed, which included the windows and doors.

On the night of 13th July 2022 first emergence was detected at 21:50 when a Soprano Pipistrelle emerged from the roof of the residence using the previously identified location. A second bat emerged at 22:13 nearby, from beneath a ridge tile near the western gable of the residence. A single Pipistrelle bat (Common or Soprano) was also observed emerging from a small crack in the northern wall of the shed attached to the west of the residence.

A visual search of the detached agricultural shed and lean-to was carried out at regular intervals to detect any pre-emergence activity as Brown Long-eared Bats often do not echolocate on emergence. A single Brown Long-eared Bat was observed and was captured by Tom O’Donnell (licensed bat worker) using a hand-net to confirm identification. The individual was an adult female which did not appear to be lactating. This species was not previously been confirmed to be roosting on-site but was recorded in echolocation surveys carried out in 2021.

On the night of the 8th August 2022, 11 Soprano Pipistrelles were recorded emerging from the roof of the residence, using the previously identified location (see Chapter 6, Plate A12, EIAR) and also a second point below this, on the 7th course of tiles down. The first emergence was at 21:37 (23 minutes after sunset). By 21:52 10 bats had emerged in total, with one additional emergence at 21:52. There was no evidence of Brown Long-eared Bat at the site including the previously identified location. There was no other evidence of emergence.

Bat species detected incidentally by ultrasonic detectors during the course of bat surveys reflected the species assemblage previously reported.

A summary of the result of surveys of the identified man-made structures is provided in Table 6.8 below.

Table 6.8: Summary of Manmade Structures within Site which were assessed for their potential to support roosting bats

Structure Reference	Comment	Building Description	Suitability for Bat Roosting
B2	Soprano Pipistrelles recorded emerging from roof apex on eastern gable.	Derelict Residence	Confirmed roost with ‘Moderate’ suitability for roosting bats overall.
B3	Occupied residence. Soprano Pipistrelles recorded emerging from under ridge tiles on roof	Residential dwelling	Confirmed roost with ‘Moderate’ suitability for roosting bats overall.

	at front of house.		
B4	Shirley Estate House. Soprano pipistrelles observed re-entering during dawn survey.	Derelict Residence	Confirmed roost with 'Moderate' suitability for roosting bats overall.
B5	Roof is partially collapsed with large gaps resulting in high levels of light ingress internally.	Derelict Residence	Low
B6	Un-occupied residence with intact tile roof. Soprano Pipistrelle (possibly Common Pipistrelle also) recorded from various locations of main residence. Brown Long-eared Bat recorded roosting in associated outbuilding.	Derelict Residence	Confirmed roost with 'High' suitability for roosting bats overall.

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Emergence Survey Work

Surveys undertaken in 2019 indicated that Building B6 hosted bat roosts. Emerging bats were recorded in the old farmhouse building (B6) with potential roosting behaviour also observed on the gable end of the old barn associated with the farmhouse. In the vicinity of building B6, very little activity was recorded during the survey work other than the emergences. Species recorded include soprano pipistrelle, common pipistrelle, and Leisler's (*Nyctalus leisleri*) bats, with Leisler's bat and soprano pipistrelles being the dominant species recorded, accounting for the majority of bat activity within the Site. Passes were generally attributed to commuting bats, albeit a small amount of foraging and social activity was observed. In particular, Leisler's were observed foraging over the adjacent farmland.

Emergence survey was repeated during August 2021 and soprano pipistrelle roosts were confirmed at buildings B2, B3, B4 and B6. Repeat emergence surveys were carried out in 2022 focusing on the four target structures to validate the understanding of the ecological context of buildings on site and to seek any previously unrecorded evidence of maternity roosting in particular. The 2022 repeat survey validated the previous emergence survey work and identified a Brown Long-eared at B6 which had only previously been recorded in echolocation surveys in 2021.

Passive Detector Survey

Wildlife Acoustics Song Meter Mini Bat (full spectrum) ultrasonic bat detectors were deployed to passively record bat activity. The detectors were located at four representative areas throughout the study area (Figure 6.13) for a total of three nights from 10th August 2021 to 12th August 2021 inclusive. Subsequent analysis of bat data recorded shows a moderate level of activity occurred overall, and from a relatively high diversity of species, although activity was dominated by three species which are common and widespread in an Irish context.



Figure 6.13: Locations of Passive Bat Detectors within the Site (2021 Drone survey aerial)

A bespoke system to describe levels of bat activity is used as follows:

- Low: <10 registrations / night;
- Low to moderate: 10 to 50 registrations / night;
- Moderate: 50 to 200 registrations / night; and
- High: >200 registrations / night.

This system is based on the professional judgement of the Author and considers the results of peer reviewed research (Mathews *et al.* 2016). Individual bats of the same species cannot be distinguished by their echolocation alone and therefore ‘bat registrations’ are used as a measure of activity (Collins, 2016). A bat registration is defined as the presence of an individual species echolocation within a recording of maximum 15 seconds duration. All bat registrations recorded in the course of this study follow these criteria, allowing comparison between monitoring stations.

It should be noted that activity levels can only be compared within a species and not between species, due to differences in the detection distances for each species and their flight characteristics.

The results of passive bat monitoring are shown in Table 6.9 and Table 6.10 below.

Table 6.9: Number of Registrations of each Bat Species recorded during Passive Bat Surveys

Species	10/08/2021			11/08/2021				12/08/2021			
	Bat_1	Bat_2	Bat_4	Bat_1	Bat_2	Bat_3	Bat_4	Bat_1	Bat_2	Bat_3	Bat_4
Daubenton's Bat	2	1	2	2	2	5	0	2	0	3	0
Whiskered Bat	0	2	0	0	0	0	0	0	1	0	0
Natterer's Bat	0	10	0	0	4	5	0	1	2	16	0
Leisler's Bat	27	32	1622	9	40	7	112	15	8	10	238
Nathusius Pipistrelle	0	0	0	0	0	3	0	0	0	0	0
Common Pipistrelle	35	27	1294	11	2	308	24	37	15	111	155
Soprano Pipistrelle	93	53	189	39	11	184	1	34	46	1193	6
Brown Long-eared Bat	3	5	0	2	0	2	0	4	2	0	0
Total	160	130	3107	63	59	514	137	93	74	1333	399

Table 6.10: Average Number of Registrations of each Bat Species recorded during Passive Bat Surveys

Species	Bat_1	Bat_2	Bat_3	Bat_4
Daubenton's Bat	2.0	1.0	4.0	0.7
Whiskered Bat	0.0	1.0	0.0	0.0
Natterer's Bat	0.3	5.3	10.5	0.0
Leisler's Bat	17.0	26.7	8.5	657.3
Nathusius Pipistrelle	0.0	0.0	1.0	0.0
Common Pipistrelle	27.7	14.7	209.5	491.0
Soprano Pipistrelle	55.3	36.7	688.5	65.3
Brown Long-eared Bat	3.0	2.3	1.0	0.0

Note: Colour indicates activity level categories as described above.

Active Mine Survey 2022

A visual survey of safely accessible areas of the underground Drummond mine was carried out on 9th August 2022 by Tom O'Donnell accompanied by a Saint-Gobain Mining employee. No evidence of bat occupation or activity were noted; however, the survey was limited in terms of the scale and complexity of the underground workings and access restrictions on safety grounds.

In the first deployment, detectors deployed at strategically located survey points in the underground workings recorded a total of 557 bat registrations. All registrations recorded were from Common Pipistrelle, with the exception of a single Soprano Pipistrelle which was recorded at 'Mine_1' on 25th August 2022 at 23:15. Common Pipistrelle registrations at Mine_1, when recorded in a given survey night, were first recorded an average of 144 minutes after sunset with the shortest period between sunset and first recording being 67 minutes. Common Pipistrelle registrations at 'Mine_2', when recorded in a given survey night, were first recorded an average of 140 minutes after sunset with the shortest period between sunset and first recording being 40 minutes.

Both bat detectors, 'Mine_1' and 'Mine_2', were re-deployed on 22nd September 2022, and set to record (when triggered) both day and night. 'Mine_1' recorded 5 Common Pipistrelle over 17 nights. Common Pipistrelle registrations at 'Mine_1', when recorded in a given survey night, were first recorded an average of 4 hours and 20 minutes after sunset with the shortest period between sunset and first recording being four hours and 4 minutes. 'Mine_2' was deployed from 22nd September to 6th October, for a total of 15 nights and recorded no bat registrations.

No evidence of day-roosting by any bat species within the mine workings was obtained during passive monitoring. Underground mining operations finish by approximately 5 pm and no lighting or other disturbances are present at the monitoring locations which might delay bat activity or emergence. Were Common Pipistrelle to be day-roosting within the mine workings, it is considered likely that they would be recorded first before or shortly after sunset as they make their way towards the mine entrance.

No evidence of any *Myotis* species was obtained during passive monitoring and this group is particularly associated with 'autumn swarming' behaviour (which might indicate use of the mine as a hibernation site by *Myotis* species also). Autumn swarming behaviour by pipistrelle bats has been recorded in mainland Europe at above ground sites which later are used as hibernacula but is poorly understood in an Irish context. The selection of winter roosts by many Irish bat species, including pipistrelles, is poorly understood although pipistrelles are not commonly associated with underground hibernation (e.g. Marnell et al. (2022), Collins (2016)).

Underground structures are used by some Irish bat species for hibernation (Marnell et al., 2022), when bats seek out spaces with low, stable temperatures and high humidity where they can enter periods of torpor. The underground mine workings are complex in layout and contain areas accessible to bats but not safely accessible for people. Air is pumped throughout the mine workings, and barriers such as draught curtains and spoil heaps are used to direct air flow to actively mined areas as required. The forcing of air through the mine network is likely to cause greater fluctuation of air temperature than would otherwise be the case, however is it likely that air temperatures remain relatively stable nonetheless and the mine would be suitable for hibernation of bats.

Bat Activity Transect Surveys

Transect surveys were carried out on 10th and 12th August 2021 after dusk in order to characterise bat activity within the immediate vicinity of the study area (Figure 6.14) following public roads. For safety the surveys were carried out from a vehicle and average driving speed was approximately 15 km/hour. The transect route was driven twice on each occasion, and the direction of travel on 12th August was opposite that used on the 10th August 2021.

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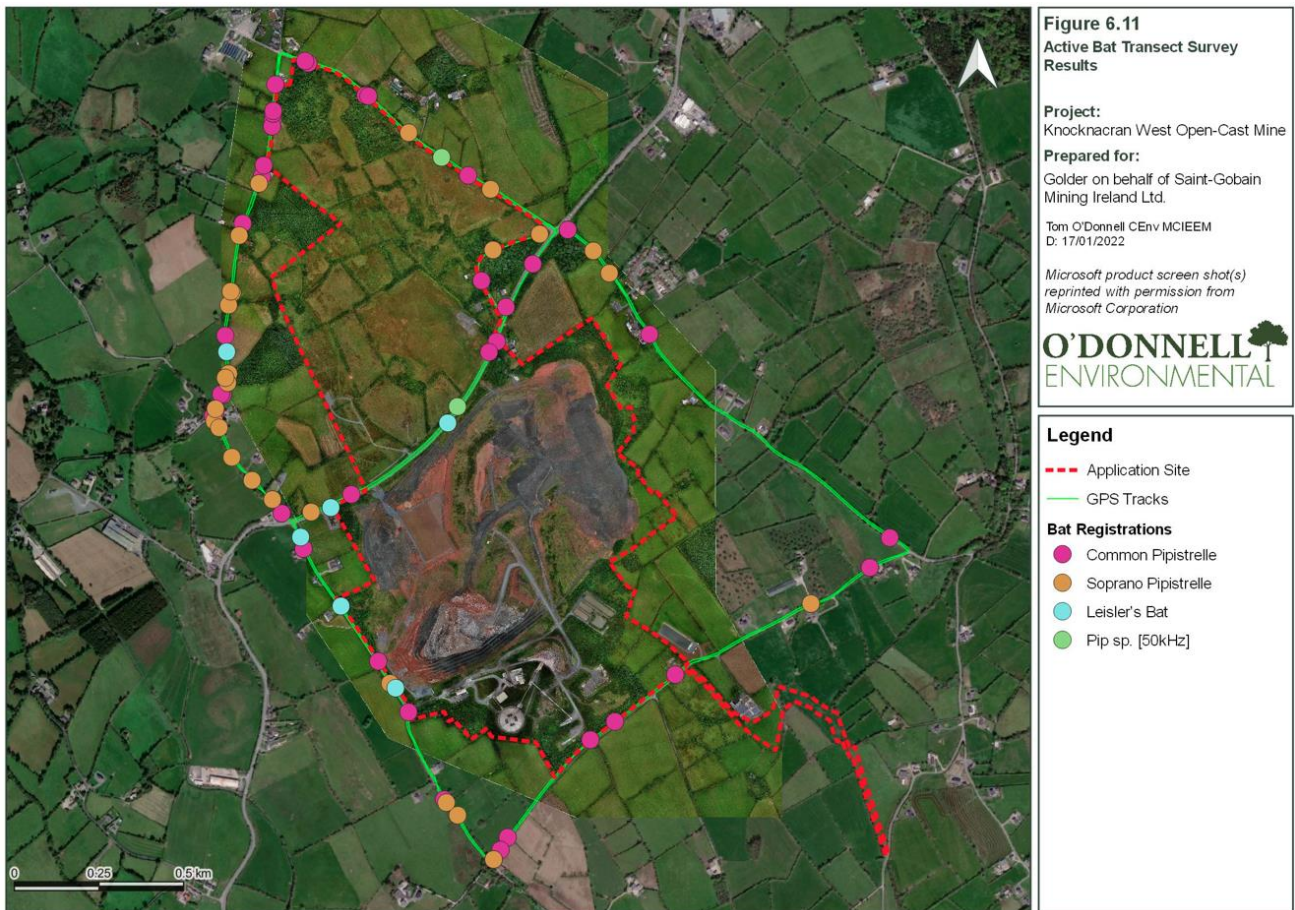


Figure 6.14: Bat Transect Survey Results (2021 Drone survey aerial)

The species diversity and relative activity levels recorded during the active transect surveys largely reflects data recorded during passive bat monitoring. On the night of 10th August 2021, a total of 61 registrations were recorded from Common Pipistrelle (35), Soprano Pipistrelle (16), Leisler's Bat (7), and three registrations could not be differentiated between Common and Soprano Pipistrelle (referred to as Pip. Sp. [50kHz]). On the night of 12th August 2021, a total of 28 registrations were recorded from Common Pipistrelle (16) and Soprano Pipistrelle (12).

The greatest level of bat activity appears to be associated with well-developed roadside hedgerows and treelines, and such features occur on the boundaries of the Knocknacran West portion of the study area.

Other Active Survey Records

During the course of emergence and re-entry surveys at buildings B2 to B6 (see Plates A1 to A12 below), incidental recordings were made of bats foraging or commuting in the survey area during the active

surveys. Four species of bats were detected at B2 during the active surveys and these species are common and widespread throughout Ireland. 248 bat calls were recorded in total. 41% and 51% of these were attributed to Soprano Pipistrelle and Common Pipistrelle respectively. 7% were attributed to Leisler's Bat. One Pipistrelle bat registration was recorded at 50kHz. It is not possible to distinguish between Common and Soprano Pipistrelles when they are echolocating at a peak frequency of 50kHz and therefore this particular registration was marked as PIP50 during analysis of the bat calls. A single Daubenton's bat registration was recorded during the surveys here. Daubenton's Bats are associated with water bodies such as rivers and lakes. Since there was no such water body in within the immediate vicinity of B3, it can be assumed that the Daubenton's bat was using the area to commute rather than for foraging or roosting opportunities.

Three species of bats were detected at B3 during the active surveys. A total of 167 bat calls were recorded. Approximately 82% of these calls were attributed to Soprano Pipistrelles. 13% of calls during this survey were from Leisler's Bats and the remainder of calls recorded were Common Pipistrelles. Emergence at B3 was confirmed visually and recorded on the thermal camera at the east of the building on 10 August 2021.

Three species of bats were detected at B4 during the active surveys. Soprano Pipistrelles formed the largest portion of these calls. 182 bat calls were recorded and 93% of these were from Soprano Pipistrelles. Leisler's Bats and Common Pipistrelles were attributed to the remaining calls. These three species are common and widespread throughout Ireland.

Building B5 was surveyed at dawn and dusk on 11 and 12 August 2021 respectively. Low bat activity was recorded on detectors during the active surveys despite the apparent presence of suitable foraging habitat proximally. 37 bat registrations were recorded in total and 49% of these calls were attributed to Soprano Pipistrelles, 30% of registrations were from Leisler's Bats, 14% were Common Pipistrelle and the remainder of calls recorded were Daubenton's Bat (1 registration) and Brown Long-eared Bat 2 registrations).

A relatively low level of bat activity was recorded at B6 with a total of 26 individual bat calls confirmed. Almost half of these were attributed to Soprano Pipistrelles. 27% of these registrations were from Leisler's Bats and 19% of these registrations were from Common Pipistrelles. 2 Daubenton's Bat registrations were recorded at this building.

The active surveys carried out in 2022 at the four targeted buildings (B2, B3, B4 & B6) did not yield significantly different results in terms of their ecological context to those recorded during the 2021 active surveys, except for the single Brown Long-eared Bat recorded at B6 (see **Plate A13**).

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Photographs - Bat Survey



Plate A1. Eastern elevation of B3



Plate A2. Western elevation of B3 showing rear of house and associated outbuilding on right



Plate A3. Northern elevation of B5 viewed showing view of thermal imaging camera



Plate A4. Large gaps in roof exterior of B5

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Plate A5. Outbuilding associated with B5



Plate A6. Southern elevation of B2



Plate A7. North-western elevation of B4



Plate A8. Eastern elevation of B4 showing dense ivy and access point



Plate A9. Soprano Pipistrelle re-entry at B4



Plate A10. Soprano Pipistrelle emergence at B3

 <p>11/08/2021 21:39:37</p>	
<p>Plate A11. Bat emergence at B6</p>	<p>Plate A12. Indicates identified bat emergence point at B6</p>
	
<p>A13. Brown Long-eared Bat roosting within detached shed at B_6.</p>	

Trees

A large number of trees are present within the north of the Site, in particular in association with woodland habitat and hedgerows though much of this woodland area is being retained. In general, trees were noted to be of a size and age that they could support features of bat roosting potential. Indeed, crack and split features were observed on a number of trees, and accordingly it is considered that the Site supports trees of low to moderate bat roosting potential.

In the south of the Site, trees to be affected by the development are largely limited to the copse of trees adjacent to the R179. As trees in this area relatively young, they exhibited little, or no bat roosting potential as defined by Collins (2016). During the Arboriculture survey (Holly, 2022) O'Donnell Environmental assigned bat roosting potential to trees as shown in Figure 6.15 below. Trees were assigned 'low' suitability on account of a lack of roosting features such as cracks, gaps and flaking bark.



Figure 6.15: Potential Bat Roosting Features Identified on Site

6.4.4.2 Birds

Initial survey work was carried out on the 21st May 2019 when a breeding pair of Lapwing were observed in the Knocknacran Mine site, and it is considered likely that they were alarmed and defensive of a juvenile lapwing chick in the area. In addition to breeding lapwing, coot, long tailed tit, and magpie were also observed. A barn owl roost (Figure 6.16 and Figure 6.17) was located at B2 in 2021 along a rafter in the derelict metal roof extension adjoining the former residence B2. A large all white barn owl was observed departing the roost when the surveyor approached (T. O’Donnell pers. comm.).

Bird surveys were carried out by Noel Linehan (BSc) on 23rd June 2022, 13th and 14th July 2022 and 8th and 9th August 2022 to assess the importance of the site for birds. Transect and point count surveys were carried out to characterise the general bird community and seek evidence of bird breeding. The transect routes and point count locations used are shown in Figure 6.18, Figure 6.19 and Figure 6.20 and were selected to provide representative sampling of all key habitats and areas on site.

Wildlife Acoustics Song Meter detectors with acoustic microphones were deployed to passively record acoustic sound (e.g. bird calls) overnight at three locations, proximal to B2, B4 and B6, for a total of 2 nights from 12th July 2022 to the 14th July 2022 inclusive. Night-time acoustic surveys were undertaken aimed to detect evidence of Barn Owl in particular. A detector was similarly redeployed from 1st to 7th August in proximity to ‘B2’ where Barn Owl has previously been recorded. No evidence of recent occupancy was visible in structure B2. The structure is currently not in use by a Barn Owl. The results of the night-time

survey also did not record evidence of a Barn Owl at structure B2 or at other locations surveyed within the site.

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Figure 6.16: Looking up towards Barn Owl perching spot. No nest was apparent

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Figure 6.17: Several owl pellets were present below



Figure 6.18: Breeding Bird survey Transect routes and point count locations in June 2022

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Figure 6.19: Breeding Bird survey Transect routes and point count locations in July 2022



Figure 6.20: Breeding Bird survey Transect routes and point count locations in August 2022

Overall, a moderate diversity of bird species was recorded, considering the size of the site and the significant survey effort deployed. 49 species of birds were noted during surveys (Table 6.11). The full survey data for both transects and point counts is provided in Appendix 6.2. The species recorded included seven species that are red-listed in *Birds of Conservation Concern in Ireland 2020 - 2026* (BoCCI; Gilbert *et al.*, 2021): Kestrel, Lapwing, Meadow Pipit, Stock Dove, Barn Owl, Grey Wagtail and Swift were all recorded within the site. Eleven BoCCI amber-listed species were recorded: Coot, Goldcrest, House Martin, Lesser Black-Backed Gull, Linnet, Mallard, Sand Martin, Spotted Flycatcher, Starling, Swallow and Willow Warbler.

Table 6.11: Species Recorded During Surveys within the Overall Mine Site

Common Name	Common Name
Barn Owl*	Mallard^
Blackbird	Meadow Pipit*
Blackcap	Mistle Thrush
Blue Tit	Moorhen
Bullfinch	Peregrine
Buzzard	Pied Wagtail
Chaffinch	Raven
Chiffchaff	Redpoll
Coot^	Reed Bunting
Dunnock	Robin
Goldcrest^	Rook
Goldfinch	Sand Martin^
Great Tit	Sedge Warbler
Grey Heron	Song Thrush
Grey Wagtail*	Sparrowhawk
Hooded Crow	Spotted Flycatcher^
House Martin^	Starling^
Jay	Stock Dove*
Kestrel*	Stonechat
Lapwing*	Swallow^

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Lesser Black-Backed Gull^	Swift*
Linnet^	Treecreeper
Little Grebe	Willow Warbler^
Magpie	Woodpigeon
	Wren

* BoCCI Red Listed

^ BoCCI Amber Listed

Existing Knocknacran Mine Site - Birds

The operational mine site includes habitats and features of value to birds including a number of permanent pools and streams, stepped vertical faces, deciduous woodland, bare and recolonising ground (including wild flowers) and accessible buildings. Importantly, on areas of the site there is no public access and consequent disturbance. Most of the bird survey highlights were in this section of the site. The presence of permanent pools and the lack of dense grassland provides some habitat suitable for ground nesting birds, and this was evidenced by the presence of a pair of Lapwings, which successfully raised one chick. Other nesting species associated with the pools were Coot, Little Grebe and Moorhen.

Kestrels were very often in view and at least one juvenile, a one-year-old individual and one adult were present, and it's very likely that they nest here. At times there was an abundance of insects, most notably an emergence of flying ants during the August survey. Insectivorous birds were taking advantage: Swallows, House Martins, Sand Martins, Swifts and Kestrel were hunting the flying ants. Ravens were present and a nest located in the 'homogeniser'. The vertical quarry faces almost certainly harbour Sand Martin nests but were not accessed on safely grounds. Peregrine Falcon nesting habitat is provided open quarry faces, although no nesting was observed. Small numbers of Swifts were present, and whilst they almost exclusively nest in buildings in Ireland, nesting on sheer quarry faces cannot be ruled out. Two pairs of Stock Doves are considered highly likely to have been nesting in holes in the vertical quarry faces close to the mine entrance.

Knocknacran West Site - Birds

The Knocknacran West site mostly consists of rank and very dense grassland, which developed following the cessation of agriculture use of the land. Dense and lodged grassland is unsuitable for most ground nesting birds which generally required a more open sward which provides access to the ground for feeding. There was no evidence of ground-nesting by any bird species. Areas of 'wet grassland' were quite dry in the summer of 2022 owing to the unseasonably dry conditions that summer, and also likely due to the enhancement of drainage on site which has taken place in recent years. In wetter conditions, this habitat appears as though it would be suitable for ground nesting birds including Snipe and Water Rail. A wet grassland area to the north of 'B2' had developed as a result of ground sinkage locally and had been remediated prior to surveying. This may have had potential for ground and pond nesting birds.

The deciduous woods and hedgerows likely provide nesting habitat for a range of songbirds which would be typical of hedgerows and treelines in agricultural grassland. Spotted Flycatchers were present. Birds of prey noted comprised a male Kestrel foraging, a family of Buzzards including one juvenile which probably nested nearby, multiple Sparrowhawk sightings (habitat suitable for nesting) and two Peregrines present calling

high over the site. A sighting of Barn Owl was made in 2021 at 'B2' and fresh pellets were also present at the same location. No evidence of Barn Owl at the site was found in 2022.

6.4.4.3 Reptiles

The Common (or Viviparous) Lizard (*Zootoca vivipara*) is Ireland's only native species of reptile. Surveys targeting Common Lizard were carried out which sought to identify the presence or absence of this species on the proposed site. Surveys consisted primarily of extensive visual surveys but some reptile 'tins' were also deployed and checked in July, August and September 2022 as a supplementary survey method.

Some areas of suitable habitat are present on site such as areas of bare and recolonising ground where ground works have taken place, south-facing banks and stone walls etc. where lizards can forage and bask in open areas proximal to cover. The grassland habitats are generally unsuitable for the species. No evidence of the presence of Common Lizard on the site was noted.

6.4.4.4 Other Taxa

Notes were made of other taxa during the course of ecological surveys in 2022. Table 6.12 provides a list of butterflies, moths and dragon flies encountered during the course of surveys.

Table 6.12: Butterflies and Moths (Lepidoptera) and Dragon Flies (Odonata) encountered during ecological surveys

Common Name	Common Name
Banded Demoiselle	Red Admiral
Black Tailed Skimmer	Ringlet
Brown Hawker	Ruddy Darter
Cinnibar	Silver-Washed Fritillary
Common Blue	Six Spot Burnet
Common Hawker	Six-Spot Burnet
Cryptic Wood White	Small Copper
Emperor Dragonfly	Small Tortoiseshell
Meadow Brown	Small White
Painted Lady	Speckled Wood
Peacock	

Common Frog (*Rana temporaria*) was encountered commonly on site, particularly near drains and in wet grassland habitats.

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Summary

Table 6.13 lists the species which were considered likely to occur within the Site, on the basis of the presence of suitable habitat and/or the occurrence of recent records in the vicinity. The species, together with its legislative designation is listed.

The source(s) of information relating to each species could include:

- Existing records from desk study;
- Specific bat survey work;
- Presence of suitable habitat identified during the walkover surveys; and / or
- Direct observation.

For each species with the potential to occur on Site, the final column of Table 6.13 presents a brief summary of the status of the species in relation to the Site itself. If the survey fails to record the species and the habitats are unsuitable, then it is concluded that the species is unlikely to occur, and it is not considered further within the assessment. If a species is confirmed as present, an indication of the likely population size/status within the Site is provided. This information is used in the evaluation presented in Table 6.12 below.

Table 6.13: Assessment of the Potential for Faunal Species to occur within the Site

Species/Group or Receptor	Status	Summary of Status on Site
Badger	Wildlife Acts (1976 – 2010)	A main and outlier sett have been identified within the Knocknacran West site in recent survey work. Evidence of the use of the Site by Badger was also noted from dung recorded within the north of the Site in one location. Habitats suitable for foraging are present (in the form of woodland, and to a lesser extent the grassland fields), whilst the field boundaries and woodland are clearly suitable for sett building.
Common mammals (such as fox and rabbit)	-	Potential to occur within the Site.
Irish Hare	Wildlife Acts (1976 – 2010)	Potential to occur within the Site.
Pine Marten	Wildlife Acts (1976 – 2010) – EU Habitat Directive.	One individual was observed via a camera trap record during 2022 as documented in Appendix 6.7.
Stoat	Wildlife Acts (1976 – 2010)	Potential to occur within the Site.
Hedgehog	Wildlife Acts (1976 – 2010)	Potential to occur within the Site.
Red Squirrel	Wildlife Acts (1976 – 2010)	Some limited potential to occur within the Site (within woodland).
Pygmy Shrew	Wildlife Acts (1976 – 2010)	Potential to occur within the Site.
Bats	Wildlife Acts (1976 – 2010) – EU Habitat Directive.	The Site supports some suitable foraging/commuting habitat. A number of bat roosts were identified within Site buildings

		(B2, B3, B4 and B6), whilst potential for roosting bats was identified within other onsite buildings, whilst some potential ² roosting habitat may be available from semi-mature to mature trees on Site. No maternity roosts were identified in any of the site buildings.
Birds	Wildlife Acts (1976 – 2010), EU Birds Directive, Birds of Conservation Concern (Colhoun & Cummins, 2013).	The Site, in particular the hedgerows, trees, and woodland, offer a plethora of nesting, foraging and commuting habitat for bird species. Common and widespread species such as magpie and robin were recorded on Site. In addition, breeding lapwings (a Red list species) were recorded. A barn owl roost was recorded in building B2. The barn owl is Red-listed in Ireland due to a significant decline in the breeding population. The European population is currently evaluated as Declining.
Aquatic Fauna	Salmonids, Wildlife Acts (1976 – 2010) – EU Habitat Directive.	The pond and drainage ditches did not typically support any aquatic or emergent species, and were not considered suitable to support any significant aquatic fauna. Brown trout, European eel, brook lamprey, stone loach, perch, and three-spined stickleback were recorded upstream of the mine water discharge. At the mine water discharge point itself, European eel, roach and perch were recorded; whilst 70 m downstream at Compliance Point CP-1 brown trout and perch were recorded. At D4-SW5 in the River Bursk (1.7 km downstream of the discharge point) perch and pike were recorded (AECOM, 2020).
Other Taxa (e.g.amphibians Lepidoptera / Odonata)	-	Common frog recorded on site. Some potential to occur within the Site (Lepidoptera / Odonata).

6.4.5 Invasive Species

Japanese knotweed was identified at one location (Figure 6.21) on the margins of building B2, an abandoned farm dwelling, north of the R179 at 0680601 0799957 (Grid Reference provided in Irish Transverse Mercator ITM).

The stand when surveyed was made up of 4 individual plants measuring up to 4 m in height and ca. 10 m² in area.

The Applicant has commissioned Shaffrey Landscaping to eradicate the Japanese knotweed onsite. It is proposed that direct chemical injection of pesticide will be undertaken each September for 3 – 4 years. The

² A tree or trees of sufficient size to exhibit potential roosting features but none seen from the ground or with limited roosting potential (Collins, 2016).

first chemical injection treatment was carried out on 14th September 2022. A follow up treatment was carried out on 28th September 2022.

The area has been fenced off to ensure no one enters the area and signage has been posted on the fence identifying the area contains knotweed (Figure 6.22 and Figure 6.23).

An assessment will be carried out in year 3 to see if further treatment is required beyond the current scope of the proposed works.



Figure 6.21: Japanese Knotweed recorded on Site

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Figure 6.22: Fencing & signage around the Japanese knotweed identified on the Knocknacran West site (date 14/09/22)



Figure 6.23: Follow-up treatment of Japanese knotweed, 28/09/22

6.5 Key Characteristics of the Proposed Development

6.5.1 Construction Phase: Community Sports Complex

During this phase, the existing Community Sports Complex will be further developed. The initial phase of this development has been constructed (Reg. Ref.: 20/365), and the next phase will involve extending the Community Sports Complex with the construction of two further playing pitches, one with a perimeter running track, an all-weather pitch, a new club building, including a sports hall, a handball alley, changing rooms and toilets, a viewing gallery, a part-covered grandstand, additional parking and associated siteworks.

The key construction considerations which will be assessed in Section 6.6 therefore are:

- Disturbance to habitats and species through noise and, traffic;
- Permanent habitat loss;
- Modification and change in habitat composition;
- Individual species mortality; and
- Impacts of dust and Site runoff (discharge) as a result of construction activities.

Potential direct and indirect impacts from water quality and quantity are as follows:

- Impacts of dust and Site runoff (sediments, fuel, etc.) as a result of construction activities.

6.5.2 Construction Phase: Mine Development

During this phase:

- The construction of screening berms and planting (including bolstering/planting and retention of the existing perimeter hedgerow which sits in front of/is separate to the proposed planted screening berms), perimeter fencing and the demolition of one residential house and three unoccupied houses and sheds on the Knocknacran West site;
- A temporary diversion of the R179 is proposed and a Cut-and-Cover Tunnel will also be constructed;
- The existing processing plant on the existing Knocknacran Open-Cast Mine site will be refurbished; and
- A new vehicular entrance will be constructed to the existing mine site from the L4816.

The key construction considerations which will be assessed in Section 6.6 therefore are:

- Disturbance to habitats and species through noise and traffic;
- Permanent habitat loss;
- Modification and change in habitat composition;

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- Individual species mortality; and
- Impacts of dust and Site runoff (discharge) as a result of construction activities.

Potential direct and indirect impacts from water quality and quantity are as follows:

- Impacts of dust and Site runoff (sediments, fuel, etc.) as a result of construction activities.

6.5.3 *Operational Phase: Community Sports Complex*

During this phase, the Community Sports Complex will be in operation.

The key operational considerations which will be assessed in Section 6.6 therefore are:

- Disturbance to habitats and species through noise and traffic;
- Permanent habitat loss;
- Modification and change in habitat composition over project life and eventual closure;
- Individual species mortality; and
- Impacts of dust and Site runoff (discharge) as a result of extraction and restoration activities.

Potential direct and indirect impacts from water quality and quantity are as follows:

- Impacts of dust and Site runoff (sediments, fuel, etc.) as a result of operational activities.

6.5.4 *Operational Phase: Mine Development*

The proposed phased extraction of gypsum by open-cast mining methods at Knocknacran West is to expose and recover the Upper and Lower gypsum seams/units remaining after the cessation of mining from the Drumgoosat underground mine in 1989. In parallel, the Knocknacran Mine will be backfilled and remediated to near original ground.

During this phase:

- Open Cast mining will be undertaken to allow extraction of the Gypsum from the Drumgoosat Underground mine area closed in 1989. The gypsum extracted will maintain a continuous supply of mineral as the current Knocknacran mine will be exhausted as the new mine is brought into operation.
- The proposed Mine Development amounts to the replacement of the loss of mining of gypsum at the Knocknacran Open-Cast Mine with the mining of gypsum at Knocknacran West Open-Cast Mine. Both mine sites are comparable in size and nature of operations;
- Overburden and Interburden will be stripped to expose the Gypsum Mineral;
- The gypsum remaining in the former Drumgoosat Underground Mine will be extracted by open-cast mining methods;

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- The existing Knocknacran Mine will be restored to near original ground level;
- The existing plant site will process and despatch the extracted gypsum;
- The existing Drumgoosat dewatering pump, will be relocated to an existing borehole on the Knocknacran West site to continue to provide dewatering;
- The depth of mining will be to a depth to which the base of the Lower gypsum bed extends in the open-cast area which is ca. - 53 m OD; and
- The stripping of the site will be undertaken in a series of campaigns at specific times and last for defined periods of time (typically < 6 months) over the life of the proposed Mine Development. The stripping earthworks will be undertaken by a specialist contractor following a tender process.

The key operational considerations which will be assessed in Section 6.6 therefore are:

- Disturbance to habitats and species through noise, traffic, and blasting;
- Permanent habitat loss;
- Modification and change in habitat composition over project life and eventual closure;
- Individual species mortality; and
- Impacts of dust and Site runoff (discharge) as a result of extraction and restoration activities.

Potential direct and indirect impacts from water quality and quantity are as follows:

- Impacts of dust and Site runoff (sediments, fuel, etc.) as a result of mining activities.

6.5.5 *Restoration/Closure Phase: Community Sports Complex*

There is no proposal to close the Community Sports Complex development, and this phase is therefore not applicable in this case.

6.5.6 *Restoration/Closure Phase: Mine Development*

During this phase:

- The new Knocknacran West site will be returned to grassland and a waterbody;
- The existing Knocknacran site will be returned to near original ground level;
- The existing Knocknacran Plant site will be partially dismantled whereby mine plant is removed; and

In line with the current CRAMP, it is presented that here that a suitable developer would be sought to utilise the general buildings existing on the existing site for a light industrial usage into the future. This would be subject to a future developer seeking the necessary permits for continuation of use and change of use from mining to a non-mining use.

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The key restoration/closure considerations which will be assessed in Section 6.6 therefore are:

- Disturbance to habitats and species through noise and traffic;
- Permanent habitat loss;
- Modification and change in habitat composition over project life and eventual closure;
- Individual species mortality; and
- Impacts of dust and Site runoff (discharge) as a result of restoration/closure activities.

Potential direct and indirect impacts from water quality and quantity are as follows:

- Impacts of dust and Site runoff (sediments, fuel, etc.) as a result of restoration/closure activities.

6.6 Potential Effects

Evaluation of Ecological Features – Identification of Sensitive Ecological Receptors

The evaluation of ecological features (sites, habitats and species) which could be affected by the project proposals is presented in Table 6.14. These ecological features will be considered further in the following subsections as sensitive receptors. The table includes:

- Any designated areas, with the exception of Natura 2000 sites, which are situated within 5 km of the project Site that have potential ecological connection(s) with the Site;
- Any surface or groundwater bodies that have hydrological connectivity with the Site;
- Any habitat type recorded within the Site; and
- Any species of conservation importance which has been confirmed as occurring / having potential to occur within the Site.

The value of the feature is based upon how important the feature is in relation to its geographical context. In other words, at what level of geographical resolution would the feature contained within the Site (habitat or species) be recognised as contribution to biodiversity to a significant degree. The evaluation takes into account extent (or population size) within the Site compared to the resource elsewhere and whether it has characteristics which either elevate or depress its importance in comparison with a 'typical' example (for example, whether a habitat is particularly species rich, or depleted in species).

Common and widespread species or habitat, therefore, only have a level of importance in respect of the biodiversity of their immediate area (taken in this case to be represented by the boundary of the Site). Such features are not considered further within the Impact Assessment.

Some protected species may, under certain circumstances (such as a single example occurring within the site, as part of a much larger local population) be considered to only be of importance within the Site itself. Such species, on the basis of legal and planning regulation compliance, are included within the Impact Assessment and, (if necessary) dedicated impact mitigation measures are provided. Table 6.14 presents each feature occurring, together with the rationale for its evaluation.

Table 6.14: Classifying the Geographical Importance of Key Ecological Features

Key Features	Ecological Importance	Rationale
Designated Sites		
pNHA sites upstream of the Site	Regional	pNHAs that are situated along the River Glyde upstream of the confluence with the River Bursk are not subject to discharges from the mine Site or community complex. Whilst they cannot be directly affected by the mine discharge, the discharge in theory could inhibit passage of migratory fish. Migratory fish may constitute prey resources for the designated bird interests of these pNHAs (in general, the species involved are not specified but include waterfowl, which may be piscivorous, and in one case heron which is piscivorous). However, movement of fish is not likely to be prevented within the River Glyde downstream of the mine water discharge based on the literature review of sulphate impacts on fish and in particular the predicted and current sulphate concentrations in the River Glyde which are significantly lowered by the River Glyde itself as the primary source of dilution (AECOM, 2020). Therefore, it is concluded that there will be no effect on pNHA's including Lough Fea Demesne.
Ballyhoe Lough pNHA	Regional	This feature is situated in proximity to the Site, situated downstream from the discharge point of the active mine. The mine extension and restoration activities have the potential to alter the properties of the discharged water, and the discharge volume and flow rate. Accordingly, this feature is carried forward into the design mitigation and impact assessment sections.
Lough Fea pNHA	Regional	This is downstream of the site and connected via the Corduff Stream which is located on the Knocknacran West site. The mine extension and restoration activities have the potential to alter the properties of the discharged water, and the discharge volume and flow rate. Accordingly, this feature is carried forward into the design mitigation and impact assessment sections.
Habitats		
Active Mine	Negligible	This resource offers negligible biodiversity value. Not considered further in this assessment.
Improved Grassland	Site	This habitat represents a valuable resource in terms of farmland, but not in terms of biodiversity given the broader habitats around the Site are comprised of abundant farmland, and this type of habitat is considered to be ubiquitous and not inherently biodiverse or rare in accordance with ecological value based upon the criteria defined by Ratcliffe (1977), namely: naturalness, size, rarity and diversity. This resource offers negligible biodiversity value and is not considered further in this assessment.
Amenity Grassland	Site	This type of habitat is considered to be ubiquitous and not inherently biodiverse or rare in accordance with ecological value based upon the criteria defined by Ratcliffe (1977), namely: naturalness, size, rarity and diversity. Not considered further in this assessment.
Grassland	Local	The grassland within Site is of reasonable condition and supports a

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Key Features	Ecological Importance	Rationale
		relatively diverse sward and is predominantly semi-natural. This grassland represents a significant area of the proposed footprint of the new mine, and accordingly is carried forward into the design mitigation and impact assessment sections.
Hedgerows	Local	The hedgerows at the Site boundaries were recorded to be relatively species-poor, whilst this habitat is also common and widespread in the wider surrounds of the site. Nevertheless, the hedgerow habitat provides connectivity across the site and with the wider landscape, and represents a valuable resource for fauna such as birds, and breeding birds in particular. Broadleaf trees associated with hedgerows also represent a valuable resource for fauna such as roosting bats and birds. This feature is carried forward into the design mitigation and impact assessment sections.
Woodland	Local	The woodland within Site is of reasonable condition and provides a valuable resource for faunal species such as breeding birds and other small mammals. This feature is carried forward into the design mitigation and impact assessment sections.
Scattered and Dense Scrub	Site	This habitat is not extensive within the Site, and is considered to be ubiquitous and not inherently biodiverse or rare in accordance with ecological value based upon the criteria defined by Ratcliffe (1977), namely: naturalness, size, rarity and diversity. Not considered further in this assessment.
Buildings and Hardstanding	Negligible	This habitat offers negligible biodiversity value. Not considered further in this assessment. The potential value of buildings to faunal species (namely bats and breeding birds) is outlined below.
Recolonising Bare Ground	Site	The recolonising bare ground within Site is of reasonable condition and supports a relatively diverse assemblage of herbaceous plants, including marsh orchid. However, this habitat is inherently transient in nature, and is not an uncommon habitat type. Indeed, the new mining activities within the north of the Site will indirectly cause the creation of more of this habitat type, meaning this resource will continue to be available under the Proposed Development works. Not considered further in this assessment.
Aquatic Habitat and associated fauna (Site discharge, ditches, Ponds and rivers)	Site	The River Bursk and River Glyde support fish species including salmonids and brook lamprey <i>Lampetra planeri</i> (both Habitats Directive Annex II, requiring establishment of SACs for their protection and indicating importance on a European scale), brown trout <i>Salmo trutta</i> , and European eel (critically endangered by IUCN criteria). Common coarse fish species are also present and have the potential to be harmed by elevated suspended sediments and water quality impacts.
Species		
Bats	Local	The Site supports some suitable foraging and commuting habitat, namely in the north of the Site. Roosting bat potential has been recorded within a number of buildings on site, with five buildings confirmed to be used by

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Key Features	Ecological Importance	Rationale
		roosting bats (soprano pipistrelle), whilst some potential ³ roosting habitat may be available from mature trees. This feature (species group) is carried forward into the design mitigation and impact assessment sections.
Badger	Site	The Site hosts a main and outlier sett; and Badger dung was recorded within the north of the Site. In addition, badgers are mobile animals, and as such badger activity can change rapidly at a site. Accordingly, mitigation measures are set out at Section 6.7 in order to safeguard badgers.
Pine Marten	Local	No field signs of Pine marten were noted but one image of a Pine Marten was recorded on a trail camera on the 13th July 2022. Some of the habitat on site is evidently suitable for this species. Accordingly, mitigation measures are set out at Section 6.7 in order to address this species.
Irish Hare	Site	The Site exhibits some suitable foraging and commuting habitat. However, it is considered that residual losses of habitat compared with the availability of similar habitat nearby will result in non-significant effects. Not considered further within this report.
Small Mammals	Local	The Site supports suitable foraging and commuting habitat. This feature (species group) is carried forward into the design mitigation and impact assessment sections.
Breeding Birds	Local	The hedgerows (and associated trees), and woodland (and to a lesser extent, the grassland) are likely to support a number of common and widespread bird species. Lapwing and Barn owl have been recorded on Site. This species group (breeding birds) is carried forward into the design mitigation and impact assessment sections.
Amphibians (Common frog)	Local	The Site supports suitable terrestrial and aquatic habitat. This feature (species) is carried forward into the design mitigation and impact assessment sections.

6.6.1 Potential Effects: Construction Phase: Community Sports Complex

Potential Effects: Construction Phase: Community Sports Complex: Ballyhoe Lough and Lough Fea pNHA

Potential Effects: Construction Phase: Community Sports Complex: Ballyhoe Lough and Lough Fea pNHA: Characterisation of Unmitigated Impact

In the absence of mitigation an increase in total suspended sediment loading, mine discharge or accidental spills of hydrocarbons may occur. Sediments within the aquatic environment are detrimental to ecological

³ A tree or trees of sufficient size to exhibit potential roosting features but none seen from the ground or with limited roosting potential (Collins, 2016).

receptors and this would result in an adverse effect to receptors and also to two proposed Natural Heritage Areas.

Potential Effects: Construction Phase: Community Sports Complex: Ballyhoe Lough and Lough Fea pNHA: Rationale for Prediction of Effect

Hydrological connectivity exists between the site and the pNHA's indirectly via drainage ditches. As such, there is a potential risk, albeit minor, of discharge impacts, transfer of sediments or hydrocarbons from accidental spills that may reach downstream receptors.

An initial surface water management system was designed for the construction of the first phase of the Community Sports Complex development. The first phase of the development was granted planning permission under Reg. Ref. 20/365.

For the construction period of Phase 1, the surface water management system was designed/sized so that construction related water was routed through a temporary management system into the existing mine water management system.

For this second phase of the Community Sports Complex development, as presented here, it is proposed that surface water management during the construction will again be routed through the existing mine water management system to allow suspended solids to be settled out in the mine's water management system.

Potential Effects: Construction Phase: Community Sports Complex: Ballyhoe Lough and Lough Fea pNHA: Effect without Mitigation

The unmitigated effect of this development would result in a Minor Adverse effect to habitats of Regional sensitivity and importance in the short-, medium- and potentially long-term.

Potential Effects: Construction Phase: Community Sports Complex: Habitat

Potential Effects: Construction Phase: Community Sports Complex: Habitat: Characterisation of Unmitigated Impact

The habitat at the existing Community Sports Complex site comprises of buildings and artificial surfaces, sports pitch and managed grass (amenity grassland) in addition to spoil and bare ground. The proposed development will see the areas of spoil and bare ground be developed in buildings and artificial surfaces and more amenity grassland (further sports pitches).

Potential Effects: Construction Phase: Community Sports Complex: Habitat: Rationale for Prediction of Effect

The habitat within the Community Sports Complex site is currently intensely managed; a landscape management plan is in place for the site which will see planting of perimeter boundaries with hedging and the creation of screening berms (some of which are currently in place under Reg. Ref. 20/365) (Appendix 6.8). When considering the loss of this habitat in the broader setting, this loss would be a small contribution of available resource within the local and regional setting.

Indeed, implementation of the landscape management plan during construction will mean that in the long-term new habitats will be provided in this area, with potential to exceed the biodiversity value of the current situation (albeit habitat will not be replaced on a like-for-like basis).

Potential Effects: Construction Phase: Community Sports Complex: Habitat: Effect without Mitigation

The creation of habitat and addition of perimeter planting during the construction works (to implement the landscape management plan in place for the Phase 1 and Phase 2 developments) has resulted in a Minor Beneficial effect to habitat of Local sensitivity and importance in the long-term.

Potential Effects: Construction Phase: Community Sports Complex: Bats

Potential Effects: Construction Phase: Community Sports Complex: Bats: Characterisation of Unmitigated Impacts

It is understood that the hedgerows at the site periphery will be retained during the construction phase, thus maintaining the value of this feature to foraging / commuting bats. Further perimeter planting will be undertaken in line with the landscape management plan (Appendix 6.8).

Noise effects associated with the construction phase would be temporary during diurnal parts of the day and during nocturnal phases of the night. In the absence of mitigation, the loss of roosting, foraging and commuting habitat would be experienced during the operational life of the mine.

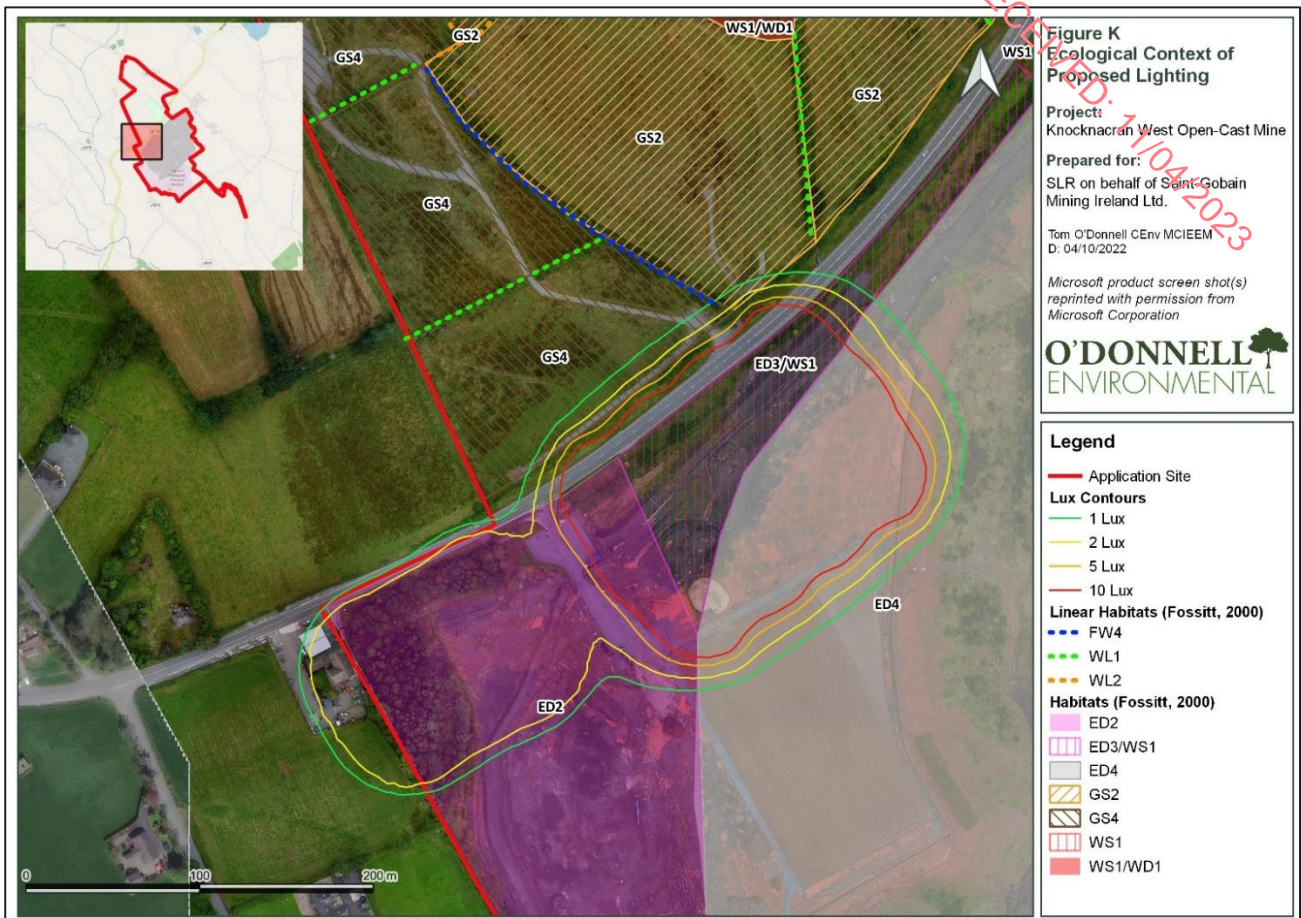


Figure 6.24: Ecological Context of proposed lighting on the Community Sports Complex site

Potential Effects: Construction Phase: Community Sports Complex: Bats: Rational for Prediction of Effect

The footprint of the proposed Community Sports Complex is considered to be relatively ubiquitous in terms of foraging value and perimeter planting is proposed which will increase linear habitat connectivity around the site. There is a lack of ecological receptors to this proposed development. However, on a precautionary basis, it is considered likely that these impacts could negatively affect the conservation status of the bat population in the area.

Potential Effects: Construction Phase: Community Sports Complex: Bats: Effect without Mitigation

On the basis of the available information, the unmitigated impact of this development would likely result in Negligible short-term and long-term Adverse effects to species of site and Local importance.

Potential Effects: Construction Phase: Community Sports Complex: Terrestrial Mammals and amphibians

Potential Effects: Construction Phase: Community Sports Complex: Terrestrial Mammals and amphibians: Characterisation of Unmitigated Impact

The small and medium mammal group includes rabbit (*Oryctolagus cuniculus*), stoat (*Mustela erminea*), pygmy shrew, and hedgehog. Amphibians, specifically common frog have also been added to this section as they may be afforded impacts both in a terrestrial and aquatic context. Although this group of species are generally mobile, construction impacts attributed to noise, water quality, vegetation removal and dust

deposition must be considered. Dust that settles on plants, can affect the plants' transpiration, respiration and other metabolic activity, by clogging pores and damaging waxy cuticles on the leaves, and by reducing available light. Dust can alter soil and water chemistry, structure and trophic status which may have impacts on the composition of plant and invertebrate communities. Dust can have direct impacts on insect and other invertebrate populations. Impacts on plant and invertebrate communities may result in effects further up the food chain (small mammals).

Potential Effects: Construction Phase: Community Sports Complex: Terrestrial Mammals and amphibians: Rationale for Prediction of Effect

The variable effects associated with construction noise, water quality and potential habitat severance and loss at different distances from the source of disturbance, are very little understood for small to medium mammals and amphibians. Habitat loss would be likely to afford a level of perceived stress and possible mortality, dependent on species mobility, though this is not certain.

Minor losses of foraging habitat and potential habitat severance is less likely to cause stress to this species group given the extensive availability of other suitable habitat within the local setting and the lack of suitable habitat within the existing Community Sports Complex site. On a precautionary basis, it is considered likely that this short-term impact could negatively affect the conservation status of the local small mammal and amphibian population. In the short-term, the planting of the perimeter boundaries, according the landscape management plan for the Community Sports Complex site (Appendix 6.8), will increase the linear habitat available for small mammals and amphibians around the site.

Potential Effects: Construction Phase: Community Sports Complex: Terrestrial Mammals and amphibians: Effect without Mitigation

The unmitigated effect to this group would result in Negligible-Minor Adverse short-term impacts to species of site and local (i.e. Low) importance. Small mammals such as stoat and hare are protected under the Wildlife Acts (1976-2010). Common frog are protected under National and European legislation.

Potential Effects: Construction Phase: Community Sports Complex: Breeding Birds

Potential Effects: Construction Phase: Community Sports Complex: Breeding Birds: Characterisation of Unmitigated Impact

In the absence of mitigation, the potential for ecological impact to the breeding bird group focuses on the following factors:

- Construction noise disturbance;
- Vegetation and soil removal; and
- Dust deposition and subsequent changes in habitat composition (changes to structural, foraging and commuting habitat).

Potential effects to bird species include a negative biophysical effect to hedgerow and tree availability which may disturb breeding birds and minimally reduce available forage.

Noise effects during the construction phase would be temporary during diurnal phases and this has the potential to affect avian behaviour. Ground nesting bird species such as skylark *Alauda arvensis* could be

disturbed, killed or injured during scrub clearance and soil strip in the absence of mitigation. The effects of increased noise during construction would be temporary and reversible.

Potential Effects: Construction Phase: Community Sports Complex: Breeding Birds: Rationale for Prediction of Effect

The rationale for effect to bird species considers that losses of available nesting habitat may occur, albeit nesting opportunities will be retained at site boundaries (including retained hedges), and further planting according to the landscape management plan (Appendix 6.8) will be undertaken which will replace lost nesting opportunities in the long-term (albeit nesting habitats will not be replaced on a like-for-like basis). In addition, short-term losses of foraging and breeding habitat from within the site are unlikely to cause significant stress to this group given the abundance of habitat (mature trees, ditch networks, hedgerow and pasture) within the local setting. On a precautionary basis, it is considered likely that this temporary impact could negatively affect the conservation status of the bird population.

Potential Effects: Construction Phase: Community Sports Complex: Breeding Birds: Effect without Mitigation

The unmitigated effect to this feature would result in a Minor short-term Adverse impact to species of Low (local) sensitivity and importance. The majority of bird species are protected under the Wildlife Acts (1976 – 2012) where it is an offence to hunt, interfere with or destroy their breeding or resting places unless authority is obtained via statutory licence provision.

6.6.2 Potential Effects: Construction Phase: Mine Development

Potential Effects: Construction Phase: Mine Development: Ballyhoe Lough and Lough Fea pNHA

Potential Effects: Construction Phase: Mine Development: Ballyhoe Lough and Lough Fea pNHA: Characterisation of Unmitigated Impact

In the absence of mitigation an increase in total suspended sediment loading, mine discharge or accidental spills of hydrocarbons may occur. Sediments within the aquatic environment are detrimental to ecological receptors and this would result in an adverse effect to receptors and also to two proposed Natural Heritage Areas.

Potential Effects: Construction Phase: Mine Development: Ballyhoe Lough and Lough Fea pNHA: Rationale for Prediction of Effect

Hydrological connectivity exists between the Mine Development and the pNHAs. As such, there is a risk, albeit minor, of discharge impacts, transfer of sediments or hydrocarbons from accidental spills that may reach downstream receptors. Design parameters are likely to confine sulphate levels downstream of the mine discharge point to meet current permitted limits and assimilative effects of the River Glyde and Bursk are considered as part of the rationale process.

Potential Effects: Construction Phase: Mine Development: Ballyhoe Lough and Lough Fea pNHA: Effect without Mitigation

The unmitigated effect of this development would result in a Minor Adverse effect to habitats of Regional sensitivity and importance in the short-, medium- and potentially long-term.

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Potential Effects: Construction Phase: Mine Development: Grassland

Potential Effects: Construction Phase: Mine Development: Grassland: Characterisation of Unmitigated Impact

It is understood that limited areas of semi-natural grassland within the Mine Development will be lost by the creation of screening berms, the temporary diversion of the R179 and the construction of the Cut-And-Cover Tunnel on the Knocknacran West site, accordingly (in the absence of mitigation) the potential for ecological impact to this habitat focuses solely on this factor.

Potential Effects: Construction Phase: Mine Development: Grassland: Rationale for Prediction of Effect

The semi-natural grassland within Mine Development was recorded to be relatively species-rich, in comparison to the intensively-managed pastoral fields in the remainder of the site. Nevertheless, this habitat type is considered to be common in the context of the wider area, and when considering the loss of this habitat in the broader setting, this loss would be a small contribution of available resource within the local and regional setting.

Potential Effects: Construction Phase: Mine Development: Semi-Natural Grassland: Effect without Mitigation

The unmitigated effect of this development would result in a Minor Adverse effect to habitat of Local sensitivity and importance in the long-term.

Potential Effects: Construction Phase: Mine Development: Hedgerows

Potential Effects: Construction Phase: Mine Development: Hedgerows: Characterisation of Unmitigated Impacts

In the absence of mitigation, the potential for ecological impact to hedgerows focuses on the following factors:

- Loss of hedgerow habitat;
- Potential un-planned encroachment of machinery and mine footprint on retained hedgerows; and
- Dust deposition and subsequent changes in habitat composition.

Hedgerow removal or modification arising from the above pressures would afford an adverse impact. In the absence of mitigation, this may restrict this resource to fauna during the construction phase of the Mine Development.

Potential Effects: Construction Phase: Mine Development: Hedgerows: Rationale for Prediction of Effect

Losses of foraging habitat and potential habitat severance is less likely to cause stress to species associated with hedgerow habitat given the abundance of optimal habitat within the local setting. On a precautionary basis, it is considered certain that this impact will negatively affect the conservation status of these linear landscape features. Figure 6.25 shows the hedgerow loss that will occur during the construction phase of the Mine Development (ca. 201 m) and is associated with the temporary diversion of the R179. Figure 6.25 also shows that perimeter bolstering (and in some cases, planting where gaps exist) of the existing perimeter hedge/treeline that will occur (over ca. 3.5 km). Some hedgerow and treeline loss will occur

locally due to the construction of the screening berms. In addition, Figure 6.25 shows the location of the perimeter screening berms that will be constructed and planted with a woodland mix during the construction phase (ca. 3 km of planting). During the construction phase, material stripped from within the site will be used to construct the screening berms, works will be coordinated so that hedges are not removed during this process unnecessarily in the south (i.e. works will be undertaken between internal site hedges).

This assessment takes into account that the hedgerows within site were recorded to be relatively species-poor (Appendix 6.3), which limits their biodiversity value, whilst this habitat is common and widespread in the surrounds of the Site. The majority of hedgerows within the site have lapsed meaning they have not been maintained for a number of years and as a result many tree species (mostly ash) have been left to grow into trees. The species diversity in these hedgerows is limited, the bulk being hawthorn and ash. Bolstering (and in some cases planting along the south by the R179) of the existing hedgerow/treelines around the perimeter will help to diversify the remaining habitat.

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Figure 6.25: Linear habitat change during the construction phase of the proposed Mine Development

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Potential Effects: Construction Phase: Mine Development: Hedgerows: Effect without Mitigation

The unmitigated effect to this development would result in a Minor Adverse permanent impact to habitat of Local (low) sensitivity and importance.

Potential Effects: Construction Phase: Mine Development: Woodland

Potential Effects: Construction Phase: Mine Development: Woodland: Characterisation of Unmitigated Impact

During the construction phase, discrete sections of woodland may be cleared to establish the perimeter berms.

The trees considered for suitable retention are located along the boundaries of the site, with additional areas in the north and east and these will be protected during the construction phase.

The majority of the trees on the site are category 'C' in accordance with the cascade chart illustrated in Table 1 of BS 5837:2012. Category 'C' trees are of low quality/value with a minimum of 10 years life expectancy or of a young age class/size that can be easily replaced with new planting.

These trees would be seen as having the potential to provide tree cover for the short to medium term or if of a young age class, or small size to develop to form part of the future tree cover and possibly move from a category C to A or B. This category consists of trees of all age classes from young to mature. These trees should not be seen as a considerable constraint on the design layout but should be considered for retention where viable.

Trees on site which would be categorised as B or A would be those within Zone 1 (to the east, largely to be retained), Poplar trees (to be retained along the north by the L4900) and some examples but not many in Zones 2 and 3 (to the northwest, woodland areas largely to be retained). The protection strategy is presented in Appendix 6.4 and summarized in the mitigation sections below.

Potential Effects: Construction Phase: Mine Development: Woodland: Rationale for Prediction of Effect

Woodland habitat is relatively frequent in the wider surrounds of the Site, and thus the woodland within the Mine Development site does not offer unique opportunities to fauna in the area, albeit it does contribute towards habitat connectivity across the landscape. Accordingly, removal of discrete areas of woodland on Knocknacran West during the construction phase is not anticipated to cause significant stress to faunal species associated with this feature. During the construction phase, woodland will be lost to accommodate perimeter berm construction and planting around the periphery. On a precautionary basis, it is considered that this impact will negatively affect the conservation status of these landscape features on a temporary basis.

Potential Effects: Construction Phase: Mine Development: Woodland: Effect without Mitigation

The unmitigated effect of this development would result in a Moderate Adverse effect to habitat of Local sensitivity and importance in the long-term.

Potential Effects: Construction Phase: Mine Development: Aquatic Habitat and Species (Site discharge and ditches)

Potential Effects: Construction Phase: Mine Development: Aquatic Habitat and Species (ditches): Characterisation of Unmitigated Impacts

The unmitigated impacts are cognisant of commitment to the design mitigation parameters detailed in Section 6.7.2 (embedded mitigation).

The existing drainage flow paths around the temporary diversion site are to the south-west; there is a limited catchment area on the north side of the temporary diversion road as the topography rises and diverts the drainage to the west and north. On the south side of the temporary diversion road, the topography falls to the south and south-west and drainage will enter the existing flow paths alongside the R179.

In advance of the proposed temporary diversion works, an interceptor ditch will be excavated on the north side of the temporary diversion road and a bund will be formed on the south side to intercept and/or divert the green-field run-off from adjacent land falling towards the proposed alignment.

Where existing ditches are cut-off by the temporary diversion road, culverts will be installed during the subgrade construction to maintain the drainage flow paths. A filter drain will be constructed along the north side of the temporary diversion road. Manholes will be placed at intervals of 100 m, and/or at intercepts with existing ditches, along the filter drain, acting as intermediate outfalls.

The proposed Mine Development has no impact on the drainage for the current or reinstated alignment for the R179. Drainage from the R179 will enter the existing filter drain on the north side of the road. This filter drain will be reinstated over the length of the extent removed during the Temporary Diversion Road excavation works.

Potential Effects: Construction Phase: Mine Development: Aquatic Habitat and Species (ditches): Rational for Prediction of Effect and Effect without Mitigation

In the absence of mitigation, silts and potentially hydrocarbons from construction plant and machinery could enter the drainage flow paths and ditches that occur on site. However, these ditches do not host species of conservation concern. Whilst there is some aquatic ecological connectivity between these ditches and the Corduff Stream the likelihood of elevated suspended sediments or hydrocarbons from mine construction reaching this habitat is low.

Potential Effects: Construction Phase: Mine Development: Aquatic Habitat and Species (ditches): Effect without Mitigation

The unmitigated effect to this group would result in a minor impact to species of local importance.

Potential Effects: Construction Phase: Mine Development: Bats

Potential Effects: Construction Phase: Mine Development: Bats: Characterisation of Unmitigated Impacts

The potential for ecological impacts to bats as a result of the development has been evaluated during the initial assessment of potential roosting features and habitat quality. The removal of woody vegetation such as hedgerows, trees and scrub would temporarily remove foraging and commuting habitat for bats.

Potential effects to bat species include a negative biophysical effect to scrub and peripheral habitat which may inhibit bat commuting value. Linear landscape features, such as hedgerows, are important habitats for bats, providing flight paths between roosts and foraging sites and as foraging habitats (e.g. Verboom & Huitema, 1997; Oakeley & Jones, 1998; Montgomery & Russ, 2002). It is understood that the hedgerows and woodland at the site periphery will be retained under the proposed Mine Development, thus maintaining the value of this feature to foraging / commuting bats. Four existing structures on the Knocknacran West site with identified bat roosts, will be demolished during the construction period.

Trees within the site were identified to support low to moderate bat roosting potential.

Predicted impacts therefore constitute the following:

- Loss of the bat foraging habitats that may be removed through the development of the proposed Mine Development;
- Permanent loss of bat roosts (non-maternity); and
- Increased noise and human activity along commuting routes and within foraging habitats.

It is considered possible that habitat removal or modification would afford a negative impact on local bat populations. Lighting during the hours of darkness would further reduce the quality of foraging and roosting habitat for bats.

Noise effects associated with the construction of the screening berms, temporary diversion, Cut-and-Cover Tunnel and relocation of the mine entrance would be temporary during diurnal parts of the day and no nocturnal noise effects are anticipated. In the absence of mitigation, the loss of roosting, foraging and commuting habitat would be experienced during the operational life of the mine.

Potential Effects: Construction Phase: Mine Development: Bats: Rational for Prediction of Effect

Buildings within the Knocknacran West site were recorded to support non-breeding soprano pipistrelle and brown long-eared bat roosts. In addition, a number of buildings and trees within the Knocknacran West site were recorded to have roosting bat potential.

The rationale for effect on bat species considers that a small number of low-status roosts may be affected by the proposed Mine Development (potentially present in the building or trees). The footprint of the proposed Mine Development is considered to be relatively ubiquitous in terms of foraging value and the restoration of both roosting and foraging habitat is proposed within the design mitigation. In the short-term, the restoration of the current mine (to the south of the R179) will include the provision of habitats similar to those which will be lost in the north of the site, increasing the habitat available for foraging/commuting bats in the wider area. On a precautionary basis, it is considered likely that these impacts could negatively affect the conservation status of the bat population.

Potential Effects: Construction Phase: Mine Development: Bats: Effect without Mitigation

On the basis of the available information, the unmitigated impact of this development would likely result in Moderate short-term and long-term Adverse effects to species of site and Local importance.

Potential Effects: Construction Phase: Mine Development: Terrestrial Mammals and amphibians

Potential Effects: Construction Phase: Mine Development: Terrestrial Mammals and amphibians: Characterisation of Unmitigated Impact

The potential for ecological impact to the small mammal and amphibian group, in the absence of mitigation focuses on the following factors:

- Construction noise disturbance;
- Vegetation and habitat removal (Hedgerows and grassland);
- Changes to water quality (otter/frog); and
- Dust deposition and subsequent changes in habitat composition (changes to structural, foraging and commuting habitat).

The small and medium mammal group includes rabbit (*Oryctolagus cuniculus*), stoat (*Mustela erminea*), pygmy shrew, Pine marten and hedgehog. The amphibian group is represented by common frog. Although this group of species are generally mobile, construction impacts attributed to noise, water quality, vegetation removal and dust deposition must be considered. Dust that settles on plants, can affect the plants' transpiration, respiration and other metabolic activity, by clogging pores and damaging waxy cuticles on the leaves, and by reducing available light. Dust can alter soil and water chemistry, structure and trophic status which may have impacts on the composition of plant and invertebrate communities. Dust can have direct impacts on insect and other invertebrate populations. Impacts on plant and invertebrate communities may result in effects further up the food chain (small mammals).

Potential Effects: Construction Phase: Mine Development: Terrestrial Mammals and amphibians: Rationale for Prediction of Effect

The variable effects associated with construction noise, water quality and potential habitat severance and loss at different distances from the source of disturbance, are very little understood for small to medium mammals and amphibians. Habitat loss would be likely to afford a level of perceived stress and possible mortality, dependent on species mobility, though this is not certain.

Minor losses of foraging habitat and potential habitat severance is less likely to cause stress to this species group given the extensive availability of other suitable habitat within the local setting. On a precautionary basis, it is considered likely that this temporary impact could negatively affect the conservation status of the local small mammal and amphibian population. The footprint of the proposed Mine Development is considered to be relatively ubiquitous in terms of foraging value, and the restoration of foraging habitat is proposed within the design mitigation (albeit not on a like-for-like basis).

Potential Effects: Construction Phase: Mine Development: Terrestrial Mammals and amphibians: Effect without Mitigation

The unmitigated effect to this group would result in Moderate Adverse short-term impacts to species of site and local (i.e. Low) importance. Small mammals such as stoat and hare and common frog are protected under the Wildlife Acts (1976-2010).

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Potential Effects: Construction Phase: Mine Development: Breeding Birds**Potential Effects: Construction Phase: Mine Development: Breeding Birds: Characterisation of Unmitigated Impact**

In the absence of mitigation, the potential for ecological impact to the breeding bird group focuses on the following factors:

- Construction noise disturbance;
- Vegetation and soil removal;
- Disturbance and loss of Barn Owl roost potential; and
- Dust deposition and subsequent changes in habitat composition (changes to structural, foraging and commuting habitat).

Potential effects to bird species include a negative biophysical effect to hedgerow and tree availability which may disturb breeding birds and minimally reduce available forage.

Noise effects associated with the construction of the temporary diversion, Cut-and-Cover Tunnel, relocation of the mine entrance and the construction of perimeter screening berms would be temporary during diurnal phases and this has the potential to affect avian behaviour. Ground nesting bird species such as skylark *Alauda arvensis* could be disturbed, killed or injured during scrub clearance and soil strip in the absence of mitigation. The effects of increased noise during operation would be temporary and reversible.

Potential Effects: Construction Phase: Mine Development: Breeding Birds: Rationale for Prediction of Effect

The rationale for effect to bird species considers that losses of available nesting habitat may occur, albeit nesting opportunities will be retained at site boundaries (including retained woodland and bolstering of existing perimeter hedgerows and planting of perimeter berms with a woodland mix), and restoration of the site will replace lost nesting opportunities in the long-term (albeit nesting habitats will not be replaced on a like-for-like basis). In addition, short-term losses of foraging and breeding habitat from within the site are unlikely to cause significant stress to this group given the abundance of habitat (mature trees, ditch networks, hedgerow and pasture) within the local setting. On a precautionary basis, it is considered likely that this temporary impact could negatively affect the conservation status of the bird population.

Potential Effects: Construction Phase: Mine Development: Breeding Birds: Effect without Mitigation

The unmitigated effect to this feature would result in a Minor short-term Adverse impact to species of Low (local) sensitivity and importance. The majority of bird species are protected under the Wildlife Acts (1976 – 2012) where it is an offence to hunt, interfere with or destroy their breeding or resting places unless authority is obtained via statutory licence provision.

6.6.3 *Potential Effects: Operational Phase: Community Sports Complex*

Potential Effects: Operational Phase: Community Sports Complex: Ballyhoe Lough and Lough Fea pNHA

Potential Effects: Operational Phase: Community Sports Complex: Ballyhoe Lough and Lough Fea pNHA: Characterisation of Unmitigated Impact

The proposed Community Sports Complex has an existing wastewater treatment system which has been constructed under Reg. Ref. 20/365.

Surface water drainage from all impermeable surfaces will be routed to the site's surface water attenuation system. The attenuation tank has been sized for a 1 in 100-year storm event.

No impact is envisaged on the surrounding hydrological features.

Potential Effects: Operational Phase: Community Sports Complex: Ballyhoe Lough pNHA and Lough Fea pNHA: Rationale for Prediction of Effect

Hydrological connectivity exists between the site and the two pNHA. As such, there is a risk, albeit minor, of discharge impacts, transfer of sediments or hydrocarbons from accidental spills that may reach downstream receptors. Design parameters are likely to confine sulphate levels downstream of the mine discharge point to meet current permitted limits and assimilative effects of the River Glyde and Bursk are considered as part of the rationale process.

Potential Effects: Operational Phase: Community Sports Complex: Ballyhoe Lough pNHA and Lough Fea pNHA: Effect without Mitigation

The unmitigated effect of this development would result in a Minor Adverse effect to habitat of Regional sensitivity and importance in the short-, medium- and potentially long-term.

Potential Effects: Operational Phase: Community Sports Complex: Habitat

Potential Effects: Operational Phase: Community Sports Complex: Habitat: Characterisation of Unmitigated Impact

The habitat at the Community Sports Complex site will comprises of buildings and artificial surfaces, sports pitch and managed grass (amenity grassland) in addition to linear habitat around the perimeter. No further impact is envisaged on habitat during this phase. Existing linear habitat will be maintained during this phase.

Potential Effects: Operational Phase: Community Sports Complex: Habitat: Rationale for Prediction of Effect

Implementation of the landscape management plan during construction will mean that in the long-term, and into the operational phase, new habitats will be provided in this area which will mature and be maintained during this phase. There is potential to exceed the biodiversity value of the baseline (albeit habitat will not be replaced on a like-for-like basis).

Potential Effects: Operational Phase: Community Sports Complex: Habitat: Effect without Mitigation

The maintenance of habitat and perimeter planting has resulted in a Minor Beneficial effect to habitat of Local sensitivity and importance in the long-term.

Potential Effects: Operational Phase: Community Sports Complex: Aquatic Habitat and Species (ditches)

Potential Effects: Operational Phase: Community Sports Complex: Aquatic Habitat and Species (Site discharge): Characterisation of Unmitigated Impacts

The proposed Community Sports Complex will have existing wastewater treatment system which has been constructed under Reg. Ref. 20/365.

Surface water drainage from all impermeable surfaces will be routed to the site's surface water attenuation system. The attenuation tank has been sized for a 1 in 100-year storm event.

No impact is envisaged on the surrounding aquatic habitat and species.

Potential Effects: Operational Phase: Community Sports Complex: Aquatic Habitat and Species (Site discharge, ditches and Ponds): Rational for Prediction of Effect and Effect without Mitigation

No impact is envisaged.

Potential Effects: Operational Phase: Community Sports Complex: Aquatic Habitat and Species (Site discharge, ditches and Ponds): Effect without Mitigation

No impact is envisaged.

Potential Effects: Operational Phase: Community Sports Complex: Bats

Potential Effects: Operational Phase: Community Sports Complex: Bats: Characterisation of Unmitigated Impacts

Hedgerows and periphery planting will be retained and maintained during this phase, thus maintaining the value of this feature to foraging / commuting bats.

Lighting during the hours of darkness would further reduce the quality of foraging and roosting habitat for bats. Proposed lighting will be principally associated with floodlights on the junior and 3G pitch on the Community Sports Complex site. Details of LUX contours associated with this lighting is shown in Figure 6.24, below. Planting of screening berms to the northeast and east will be undertaken and this will help to minimise lighting impacts (as part of the landscape management plan for the site). Planting will also be undertaken on the western side of the site to offer screening. As there are a lack of ecological receptors to this proposed development the impact of lighting from the proposed pitches is considered to be low.

Noise effects would be temporary during diurnal parts of the day and no nocturnal noise effects are anticipated. In the absence of mitigation, the loss of roosting, foraging and commuting habitat would be experienced during the operational life of the mine.

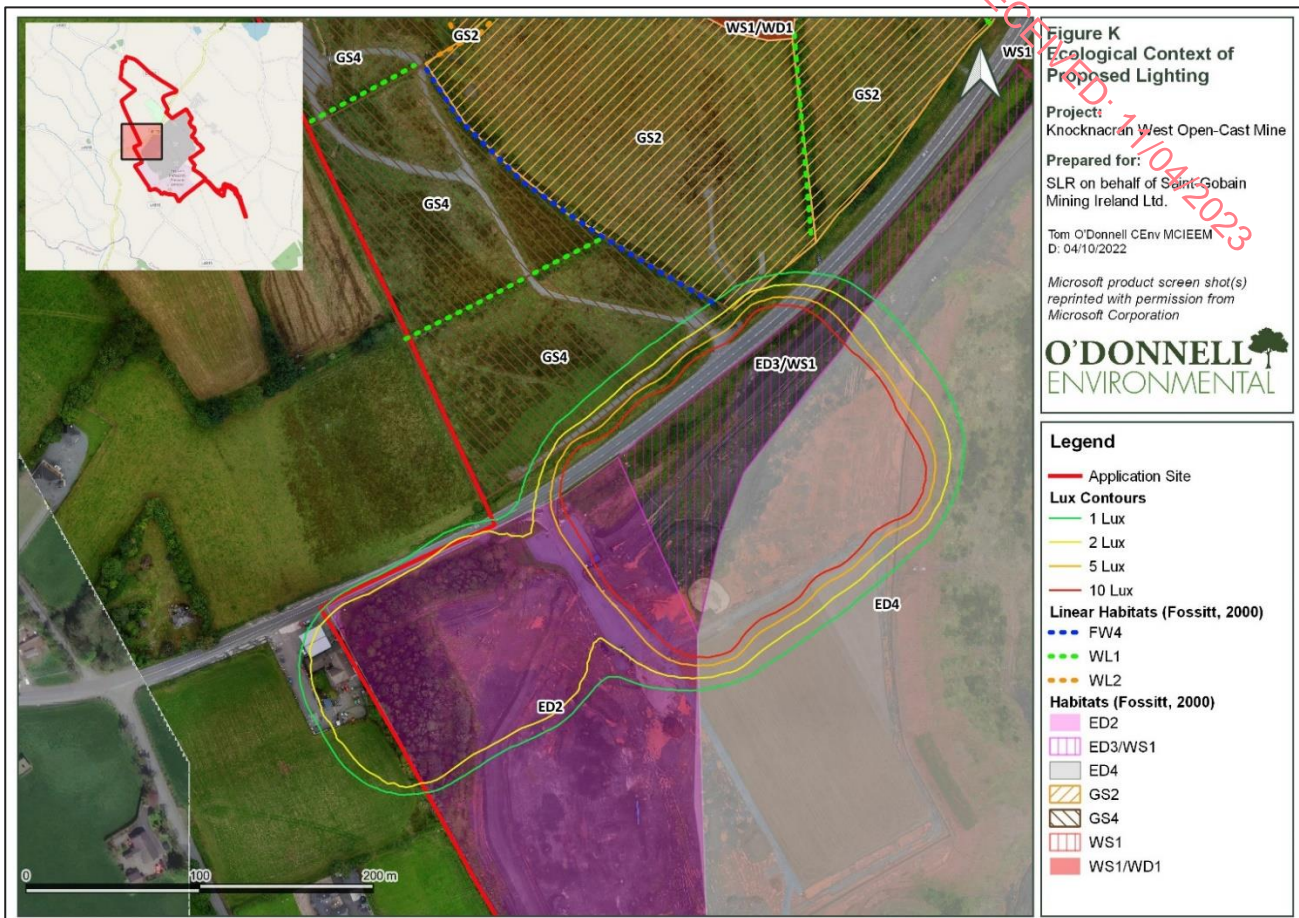


Figure 6.26: Ecological Context of proposed lighting on the Community Sports Complex site

Potential Effects: Construction Phase: Community Sports Complex: Bats: Effect without Mitigation

On the basis of the available information, the unmitigated impact of this development would likely result in Negligible short-term and long-term Adverse effects to species of site and Local importance.

Potential Effects: Operational Phase: Community Sports Complex: Terrestrial Mammals and amphibians

Potential Effects: Operational Phase: Community Sports Complex: Terrestrial Mammals and amphibians: Characterisation of Unmitigated Impact

No further habitat loss occurs during this phase, existing linear habitats will be maintained around the perimeter of the site which will offer foraging habitat for species.

On a precautionary basis, it is considered likely that this permanent impact could negatively affect the conservation status of the local small mammal and amphibian population.

Potential Effects: Construction Phase: Community Sports Complex: Terrestrial Mammals and amphibian: Effect without Mitigation

The unmitigated effect to this group would result in Negligible effects to species of site and local (i.e. Low) importance. Small mammals such as stoat and hare along with common frog are protected under the Wildlife Acts (1976-2010).

Potential Effects: Operational Phase: Community Sports Complex: Breeding Birds

Potential Effects: Operational Phase: Community Sports Complex: Breeding Birds: Characterisation of Unmitigated Impact

No further habitat loss occurs during this phase, existing linear habitats will be maintained around the perimeter of the site which will offer foraging habitat for bird species.

On a precautionary basis, it is considered likely that this permanent impact could negatively affect the conservation status of the local bird population.

Potential Effects: Construction Phase: Community Sports Complex: Breeding birds: Effect without Mitigation

The unmitigated effect to this feature would result in a negligible impact to species of Low (local) sensitivity and importance. The majority of bird species are protected under the Wildlife Acts (1976 – 2012) where it is an offence to hunt, interfere with or destroy their breeding or resting places unless authority is obtained via statutory licence provision.

6.6.4 Potential Effects: Operational Phase: Mine Development

Potential Effects: Operational Phase: Mine Development: Ballyhoe Lough and Lough Fea pNHA

Potential Effects: Operational Phase: Mine Development: Ballyhoe Lough and Lough Fea pNHA: Characterisation of Unmitigated Impact

In the absence of mitigation an increase in total suspended sediment loading, mine discharge or accidental spills of hydrocarbons may occur. Sediments within the aquatic environment are detrimental to ecological receptors and this would result in an adverse effect to receptors and also to two proposed Natural Heritage Areas.

Potential Effects: Operational Phase: Mine Development: Ballyhoe Lough and Lough Fea pNHA: Rationale for Prediction of Effect

Hydrological connectivity exists between the Site and the pNHAs. As such, there is a risk, albeit minor, of discharge impacts, transfer of sediments or hydrocarbons from accidental spills that may reach downstream receptors. Design parameters are likely to confine sulphate levels downstream of the mine discharge point to meet current permitted limits and assimilative effects of the River Glyde and Bursk are considered as part of the rationale process.

Potential Effects: Operational Phase: Mine Development: Ballyhoe Lough and Lough Fea pNHA: Effect without Mitigation

The unmitigated effect of this development would result in a Minor Adverse effect to habitats of Regional sensitivity and importance in the short-, medium- and potentially long-term.

Potential Effects: Operational Phase: Mine Development: Grassland**Potential Effects: Operational Phase: Mine Development: Grassland: Characterisation of Unmitigated Impact**

The loss of the habitat will occur over two main phases, the initial loss of habitat will occur in the northern extraction area in the short-term Figure 6.27. Approximately 149,799m² of grassland habitat will be lost over the first 15 years on the Knocknacran West site. Overburden and interburden will be moved from the northern Knocknacran West Mine area and brought to the Knocknacran Open-Cast to be used to restore this area to near original ground levels in the short to medium-term. There is a time lag between restoring the topography and planting and maturing the habitat. This restored land within Knocknacran will be provided as mixed grassland and scrub habitat (ca. 474,716 m²) in the medium – long-term (ca. 10 – 20 years into the operational life).

The second loss of semi-natural grassland will occur over the later ca. 15 years of the operational life (Figure 6.28). This will involve the removal of the habitat in the southern extraction area within Knocknacran West. Approximately 260,411 m² of grassland habitat will be lost within the southern area of Knocknacran West Mine. During this phase, the restored grassland within Knocknacran will enhance the habitat availability in the locality, it is acknowledged that there will remain a net loss of ca. 410,210 m² on the Knocknacran West site during this period.

Overall, it is understood that the majority of semi-natural grassland within the Knocknacran West Mine site is lost under the proposed Mine Development, accordingly (in the absence of mitigation) the potential for ecological impact to this habitat focuses solely on this factor.

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Figure 6.27: Habitat change areas onsite during the first ca. 15 years of the operational life Mine Development

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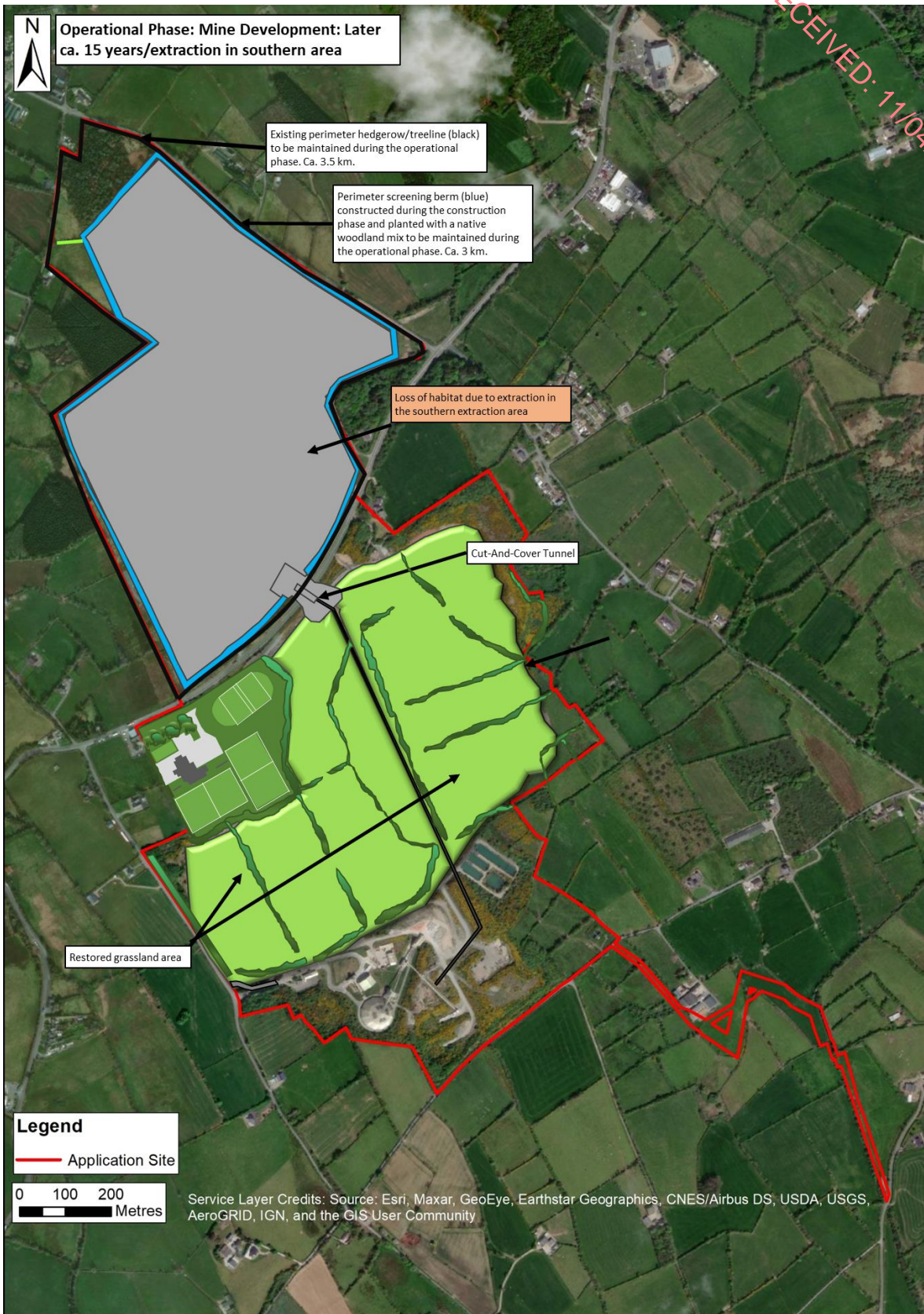


Figure 6.28: Habitat change areas onsite during the later ca. 15 years of the operational life Mine Development

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Potential Effects: Operational Phase: Mine Development: Grassland: Rationale for Prediction of Effect

The semi-natural grassland within Knocknacran West Mine site was recorded to be relatively species-rich, in comparison to the intensively-managed pastoral fields in the remainder of the site. Nevertheless, this habitat type is considered to be common in the context of the wider area, and when considering the loss of this habitat in the broader setting, this loss would be a small contribution of available resource within the local and regional setting.

Indeed, the restoration of the Site (included in the design mitigation), will mean that in the long-term new habitats will be provided in this area, with potential to exceed the biodiversity value of the current situation (albeit habitat will not be replaced on a like-for-like basis).

Potential Effects: Operational Phase: Mine Development: Grassland: Effect without Mitigation

The unmitigated effect of this development would result in a Minor Adverse effect to habitat of Local sensitivity and importance in the long-term.

Potential Effects: Operational Phase: Mine Development: Hedgerows

Potential Effects: Operational Phase: Mine Development: Hedgerows: Characterisation of Unmitigated Impacts

In the absence of mitigation, the potential for ecological impact to hedgerows focuses on the following factors:

- Phased Loss of hedgerow habitat;
- Potential un-planned encroachment of machinery and mine footprint on retained hedgerows; and
- Dust deposition and subsequent changes in habitat composition.

Hedgerow removal or modification arising from the above pressures would afford an adverse impact. In the absence of mitigation, this may restrict this resource to fauna during the operational life of the mine.

Potential Effects: Operational Phase: Mine Development: Hedgerows: Rationale for Prediction of Effect

Phased losses of foraging habitat and potential habitat severance is less likely to cause stress to species associated with hedgerow habitat given the abundance of optimal habitat within the local setting and the time lapse (phased) losses that would occur over some time rather than abruptly. On a precautionary basis, it is considered certain that this impact will negatively affect the conservation status of these linear landscape features. Nevertheless, this assessment also takes into account that the hedgerows within site were recorded to be relatively species-poor, which limits their biodiversity value, whilst this habitat is common and widespread in the surrounds of the site. Also taken into account, is the provision of new hedgerow planting within the phased restoration plan for the Knocknacran Mine, which has been accounted for at the project design stage.

As can be seen in Figure 6.29, ca. 1.2 km of existing hedgerow will be lost during extraction of the northern open-cast area within Knocknacran West over the first ca. 15 years. Approximately 210 m of treeline will also be lost during this period. During this same period, ca. 1.8 km of hedgerow and ca. 712 m of treeline will be established on the west side of Knocknacran during the phased restoration that is coincident with

phased extraction in Knocknacran West. Hedgerow and treelines to the south of the Knocknacran West site will remain in situ during this period.

As can be seen in Figure 6.30, ca. 1.3 km of existing hedgerow will be lost during extraction of the southern open-cast area within Knocknacran West over the later ca. 15 years. Approximately 830 m of treeline will also be lost during this period. During this same period, ca. 1.8 km of hedgerow and ca. 712 m of treeline will be established on the eastern side of Knocknacran during the phased restoration that is coincident with phased extraction in Knocknacran West.

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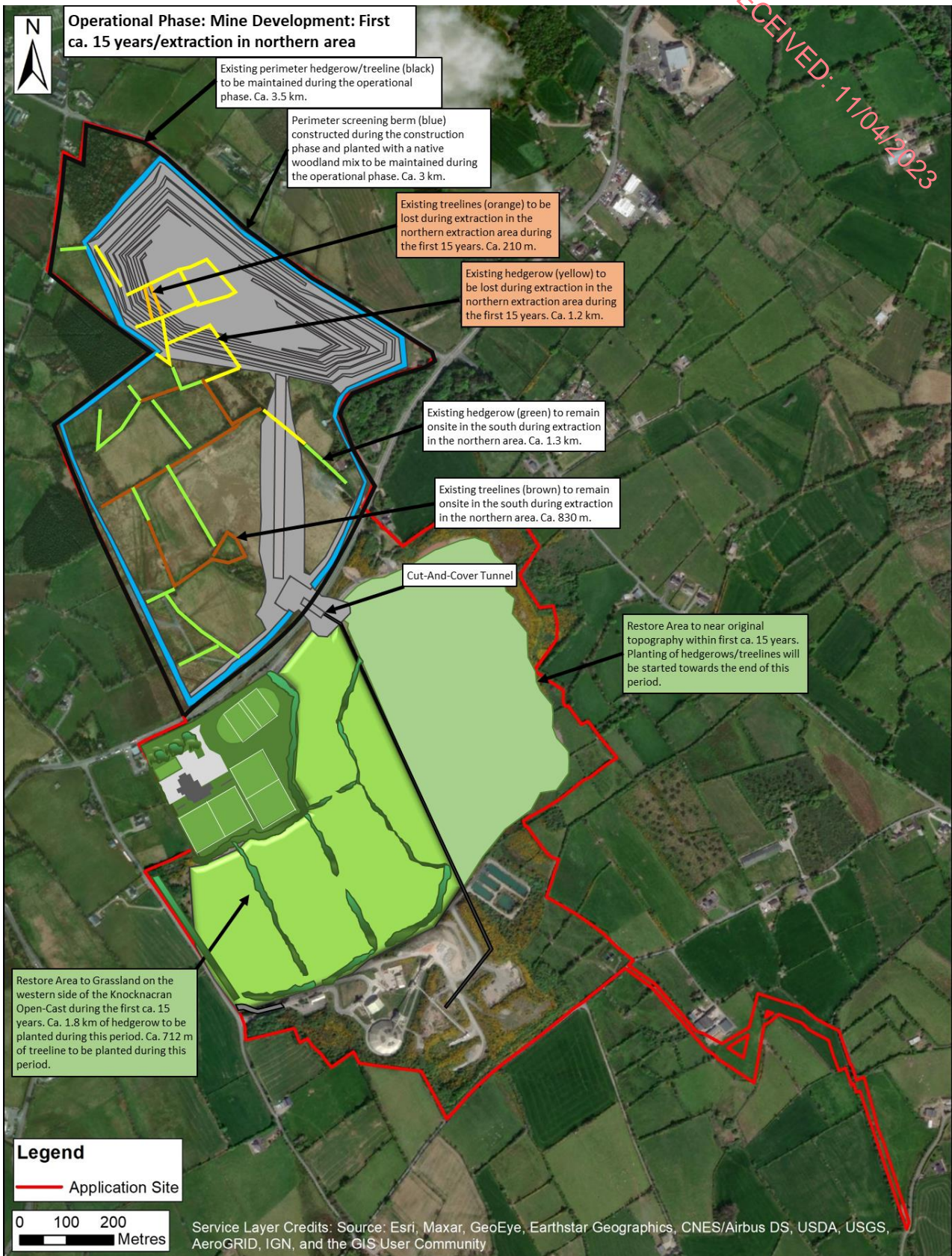


Figure 6.29: Linear habitat change during the operational life (ca. first 15 years) of the Mine Development

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Figure 6.30: Linear habitat change during the operational life (ca. later 15 years) of the Mine Development

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Potential Effects: Operational Phase: Mine Development: Hedgerows: Effect without Mitigation

The unmitigated effect to this development would result in a Minor Adverse permanent impact to habitat of Local (low) sensitivity and importance.

Potential Effects: Operational Phase: Mine Development: Woodland

Potential Effects: Operational Phase: Mine Development: Woodland: Characterisation of Unmitigated Impact

As described within the arboricultural report (Appendix 6.4) the proposed works will involve the removal of trees onsite. The trees considered for suitable retention are located along the boundaries of the site, with additional areas in the north and east.

It is understood that the majority of woodland within the site is retained under the proposed Mine Development, accordingly (in the absence of mitigation) the potential for ecological impact to hedgerows focuses on the following factors:

- Discrete loss of woodland habitat;
- Potential un-planned encroachment of machinery and mine footprint on retained hedgerows; and
- Dust deposition and subsequent changes in habitat composition.

Discrete areas of woodland will be lost under the proposed Mine Development. During the first 15 years in the northern extraction area (Figure 6.27) ca. 26,855 m² of woodland will be lost on the Knocknacran West Mine site. During the later 15 years in the southern extraction area (Figure 6.28) ca. 2,844 m² of woodland will be lost on the Knocknacran West Mine site. In addition, there is potential for habitat degradation of the woodland within site due to habitat modification from pressures such as dust deposition.

The majority of the trees on the site are category 'C' in accordance with the cascade chart illustrated in Table 1 of BS 5837:2012. Category 'C' trees are of low quality/value with a minimum of 10 years life expectancy or of a young age class/size that can be easily replaced with new planting.

These trees would be seen as having the potential to provide tree cover for the short to medium term or if of a young age class, or small size to develop to form part of the future tree cover and possibly move from a category C to A or B. This category consists of trees of all age classes from young to mature. These trees should not be seen as a considerable constraint on the design layout but should be considered for retention where viable.

Trees on site which would be categorised as B or A would be those within Zone 1 (to the east, largely to be retained), Poplar trees (to be retained along the north by the L4900) and some examples but not many in Zones 2 and 3 (to the northwest, woodland areas largely to be retained). The protection strategy is presented in Appendix 6.4 and summarized in the mitigation sections below.

Potential Effects: Operational Phase: Mine Development: Woodland: Rationale for Prediction of Effect

Woodland habitat is relatively frequent in the wider surrounds of the site, and thus the woodland within site does not offer unique opportunities to fauna in the area, albeit it does contribute towards habitat connectivity across the landscape. Accordingly, removal of discrete areas of woodland is not anticipated to

cause significant stress to faunal species associated with this feature. On a precautionary basis, it is considered that this impact will negatively affect the conservation status of these landscape features on a temporary basis.

Potential Effects: Operational Phase: Mine Development: Woodland: Effect without Mitigation

The unmitigated effect of this development would result in a Moderate Adverse effect to habitat of local sensitivity and importance in the long-term.

Potential Effects: Operational Phase: Mine Development: Aquatic Habitat and Species (Site discharge, ditches and Ponds)

Potential Effects: Operational Phase: Mine Development: Aquatic Habitat and Species (Site discharge, ditches and Ponds): Characterisation of Unmitigated Impacts

The unmitigated impacts are cognisant of commitment to the embedded design mitigation parameters detailed in Section 6.7.4. As such, the operational discharges from the mine will be regulated as per the extant EPA licence and also the wastewater directive. Sulphate levels have, on occasion, breached the licence limits and this level of exceedance is assessed in the impact assessment process as follows. No breaches of the revised sulphate limit of 625 ppm have taken place before or since the licence was updated.

A loss of ca. 506 m of the ephemeral Corduff Stream will occur on site during extraction in the northern area of the Mine Development (within the first ca. 15 years). However, baseline data for this section of the stream indicate it is an ephemeral stream here and is considered of local importance (lower value) with a poor status. It is not considered of any value to salmonids and crayfish and of low value for eel.

Potential Effects: Operational Phase: Mine Development: Aquatic Habitat and Species (Site discharge, ditches and Ponds): Rational for Prediction of Effect and Effect without Mitigation

Studies documented by AECOM (2020) citing a study by Timpano (2010) indicate that pollution-intolerant invertebrates (mayflies, caddisflies and stoneflies) were likely to suffer a decrease in diversity as sulphate levels increase. The IE Licence for the Site (P0519-04) has recently been revised to allow for increased daily sulphate limits at the mine discharge point because of changes to mine water management following collapse of an underground area (Drumgoosat). More stringent monthly and annual limits have been set in recognition of the current data and scientific knowledge which points to the importance of longer-term exposure to elevated sulphate in terms of impact. The EPA has also concluded that the ecological status of the Glyde catchment has not deteriorated since the new mine water management system (during which occasional sulphate levels have been exceeded) has been in operation. Historically there have not been records of salmonid fish at the mine discharge point. Given the rationale set out above, residual effects to this group are not predicted.

Potential Effects: Operational Phase: Mine Development: Aquatic Habitat and Species (Site discharge, ditches and Ponds): Effect without Mitigation

The unmitigated effect to this group would result in Negligible impacts to species of international importance.

Potential Effects: Operational Phase: Mine Development: Bats

Potential Effects: Operational Phase: Mine Development: Bats: Characterisation of Unmitigated Impacts

The potential for ecological impacts to bats as a result of the development has been evaluated during the initial assessment of potential roosting features and habitat quality. The removal of woody vegetation such as hedgerows, trees and scrub would temporarily remove foraging and commuting habitat for bats. Potential effects to bat species include a negative biophysical effect to scrub and peripheral habitat which may inhibit bat commuting value. Linear landscape features, such as hedgerows, are important habitats for bats, providing flight paths between roosts and foraging sites and as foraging habitats (e.g. Verboom & Huitema, 1997; Oakeley & Jones, 1998; Montgomery & Russ, 2002). It is understood that the hedgerows and woodland at the Site periphery will be retained under the proposed Mine Development, thus maintaining the value of this feature to foraging / commuting bats.

Trees within the site were identified to support low to moderate bat roosting potential.

Predicted impacts therefore constitute the following:

- Loss of the bat foraging habitats that may be removed through the development of the proposed mine development;
- Permanent loss of bat roosts; and
- Increased noise and human activity along commuting routes and within foraging habitats.

It is considered possible that habitat removal or modification would afford a negative impact on local bat populations. Lighting during the hours of darkness would further reduce the quality of foraging and roosting habitat for bats.

Noise effects associated with the operation of the mine would be temporary during diurnal parts of the day and no nocturnal noise effects are anticipated. In the absence of mitigation, the loss of roosting, foraging and commuting habitat would be experienced during the operational life of the mine.

Potential Effects: Operational Phase: Mine Development: Bats: Rational for Prediction of Effect

The rationale for effect on bat species considers that a small number of low-status roosts may be affected by the proposed Mine Development (potentially present in trees). The footprint of the proposed Mine Development is considered to be relatively ubiquitous in terms of foraging value and the restoration of both roosting and foraging habitat is proposed within the design mitigation. In the short-term, the restoration of the current mine (to the south of the R179) will include the provision of habitats similar to those which will be lost in the north of the site, increasing the habitat available for foraging/commuting bats in the wider area. On a precautionary basis, it is considered likely that these impacts could negatively affect the conservation status of the bat population.

Potential Effects: Operational Phase: Mine Development: Bats: Effect without Mitigation

On the basis of the available information, the unmitigated impact of this development would likely result in Moderate short-term and long-term Adverse effects to species of site and Local importance.

Potential Effects: Operational Phase: Mine Development: Terrestrial Mammals and amphibians

Potential Effects: Operational Phase: Mine Development: Terrestrial Mammals and amphibians: Characterisation of Unmitigated Impact

The potential for ecological impact to the small mammal and amphibian group, in the absence of mitigation focuses on the following factors:

- Operational noise disturbance;
- Vegetation and habitat removal (Hedgerows and grassland);
- Changes to water quality; and
- Dust deposition and subsequent changes in habitat composition (changes to structural, foraging and commuting habitat).

The small and medium mammal group includes rabbit (*Oryctolagus cuniculus*), stoat (*Mustela erminea*), Pine marten, pygmy shrew, and hedgehog. The amphibians are solely represented by common frog. Although this group of species are generally mobile, operational impacts attributed to noise, water quality, vegetation removal and dust deposition must be considered. Dust that settles on plants, can affect the plants' transpiration, respiration and other metabolic activity, by clogging pores and damaging waxy cuticles on the leaves, and by reducing available light. Dust can alter soil and water chemistry, structure and trophic status which may have impacts on the composition of plant and invertebrate communities. Dust can have direct impacts on insect and other invertebrate populations. Impacts on plant and invertebrate communities may result in effects further up the food chain.

Potential Effects: Operational Phase: Mine Development: Terrestrial Mammals and amphibians: Rationale for Prediction of Effect

The variable effects associated with operational noise, water quality and potential habitat severance and loss at different distances from the source of disturbance, are very little understood for small to medium mammals and amphibians. Habitat loss would be likely to afford a level of perceived stress and possible mortality, dependent on species mobility, though this is not certain.

Minor losses of foraging habitat and potential habitat severance is less likely to cause stress to this species group given the extensive availability of other suitable habitat within the local setting. On a precautionary basis, it is considered likely that this temporary impact could negatively affect the conservation status of the local small mammal population. The footprint of the proposed Mine Development is considered to be relatively ubiquitous in terms of foraging value, and the restoration of foraging habitat is proposed within the design mitigation (albeit not on a like-for-like basis). In the medium-term, the restoration of the current mine (to the south of the R179) will include the provision of habitats similar to those which will be lost in the north of the Site, increasing the habitat available for small mammals and amphibians in the wider area in the interim.

Potential Effects: Operational Phase: Mine Development: Terrestrial Mammals and amphibians: Effect without Mitigation

The unmitigated effect to this group would result in Moderate Adverse medium-term impacts to species of site and local (i.e. Low) importance. Small mammals such as stoat and hare plus common frog are protected under the Wildlife Acts (1976-2010).

Potential Effects: Operational Phase: Mine Development: Breeding Birds

Potential Effects: Operational Phase: Mine Development: Breeding Birds: Characterisation of Unmitigated Impact

In the absence of mitigation, the potential for ecological impact to the breeding bird group focuses on the following factors:

- Operational noise disturbance including blasting;
- Vegetation and soil removal;
- Disturbance and loss of Barn Owl roost; and
- Dust deposition and subsequent changes in habitat composition (changes to structural, foraging and commuting habitat).

Potential effects to bird species include a negative biophysical effect to hedgerow and tree availability which may disturb breeding birds and minimally reduce available forage.

Noise effects associated with the operation of the mine would be temporary during diurnal phases and this has the potential to affect avian behaviour. Ground nesting bird species such as skylark *Alauda arvensis* could be disturbed, killed or injured during scrub clearance and soil strip in the absence of mitigation. The effects of increased noise during operation would be temporary and reversible.

Potential Effects: Operational Phase: Mine Development: Breeding Birds: Rationale for Prediction of Effect

The rationale for effect to bird species considers that losses of available nesting habitat may occur, albeit nesting opportunities will be retained at site boundaries (including retained woodland), and restoration of the site will replace lost nesting opportunities in the long-term on the Knocknacran Mine site (albeit nesting habitats will not be replaced on a like-for-like basis and will be south of the Knocknacran West site). In addition, short-term losses of foraging and breeding habitat from within the site are unlikely to cause significant stress to this group given the abundance of habitat (mature trees, ditch networks, hedgerow and pasture) within the local setting. On a precautionary basis, it is considered likely that this temporary impact could negatively affect the conservation status of the bird population.

Potential Effects: Operational Phase: Mine Development: Breeding Birds: Effect without Mitigation

The unmitigated effect to this feature would result in a Minor short-term Adverse impact to species of Low (local) sensitivity and importance. The majority of bird species are protected under the Wildlife Acts (1976 – 2012) where it is an offence to hunt, interfere with or destroy their breeding or resting places unless authority is obtained via statutory licence provision.

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6.6.5 *Potential Effects: Closure/Restoration Phase: Community Sports Complex*

No closure phase is proposed for the Community Sports Complex, therefore the potential impact and effect from this phase is not considered further. It is scoped out for consideration in this phase.

6.6.6 *Potential Effects: Closure/Restoration Phase: Mine Development*

Potential Effects: Closure/Restoration Phase: Mine Development: Ballyhoe Lough and Lough Fea pNHA

Potential Effects: Closure/Restoration Phase: Mine Development: Ballyhoe Lough and Lough Fea pNHA: Characterisation of Unmitigated Impact

Following the restoration phase, there will be no mine water discharge to the River Bursk.

Potential Effects: Closure/Restoration Phase: Mine Development: Ballyhoe Lough and Lough Fea pNHA: Rationale for Prediction of Effect

Hydrological connectivity exists between the Site and the pNHAs. Water quality from site-based sources in restoration phases is likely to be good. Small risks of suspended sediment mobilisations from restoration activities may be apparent.

Potential Effects: Closure/Restoration Phase: Mine Development: Ballyhoe Lough and Lough Fea pNHA: Effect without Mitigation

The unmitigated effect of this development would result in a negligible Adverse effect to habitats of Regional sensitivity and importance in the short-, medium- and potentially long-term.

Potential Effects: Closure/Restoration Phase: Mine Development: Grassland

Potential Effects: Closure/Restoration Phase: Mine Development: Grassland: Characterisation of Unmitigated Impact

The final restoration will see the creation of ca. 180,740 m² of grasslands and scrubland on the Knocknacran West Mine site. This will be carried out in line with the habitat management plan (Appendix 6.7).

Potential Effects: Closure/Restoration Phase: Mine Development: Grassland: Rationale for Prediction of Effect

The restoration of the Mine Development (included in the design mitigation) will mean that in the long-term new habitats will be provided in this area, with potential to exceed the biodiversity value of the current situation (albeit habitat will not be replaced on a like-for-like basis).

Potential Effects: Closure/Restoration Phase: Mine Development: Grassland: Effect without Mitigation

The unmitigated effect of this development would result in a Minor positive effect to habitat of Local sensitivity and importance in the long-term.

Potential Effects: Closure/Restoration Phase: Mine Development: Hedgerows

Table 6.15 below presents a summary of the habitat change following restoration of the Knocknacran West.

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Potential Effects: Closure/Restoration Phase: Mine Development: Hedgerows: Effect without Mitigation

The unmitigated effect to this development would result in a Minor Adverse permanent impact to habitat of Local (low) sensitivity and importance.

Potential Effects: Closure/Restoration Phase: Mine Development: Summary

Potential effects at the Site as a consequence of restoration and closure will generally be positive. Although effects analysis is undertaken in the absence of mitigation there are clear planning obligations to restore the site. The effects of restoration and closure impacts would vary from negligible in the context of water quality related to connectivity with the pNHAs to minor to moderate beneficial in terms of habitat creation and biodiversity value over the medium to long term at the site (> 10 to 15 years) to allow for hedgerow establishment and tree planting to gain value. The extent of residual beneficial value at the site during restoration and closure can only be evaluated following the delivery of mitigation as detailed in the following sections.

Table 6.15 below presents a summary of the habitat change following restoration of the Knocknacran West.

Table 6.15: : Habitat change after restoration – Knocknacran West

Habitat	Knocknacran West Open-Cast Mine: Habitat change after restoration
Hedgerow (WL1)	+ ca. 963 m
Treeline (WL2)	No change
Screening Berms (Planted Mixture of Native Woodland) (WL1/WL2)	No change
Mixed Broadleaved Woodland (WD1)	+ ca. 3,914 m ²
Scrub/Mixed Broadleaved Woodland (WS1/WD1)	+ ca. 25,529 m ²
Wet Willow-Alder-Ash Woodland (WN6)	+ ca. 678 m ²
Oak-Ash-Hazel Woodland (WN2)	+ ca. 13,573 m ²
Recolonising Bare Ground (ED3)	No change
Active Quarries and Mines (ED4)	- ca. 475,386 m ²
Other Artificial Lakes and Ponds (FL8)	+ ca. 250,998 m ²
Drainage Ditch (FW4) (Corduff Stream)	+ ca. 256 m
Dry Meadows and Grassy Verge Grassland (GS2)	+ ca. 180,704 m ² (Mix of Grasslands and Scrub GS2/GA1/GS4/WS1)
Scrub (WS1)	
Dry Meadows and Grassy Verge Grassland (GS2)	

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Wet Grassland (GS4)	
Improved Agricultural Grassland (GA1)	

6.7 Mitigation and Management

The principal objective of the ecological mitigation is to take measures to reduce negative effects of the proposals upon the existing ecological value of the site. Where negative effects cannot be entirely avoided it is often necessary to enhance the ecological value of the locality through the creation of appropriate compensatory habitats. Avoidance of negative effects through design is included in the Embedded Design Mitigation section of this Chapter. Details of committed mitigation, compensation and enhancement measures are outlined in this section.

Monaghan County Council Hedgerow Survey Work 2021 – Incorporation into future Site Management

In 2021 MCC released the “*Monaghan Hedgerow Appraisal Survey, 2021. A Decade of Change.*” The survey aimed to assess hedges previously studied in 2010 and review their current state a decade on.

The survey findings indicate that between 2010 and 2021, ca. 0.3469 km of hedgerow have been removed in the 1 km grid square in the townland of Knocknacran West.

The findings of the survey indicate that “*designing and planting a new hedgerow should be done with consideration of the longterm outcomes and with the purpose of the hedgerows in mind. Hedgerows should be sighted based on how stock are moved around the farm or with consideration for machinery access.*”

SGMI also will incorporate the following recommendations from the review into their management plan:

- SGMI commit to managing their site with consideration of the longterm outcomes and with the purpose of the hedgerows in mind;
- Hedge cutting will not take place between 1st March to 31st August except where absolutely necessary for safety reasons;
- All relevant staff (and any contractors used) will have the necessary skills and data sources to implement or evaluate best practice hedgerow conservation; and
- Native plant species will be used for any hedgerow planting (including hedgerow trees).

6.7.1 Mitigation and Management: Construction Phase: Community Sports Complex

- Works will be undertaken in line with any conditions set by MCC;
- All works will be undertaken in accordance with best practice and adhere to the following guidelines:
 - Inland Fisheries Ireland (2016). Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters;
 - CIRIA (2009). Control of Water Pollution from Construction Sites – Guidance for Consultants and Contactors (C532);

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- NRA Guidelines (2006). NRA Guidelines for the Crossing of Watercourses during the Construction of National Road Scheme; and
- Defra (Department for Environment, Food and Rural Affairs) (2009). Construction Code of Practice for the Sustainable Use of Soils on Construction Sites.

6.7.2 Mitigation and Management: Construction Phase: Mine Development

6.7.2.1 Embedded Design Mitigation: Construction Phase: Mine Development

- A key objective of the construction phase is to ensure that screening berms and other screening measures (i.e. bolstering existing perimeter hedgerows) are carried out early on, and in advance of the operational phase of development. A landscaping plan is presented in Appendix 6.9, for the proposed Knocknacran West Mine development.
- During the construction phase, a 2 m to 4 m-high screening berm will be constructed and completed on all sides of the Knocknacran West Open-Cast Mine site (gure 6.31). This will assist in screening works at the site from sensitive views to the south (i.e., along the busy R179 road) and to the eastern and north-western boundaries of the site, which are aligned by local/third class roads, on which local dwellings are located (i.e., where such roads align the site boundary). In addition, this will screen any potential views of the proposed Knocknacran West Mine from the village of Drumgoosat, and the smaller settlement of Magheraclone. As illustrated in Figure 6.31, the existing perimeter boundary hedgerow will be maintained and thickened. The security fence and an internal access track will sit between the existing hedgerow and the newly constructed (and planted) screening berms.

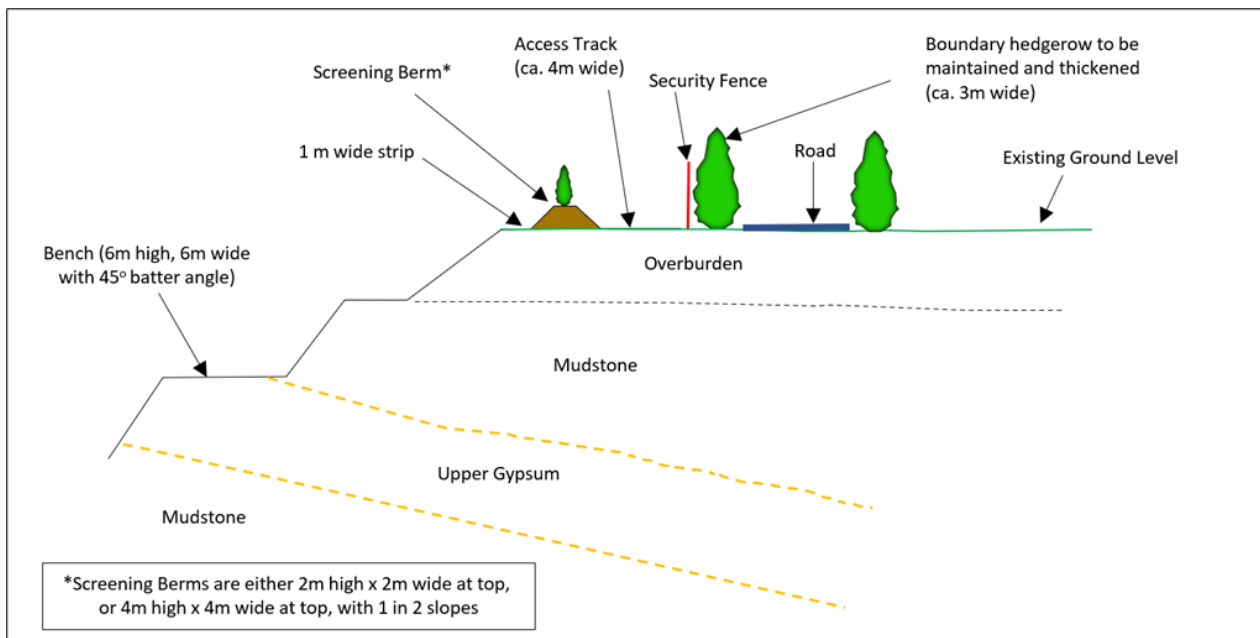


Figure 6.31: Schematic cross-section of generic boundary treatment for the Knocknacran West Mine site

- All existing roadside trees and vegetation will be retained along the three adjacent roads to the Knocknacran West Mine site, to further assist in screening the proposed Knocknacran West Mine site;

- The tree protection strategy (Appendix 6.4) will be implemented on site. The protection strategy provides data for the future construction/site manager on how trees need to be protected during development and to incorporate the protection strategy into work method statements during development. The erection of tree protection fencing during construction works is essential;
- An area of existing wooded, higher to the north of the proposed extraction area will be left in place and will screen any potential views of the future excavation area at Knocknacran West from the village of Drumgoosat;
- Removal of boundary hedgerows and trees outside the development footprint will be avoided where possible. Planting will be required to mitigate for tree removal and future restoration plans will be required to replace any trees and shrub species removed on a “like for like” basis (as a minimum);
- Consideration will be given towards hawthorn, blackthorn mix with individual alder and birch (to form native tree hedges) and deciduous trees (native tree species include oak, alder, birch). In the short-term, it is recommended that hedgerows are planted as part of buffer zones to maintain ecological connectivity;
- Upon construction, the proposed berms will be planted in a native woodland mix. As this mix will be planted with advanced nursery stock, the trees are likely to reach ca. 6 m height within a 4-5 year period, resulting in at least a 10 m-high ‘green’ screen surrounding the Knocknacran West Open-Cast Mine boundary;. This embedded mitigation measure is called the Miyawaki Method. The main principles of the Miyawaki Method are to plant species of trees that would naturally occur in the area at a high density. It is proposed to plant trees at 1.5 m centres, whilst a mixed arrangement of native shrubs are to be planted at 900 mm centres. Using a combination of the Miyawaki Method, and planting of advanced nursery stock (standard trees ca. 2 – 3 m planted height), it is considered that five years is sufficient time for the proposed woodland planting to reach a height of ca. 6 m;
- Fencing will be maintained at the Site to ensure that the risk of injury to the public and livestock is minimised;
- Re-handling of the topsoil will be kept to a minimum to preserve the integrity of the material;
- All plant on the Site be regularly maintained, and where plant is damaged or leaking, it will be fixed or replaced immediately, as part of ongoing operational management of the site;
- Refuelling of mobile plant will take place from bunded fuel tanks as required;
- Refuelling and the addition of hydraulic oils or lubricants to vehicles or generators will take place on-site only in designated areas; and
- Stockpiles will be evaluated and monitored and kept stable for safety and to minimise erosion.

6.7.2.2 Additional Mitigation: Construction Phase: Mine Development

Embedded design mitigation has already been outlined in Section 6.7.2.1, the following additional mitigation will be implemented onsite:

- Works will be undertaken in line with any conditions set by MCC;
- Earthworks will follow the embedded mitigation measures outlined in 7.5.2.1 above. All works will be undertaken in accordance with best practice and adhere to the following guidelines:
 - Inland Fisheries Ireland (2016). Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters;
 - CIRIA (2009). Control of Water Pollution from Construction Sites – Guidance for Consultants and Contactors (C532);
 - NRA Guidelines (2006). NRA Guidelines for the Crossing of Watercourses during the Construction of National Road Scheme; and
 - Defra (Department for Environment, Food and Rural Affairs) (2009). Construction Code of Practice for the Sustainable Use of Soils on Construction Sites.
- Any processing plant and / or mobile plant on the mine sites will be regularly maintained and kept in good working order; and
- In order to protect retained hedgerows and trees (including woodland habitat), such vegetation will be protected with secure fencing prior to the commencement of construction works on Site (in line Monaghan County Council's County Development Plan). This protection will be designed following NRA guidance (NRA, 2005), in particular with regard to root protection areas and fencing specifications (unless otherwise advised by a suitably qualified arboriculturist).

Additional Mitigation: Construction Phase: Mine Development: Birds

Any demolition of buildings with potential to support nesting birds will be undertaken outside of the bird nesting season (March to August inclusive). Consultation will occur with the Regulatory Authority regarding the provision of a barn owl derogation licence and a mitigation strategy will be delivered for this species and documented within the EMP. This will include the provision of alternative nesting habitat as appropriate.

If there is a necessity for vegetation clearance within the nesting season, a suitably qualified ecologist must carry out a series of nesting bird checks in advance of any works to ascertain breeding activity in affected areas.

Habitat compensation measures (as set out above) will serve to ensure the maintenance of foraging, shelter, and nesting opportunities within the site in the long-term. In the short-term, nest boxes will be provided on suitable retained trees at the periphery of the site, in order to ensure replacement nesting opportunities are immediately available.

Additional Mitigation: Construction Phase: Mine Development: Badger

Badgers are mobile animals, and as such badger activity can change rapidly at a site. Accordingly, it is recommended that pre-construction badger surveys are undertaken prior to site clearance works, in order to identify the extent of use by badgers at the time of the works.

The following mitigation measures will be put in place for the protection of badger setts:

Alternative habitat surrounds the extraction area, and these lands are in the ownership of the Applicant. Engagement is ongoing with the NPWS about the relocation of the onsite badger setts, and will continue for the timely and safe relocation of the animals to take place.

Other badger mitigation measures which will be put in place at the site during construction works are as follows:

- Pre-construction badger surveys will be undertaken prior to site clearance works, in order to identify the extent of use by badgers, or absence of use of the setts;
- Where excavation works are required onsite, mitigation measures will be put in place to prevent mammal ingress;
- Fencing will be put in place along the perimeter of the work areas; and
- If setts are found within the works area, the Ecological Clerk of Works (ECoW) will be contacted for advice and the ECoW will liaise with the NPWS and regulatory authority, where necessary.

Additional Mitigation: Construction Phase: Mine Development: Buildings

A derogation licence has been granted (DER/BAT 2023-40) in order to facilitate the demolition of building supporting bat roosts (and any other structure which may be recorded to support roosting bats). This licence includes a full mitigation strategy to minimise residual effects and ensure that the favourable conservation status of bats is maintained at the Site. The mitigation strategy includes the following provisions:

The proposed mitigation strategy will provide replacement bat roosting opportunities to fully off-set the loss of the bat roosts proposed. Specifically, the following will be provided:

- Building enhancement at retained structure (i.e., Shirley House);
- Provision of a bespoke roost in the north of the site; and
- Provision of bat boxes.

The Shirley House is currently unused. Roosting opportunities will be provided externally and internally to provide multiple roosting opportunities throughout the year for bats. The building will be solely retained for use by bats.

A bespoke roost will be provided at the location in the north of the site. This bespoke roost will be block-built and will be roofed with natural slates laid on traditional 1F bitumen roofing membrane. Appropriate access and egress points will be provided, and a variety of roosting opportunities will be provided externally and internally to provide roosting opportunities which will be of use to bats throughout the year. The building will measure a minimum of 4 m x 2.5 m and will be solely provided for use by bats.

The installation of bat and bird boxes at suitable locations within the study area will maximise the benefit of the study site to bats. As recommended in Kelleher et al. (2006), 'woodcrete' bat boxes will be used as they are durable and long-lasting and do not require maintenance. A mixture of bat box types should be used to cater for seasonal and species requirements. The following products (or similar) are suitable:

- Schwegler 1FS Colony Bat Box 95
- Schwegler 2F Universal Bat Box

- Schwegler 2FN Bat Box 55

A minimum of 15 bat boxes will be installed at appropriate locations. The boxes will be installed on trees which are in good health. The selection of bat box locations will be decided in consultation with an Ecologist and with cognisance of the following:

- Bat boxes should be installed at a minimum height of 4 m above ground level, and in locations which are inaccessible to unaided climbing (to minimise risk of vandalism).
- Two bat boxes should be installed on each of the three of the most suitable trees.
- Locations should be chosen which are not vulnerable to artificial light pollution.
- Boxes will be installed so that they have southern or westerly aspects and preferably in locations where they will receive some direct sunlight.

Foraging/Commuting

Suitable screening and planting will take place in proximity to the proposed roosts and connectively between the roosts and surrounding landscape will be maintained. Planting along the L4900 would provide a corridor to connect 'Building 4' (Shirley House) to the woodland area to the north that will be largely retained (south of Drumgoosat Village).

Sensitive Lighting

Lighting strategy within the site will aim to maintain any opportunities within the site for nocturnal and crepuscular species by using timers, cowls and hoods to maintain dark skies and avoid illuminating features such as bat roosts, woodland and hedgerow habitat.

Other opportunities to avoid impacts on nocturnal and crepuscular species will be explored e.g., by using timers, cowls and hoods to maintain dark skies and avoid illuminating sensitive ecological features, where relevant.

6.7.3 Mitigation and Management: Operational Phase: Community Sports Complex

- Works will be undertaken in line with any conditions set by MCC;
- Any plant will be regularly maintained and kept in good order on the proposed Community Sports Complex site; and
- Refuelling of mobile plant will take place from bunded fuel tanks.
- Proposed lighting is principally associated with floodlights on the junior and 3G pitch on the Community Sports Complex site. Planting of screening berms to the northeast and east will be undertaken and this will help to minimise lighting impacts. Planting will also be undertaken on the western side of the site to offer screening.

6.7.4 Mitigation and Management: Operational Phase: Mine Development

6.7.4.1 Embedded Mitigation: Operational Phase: Mine Development

This section describes the mitigation measures that are incorporated at the design stage. Additional mitigation measures not incorporated at the design stage are considered under Section 6.7.4.2.

The operational phase will carry through the embedded mitigation measures listed in Section 6.7.2.1 regarding screening provided by berms and perimeter hedgerows.

A number of measures which follow generic best practice are proposed to mitigate the impacts of the Proposed Development on the ecological environment at the Site which include:

- All Site construction will be undertaken in accordance with the CIRIA (2016) Environmental Good Practice on Site Guide (fourth edition);
- Lighting will be minimised during hours of darkness and will not illuminate peripheral mature trees and vegetation to ensure no adverse effects on bats and other nocturnal species;
- Site operations will be managed in accordance with relevant health and Safety legislation (Safety, Health & Welfare at Work Act (2005, as amended); and the Mines and Quarries Act (1965, as amended));
- Fencing will be maintained at the Site to ensure that the risk of injury to the public and livestock is minimised. The entrance gate is locked and controlled by the Site's management;
- The extraction of gypsum will take place using the mining industry standard method of cyclical drilling, blasting, loading, hauling and supporting;
- Existing groundwater wells will be continuously monitored on site during mining operations;
- Blasting will take place at the Site using licenced and experienced operators. Site management give advance notification of blast events to nearby residents as is standard procedure for the existing mine; and
- Stockpiles will be evaluated and monitored and kept stable for safety and to minimise erosion.

Mine Water Management Arrangement

Water will be pumped from a main sump located on the open-cast floor (4a) from where it will be transferred to the existing water management system located adjacent to the Knocknacran Processing Plant (refer to the Water Chapter (8.0) for more details on the water management plan for the Proposed Development).

The existing water management system consists of a series of 4 holding ponds (4b) to facilitate the settlement of suspended solids. The ponds have a capacity of ca. 14,000 m³ and store water prior to discharge from the site to the River Bursk. The ponds are constructed of earth embankments and are lined with mudstone.

A pumphouse (4c) containing pumps for the discharge of water to the River Bursk is located on the southern side of the ponds. The pumphouse is a concrete-block structure. Water is pumped from the lagoons, via the pumphouse, to the holding tanks (4d) prior to discharge using an automated valve to the River Bursk. The flow of water from the holding tanks to the River Bursk is monitored on a real time basis from the site administration building. Any discharge water will be strictly monitored and only discharged once in compliance with the extant EPA licence. Figure 6.32 presents the location of main infrastructure associated with the proposed mining of gypsum from Knocknacran West.

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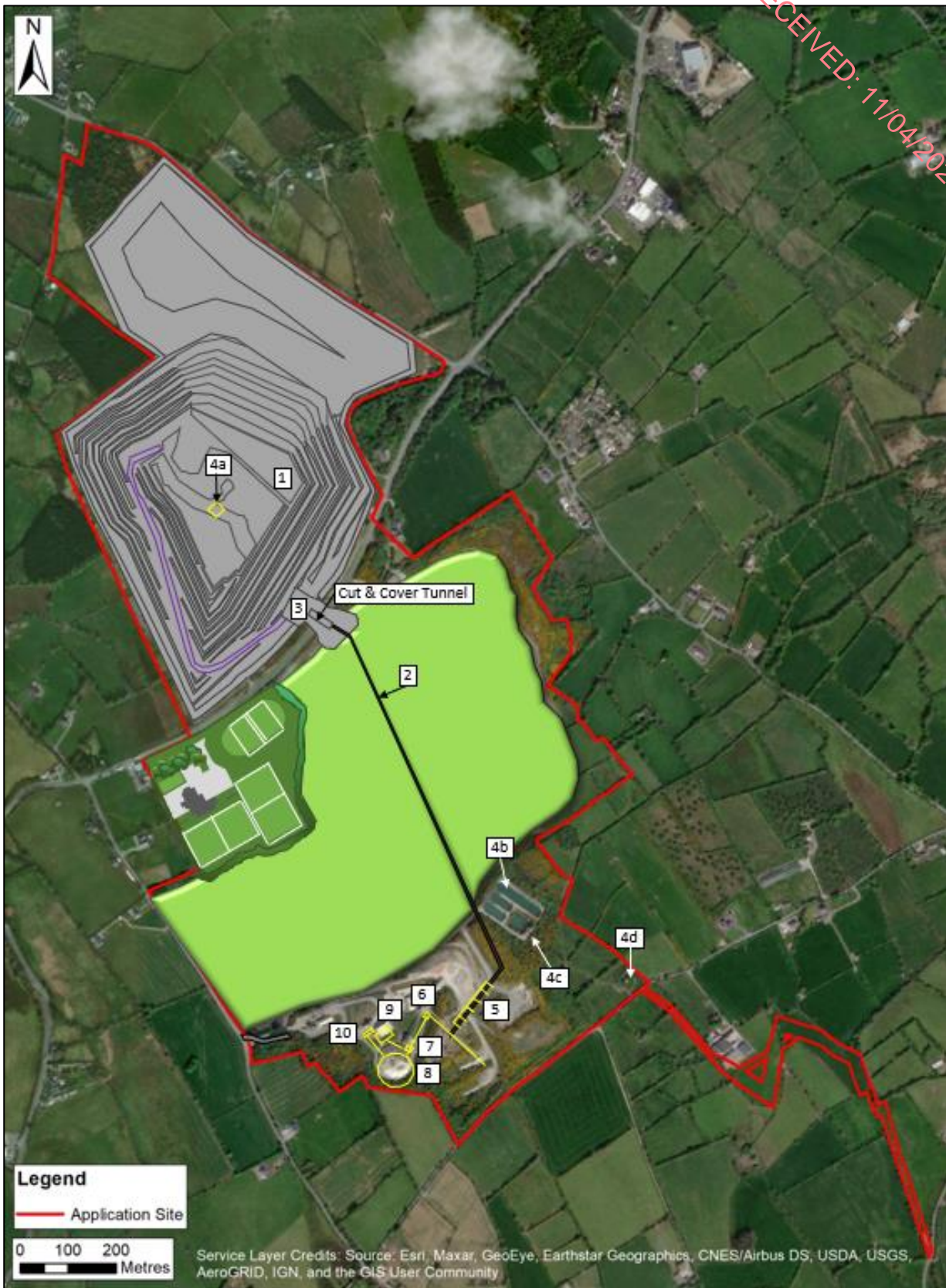


Figure 6.32: Plan showing Location of Main Infrastructure associated with the mining of Gypsum from Knocknacran West (refer to Section 3.5 for further detail on numbered infrastructure)

6.7.4.2 Additional Mitigation: Operational Phase: Mine Development

All details of mitigation will be integrated into an *Environmental Management Plan* (EMP). A copy of the draft EMP is included in Appendix 6.10, and is a live document which will be updated through operations. This will include, for example, Construction Method Statements, Pre-construction Works and use of Ecological Clerk of Works to oversee implementation of ecological requirements. A derogation licence has been granted (Ref. DER/DEF 2023-40) in order to facilitate the demolition of buildings supporting bat roost (during the construction phase). The licence includes a full mitigation strategy to minimise residual effects and ensure that the favourable conservation status of bats is maintained at the site and will continue to be implemented during the operational phase. Mitigation works committed as part of this licence will be delivered as described within this licence or future licence.

A provisional *Habitat Management Plan* (HMP), detailing relevant and necessary prescriptions for management of features, for which broad objectives are described in the following sections is provided in Appendix 6.7. This plan will evolve throughout the life of the development and is a live document.

In order to protect retained hedgerows and trees (including woodland habitat), such vegetation will be protected with secure fencing prior to the commencement of construction works on Site (in line Monaghan County Council's County Development Plan). This protection will be designed following NRA guidance (NRA, 2005), in particular with regard to root protection areas and fencing specifications (unless otherwise advised by a suitably qualified arboriculturist).

In addition, the following mitigation will also be applied:

- Works will be undertaken in line with any conditions set by the IE licence;
- The designed intercept drainage system(s) and settling pond/filter system, for each stripping campaign, will be installed prior to stripping of material. The design will be updated throughout the stripping campaigns as the works progress. The design will be agreed with the relevant authorities prior to stripping;
- The contractor will organize the earthworks operations, whether in excavation or in restoration, so that all water shed onto the earthworks, or which enters the earthworks from any source is rapidly led away into a specifically designed intercept drainage system(s) and settling pond / filter system prior to discharge into the underlying mine workings, where it will enter the existing mine water management and treatment system;
- As the earthworks progress, the contractor will construct, maintain and revise, as necessary, all temporary ditches, sumps, pump lines and pumping units required for the effective disposal of all such water flows;
- The contractor will not commence main earthworks operations or continue with a section of main earthworks operations until a plan and programme of ditches, sumps, pump lines and pumping units has been agreed with SGMI's project manager;
- Depending on the area(s) to be stripped and restored, the contractor will construct a temporary desilting settling pond / system at approximate location(s) to be agreed with SGMI's project manager prior to any stripping taking place;

- The contractor will construct surface water cut-off drains, ditches, swales and sumps, as required to ensure that the works are maintained free from standing water and to divert surface water and groundwater gathered to the drainage system via gravity and/or pumping. The cut-off drains will be a minimum of 600 mm deep and 400 mm wide at the base, and will have side slopes of no steeper than 1(V):2(H);
- The contractor's working surfaces in excavation and in filling will be sufficiently regular and will have such cross falls or longitudinal falls or both as are necessary to prevent standing water and to rapidly dispose of water run-off. The contractor's earthworks slopes, whether in cutting or in filling, will be trimmed to regular profile and compacted so as to prevent ponding water and to rapidly dispose of water run-off without scour;
- The contractor's temporary ditches and sumps will be located such that when backfilled they shall not have any adverse effects on the strengths or stability of the completed works. When temporary ditches and sumps are no longer required in a particular area of the site by reason of progress of the work, the contractor will promptly remove all temporary pump pipelines and pumping units. All softened deposits will be removed from the ditches and these areas backfilled with suitable material. Filling, compaction and field quality control will be as specified for the adjacent earthworks operations;
- The contractor's temporary sumps, pumping units and fuel or power supply will have adequate capacities for the pumping loads and will be maintained regularly to ensure efficient and reliable operation. The contractor will provide adequate supervision to ensure continuous operation whenever this is required to ensure rapid disposal of water run-off and will have adequate standby arrangements available to cope with pump or power failures;
- To avoid siltation of watercourses from crossing point locations, silt traps will be placed beside temporary crossing points with an associated buffer strip. The silt-traps will be maintained and cleaned regularly during the course of the works;
- A maintenance schedule and operational procedure will be established by the contractor for silt and pollution control measures during the construction period. This will be undertaken in consultation with the relevant statutory authorities;
- All soil / overburden stockpiles shall be covered (i.e. vegetated) to minimise the risk of rain / wind erosion;
- Restoration of topsoil and overburden will be carried out on a phased basis to reduce the vulnerability of the underlying aquifer to possible contamination;
- Continued operation and maintenance of the existing bunds and hydrocarbon interceptor will occur;
- Regular maintenance and emptying of the hydrocarbon interceptor as per manufacturer's recommendations will be implemented;
- All plant and machinery will continue to be regularly serviced before being used on site;
- Mobile plant will be refuelled on an existing dedicated concrete hardstanding apron (with associated interceptor) on the permitted adjacent mine site. Static plant or tracked excavators will

refuel over a drip tray with an absorbent mat. In addition, spill kits will be maintained on site to deal with all spills and leaks, and spill training will be provided to relevant staff members;

- All plant on the Site be regularly maintained, and where plant is damaged or leaking, it will be fixed or replaced immediately, as part of ongoing operational management of the site;
- Mobile bowsers, tanks and drums will be stored in secure, impermeable storage areas away from open water;
- Dust suppression will be achieved by bowsers operating on haul roads or by providing hardstanding surfaces on permanently trafficked areas;
- Fuel and oil containers will be stored within a secondary containment system, e.g. bunds for static tanks or a drip tray for mobile stores;
- Containers and bunding for storage of hydrocarbons and chemicals will have a holding capacity of 110% of the volume to be stored;
- Fuel and oil stores including tanks and drums will be regularly inspected for leaks and signs of damage;
- Drip-trays will be used for fixed or mobile plant such as pumps and generators in order to retain oil leaks and spills;
- Only designated trained operators will be authorised to refuel mobile plant on site;
- Procedures and contingency plans will be set up to deal with emergency accidents or spills; and,
- An emergency spill kit (including absorbers) will be available for use in the event of an accidental spill on the mine floor and key personnel trained in their use.

Additional Mitigation: Operational Phase: Mine Development: General Faunal Safeguards

In order to safeguard any fauna (such as badgers or small mammals) should they enter the site during works, a number of safeguarding measures will be implemented. These measures and specific roles and responsibilities of these tasks are described within the HMP such as:

- Any excavations that will remain overnight will include measures to ensure any mammals that may enter the excavation have a way to get out, such as graded banks, or a rough plank of wood to act as a 'crawl board';
- Should the works expose any pipework, for any larger pipes (supporting a diameter of approximately 15cm or larger), any exposed ends of piping will be covered, to prevent any mammals (such as badger) making opportunistic use of the piping;
- Any fuel or chemical storage within the site will take into consideration the risk of access and / or damage by mammals (such as foxes or badger); and
- Good working practices will be observed across the site, such as avoiding littering and maintaining a tidy construction area with materials stored on pallets.

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Additional Mitigation: Operational Phase: Mine Development: Badger

Badgers are mobile animals, and as such badger activity can change rapidly at a site. Accordingly, it is recommended that pre-construction badger surveys are undertaken prior to site clearance works, in order to identify the extent of use by badgers at the time of the works.

The following mitigation measures will be put in place for the protection of badger setts:

The proposed development area includes the entirety of the Site area. Within the overall Site blasting will only take place in the Knocknacran West open-cast mine during the extraction of gypsum.

In terms of the impacts of blasting on badgers (blasting associated with the Knocknacran West site lies further within the site interior than the redline development boundary), a 150 m stand-off/offset from the edge of the active gypsum faces (i.e., the blast line) for the protection of badgers is proposed.

Badger mitigation measures which will be put in place at the site during operational works are as follows:

- Fencing will be put in place along the perimeter of the works areas to prevent badger access to open-cast work areas;
- Badger surveys will be undertaken prior to ground clearance works (stripping campaigns which would require overburden removal); and
- If setts are found within the works area or in advance of stripping campaigns in new work areas, the Ecological Clerk of Works (ECoW) will be contacted for advice.

Additional Mitigation: Operational Phase: Mine Development: Trees

Where any trees with moderate or high bat roosting potential have been identified and will require felling, further survey work will likely be required in order to establish the presence or absence of roosting bats (i.e. aerial inspection or dusk/dawn survey work). Should a bat roost be identified within any trees subject to survey, a derogation licence will need to be sought in order to facilitate the felling of such trees.

Any trees recorded to have low bat roosting potential will be felled in a manner that reduces the risks of harming fauna in the process (soft felling). Soft-felling involves the whole of the tree and any large branches being cut down in sections, with each section being carefully lowered to the ground. Once felled, timber will be left in situ on the ground for a minimum of 24 hours before being chipped or removed in order for any resident fauna to disperse without harm.

Additional Mitigation: Operational Phase: Mine Development: Bats

The proposed mitigation strategy will provide replacement bat roosting opportunities to fully off-set the loss of the bat roosts proposed. Specifically, the following will be maintained during this phase:

- Building enhancement at retained structure (i.e., Shirley House);
- Provision of a bespoke roost in the north of the site; and
- Provision of bat boxes.

Additional Mitigation: Operational Phase: Mine Development: Foraging/Commuting

The hedgerows and trees (and to a lesser extent, the grassland fields) in the north of the Site are considered likely to be utilised by foraging/commuting bats in the local area, and the new open-pit mine and sports complex will result in the loss of these habitats.

In order to compensate for this loss, replacement habitats will be provided under the restoration plan for the mine, including provision of hedgerows, wildflower grassland, scrub, and a central lake. This planting will have regard to restoring connectivity across the Site and with the wider landscape. In the short-term, the restoration of the current mine (to the south of the R179) will include the provision of habitats similar to those which will be lost in the north of the Site, increasing the habitat available for foraging/commuting bats in the wider area.

Additional Mitigation: Operational Phase: Mine Development: Sensitive Lighting

Lighting is already in place on the Knocknacran Open-Cast Mine plant site, with exterior lights on several buildings. This lighting will be maintained for the proposed development. A programme is in place to replace existing lightbulbs with LED luminaire lights.

There will be a minimal need for lighting within the Knocknacran West Open-Cast Mine site as the open-cast area will not require fixed lighting to be installed due to the nature of extraction activities. Lighting will be present at the office and welfare facilities to the south; however, use will be very infrequent and confined to winter periods of darkness within the operating hours of 08:00 to 20:00. Mobile plant may also be required to use their lights within working areas in the open-cast area (during winter periods with shorter daylight hours).

Once the excavation has commenced, the habitat within the site will be an open-cast area, which will progressively deepen from ground level. Perimeter screening will be developed in the form of landscape screening berms which are 2 – 4 m high. Planting atop the berms will reach a height of ca. 6 m within 5 years. It is considered that there will be very little impact from lighting use on the Knocknacran West site to ecological receptors, due to the recessed nature of the works, perimeter screening offering protection offsite and infrequent and minimal light usage on the site.

Appendix 6.7 provides a proposed Habitat Management Plan (HMP) for the proposed development from construction, through operation to mine closure.

Additional Mitigation: Operational Phase: Mine Development: Birds

Any vegetation clearance will be undertaken outside of the bird nesting season (March to August inclusive). Consultation will occur with NPWS regarding the provision of a barn owl derogation licence and a mitigation strategy will be delivered for this species and documented within the HMP. This will include the provision of alternative nesting habitat.

If there is a necessity for vegetation clearance within the nesting season, a suitably qualified ecologist must carry out a series of nesting bird checks in advance of any works to ascertain breeding activity in affected areas.

Habitat compensation measures (as set out above) will serve to ensure the maintenance of foraging, shelter, and nesting opportunities within the site in the long-term. In the short-term, nest boxes will be

provided on suitable retained trees at the periphery of the site, in order to ensure replacement nesting opportunities are immediately available.

Additional Mitigation: Operational Phase: Mine Development: Invasive Species

Measures will be implemented throughout site works to safeguard against the spread of any invasive non-native species (such as cotoneaster, Japanese knotweed or rhododendron). Indeed, where possible such plants will be removed from the Site (and disposed of appropriately, following an appropriate method statement). Japanese knotweed is confirmed on Site and should be dealt with by an appropriately qualified contractor.

Additional Mitigation: Operational Phase: Mine Development: Enhancement

The restoration of the Site, following the decommissioning of the mine, offers vast opportunities for habitat enhancement over and above the existing situation. Such enhancement measures will be detailed in a formal restoration plan and will be drafted in line with the following principles regarding enhancement measures for habitats and for fauna.

Additional Mitigation: Operational Phase: Mine Development: Habitat

New habitat provision under the restoration plan will be provided in line with the plan presented in Figure 6.15 above.

Where possible, this will include habitats of elevated value, such as species-rich hedgerows and wildflower grassland. Planting will comprise native species of local provenance. Where this is not possible, plants will be selected for their fruit, berry, or nectar bearing qualities. All landscape planting within the site will be managed for the benefit of wildlife.

6.7.5 Mitigation and Management: Restoration/Closure Phase: Community Sports Complex

There is no proposed decommissioning of the Community Sports Complex and so this is not considered further.

6.7.6 Mitigation and Management: Restoration/Closure Phase: Mine Development

6.7.6.1 Embedded Design Mitigation: Restoration/Closure Phase: Mine Development

The existing Knocknacran Mine will be restored to grassland. This land will consist of regular-sized fields bordered by field boundaries consisting of native vegetation; in other words, compatible and consistent with the topography, land use, historical field boundary arrangements, field sizes and field boundaries of agricultural lands bordering the site within the central study area. Such a restoration will reduce any long-term or lasting visible presence of the open-cast mine on the landscape and will help facilitate the re-establishment pasture, and its accompanying ecological habitat. This land will be dressed with ca. 0.3 m of topsoil (originally stored in stockpiles from the Knocknacran West excavation) and re-seeded with an agricultural grade grass seed mixture.

In addition, following cessation of mining, the site of the Knocknacran West Mine will be partially restored, with a water body (lake) towards the centre of the site. In this incremental working process, the site (i.e., both the existing Knocknacran Mine and the proposed Knocknacran West Mine) will never be revealed in its entirety as a completely excavated open-cast void/pit with bare faces (benches). By the time that the

later stage sections of the site are excavated north of the R179 (i.e., Knocknacran West Mine), the existing Knocknacran Mine to the south of the R179 will have been restored. The majority of all extraction works, including vehicular movement, will take place in visually obscured areas towards the open-cast mine floor, and so will have reduced visual effects beyond the mine area.

Three distinct habitats will be created through the closure of the Knocknacran West Open-Cast Mine

- Open Water Habitat.
- Shoreline / Washland Habitat.
- Open Ground Habitat.

Each of these habitats are quite different from the other and will require different measures to establish and support diverse and sustainable ecosystems.

A consideration that is quite unique to this project compared to other habitat creation projects is that the size of the open water body will increase year on year as the area rewaters, and as such the rehabilitation plan to establish the new habitats needs to be able to be flexible with this changing environment.

The priority is to introduce only native species and this work will be carried out under the guidance of an ecologist and as part of a Biodiversity Action Plan. Each of the habitats is presented in the Chapter 13.0 Landscape.

Open Water Habitat

The open water habitat will be akin to a lake. The water quality will be of suitable quality to support a diverse range of species. It will not be necessary to introduce any species as indigenous species will migrate from nearby waterbodies and colonise the open water. The shoreline of the lake will be of a suitable depth to support benthic populations of macroinvertebrates. It is known that disconnected virgin freshwater bodies will over time develop a population of invertebrate life as species such as mayfly and stone fly etc can colonise these areas by flight. Species such as frogs can migrate to the waterbody and even fish eggs can be transported by vectors such as birds, so that fish populations can become established. There is no plan to introduce any vertebrate aquatic species such as fish and indeed protections may be installed at the outlet of the lake such as a gabion basket wall to ensure that fish life from the waterbody does not migrate into the receiving surface waterbody (Corduff Stream). Saint-Gobain will liaise with Inland Fisheries Ireland with respect to the open waterbody and associated habitat.

Q Rating tests will be conducted to monitor the establishment of macroinvertebrates within the waterbody and ecosystem, and this will also be a good measure of the biodiversity of the habitat.

Shoreline / Washland Habitat

A shoreline is a habitat that provides major opportunity for the development of diverse habitat. The washland is the land next to the shore that will become covered in water seasonally and during periods of heavy rainfall.

The shoreline will support benthic macro invertebrate populations, plants, and invertebrate populations including mammals and birds.

The shoreline is an important habitat and is capable of supporting a diverse population of flora and fauna. To maximise the potential of this area reprofiling of the open-cast at the projected elevation of the final shoreline will introduce inlets to maximise contact area between land and water, which will maximise the extent of this habitat.

Plant species will be introduced by transplanting from donor sites around the area, such that the species introduced will be indigenous. An amount of soil will be imported with the root system during the transfer of the donor species to enhance the growing media. A shallow cover of soil (from the stripping of the Site) will be introduced on the land that will become shoreline and then lakebed as the lake expands. The shoreline species will be introduced in the early years of rewatering as the initial shoreline is established and these species will push out naturally as the water rises and the shoreline expands.

No invertebrate or vertebrate species will be introduced, these species will colonize naturally once the habitat is established. Ecological surveys, including bird surveys will be conducted routinely to monitor the success of the habitat.

Open Ground Habitat

The open ground habitat will be planted with a selection of grasses, shrubs and plants to form a diverse habitat. It is proposed to seed areas of the Site with a range of seed mixes to increase the cover and to improve the habitat value. The grass mixes will be consistent with species in the surrounding lands. The first planting of pioneer grass species will occur following the final contouring of the open-cast mine slopes. Planting will be used to facilitate a long-term process of succession and colonization in order to create a diverse ecological habitat.

The open ground that will be above the elevation of the final water level will have a deeper cover of soil so that it can be planted with tree species such as birch and alder. These species tolerate harsh and exposed conditions and will create shelter for other tree species to be planted such as oak.

Hawthorn, hazel and dogwood will also be planted, and these woody plants will encourage bird species to establish in wooded areas and assist with the dispersal of seeds and the natural plantation of the Site. Tree and hedge plantations will be placed to create links with existing hedgerows creating corridors for fauna to move from area to area. They will also create habitat islands which will help in the dispersal of seed.

Habitat surveys will be completed to monitor the performance and success of the rehabilitation. In the early years pruning and general maintenance will be carried out to promote success but ultimately the habitat will be designed to be self-sustaining, with minimal input required from the landowner.

It is the intention of the Applicant to restore the site in line with an overall site Closure Restoration Aftercare Management Plan (CRAMP) to be agreed with the EPA and other relevant stakeholders. The CRAMP will be updated annually as part of the Applicant's commitments under the site's IE Licence (Reg. No. P0519-04).

A phased restoration plan will replace lost key habitats which will have been of importance to birds, bats and small mammals within the Site. The restoration plan is intended to fit within the planned phasing of works and the creation of habitat shall be an ongoing process during active working periods. Inherent design parameters also relate to the phased closure and restoration of the Site. Following cessation of mining at Knocknacran West Mine, all plant and infrastructure will be removed prior to restoration of the Site.

Excess stripped material stored in the northern pit area will be used to backfill and profile the southern part of the Knocknacran West Mine. Final profiling of the open-cast slopes will be completed to ensure that any in-situ gypsum is covered, and benches are made safe. This will allow the planting of native grasses, wildflowers, scrub and trees to be undertaken and biodiverse habitats to be developed (Figure 6.16 below). Features will include a lake (following cessation of mining pumps will be turned off and water levels allowed to rebound to natural levels (refer to Chapter 8.0 Water for more details), and areas of natural grassland/wildflowers and woodland.

Measures will be implemented throughout operation and restoration works to safeguard against the spread of any invasive non-native species (such as cotoneaster, Japanese knotweed or rhododendron). Indeed, where possible such plants will be removed from the Site (and disposed of appropriately, following an appropriate method statement). Japanese knotweed is confirmed on Site and will be dealt with by an appropriately qualified contractor.

Following cessation of mining the water-table in the Knocknacran West Mine will return to a level of between ca. 38 and 39 m OD (Malin) (depending on seasonal fluctuations), creating an open waterbody. Access to the haul ramp and upper benches will be made secure and the area where the haul ramp enters the water will be graded and planted with plants suitable to that environment, adding additional biodiversity to the Site as a whole.

The restoration plan for the Site will be updated annually as part of the Applicant's commitments under the Site's IE Licence (Reg. No. P0519-04). It is the intention of the Applicant to restore the site in line with an overall site Closure Restoration Aftercare Management Plan (CRAMP) to be agreed with the EPA. The final restoration (Figure 6.33) at Phase 7 includes the provision of aquatic habitat, woodland and hedgerow planting, plus grassland creation. Figure 6.33 also illustrates the retention of woodland within the Site boundary to the northwest of the Site.

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Figure 6.33: Final Restoration Plan for the Site and habitat management areas (HMAs)

6.7.6.2 Additional Mitigation: Restoration/Closure Phase: Mine Development

A provisional *Habitat Management Plan* (HMP), detailing relevant and necessary prescriptions for management of features, for which broad objectives is provided in Appendix 6.7. This plan will be implemented in conjunction with the requirements of the EPA Licence and CRAMP.

In order to protect retained hedgerows and trees (including woodland habitat), such vegetation will be protected with secure fencing prior to the commencement of decommissioning works on Site (in line Monaghan County Council's County Development Plan). This protection will be designed following NRA guidance (NRA, 2005 or equivalent guidance), in particular with regard to root protection areas and fencing specifications (unless otherwise advised by a suitably qualified arboriculturist).

Where possible, restoration will include habitats of elevated value, such as species-rich hedgerows and wildflower grassland. Planting will comprise native species of local provenance. Where this is not possible, plants will be selected for their fruit, berry, or nectar bearing qualities. All landscape planting within the site will be managed for the benefit of wildlife.

The restoration of the Site, following the decommissioning of the mine, offers vast opportunities for habitat enhancement over and above the existing situation, will be developed over time in the HMP as the development progresses.

Additional Mitigation: Restoration/Closure Phase: Mine Development: Fauna

In order to increase opportunities of roosting bats and nesting birds, a number of bat and bird boxes will be incorporated in the restoration of the Site, placed on trees of a suitable size. Also, four Pine Marten boxes will be erected on site as directed by a suitably qualified ecologist. More information on Pine Marten boxes is available through the Vincent Wildlife Trust (A new design for a pine marten den box (vwt.org.uk)

In addition, to increase opportunities for invertebrates within the site, invertebrate boxes and habitat piles will be provided under the restoration plan; these will be located in sheltered areas of new and retained vegetation, such as in association with hedgerows.

Following final restoration of the open-cast mine sites, which includes hedgerows, grassland and aquatic habitat, the proposed project will result in an increase in high-value foraging availability for the local badger population. In addition, improved ground stability and a reduced likelihood of crownhole development on the Knocknacran West site after final restoration, will offer better habitat development opportunities to the local badger population in the long-term. Further mitigation measures during this phase of the development are not proposed for badgers.

In addition, the following mitigation will be in place:

- Works will be undertaken in line with any conditions set by the IE licence;
- Stockpiles will be evaluated and monitored and kept stable for safety and to minimise erosion;
- Restoration of topsoil and overburden will be carried out on a phased basis to reduce the vulnerability of the underlying aquifer to possible contamination;
- Continued operation and maintenance of the existing bunds and hydrocarbon interceptor will occur;
- Regular maintenance and emptying of the hydrocarbon interceptor as per manufacturer's recommendations will be implemented;
- All plant and machinery will continue to be regularly serviced before being used on site;

- Mobile plant will be refuelled on an existing dedicated concrete hardstanding apron (with associated interceptor) on the permitted adjacent mine site. Static plant or tracked excavators will refuel over a drip tray with an absorbent mat. In addition, spill kits will be maintained on site to deal with all spills and leaks, and spill training will be provided to relevant staff members;
- Mobile bowzers, tanks and drums will be stored in secure, impermeable storage areas away from open water;
- Dust suppression will be achieved by bowzers operating on haul roads or by providing hardstanding surfaces on permanently trafficked areas;
- Fuel and oil containers will be stored within a secondary containment system, e.g. bunds for static tanks or a drip tray for mobile stores;
- Containers and bunding for storage of hydrocarbons and chemicals will have a holding capacity of 110% of the volume to be stored;
- Fuel and oil stores including tanks and drums will be regularly inspected for leaks and signs of damage;
- Drip-trays will be used for fixed or mobile plant such as pumps and generators in order to retain oil leaks and spills;
- Only designated trained operators will be authorised to refuel mobile plant on site;
- Procedures and contingency plans will be set up to deal with emergency accidents or spills;
- An emergency spill kit (including absorbers) will be available for use in the event of an accidental spill on the mine floor and key personnel trained in their use;
- The designed intercept drainage system(s) and settling pond/filter system, for each stripping campaign, will be installed prior to stripping of material. The design will be updated throughout the stripping campaigns as the works progress. The design will be agreed with the relevant authorities prior to stripping;
- The contractor will organize the earthworks operations, whether in excavation or in restoration, so that all water shed onto the earthworks, or which enters the earthworks from any source is rapidly led away into a specifically designed intercept drainage system(s) and settling pond / filter system prior to discharge into the underlying mine workings, where it will enter the existing mine water management and treatment system;
- As the earthworks progress, the contractor will construct, maintain and revise, as necessary, all temporary ditches, sumps, pump lines and pumping units required for the effective disposal of all such water flows;
- The contractor will not commence main earthworks operations or continue with a section of main earthworks operations until a plan and programme of ditches, sumps, pump lines and pumping units has been agreed with SGMI's project manager;

- Depending on the area(s) to be stripped and restored, the contractor will construct a temporary de-silting settling pond / system at approximate location(s) to be agreed with SGM's project manager prior to any stripping taking place;
- The contractor will construct surface water cut-off drains, ditches, swales and sumps, as required to ensure that the works are maintained free from standing water and to divert surface water and groundwater gathered to the drainage system via gravity and/or pumping. The cut-off drains will be a minimum of 600 mm deep and 400 mm wide at the base, and will have side slopes of no steeper than 1(V):2(H);
- The contractor's working surfaces in excavation and in filling will be sufficiently regular and will have such cross falls or longitudinal falls or both as are necessary to prevent standing water and to rapidly dispose of water run-off. The contractor's earthworks slopes, whether in cutting or in filling, will be trimmed to regular profile and compacted so as to prevent ponding water and to rapidly dispose of water run-off without scour;
- The contractor's temporary ditches and sumps will be located such that when backfilled they shall not have any adverse effects on the strengths or stability of the completed works. When temporary ditches and sumps are no longer required in a particular area of the site by reason of progress of the work, the contractor will promptly remove all temporary pump pipelines and pumping units. All softened deposits will be removed from the ditches and these areas backfilled with suitable material. Filling, compaction and field quality control will be as specified for the adjacent earthworks operations;
- The contractor's temporary sumps, pumping units and fuel or power supply will have adequate capacities for the pumping loads and will be maintained regularly to ensure efficient and reliable operation. The contractor will provide adequate supervision to ensure continuous operation whenever this is required to ensure rapid disposal of water run-off and will have adequate standby arrangements available to cope with pump or power failures;
- To avoid siltation of watercourses from crossing point locations, silt traps will be placed beside temporary crossing points with an associated buffer strip. The silt-traps will be maintained and cleaned regularly during the course of the works; and
- A maintenance schedule and operational procedure will be established by the contractor for silt and pollution control measures during the construction period. This will be undertaken in consultation with the relevant statutory authorities.

6.8 Monitoring

6.8.1 *Monitoring: Construction Phase: Community Sports Complex*

- The appointed Main Contractor will be required to produce a final Construction Management Plan (CMP), which will document appropriate procedures and responsible persons when working on and around utilities and services infrastructure within and around the site; and
- Any monitoring associated with authorisation or consents (e.g., construction discharges) will be incorporated into the Main Contractor's CMP and will be adhered to.

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6.8.2 *Monitoring: Construction Phase: Mine Development*

- Monitoring will be undertaken in line with any conditions set by MCC;
- The appointed Main Contractor will be required to produce a final CMP, which will document appropriate procedures and responsible persons when working on and around utilities and services infrastructure within and around the site; and
- Any monitoring associated with authorisation or consents (e.g., construction discharges) will be incorporated into the Main Contractor’s CMP and will be adhered to.

6.8.3 *Monitoring: Operational Phase: Community Sports Complex*

There is no proposed environmental monitoring of the Community Sports Complex and so this is not considered further.

6.8.4 *Monitoring: Operational Phase: Mine Development*

- Monitoring will be undertaken in line with any conditions set by the IE Licence; and
- SGMI will monitor adherence to the HMP.

6.8.5 *Monitoring: Restoration/Closure Phase: Community Sports Complex*

There is no proposed decommissioning of the Community Sports Complex and so this is not considered further here.

6.8.6 *Monitoring: Restoration/Closure Phase: Mine Development*

- Monitoring will include ecological metrics (including bird, mammal and aquatic surveys) for land and water.

Specific studies, reviews and reports may be required during the closure implementation process and in particular during the passive validation period. These reports will be prepared by persons with expertise in the aspects being reported.

There are a number of separate aspects that will require expert reports, and each will be completed by different experts (for example water reports will be very different to surface level reports). It is also anticipated that for certain aspects, experts’ reports will be required to be updated to describe the changes with time and ultimately, it is anticipated, demonstrate that steady state has been achieved. The scope of reports will vary throughout the restoration and aftercare periods.

The proposed CRAMP proposes that Aftercare monitoring and reporting will take place on a yearly basis, or as otherwise agreed with the EPA.

- Appendix 3.3 sets out details of the closure and aftercare vision for the Application Site, which will be developed in line with Saint-Gobain’s Stakeholder Management Plan and the CRAMP will evolve through the life of the mine, taking community and statutory interests into account; and
- SGMI will monitor adherence to the HMP through closure.

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6.9 Residual Effects

6.9.1 Community Sports Complex

Residual effects are those that remain once the development proposals have been implemented i.e. with the mitigation and/or compensation measures in place. The main aim of ecological mitigation and compensation is to ensure that processes are in place to avoid or reduce any negative effects of the development.

Once the identified mitigation measures, appropriate design standards and operational infrastructure management plans are adhered to, it is considered that any effects surrounding the Community Sports Complex will be **Not Significant**.

6.9.2 Mine Development

Residual effects are those that remain once the development proposals have been implemented i.e. with the mitigation and/or compensation measures in place. The main aim of ecological mitigation and compensation is to ensure that processes are in place to avoid or reduce any negative effects of the development.

In the absence of the mitigation and compensation measures detailed, the development has the potential to cause Moderate to Minor effects to features of site and local value. However, consideration of the measures outlined above has resulted in residual effects being considered to be **Minor to Not Significant** in the long-term.

6.10 Cumulative Effects

6.10.1 The Project – Community Sports Complex and Mine Development

The construction phases of the Community Sports Complex and the Mine Development occur simultaneously, however, no significant effects are identified for either and it is considered that there are no cumulative effects on biodiversity between the two developments.

The construction phase of the Community Sports Complex overlaps with the first year of the operational life of the Mine Development, however, no significant effects are identified for either and it is considered that there is no potential for cumulative effects on biodiversity between the two developments.

The operational phase of the Community Sports Complex and mine development overlap, however, no significant effects are identified for either and it is considered that there is no potential for cumulative effects on biodiversity between the two developments.

The restoration phase of the mine development overlaps with the operational phase of the Community Sports Complex, however, no significant effects are identified for either and it is considered that there is no potential for cumulative effects on biodiversity between the two developments.

6.10.2 The Project and Other Offsite Projects

Drummond Mine and the proposed Mine Development occur within the same gypsum deposit and the Drummond Mine currently uses the processing site at Knocknacran. However, Drummond is currently

permitted to 2032 and should close during the first half of the operational life of the Mine Development. Bat survey work in the existing Drummond Mine has identified bats enter the workings during the night for foraging, however, this will not have a significant cumulative effect with the Project. Drummond Mine is an underground mine and it is considered that other potential cumulative effects with the Project are unlikely as there is no surface habitat overlap.

Other extractive industries near to the Application Site include four operational quarries within a radius of 5 km of the proposed development. These are; (i) Cormey Clay Pit, Breedon Brick Ltd.'s open-cast clay quarry, located ca. 1.5 km south of the Site. (ii) an associated site located ca. 4 km south of the Site, (iii) Limestone Industries Ltd limestone quarry, located ca. 2 km west of the Site, and (iv) Roadstone Barley Hill open-cast quarry located ca. 4 km southeast of the Site. As these facilities are not within the immediate vicinity of the Site (ca. 1 km), there will be no cumulative effect on the biodiversity that could be attributed to the interaction of several extractive industries in close proximity to each other.

Losset ADN Materials Ltd. have a planning application under consideration (Reg. Ref. 22/254) and are located ca. 1 km to the north of the Project site. Based on a review of the current planning file data (to date 27th March 2023), there will be no cumulative effect on biodiversity due to this development.

Other existing developments in the area include a mushroom farm, chicken farm, school and industrial/commercial facilities (e.g. car dealership). There will be no cumulative effect between the Project and these developments.

The cumulative effects are deemed **Not Significant** between the Project and other offsite Projects.

6.11 'Do-Nothing' Scenario

The 'Do-Nothing' scenario would mean that a large portion of lands on the Knocknacran West site would remain vacant due to concerns about ground stability. Opportunities to create areas of biodiversity interest associated with rehabilitation proposals following mining activities would be lost. The Knocknacran open-cast would be instead restored to grassland and a waterbody and the plant site would be retained for future light industrial usage.

6.12 Difficulties Encountered

No other particular difficulties were encountered in the preparation of this chapter of the EIAR.

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APPENDIX 6.1

Knocknacran West Project Habitat Survey August 2021

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METHODOLOGY

ASSESSMENT GUIDANCE METHODOLOGY

The assessment had regard to the following guidelines:

- EPA (2002) *Guidelines on the information to be contained in Environmental Impact Statements*, Environmental Protection Agency;
- EPA (2003), *Advice Notes on current practice in the preparation of Environmental Impact Statements*, Environmental Protection Agency;
- NRA (2009) *Guidelines for the Assessment of Ecological Impacts of National Road Schemes Rev. 2*, National Roads Authority;
- NRA (2008) *Ecological Surveying Techniques for Protected Flora and Fauna During the Planning of National Road Schemes*, National Roads Authority;
- (NRA, 2008c) *Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads*, National Roads Authority;
- CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, Version 1.1*. Chartered Institute of Ecology and Environmental Management, Winchester; and
- EPA (2017) *Guidelines on the information to be contained in Environmental Impact Assessment Reports*, Environmental Protection Agency.

The assessment was carried out in two stages, firstly through a desktop study and secondly by field survey work in order to identify, describe and map areas of know or potential ecological value.

Eamonn Delaney of Delichon Ecology is a Full and Chartered member of Chartered Institute of Ecology and Environmental Management (CIEEM). Eamonn has 13 years' experience in ecological consultancy and routinely undertakes a range of field surveys including bird surveys (vantage point and walked transect surveys) habitat surveys, botanical surveys and invasive species surveys. Recent and ongoing project involvement include assessments for planning applications culminating in Environmental Impact Assessments (EIA), Ecological Impact Assessments (EclIA) & Appropriate Assessments (AA) for windfarms, greenways, flood relief schemes, pedestrian and cycle routes, road schemes and water infrastructure projects.

DESK STUDY

Sources of information that were used to inform the assessment were:

- Environmental Protection Agency (EPA) EnVision Mapping gis.epa.ie/EPAMaps;
- EPA Catchments Website – for the 2nd cycle River Basin Management Planning www.catchments.ie;
- Geological Survey of Ireland online mapping www.gsi.ie;
- Information on the conservation status of birds in Ireland (Colhoun & Cummins, 2013);
- NPWS online maps and data, site synopsis and conservation objectives www.npws.ie
- National Biodiversity Data Centre (NBDC) online maps and data www.biodiversityireland.ie;
- OSI Map Viewer www.osi.ie;
- Botanical Society of Britain and Ireland online maps and data <https://bsbi.org/maps>;
- Any other relevant ecological reports and literature (published scientific literature and 'grey' literature).

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ZONE OF INFLUENCE

Following the guidance set out by the NRA (2009), the proposed development has been evaluated based on an identified zone of influence (Zoi) with regard to the potential impact pathways to ecological features (habitats, flora and fauna).

The Zoi for terrestrial habitats is limited to the footprint of the proposed development, with groundwater movement and levels considered in relation to groundwater dependent terrestrial habitats outside of the footprint of the development.

Hydrological linkages between a proposed development and aquatic habitats/species can occur over significant distances; however the significance of the impact will be site specific depending on the receiving water environment and nature of the potential impact. Adopting a precautionary approach, the distance over which surface water discharges could have a significant impact on receiving watercourses is considered to extend downstream of the Knocknacran site.

FIELD SURVEY

The principal aim of the field survey was to identify and map habitats and their component plant species within the Knocknacran Site and lands located to the north. A field walkover survey was completed within these lands on August 12th 2021.

A habitat assessment was carried out in accordance with current guidelines (Smith *et al.* 2011). This involved a walkover of the study site, where the habitats present were classified according to Fossitt (2000) and recorded on a field map. A botanical survey was conducted in-parallel with the habitats survey, where botanical species were identified and recorded according to dominant habitat type. Any other records of interest (e.g. invasive plant species) were also marked on field maps and locations were recorded using GPS handheld units.

The conservation status of habitats and flora was also considered. The conservation status of habitats and flora within Ireland and Europe is indicated by inclusion in one or more of the following: Irish Red Data Book for Vascular Plants (Wyse Jackson *et al.*, 2016); Flora Protection Order (1999 as amended 2015); the EU Habitats Directive (92/43/EEC).

Evaluation

All ecological receptors within the project's zone of influence were assessed according to criteria for site evaluation outlined in the NRA *Guidelines for Ecological Impact Assessment of National Road Projects* (NRA, 2009). The geographic frame of reference used to determine the ecological value of receptors as they occurred within the project zone of influence are presented in

Table 1 - Ecological Site Assessment Scheme

Ratings for Ecological Sites
International Importance: 'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation. Proposed Special Protection Area (pSPA). Site that fulfils the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended).

Ratings for Ecological Sites

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.

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Ratings for Ecological Sites

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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.

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):

Ratings for Ecological Sites

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.

In summary, the habitats found are evaluated based on their naturalness, value and vulnerability, as well as their inclusion within the European site network. Habitats that are considered to be good examples of Annex I and Annex I Priority habitats are classed as being of International or National Importance. Semi-natural habitats with high biodiversity in a county context and that are vulnerable, are considered to be of County Importance. Habitats that are semi-natural, or locally important for wildlife, are considered to be of Local Importance (higher value) and sites containing small areas of semi-natural habitat or maintain connectivity between habitats are considered to be of Local Importance (lower value).

HABITATS & FLORA

A description of the habitats identified within the study area are presented below. Habitat maps (See **Error! Reference source not found.** to **Figure 2**) have been prepared to illustrate and classify habitats identified within the footprint of the proposed development and its immediate environs. This includes the Knocknacran mine and quarry site as well as proposed extension lands located to the north of the R179 regional road. The footprint of the mine site includes extensive areas of active mines and quarries (ED4) in addition to buildings and artificial surfaces (BL3), recolonising bare ground (ED3), artificial lakes ponds (FL8), recolonising bare ground (ED3), scrub (WS1) and young mixed broadleaved woodland plantations established as screen planting (WD1).

The lands to the north of the R179 support extensive areas of unmanaged pastoral lands, in addition to areas of reinstated lands that are currently or have recolonised (ED3) to dry semi-natural grassland (GS2). These pastoral lands are fringed throughout by unmanaged hedgerows (WL1) and some treelines (WL2). The northernmost section of the site and proposed extension lands support extensive scrub (WS1) and wet willow-alder-ash woodland (WN6).

Improved Agricultural Grassland (GA1)

Improved agricultural grassland occurs at the south-eastern margins of the Knocknacran site boundary and not within or immediate adjacent to the mine and quarry areas. These lands support beef farming and are highly improved and consequently support abundant perennial rye grass (*Lolium perenne*) and accompanying agricultural herbs including creeping buttercup (*Ranunculus repens*), mouse-ear chickweed (*Cerastium fontanum*) and broadleaved dock (*Rumex obtusifolius*).

These lands are fringed by unmanaged hedgerow habitats comprising young ash (*Fraxinus excelsior*) trees and hawthorn (*Crataegus monogyna*) shrubs.

Evaluation: Local Importance – Lower Value

Amenity Grassland (GA2)

Small areas of amenity grassland are located around the services buildings, offices and car parking areas associated with the Knocknacran quarry and mine Facility. Some of these areas have been unmanaged in recent years and are classified under the dry meadows and grassy verge grassland habitat category. Those areas that have undergone recent maintenance support recently mown grass swards and support perennial rye grass, red fescue (*Festuca rubra*) dandelion (*Taraxacum officinale* agg.), white clover (*Trifolium repens*) and localised abundances of the moss *Rhytidiadelphus squarrosus*.

Evaluation: Negligible

Dry meadows and grassy verge grassland (GS2)

Within the quarry and active mine site, this habitat is present locally along the margins of access roads and tracks and on areas of unmanaged amenity grassland. Plant species composition includes cock's-foot (*Dactylis glomerata*), creeping bent (*Agrostis stolonifera*), Yorkshire fog, ragwort (*Senecio jacobaea*), nettle and bush vetch (*Vicia sepium*).

Dry meadows and grassy verge grassland (GS2) is more extensive in its distribution to the north of the R179, where it has established due to the recent lack of management of pastoral lands. Plant species composition typically comprises Yorkshire fog (*Holcus lanatus*), false oat grass (*Arrhenatherum elatius*), common couch grass (*Elytrigia repens*), common rush (*Juncus effusus*), creeping bent (*Agrostis stolonifera*), common bent (*Agrostis capillaris*), broadleaved dock, ribwort plantain (*Plantago lanceolata*) and sweet vernal grass (*Anthoxanthum odoratum*).

The lands that once supported Magheraclone GAA pitch have been reinstated and reseeded to form a pastoral grassland. However, this area hasn't been managed through grazing or mowing in recent years and has therefore transitioned to a dry meadow type grassland habitat, exhibited by an

establishing sward comprising, tall and overgrown grasses. Plant species composition includes abundant perennial rye grass (*Lolium perenne*), creeping bent, creeping buttercup (*Ranunculus repens*), white clover (*Trifolium repens*), greater bird's foot trefoil (*Lotus pedunculatus*), broad-leaved dock, red clover (*Trifolium pratense*) and Yorkshire fog.

This habitat also occurs in mosaic with areas of recolonising bare ground, near the eastern boundary of the site, north of the R179. This area has been recently reclaimed and reinstated and has been left unmanaged in recent years. As a result, a mosaic of recolonising bare ground and dry meadows and grassy verge grassland habitats has established. Plant species composition includes creeping bent, common bent, Yorkshire fog, false oat grass, greater bird's foot trefoil, marsh thistle (*Cirsium palustre*), sweet vernal grass, ribwort plantain, compact rush (*Juncus conglomeratus*), common rush, red bartsia (*Odontites vernus*), common knapweed (*Centaurea nigra*), meadow vetchling (*Lathyrus pratensis*), creeping cinquefoil (*Potentilla reptans*) and lesser stitchwort (*Stellaria graminea*).

Evaluation: Local Importance – Lower Value

Wet grassland (GS4)

Wet grassland occurs throughout much of the study area, north of the R179 where it occurs near the centre and south west. Like most of the pastoral lands located to the north R179, these wet grassland habitats have been unmanaged in recent years resulting in the development of dense rushy swards, most of which are dominated by common rush. In addition to common rush other species occur locally and include Yorkshire fog, greater bird's-foot trefoil, sweet vernal grass, creeping bent, marsh thistle, meadowsweet (*Filipendula ulmaria*), marsh willowherb (*Epilobium palustre*), angelica (*Angelica sylvestris*), silverweed (*Potentilla anserina*), jointed rush (*Juncus articulatus*), compact rush and meadow vetchling.

Wet grassland also occurs in mosaic with scrub, where the lack of recent management has resulted in the colonisation and spread of scrub species including bramble (*Rubus fruticosus* agg.), grey willow (*Salix cinerea* subsp. *oleifolia*) and gorse (*Ulex europaeus*).

Evaluation: Local Importance – Lower Value

Spoil and bare ground (ED2)

This habitat is located within the quarry and mine facility, occurring in mosaic with recolonising bare ground or along the immediate margins of the quarry and mine site's access tracks. During the site visit, this habitat occurred within the footprint of the proposed Magheraclone GAA grounds, which were under construction. Plant species assemblage is sparse and includes localised and individual occurrences of those species identified for the recolonising bare ground habitat described below.

Evaluation: Local Importance – Lower Value

Recolonising Bare Ground (ED3)

This habitat occurs as large, relatively extensive areas within the Knocknacran Quarry and mine site as well as occurring in mosaic with (or in transition from) areas of spoil and bare ground. To the north of the R179, this habitat occurs in mosaic with dry meadows and grassy verge grassland, where it has established and transitioned from recently regraded and reinstated lands. It represents one of the more species rich areas within the study including a range of ephemeral, wetland, and dry grassland plant species.

Within the quarry site, areas of recolonising bare ground occur along access tracks margins and within the sections of the quarry footprint that are starting to recolonise with ruderal plant species. Areas of recolonising bare ground and nascent scrub also occur on sloping quarry faces and margins near the north and north-west, that have not been worked in the recent past. Plant species composition includes colt's-foot (*Tussilago farfara*), Yorkshire fog, broad leaved willowherb (*Epilobium montanum*), yarrow (*Achillea millefolium*), wild carrot (*Daucus carota*), greater bird's foot trefoil,

lesser trefoil (*Trifolium dubium*), ribwort plantain, cock's-foot, mayweed (*Matricaria chamomilla*), common bent, cat's ear (*Hypochaeris radicata*), sweet vernal grass, field horsetail (*Equisetum arvense*), ox-eye daisy (*Leucanthemum vulgare*), rosebay willowherb (*Chamerion angustifolium*), weld (*Reseda luteola*), creeping thistle (*Cirsium arvense*), black medick (*Medicago lupulina*), black knapweed (*Centaurea nigra*), common centaury (*Centaurium erythraea*), silverweed (*Potentilla anserina*), prickly sow thistle (*Sonchus asper*) and redshank (*Persicaria maculosa*).

Evaluation: Local Importance – Lower Value

Other artificial lakes and ponds (FL8)

This habitat relates to the network of attenuation pond cells located near the south-eastern corner of the Knocknacran quarry and mine site. These ponds are active and continually receive turbid water from the mine and quarry works. As a result instream aquatic macrophytes are not abundant. However the margins of these habitats support emergent aquatic macrophytes including bulrush (*Typha latifolia*), greater willowherb (*Epilobium hirsutum*), rosebay willowherb, wild carrot and angelica. These ponds also support wetland waterbirds including Coot and Mallard. Another area of standing water occurs near the northern boundary of the quarry void and includes bulrush. A disused attenuation pond also occurs near the southern boundary of the mine and quarry site and supports emergent bulrush and fringing grey willow and gorse.

Evaluation: Local Importance – Lower Value

Reed and Large Sedge swamp (FS1)

This habitat occurs in mosaic with the extensive attenuation ponds located near the south-eastern corner of the Knocknacran quarry and mine site. Species composition includes bulrush (*Typha latifolia*) with accompanying aquatic emergent macrophytes as listed above.

Evaluation: Local Importance – Lower Value

Mixed Broadleaved Woodland (WD1)

The boundaries of the Knocknacran quarry and mine facility support young mixed broadleaved woodland blocks that have been established for screening and landscaping purposes. This includes young ash plantations at the south-eastern and north-eastern boundary of the mine facility. Other areas of mixed broadleaved woodland are located to the south-west of the mine offices and weighbridge and located to the east of the local access road serving the western boundary of the mine and quarry site. These are young woodland habitats with undeveloped shrub and ground layers. Plant species composition includes ash (*Fraxinus excelsior*), cherry (*Prunus* sp.), pubescent birch (*Betula pubescens*), sycamore (*Acer pseudoplatanus*) and hybrid poplar (*Populus* sp.).

Mixed broadleaved woodland also occurs in mosaic with scrub on those lands located to the north of the R179. One area occurs immediately south of a ruined farmhouse and outbuildings and has formed from an overgrown garden and converging hedgerows and treelines and comprises semi-mature ash and Lawson cypress (*Chamaecyparis lawsoniana*) trees and underlying elder (*Sambucus nigra*), hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*), grey willow, plum (*Prunus* sp.) and apple (*Malus* sp.) trees. Another area of mixed broadleaved woodland in mosaic with scrub, occurs near the north-eastern boundary of the site, north of the R179. These habitats have colonised the footprint of an old quarry site and now support pubescent birch, grey willow, sycamore and ash overtopping more extensive gorse (*Ulex europaeus*) scrub.

Evaluation: Local Importance – Lower Value

Wet willow-alder-ash woodland (WN6)

A small copse of wet-willow-alder-ash woodland has developed at the northernmost location of the study area. This is a recently developed woodland habitat comprising young ash and grey willow, with gorse and bramble in the understorey.

Evaluation: Local Importance – Higher Value

Oak-ash-hazel woodland (WN2)

A small area of developing semi-natural woodland comprising pedunculate oak (*Quercus robur*) and ash is located near the eastern boundary of the study area, north of the R179. This woodland supports pedunculate oak, ash and occasional pubescent birch in the canopy. The shrub and ground layers are poorly developed, with localised holly (*Ilex aquifolium*), regenerating ash, ivy (*Hedera hibernica*) and bramble.

Evaluation: Local Importance – Higher Value

Scrub (WS1)

Localised pockets of scrub occur throughout the study area and include gorse, grey willow and bramble. These habitats occur singularly or in mosaic with other habitats such as wet grassland, dry meadows and grassy verge grassland and mixed broadleaved woodland.

Areas of dense gorse scrub with some grey willow has established within the mine and quarry site, its immediate environs and site boundary. Dense gorse, willow and broom (*Cytisus scoparius*) scrub occur on the fringes of the silt ponds located near the south-eastern boundary of the site, while the southern, western and north-eastern fringes of the quarry void support gorse dominated scrub.

The lands located to the north of the R179 support localised areas of gorse and grey willow scrub, in addition to areas of scrub occurring in mosaic with mixed broadleaved woodland.

Evaluation: Local Importance – Lower Value

Drainage ditches (FW4)

Poorly defined, narrow and sinuous drainage channels are located toward the centre and north-east of the Knocknacran site, north of the R179. These drainage channels supported shallow water and little to no waterflow. These drainage channels are contributory watercourses of the Glyde_030 river (IE_NB_06G020400).

Evaluation: Local Importance – Higher Value

Hedgerows (WL1)

Hedgerows occur along the boundaries of the unused pastoral fields located north of the R179. Like the pastoral field networks, these hedgerows have been unmanaged over the short to medium term. Hawthorn is the most common and dominant shrub species within these linear woodland habitats. Other regularly occurring species include elder, blackthorn (*Prunus spinosa*), grey willow, gorse, wych elm (*Ulmus glabra*) and young ash trees. Nearer the ruined and abandoned farmhouses and outbuildings, species such as apple, plum, cherry and elm occur.

Evaluation: Local Importance – Higher Value

Treelines (WL2)

Similar to hedgerows, treeline habitats typically occur to the north of the R179 along the boundaries of abandoned farm buildings, on the margins of the old Magheraclone GAA field and where overgrown hedgerows have formed into treeline habitats. Treelines around the old Magheraclone GAA field include tall hybrid poplar trees. Hybrid poplar trees also fringe the north-eastern boundary of the study area, north of the R179. Where treelines border the pastoral lands north of the R179, they mostly comprise semi-mature ash trees occurring with or overtopping hawthorn and blackthorn trees.

Evaluation: Local Importance – Higher Value

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Photos of habitats at the Knocknacran Site

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Rank, rush dominated wet grassland (GS4) located north of the R179

Rehabilitated lands on Magheracloone GAA ground, supporting rank, unmanaged grassland



Internal access tracks at the quarry site

Silt pond (FL8) located near the south-eastern boundary of the mine site



Knocknacran Quarry void (ED4) with recolonising bare ground (ED3)

Knocknacran Quarry void (ED4), with localised ponding water (FL8) and revegetating / recolonising ground (ED3)



Mine entrance, near the southern boundary of the Knocknacran site

Abandoned farm house and outbuilding (BL3) north of the R179



Japanese knotweed fringing an abandoned farmhouse and outbuilding, north of the R179

Dry meadows and grassy verge grassland (GS2) on regraded lands, north of the R179



Mixed broadleaved woodland (WD1) copse immediately north of the R179

Dry meadows and grassy verge grassland (GS2) near the northern boundary of the site



Abandoned farm dwelling (BL3) near the northern boundary of the site

Rank wet grassland (GS4) and dry meadows and grassy verge grassland (GS2) mosaic

Invasive Alien Plant Species

Invasive alien plant species were identified at one location within the study area. An abandoned farm house, buildings and adjoining overgrown garden supports a stand of Japanese knotweed (*Reynoutria japonica*). The stand is made up of 4 individual plants measuring up to 4 metres in height and 5 metres in length. Grid co-ordinates for this stand of Japanese knotweed are: 0680601 0799957¹.

¹ Grid co-ordinates in Irish Transverse Mercator (ITM)

Habitat Maps of the Knocknacran Mine Facility and proposed extension lands to the north of the R179

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Figure 1 – Habitats within the northern half of the Knocknacran Site, north of the R179

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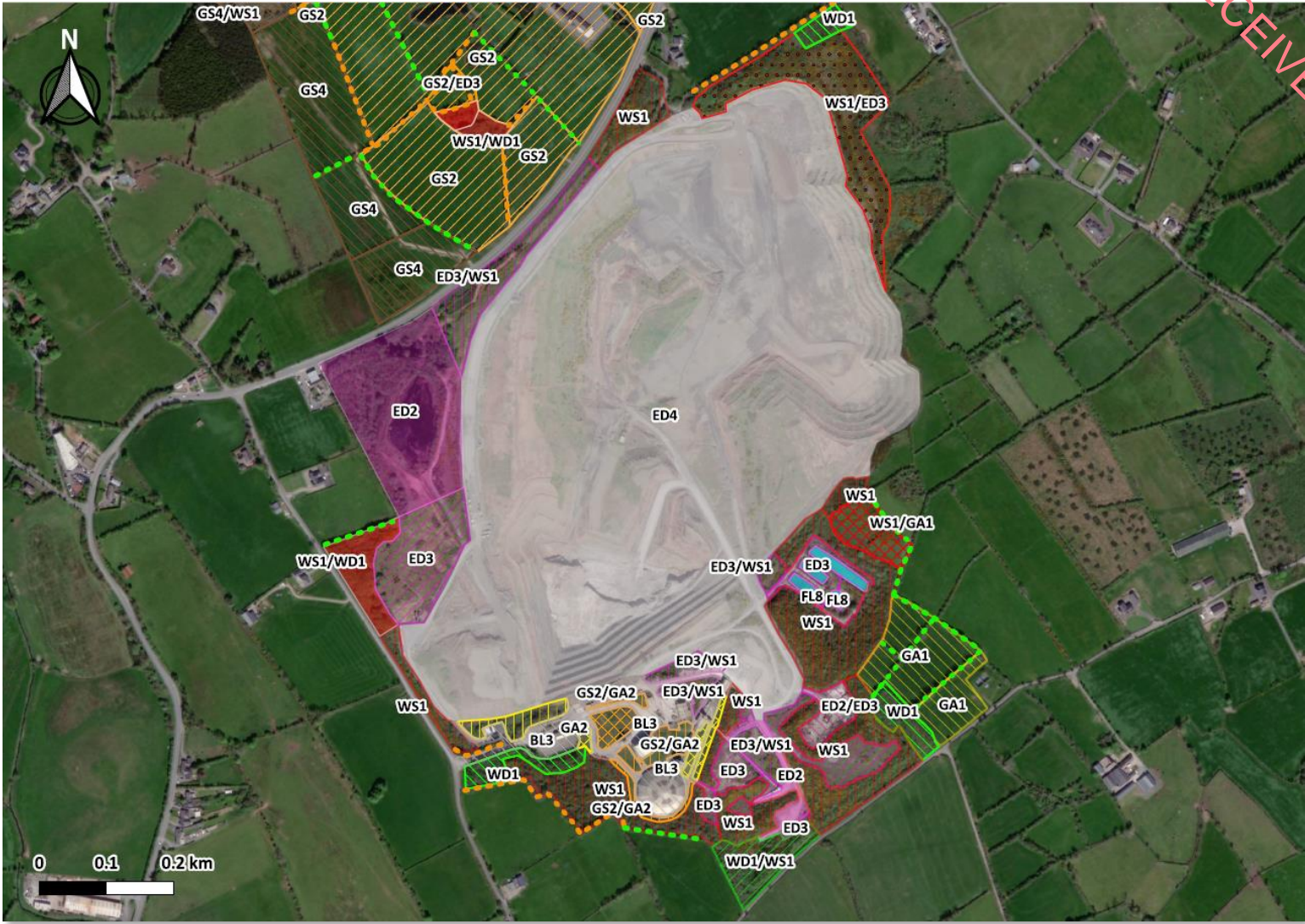


Figure 2 – Habitats within the southern half of the Knocknacran Site

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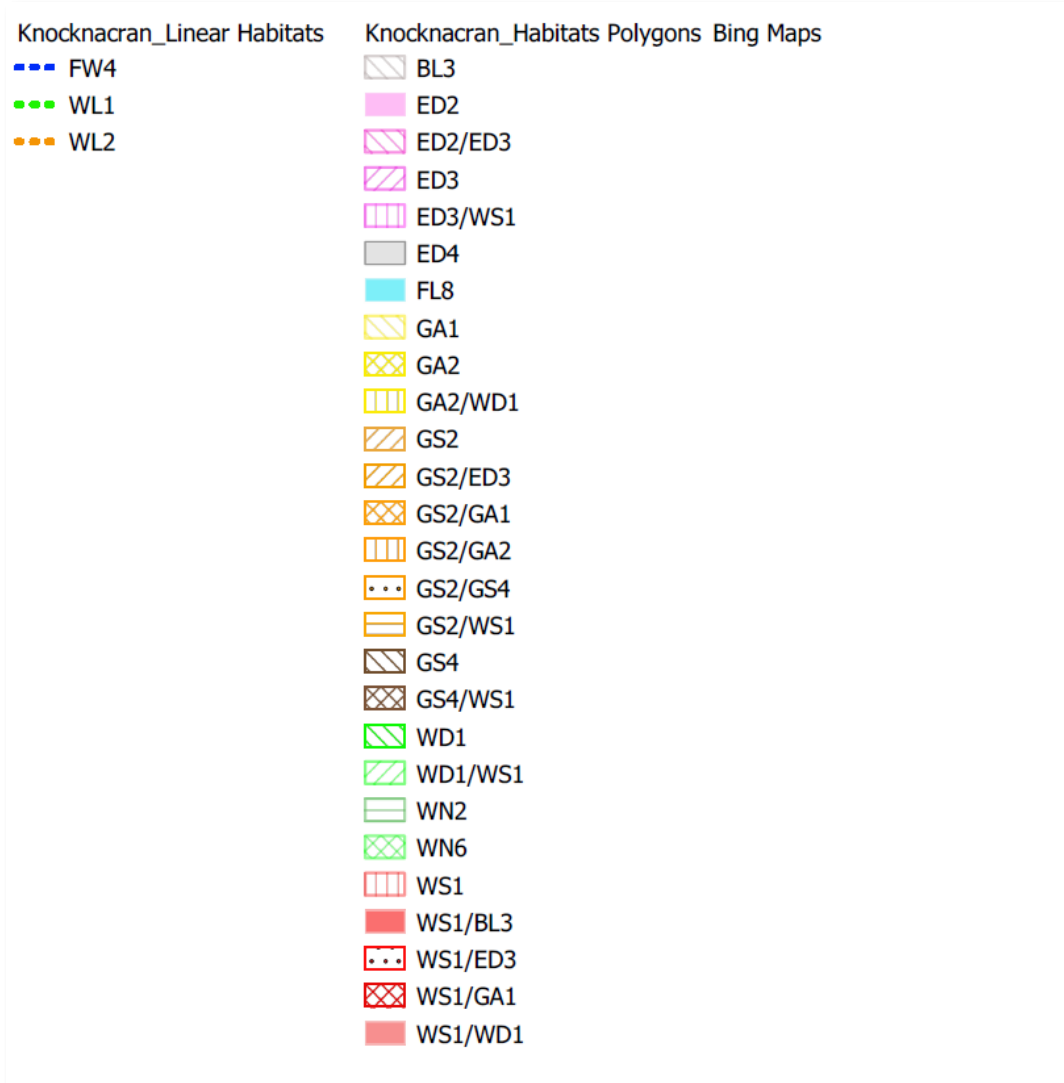


Figure 3 – Habitat Map legend



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Figure 4 – Japanese knotweed population located on the margins of an abandoned farm building, north of the R179

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APPENDIX 6.2

Knocknacran West Mine Project Ecology Surveys 2022

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1 Introduction

O'Donnell Environmental was commissioned by SLR to carry out ecological surveys and reporting to support ecological and environmental reporting to be carried out by SLR.

1.1 STATEMENT OF COMPETENCE

Tom O'Donnell BSc (Hons) MSc CEnv MCIEEM is a Chartered Environmentalist and a full member of the Chartered Institute of Ecology and Environmental Management. He was awarded a BSc in Environmental and Earth System Science [Applied Ecology] in 2007 and an MSc in Ecological Assessment in 2009, both from UCC. Tom has over 10 years professional experience in the environmental industry, including working on projects such as windfarms, overhead power lines, roads, cycleways and residential developments. Tom is licensed by NPWS for roost disturbance (Ref: DER/BAT 2021-04) and to capture bats (C181/2020).

Eamonn Delaney of Delichon Ecology is a Full and Chartered member of Chartered Institute of Ecology and Environmental Management (CIEEM). Eamonn has 13 years' experience in ecological consultancy and routinely undertakes a range of field surveys including bird surveys (vantage point and walked transect surveys) habitat surveys, botanical surveys and invasive species surveys. Recent and ongoing project involvement include assessments for planning applications culminating in Environmental Impact Assessments (EIA), Ecological Impact Assessments (EclA) & Appropriate Assessments (AA) for windfarms, greenways, flood relief schemes, pedestrian and cycle routes, road schemes and water infrastructure projects.

Noel Lenihan BSc (Hons) is a Bird Surveyor with a life-long passion for bird watching and ornithology. Throughout his former career in Engineering, Noel conducted bird surveys on a voluntary basis including contribution to the Birdwatch Ireland Countryside Bird Survey. Noel is a highly regarded and widely recognised bird identification expert in Ireland and can identify birds based on vocalisations as well as visual identification. Noel has been accredited with multiple 'Irish Rare Birds Committee' validated sightings, including 1st, 2nd & 3rd Irish records. Noel continues in his role as a voluntary Surveyor with Birdwatch Ireland Countryside Bird Survey as well as being Outing Leader with Birdwatch Ireland West Cork Branch. In June 2021 Noel commenced full time work as a freelance Bird Surveyor and has worked on several commercial projects including winter bird surveys for waterbirds for the Lower Lee (Cork City) Drainage Scheme, Winter Bird Survey for Youghal Proposed Waste Facility Site, bird survey following SNH (2017) in relation to a proposed wind farm. Noel carried out winter bird survey on behalf of O'Donnell Environmental surveys in Cork Harbour for a pharmaceutical Client.

Ross Macklin B.Sc. (Hons) MCIEEM, MIFM, HDip GIS, PDip IPM is an ecologist with over 16 years' professional experience in Ireland. He specialises in freshwater fisheries ecology, biology and water quality. He has considerable experience in a wide range of ecological and environmental projects including EIAR, EclA, AA/NIS, CEMP reporting, as well as biodiversity, water quality monitoring, invasive species and fisheries management. He also has expert identification skills in macrophytes, freshwater invertebrates, protected aquatic habitats and protected aquatic species including freshwater pearl mussel. His diverse project list includes work on renewable energy developments, flood relief schemes, road schemes, blueways/greenways, biodiversity projects, fisheries management projects and catchment wide water quality management. He is currently completing his Ph.D. on the ecology and impact of common carp (*Cyprinus carpio*) in Irish waters.

2 Methodology

2.1 SURVEYS

2.1.1 Habitat Survey

A Phase 1 habitat and flora assessment was carried out by Eamonn Delaney on 13th July 2022 in accordance with the Heritage Council's guidelines (Smith *et al.* 2011). The dominant habitats present were classified according to Fossitt (2000) and key botanical species were identified. Any other records of interest (e.g. invasive plant species) were also marked on field maps and/or locations were recorded.

The survey identified and surveyed all linear woodland habitats (i.e. treelines and hedgerows) within the proposed Knocknacran West site. Survey methodology was undertaken in accordance with the guidelines and parameters outlined in *Hedgerow Appraisal System Best Practise Guidance on Hedgerow Surveying, Data Collation and Appraisal* (Foulkes *et al.*, 2013). This allowed for a detailed and systematic assessment of each hedgerow within the extension boundary following fixed assessment criteria based on hedgerow management, growth form, integrity, structure and adjacent land use.

2.1.2 Terrestrial Mammal Survey (Non-Volant)

Survey for non-volant mammals were undertaken by Tom O'Donnell on 23rd June 2022 and 12th, 13th and 14th July 2022 with some additional visits in August and September 2022. Surveys involved a walkover of the site to identify any mammal species present or signs of mammal activity such as droppings, tracks, burrows etc. Observations were recorded using field notes and/or handheld GPS units. Techniques used to identify mammal activity followed recognised guidelines (e.g. Clark 1988, Sutherland 1996, Bang & Dahlstrom 2004 and JNCC 2004). The study area included the Knocknacran West site plus additional areas outside this boundary which fell within 150m of the area in which blasting may potentially be carried out (see **Figure A**). In these additional areas an underground dwelling (e.g. a Badger sett), should it be present, may be vulnerable to disturbance as a result of blasting.

Three infra-red camera traps were deployed at the site from 14th July to 9th August 2022 to capture photographic evidence of mammal usage (see **Figure A**).

The conservation status of mammal species was considered. The conservation status of mammals within Ireland and Europe is indicated by inclusion in one or more of the following: Irish Wildlife Acts (1976 - 2010); Red List of Terrestrial Mammals (Marnell *et al.* 2009); EU Habitats Directive.

Some areas of open grassland were unsafe to access during the survey period as a result of subsidence and these areas were not surveyed. Winter is the optimal time of year to search for signs of mammals, when vegetation dieback permits greater visibility and signs of mammals often persist for longer. Carrying out the survey in the summer period may limit the opportunity to identify some mammal features or access densely vegetated areas. These limitations are generally not considered to be significant in this instance.



Figure A - Terrestrial Mammal Survey Methodology.

2.1.3 Bat Surveys

Four buildings were identified in 2019 (Golder) and/or 2021 (O'Donnell Environmental) as having some potential for maternity roosting by bats (i.e. 'moderate' or 'high' suitability). These buildings are referred to as B_2, B_3, B_4 and B_6 in **Figure B**. Targeted surveys of these structures were carried out in 2022 by O'Donnell Environmental. The aim of these surveys was to validate current understanding of the ecological context of buildings on site and to seek any previously unrecorded evidence of maternity roosting in particular. In an Irish context, maternity sites are generally occupied between May and September (Marnell *et al.* 2022).

Daytime visual assessments were carried out on the target buildings on 23rd June 2022 by Tom O'Donnell to identify signs of bat use, and particularly signs of maternity roosting such as accumulation of droppings or evidence of vocalisation.

Dusk bat emergence surveys were carried out on 12th, 13th and 14th July 2022 and 8th August 2022 at the four structures (see **Table 2.1**). The surveys were carried out by three surveyors: Tom O'Donnell BSc (Hons) MSc CEnv MCIEEM, Noel Linehan BSc (Hons) and Colm Breslin. Surveyors were positioned at suitable points to detect bat emergence from the target structures. The surveys were carried out by visual means primarily, with the aid of Echo Meter Touch Pro full spectrum ultrasonic detectors. Guide IR Pro thermal imaging cameras and a 'Nightfox Red' infrared camera were utilised to record bat activity which occurred at the target structures, in accordance with recent BCI guidelines. Emergence and re-entry surveys were carried out during suitable weather conditions and followed guidelines set out in Collins (2016).

A visual survey of safely accessible areas of the underground mine was carried out on 9th August 2022 by Tom O'Donnell accompanied by a guide provided by Saint-Gobain Mining. The underground workings are extensive and inactive areas are generally not safe to access. In an attempt to detect any bat activity occurring down the mine, two Song Meter Mini full spectrum bat detectors were deployed at strategic locations within the mine. The survey aimed to detect any evidence of 'autumn swarming' in particular which may indicate possible use of the underground areas by hibernating bats also.

Bat sonograms were analysed using Kaleidoscope automatic analysis and identifications were manually verified following Russ (2012).

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Table 2.1 – Bat Emergence survey details

Date	Location	Sunset	Survey times	Weather Conditions
12.07.22	B_4 & B_3*	21:57	21:45 to 23:35	Temp: 16°C Wind: F 2 or 3 Precipitation: None Visibility: Good
13.07.22	B_6	21:56	21:40 to 23:30	Temp: 18°C Wind: F 1 Precipitation: None Visibility: Good
14.07.22	B_2	21:55	21:40 to 23:30	Temp: 17°C Wind: F0 or F1 Precipitation: None Visibility: Good
08.08.22	B_3 & B_6	21:14	21:00 to 22:50	Temp: 17°C Wind: F0 Precipitation: None Visibility: Good

See Figure B.



Figure B - Bat Emergence Survey Locations July 2022.

2.1.3.1 Surveys of Active Mine

Passive detector survey was carried out to investigate bat usage of active underground mine. Two detectors were deployed at strategic locations, which were also safely accessible, in areas considered likely to detect bats traveling to deeper areas of the mine networks from the main mine entrances. Quarrying on the active mine site is exposing old, buried workings which also provide access by bats to the mine, but these areas are not safely accessible.

Wildlife Acoustics Song Meter Mini Bat (full spectrum) ultrasonic bat detectors were deployed to passively record bat activity at two locations (See **Figure J**) underground within the mine network.

'Mine_1' was deployed on 9th August 2022 and continued to record until 10th of September 2022, resulting in 33 survey nights. 'Mine_2' was deployed on 9th August 2022 and continued to record until 4th of September 2022, resulting in 26 survey nights. Both detectors were programmed to record from 30-minutes before sunset until 30-minutes after sunrise (when triggered). Their locations (for the purposes of sunset and sunrise calculations) were set to the mine entrance.

Bat sonograms were analysed using Kaleidoscope automatic analysis and identifications were manually verified following Russ (2012). Individual bats of the same species cannot be distinguished by their echolocation alone and therefore 'bat registrations' are used as a measure of activity (Collins, 2016). A bat registration is defined as the presence of an individual species echolocation within a recording of maximum 15 seconds duration.

The detectors were redeployed on 22nd September 2022. Both detectors were programmed to record 24 hours a day (when triggered). Their locations were again set to the mine entrance.

A brief visual survey was carried out within the mine by Tom O'Donnell and evidence of bat activity was sought. It is acknowledged that the underground workings are vast and complex and not all areas of old mine working was safely accessible. In this context the visual survey is considered to be extremely limited.

2.1.4 Bird Surveys

Bird surveys were carried out by Noel Linehan (BSc) on 23rd June 2022, 13th and 14th July 2022 and 8th and 9th August 2022. Transect and point count surveys were carried out to characterise the general bird community and seek evidence of bird breeding. The transect routes and point count locations used are shown in **Figures C to E** and were selected to provide representative sampling of all key habitats and areas on site. Details of the surveys are shown in **Table 2.2, Table 2.3 and Table 2.4**.

The transect survey methodology was based on that used for the Countryside Bird Survey (e.g. Coombes *et al.*, 2009). Birds were recorded in three distance bands from the transect route (0-25 m, 25-100 m and > 100 m), with overflying birds recorded separately. Point counts were carried following the methodology used in the BIOFOREST project (Wilson *et al.*, 2005). Each point count was of ten minutes duration.

Birds noted during other site visits, including ecological walkover surveys were also recorded.



Figure C - Breeding Bird survey Transect routes and point count locations in June 2022.



Figure D - Breeding Bird survey Transect routes and point count locations in July 2022

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Figure E - Breeding Bird survey Transect routes and point count locations in August 2022
Table 2.2. Timings of, and weather conditions during, the bird surveys on 23rd June 2022.

Survey	Survey unit	Start	Finish	Cloud	Wind	Rain
Point counts	PC1	13:50	14:15	8/8	F 2	None
	PC2	14:20	14:25	8/8	F 2	None
	PC3 & 4	14:28	14:35	8/8	F 2	None
Transects	T1	15:11	16:20	7/8	F 3	None
	T2	16:40	17:20	2/8	F 3	None
	T3	17:39	18:25	3/8	F 2	None

Table 2.3. Timings of, and weather conditions during, the bird surveys on 13th & 14th July 2022.

Survey	Survey unit	Start	Finish	Cloud	Wind	Rain
Point counts	PC1	09:00	09:30	8/8	F 2	None
	PC2	11:00	11:30	8/8	F 2	None
	PC3 & 4	09:37	10:03	4/8	F 2	None
Transects	T1*	13:04	15:16	7/8	F 3	None
	T2*	16:00	17:42	6/8	F 3	None
	T3	08:08	08:55	1/8	F 2	None
	T4	10:09	10:57	8/8	F 2	None

* 13th July 2022

Table 2.4. Timings of, and weather conditions during, the bird surveys on 8th and 9th August 2022.

Survey	Survey unit	Start	Finish	Cloud	Wind	Rain
Point counts	PC1	08:38	09:31	2/8	F 0	None
	PC2	09:33	09:44	2/8	F 0	None
	PC3 & 4	09:48	10:38	4/8	F 2	None
Transects	T1*	14:24	17:21	2/8	F 1	None
	T2*	17:41	18:52	4/8	F 1	None
	T3	07:58	08:32	2/8	F 0	None
	T4	10:58	11:43	3/8	F 2	None

* 8th August 2022

2.1.4.1 Night-time Acoustic Monitoring

Wildlife Acoustics Song Meter detectors with acoustic microphones were deployed to passively record acoustic sound (e.g. bird calls) overnight at three locations, proximal to B2, B4 and B6, for a total of 2 nights from 12th July 2022 to the 14th July 2022 inclusive. Night-time acoustic surveys aimed to detect evidence of Barn Owl in particular. A detector was similarly redeployed from 1st to 7th August in proximity to 'B_2' where Barn Owl has previously been recorded. The detectors were programmed to record from 30 minutes before sunset, to 30 minutes after sunrise.

The resulting WAV files were analysed using 'Audacity' and visually and aurally identified by Mr. Mark Shorten. No filters were used on the files as the recording environment was generally benign. Validation of the identification of a subset of recordings was carried out using <https://birdnet.cornell.edu/api/> and was used to confirm identification. An estimation of the number of individual birds in each file was made where possible.

2.1.5 Reptile Surveys

The Common (or Viviparous) Lizard (*Zootoca vivipara*) is Ireland's only native species of reptile. Targeted surveys were carried out which sought to identify the presence or absence of this species on the proposed site. Survey methodology follows 'Froglife' (1999). This UK based methodology is adapted for use in an Irish context given our lesser diversity of reptile species. Visual surveys were used as the primary means of survey of this species, as they are less likely to respond to artificial refugia than other reptiles which are also considered in UK based survey guidance (Froglife, 1999).

During walkover surveys carried out in June, July, August and September 2022, visual searching 3 - 4m ahead of the Surveyor were carried out in order to observe any Common Lizard which may be basking on exposed structures such as logs, rocks and fencing posts, alongside areas of open ground proximal to vegetation. Care was taken not to cast shadows on the observing area whilst facing away from direct sunlight.

As a complimentary method, artificial refugia (known as 'tins') made of black roofing felt cut to 50cm x 50cm squares were placed as shown in **Figure F** (see **Plate 3.10**). Locations were chosen based on proximity to suitable reptile areas such as along hedgerows or walls, alongside site road etc. Tins were placed on short or flattened vegetation. Much of the site contains dense, lodged grassland which has developed in the last number of years following cessation of agriculture and these areas do not provide optimal habitat for Common Lizard.

The tins were deployed on 23rd June 2022 and checked for the presence of reptiles on 13th & 14th July, 8th August 2022, 9th and 22nd September 2022.



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Figure F - Locations of Reptile 'Tins' Deployed in 2022

2.1.6 Aquatic Assessment

Site visit carried out 8th September 2022. Aquatic habitat appraisals and macro-invertebrate assessment were carried out at two locations (see **Figure G**).

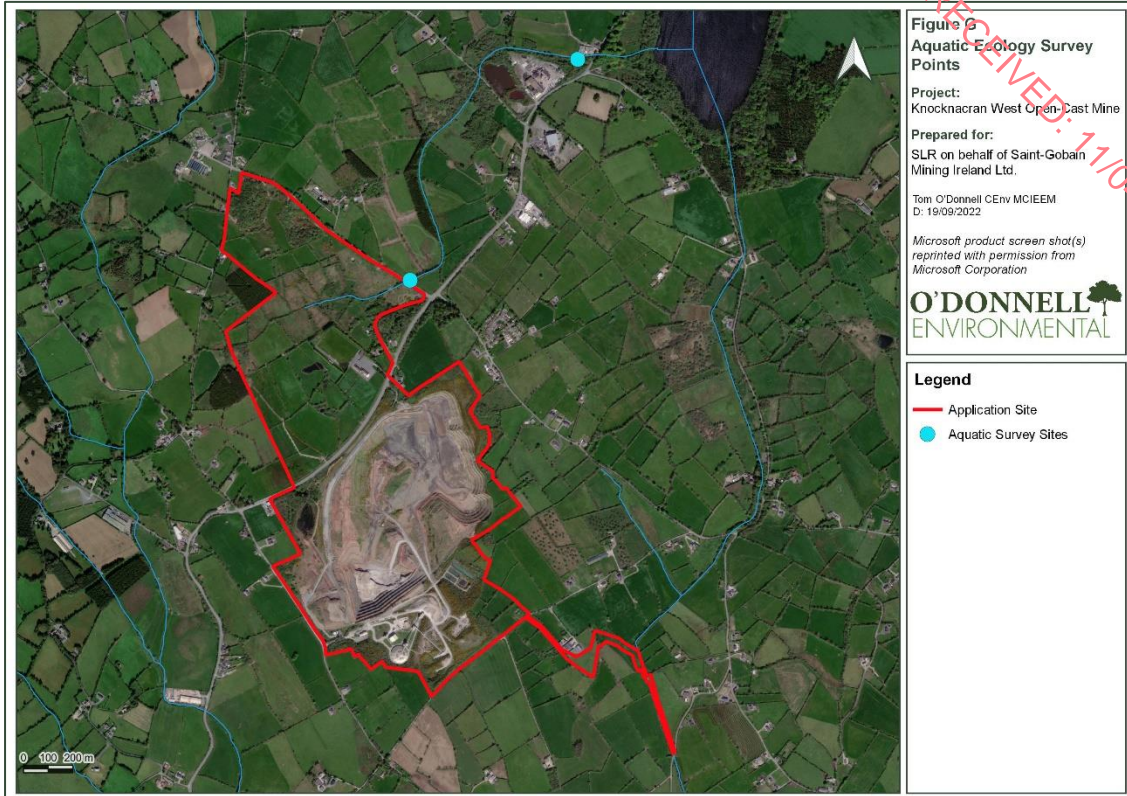


Figure G - Locations of Aquatic Ecology Survey Sites on Corduff Stream.

3 Results

3.1 HABITATS

3.1.1 Habitat Survey

A Phase 1 habitat and flora assessment was carried out by Eamonn Delaney on 13th July 2022 in accordance with the Heritage Council's guidelines (Smith *et al.* 2011). The dominant habitats present were classified according to Fossitt (2000) and key botanical species were identified. Any other records of interest (e.g. invasive plant species) were also marked on field maps and/or locations were recorded.

No additional area of invasive species were found to be present. 2021 habitat survey was validated and no significant changes in habitat classification or significance are necessary. In some areas treelines were reclassified as hedgerow reflecting treecutting works which took place in winter 2021.

An appraisal of hedgerows was also undertaken in accordance with the guidelines and parameters outlined in *Hedgerow Appraisal System Best Practise Guidance on Hedgerow Surveying, Data Collation and Appraisal* (Foulkes *et al.*, 2013). Baseline hedgerow appraisal provided as standalone report.

3.1.2 Terrestrial Mammal Survey (Non-Volant)

Survey for non-volant mammals was undertaken in June and July 2022. Surveys involved a walkover of the site to identify any mammal species present or signs of mammal activity such as droppings, tracks, burrows etc. The study area included the Knocknacran West site plus additional areas outside this boundary which fell within 150m of the area in which blasting may potentially be carried out (see **Figure A**). Three infra-red camera traps were deployed at the site from 13th July 2022 to 9th August 2022 to capture photographic evidence of mammal usage (see **Figure A**).

Badgers are common and widespread in agricultural habitats across the Republic of Ireland (Sleeman *et al.* 2009). Badgers construct and use setts of different types (main, annex, subsidiary and outlier setts) (SNH, 2001). Main setts are of the greatest conservation importance and are where breeding typically occurs. Outlier setts typically comprise of one to two holes and may be found some distance away from the main sett and are not usually linked to it by any obvious paths. The type and level of use of outlier badger setts is variable and they may be used sporadically or seasonally (SNH, 2001).

Two badger setts were located within the Knocknacran West site. The exact locations of these setts is not disclosed in the current report, but they are both within the proposed 'blasting area' (**Figure A**).

A 'main' sett is within an area of dense bramble and gorse and extends over several meters on the edge of the slope into a former mine area. Downslope, significant amounts of excavated soil are present as well as evidence of bedding. The exact number of entrances is not possible to establish without vegetation clearance, but from available information the sett is assumed to be a 'main' sett.

An 'outlier' sett is located within a hedgerow on an earth bank. The sett has a single entrance and appears to be in regular use with the entrance being maintained clear. A clear trail leads to the sett.

Field signs of Badger are widely distributed on the site and include latrines, paw prints, snuffle holes and hair snagged on barbed wire fencing (see **Figure H**).

Field signs of Pine Marten were not recorded, but an individual was recorded on trail camera Cam_1 on the night of 13th July 2022.

No evidence of Otter was recorded, and it is considered unlikely that the species would occur on the site regularly as the site lacks substantial water features.

Hare was recorded during bird surveys (Transect 4) on 9th August 2022.

Field signs of Fox were widely distributed on the site and consisted of scat, prints left in soft mud and numerous trails through grass. Fox were detected on all three camera monitoring points. No evidence of any underground dwellings used by Foxes was found.

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X. An entrance at main sett, possibly a disused entrance.



X. Significant amounts of excavated soil downslope of main badger sett.



X. Entrance to outlier sett (Garmin 64s for scale).



X. Badger print recorded in soft mud along internal drainage channel.



X. Badger latrine (Garmin 64s for scale).



X. Badger at outlier sett entrance (Cam_2).

X. Badger at Cam_3.



X. Pine Marten at Cam_1.



Figure H - Locations of evidence of Badgers

3.1.3 Bat Emergence Surveys

Dusk bat emergence surveys were carried out on 12th, 13th and 14th July 2022 at four structures where bat roosting has previously been identified by Golder (2019) or O'Donnell Environmental (2021). Surveys were also carried out at B_3 and B_6 on 8th August. Built structures are identified in **Figure B**. The surveys were to supplement data gathered during survey in 2019 (Golder) and 2021 (O'Donnell Environmental) to establish if maternity roosting is occurring at the properties and accordingly the surveys were carried out in the bat maternity season. In an Irish context, maternity sites are generally occupied between May and September (Marnell *et al.* 2022).

The results of the survey were consistent with previous surveys in 2019 and 2021. No maternity roosts were found to be present. Brown Long-eared Bat, not previously recorded as being roosting on the site, was found to be roosting in a shed at B6.

3.1.3.1 Structure B2

A visual assessment of the building was carried out on 23rd June 2022 to identify signs of bat use, and particularly signs of maternity roosting such as significant accumulation of droppings or evidence of vocalisation. B2 has not changed in terms of its ecological context and is considered to remain as being of 'Moderate' suitability to roosting bats (following Collins, 2016).

B2 was surveyed at dusk on 14th July 2022 by two Surveyors and utilising two thermal cameras. No emergence was detected on this occasion, but the building should be considered to be a bat roost following a record of Soprano Pipistrelle emergence from the apex on the eastern gable, immediately below the ridge tiles in 2021.

3.1.3.2 Structure B3

A visual assessment of the building was carried out on 23rd June 2022 to identify signs of bat use, and particularly signs of maternity roosting such as significant accumulation of droppings or evidence of vocalisation. B3 has not changed in terms of its ecological context and is considered to remain as being of 'Moderate' suitability to roosting bats (following Collins, 2016).

This building was surveyed on 12th July 2022 and 8th August 2022 and on each occasion one Surveyor was positioned mostly at the rear (west) of the property. A thermal camera was positioned at the front of the house (east) and covered the known bat emergence point. The camera recorded continuously throughout the survey periods.

On 12th July 2022 two Soprano Pipistrelles emerged from the previously identified roosting location on the eastern site of the roof of this Residence and flew in a northerly direction. There was no other evidence of bat emergence.

On 8th August 2022 there was no evidence of bat emergence from any location.

3.1.3.3 Structure B4

A visual assessment of the building was carried out on 23rd June 2022 to identify signs of bat use, and particularly signs of maternity roosting such as significant accumulation of droppings or evidence of vocalisation. B4 has not changed in terms of its ecological context and is considered to remain as being of 'Moderate' suitability to roosting bats (following Collins, 2016). Internally, the building is in poor order with water and light ingress occurring from a number of holes in the roof. The bitumen felt which underlay the slate tiles is significantly deteriorated and torn in most areas.

This building was surveyed on 12th July 2022 by one Surveyor who was positioned mostly at the western side of the property. A thermal camera was positioned which covered the east gable and south elevation of the building (including both previously recorded roosting locations). No emergence was detected on this occasion, but the building should be considered to be a bat roost following a record of Soprano Pipistrelle re-entry in 2021, when two bats were observed re-entering under gaps in the roof overhang on the northern side of the building, as well as in the dense ivy on the eastern side of the house to the left of the open window on the upper floor.

3.1.3.4 Structure B6

A visual assessment of the building was carried out on 23rd June 2022 to identify signs of bat use, and particularly signs of maternity roosting such as significant accumulation of droppings or evidence of vocalisation. B6 has not changed in terms of its ecological context and is considered to remain as being of 'high' suitability to roosting bats (following Collins, 2016).

B6 was surveyed on 13th July 2022 by three Surveyors and on the 8th August 2022 by two Surveyors. During the survey of 13th July 2022 one thermal camera was positioned on the south-west of the Residence, with views over the southern side of the roof and some of the detached shed while a second thermal camera was positioned on the north-west of the Residence. On the 8th August 2022 one thermal camera was positioned on the south-west of the Residence, with views over the southern side of the roof and some of the detached shed. An infrared camera and associated infrared lighting was positioned to view the eastern face of the detached agricultural shed, which included the windows and doors.

On the night of 13th July 2022 first emergence was detected at 21:50 when a Soprano Pipistrelle emergence from the roof of the Residence using the previously identified location (see Chapter 6, Plate A12, EIAR). A second bat emerged at 22:13 nearby, from beneath a ridgetile near the western gable of the Residence. A single Pipistrelle bat (Common or Soprano) was also observed emerging from a small crack in the northern wall of the shed attached which is attached to the west of the Residence.

A visual search of the detached agricultural shed and lean-to was carried out at regular intervals to detect any pre-emergence activity as Brown Long-eared Bats often do not echolocate on emergence. A single bat was observed and was captured by Tom O'Donnell (licensed bat worker) using a hand-net to confirm identification. The individual was an adult female which did not appear to be lactating. This species has not previously been confirmed to be roosting on-site but has been recorded in echolocation surveys carried out in 2021 (see EIAR).

On the night of the 8th August 2022 11 Soprano Pipistrelles were recorded emerging from the roof of the Residence, using the previously identified location (see Chapter 6, Plate A12, EIAR) and also a second point below this, on the 7th course of tiles down. The first emergence at 21:37 (23 minutes after sunset). By 21:52 10 bats had emerged in total, with one additional emergence at 21:52. There was no evidence of Brown Long-eared Bat at the site including the previously identified location. There was no other evidence of emergence.

Bat species detected incidentally by ultrasonic detectors during the course of bat surveys reflected the species assemblage previously reported.

A summary of the result of surveys of the identified man-made structures is provided in **Table 3.1**, below. The locations of each building are shown in **Figure B**.

Table 3.1 - Summary of man-made structures within Knocknacran West which were assessed for their potential to support roosting bats.

Structure Reference	Comment	Building Description	Suitability for Bat Roosting
B2	Soprano Pipistrelles recorded emerging from roof apex on eastern gable in 2021.	Derelict Residence	Confirmed roost with 'Moderate' suitability for roosting bats overall.
B3	Occupied residence. Soprano Pipistrelles recorded emerging from under ridge tiles on roof at front of house in 2021 and 2022.	Residential dwelling	Confirmed roost with 'Moderate' suitability for roosting bats overall.
B4	Shirley Estate House. Soprano pipistrelles observed re-entering during dawn survey in 2021.	Derelict Residence	Confirmed roost with 'Moderate' suitability for roosting bats overall.
B6	Un-occupied residence with intact tile roof. Associated attached and detached buildings. Soprano Pipistrelle and Brown Long-eared Bat recorded, possibly Common Pipistrelle also.	Derelict Residence	Confirmed roost with 'High' suitability for roosting bats overall.

In an Irish context Marnell *et al.* (2022) arguably represents the most relevant survey standards. It is considered that the survey effort employed for the current project implement the guidance appropriately and allow comprehensive and appropriate understanding of value of the proposed Knocknacran West site to bats.

The UKs Bat Conservation Trust guidance (Collins, 2016) takes a more prescriptive approach. Regarding the survey of bats in buildings, Collins (2016) recommends one, two or three surveys, for low, moderate and high suitability structures respectively, at dusk or dawn to give confidence in a negative result. For moderate suitability roosts at least one of the surveys should be carried in the period May to August and for high suitability roosts at least two of the surveys should be in that period.

Surveys carried out in 2022, building upon surveys carried out in 2021, fully meet best practice standards in relation to survey of bat roosts.

The proposed works would involve the loss of roosting spaces which are occupied in relatively small numbers by common species. No maternity roosting or hibernation sites have been identified on the Knocknacran West site or are likely to be present. Following Marnell *et al.* (2022) the significance of these identified roosts is considered to be low.

Based upon the results of surveys described above, and considering the local context of the proposed site, the study site is considered to be of **Local Importance (Higher Value)** for bats following NRA (2009).

3.1.4 Survey of Active Mine

A visual survey of safely accessible areas of the underground mine was carried out on 9th August 2022 by Tom O'Donnell accompanied by a Saint-Gobain Mining employee. No evidence of bat occupation or activity were noted, however the survey was extremely limited in terms of the scale and complexity of the underground structures and access restrictions on safety grounds.

Detectors deployed at strategically located survey points in the underground network recorded Common Pipistrelle (556 registrations) and Soprano Pipistrelle (1 registration) activity (see **Figure I**, below).

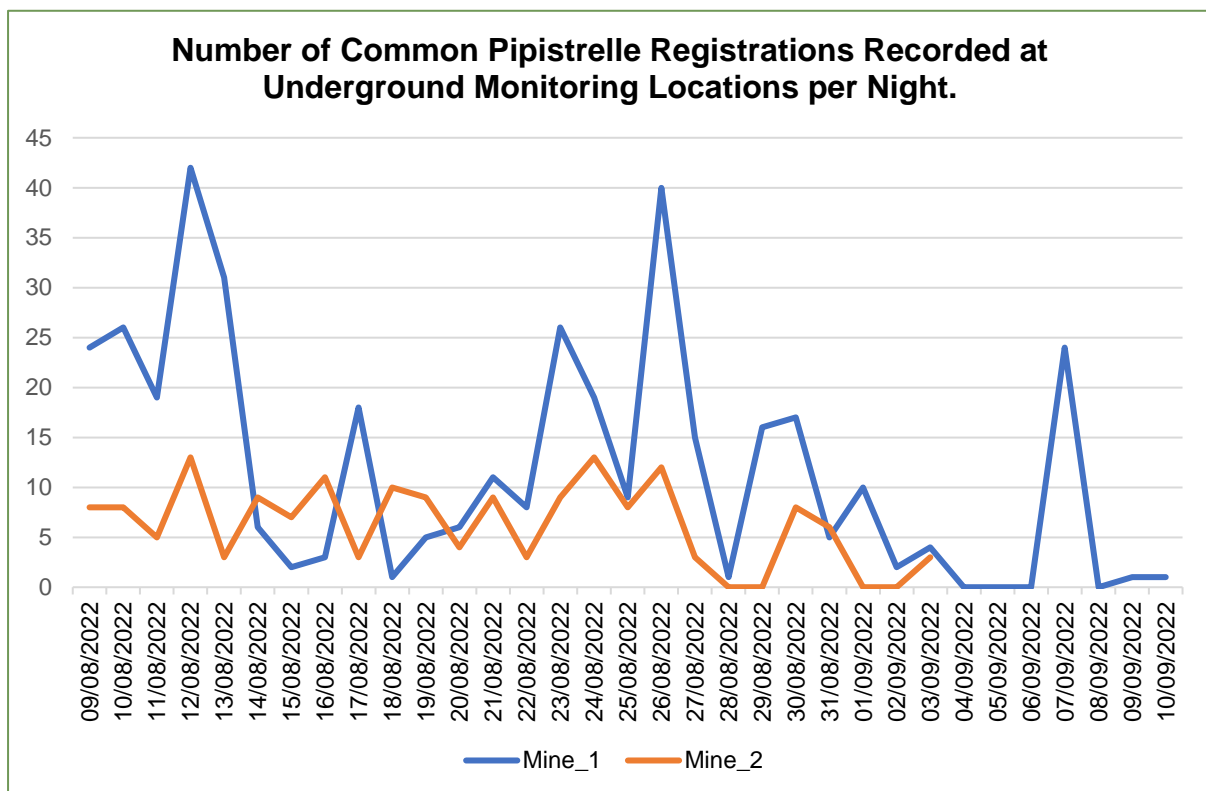


Figure I - Number of Common Pipistrelle Registrations Recorded by Night

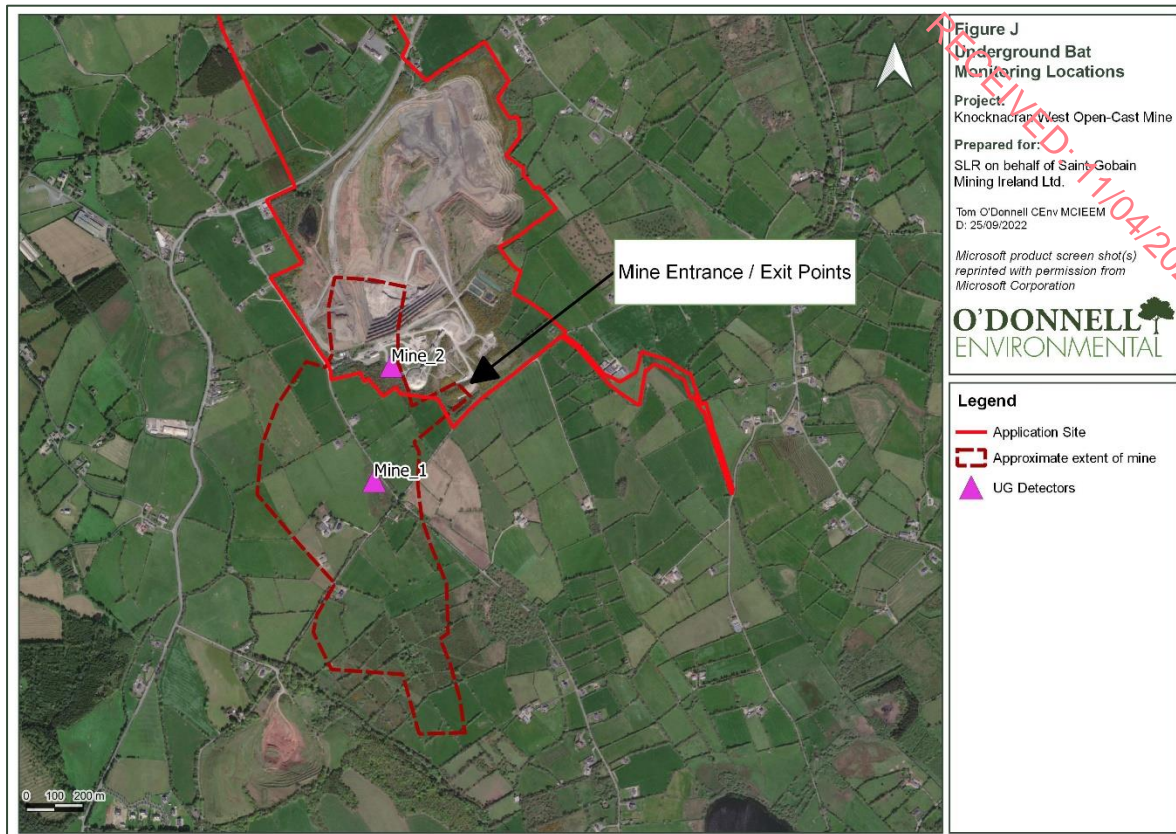


Figure J - Locations of Underground Bat Monitoring Sites.

All registrations recorded were from Common Pipistrelle, with the exception of a single Soprano Pipistrelle which was recorded at 'Mine_1' on 25th August 2022 at 23:15. Common Pipistrelle registrations at Mine_1, when recorded in a given survey night, were first recorded an average of 144 minutes after sunset with the shortest period between sunset and first recording being 67 minutes. Common Pipistrelle registrations at 'Mine_2', when recorded in a given survey night, were first recorded an average of 140 minutes after sunset with the shortest period between sunset and first recording being 40 minutes.

No evidence of day-roosting by any bat species within the mine network was obtained during passive monitoring. Underground mining operations finish by approximately 5pm and no lighting or other disturbances are present at the monitoring locations which might delay bat activity or emergence. Were Common Pipistrelle to be day-roosting within the mine network, it is considered likely that they would be recorded first before or shortly after sunset as they make their way towards the mine entrance. The average emergence time of Common Pipistrelle is approximately 20 minutes after sunset.

No evidence of any *Myotis* species was obtained during passive monitoring and this group is particularly associated with 'autumn swarming' behaviour (which might indicate use of the mine as a hibernation site by *Myotis* species also). Autumn swarming behaviour by pipistrelle bats has been recorded in mainland Europe at above ground sites which later are used as hibernacula, but is poorly understood in an Irish context. The selection of winter roosts by many Irish bat species, including pipistrelles, is poorly understood although pipistrelles are not commonly associated with underground hibernation (e.g. Marnell *et al.* (2022), Collins (2016)).

Underground structures are used by some Irish bat species for hibernation (Marnell *et al.* 2022), when bats seek out spaces with low, stable temperatures and high humidity where they can enter periods of torpor. The underground mine network is vast and complex and contains areas accessible to bats but not safely accessible for people. Air is pumped through the mine network and barriers such as draught curtains and spoil heaps are used to direct air flow to the actively mined areas of the site. The forcing

of air through the mine network is likely to cause greater fluctuation of air temperature than would otherwise be the case however is it likely that air temperatures remain relatively stable nonetheless and the mine would be suitable for hibernation by bats.

Photographs:



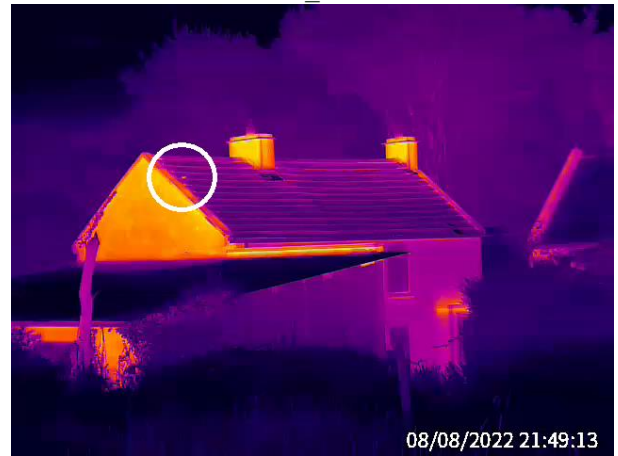
A1. Brown Long-eared Bat roosting within detached shed at B_6.



A2. Showing field of view of thermal camera at B_3.



A3. Showing field of view of thermal camera at B_4.



A4. Showing bat emergence B_6.



3.1.5 Bird Surveys

The importance of the proposed site to birds was assessed via observations made during dedicated ornithological surveys carried out by Noel Linehan (BSc) in June, July and August 2022. Transect and point count surveys were carried out as shown in **Figure C** to **Figure E**. Birds seen or heard during other site visits, including ecological walkover surveys were also noted.

Overall, a moderate diversity of bird species was recorded, considering the size of the site and the significant survey effort deployed. 49 species of birds were noted during surveys (see **Table 3.2**, below). The full survey data for both transects and point counts is provided in **Table 3.3** to **Table 3.8**, below.

The species recorded included seven species that are red-listed in *Birds of Conservation Concern in Ireland 2020 - 2026* (BoCCI; Gilbert *et al.*, 2021): Kestrel, Lapwing, Meadow Pipit, Stock Dove, and Swift were all recorded within the site. Barn Owl was also observed at 'B_2' in 2021 as outlined in the EIAR.

Eleven BoCCI amber-listed species were recorded: Coot, Goldcrest, House Martin, Lesser Black-Backed Gull, Linnet, Mallard, Sand martin, Spotted Flycatcher, Starling, Swallow and Willow Warbler.

Operational Quarry and Mine Site

The operational quarry site includes habitats and features of value to birds including a number of permanent pools and streams, stepped vertical quarry faces, deciduous woodland, bare and recolonising ground (including wild flowers) and accessible buildings. Importantly, on areas of the site there is no public access and consequent disturbance. Most of the bird survey highlights were in this section of the site. The presence of permanent pools and the lack of dense grassland provides some habitat suitable for ground nesting birds, and this was evidenced by the presence of a pair of Lapwings, which successfully raised one chick. Other nesting species associated with the pools were Coot, Little Grebe and Moorhen. Kestrels were very often in view and at least one juvenile, a one-year-old individual & one adult were present, and it's very likely that they nest here. At times there was an abundance of insects, most notably an emergence of flying ants during the August survey. Insectivorous birds were taking advantage: Swallows, House Martins, Sand Martins, Swifts and Kestrel were hunting the flying ants. Ravens were present and a nest located in the 'homogeniser'. The vertical quarry faces almost certainly harbour Sand Martin nests but were not accessed on safely grounds. Peregrine Falcon nesting habitat provides suitable nesting habitat and although the species are present locally, nesting was not observed. Small numbers of Swifts were present, and whilst they almost exclusively nest in buildings in Ireland, nesting on sheer quarry faces cannot be ruled out. Two pairs of Stock Doves are considered highly likely to have been nesting in holes in the vertical quarry faces close to the mine entrance.

Proposed Knocknacran West Site

The proposed Knocknacran West quarry site mostly consists of rank and very dense grassland, which developed following the cessation of agriculture on the land. Dense and lodged grassland is unsuitable for most ground nesting birds which generally required a more open sward which provides access to the ground for feeding. There was no evidence of ground-nesting by any bird species. Area of 'wet grassland' were quite dry in the summer of 2022 owing to the unseasonably dry conditions that summer and likely also the enhancement of drainage on site which has taken place in recent years. In wetter conditions, this habitat appears as though it would be suitable for ground nesting birds including Snipe & Water Rail. A wet grassland area to the north of 'B_2' had developed as a result of ground sinkage locally and had been remediated prior to survey. This may have had potential for ground and pond nesting birds.

The deciduous woods and hedgerows likely provide nesting habitat for a range of songbirds which would be typical of hedgerows and treelines in agricultural grassland. Spotted Flycatchers were also present. Birds of prey noted comprised a male Kestrel foraging, a family of Buzzards including one juvenile which probably nested onsite, multiple Sparrowhawk sightings (habitat suitable for nesting) and two Peregrines present calling high over the site. A sighting of Barn Owl was made in 2021 at 'B_2' and fresh pellets were also present at the same location. No evidence of Barn Owl at the site was found in 2022 and survey targeted at Barn Owl is discussed further below.

Table 3.2 - Species Recorded During Surveys within the Overall Knocknagran Mine Site

Common Name	
Barn Owl*	Mallard^
Blackbird	Meadow Pipit*
Blackcap	Mistle Thrush
Blue Tit	Moorhen
Bullfinch	Peregrine
Buzzard	Pied Wagtail
Chaffinch	Raven
Chiffchaff	Redpoll
Coot^	Reed Bunting
Dunnock	Robin
Goldcrest^	Rook
Goldfinch	Sand Martin^
Great Tit	Sedge Warbler
Grey Heron	Song Thrush
Grey Wagtail*	Sparrowhawk
Hooded Crow	Spotted Flycatcher^
House Martin^	Starling^
Jay	Stock Dove*
Kestrel*	Stonechat
Lapwing*	Swallow^
Lesser Black-Backed Gull^	Swift*
Linnet^	Treecreeper
Little Grebe	Willow Warbler^
Magpie	Woodpigeon
	Wren

* BoCCI Red Listed

^ BoCCI Amber Listed

3.1.5.1 Night-time Acoustic Monitoring

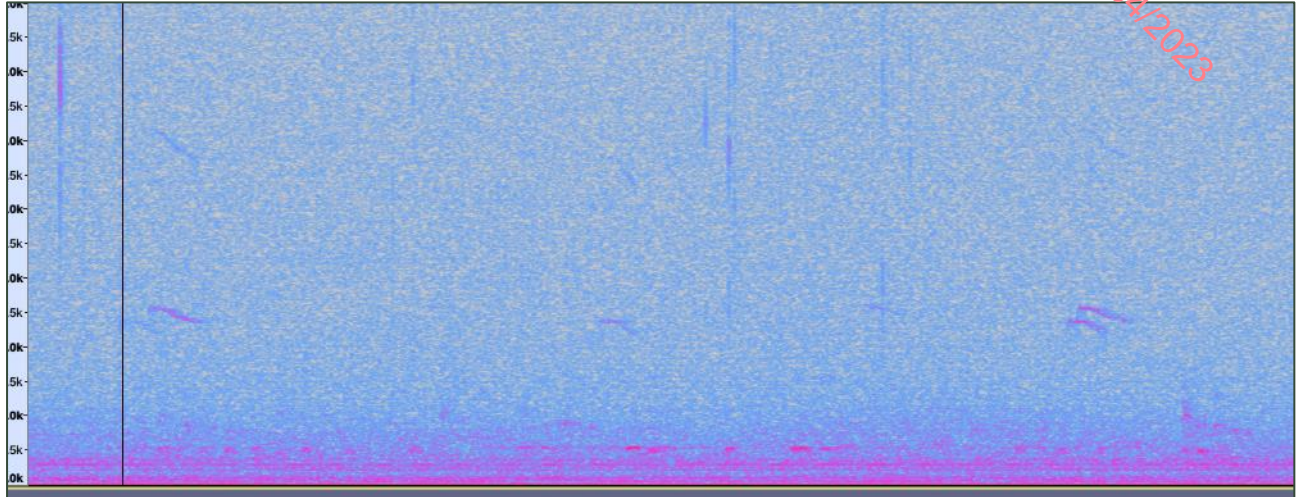
Wildlife Acoustics Song Meter detectors with acoustic microphones were deployed to passively record acoustic sound (e.g. bird calls) overnight at three locations, proximal to buildings B_2, B_4 and B_6, for a total of 2 nights from 12th July 2022 to the 14th July 2022 inclusive. Night-time acoustic surveys aimed to detect evidence of Barn Owl in particular, following a sighting in 2021 at 'B_2'. A detector was similarly redeployed from 1st to 7th August 2022 in proximity to 'B_2' where Barn Owl had previously been recorded.

Barn Owl was not conclusively recorded at any survey location. On the night of 12th July 2022 at approx. 23.00 some distant calls were recorded at the 'B_4' recorder, which may have been Barn Owl (approx. frequency 2.0k Hz) but were short in duration. These are considered as possible Barn Owl calls and a cautious approach is taken as a range of anthropogenic sounds occur in that range. They were not recorded on other recorders located on the site, and therefore these noises were inferred to have emanated from off-site, possibly to the east. No other evidence of Barn Owl was recorded and no recent pellets were noted at 'B_2'.

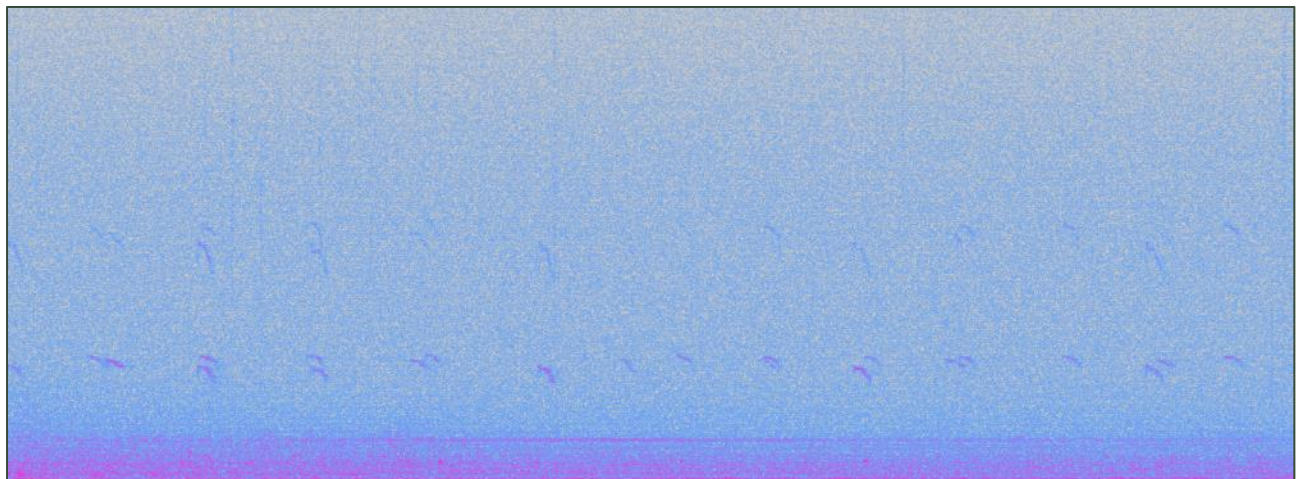
Two or three juvenile Long-eared Owls called regularly from approx. 22.00 to 04:00 on the nights of the 12th and 13th of July 2022 and 3rd to 6th August at the B2 recording location. Some of the July calls were

also recorded on the B_6 recorder but were noted to sound more distant. Distant calls were recorded at B_4 on the night of 12th July 2022 at approx. 01:30. Juvenile Long-eared Owl is not uncommon bird and not unexpected at such a site.

Green Sandpiper was recorded at B2 on the night of the 12th of July. These calls were also recorded on the B_6 recorder but were noted to sound more distant.



X - Sonogram showing juvenile Long-eared Owl calls, recorded at B2 in July 2022.



X - Sonogram showing Green Sandpiper calls, recorded at B2 in July 2022.

Calls of Moorhen, Heron and Water Rail were noted indicating nocturnal flight. Long-eared Owl,

Others calls recorded at dusk and dawn were reflective of the species assemblage recorded during daytime surveys.

3.1.5.2 June 2022 Bird Survey Results

Table 3.3 - June 2022 Bird Transect Survey Results

Species	T1			T2			T3		
	0	25	100/F	0	25	100/F	0	25	100/F
Blackbird		1		1					
Blackcap	1	3					1		
Blue Tit	1	1		1					

Bullfinch	1						
Buzzard			4		1	1	
Chiffchaff			1				
Dunnock				1		1	
Great Tit		1					
Hooded Crow			1				
House Martin				3			
Kestrel			1				
Mistle Thrush	1						
Reed Bunting				1			1
Robin						1	
Rook		1	6				
Song Thrush	1				1		1
Sparrowhawk	1						
Starling			3				
Swallow			3	6			
Willow Warbler	2						
Woodpigeon			1		2		1
Wren	2	1					

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The table shows the total numbers of each species that were recorded in each distance band, or overflying, on each transect: 0 = 0-25 m distance band; 25 = 25-100 m distance band; 100/F = > 100 m distance band/ flying over.

Additional notes:

T2 – Very old barn owl pellets and old feather in B2. No indication of recent or current occupancy.

Table 3.4 - June 2022 Bird Point Count Survey Results

Species	PC1		PC2		PC3 & PC4	
	Qty	Behaviour/Notes	Qty	Behaviour/Notes	Qty	Behaviour/Notes
Blackbird	1	Flyover				
Blackcap	2	Singing				
Blue Tit	1	Calling				
Buzzard			1	Hunting	1	Hunting
Chiffchaff	1	Singing				
Coot	2	Nesting			2	Nesting
Dunnock			1	Calling		
House Martin			1	Foraging		
Kestrel			1	Hunting		
Lapwing			1	Calling	3	2 adults and juvenile
Linnet	1	Flyover	1	Flyover		
Little Grebe	2	Foraging			1	Nesting
Mallard					2	Flushed
Mistle Thrush	1	Bathing				
Pied Wagtail			1	Calling		

Raven					2	Flyover
Robin	1	Calling				
Sand Martin			9	Foraging	2	Foraging
Swallow	1	Flyover, Singing				
Willow Warbler	2	Singing			1	Singing
Woodpigeon	2	Flyover				
Wren	1	Singing				

The table shows the total numbers of each species that were recorded in each distance band at each point count location.

Additional Notes: PC1 – Disturbance from road tanker pumping to/from pond, Habitat suitable for Little Grebe nesting. PC3 & PC4 – Habitat suitable for Little Grebe and Coot nesting.

Table 3.5 - June 2022 Bird Point Count Survey Results

Species	T1			T2			T3			T4		
	0	25	100/F	0	25	100/F	0	25	100/F	0	25	100/F
Blackbird	1			1			2					
Blackcap		1				1	1					
Blue Tit				1								
Buzzard			2	2	1	2	1					
Chaffinch		1	1	2	1							
Chiffchaff	1	1										
Chiffchaff/Willow				2			1					
Coot							2					
Dunnock				1			3				2	
Goldfinch		1		1								
Grey Heron						1						2
Hooded Crow				1								
House Martin		2		12							1	
Kestrel						1					1	3
Lesser Black-Backed Gull			3									
Linnet				1		3			1	3		
Little Grebe							3					
Magpie												1
Mallard							1					
Meadow Pipit				2							1	
Mistle Thrush				1								
Moorhen							1					
Peregrine			2									
Raven												2
Redpoll				1								
Reed Bunting				1	2							
Robin	1			4			2				1	
Rook		8	1									
Sand Martin											1	
Song Thrush	3											
Starling						31						
Stonechat				2								
Swallow	7	1			7		3				4	
Swift	2			5								
Treecreeper				1								
Woodpigeon		3	14			6	1	1	1			
Wren	5	1		3			3					

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The table shows the total numbers of each species that were recorded in each distance band, or overflying, on each transect: 0 = 0-25 m distance band; 25 = 25-100 m distance band; 100/F = > 100 m distance band/ flying over.

Additional Notes: T1 – Peregrine pair high above site calling. T2 – Pair of adult and juvenile Buzzard. T3 – Juvenile and 2 adult Little Grebes. T4 – Female juvenile Kestrel and 1st summer male hunting.

Table 3.6 - July 2022 Bird Point Count Survey Results

Species	PC1			PC2			PC3 & PC4		
	0	25	100/F	0	25	100/F	0	25	100/F
Blackcap			1						1
Buzzard			1						
Coot								1	
Grey Wagtail				1					
Hooded Crow			1						
House Martin		2	1				2	1	
Kestrel	2								
Lapwing								1	
Linnet	2							1	
Little Grebe								1	
Magpie			1					1	
Mallard			1			1		2	
Moorhen			4						
Robin							1		
Sand Martin								1	
Sparrowhawk			1						1
Stock Dove			1		3 to 5				
Swallow			9				4		
Swift			1					1	
Wren	1						1	1	

The table shows the total numbers of each species that were recorded in each distance band at each point count location.

Additional Notes: PC1 – Possible House Martin and Swallow nest habitat in homogeniser building, Stock Dove foraging along quarry edge. Buzzard carrying prey. 3 juvenile and 1 adult moorhen in pond to west. Adult and juvenile Kestrel and Sparrowhawk hunting. PC2 – Stock Doves likely nesting. Grey Wagtail collecting food.

Table 3.7 - August 2022 Bird Transect Survey Results

Species	T1			T2			T3			T4		
	0	25	100/F	0	25	100/F	0	25	100/F	0	25	100/F
Blackbird	1	1		1								
Blackcap								1				
Blue Tit	1	2		1	1			1				
Bullfinch		2					1				1	
Buzzard	3	1	2	1		1						
Chaffinch	1			1	2	1						

Chiffchaff										
Chiffchaff / Willow Warbler	2									
Coot							2			
Duncock	2			1	1					
Goldcrest	2	1		2			1			
Goldfinch	5			2		1			1	
Great Tit										1
Grey Heron				1			1			
Hooded Crow				1	2				1	
House Martin	50			11			100+			
Jay		2								
Kestrel				1						1
Lesser Black-Backed Gull							1			
Linnet				4					1	14
Little Grebe							1			
Magpie		1								
Meadow Pipit										2
Moorhen							1			
Raven										2
Reed Bunting				1						
Robin	5	1		2			2	1		
Rook				7						
Sand Martin	1	1								
Sedge Warbler							1			
Song Thrush	1									
Sparrowhawk				3						
Spotted Flycatcher							3			
Stonechat				6						
Swallow	2	1		4			1	2		5
Treecreeper	1									
Willow Warbler							3			
Woodpigeon		2	32	4	1	5		1		
Wren	4	3		3			1			1

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The table shows the total numbers of each species that were recorded in each distance band, or overflying, on each transect: 0 = 0-25 m distance band; 25 = 25-100 m distance band; 100/F = > 100 m distance band/ flying over.

Additional notes: T1 - Buzzard prey pass from adult to juvenile. T2 - Calling juvenile Buzzard present.

Table 3.8 - August 2022 Bird Point Count Survey Results

Species	PC1			PC2			PC3 & PC4		
	0	25	100/F	0	25	100/F	0	25	100/F
Coot								1	

Dunnoek		1			1			
Grey Heron						1	1	
House Martin							42	
Kestrel			1	1				
Linnet			1					1
Little Grebe							2	
Magpie			2					
Robin	1			1				
Rook						7		3
Song Thrush				1				
Stock Dove		1	2					
Swallow			1	7				5
Woodpigeon					1			2
Wren		2		1				1

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The table shows the total numbers of each species that were recorded in each distance band at each point count location.

Additional notes: PC1 - Stock Dove courtship display observed. PC2 Kestrel juvenile foraging.

3.1.6 Reptile Surveys

The Common (or Viviparous) Lizard (*Zootoca vivipara*) is Ireland's only native species of reptile. Surveys targeting Common Lizard were carried out which sought to identify the presence or absence of this species on the proposed site. Surveys consisted primarily of extensive visual surveys but some reptile 'tins' were also deployed and checked in July, August and September 2022 as a supplementary survey method.

Some areas of suitable habitat are present on site such as areas of bare and recolonising ground where ground works have taken place, south-facing banks and stonewalls etc. where lizards can forage and bask in open areas proximal to cover. The grassland habitats are generally unsuitable for the species. No evidence of the presence of Common Lizard on the site was noted.



Plate X - Checking of reptile 'tins' for evidence of Common Lizard.

3.1.7 Aquatic Assessment

To be provided.

3.1.8 Other Taxa

Notes were made of other taxa during the course of ecological surveys. **Table 3.9** provides a list of butterflies, moths and dragon flies encountered during the course of surveys.

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Table 3.9 - Butterflies and Moths (Lepidoptera) and Dragon Flies (Odonata) encountered during ecological surveys.

Common Name	
Banded Demoiselle	Peacock
Black Tailed Skimmer	Red Admiral
Brown Hawker	Ringlet
Cinnibar	Ruddy Darter
Common Blue	Silver-Washed Fritillary
Common Hawker	Six Spot Burnet
Cryptic Wood White	Six-Spot Burnet
Emperor Dragonfly	Small Copper
Meadow Brown	Small Tortoiseshell
Painted Lady	Small White
	Speckled Wood

Common Frog (*Rana temporaria*) was encountered commonly on site, particularly near drains and in wet grassland habitats.

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APPENDIX 6.3

Knocknacran West Hedgerow Survey

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Knocknacran West Open Cast Mine and Community Sports Complex



Hedgerow Survey

Prepared By:



Delichon Ecology

Prepared For:

O'Donnell Environmental Limited



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Knocknacran West Open Cast Mine and Community Sports Complex

Revision	Document Number	Description	Prepared by	Checked by	Date
Draft for Comment	50_22	Hedgerow Survey	ED	ED	27/09/2022
Updated	50_22	Hedgerow Survey	ED	ED	30/09/2022
Final	50_22	Hedgerow Survey	ED	ED	30/09/2022



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1. INTRODUCTION

In June 2022, Delichon Ecology was commissioned by O'Donnell Enviro Ltd / SLR Consulting Ltd. to undertake a hedgerow survey in response to a Request for Further Information (RFI) from Monaghan County Council (MCC) (Planning File Reference Number 2234) for the proposed Knocknacran West Open Cast Mine Knocknacran (East & West) and Drumgoosat, Co. Monaghan.

This survey and report has been completed to further inform Item 17(j) and of MCC's RFI response. Item 17 (j) of the RFI correspondence requested the following:

(vii) Applicant shall provide a detailed appraisal for all hedges present on the site including species list and other qualitative data on the values of the hedgerow. It is recommended that the applicant uses the Hedgerow Appraisal System by Foulkes and Murray, Woodlands of Ireland for each hedge present.'

The hedgerow survey and accompanying reporting has been prepared to provide a response to Item 17(j) of the RFI correspondence.

1.1 PROJECT DESCRIPTION

Site Description

The Site is located in the townlands of Knocknacran (East & West), Drumgoosat, Derrynascobe, Enagh, Derrynaglah, Clontrain and Drummond, Co. Monaghan. To the south of the R179, the Site is dominated by the existing open-cast and processing plant at Knocknacran Mine, with other habitats around the periphery of the mine including a small, wooded copse and recolonising ground.

The area of the Site to the north of the R179 is dominated by former agricultural fields (now overgrown as no cutting occurs), bound by hedgerows, with some small pockets of woodland. There are areas of remediated land which is in the process of recolonisation. Beneath the surface, this area was previously exploited by the Drumgoosat Underground Mine from the 1950s to 1980s. Remediation works have taken place since 2019 to remove all structures associated with the former GAA site and community centre and to infill and regrade subsidence areas.



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Proposals

The Project proposals are provided as follows:

- The extraction of gypsum from the former (Drumgoosat) underground mine at Knocknacran West by open-cast mining methods, located in the townlands of Knocknacran (East & West) and Drumgoosat, Co. Monaghan, and the construction of a Cut-and-Cover Tunnel under the main Carrickmacross to Kingscourt regional road (R179) (which will necessitate in the temporary diversion of the R179) for the transport of gypsum (by haulage truck and covered conveyor) to the existing processing plant at Knocknacran Open-Cast Mine (an existing open-cast mine), and for the transport of overburden and interburden (by haulage truck) to the Knocknacran Open-Cast Mine for restoration purposes. The works will also include pumping of water from the Drumgoosat workings via an existing borehole on the Knocknacran West site.
- The continued restoration of the existing Knocknacran Open-Cast Mine located in the townlands of Derrynascobe, Derrynaglah, Enagh, Knocknacran (East & West) and Drummond, Co. Monaghan, currently operating under Planning Reg. Ref. 17/217, Industrial Emissions (IE) Licence P0519-04 and Mining Lease M139. This proposed final restoration plan proposes to modify the currently permitted restoration plan and return the existing Knocknacran Open-Cast Mine to near original ground levels.
- The continuation of use and refurbishment of the existing processing plant, water treatment facilities and associated infrastructure (including discharge pipeline to the River Bursk) on the existing Knocknacran Open-Cast Mine site located in the townlands of Enagh, Derrynaglah, Drummond Derrynascobe and Clontrain, Co. Monaghan currently operating under Planning Reg. Ref. 03/578, Industrial Emissions (IE) Licence P0519-04 and Mining Lease M139.
- The demolition of one residential house and three unoccupied houses and sheds in the townlands of Knocknacran West and Knocknacran East, Co. Monaghan.
- The construction of a new vehicular access to the existing Knocknacran and Drummond Mine site from the L4816.
- The further development of a Community Sports Complex located in the townlands of Drummond, Derrynaglah and Knocknacran West, Co. Monaghan. Monaghan County Council (MCC) have recently granted permission for the initial phase of this development, comprising of a new playing pitch, dressing rooms, welfare facilities, parking and associated drainage/wastewater infrastructure on the Community Sports Complex site under Reg. Ref. No: 20/365. The next phase of this specific development will include permission to extend the Community Sports Complex, approved under Reg. Ref. 20/365, comprising construction of two further playing pitches, (one with perimeter running track) and all-weather pitch, with associated goal posts, ball stops, dugouts, pitch fencing, flood lighting, new building to incorporate reception, meeting / club rooms, sports hall, handball alley, changing rooms and toilets, viewing gallery, part covered grandstand, additional parking and all associated siteworks at Drummond, Derrynaglah and Knocknacran West, Carrickmacross, Co. Monaghan.

A site location map is presented in **Figure 1.1** below.



1.2 STATEMENT OF AUTHORITY

Eamonn Delaney undertook desk and field surveys and compiled and completed this assessment and reporting. Eamonn holds a B.Sc. (Hons) in Science, and M.Sc. in Environmental Science. Eamonn has 15 years' experience in ecological consultancy. Eamonn is a full and Chartered Member of the Chartered Institute of Ecology and Environmental Management (CIEEM).



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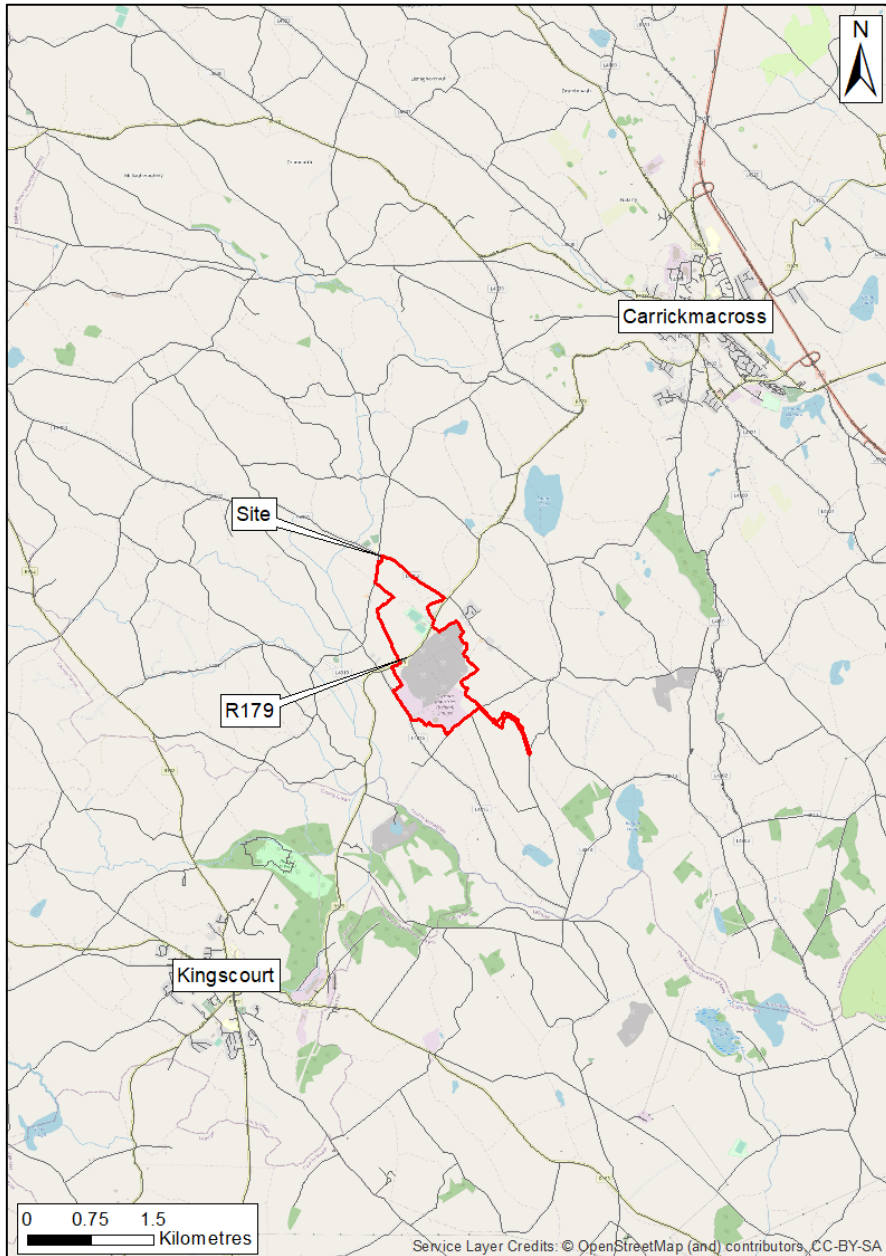


Figure 1-1: Site Location



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2 METHODOLOGY

A site walkover survey of the proposed development area was undertaken on Wednesday July 13th 2022. The survey identified and surveyed all linear woodland habitats (i.e. treelines and hedgerows) within the footprint of the proposed extension area, north of the R179. Survey methodology was undertaken in accordance with the guidelines and parameters outlined in Hedgerow Appraisal System Best Practise Guidance on Hedgerow Surveying, Data Collation and Appraisal (Foulkes *et al.*, 2013)¹.

All hedgerows and treelines within the proposed extension boundary were surveyed following the criteria outlined in Appendix B of the *Hedgerow Appraisal System Best Practise Guidance on Hedgerow Surveying, Data Collation and Appraisal* publication. This allowed for a detailed and systematic assessment of each hedgerow and treeline within the extension boundary following fixed assessment criteria based on hedgerow management, growth form, integrity, structure, landscape significance and adjacent land use. Prior to attending site, a field data sheet was prepared to capture the assessment criteria outlined in Appendix B of the *Hedgerow Appraisal System Best Practise Guidance on Hedgerow Surveying, Data Collation and Appraisal* publication. This is presented in **Appendix A** of this report.

¹ Foulkes, N., Fuller, J., Little, D., McCourt, S. & Murphy, P. (2013). Hedgerow Appraisal System - Best Practise Guidance on Hedgerow Survey, Data Collation and Appraisal. Woodlands of Ireland, Dublin. Unpublished Report.



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3 RESULTS

The field survey to inform this hedgerow appraisal was undertaken on July 13th, 2022. The survey identified 36 linear woodland features within the Knocknacran West extension area (See **Figure 3.1**). These linear woodlands are located within and border dry meadows and grassy verge grassland (GS2) (unmanaged improved grassland fields (GA1)) and wet grassland (GS4), the majority of which have not been used in recent times for grazing or mowing purposes.

Dry meadows and grassy verge grassland (GS2) within the proposed Knocknacran west extension area have established due to the recent lack of management of pastoral lands. Plant species composition typically comprises Yorkshire fog (*Holcus lanatus*), false oat grass (*Arrhenatherum elatius*), common couch grass (*Elytrigia repens*), common rush (*Juncus effusus*), creeping bent (*Agrostis stolonifera*), common bent (*Agrostis capillaris*), broadleaved dock (*Rumex obtusifolius*), ribwort plantain (*Plantago lanceolata*) and sweet vernal grass (*Anthoxanthum odoratum*). The lands that once supported Magheraclone GAA pitch have been reinstated and reseeded to form a pastoral grassland. However, this area hasn't been managed through grazing or mowing in recent years and has therefore transitioned to a dry meadow type grassland habitat, exhibited by an establishing sward comprising tall and overgrown grasses. Plant species composition includes abundant perennial rye grass (*Lolium perenne*), creeping bent, creeping buttercup (*Ranunculus repens*), white clover (*Trifolium repens*), greater bird's foot trefoil (*Lotus pedunculatus*), broad-leaved dock, red clover (*Trifolium pratense*) and Yorkshire fog (*Holcus lanatus*). This habitat also occurs in mosaic with areas of recolonising bare ground and dry meadows and grassy verge grassland habitats, near the eastern boundary of the proposed extension area, north of the R179. This area has been recently reclaimed and reinstated and has been left unmanaged in recent years. Plant species composition includes creeping bent, common bent, Yorkshire fog, false oat grass, greater bird's foot trefoil (*Lotus pedunculatus*), marsh thistle (*Cirsium palustre*), sweet vernal grass, ribwort plantain (*Anthoxanthum odoratum*), compact rush (*Juncus conglomeratus*), common rush, red bartsia (*Odontites vernus*), common knapweed (*Centaurea nigra*), meadow vetchling (*Lathyrus pratensis*), creeping cinquefoil (*Potentilla reptans*) and lesser stitchwort (*Stellaria graminea*).

Wet grassland (GS4) also occurs within the Knocknacran west extension area where it occurs near the centre and south west. Like most of the pastoral lands located within the proposed western extension area, these wet grassland habitats have been unmanaged in recent years resulting in the development of dense rushy swards, most of which are dominated by common rush. In addition to common rush, other species occur locally and include Yorkshire fog, greater bird's-foot trefoil, sweet vernal grass, creeping bent, marsh thistle, meadowsweet (*Filipendula ulmaria*), marsh willowherb (*Epilobium palustre*), angelica (*Angelica sylvestris*), silverweed (*Potentilla anserina*), jointed rush (*Juncus articulatus*), compact rush (*Juncus conglomeratus*) and meadow vetchling.

Hedgerows occur throughout the boundaries of the unused pastoral fields within the proposed western extension areas. Like the pastoral field networks, these hedgerows have been unmanaged over the short to medium term. Hawthorn (*Crataegus monogyna*) is the most common and dominant shrub species within these linear woodland habitats. Other regularly occurring species include elder (*Sambucus nigra*), young ash (*Fraxinus excelsior*) and blackthorn (*Prunus spinosa*) with occasional grey willow (*Salix cinerea* subsp. *oelifolia*), gorse (*Ulex europaeus*) and wych elm (*Ulmus glabra*). Nearer



the ruined and abandoned farmhouses and outbuildings, species such as apple (*Malus* sp.), plum (*Prunus* sp.), cherry (*Prunus* sp.) and wych elm (*Ulmus glabra*) occur.

Table 3.1 below presents the findings of the hedgerow / treeline condition assessment undertaken during the site walkover survey. This assessment considered the following variables; i.e. Context, Construction, Structure/Condition and Management in accordance with the criteria presented in **Appendix A**.



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Table 3-1 - Outline assessment of linear features within the proposed development site

Feature Number ²	Habitat Code ³	Habitat Name	Gaps (Average along feature)	Height (Average along feature)	Width (Average width at the base)	Comment
1	WL1	Hedgerow	5-10%	1.5m – 2.5m	2m-3m	Unmanaged, poorly structured hedgerow comprising hawthorn and blackthorn.
2	WL1	Hedgerow	5-10%	1.5m – 2.5m	1m-2m	Remnant hedgerow showing signs of recent disturbance and a recently excavated drain.
3	WL2	Treeline	5-10%	>4m height	1m-2m	Tall thin ash treeline overtopping hawthorn and bramble.
4	WL2	Treeline	<5% gaps	>4m height	1m-2m	Semi-mature ash treeline.
5	WL1	Hedgerow	5-10%	1.5m – 2.5m	1m-2m	Hawthorn hedgerow, regrowing following past cutting.
6	WL2	Treeline	5-10%	>4m height	1m-2m	Semi-mature cherry (<i>Prunus</i> sp.) treeline 10-15m long.
7	WL1	Hedgerow	5-10%	>4m height	1m-2m	Hawthorn hedgerow with occasional overtopping ash and cherry.
8	WL2	Treeline	5-10%	>4m height	1m-2m	Ash treeline with occasional cherry.
9	WL2	Treeline	<5% gaps	1.5m – 2.5m	2m-3m	Recently felled treeline, regrowth of multi-stemmed cherry on flailed shoots.
10	WL1	Hedgerow	5-10%	1.5m – 2.5m	1m-2m	Recently flailed hedgerow with adjoining drain comprising blackthorn, honeysuckle, bramble and dog rose.

² Refer to accompanying map

³ In accordance with Fossitt (2000) A Guide to Habitats in Ireland



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Feature Number ²	Habitat Code ³	Habitat Name	Gaps (Average along feature)	Height (Average along feature)	Width (Average width at the base)	Comment
11	WL1	Hedgerow	5-10%	1.5m – 2.5m	1m-2m	Overgrown and unmanaged hedgerow – recent tree felling and drainage channel regarding nearby. Young ash trees overtopping hawthorn, honeysuckle, gorse and ivy.
12	WL1	Hedgerow	5-10%	2.5m-4.0m	1m-2m	Overgrown and unmanaged hawthorn hedgerow.
13	WL2	Treeline	10-25%	>4m height	<1m	Ash treeline, overtopping hawthorn located on southern fringe of conifer woodland comprising young ash and hawthorn.
14	WL1	Hedgerow	5-10%	2.5m-4.0m	1m-2m	Overgrown and unmanaged hedgerow with ash, hawthorn and blackthorn.
15	WL2	Treeline	5-10%	>4m height	1m-2m	Young ash trees overtopping overgrown hawthorn hedgerow.
16	WL1	Hedgerow	5-10%	2.5m-4.0m	1m-2m	Young ash, hawthorn, bramble and honeysuckle hedgerow.
17	WL2	Treeline	5-10%	>4m height	1m-2m	Young treeline comprising young ash trees.
18	WL2	Treeline	5-10%	>4m height	1m-2m	Young ash treeline overtopping an overgrown and unmanaged hawthorn hedgerow.
19	WL2	Treeline	<5% gaps	>4m height	1m-2m	Young ash treeline overtopping hawthorn.
20	WL1	Hedgerow	10-25%	1.5m – 2.5m	2m-3m	Flailed hedgerow with hawthorn and occasional elder.
21	WL1	Hedgerow	5-10%	1.5m – 2.5m	1m-2m	Gappy hawthorn hedge with regrowing young ash trees and two maturing pedunculate oak trees.
22	WL1	Hedgerow	<5% gaps	2.5m-4.0m	1m-2m	Ash overtopping hawthorn, gorse, bramble and dog rose.



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Feature Number ²	Habitat Code ³	Habitat Name	Gaps (Average along feature)	Height (Average along feature)	Width (Average width at the base)	Comment
23	WL1	Hedgerow	<5% gaps	1.5m – 2.5m	2m-3m	Roadside hedgerow – with spreading blackthorn and occasional young ash.
24	WL1	Hedgerow	<5% gaps	1.5m – 2.5m	1m-2m	Hawthorn and blackthorn hedgerow with occasional overtopping ash.
25	WL1	Hedgerow	<5% gaps	1.5m – 2.5m	2m-3m	Dense structurally good quality blackthorn hedgerow.
26	WL2	Treeline	<5% gaps	>4m height	1m-2m	Treeline comprising semi-mature ash trees.
27	WL1	Hedgerow	5-10%	1.5m – 2.5m	1m-2m	Hawthorn hedge, recently flailed and topped.
28	WL1	Hedgerow	10-25%	1.5m – 2.5m	1m-2m	Hawthorn hedge, recently flailed and topped.
29	WL1	Hedgerow	5-10%	2.5m-4.0m	1m-2m	Hawthorn hedge with accompanying tall spindly shrubs.
30	WL1	Hedgerow	<5% gaps	1.5m – 2.5m	1m-2m	Hawthorn hedgerow with overtopping ash. Part of the hedgerow has been topped and flailed.
31	WL1	Hedgerow	<5% gaps	1.5m – 2.5m	1m-2m	Hawthorn hedgerow with spreading blackthorn and occasional ash.
32	WL1	Hedgerow	5-10%	1.5m – 2.5m	1m-2m	Flailed hedgerow dominated by hawthorn and overtopped by occasional young ash. Adjoining drainage channels has been recently regraded.
33	WL1	Hedgerow	10-25%	2.5m-4.0m	1m-2m	Flailed hawthorn hedgerow comprising spindly hawthorn and gappy ash and occasional honeysuckle and blackthorn.



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Feature Number ²	Habitat Code ³	Habitat Name	Gaps (Average along feature)	Height (Average along feature)	Width (Average width at the base)	Comment
34	WL2	Treeline	5-10%	>4m height	1m-2m	Hybrid poplar treeline used as a partial screen for the GAA grounds
35	WL1	Hedgerow	<5% gaps	>4m height	<1m	<i>Leylandii</i> hedgerow – a landscape feature of the Magheraclone GAA grounds
36	WL2	Treeline	10-25%	>4m height	1m-2m	Hybrid poplar treeline on the eastern boundary of the site, fringing a local road.



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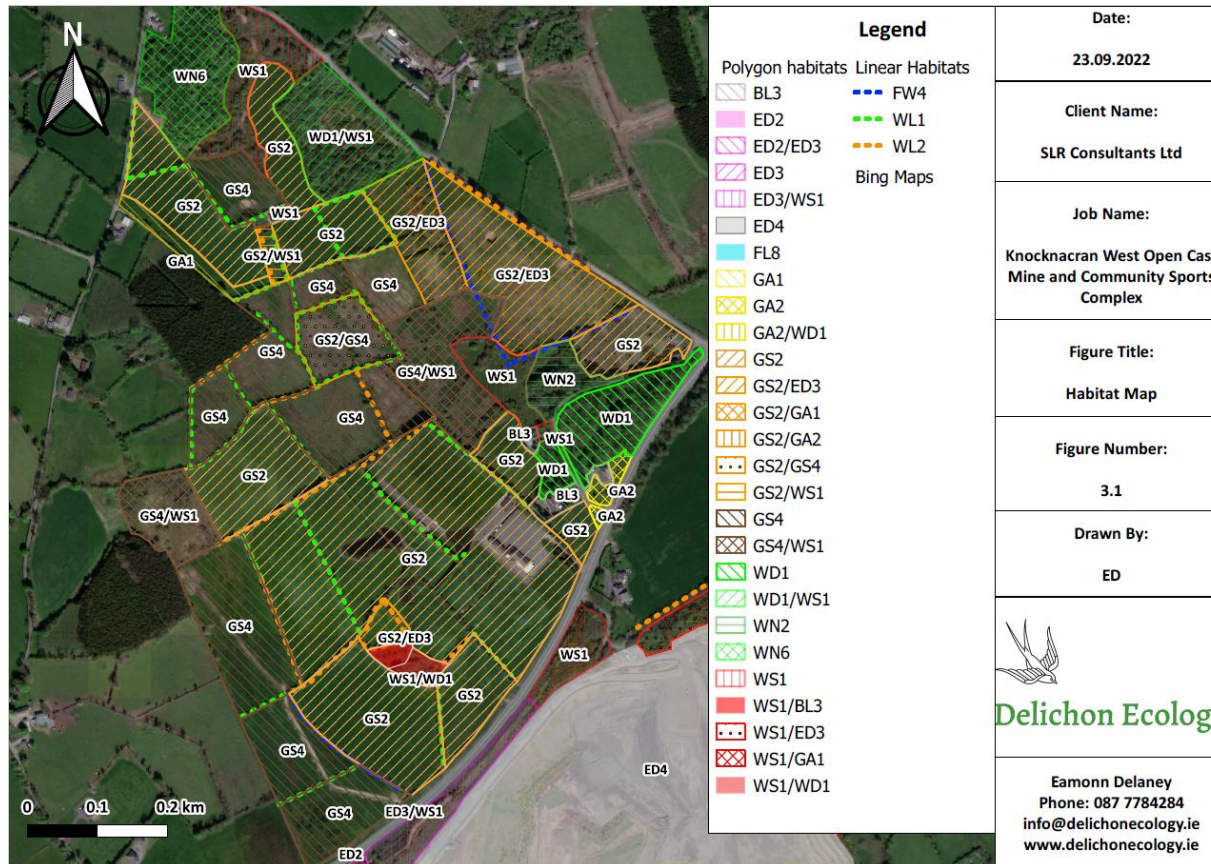


Figure 3-1: Habitats within the Knocknacran West Open Cast Mine Site



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Figure 3-2: Linear woodland habitats within the Knocknacran West Open Cast Mine Site



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Photos of Linear Woodland Features on the proposed western extension lands





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Hedgerow No. 7



Hedgerow No. 11



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Treeline No. 13



Treeline No. 15



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Treeline No. 17



Treeline No. 19



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Hedgerow No. 21



Hedgerow No. 22



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Hedgerow No 25



Hedgerow No. 28



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Hedgerow No. 30



Hedgerow No 31



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3.1 Hedgerow / Treeline Condition Assessment results

Table 3.2 below presents the findings of the hedgerow / treeline condition assessment undertaken during the July 2022 site walkover survey. This assessment considered the following variables; i.e. Context, Construction, Structure/Condition and Management in accordance with the criteria presented in **Appendix A**.

In summary, this assessment found that the majority of hedgerows and treelines within the study area were located upon or adjoined by earth banks and were situated within a pastoral landscape. Ongoing pastoral activities such as grazing and mowing have not been carried out in recent years, resulting in the establishment of rough grassy meadows and wet rushy pastures. The majority of hedgerows and treelines surveyed were single line hedges, were located upon small earth banks which were typically less than 1.0m in height. Many of the hedgerows and treelines surveyed were unmanaged and overgrown, support routine gaps at the base and localised proliferation of bramble within the shrub layer. Nonetheless, there was evidence of some recent maintenance through flailing and topping of previously unmanaged hedgerows and treelines; e.g. hedgerows 10, 20, 30, 32 and 33. Hedgerows within or adjoining the wet grassland areas (See **Figure 3.2**) were typically fringed by narrow, shallow and dry drainage channels, bearing limited carrying capacity. Like the maintenance operations mentioned for the above hedgerows, some of these drainage channels have been subject to recent regrading.

The hedgerows and treelines surveyed were not typically livestock proof and the field boundaries were supplemented by post and wire fencing or barbed wire fencing attached to the shrub stems. Some unmanaged hedgerows have developed in treelines such as Hedgerows 3, 4, 8 and 15, comprising tall thin semi-mature ash trees overtopping hawthorn, blackthorn and occasional elder. Ground flora at the base of the hedgerow and treeline structures were poorly developed, with little evidence of diverse vernal forb and grass species present.

Most hedgerow shrubs within the study area are overgrown, with the average hedgerow height measuring between 1.5m and 4.0m. Hedgerows were gappy within the proposed extension site. In addition, many of the hedgerows within the study area have not received management in the recent past. The majority of hedgerows surveyed were classified as either relict or overgrown.

Treelines within the proposed extension site occur as overgrown and unmanaged hedgerows as described or treelines occurring along roadside and amenity facilities, such as the hybrid poplar treelines located on the eastern roadside boundary of the site (Treeline 36) and that fringing Magheraclone GAA grounds. The old farmhouse near the southern roadside boundary (R179) comprises a treeline with semi-mature ash trees (Treeline 18) possibly established as a shelter belt when the dwelling was operational.



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Table 3-2 - Hedgerow Condition Assessment Criteria⁴ – Result of site walkover survey

	Condition Assessment Criterion	A	B	C	D	E	F	G1-3	G4	H	I/I1	J	K	L	M/M1	N	O	P	Q	R/R2	S	U	U1/U2	V	W	X
Hedgerow / Treeline Number	1	H	1	C	B	2	A	11A	1	A	2A	C	2	C	3A	D	3	B	2	A0	B	J	n/a	7	A	1
	2	H	1	C	B	1	A	11A	1	A	3A	E	2	B	3B	C	3	B	2	A0	B	J	n/a	7	A	1
	3	H	1	C	C	1	A	11A	2	A	2A	E	4	B	3A	C	3	E	2	E0	B	J	n/a / 10	7	A	1
	4	H	1	C	C	1	A	11A	2	A	3A	E	4	B	3A	C	3	E	2	E0	B	J	n/a / 10	7	A	4
	5	H	1	C	C	1	A	11A	1	A	2A	E	2	B	3A	D	3	A	3	E0	B	J	n/a	7	A	4
	6	H	1	C	C	1	A	11A	1	A	2A	E	4	B	3A	C	3	E	2	E0	B	J	n/a	7	A	4
	7	H	1	C	C	1	A	11A	1	A	2A	E	4	B	3B	C	3	C	2	E0	B	J	n/a	7	A	4
	8	H	1	C	C	2	A	110	2	B	1A	E	4	B	3A	C	3	E	2	E0	B	J	n/a / 10	7	A	4
	9	H	1	C	C	2	A	11A	1	A	2A	C	2	C	2A	D	3	A	3	E0	A	E	n/a	1	A	4
	10	H	1	C	C	2	A	11A	1	B	3A	C	2	B	3A	C	3	A	3	E0	B	E	n/a	1	A	1
	11	H	1	C	C	1	A	11A	1	B	2A	E	2	B	3A	C	2	C	2	E0	B	J	n/a	7	A	1
	12	H	1	C	C	2	A	11A	1	B	3A	E	3	B	3A	C	2	B	2	B0	B	C	n/a	1	A	1
	13	H	1	C	C	1	A	11A	2	A	3A	A	4	A	4A	A	2	C	2	E0	A	C	n/a / 10	1	A	1
	14	H	1	C	C	1	A	11A	1	A	2A	E	3	B	3A	C	2	C	2	E0	B	C	n/a	1	A	1
	15	H	1	C	C	1	A	11A	2	B	3A	E	4	B	3A	C	2	C	2	E0	B	C	n/a / 10	1	A	1
	16	H	1	C	C	1	A	11A	1	B	4A	B	3	B	3A	C	2	C	2	E0	B	C	n/a	1	A	1
	17	H	1	C	C	1	A	11A	2	B	2A	E	4	B	3A	C	3	D	2	E0	B	C	n/a / 10	1	A	1
	18	H	1	C	C	1	A	11A	2	B	3A	E	4	B	3A	C	2	E	2	E0	B	K	n/a	7	A	1
	19	H	1	C	C	1	A	110	2	B	1A	E	4	B	2A	C	3	E	2	E0	C	J	n/a	7	A	2
	20	H	1	C	C	1	A	110	1	B	2A	B	2	C	4A	C	3	A	3	E0	B	C	n/a	1	A	1
	21	H	1	C	C	1	A	21B	1	A	2A	B	2	B	3A	C	3	B	2	E0	B	E	n/a	7	A	1
	22	H	1	C	B	2	A	11B	1	A	2A	E	3	B	A1	D	3	C	2	E0	C	J	n/a	7	A	1

⁴ Explanatory notes for each criterion is presented in **Appendix A**.



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	Condition Assessment Criterion	A	B	C	D	E	F	G1-3	G4	H	I/I1	J	K	L	M/M1	N	O	P	Q	R/R2	S	U	U1/U2	V	W	X
	23	H	1	C	K	2	A	11A	1	A	2A	E	2	C	2A	D	3	B	2	E0	C	J	n/a	7	A	1
	24	H	1	C	B	1	A	110	1	A	1A	B	2	B	2A	D	3	C	2	E0	B	J	n/a	1	A	2
	25	H	1	C	C	2	A	110	1	A	2A	E	2	C	2A	D	3	B	2	E0	C	E	n/a	7	A	1
	26	H	1	C	F	2	A	110	1	B	1A	E	4	B	2A	C	3	E	2	E0	C	J	n/a	7	A	4
	27	H	1	C	C	2	A	110	2	B	1A	B	2	B	3A	C	3	A	3	E0	A	E	n/a	1	A	1
	28	H	1	C	C	1	A	110	1	B	2A	B	2	B	4A	C	2	A	3	E0	A	J	n/a	7	A	2
	29	H	1	C	C	1	A	110	1	A	3A	B	3	B	3A	C	3	B	2	E0	B	J	n/a	7	A	1
	30	H	1	C	C	1	A	110	1	A	1A	F	2	B	2A	D	3	B	2	E0	B	J	n/a	7	A	1
	31	H	1	C	E	2	A	11A	1	B	3A	E	2	B	2A	C	3	A	3	E0	C	J	n/a	7	A	1
	32	H	1	C	C	2	A	11A	1	B	3A	B	3	B	4A	A	2	B	2	E0	B	E	n/a	7	A	1
	33	H	1	C	C	1	B	11A	1	B	3A	B	2	B	3A	A	2	B	2	B0	A	E	n/a	7	A	1
	34	H	1	C	C	1	A	110	2	B	1A	E	4	B	3A	A	3	E	2	B0	B	K	n/a	7	A	4
	35	H	1	C	C	2	A	110	1	A	1A	E	4	B	2A	D	3	A	2	E0	C	J	n/a	7	A	1
	36	H	1	C	K	1	A	11A	2	B	2A	E	4	B	3A	A	3	E	2	B0	B	K	n/a	7	A	4



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3.2 Hedgerow / Treeline Significance

Table 3.3 examines the significance of hedgerows within the study area in accordance with the parameters provided in Foulkes *et al.*, 2013. Hedgerows were considered to be significant in terms of historical significance and many linear woodland features near the south-western and western sections of the proposed extension site are identified on 1st edition Ordnance Survey mapping. On balance, hedgerows were considered to be slightly significant in terms of ground flora and of low significance in terms of species diversity. The structure, construction and habitat connectivity of hedgerows within the study area were deemed to be moderately significant due to accompanying earth bank and drainage channels and their relatively continuity and interconnectivity across the study area and immediate environs.

In terms of ecological significance, hedgerows and treelines on site are considered to be of Local Importance (higher value)⁵. Hedgerows and treelines on site provide the main source of ecological connectivity and transit for faunal species, particularly avifauna and bats within the site. Furthermore, the hedgerow and treeline habitats and their accompanying earth banks provide greatest potential for foraging and breeding habitat for burrowing mammals including badger (*Meles meles*) and fox (*Vulpes vulpes*).

Table 3.3 - Hedgerow Significance (historical, ecological and landscape)⁶

Hedgerow Number	Historical Significance	Species Diversity Significance	Ground Flora Significance	Structure, Construction & Associated Features	Habitat Connectivity Significance	Landscape Significance
1	3_Significant ⁷	0_Low Significance ⁸	1_Slightly Significant ⁹	2_Moderately Significant ¹⁰	2_Moderately Significant ¹¹	1_Slightly Significant ¹²
2	3_Significant	0_Low Significance	1_Slightly Significant	2_Moderately Significant	2_Moderately Significant	1_Slightly Significant
3	3_Significant	0_Low Significance	1_Slightly Significant	2_Moderately Significant	2_Moderately Significant	1_Slightly Significant
4	3_Significant	0_Low Significance	1_Slightly Significant	2_Moderately Significant	2_Moderately Significant	1_Slightly Significant
5	3_Significant	0_Low Significance	1_Slightly Significant	2_Moderately Significant	2_Moderately Significant	1_Slightly Significant
6	3_Significant	0_Low Significance	1_Slightly Significant	2_Moderately Significant	2_Moderately Significant	1_Slightly Significant

⁵ Following the National Road Authority's *Guidelines for Ecological Impact Assessment of National Road Projects* (NRA (TII), 2009)

⁶ Assessed in accordance with (Foulkes *et al.* 2013) *Table 1: Criteria for assessing Hedgerow Significance (historical, ecological and landscape)*

⁷ Boundary appears on 1st Edition O.S.

⁸ 1-3 species / 30m strip

⁹ (2-3 species / 30m strip)

¹⁰ Wall / Bank 0.5 - 1m

¹¹ Multiple links with semi-natural habitats, including other hedgerows

¹² Wind shaped



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Hedgerow Number	Historical Significance	Species Diversity Significance	Ground Flora Significance	Structure, Construction & Associated Features	Habitat Connectivity Significance	Landscape Significance
7	3_Significant	0_Low Significance	1_Slightly Significant	2_Moderately Significant	2_Moderately Significant	1_Slightly Significant
8	3_Significant	0_Low Significance	1_Slightly Significant	2_Moderately Significant	2_Moderately Significant	1_Slightly Significant
9	3_Significant	0_Low Significance	1_Slightly Significant	2_Moderately Significant	2_Moderately Significant	1_Slightly Significant
10	3_Significant	1_Slightly Significant ¹³	1_Slightly Significant	2_Moderately Significant	2_Moderately Significant	1_Slightly Significant
11	3_Significant	1_Slightly Significant	1_Slightly Significant	2_Moderately Significant	2_Moderately Significant	1_Slightly Significant
12	3_Significant	0_Low Significance	1_Slightly Significant	2_Moderately Significant	2_Moderately Significant	1_Slightly Significant
13	3_Significant	0_Low Significance	1_Slightly Significant	2_Moderately Significant	3_Significant ¹⁴	1_Slightly Significant
14	3_Significant	0_Low Significance	1_Slightly Significant	2_Moderately Significant	3_Significant	1_Slightly Significant
15	3_Significant	0_Low Significance	1_Slightly Significant	2_Moderately Significant	1_Slightly Significant	1_Slightly Significant
16	1_Slightly Significant	1_Slightly Significant	1_Slightly Significant	2_Moderately Significant	1_Slightly Significant	1_Slightly Significant
17	1_Slightly Significant	0_Low Significance	1_Slightly Significant	2_Moderately Significant	1_Slightly Significant	1_Slightly Significant
18	3_Significant	0_Low Significance	1_Slightly Significant	2_Moderately Significant	2_Moderately Significant	1_Slightly Significant
19	3_Significant	0_Low Significance	1_Slightly Significant	2_Moderately Significant	2_Moderately Significant	1_Slightly Significant
20	3_Significant	0_Low Significance	1_Slightly Significant	2_Moderately Significant	2_Moderately Significant	1_Slightly Significant
21	3_Significant	1_Slightly Significant	1_Slightly Significant	2_Moderately Significant	2_Moderately Significant	2_Moderately Significant
22	1_Slightly Significant	0_Low Significance	1_Slightly Significant	2_Moderately Significant	3_Significant	1_Slightly Significant
23	2_Moderately Significant ¹⁵	1_Slightly Significant	1_Slightly Significant	2_Moderately Significant	2_Moderately Significant	1_Slightly Significant
24	1_Slightly Significant	1_Slightly Significant	1_Slightly Significant	2_Moderately Significant	3_Significant	1_Slightly Significant

¹³ 4-5 species / 30m strip

¹⁴ Link with woodland / forest habitat

¹⁵ Roadside Boundary



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Hedgerow Number	Historical Significance	Species Diversity Significance	Ground Flora Significance	Structure, Construction & Associated Features	Habitat Connectivity Significance	Landscape Significance
25	3_ Significant	0_Low Significance	1_Slightly Significant	2_Moderately Significant	3_ Significant	1_Slightly Significant
26	1_Slightly Significant	0_Low Significance	1_Slightly Significant	2_Moderately Significant	2_Moderately Significant	1_Slightly Significant
27	1_Slightly Significant	0_Low Significance	1_Slightly Significant	2_Moderately Significant	2_Moderately Significant	1_Slightly Significant
28	3_ Significant	0_Low Significance	1_Slightly Significant	2_Moderately Significant	2_Moderately Significant	1_Slightly Significant
29	1_Slightly Significant	0_Low Significance	1_Slightly Significant	2_Moderately Significant	2_Moderately Significant	1_Slightly Significant
30	1_Slightly Significant	0_Low Significance	1_Slightly Significant	2_Moderately Significant	3_ Significant	1_Slightly Significant
31	1_Slightly Significant	0_Low Significance	1_Slightly Significant	2_Moderately Significant	3_ Significant	1_Slightly Significant
32	1_Slightly Significant	1_Slightly Significant	1_Slightly Significant	2_Moderately Significant	2_Moderately Significant	1_Slightly Significant
33	1_Slightly Significant	1_Slightly Significant	1_Slightly Significant	2_Moderately Significant	2_Moderately Significant	1_Slightly Significant
34	0_Low Significance	0_Low Significance	1_Slightly Significant	2_Moderately Significant	2_Moderately Significant	0_Low Significance
35	0_Low Significance	0_Low Significance	1_Slightly Significant	2_Moderately Significant	2_Moderately Significant	0_Low Significance
36	0_Low Significance ¹⁶	0_Low Significance	1_Slightly Significant	2_Moderately Significant	2_Moderately Significant	0_Low Significance

¹⁶ Also a roadside boundary features – however it is a recently planted hybrid poplar treeline of low historical importance.



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4 SUMMARY

In summary the linear woodland (hedgerow and treeline) habitats associated with the proposed extension area support the following characteristics:

- The proposed extension site primarily supports unmanaged and overgrown hedgerow and treeline habitats. These hedgerows and treelines are relict structures, and few retain stock proofing functionality.
- The linear woodland structures on site exhibit poor ecological diversity, typically supporting 2-3 shrub / tree species and a depauperate ground flora.
- Trees and shrubs within these hedgerows are typically young and semi-mature;
- Most hedgerows support hawthorn with accompanying blackthorn and occasional / localised elder, dog rose, honeysuckle and cherry and frequent or co-abundant ash trees;
- Some unmanaged hedgerows have formed into young treelines comprising young ash trees overtopping overgrown hawthorn shrubs;
- In spite of poor botanical diversity of the hedgerow and treeline habitats at Knocknacran west, they are considered to be of Local Importance – Higher value¹⁷. This is due to their ecosystem service in the locality potential providing valuable green infrastructure and corridors of connectivity for local ecological receptors (including bats, non-volant mammals, passerine birds and birds of prey) within the pastoral landscape at Knocknacran west and environs.

¹⁷ In accordance with the evaluation classification criteria outlined in the *NRA Guidelines for Ecological Impact Assessment of National Road Projects* (NRA, 2009).



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APPENDIX A – HEDGEROW MANUAL DATA RECORDING FIELD SHEETS – EXPLANATORY NOTES¹⁸

¹⁸ Criteria in accordance with: Foulkes, N., Fuller, J., Little, D., McCourt, S. & Murphy, P. (2013). Hedgerow Appraisal System - Best Practise Guidance on Hedgerow Survey, Data Collation and Appraisal. Woodlands of Ireland, Dublin. Unpublished Report.

Appendix B: Hedgerow Manual data recording field sheets – explanatory notes

These notes are for field use to assist in finalising the survey field sheets available at www.heritagecouncil.ie/landscape/resources-links/ prior to submission to the National Hedgerow Database located in the NBDC.

Note: * denotes a data category derived from desk study, i.e. maps, documents, databases, etc.

Surveyor(s)	Name(s), address & contact details
Date of Recording	Date of field survey (day: month: year)
*D ID	Unique identifier: 3 character OS hectad reference; 2 digit hedge number identifier; 1 alpha character <i>a</i> or <i>b</i> to indicate 30m strip, e.g. H13.01a
*D OS_Square	3 character OS hectad reference
*D Length	Total length (m) of polyline
*D Start_node_to_start_of_1st_30m_strip_	Distance in metres
*D End_of_1st_30m_to_start_of_2nd_30m_	Distance in metres
*D End_of_2nd_30m_to_End_Node_	Distance in metres
<u>Context</u>	
*D Corine	CORINE Land Cover Classification
*D Soil Type	This can be assessed using the appropriate layer on the NBDC website www.biodiversityireland.ie
GPS_Start_Point	
GPS_End_Point	
*D a1. Elevation_max.(m)	Record maximum elevation of the hedge using GPS or Discovery Series contours.
*D a2. Elevation_min.(m)	Record minimum elevation of the hedge using GPS or Discovery Series contours.
*D b1. Aspect_Side_1	Using 16 major compass points deduce the aspect of each side based on a straight line drawn from one end of the hedge to the other.
*D b2. Aspect_Side_2	See above.
A. Adjacent Land Use (1)	Record the type of farming carried out on lands adjacent to the hedge – record both sides of the hedge.
a tillage	
b dairy	
c cattle	
d sheep	
e mixed stock	
g equine	
h other	
l fodder	Meadow cut or left for making silage or hay

j	curtilage	Fossitt BL3 and BC4
k	amenity / golf course / playing field	
l	parkland / demesne	
*D	B. History (1)	With reference to the 6 inch to one-mile OS Maps, note if the hedge is a Townland, County or other boundary of historical significance.
	1 internal farm boundary	
*D	2 townland / parish, etc. boundary	
*D	3 canal side boundary	
*D	4 railway line boundary	
	5 farm boundary	Townland boundaries, etc. should be assumed to be property boundaries.
	B1. History Road_/_Stream (0,3)	
*D	1 road	
	2 stream	Only record if it meets Fossitt watercourse definitions
	3 recently established	Hedgerow up to c.25 years old
*D	B1a. Road Class (0,1)	For roadside hedges only
	NP – National Primary	
	NS – National Secondary	
	R – Regional	
	L – Local	
	U – Unclassified	
	F – Farm Road or Track	
	B2. History Ordnance Survey (0,2)	
*D	1. Boundary present on 1st Edition OS Map	6 inch to one-mile
*D	2. Boundary present on 2nd Edition OS Map	6 inch to one-mile
	B3. Sites and Monuments Record (0,1)	
*D	3. Boundary connects to feature on SMR	Sites and Monuments Record can be found at www.archaeology.ie
	B4. Old Woodland Link (0,2)	

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*D	a Boundary connects to woodland on 1 st edition OS	
	b Boundary shown as treeline on 1 st edition OS	
	C. Adjacent Land Classification (1+) &	Record the Fossitt (2000) habitat (to the greatest level of detail possible) for land on both sides of the hedge
	D. Habitat Link Classification (1+)	This category is primarily applicable to the ends of the hedge. If the hedgerow links at any other point with any other listed habitat that is not recorded in C this should also be recorded. A 'link' is applicable only where the hedge physically borders or runs in to another habitat type. Where a break of 5 metres or less, such as a gateway, occurs between the hedge and the other habitat, treat this as being linked. Where the canopies of trees in the hedge and the other habitat meet (often over distances of 10m +), include as a link. Likewise, if a ditch continues past the hedge to link up with, for example, a watercourse, record as a link.
	a arable (BC)	
	b improved grassland (GA)	
	b1 neglected pasture (GA)	
	c semi-natural grassland (GS)	
	d non-native woodland (WD)	
	e semi-natural woodland / scrub (WN)	
	f scrub/transitional woodland (WS)	
	g curtilage/built land (BL)	
	g3 curtilage/built land (BL3)	BL3 Buildings and artificial surfaces
	h peatlands (P)	
	i lake/pond (FL)	
	j watercourse (FW)	
	k other (target note)	
	m hedgerow (WL1 or WL2)	
	n earthbank (BL2)	
	o re-colonising bare ground (ED3)	
*D	D3. Designated Site (0,1)	Record if hedgerow is within or immediately adjacent to any designated site.
	1 Annex 1 habitat	
	2 designated site	NHA, SAC, SPA layers can be found at http://www.npws.ie/protectedsites/ and at http://maps.biodiversityireland.ie/Maps.aspx

	3 designated woodland	
	E._Boundary Function (1)	This refers specifically to the functionality of the hedge line as a farm / field boundary. Does the same stock have simultaneous access to land on both sides of the hedge? An active boundary must be stockproof, irrespective of the condition of the hedge. A redundant boundary may not necessarily be redundant for shelter or other functions.
	1 hedge redundant	
	2 active boundary	
	<u>Construction</u>	
	*D F._Outline (1)	Assess whether the hedge runs in a straight line or has a more curved or irregular plan. This may best be noted from the map.
	a linear	
	b non-linear	
	G1._Linearity_of_Shrubs_ (1)	
	1 Single Line Hedge	where the linearity of the hedgerow stems is principally defined by a single line
	2 Double Line Hedge	where the linearity of the hedgerow stems is principally defined by a two separate and distinct lines
	3 Random Line	Where the hedgerow stems do not appear to follow any distinct linear pattern record
	G2._Bank,_Wall,_Shelf (1)	
	1 Bank	
	2 Wall	
	3 Shelf	
	0 none of the above features	
	G3._Drain (1,2)	
	a External Drain	Double Ditch should be recorded as a_a
	b Internal Drain	
	c Internal Path, Track-way, etc.	Where this category is recorded structural, management and floristic recording should be made on the hedge on the side of the lane nearest to the randomly selected point that identified the hedge
	0 none of the above features	

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G4. Boundary Classification (1)	Fossitt classification of recorded feature
1 WL1	Hedgerow
2 WL2	Treeline
H. Bank,Wall,Shelf_size__ (1)	The height of these features should be estimated as the average along the length of the hedge. Record the height above the general ground level of the top of the earth or stone bank (also called ditch!). Take care not to record the bank height from the level of bottom of shallow drains. A stone-breasted bank, containing earth / clay, should not be confused with a stone wall. A shelf is where the ground level is different between the two sides of the hedge (often in roadside situations). The height of a shelf is the difference between the two levels.
a < 0.5m	
b 0.5 – 1 m	
c > 1m	
d not applicable	
I Drain Size (1)	Drains tend to be approximately square in cross section. The measurements denote width and depth of the drain. An assessment based on volume should be made for very wide, shallow drains or very deep, narrow drains.
1 not present	
2 small (<0.5m)	
3 medium (0.5 – 1m)	
4 large (>1m)	
I1. Drain_Wet/Dry (0,1)	
a dry ditch / drain	
b wet ditch / drain	
<u>Structure/Condition</u>	For structural attributes the recording should be taken as an average for the hedge length as a whole. With the exception of Category <i>M</i> this average should not include the gaps in the hedge.
J Profile (1)	The cross-sectional profile of the hedge

a remnant	The remains of what used to be a hedge, has no consistent profile. A remnant hedge is generally indicated by a (broken) line of mature or senescent plants in tree, rather than shrub form. Almost invariably has a high percentage of gaps, although may have bits of shrubby growth (including brambles) along its length. Once the remains of a hedge covers <25% of a boundary, it is no longer classed as remnant and is not recorded (including for extent). <i>For a remnant hedge only record categories A-J, M,O, R, and U-Y.</i>
b relict (derelict)	Where shrubs and thorns of the hedge component have mostly grown up into trees, no longer displaying shrubby, dense growth form in the bottom 1-2 metres of the hedge. Plants have potential for rejuvenation.
c boxed / A shape	Has been cut into some form of a box- or A-shape, even if the last one or two years growth since cutting does not give the impression of a straight, neat, clipped hedge. 'Boxed' does not necessarily mean cut down low, hedges can be cut quite high (up to around 2 metres or more).
d overgrown/irregular	This type will have more of a base structure than type b.
e. top heavy / undercut	Hedges that have been managed in the lower section and allowed to grow up and out on top.
f straight sided	A hedge that has been completely breasted (side cut) but not topped
g wind-shaped	Shaped by the effects of strong prevailing winds.
J1._Profile_base_suffix (0,2)	
a losing basal structure	Where many of the shrubs of the hedge component do not display a horizontal mesh of branches in the lowest 1m; most of the lower portion of stems are visible (unless obscured by herbage/ground flora).
b outgrowths at base	Where shrubs / scrub are spreading laterally in to the verge alongside the base over the majority of the length. This is most commonly seen where blackthorn, gorse or damson plants are suckering out from the base of the hedge.
K Height (1)	
	This is estimated as an average over the whole length of the hedge to best fit classes. Where there is a distinct tree layer the measurement is taken as the height of the woody shrub layer. For managed hedges – 'height' should be the height at the last trimming/cutting point; otherwise the recorded height category could vary dependent on the time of year the hedge is surveyed.
1 <1.5m	
2 1.5 – 2.5m	
3 2.5 – 4m	
4 4 - 5m	
5 5m+	
K1._Height_overhead_cables (0,1)	
a overhead wires/cables	

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L Width (1)	This is estimated as an average over the whole length of the hedge to best fit classes.
a < 1m	
b 1- 2m	
c 2 - 3m	
d 3 m+	
M. __%_of_Gaps_ (1)	This is an assessment of the percentage of the length of the hedge that no longer has a cover of hedgerow shrubs. Gaps that are filled with brambles and /or non woody vegetation are still recorded as gaps
1 complete	
2 < 5 % gaps	
3 5 - 10 % gaps	
4 10 - 25 %	
5 25 - 50 %	
6 > 50 %	
M1. Gaps_Specific_or_general (0,1)	
a general	Individual gaps < 5m
b specific	Any individual gap >5m
N Base Structure (1)	Rampant growth of brambles and cleavers or other climbers in the base of the hedge can be deceptive regarding the density at the base of the hedge. Picture the density in winter when foliage is absent for a more accurate assessment of base structure.
a open / translucent	Little or no horizontal mesh of branches of woody shrubs in the bottom metre.
b scrawny, semi-translucent	More light/ vegetation than hedge growth. The horizontal mesh of branches or bushy growth of hedging shrubs at base of the hedge is unlikely to prevent movement of stock through the hedgerow.
c semi-opaque	More hedge growth than light/ vegetation.
d dense / opaque	Shrub growth and horizontal meshing of branches in the bottom metre, sufficiently dense to contain livestock.
N1. Base_- Vegetation (0,1)	
a vegetation	Record where the space in the lower 1m of the hedge is filled with growth of brambles or other herbage/ vegetation, etc.

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O. Bank Degradation Degree_ (1,2)	
1 not applicable	No bank, wall or shelf.
2 none	
3 severe	Degree of erosion or degradation - bare soil may be showing, root systems may be exposed.
4 minor	
5 drain blocked/waterlogged	
O1. Bank Degradation__ Extent (1)	
a general >10%	Damage occurs over >10% of the length of the hedge
b isolated	Damage occurs at up to 10% of the length of the hedge.
P. Trees Quantity (1)	Should reflect where species have reached tree proportions (particularly for hawthorn) diameter at breast height (DBH >8cm).
a none	
b few up to 15%	
c scattered 15 – 30%	
d abundant 31-75%	
e line >75%	
Q. Tree Age Composition (1)	For the purpose of this survey, immature trees are defined as having a diameter at breast height (DBH) of no more than 8 cm. Planted saplings, whips, etc. that are clearly intended to be trees should be recorded as such. Some discretion is required on the part of the surveyor as long as the basis of discretion is explained for the benefit of those using the data.
1 all mature	
2 predominantly mature	
3 predominantly immature	
4 mixed age range	
5 none	
Q1. Tree Height (max) (1) &	Record the maximum and minimum height for trees within the hedge.
Q2. Tree Height (min) (1)	

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a <3m	
b 3-5m	
c 5-10m	
d 10-20m	
e >20m	
R._Verge_/_Margin__Width (1)	This refers to an uncultivated strip or undisturbed grassy margin alongside the hedge. In the case of tillage or arable land, this will be an unploughed/ unplanted strip (a sterile strip is not counted as a verge). In grassland situations a verge is where the edge of the field is clearly not seeded, managed, or utilised as the rest of the field, such as where grazers are excluded by a fence. A fenced off area in from a hedge should be counted, but a strip left after mowing for hay/silage should not. This should be clearly indicated by the surveyor. Record for both sides of the hedge.
a < 1m	
b 1 - 2m	
c 2 - 4m	
d 4m +	
e none	
R2._Verge_/_Margin_Degradation (0,2)	Record for both sides of the hedge.
0 none	
1 poached within 2m	
2 ploughed within 2m	
3 herbicide use >20%	Herbicide use over >20% of the length of the side of the hedge.
S._Vigour_(1,2)	An assessment of the average amount of new growth (annual increment), in terms of protruding shoots, along the length of the hedge.
a poor	This recording is appropriate where there are few new shoots, little annual increment, and /or shoots are weak or unhealthy looking.
b average	
c good	
d poor in part	
e basal decay	Evidence of dead wood in the base of hedgerow trees and shrubs.
f. evidence of disease	This includes fungal disease, mildew, etc.

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<u>Management</u>	
U._Management_ (1+)	
a cut box profile	
b cut 'A' shape	
c cut on one side	
d cut on both sides	
e topped	
f excavator	This applies where land excavator type machinery has been used for hedge management purposes. Usually this involves knocking over mature stems along the hedge line and compressing them. Occasionally just the side growth is 'folded' or 'tucked' back into the hedge. Both cases are identified by partially broken rather than cut wounds.
g fully laid	
h laid in part	This category applies where gaps have been dealt with by laying
i coppiced	Cut no higher than 10cm from the ground
j short term unmanaged	Applies where options a-i and m have not been implemented in the last 3-5 years.
k long term unmanaged	Where there is no evidence of management activity in the last 5+ years.
l infill planting	Evidence that young plants have been introduced into the hedge to fill gaps.
m pruned	Selective cutting of individual hedgerow plants.
n other (target note)	
o cropped	Cut between 10cm and 1m from ground (high coppicing.)
U1._Management_-_out_of_season (0,1)	
a. out of season	Cut between 1 st March and 31 st August.
U2._Management_Stage	This is based on work done by Hedgelink in the UK, detailed in www.ptes.org/files/1353_hedgemanagementcycle.pdf
1	Heavily over-trimmed with many gaps and sparse stems, their bases gnarled or rotting.
2	Over-trimmed, infrequent stems too far apart to be 'let up' for laying. Hard knuckle at trim line, shrubs developing mushroom shaped growth form.
3	Over-trimmed, frequent stems. Stems still healthy but require more height. Hard knuckle may be starting to form at trim line.
4	Recently layed, coppiced, or planted hedgerow.

5	Healthy, dense, hedgerow with frequent stems and more than 2m in height.
6	Either a) Hedgerow more than 3m high and trimmed on rotation, or b) May also be non-intervention hedge, having intentionally been left un-trimmed for several years.
7	Hedgerow with frequent healthy stems more than 4m high.
8	Mature tall hedgerow with spreading tops. Stems still healthy (although they may be infrequent) but too large (more than 18cm in diameter) for laying.
9	Over-mature hedgerow with tops dying back, collapse possible. Perhaps becoming dominated by tree species.
10	Hedge developed into line of trees.
V. Management Method (1+)	This must be determined by examining the cuts at the hedge front over which machinery has passed. If a hedge clearly has been managed but the surveyor is unsure as to the means employed, record as 7, 'unsure'.
1 flail	
2 circular saw	
3 bar cutter	
4 hand tools	
5 excavator	
6 other	
7 unsure	
8 not applicable	
W. Evidence of Rejuvenation - Past (1,2)	Laying is detected by looking in at the hedge stems to see if any are growing horizontally, or at an upward angle with lesser shoots / stems growing vertically from these. Often it can be seen where the hedge was laid as long as several decades ago. Sometimes branches can have a horizontal growth form as a result of a reaction to trimming, this should not be confused with laid stems. Closer inspection should reveal the source of the action. The scar tissue around the clean wounds from hedge laying is significantly different from those caused by the action of machinery. Past coppicing is generally detected by multiple stems originating from the same point at or close to ground level of species where this would not be the typical habit.
a no evidence	
b past evidence of laying	
d past evidence of coppicing	
W1. Evidence of Rejuvenation - Recent	

c	recent evidence of laying	Within the last 5 years.
d	recent evidence of coppicing	
X Fencing (1)		Record for both sides of the hedge.
1	none	
3	electric	
4	post & wire	
5	sheep wire	
6	timber fence	
7	concrete post and rail	
X3. Fencing__wire_to_stems		
2	fixed to stems	Record if wire is fixed to hedgerow stems irrespective of other fencing.
Y Ground Flora (1,5)		
d	noxious weeds	Record the following on the DAFOR scale <ul style="list-style-type: none"> ▪ Common ragwort (<i>Senecio jacobea</i>) ▪ Spear thistle (<i>Cirsium vulgare</i>) ▪ Creeping or field thistle (<i>C. arvense</i>) Two species of dock: the curled dock (<i>Rumex crispus</i>) and the broad-leaved dock (<i>Rumex obtusifolius</i>).
e	nutrient rich >20%	>20% of ground layer dominated by nutrient rich species – nettles, docks, cleavers (<i>Galium aparine</i>).
f	use of herbicide	>10% of ground layer affected.
h.	alien invasive species	Record presence of alien invasive species, primarily Japanese Knotweed, Giant Rhubarb, Spanish Bluebell and Himalayan Balsam. See also; http://invasivespeciesireland.com/most-unwanted-species/established/terrestrial/?pg=1

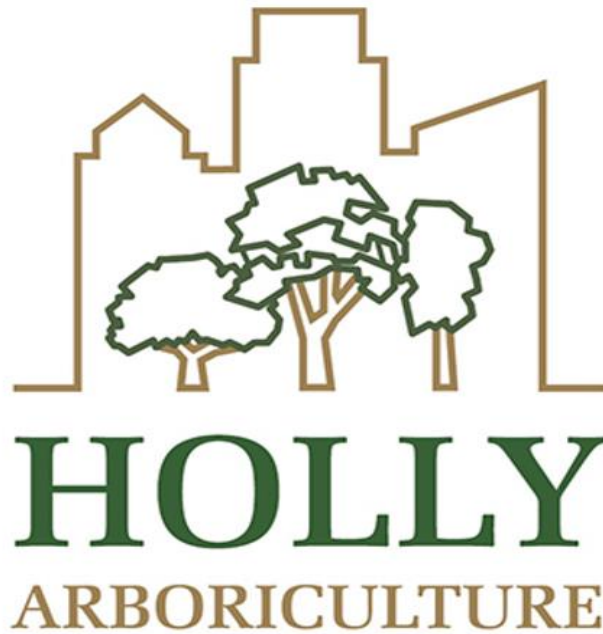
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APPENDIX 6.4
Tree Protection Management Plan

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Tree Management and Protection Plan, Knocknacran Mine, Co Monaghan.

Prepared For: Tom O'Donnell, O'Donnell Environmental.

Prepared By: Paul Holly L4 DipArb, TechArbor A.

Date: 13-10-2022

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1. Instructions

I have been instructed by Tom O'Donnell of O'Donnell Environmental Ltd. to carry out a site visit at Knocknacran Mine, Co Monaghan in order to;

- Prepare a 'Tree Management & Protection Plan' in respect of the proposed project.

2. Purpose of this Report

2.1 This report is an arboricultural review of the site in the context of the proposed works.

This includes;

- a) an assessment of the sites existing tree population within its current context.
- b) an assessment of their potential for sustainable retention in the post-works scenario.
- c) the likely effects and repercussions of the development and construction process upon those trees.
- d) information supporting the appropriate tree protection measures to avoid damage during the construction process, to achieve sustainable tree retention.

This assessment summarises my findings and recommendations, after reviewing the proposed project details, the BlueSky survey as provided, and after my own evaluation of tree population following my site visit.

2.2 This report also includes a preliminary "Arboricultural Method Statement" at section 8 as well as a Tree Protection Plan that illustrates the requisite conservation and protection methodologies necessary to maintain tree sustainability. This report is not intended as a critique of the proposed development but is an impartial assessment of the development implications relating to the sustainable retention of trees, whether that be any, some, or all trees. This report is for planning purposes only and may be deficient for construction phase use

2.3 The survey is designed to be an independent analysis of the tree population on site. It is likely that changes in site usage, development or other environmental changes will require an amendment of any tree's potential retention status and its preliminary management recommendations, and in some instances, may require the re-classification of a tree's suitability for retention.

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3. Introduction

3.1 The site is located between Magheracloone and Knocknacran off the R179. The site was characterised by intensive agriculture supporting open fields and divided mostly by hedgerows. The majority of these hedgerows have 'lapsed' meaning they have not been maintained for a number of years and as a result many tree species (mostly ash) have been left to grow into trees. The species diversity in these hedgerows is limited, the bulk being hawthorn and ash.

There are cottages and old farm buildings, around which larger trees have been left to mature in groups. These make up attractive copses displaying some more species including sycamore, ash and cypress.

At present the site contains many trees of varying condition, age class and quality. Zone 1 in particular is an area of high quality trees. There is a range of broadleaf and conifer species creating a tall canopy and excellent habitat. There also exists a sub-storey of scrub vegetation mostly thickets of bramble, willow, hazel and fern species.

It is recognised that the proposed works will involve mass excavation and therefore removal of a large proportion of the trees on site. The trees considered for sustainable retention shall be located in close proximity to the boundaries of the site with some exceptions to the north and east.

Photographs of the proposed site are shown in Appendix 1. A specification for tree protection fencing is shown in Appendix 2. Relevant drawings are shown in Appendix 3.

3.2 I can confirm that I have prepared this report in accordance with the ethical and professional standards expected of a technician member of the Arboricultural Association. This means that I am acting completely independent, and my fee is not dependent upon my opinions or outcome, and that the opinions I do reach are the same whosoever may have instructed me.



[Tree location map courtesy of NTM™ National Tree Map™ – © Bluesky International Ltd.]

4. Report Limitations

4.1 I surveyed the tree population at a preliminary level only. The survey must not be substituted for a tree risk assessment report. Detailed inspection including decay mapping, aerial inspections, root, or soil analysis etc was not undertaken.

4.2 The trees were viewed from public vantage points and within the site boundaries only.

4.3 The recommendations within this report are valid for a 12-month period only and this may be reduced in the case of any change in conditions to or within the proximity of the trees.

4.4 Some areas of the site to the north are heavily overgrown with bramble and this restricted full access to all trees; where full access was not possible a general assessment was made of trees based on what observations were possible.

4.5 This survey has been carried out to provide a preliminary assessment of the existing trees and vegetation on site. It is not intended as a detailed health and condition survey of the entire tree population. If a more detailed survey is required for individual trees which may be able to be retained by tree surgery or other means, this will be noted in the findings section.

4.6 Tree location data is provided by Bluesky's 'National Tree Map'. This dataset shows the location, height and canopy/crown extents for trees 3m and above in height. Known limitations of this data include the identification of discrete clusters of small trees as one larger tree in some instances.

5. Survey Data Collection and Methodology

5.1 Tree location, height and spread data was provided by Bluesky International's National Tree Map™ database. This provides the following information on all significant trees over 3 meters in height located on site and plotted on the land survey map provided. For ease of reference a numbering scheme was applied to this data.

- Tree Number (Digital number attached to each tree corresponding to QGIS drawing).
- Location.
- Height.
- Approximate crown spread.

5.2 Additional notes during my site visit have been taken in relation to the tree population surveyed. These are broad observations regarding;

- Tree species.
- Dimensions (Trunk diameter, height).
- Age Class.
- Physiological Condition.
- Structural Condition.
- Preliminary Recommendations.
- Estimated remaining contribution within their present environment.

Each tree or tree group included within this assessment has been referenced by number that relates to the main BlueSky Tree Survey. The tree numbers used in this report correspond to those used in the BlueSky Tree Survey to ensure seamless cross-referencing throughout.

5.3 The inspection of the trees involves a visual assessment from ground level only and does not include any invasive means of assessing the trees internally, their below ground parts or the aerial parts that are not visible from the ground. Good, fair, and poor have been used to summarize the physiological and structural conditions of these trees with the comments giving more detail. Other items that may limit the assessment of a tree included ivy cover, scrub vegetation and/or basal suckers obscuring view.

5.4 The trees have been plotted as part of a topographical survey of the site and can be seen on the accompanying drawing (No. HA/0922/Knocknacran). The tree numbers referred to in this report, have been shown on this drawing along with their crown spreads. This drawing has been developed as a constraints plan (Minimum Root Protection Areas) and has been prepared for the design team to aid in the detail design for the construction activity. It is of the utmost importance that further discussion takes place regarding the final design including locating underground utilities. Including the author of this report as part of this design team is critical to avoid unnecessary tree loss or windthrow.

5.5 The Root Protection Area (RPA) is the minimum area around individual trees to be protected from disturbance during construction works; RPA is usually expressed as a radius in metres measured from the tree stem.

For single stem trees, the root protection area (RPA) has been calculated as an area equivalent to a circle with a radius 12 times the stem diameter.

For trees with more than one stem, one of the two calculation methods, a) & b) below have been used. The calculated RPA for each tree should be capped to 707 m².

a) For trees with two to five stems, the combined stem diameter has been calculated as follows:

$$\sqrt{((\text{stem diameter } 1)^2 + (\text{stem diameter } 2)^2 \dots + (\text{stem diameter } 5)^2)}$$

b) For trees with more than five stems, the combined stem diameter has been calculated as follows:

$$\sqrt{((\text{mean stem diameter})^2 \times \text{number of stems})}$$

6. Findings

6.1 The tree population on site was assessed during my site visit on the 22nd of September 2022. The field notes and commentary for the tree population is contained below and should be read in conjunction with the tree drawing (No. HA/0922/Knocknacran).

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6.2 Field notes and general commentary

Ref	Zone	NTM_ID	Mean Tree Height*	Perimeter*	Area*	Lat.	Lng.	Species	Comment
890	5	NTM_P_680798_68069925_79983850	7.19	52	50.25	53.9415779	-6.77084394	Oak	Mature oak trees, early mature in age. RPA 5m. Well balanced crowns, good specimens, retention desirable.
895	5	NTM_P_680798_68069900_79985025	11.83	75	135.9	53.9416835	-6.77084465	Oak	Mature oak trees, early mature in age. RPA 5m. Well balanced crowns, good specimens, retention desirable.
968	5	NTM_P_680798_68053575_79997537	5.34	53	82.81	53.942833	-6.77329755	Ash	Tree line centred 968: Typical old ditch line, lapsed hedge, RPA approximately 3.6m. High canopy ash, some early signs of ADB but in general looking in good condition. Heavily colonised by ivy.
969	5	NTM_P_680798_68037150_79997675	11.21	26	17.63	53.9428709	-6.77579838	Poplar	16 meters approx. in height with a root protection area of 4.8m. The tree is located adjacent to a water course. Ground level changes suspected here.
990	4	NTM_P_680798_68058900_79999237	8.84	99	226.7	53.9429774	-6.77248218	Mix	Tree line centred 990: Comprised mostly of small diameter ash, heavily colonised by ivy. Sub storey of lapsed hawthorn and bramble. Evidence of windthrow with one large ash tree (see photo 7) as well as ADB. RPA approximately 4m.
1036	5	NTM_P_680800_68035649_80001649	9.77	75	90.06	53.9432303	-6.77601634	Poplar	Co-dominant stem at 5m, RPA 6m. Extensive wounds from excavator, poor condition, slight lean east. Should not be considered a constraint on the project.

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1065	4	NTM_P_680800_68 059149_80003862	9.46	132	409.9	53.9433926	-6.77243191	Mix	Tree line centred 1065: A group of 10-12 multi-stemmed ash and one sycamore (1095). RPA 4m. Height 10-14m, heavily colonised by ivy, evidence of ADB, low Arboricultural merit. Trees adjacent to B2: Species include elder, Japanese knotweed, lawson cypress, mature ash trees. Condition fair – good.
1068	5	NTM_P_680800_68 045399_80004012	9.3	88	202.6	53.9434274	-6.77452538	Ash/mix	High canopy ash trees, all the result of lapsed hedge in which trees develop through the lack of hedge cutting. Signs of ADB present here. The hedge also contains hawthorn and some sycamore. Trees growing in close proximity, competition for space has led to suppressed crowns. No trees of any particular arboricultural merit here.
1095	4	NTM_P_680800_68 059737_80005499	6.37	9	3.06	53.9435388	-6.77233812	Mix	Tree line centred 1065: A group of 10-12 multi-stemmed ash and one sycamore (1095). RPA 4m. Height 10-14m, heavily colonised by ivy, evidence of ADB, low Arboricultural merit. Trees adjacent to B2: Species include elder, Japanese knotweed, lawson cypress, mature ash trees. Condition fair – good.
1203	5	NTM_P_680800_68 041099_80015937	2.71	51	71.81	53.9445054	-6.7751488	Mix	Predominantly regenerative willow with some examples of young and semi mature ash. An understorey of

									bramble, gorse and hawthorn. The ash is showing signs of 'Ash Dieback' (ADB). No trees of any particular arboricultural merit here.
1377	5	NTM_P_680800_68058474_80033999	6.45	90	255.1	53.9461012	-6.7724552	Mix	Tree line centred 1377: Small diameter hawthorn, ash, lapsed hedgerow. No trees of any arboricultural merit.
1386	5	NTM_P_680800_68046437_80034974	3.01	30	40.06	53.9462075	-6.77428583	Mix	Tree line centred 1386: Lapsed hedgerow, dominated by ash trees, small diameter. One sycamore in the centre. RPA 3m.
1392	5	NTM_P_680800_68084712_80035437	12.03	92	187.1	53.9461894	-6.76845566	Leylandii cypress	Tree line centred 1392: Leylandii cypress tree group, 10-12m in height. Grown as boundary hedge. Reasonably well maintained by flail mower up to 6m. RPA 4m.
1401	1	NTM_P_680800_68086399_80036537	12.56	96	178.1	53.9462856	-6.76819575	Mix	Mix of elder, willow, hawthorn, aspen, ferns, ivy and bramble to make up the sub-storey of vegetation here. High canopy species include ash in close proximity, scots pine, oak and willow. The oak trees (1401 & 1424) here are excellent specimen trees, early mature in age class. All trees in this copse are to be considered for retention.
1421	1	NTM_P_680800_68091162_80038124	10.59	125	473.3	53.9464208	-6.76746626	Mix	To the east of this group the ground seems to be reclaimed and is 1-1.5m higher than the ground level in the copse of trees. The RPA here shall be in line with the existing stock proof fencing. The water course to the north

									acts as a natural protective feature for this tree group. New bat roost building: Tree line of willow, blackthorn and sycamore along the fence line. No trees of any Arboricultural merit here.
1424	1	NTM_P_680800_68088612_80038174	12.33	116	245.9	53.9464292	-6.76785447	Mix	Mix of elder, willow, hawthorn, aspen, ferns, ivy and bramble to make up the sub-storey of vegetation here. High canopy species include ash in close proximity, scots pine, oak and willow. The oak trees (1401 & 1424) here are excellent specimen trees, early mature in age class. All trees in this copse are to be considered for retention.
1563	5	NTM_P_680800_68041449_80049599	3.65	60	108.3	53.9475291	-6.77500688	Mix	Tree line centred 1563: Lapsed hedgerow of dense blackthorn, hawthorn, ferns, bramble and gorse. An ash tree also present.
1605	Poplars	NTM_P_680800_68089149_80054099	5.44	9	3	53.9478591	-6.76773044	Poplar	Tree number 1605: Small diameter Poplars trees along boundary with local access road. 16 meters in height, RPA 4m. These poplars have been planted in a linear orientation in close proximity to each other. Some trees have dominated the space and others have been suppressed.
1607	5	NTM_P_680800_68043324_80054387	7.29	76	188.7	53.9479563	-6.77470872	Mix	Tree line centred 1607: Group of ash, lapsed hedgerow with hawthorn, blackthorn, bramble and dog rose. Good condition.

1646	Poplars	NTM_P_680800_68 080799_80058862	14.81	70	125.9	53.9483	-6.76898952	Poplar	Tree number 1646: Larger poplars, 20-22m in height, excavation within root zone evident. Tree protection fencing required to ensure no incursion into the RPA. RPA 6m.
1656	5	NTM_P_680800_68 044237_80060324	6.15	46	69.69	53.9484883	-6.77455411	Ash	Ash tree, showing signs of ADB.
1664	5	NTM_P_680800_68 045324_80061487	6.15	81	168.2	53.9485911	-6.77438542	Ash	Copse of ash trees. Good condition, close proximity, small stem diameter, 12-14m in height.
1695	2	NTM_P_680800_68 051574_80065812	6.12	98	330.5	53.9489699	-6.77342214	Mix	Tree number 1695 and surrounding copse. Dominated by willow with birch and oak becoming established. Ground vegetation of ferns, ivy, bramble and ash whips plentiful. Age class young, approximately 25 years. Steep topography descending north towards local access road. No trees of particular arboricultural merit.
1718	5	NTM_P_680800_68 031174_80067574	7.85	101	291.4	53.9491599	-6.77652446	Ash	Ash x2, ADB present.
1775	5	NTM_P_680800_68 023249_80070912	12.01	88	231.9	53.9494721	-6.77772269	Ash	Heavily colonised by ivy, reasonably well balanced crown. Growing from a hedgerow of hawthorn, blackthorn and bramble. RPA 4.8m.
1779	2	NTM_P_680800_68 063274_80071174	3.99	57	108.4	53.9494335	-6.77162605	Mix	A mix of planted species including hazel, lime, ash and birch. Young in age class. Naturally regenerating species such as dog rose, hawthorn and willow are also present. This creates a nice copse of trees and

									retention here is desirable. Excavation is to occur close to this section. Tree protective fencing shall be set 4m from trees to be retained.
1790	2	NTM_P_680800_68 062674_80071699	4.4	32	34.19	53.9494816	-6.77171605	Mix	Tree group to include 1779, 1790, 1796, 1805 and surrounding trees A mix of planted species including hazel, lime, ash and birch. Young in age class. Naturally regenerating species such as dog rose, hawthorn and willow are also present. This creates a nice copse of trees and retention here is desirable. Excavation is to occur close to this section. Tree protective fencing shall be set 4m from trees to be retained.
1796	2	NTM_P_680800_68 062137_80072049	4.38	49	85.81	53.9495138	-6.77179699	Mix	Tree group to include 1779, 1790, 1796, 1805 and surrounding trees A mix of planted species including hazel, lime, ash and birch. Young in age class. Naturally regenerating species such as dog rose, hawthorn and willow are also present. This creates a nice copse of trees and retention here is desirable. Excavation is to occur close to this section. Tree protective fencing shall be set 4m from trees to be retained.
1801	3	NTM_P_680800_68 036887_80072412	6.41	119	426.8	53.9495857	-6.7756417	Mix	A little copse of regenerative willow, some examples of young ash. To the north of the planned excavation

									works, the ground rises as a mound exists creating the appearance of a more mature, established copse of trees. Ash showing signs of ADB, hawthorn, sycamore and willow present. RPA 5m.
1805	2	NTM_P_680800_68 061224_80072799	3.85	59	111.9	53.9495826	-6.77193399	Mix	Tree group to include 1779, 1790, 1796, 1805 and surrounding trees. A mix of planted species including hazel, lime, ash and birch. Young in age class. Naturally regenerating species such as dog rose, hawthorn and willow are also present. This creates a nice copse of trees and retention here is desirable. Excavation is to occur close to his section. Tree protective fencing shall be set 4m from trees to be retained.
1824	5	NTM_P_680800_68 023762_80073874	6.65	58	101.3	53.9497374	-6.77763685	Mix	Trees 1866 1824 1809: Ash and small diameter sycamore. Located on the north side of the road in neighbouring land.
1865	2	NTM_P_680800_68 044912_80075949	5.55	69	168.6	53.949891	-6.77441014	Mix	Tree number 1865 and surrounding trees: Examples of elder and ash with plenty of emerging blackthorn becoming established. Young in age class, evidence of ground level changes here in recent past. It is planned to remove the majority of this group.

1983	2	NTM_P_680800_68 046824_80084199	7.58	105	309.3	53.9506292	-6.77409712	Mix	Tree number 1983,2003,1986: Small diameter ash, ADB present. Hawthorn, elder and willow present, close proximity, poor form. No trees of particular arboricultural merit.
1986	2	NTM_P_680800_68 048524_80084237	4.8	68	145.9	53.9506299	-6.7738381	Mix	Tree number 1983,2003,1986: Small diameter ash, ADB present. Hawthorn, elder and willow present, close proximity, poor form. No trees of particular arboricultural merit.
2003	2	NTM_P_680800_68 046924_80085549	2.74	32	35.75	53.9507503	-6.77407833	Mix	Tree number 1983,2003,1986: Small diameter ash, ADB present. Hawthorn, elder and willow present, close proximity, poor form. No trees of particular arboricultural merit.

* NTM™ National Tree Map™ – © Bluesky International Ltd.

6.3 Where trees are to be removed, efforts shall be made to consider replacement trees of an appropriate specification and species to be planted in locations which shall allow the full maturation of the species. Replacement planting shall be site specific with an emphasis on quality stock, location, establishment, and aftercare instead of a purely numerical approach, for example 1 for 1 replacement.

7. Impact Assessment of the Proposed Development

7.1 This section discusses the potential impact of the proposed development on the existing tree population on site and considers the need for mitigation measures in accordance with BS5837(2012), for sustainable development.

Implementation of the proposed plans (as understood from the drawings supplied) will entail the mass excavation of the site, leaving the boundaries protected along with pockets of land to the north and east of the site. A full inventory of the number of trees to be removed is as yet undetermined, however it is reasonable to suggest that up to 80-85% of trees on site shall be removed to facilitate project works. This is without question a huge impact on the tree population and this shall change the landscape radically.

7.2 From my field notes, the majority of these trees would be categorised as 'C' in accordance with the cascade chart illustrated in Table 1 of BS 5837:2012.

Category C – *Trees of low quality/value with a minimum of 10 years life expectancy or of a young age class/size that can be easily replaced with new planting.*

These trees would be seen as having the potential to provide tree cover for the short to medium term or if of a young age class or small size to develop to form part of the future tree cover and possibly move from a category C to A or B. This category consists of trees of all age classes from young to mature. These trees should not be seen as a considerable constraint on the design layout but should be considered for retention where viable.

7.3 Trees on site which would be categorised as B or A would be those within ZONE 1, Poplar trees and some examples but not many in ZONE 2 & 3.

8. Arboricultural Method Statement/Tree Protection Strategy

8.1 The objective of this arboricultural method statement/tree protection strategy is to provide information to the main building contractor/site manager on how trees need to be protected during a construction project so that they can prepare their own site-specific detailed method statement for their works.

8.2 It is essential that tree protective fencing is erected, and all other mitigation measures are put in place that are required prior to the construction works commencing on site and all these measures must enclose and protect the root zone of the tree vegetation proposed for retention.

8.3 The protection of the tree population shown for retention on the development site is divided into three main sections starting with the pre-construction stage right through to post-construction and the reassessment of the retained trees.

8.4 Stage 1: Pre-Construction Works

Prior to the main construction works commencing on site the following needs to be planned:

- 1.** The client or main contractor needs to appoint an Arboriculturist for the duration of the project. The Arboriculturist is to make regular site visits to ensure that the tree protection measures are in place and adhered to.
- 2.** The main contractors and all sub-contractors work force are to be briefed on the tree protection and ensure that these measures are to be kept in place throughout the construction period.
- 3.** All personnel are to adhere to the recommendations of the appointed Arboriculturist.
- 4.** Any issues in relation to the trees shown for retention must be discussed with the appointed project Arboriculturist and the necessary mitigation measures put in place without delay and prior to the specific works being carried out.

Site meeting

Prior to any works commencing on site, it is necessary that a meeting be arranged between the project manager, site foremen, the project landscape architect, the project Ecologist, the project Arboriculturist and local authority to identify all trees, tree group and hedge vegetation for retention and the position of the protective fencing. The positioning of the protective fencing shown on our drawing is a preliminary drawing and subject to final

ground truthing following discussion between project manager, site foremen, the project landscape architect, the project Ecologist and Arboriculturist and local authority.

Tree works

The client or the main contractor is to appoint a competent tree surgery company to carry out the remedial tree surgery works and tree felling that are required for the construction phase of the scheme. The tree surgery contractor is to produce a method statement detailing how they plan to undertake the works and informing the site foreman of the process so the necessary steps can be taken to ensure the works are carried out safely and efficiently. The works are to be carried out by appropriately trained personnel taking account of the recommendations of BS3998 2010.

Tree removal

Trees for removal will be shown in the construction site clearance drawings and these are to be classified on site by the project Arboriculturist. The method for removing stumps is to be carried out to the recommendations of the project Arboriculturist. Where necessary, to avoid damage to trees being retained and surrounding structures, trees are to be removed in sections by a tree surgeon (Arborist). The roots and stumps are to be dug out with a digger except where the stumps are located within the RPA (root protection area) of trees being retained. In this instance, the stumps are to be ground out with a mechanical stump grinder taking care not to cause damage to the roots of trees being retained.

Remedial tree surgery works

The necessary remedial tree surgery works required to promote health and safety of the trees being retained are to be carried out. A schedule of these works is to be produced by the project Arboriculturist taking into consideration the trees within their new built environment and prior to these works being carried out; they are to be agreed with the local authority. These measures will be included in the construction documents.

Erection of the protective fencing

Once the trees have been removed, the line of the protective fencing that is required around the trees and tree groups being retained is to be erected prior to the main construction works commencing. The fencing needs to be 2.3m high and constructed in accordance with figure 2 of BS 5837 2012 (see fencing detail in Appendix 2) using vertical

and horizontal scaffold bars well braced together with the verticals spaced out at a maximum of 3m centres. Onto this, weld mesh panels are to be securely fixed with wire or scaffold clamps. Signs need to be attached to these fences warning people 'Tree Protection Area keep out'. See detail within appendix 2. Once the protective fence line is erected, then the main construction works can commence on site.

Storage of Material, Work Yards, and staff car parking

These areas must be identified on the construction drawings prior to the construction works starting. These must be positioned outside the root protection areas around the trees being retained.

8.5 Stage 2: The Construction Works Stage

Protective fencing

During the course of the works, special attention must be paid to ensure that these fences remain upright, rigid, and complete at all times. They must be checked daily by the main contractor/foreman and any damage noted must be fixed immediately. If works need to take place inside the protective fence lines, then the project Arboriculturist must be informed in advance of the works taking place and the mitigation measures required to reduce impact on the tree vegetation agreed. These mitigation measures will include the supervision of these works by the project Arboriculturist. The protective fencing is to remain in place throughout the construction works phase and must only be removed when all the works are complete and at that stage the retained trees and hedge vegetation will be incorporated into the finished landscape.

Excavations

The site clearance and excavation works are only to commence once the protective fence line is in place. The site clearance area needs to be marked out on site with the project manager, site foreman and the project Arboriculturist in advance of any works to determine the extent of the impact on the workspace required to allow for the construction works to proceed and to assess what additional mitigation measures will be required to protect the tree, tree group and hedge vegetation for retention. In certain areas, it may be necessary to use an alternative method of excavating or construction to prevent encroachment into the RPA of the trees to be retained and this may include such methods as retaining walls or similar. Where roots of tree and hedge vegetation to be retained are exposed during the excavation works, these are to be assessed by the project Arboriculturist and pruned back

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beyond damaged material. The excavated face is then to be covered with soil or with damp Hessian sacking to prevent further drying out and death of root material. Where the Hessian sacking is used, it will be necessary to keep this moist especially during dry periods.

Working within the RPA (Root Protection Area)

If it becomes necessary to carry out works within the RPA of a tree/trees, these must be discussed and agreed with the project Arboriculturist. All works must be carried out manually. Root pruning is to be undertaken by an Arboriculturist using proprietary cutting tools such as a secateurs or hand pruning saw. The ground within the RPA of the trees must be protected from damage as per the recommendations of section 6.2.3 of BS5837 2012.

Finished ground levels/Landscaping

The existing ground levels within the RPA of trees must be retained and incorporated into the finished landscaped works areas. Where changes in levels occur, these are to be either graded into the finished levels starting outside the RPA or alternatively, retaining wall structures are to be used differentiating between the different levels. All soft and hard landscaping within the RPA of the trees to be retained must be carried out manually and the soil levels must not be lowered or raised resulting in root damage to the trees. All surfaces are to be porous to allow the free movement of air and moisture to the roots below.

Recommendations of sections 8 of BS5837 2012 must be adhered to during the landscaping within the RPA of the trees being retained.

Other items

The following is a list of additional activities that are not allowed within the RPA or within the vicinity of the trees being retained.

- 1 - Storage of equipment, fuel, construction material, or the stockpiling of soil or rubble.
- 2 - Burning rubbish
- 3 -The washing of machinery
- 4 - Attaching notice boards, cables, or other services to any part of the tree.
- 5 - Using neighbouring trees as anchor points.
- 6 - Care is required when using machinery such as Tele-porters, cranes or other equipment close to trees so as not to damage the crown or any other parts.

8.6 Stage 3 Post Construction Works

This project is not to be considered complete until all retained vegetation has been re-examined by the project Arboriculturist and the remedial works necessary to ensure their health and their immediate safety of the end user of this road and adjoining properties are implemented.

This report has been produced as part of the design stage of the project scheme and is for the sole use of the above-named client and refers to only those trees identified within. Its use by any other person(s) in attempting to apply its contents for any other purpose renders the report invalid for that purpose.

Disclaimer

The statements made in this report do not take account of the effects of extremes of climate, vandalism, or accident whether physical, chemical or fire. Holly Arboriculture cannot therefore accept any liability in connection with these factors, nor where prescribed work is not carried out in a correct and professional manner in accordance with current good practice. The authority of this Report ceases at any stated time limit within it, or if none stated after two years from the date of the survey or when any site conditions change or pruning or other works unspecified in the Report are carried out to, or affecting, the subject trees, whichever is the sooner.

Information contained in the Report is current as at the date of the Report and may not reflect any event or circumstances which occur after the date of the Report.

All queries related to the content, or to any use of this report must be addressed to Paul Holly.

Signed



Paul Holly
Consultant Arboriculturist

Date: 30-September-2022

Appendix 1. Photographs

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[Photo 1; T969, view looking south.]



[Photo 2; T1036, view looking north]



[Photo 3; Tree line centred 1068, View looking north.]



[Photo 4; Tree line centred 968.]



[Photo 5; Tree line centred 968.]



[Photo 6; Tree line centred 1132.]



[Photo 7; Windthrown ash in Tree line 990.]



[Photo 8; Tree line centred 1065]



[Photo 9; Building 2 surrounded by copse of trees at Zone 4.]



[Photo 10; Tree numbers 895 & 890, Oak trees.]



[Photo 11; Tree line centred 1392.]



[Photo 12; Tree numbers 1408 & 1406, Scots pine x 2]



[Photo 13; Building, new bat roost. Young sycamore and willow to the south.]



[Photo 14; View looking west at Zone 1.]



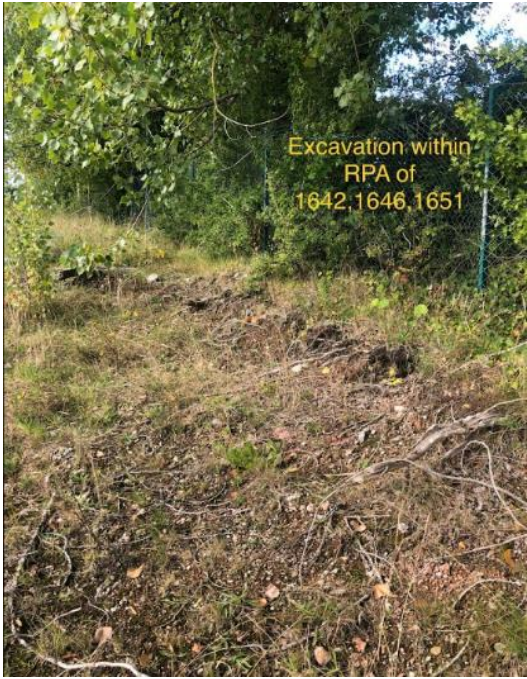
[Photo 15; Zone 1, view looking north west.]



[Photo 16; Watercourse running north of Zone 1.]



[Photo 17; Poplars, note group of smaller and larger poplars.]



[Photo 18; Excavation within RPA of poplars.]



[Photo 19; Poplars view looking south east.]



[Photo 20; Tree number 1801 and surrounding copse, mostly regenerative willow and ash.]

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[Photo 21; Tree numbered 1664 & 1665, note the ADB symptoms of 1656.]



[Photo22; Tree numbered 1775, ash heavily colonised by ivy.]

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[Photo 23; Zone 3, view looking east.]



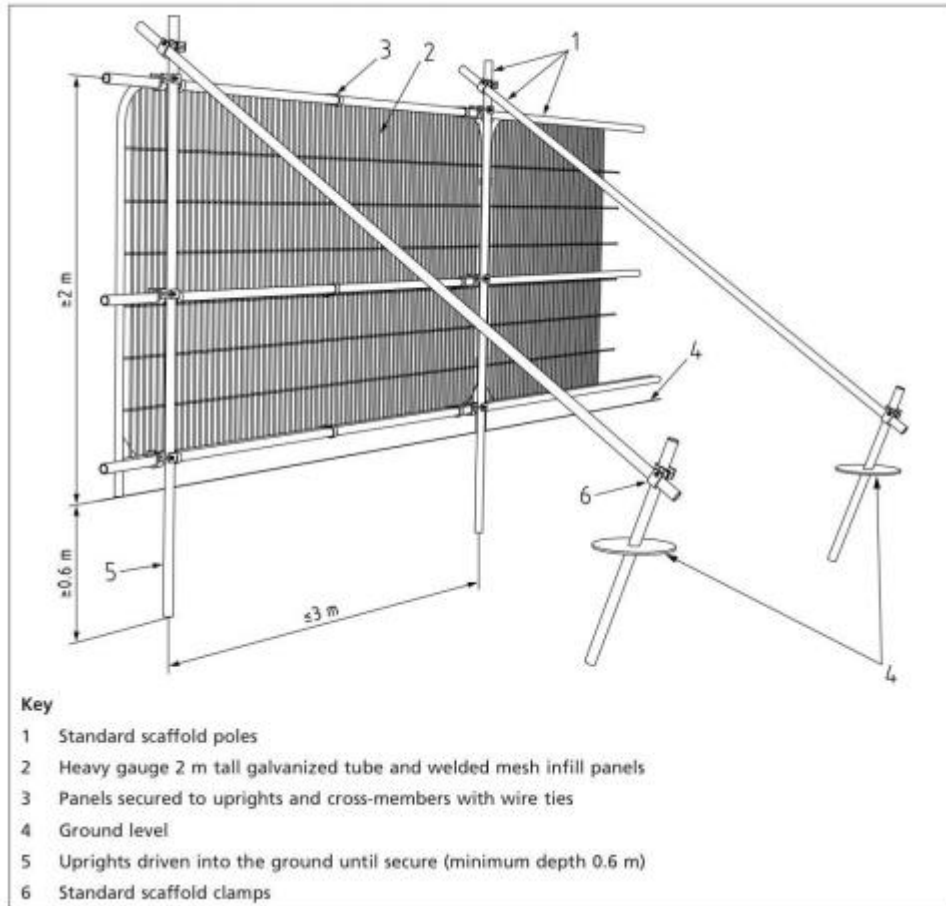
[Photo 24; Tree number 1718, ash x2.]

Appendix 2. Tree Protective Fencing

Below are illustrations as recommended in BS 5837. These illustrations provide a visual representation of possible options for the construction of the protective fencing.

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Figure 2 Default specification for protective barrier



Sample Fencing signage





PROTECTIVE FENCING

**THIS FENCING MUST BE
MAINTAINED IN ACCORDANCE
WITH THE APPROVED
PLANS AND DRAWING
FOR THESE WORKS**



TREE PROTECTION AREA KEEP OUT !

**TREES ENCLOSED BY THIS FENCE
ARE TO BE RETAINED & PROTECTED
ANY INCURSION INTO THE PROTECTED
AREA MUST BE APPROVED BY A
PROJECT ARBORIST
CONTRAVENTION OF THESE CONDITIONS
MAY LEAD TO FINES AND/OR PENALTIES**

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Appendix 3. Drawings

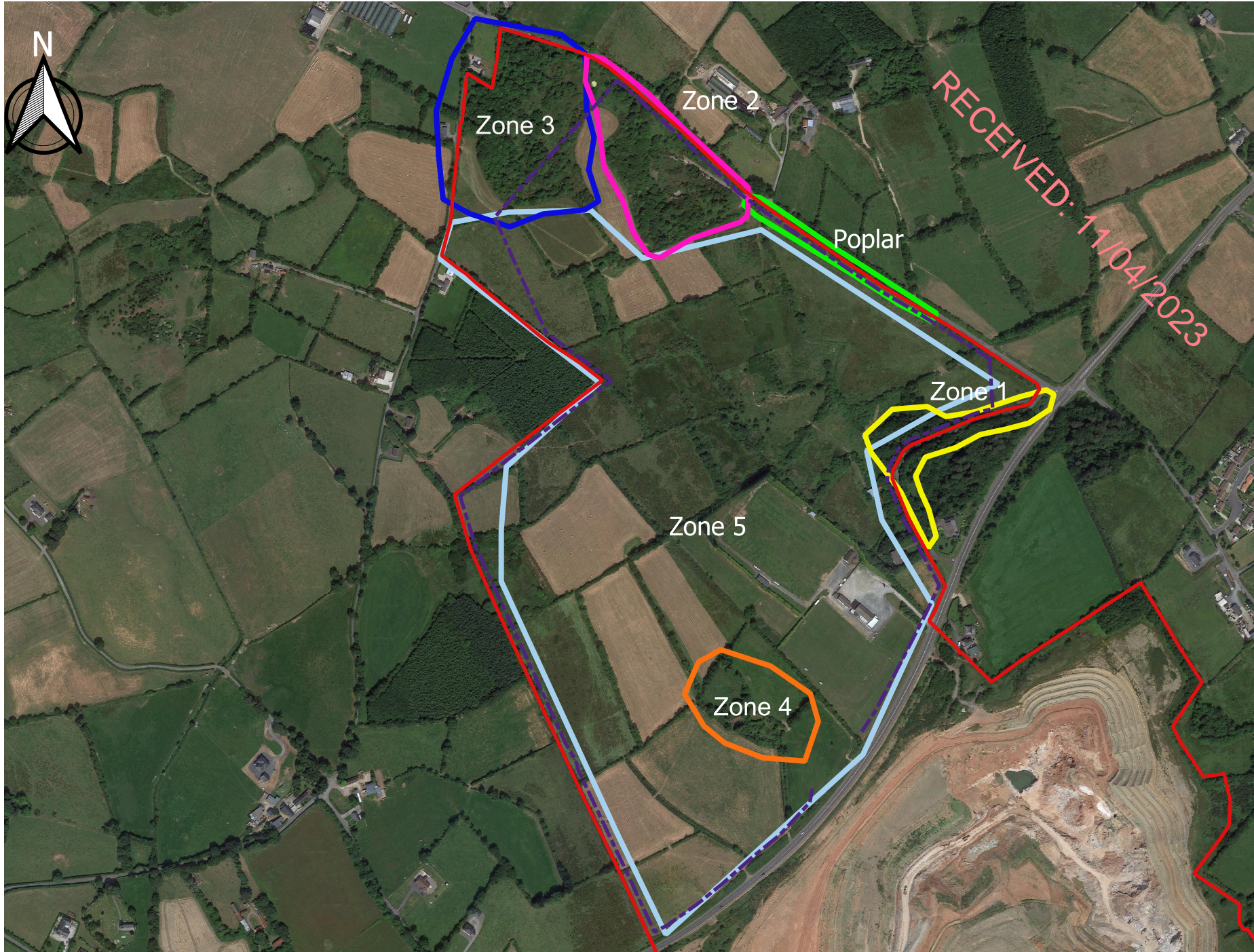
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Tel **0872811590.**

Survey Area



Legend

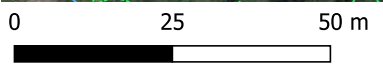
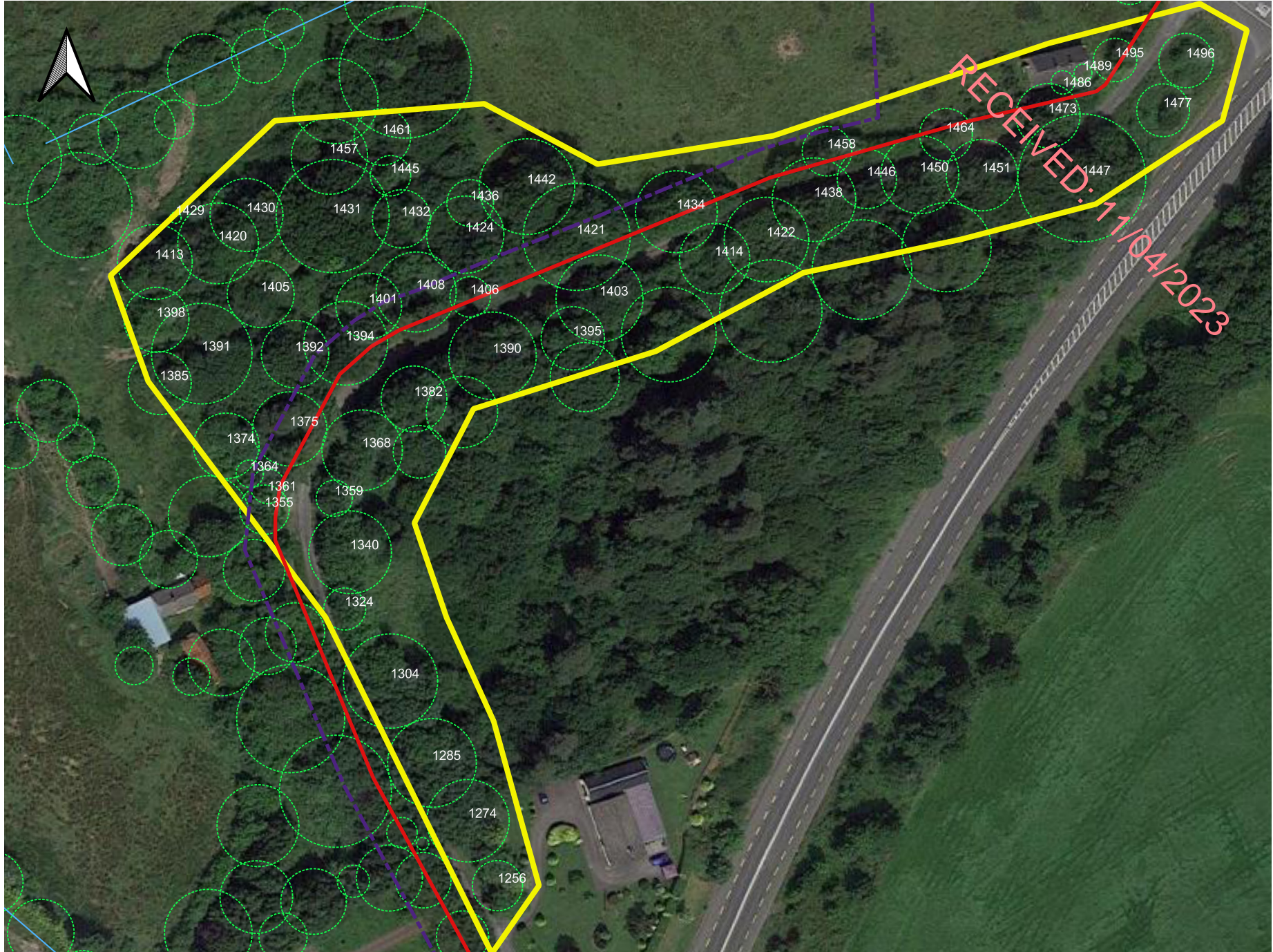
Zone 1	
Zone 2	
Zone 3	
Zone 4	
Zone 5	
Poplar Trees	

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Zone 1

Legend

- Tree Crown Spread
- Linear Habitats
- Site Boundary
- Tree Protective Fencing

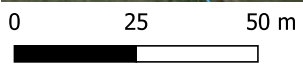
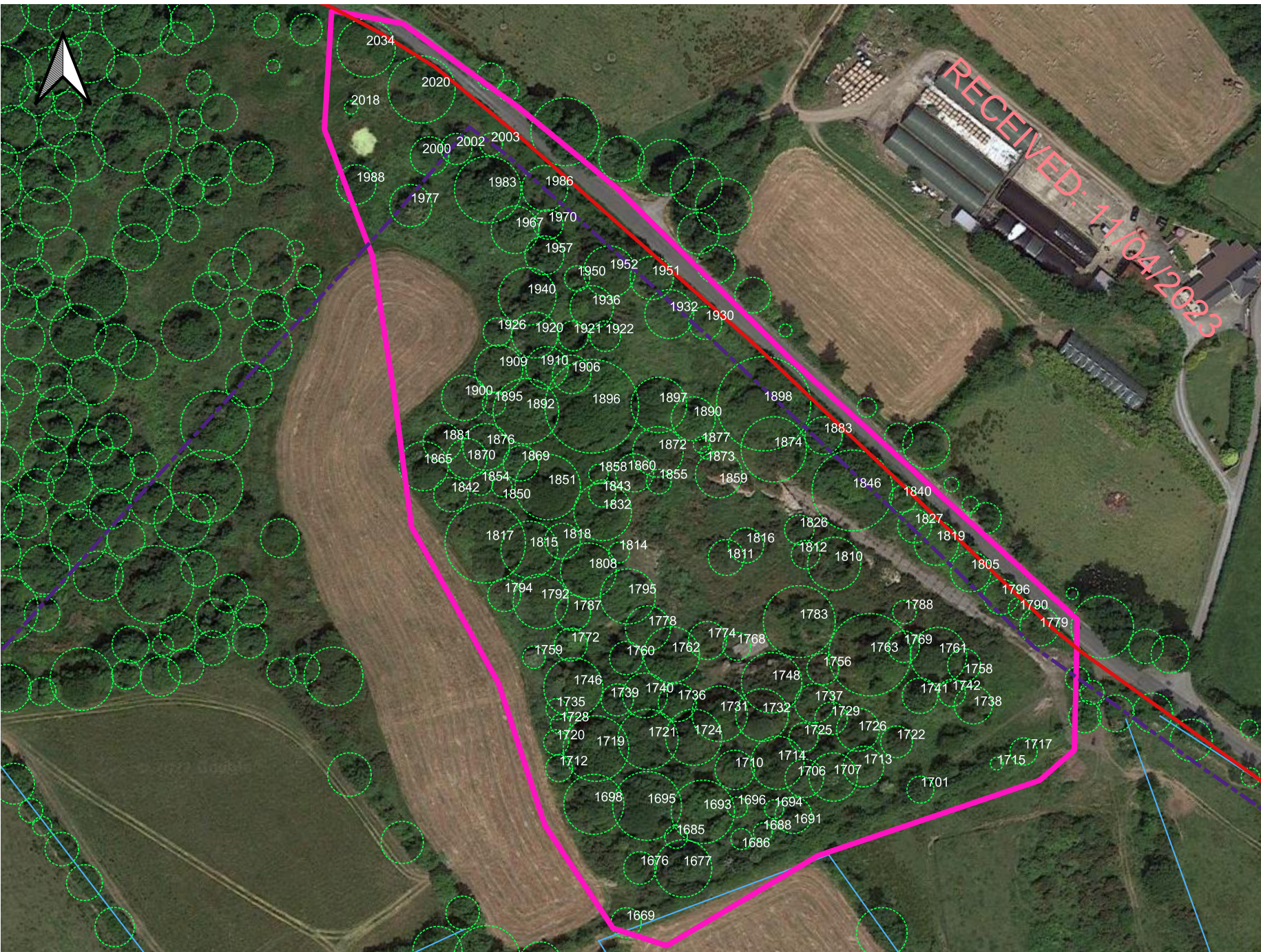


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Zone 2

Legend

- Tree Crown Spread
- Linear Habitats
- Site Boundary
- Tree Protective Fencing



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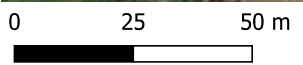
Zone 3

Legend

- Tree Crown Spread
- Linear Habitats
- Site Boundary
- Tree Protective Fencing



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Zone 4

Legend

- Tree Crown Spread
- Linear Habitats
- Site Boundary
- Tree Protective Fencing



0 25 50 m

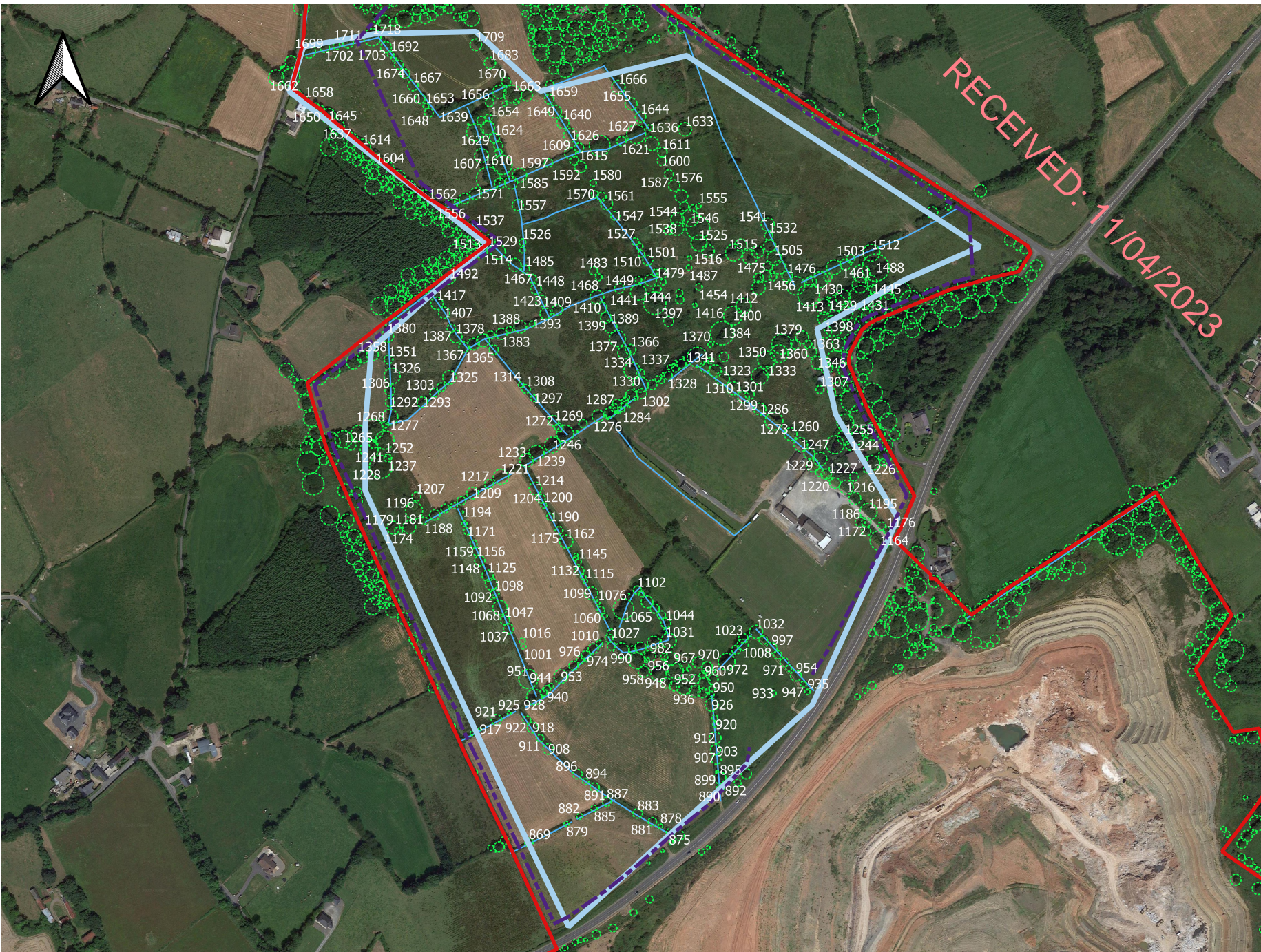


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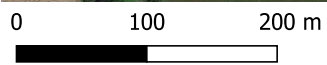
Zone 5

Legend

- Tree Crown Spread
- Linear Habitats
- Site Boundary
- Tree Protective Fencing



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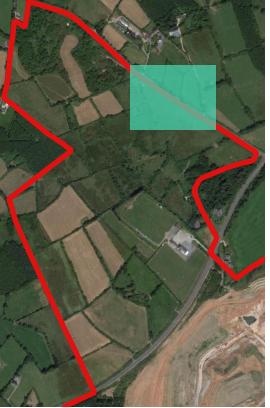
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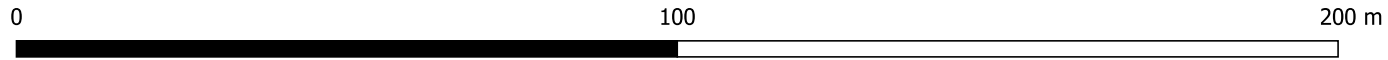
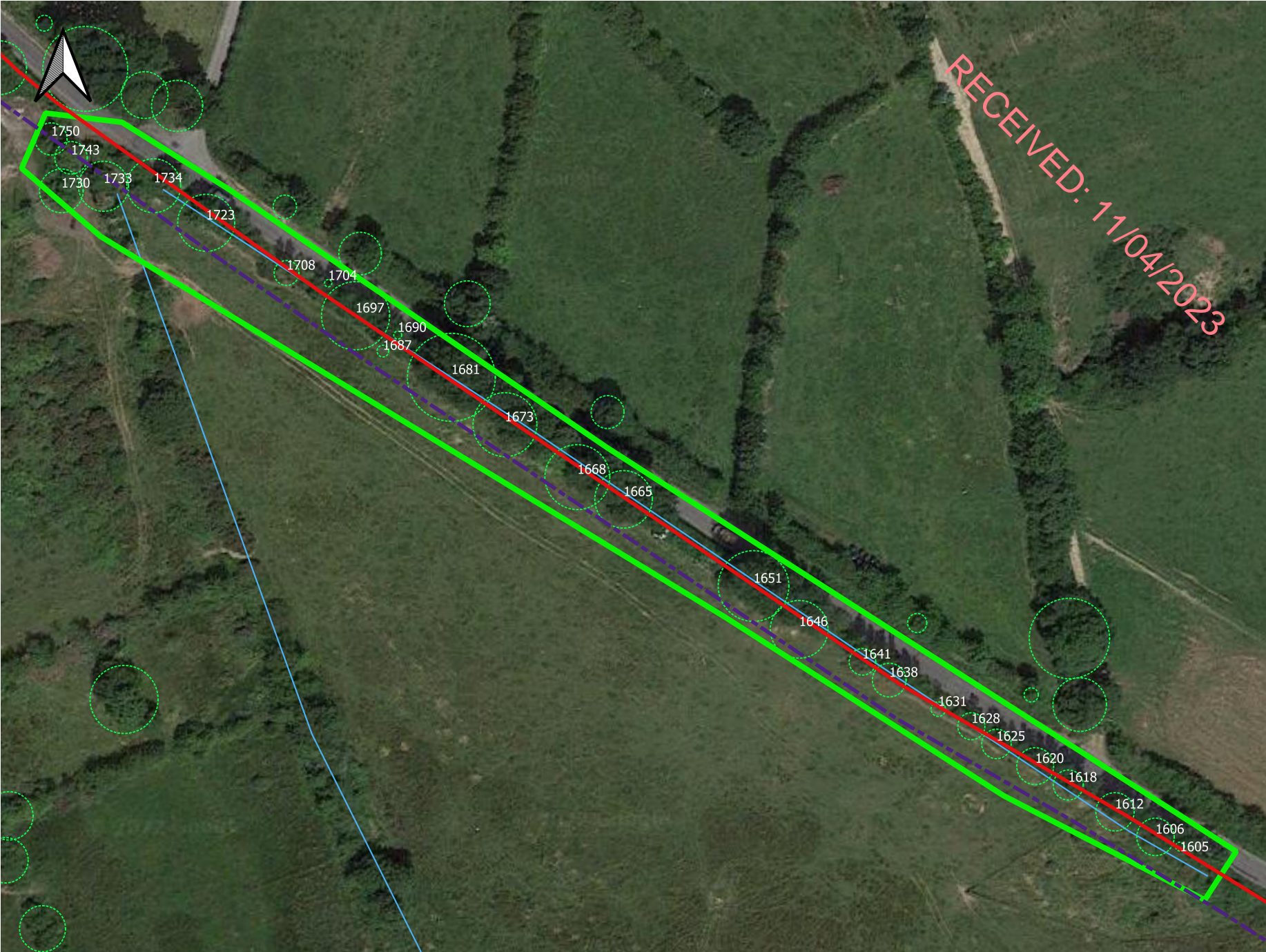
Poplar Area

Legend

- Tree Crown Spread
- Linear Habitats
- Site Boundary
- Tree Protective Fencing



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APPENDIX 6.5

Knocknacran West Project Ecology Surveys 2021

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1 Introduction

O'Donnell Environmental was commissioned by Golder Associates Ireland Limited to carry out ecological surveys and reporting required to support ecological and environmental reporting.

1.1 STATEMENT OF COMPETENCE

Tom O'Donnell BSc (Hons) MSc CEnv MCIEEM is a Chartered Environmentalist and a full member of the Chartered Institute of Ecology and Environmental Management. He was awarded a BSc in Environmental and Earth System Science [Applied Ecology] in 2007 and an MSc in Ecological Assessment in 2009, both from UCC. Tom has over 10 years professional experience in the environmental industry, including working on projects such as windfarms, overhead power lines, roads, cycleways and residential developments. Tom is licensed by NPWS for roost disturbance (Ref: DER/BAT 2021-04) and to capture bats (C181/2020).

Eamonn Delaney of Delichon Ecology is a Full and Chartered member of Chartered Institute of Ecology and Environmental Management (CIEEM). Eamonn has 13 years' experience in ecological consultancy and routinely undertakes a range of field surveys including bird surveys (vantage point and walked transect surveys) habitat surveys, botanical surveys and invasive species surveys. Recent and ongoing project involvement include assessments for planning applications culminating in Environmental Impact Assessments (EIA), Ecological Impact Assessments (EclA) & Appropriate Assessments (AA) for windfarms, greenways, flood relief schemes, pedestrian and cycle routes, road schemes and water infrastructure projects.

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2 Methodology

2.1 DESK STUDY

A desktop review of publicly available relevant data was undertaken on the National Biodiversity Data Centre (NBDC) and National Parks & Wildlife Service (NPWS) websites. The National Biodiversity Data Centre was reviewed for relevant data, specifically i) existing species records for the 10km square in which the study site is located (N89) and ii) an indication of the relative importance of the wider landscape in which the study site is located, based on Model of Bat Landscapes for Ireland (Lundy *et al.* 2011). In the latter, the index ranges from 0 to 100, with 0 being least favourable and 100 most favourable for bats.

Bat Conservation Ireland (BCI) conducted a search of available bat records within 10km of the study area on 5th August 2021 at the request of O'Donnell Environmental.

2.2 SURVEYS

2.2.1 Habitat Survey

A Phase 1 habitat and flora assessment was carried out by Eamonn Delaney on 12th August 2021 in accordance with the Heritage Council's guidelines (Smith *et al.* 2011). The dominant habitats present were classified according to Fossitt (2000) and key botanical species were identified. Any other records of interest (e.g. invasive plant species) were also marked on field maps and/or locations were recorded.

2.2.2 Preliminary Bat Roost Assessments

Preliminary roost assessments were carried out by Tom O'Donnell BSc (Hons) MSc CEnv MCIEEM, to identify the suitability of identified man-made structures at Knocknacran West for roosting bats. The relevant structures are identified as B2 to B6 on **Figure 1**. These preliminary roost assessments were carried out 10th, 11th and 12th August 2021 and followed guidance set out in Collins (2016). The surveys were non-destructive, and relevant Potential Roost Features (PRFs) were visually inspected from ground level to identify any evidence of bat roosting. Where accessible, potential roosting features were investigated using an endoscope. Signs of bat use include bat droppings, feeding remains, potential bat access points identified by characteristic staining and scratches, noise made by bats etc. Potential Roost Features (PRFs) are described according to the scheme outlined in **Table 2.1**, below.

Table 2.1. Scheme for describing the potential suitability of features for bats.

Suitability	Description
Negligible	Negligible features which are likely to be used by roosting bats.
Low	A feature with one or more potential roost sites that could be used by individual bats opportunistically. Potential roost sites which do not provide appropriate conditions and / or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e., unlikely to be suitable for maternity or hibernation). A tree of sufficient size and age to contain PRFs but with none seen from the ground or features seen with only very limited roosting potential.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to characteristics and surrounding habitat but unlikely to support a roost of high conservation status.
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.

After 'Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edition)', Collins (2016).

2.2.3 Emergence and re-entry bat surveys

Active bat surveys were carried out from 10th to 12th August 2021 inclusive in order to characterise bat activity in the area and to seek to identify any behaviour indicative of bat roosting (see **Table 2.2**). The surveys were carried out by three surveyors: Tom O'Donnell BSc (Hons) MSc CEnv MCIEEM, Donnachadh Powell BSc (Hons) and Tiernan O'Ceallaigh BSc (Hons). Surveyors were positioned at suitable points to detect bat emergence or re-entry from the target structures. The surveys were carried out by visual means primarily, with the aid of Echo Meter Touch Pro full spectrum ultrasonic detectors. A Guide IR Pro thermal imaging camera was utilised to record bat activity which occurred at the target structures. Emergence and re-entry surveys were carried out during suitable weather conditions and followed guidelines set out in Collins (2016).

Table 2.2 - Emergence and re-entry survey details

Date	Survey	Sunset / sunrise	Survey times	Weather Conditions
10.08.21	Dusk emergence survey	21:06	20:55 to 22:45	Temp: 18°C Wind: F0 or 1 Precipitation: None Visibility: Good
11.08.21	Dawn re-entry survey	05:58	04:30 to 06:00	Temp: 15°C Wind: F 1 Precipitation: None Visibility: Good
11.08.21	Dusk emergence survey	21:04	20:55 to 22:35	Temp: 15°C Wind: F0 or F1 Precipitation: None Visibility: Good
12.08.21	Dawn re-entry survey	05:59	04:35 to 06:05	Temp: 9°C Wind: F0 or F1 Precipitation: None Visibility: Good
12.08.21	Dusk emergence survey	21:02	20:55 to 22:37	Temp: 18°C Wind: F0 or F1 Precipitation: None Visibility: Good

2.2.4 PASSIVE DETECTOR SURVEYS

Wildlife Acoustics Song Meter Mini Bat (full spectrum) ultrasonic bat detectors were deployed to passively record bat activity at four locations (See **Figure 2**) for a total of 3 nights from 10th August 2021 to the 12th August 2021 inclusive. The detectors were programmed to record from 30 minutes before sunset, to 30 minutes after sunrise.

2.2.5 Data analysis

Bat sonograms were analysed using Kaleidoscope automatic analysis and identifications were manually verified following Russ (2012).

3 Results

3.1 HABITATS

Synopses provided below. Full habitat description and habitat map in [Appendix 5.1](#).

The Knocknacran study area supports an existing quarry and mine facility located to the south of the R179 regional road, in addition to an area of recently unmanaged pastoral land, areas of scrub and woodland located to the north of the R179.

The quarry site comprises open, expansive areas of quarried and excavated ground, that are served by access tracks, hard standing areas and associated offices, welfare facilities, access roads and parking areas. The dominant habitats at this part of the site include active quarries and mines (ED4)¹ and buildings and artificial surfaces (BL3). Semi-natural habitats within the quarry and mine footprint are restricted to the margins and field boundaries and include area of gorse scrub (WS1), young broadleaved woodland (WD1) established as screen planting, and nascent growth of ruderal plant species recolonising areas of bare or previously disturbed ground (ED3). The quarry site also supports a number of tailings / settlement ponds that are fringed by tall aquatic macrophytes and areas of dense gorse scrub.

The lands located to the north of the R179 differs support a network of pastoral land (GA1), wet grassland (GS4), hedgerows (WL1), treelines (WL2), scrub (WS1) and mixed broadleaved woodland (WD1). This area also includes the lands that previously supported Magheracloone Mitchells GAA facility. These lands have been rehabilitated / reinstated and now support unmanaged grassland that is in transition toward dry meadows and grassy verge grassland (GS2). The lands to the north of the R179 have received little or no ongoing management in the short to medium term as evidenced by the overgrown and rush dominated nature of the wet grassland habitats that are commonplace throughout. Areas of drier grassland are in transition or currently represent the dry meadows and grassland verge grassland habitat type. The northernmost section of the study area supports an area of wet woodland and scrub mosaic, while the footprint of the previous mine and quarry area, near the site's north-eastern boundary, supports an area of scrub in transition to woodland. The lands to the north of the R179 support drainage channels along the field margins. The upper reaches of the Glyde_030 watercourse (IE_NB_06G020400) are located near the eastern boundary, and originate within areas of poor draining, low lying lands supporting rank, rush dominated wet grassland.

The lands located to the north of the R179 do not support habitats of high botanical diversity, however they do represent a continuum of semi-improved or unmanaged habitats that in turn may provide suitable refuge and foraging habitat for a range of breeding avifauna, mammals (volant and non-volant) and invertebrates.

Japanese knotweed was identified at one location on the margins of B2, an abandoned and ruined farm dwelling, north of the R179 at 0680601 0799957 (Grid Reference provided in Irish Transverse Mercator ITM).

3.2 BATS

3.2.1 Desk Study

Proximal Natura 2000 sites and nationally designated sites have been reviewed and non are considered to be relevant to the current bat study. **Table 3.1** show the nationally designated site present within 5km of the proposed site. In this instance 5km is considered to be an appropriate screening distance.

Table 3.1 Proposed NHA sites within 5 km of the proposed site

¹ Alphanumeric codes assigned in accordance with Fossitt, J. (2000) *A Guide to Habitats in Ireland*. Heritage Council, Kilkenny

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Site Name	Site Code	Distance
Lough Fea Demesne	000560	3.03km
Lough Naglack	000561	4.75km
Ballyhoe Lough	001594	4.58km
Nafarty Fen	002077	5km

National Biodiversity Data Centre holds previous records of bat presence from within the 10km square (N89) in which the proposed site is located.

These records are for Common Pipistrelle (*Pipistrellus pipistrellus*), Soprano Pipistrelle (*Pipistrellus pygmaeus*), Daubenton's Bat (*Myotis daubentonii*), Brown Long-eared Bat (*Plecotus auritus*) and Leisler's Bat (*Nyctalus leisleri*). It is important to note that an absence of other bat species records is reflective of a lack of surveys undertaken to date rather than absence of bat species.

The overall bat suitability index value (39.67) according to 'Model of Bat Landscapes for Ireland' (Lundy *et al.* 2011) suggests the landscape in which the locality of the study area is of high suitability for bats in general. Species specific scores are provided in **Table XX**.

Table 3.2 - Suitability of the study area for the bat species according to 'Model of Bat Landscapes for Ireland' (Lundy *et al.* 2011).

Common name	Scientific name	Suitability index
<i>All bats</i>		39.67
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>	54
Brown long-eared bat	<i>Plecotus auritus</i>	46
Common pipistrelle	<i>Pipistrellus pipistrellus</i>	54
Lesser horseshoe bat	<i>Rhinolophus hipposideros</i>	4
Leisler's bat	<i>Nyctalus leisleri</i>	56
Whiskered bat	<i>Myotis mystacinus</i>	27
Daubenton's bat	<i>Myotis daubentonii</i>	51
Nathusius pipistrelle	<i>Pipistrellus nathusii</i>	19
Natterer's bat	<i>Myotis nattererii</i>	46

Bat Conservation Ireland (BCI) conducted a search of their records database at the request of O'Donnell Environmental on 5th August 2021. The relevant search area included a 10km radius from the development application boundary. Bat roosts have been identified in 7 1km grid squares within the search area (see **Table 3.3** and **Figure 3**). No roost data existing within or in close proximity to the proposed site.

Table 3.3 - Bat Conservation Ireland (BCI) bat roost records from a 10km search area surrounding the proposed site.

Ref	Grid Ref. (IG)	Comment
R_01	N7190	Soprano Pipistrelle, Common Pipistrelle, Brown Long-eared Bat, Leisler's Bat
R_02	H8502	Daubentons Bat, Leisler's Bat
R_03	N8396	Common Pipistrelle
R_04	N8597	Soprano Pipistrelle, Common Pipistrelle, Brown Long-eared Bat
R_05	H7103	Common Pipistrelle
R_06	N7991	Unidentified bat

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3.2.2 Potential Bat Roost Assessments

The suitability of man-made structures for roosting bats was considered. Daytime visual assessments were carried out at all remaining man-made structures in the Knocknacran West site (see **Figure 1**; structures B2 - B6) in order to identify any bat roosting potential which may exist associated with these structures.

Following the initial visual assessments, active bat surveys were carried out following Collins (2016) to seek to identify any behaviour indicative of bat roosting and to characterise bat activity in the area. Buildings were surveyed at either dusk or dawn for signs of bat emergence/re-entry (see **Table 2.2**).

Bat roosting was confirmed at four of the five buildings surveyed: B2, B3, B4 and B6 with Soprano Pipistrelles observed emerging from these buildings at dusk or re-entering at dawn in all cases.

3.2.2.1 Structure B2

B2 is a derelict residence and associated outbuildings. Potential roosting features include small gaps between slate roof tiles and a partially intact attic space. Access to the upper floors of this building was not possible due to the degradation of the staircase. Based on visual inspection of accessible areas of the structures, B2 is considered to be of 'Moderate' suitability to roosting bats (following Collins, 2016).

B2 was surveyed twice at dusk on 11th and 12th August 2021. Bat emergence was confirmed during the survey on 12th August. Soprano Pipistrelles were observed emerging from the apex on the eastern gable of B2, immediately below the ridge tiles. Soprano and Common Pipistrelles were observed foraging within the immediate environs of B2, between the building and the surrounding treelines, for several minutes during both surveys.

3.2.2.2 Structure B3

B3 is a residential dwelling that is currently occupied and an associated outbuilding. The dwelling house is a bungalow with intact tile roof. An outbuilding is located to the rear of the residence which is block built and has an intact tile roof. The attic of the residence was not accessed. Based on visual inspection of accessible areas of the structures, B3 is considered to be of 'Moderate' suitability to roosting bats (following Collins, 2016).

This building was surveyed on 10th August 2021. Surveyors were positioned at the front and back (east and west respectively) of the house. A thermal camera was positioned at the front of the house (east). Five Soprano Pipistrelles were observed emerging from under the ridge tiles on the roof at the front side of the house at approximately 21:30 (**Plate A.10**).

3.2.2.3 Structure B4

B4 (Shirley Estate House) is a derelict former residence. The building was not accessible internally as all windows and doorways on the ground floor were blocked. Suitable roosting features such as a roof with gaps between the slate tiles, gaps between the external masonry, and dense ivy cover on the eastern side of the house were present. The upper floor was examined through an open window on the eastern side. It was noted that the upper floor had low light ingress and loose internal roofing membrane which could be utilised by crevice dwelling bats. Based on visual inspection of accessible areas of the structures, B3 is considered to be of 'Moderate' suitability to roosting bats (following Collins, 2016).

B4 was surveyed at dawn on 11th August 2021 by two surveyors and a thermal camera was positioned at the northern side of the building and included potential access/egress points. Bat roosting was confirmed when two Soprano Pipistrelles were observed re-entering under gaps in the roof overhang on the northern side of the building (**Plate A.9**), as well as in the dense ivy on the eastern side of the house to the left of the open window on the upper floor.

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3.2.2.4 Structure B5

B5 is a former residence and an associated outbuilding which is in an advanced state of dereliction, with large gaps in roof and partially collapsed internal ceilings causing high levels of light and wind ingress internally. The building was examined externally for signs of bat roosting. Based on visual inspection of accessible areas of the structures, B5 is considered to be of 'Low' suitability to roosting bats (following Collins, 2016).

This building was surveyed at dawn and dusk on 11th and 12th August 2021 respectively. Two surveyors were positioned at the north and south sides of B5 during the dawn survey on 11th August. One surveyor was positioned at the southern side of B5 during the dusk survey on 12th August and a thermal camera was positioned to cover the north of the building. During both surveys and the field of view of the thermal camera included a number of potential access/egress points including open windows and holes in the roof. No evidence of bat roosting was recorded.

3.2.2.5 Structure B6

B6 is a former residence and associated outbuildings that is unoccupied but appears is good repair. The building was inspected internally, but access to the attic space was not possible, Surveys carried out by Golder on 2nd July 2019 identified roosting by small numbers of pipistrelle bats which were accessing the attic of the residence through small gaps between roosting tiles.

B6 was surveyed 11th August 2021 and during the survey a thermal camera was positioned on the south-east of the residence, with views over the southern side of the roof. . One Soprano Pipistrelle emergence was recorded at 21:39 (**Plate A.11**) and a Soprano Pipistrelle re-entry was also recorded at the southern side of the main residence at B6 via a gap beneath a roof tile (**Plate A.12**).

A summary of the result of surveys of the identified man-made structures is provided in **Table 3.4**, below. The locations of each building are shown in **Figure 1**.

Table 3.4 - Summary of man-made structures within Knocknacran West which were assessed for their potential to support roosting bats.

Structure Reference	Comment	Building Description	Suitability for Bat Roosting
B2	Soprano Pipistrelles recorded emerging from roof apex on eastern gable.	Derelict Residence	Confirmed roost with 'Moderate' suitability for roosting bats overall.
B3	Occupied residence. Soprano Pipistrelles recorded emerging from under ridge tiles on roof at front of house.	Residential dwelling	Confirmed roost with 'Moderate' suitability for roosting bats overall.
B4	Shirley Estate House. Soprano pipistrelles observed re-entering during dawn survey.	Derelict Residence	Confirmed roost with 'Moderate' suitability for roosting bats overall.
B5	Roof is partially collapsed with large gaps resulting in high levels of light ingress internally.	Derelict Residence	Low
B6	Un-occupied residence with intact tile roof.	Derelict Residence	Confirmed roost with 'High' suitability for roosting bats overall.

3.2.3 PASSIVE DETECTOR SURVEY

Wildlife Acoustics Song Meter Mini Bat (full spectrum) ultrasonic bat detectors were deployed to passively record bat activity. The detectors were located at four representative areas throughout the study area (see **Figure 3.2**) for a total of three nights from 10th August 2021 to 12th August 2021 inclusive. Subsequent analysis of bat data recorded shows a moderate level of activity occurred overall, and from a relatively high diversity of species, although activity was dominated by three species which are common and widespread in an Irish context.

A bespoke system to describe levels of bat activity is used as follows:

- Low: <10 registrations / night
- Low to moderate: 10 to 50 registrations / night
- Moderate: 50 to 200 registrations / night
- High: >200 registrations / night.

This system is based on the professional judgement of the Author and considers the results of peer reviewed research (Mathews *et al.* 2016). Individual bats of the same species cannot be distinguished by their echolocation alone and therefore 'bat registrations' are used as a measure of activity (Collins, 2016). A bat registration is defined as the presence of an individual species echolocation within a recording of maximum 15 seconds duration. All bat registrations recorded in the course of this study follow these criteria, allowing comparison between monitoring stations.

It should be noted that activity levels can only be compared within a species and not between species, due to differences in the detection distances for each species and their flight characteristics.

The results of passive bat monitoring are shown in **Table 3.5** below.

Table 3.5 - Number of registrations of each bat species recorded during passive bat surveys

Species	10/08/2021			11/08/2021				12/08/2021			
	Bat_1	Bat_2	Bat_4	Bat_1	Bat_2	Bat_3	Bat_4	Bat_1	Bat_2	Bat_3	Bat_4
Daubenton's Bat	2	1	2	2	2	5	0	2	0	3	0
Whiskered Bat	0	2	0	0	0	0	0	0	1	0	0
Natterer's Bat	0	10	0	0	4	5	0	1	2	16	0
Leisler's Bat	27	32	1622	9	40	7	112	15	8	10	238
Nathusius Pipistrelle	0	0	0	0	0	3	0	0	0	0	0
Common Pipistrelle	35	27	1294	11	2	308	24	37	15	111	155
Soprano Pipistrelle	93	53	189	39	11	184	1	34	46	1193	6
Brown Long-eared Bat	3	5	0	2	0	2	0	4	2	0	0
Total	160	130	3107	63	59	514	137	93	74	1333	399

Table 3.6 - Average number of registrations of each bat species recorded during passive bat surveys

Species	Bat_1	Bat_2	Bat_3	Bat_4
Daubenton's Bat	2.0	1.0	4.0	0.7
Whiskered Bat	0.0	1.0	0.0	0.0
Natterer's Bat	0.3	5.3	10.5	0.0
Leisler's Bat	17.0	26.7	8.5	657.3
Nathusius Pipistrelle	0.0	0.0	1.0	0.0

Common Pipistrelle	27.7	14.7	209.5	491.0
Soprano Pipistrelle	55.3	36.7	688.5	65.3
Brown Long-eared Bat	3.0	2.3	1.0	0.0

Note: Colour indicates activity level categories as described in Section 3.2.3.

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3.2.4 Bat Activity Transect Surveys

Transect surveys were carried out on 10th and 12th August 2021 after dusk in order to characterise bat activity within the immediate vicinity of the study area (see **Figure 4**) following public roads. For safety the surveys were carried out from a vehicle and average driving speed was approximately 15km/hour. The transect route was driven twice on each occasion, and the direction of travel on 12th August was opposite that used on the 10th August 2021.

The species diversity and relative activity levels recorded during the active transect surveys largely reflects data recorded during passive bat monitoring. On the night of 10th August 2021, a total of 61 registrations were recorded from Common Pipistrelle (35), Soprano Pipistrelle (16), Leisler's Bat (7), and three registrations could not be differentiated between Common and Soprano Pipistrelle (referred to as Pip. Sp. [50kHz] in **Figure 4**). On the night of 12th August 2021, a total of 28 registrations were recorded from Common Pipistrelle (16) and Soprano Pipistrelle (12).

The greatest level of bat activity appears to be associated with well-developed roadside hedgerows and treelines, and such features occur on the boundaries of the Knocknacran West portion of the study area.

3.2.4.1 Other active survey records

During the course of emergence and re-entry surveys at buildings B2 to B6, incidental recordings were made of bats foraging or commuting in the survey area during the active surveys.

Four species of bats were detected at B2 during the active surveys and these species are common and widespread throughout Ireland. 248 bat calls were recorded in total. 41% and 51% of these were attributed to Soprano Pipistrelle and Common Pipistrelle respectively. 7% were attributed to Leisler's Bat. One Pipistrelle bat registration was recorded at 50kHz. It is not possible to distinguish between Common and Soprano Pipistrelles when they are echolocating at a peak frequency of 50kHz and therefore this particular registration was marked as PIP50 during analysis of the bat calls. A single Daubenton's bat registration was recorded during the surveys here. Daubenton's Bats are associated with water bodies such as rivers and lakes. Since there was no such water body in within the immediate vicinity of B3, it can be assumed that the Daubenton's bat was using the area to commute rather than for foraging or roosting opportunities.

Three species of bats were detected at B3 during the active surveys. A total of 167 bat calls were recorded. Approximately 82% of these calls were attributed to Soprano Pipistrelles. 13% of calls during this survey were from Leisler's Bats and the remainder of calls recorded were Common Pipistrelles. Emergence at B3 was confirmed visually and recorded on the thermal camera at the east of the building on 10th August 2021.

Three species of bats were detected at B4 during the active surveys. Soprano Pipistrelles formed the largest portion of these calls. 182 bat calls were recorded and 93% of these were from Soprano Pipistrelles. Leisler's Bats and Common Pipistrelles were attributed to the remaining calls. These three species are common and widespread throughout Ireland.

Building B5 was surveyed at dawn and dusk on 11th and 12th August 2021 respectively. Low bat activity was recorded on detectors during the active surveys despite the apparent presence of suitable foraging habitat proximally. 37 bat registrations were recorded in total and 49% of these calls were attributed to Soprano Pipistrelles, 30% of registrations were from Leisler's Bats, 14% were Common Pipistrelle and the remainder of calls recorded were Daubenton's Bat (1 registration) and Brown Long-eared Bat 2 registrations).

A relatively low level of bat activity was recorded at B6 with a total of 26 individual bat calls confirmed. Almost half of these were attributed to Soprano Pipistrelles. 27% of these registrations were from Leisler's Bats and 19% of these registrations were from Common Pipistrelles. 2 Daubenton's Bat registrations were recorded at this building.

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Incidental record:

A barn owl roost is located at B2 along a rafter in the derelict metal roof extension adjoining the former residence. A large all white barn owl was observed departing the roost when the surveyor approached (T. O'Donnell pers. comm.).



Looking up towards perching spot. No nest was apparent.



Several pellets were present below.

Photographs:



A1. Eastern elevation of B3.



A2. Western elevation of B3 showing rear of house and associated outbuilding on right.



A3. Northern elevation of B5 viewed showing view of thermal imaging camera.



A4. Large gaps in roof exterior of B5.



A5. Outbuilding associated with B5



A6. Southern elevation of B2.



A7. North-western elevation of B4



A8. Eastern elevation of B4 showing dense ivy and access point.



A9. Soprano Pipistrelle re-entry at B4



A10. Soprano Pipistrelle emergence at B3.



A11. Bat emergence at B6.



A12. Indicates identified bat emergence point at B6.



Figure 1
Bat Registrations Recorded During Active Bat Transect Surveys

Project:
Knocknacran West Open-Cast Mine

Prepared for:
Golder on behalf of Saint-Gobain Mining Ireland Ltd.

Tom O'Donnell CEnv MCIEEM
D: 08/09/2021

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Legend

- Application Site Boundary
- ▲ Buildings

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Figure 2
Passive Bat Detector Locations

Project:
 Knocknacran West, Open-Cast Mine

Prepared for:
 Golder on behalf of Saint-Gobain Mining Ireland Ltd.

Tom O'Donnell CEnv MCIEEM
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O'DONNELL 
 ENVIRONMENTAL

Legend

- - - Application Site Boundary
- ▲ Passives Bat Detectors

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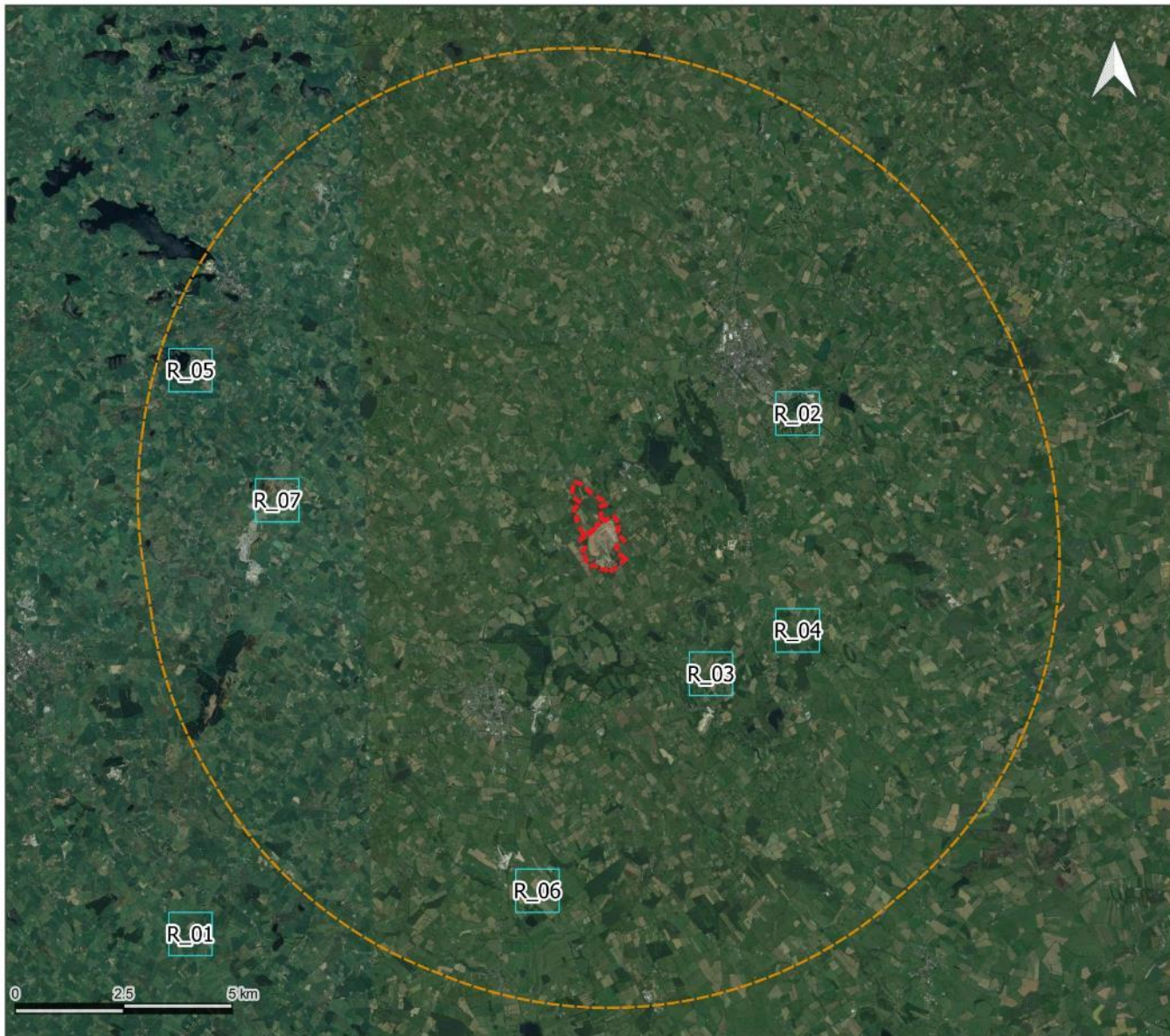


Figure 3
Bat Conservation Ireland Roost Records

Project:
 Knocknacran West, Open-Cast Mine

Prepared for:
 Golder on behalf of Saint-Gobain Mining Ireland Ltd.

Tom O'Donnell CEnv MCIEEM
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 ENVIRONMENTAL

Legend

- - - Application Site Boundary
- 10km search area
- BCI Roost Records

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Figure 4
Bat Registrations Recorded During Active Bat Transect Surveys

Project:
Knocknacran West Open-Cast Mine

Prepared for:
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ENVIRONMENTAL

Legend

- - - Application Site Boundary
- GPS Tracks

Bat Registrations

- Common Pipistrelle
- Soprano Pipistrelle
- Leisler's Bat
- Pip sp. [50kHz]

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APPENDIX 6.6

**Aquatic Baseline Report for the Corduff Stream, Knocknacran West
Project, Co. Monaghan**

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Aquatic baseline report for the Corduff Stream, Knocknacran West Project, Co. Monaghan

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Prepared by Triturus Environmental Ltd. for O'Donnell Environmental Ltd.

October 2022

Please cite as:

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1. Methodology

1.1 Aquatic Survey Area

The aquatic survey area was focused on the Corduff Stream catchment (EPA code: 06C70), that drains the Drumgoosat/ Knocknacran West area, rising above the old Drumgoosat mine workings and flows north and east into Lough Fea (**Figure 1**). The Corduff Stream then forms part of the River Bursk (Lurgans) sub-catchment (EPA code: 06L06) south of Lough Fea and the Lagan (Glyde) River catchment (EPA code: 06G02) south of Rahans Lough.

1.2 Aquatic site survey

Aquatic surveys of the Corduff Stream (EPA code: 06C70) were conducted on Friday 9th September 2022. Survey effort focused on both instream and riparian habitats at each aquatic sampling location (**Table 1 & Figure 1**). Surveys at each of these sites included a fisheries habitat appraisal, macrophyte & aquatic bryophyte survey and biological water quality sampling (Q-sampling).

Surveys were also cognisant of aquatic invasive species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011-2021 (S.I. 477/2011) or high-risk invasive species in Ireland (after O' Flynn *et al.*, 2014). This survey approach ensured that any habitats and species of high conservation value would be detected to best inform mitigation for the development.

In addition to the ecological characteristics of the site, a broad aquatic and riparian habitat assessment was conducted utilising elements of the methodology given in the Environment Agency's 'River Habitat Survey in Britain and Ireland Field Survey Guidance Manual 2003' (EA, 2003) and the Irish Heritage Council's 'A Guide to Habitats in Ireland' (Fossitt, 2000). This broad characterisation helped define the watercourses' conformity or departure from naturalness. All sites were assessed in terms of:

- Physical watercourse/waterbody characteristics (i.e. width, depth etc.) including associated evidence of historical drainage
- Substrate type, listing substrate fractions in order of dominance (i.e. bedrock, boulder, cobble, gravel, sand, silt etc.)
- Flow type by proportion of riffle, glide and pool in the sampling area
- An appraisal of the macrophyte and aquatic bryophyte community at each site
- Riparian vegetation composition

Table 1 Location of $n=2$ aquatic survey sites on the Corduff Stream, in the vicinity of the Knocknacran West project site area (the existing Knocknacran Open-Cast Mine and proposed Knocknacran West Open-Cast Mine sites), Co. Monaghan.

Site no.	Watercourse	EPA code	Location	X (ITM)	Y (ITM)
1	Corduff Stream	06C70	Drumgoosat	281044	300480
2	Corduff Stream	06C70	Corrybrackan (West of Lough Fea)	281726	301387

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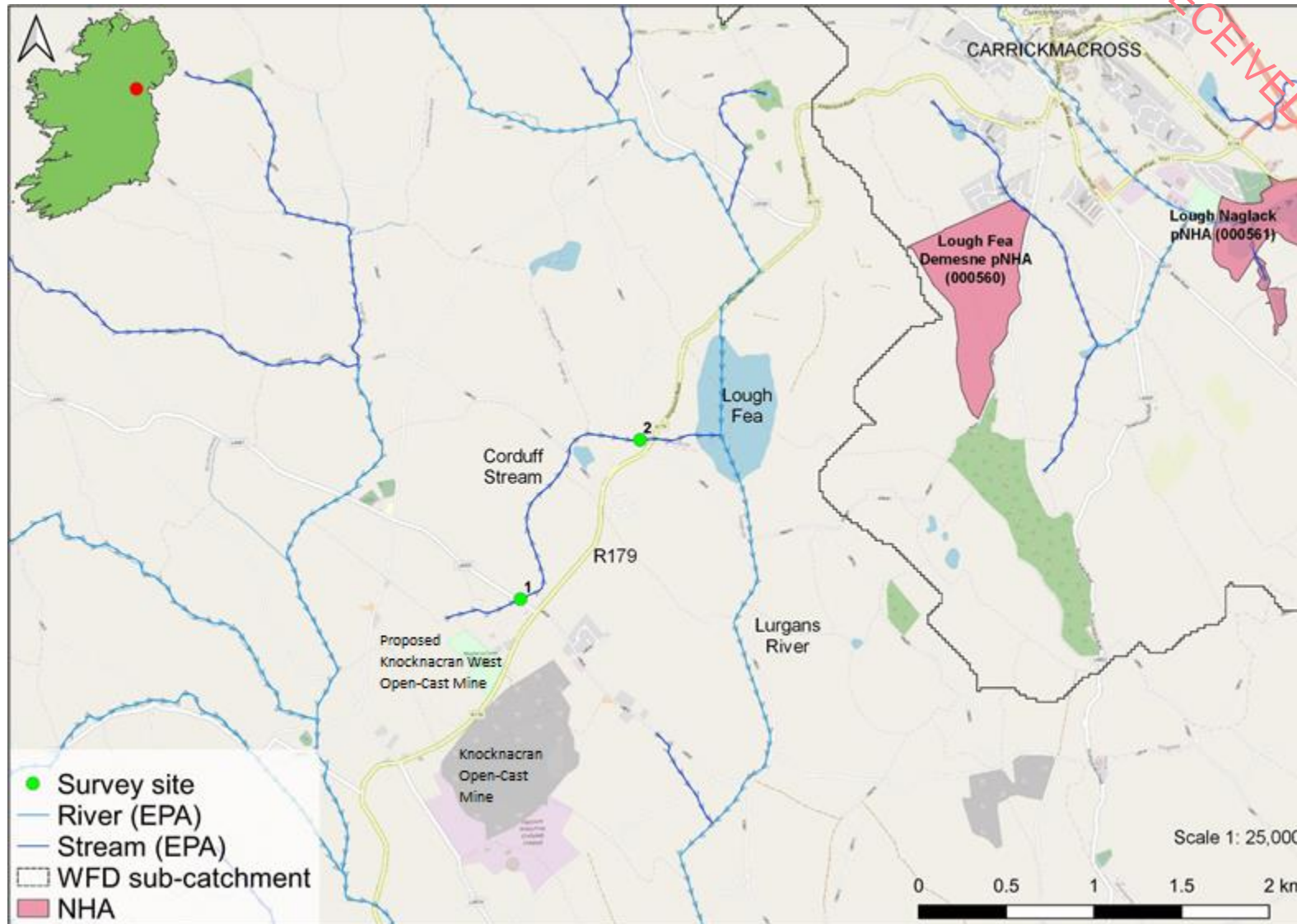


Figure 1 Overview of the $n=2$ aquatic survey locations on the Corduff Stream in the vicinity of the existing Knocknacran Open-Cast Mine and proposed Knocknacran West Open-Cast Mine, Co. Monaghan

1.3 Fisheries Appraisal

A fisheries appraisal of the Corduff Stream was undertaken at the two survey locations at Drumgoosat and Corrybrackan, west of Lough Fea. The survey examined key characteristics of habitat capable of supporting fish of high conservation value (e.g. salmonids, European eel and lamprey). This included suitable nursery, spawning and holding areas for salmonids. It also examined for habitat capable of supporting lamprey species e.g. soft sediment for ammocoetes and nearby spawning in mixed finer gravels. European eel nursery habitat identified by rivers with good flow diversity, boulder and cobble refugia with cover from predators was also examined for. The habitat characteristics informed the likelihood of the Corduff Stream to support these species inclusive of their known distribution in the catchment.

1.4 Biological water quality (Q-sampling)

The $n=2$ aquatic survey sites were assessed for biological water quality through Q-sampling on the 9th September 2022 (**Figure 2**). All samples were taken with a standard kick sampling hand net (250mm width, 500 μ m mesh size) from areas of riffle/glide utilising a 2-minute kick sample, as per Environmental Protection Authority (EPA) methodology (Feeley et al., 2020). Large cobble was also washed at each site for 1-minute (where present) to collect attached macro-invertebrates (as per Feeley et al., 2020). Samples were elutriated and fixed in 70% ethanol for subsequent laboratory identification. Samples were converted to Q-ratings as per Toner et al. (2005) and assigned to WFD status classes.

Table 2.4 Reference categories for EPA Q-ratings (Q1 to Q5)

Q Value	WFD status	Pollution status	Condition
Q5 or Q4-5	High status	Unpolluted	Satisfactory
Q4	Good status	Unpolluted	Satisfactory
Q3-4	Moderate status	Slightly polluted	Unsatisfactory
Q3 or Q2-3	Poor status	Moderately polluted	Unsatisfactory
Q2, Q1-2 or Q1	Bad status	Seriously polluted	Unsatisfactory

1.5 Aquatic ecological evaluation

The evaluation of aquatic ecological receptors contained within this report uses the geographic scale and criteria defined in the 'Guidelines for Assessment of Ecological Impacts of National Road Schemes' (NRA, 2009).

1.6 Biosecurity

A strict biosecurity protocol following IFI (2010) and the Check-Clean-Dry approach was adhered to during surveys for all equipment and PPE used. Disinfection of all equipment and PPE before and after use with Virkon™ was conducted to prevent the transfer of pathogens or invasive propagules between

survey sites. Equipment was also thoroughly dried (through UV exposure) between survey areas by using duplicate equipment. Surveys were undertaken at sites in a downstream order to minimise the risk of upstream propagule mobilisation. Any aquatic invasive species or pathogens recorded within or adjoining the survey areas were geo-referenced. All Triturus staff are certified in 'Good fieldwork practice: slowing the spread of invasive non-native species' by the University of Leeds.

2. Results of aquatic surveys

The following section summarises each of the $n=2$ survey sites in terms of aquatic habitats, physical characteristics and overall value for invertebrates, fish and macrophyte/aquatic bryophyte communities. Biological water quality (Q-sample) results are also summarised for each site and in **Table 2.1**. Habitat codes are according to Fossitt (2000). Scientific names are provided at first mention only. An evaluation of the aquatic ecological importance of each survey site based on these aquatic surveys is provided and summarised in **Table 3.2**.

2.1 Aquatic survey site results

Site 1 – Corduff Stream at Drumgossatt

The Corduff stream at site 1 was situated west of the local road crossing in the Drumgoosat townland southeast of the Drumgoosat National School (**Figure 1**). The low order stream emerged from a box culvert east of the road crossing and was representative of a heavily modified lowland depositing stream channel (FW2). The channel was 1-1.5m wide with 1-2m bank heights, being trapezoidal in shape. The stream was evidently historically deepened as part of drainage works. The stream was between 0.3m and 0.7m deep with stagnant water at the time of the survey. The stream had a deep silt and clay bed with no hard substrata. The silt was anoxic (black) in places when disturbed. The stream supported several common macrophyte species including abundant fool's watercress (*Apium nodiflorum*) with localised branched bur-reed (*Sparganium erectum*) and brooklime (*Veronica beccabunga*). Common duckweed (*Lemna minor*) was also frequent in the stream indicating enrichment. The riparian areas supported mature hawthorn (*Crataegus monoygna*), oak (*Quercus* sp.) and ivy (*Hedera hibernica*) with heavily scrubbed over understories with species including hedge bindweed (*Calystegia sepium*), bramble (*Rubus fruticosus*), great willowherb (*Epilobium hirsutum*), nettle (*Urtica dioica*) and wild angelica (*Angelica sylvestris*). The bordering land uses were of improved pasture (GA1).

The Corduff Stream at site 1 was not of any value to salmonids due to the absence flows, heavy enrichment and siltation. The bed was too compacted due to the clay content and with insufficient flows (being stagnant at the time of the survey) to support lamprey. It was considered to be of low value to eel given the absence of coarse substrata, limited deeper pool and heavily vegetated nature of the channel. The channel was not of value to crayfish given poor riverine conditions i.e. absence of flow, enrichment, heavy siltation and the absence of coarse substrata.

Biological water quality, based on Q-sampling, was calculated tentatively as **Q2-3 (poor status)**. No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling. Given the absence of any aquatic species of high importance

or of any significant fisheries value at site 1, the aquatic ecological evaluation was of **local importance (higher value) (Table 3.2)**.



Plate 1 Representative image of site 1 on the Corduff Stream

Site 2 – Corduff Stream, west of Lough Fea

Site 2 was located on the Corduff Stream, west of Lough Fea and the R179 road crossing (**Figure 1**). The Corduff stream at the survey area was a 3m wide heavily modified lowland depositing channel (FW2). The channel was 0.3m-0.6m deep with steep 5-8m bank heights and had a trapezoidal channel profile. The channel had evidently been historically extensively deepened and had a deep silt and clay bed. Large accumulations of silt and clay were visible on the bed of the stream and on entry into the channel silt plumes were visible indicating gross siltation. The stream supported no macrophytes apart from frequent common water starwort (*Callitriche stagnalis*) and abundant invasive least duckweed (*Lemna minuta*). The riparian areas were densely scrubbed over with bramble, nettle, cleavers (*Galium aparine*), great willowherb and ivy with scattered mature sycamore (*Acer pseudoplatanus*) and crack willow (*Salix fragilis* agg.). The bordering land uses were of built land. The stream was a poor salmonid nursery due to gross siltation and enrichment but likely supports a small residual adult brown trout (*Salmo trutta*) population. The stream bed may support a small brook lamprey (*Lampetra planeri*) population due to suitable lamprey ammocoete burial habitat albeit spawning habitat was absent. The stream was considered to be of limited value for European eel (*Anguilla anguilla*) but a population due to the degraded nature but a small population may exist given the species presence in downstream connecting Lough Fea. The stream had no suitability for crayfish due to gross enrichment, siltation and very limited hard substrata.

Biological water quality, based on Q-sampling, was calculated tentatively as **Q2-3 (poor status)**. No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling. Given that the Corduff Stream at site 2 may support brook lamprey and a small trout population and or European eel, the aquatic ecological evaluation was of **local importance (higher value) (Table 3.2)**.

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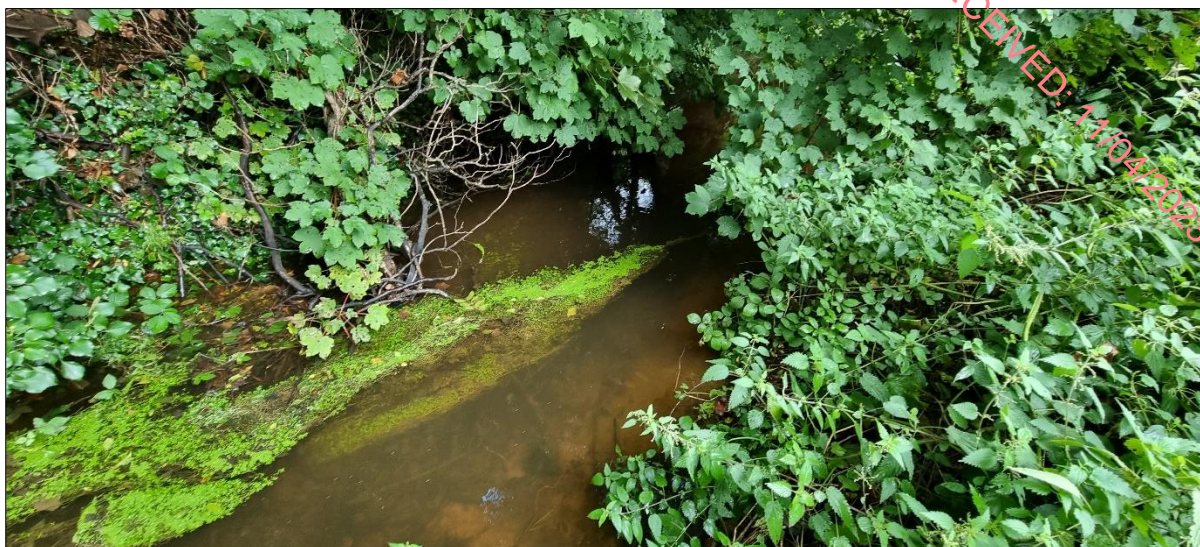


Plate 2 Representative image of site 2 on the Corduff Stream

2.2 Biological water quality (macro-invertebrates)

Both sampling sites collected from the Corduff Stream during September 2022 achieved **Q2-3 (poor status)** water quality (moderately polluted) (**Table 2**). In light of the results both sampling sites failed to meet target good status ($\geq Q4$) requirements of the European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2019 and the Water Framework Directive (2000/60/EC) (**Figure 2 below**).

Poor status water quality was achieved given the absence of EPA group A clean water indicator species, the presence of a single group B species only (i.e. *Coenagrion* sp. damselfly that are tolerant of enrichment) and a dominance of EPA group C species (moderate water quality indicator species). The group C species recorded included common coleopteran species i.e. *Hydroporus tessellatus* and *Haliphus* spp. with common snail species such as such as *Bithynia tentaculata* and non-native *Potamopyrgus antipodarum* also being present. There were also pollution tolerant EPA Group D species in the samples including the snail *Ampullacaena balthica* and the freshwater hoglouse (*Asellus aquaticus*). Furthermore, very pollution tolerant species were also present e.g. *Chironomus* sp. (EPA Group E). The community composition at both sites was therefore indicative of **Q2-3** (Poor Status) water quality (**Table 2**).

Table 2 Macro-invertebrate Q-sampling results for sites on the

Group	Family	Species	Site 1	Site 2	EPA Group
Odonata	<i>Coenagrionidae</i>	<i>Coenagrion</i> sp.	1		B
Amphipoda	Gammaridae	<i>Gammarus duebeni</i>		17	C
Coleoptera	Dytiscidae	<i>Agabus paludosus</i>	1		C
Coleoptera	Dytiscidae	<i>Hydroporus tessellatus</i>	2		C
Coleoptera	Halipliidae	<i>Halipilus ruficollis</i> group	1		C
Coleoptera	Halipliidae	<i>Halipilus lineatocollis</i>	1		C
Diptera	Chironomidae	<i>Non-Chironomus</i> spp.	6	2	C
Diptera	Dixidae	sp. indet.		3	C
Mollusca	Tateidae	<i>Potamopyrgus antipodarum</i>	39		C
Mollusca	Bithyniidae	<i>Bithynia tentaculata</i>		2	C
Hirudinea	Glossiphonidae	sp. indet.		2	D
Isopoda	<i>Asellidae</i>	<i>Asellus aquaticus</i>	62		D
Mollusca	<i>Lymnaeidae</i>	<i>Ampullacaena balthica</i>	2		D
Mollusca	<i>Sphaeriidae</i>	sp. indet.			D
Diptera	<i>Chironomidae</i>	<i>Chironomus</i> spp.		26	E
Oligochaeta	<i>Annelidae</i>	sp. indet.		2	N/A
Abundance			82	167	
Q-rating			2-3¹	2-3	
WFD status			Poor	Poor	

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¹ Tentative Q Rating applied given absence of riffle and glide habitat which is required for a definitive Q Rating determination.

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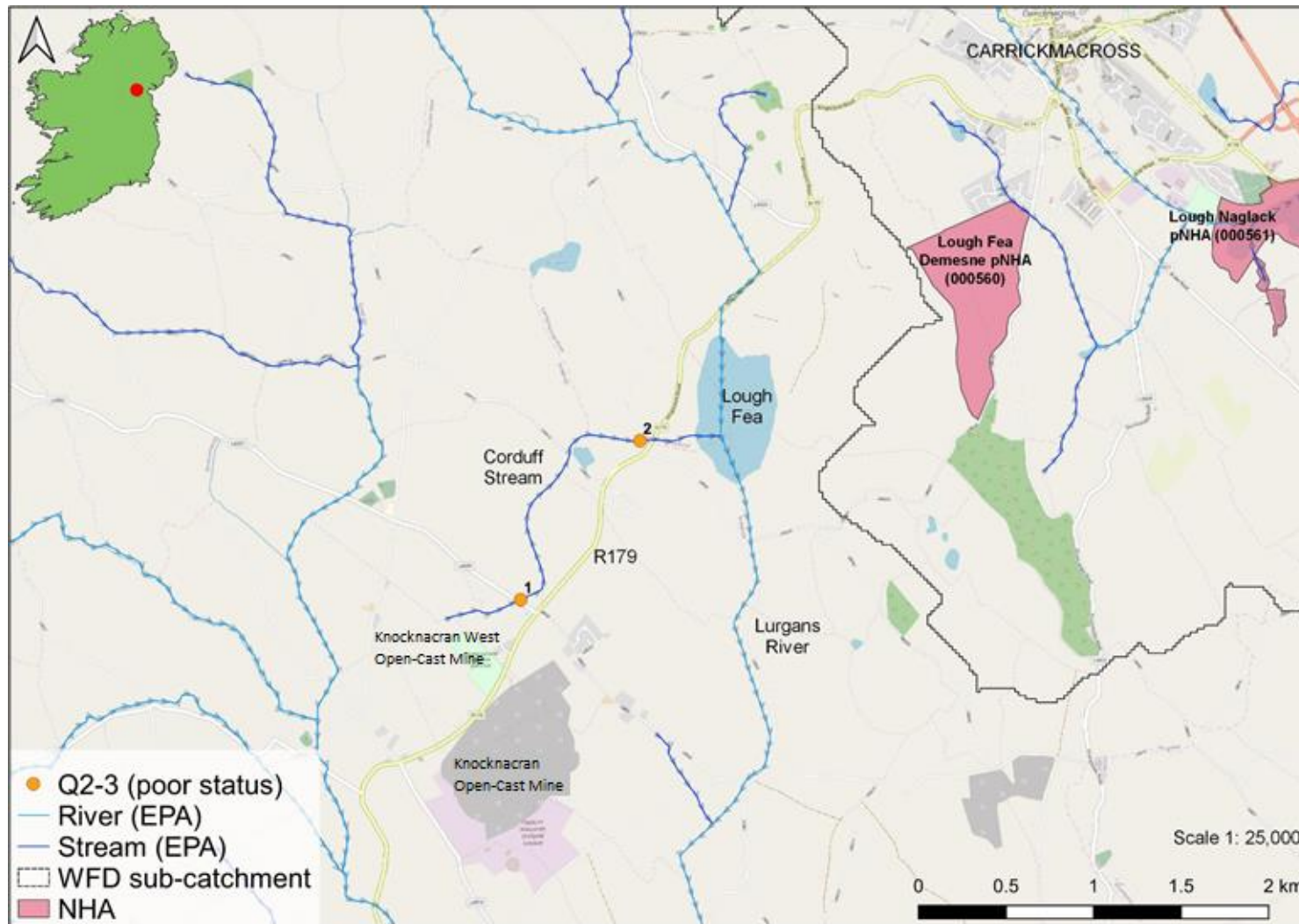


Figure 2 Overview of the biological water quality recorded in the Corduff Stream in the vicinity of the existing Knocknacran Open-Cast Mine and proposed Knocknacran West Open-Cast Mine, Co. Monaghan

2.3 Aquatic ecological evaluation

An aquatic ecological evaluation of each survey site was based on the results of the fisheries habitat assessments (including electro-fishing), the presence of protected or rare species or habitats and the biological water quality status of the survey sites (**Table 3**).

Survey site 1 at Drumgoosat on the Corduff Stream was evaluated as of **local importance (lower value)**. Primarily, this evaluation was due to the low aquatic ecological value for invertebrates, macrophytes and fisheries (Table 1). The Corduff Stream was also heavily modified in nature with evident heavy enrichment and siltation. Survey site 2, west of Lough Fea had improved flows and more semi-natural riverine conditions that resulted in the stream having some improved fisheries value for brown trout, lamprey and European eel. These attributes indicated that the Corduff Stream at site 2 was of **local importance (higher value)**.

Table 3 Aquatic ecological evaluation summary of the Corduff Stream survey sites in vicinity of the Knocknacran West Project, Co. Monaghan, according to NRA (2009) criteria.

Site no.	Watercourse	EPA code	Evaluation of importance	Rationale summary
1	Corduff Stream at Drumgoosat	06C70	Local importance (lower value)	Small, very heavily modified lowland stream that was heavily overgrown with commonly occurring macrophyte vegetation. The stream was historically straightened and deepened with no visible water flows, deep silt base and heavy enrichment, poor indicators of habitat quality. Of no inherent value to fish of high conservation value including salmonids, lamprey and European eel; no suitability for crayfish and none recorded; Q2-3 (poor status) water quality.
2	Corduff Stream west of Lough Fea	06C70	Local importance (higher value)	Small, heavily modified lowland stream but retaining some semi-natural characteristics including swift flowing water and coarse substrata locally. The stream was historically deepened and had a bed dominated by silt with heavy enrichment that are poor indicators of habitat quality. Of some lower value to lamprey given soft sediment burial habitat present; too enriched and silted to support a healthy salmonid population albeit some adult brown trout may exist (trout are known from Lough Fea & adjoining tributaries). Low suitability for eel but the presence of eel populations in Lough Fea may indicate the species presence in the Corduff Stream at site 2; no suitability for crayfish and none recorded; Q2-3 (poor status) water quality.

Conservation value: Atlantic salmon (*Salmo salar*), sea lamprey (*Petromyzon marinus*), brook lamprey (*Lampetra planeri*), river lamprey (*Lampetra fluviatilis*) and white-clawed crayfish (*Austropotamobius pallipes*) are listed under Annex II of the Habitats Directive [92/42/EEC]. Atlantic salmon, river lamprey, freshwater pearl mussel, white-clawed crayfish and otter are also listed under Annex V of the Habitats Directive [92/42/EEC]. European eel are 'critically endangered' according to most recent ICUN red list (Pike et al., 2020) and listed as 'critically endangered' in Ireland (King et al., 2011). With the exception of the Fisheries Acts 1959 to 2019, brown trout have no legal protection in Ireland.

3. Discussion

The Corduff Stream in the vicinity of the Knocknacran West Project and, indeed, through much of its course as far as Lough Fea has been historically modified (including straightening, deepening, road culverts and bank reinforcements), with resulting impacts to hydromorphology and the quality of aquatic habitats present. Furthermore, the stream suffers from low seasonal flow (particularly at site 1 near Drumgoosat) with siltation and water quality enrichment pressures evident. Both survey sites achieved Q2-3 (poor status) water quality in September 2022, with no rare or protected macro-invertebrates recorded present (**Table 2**). The poor habitat quality, limited aquatic and fisheries value at site 1 near Drumgoosat accounted for the low ecological evaluation i.e. **local importance (lower value)**.

However, despite evident historical and current pressures on the Corduff Stream, the stream may support a small adult brown trout population at site 2, west of Lough Fea where improved flows existed. Brown trout and brook lamprey are also known from the upper Glyde catchment in the vicinity of Lough Fea (Fleming *et al.* 2021). Furthermore, the improved flows and soft sediment at survey site 2 west of Lough Fea may support a small brook lamprey and European population, the latter species of which is Red-listed in Ireland (King *et al.*, 2011) and critically endangered according to the IUCN (Pike *et al.*, 2020). The improved fisheries value of the Corduff Stream at site 2 accounted for the higher evaluation than at site 1, i.e. **local importance (higher value)**.

The proposed mine development must, therefore, ensure impacts to the Corduff Stream are mitigated in respect of salmonid, European eel and general fisheries habitat, by preventing further deterioration of the already degraded Corduff Stream catchment.

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APPENDIX 6.7

Proposed Habitat Management Plan – Knocknacran West Project

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KNOCKNACRAN WEST PROJECT

Proposed Habitat Management Plan

Prepared for: Saint-Gobain Mining (Ireland) Limited

SLR Ref: 501.00545.008624
Version No: 1
October 2022



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1.0 INTRODUCTION

1.1 Background

This proposed Habitat Management Plan (HMP) has been prepared by SLR Consulting ('SLR') on behalf of Saint-Gobain Mining (Ireland) Limited ('SGMI') for the Knocknacran West Open-Cast Mine and Community Sports Complex Project (the 'Project') in response to a request for further information from Monaghan County Council ('MCC') in response to Reg. Ref.: 22/34.

The plan has been prepared in accordance with the guidance published in 2014 by the International Union for Conservation of Nature (IUCN) for an Integrated Biodiversity Management System (IBMS)¹.

The HMP represents a strategic working document in respect of the future management of key areas at the Site. The HMP identifies objectives for the conservation and enhancement of biodiversity at Knocknacran West Open-Cast Mine, Knocknacran Open-Cast Mine, and the Community Sports Complex; and goes on to describe targets and actions to deliver these objectives over the life of the operation.

1.2 Habitat - Biodiversity Management

1.2.1 What is Biodiversity?

The Convention on Biodiversity agreed at the Earth Summit in Rio de Janeiro in 1992 defined biodiversity as:

"The variability among living organisms from all sources, including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems."

Biodiversity can be defined simply as *"the variety of life"* and encompasses all living organisms, including common and rare species, as well as the genetic diversity within species. Biodiversity also refers to the habitats and ecosystems that support these species.

1.2.2 The Importance of Conserving Habitats and Biodiversity

Biodiversity is a vital resource, and it is essential to acknowledge its importance to our lives along with the range of benefits and ecosystem services that include:

- Provisioning services (production of food and water etc);
- Regulating services (climate change mitigation and disease etc.);
- Supporting services (nutrient cycling and pollination etc.); and
- Cultural services (educational, recreational and well-being etc.).

1.2.3 Habitat - Biodiversity Action Planning Framework

This HMP for the Project forms part of a much larger biodiversity framework encompassing biodiversity action planning at an international, national and local level.

International Context

The international commitment to halt the worldwide loss of habitats and species and their genetic resources was agreed in 1992 at United Nations Conference on the Environment and Development, commonly known as the Rio Earth Summit. Over 150 countries, including Ireland, signed the

¹ IUCN (2014). *Biodiversity Management in the Cement and Aggregates Sector: Integrated Biodiversity management System (IBMS)*. Gland, Switzerland: IUCN. 84pp.

Convention on Biological Diversity, pledging to contribute to the conservation of biodiversity at the global level. These signatories made a commitment to draw up national strategies to address the losses to global biodiversity and to resolve how economic development could go hand in hand with the maintenance of biodiversity.

The target set by the Rio Convention, and endorsed in 2002 at the World Summit in Johannesburg on Sustainable Development, to achieve a significant reduction of current rate of biodiversity loss at the global, regional and national level by 2010 was not met. Subsequently new objectives were set in Nagoya, Japan in 2010 around a strategic plan for the period 2011 to 2020 "Living in Harmony with Nature". These targets have been accepted by the European Union (EU) and would be integrated through every ongoing policy reform process at EU Level.

National Context

Ireland's second National Biodiversity Plan (NBP)² identifies actions towards understanding and protecting biodiversity in Ireland with the vision:

"that biodiversity and ecosystems in Ireland are conserved and restored, delivering benefits essential for all sectors of society and that Ireland contributes to efforts to halt the loss of biodiversity and the degradation of ecosystems in the EU and globally".

Local Context

For the NBP to be implemented successfully it requires some means of ensuring that the national strategy is translated into effective action at the local level with Local Biodiversity Action Plans required to be produced at the county level by each Local Authority under Objective 1 of the NBP.

At this current time, Monaghan's Biodiversity and Heritage Strategic Plan (2020 - 2025) combines the areas of heritage and biodiversity into a strategic plan for County Monaghan. It contains thirteen priority themes for the county and provides a programme of actions to protect and enhance biodiversity and heritage at the local level.

1.3 The Purpose of the Habitat – Biodiversity Management Plan

This proposed Habitat Management Plan (HMP) is a strategic working document that sets out a plan, of site-specific habitat - biodiversity management objectives and actions to enhance the habitats and biodiversity value of key locations at the Application Site.

The primary aim of the HMP is to integrate biodiversity management into the extractive and restoration activities at the proposed Knocknacran West Open-Cast Mine, and existing Knocknacran Open-Cast Mine; specifically to maintain and enhance existing key habitat areas for biodiversity where applicable, and to further enhance and develop others throughout the life of the development, thereby providing a biological resource to aid the ultimate restoration of the Site on cessation of mining operations.

² Department of Arts, Heritage and the Gaeltacht (2011). *Actions for Biodiversity 2011-2016 -Ireland's National Biodiversity Plan.*

2.0 SITE DESCRIPTION

2.1 General Information

2.1.1 Site Location and Setting

The Site is located in the townlands of Knocknacran (East & West), Drumgoosat, Drummond, Derrynascobe, Enagh, Derrynaglah and Clontrain, Co. Monaghan, to the north and south of the R179, a regional road which runs between Carrickmacross and Kingscourt (Figure 1). The Site is accessed via a public road (L4816) which runs south-eastwards from the R179. The town of Kingscourt is located ca. 7 km south of the Site along the R179, and the town of Carrickmacross is located ca. 7 km north of the Site also along the R179.

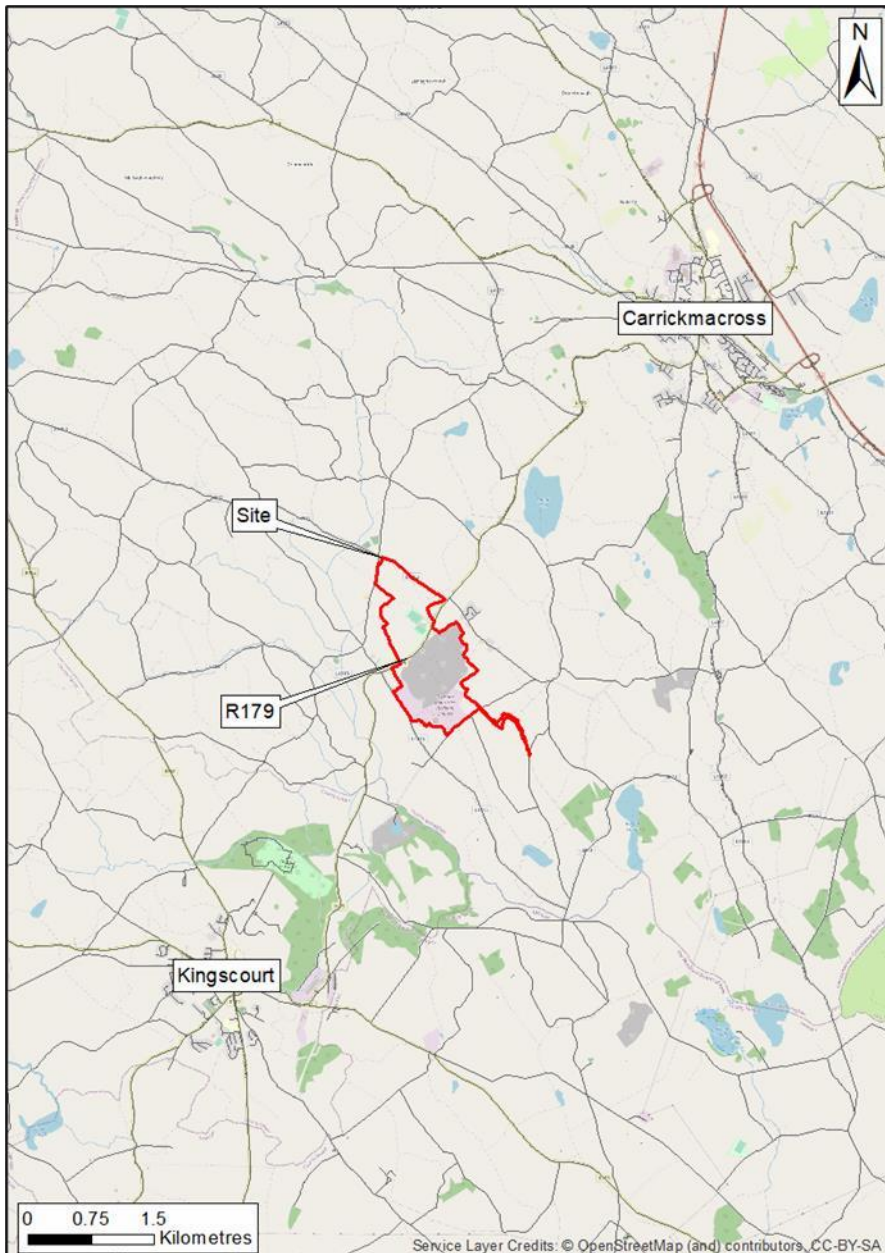


Figure 1: Site Location Plan

Due to the depletion of the gypsum resource from the existing Knocknacran Mine, permission is being sought to develop and recover the gypsum remaining in the former Drumgoosat Underground Mine by open-cast mining methods. The Proposed Development includes the restoration of the existing Knocknacran Mine to near original

ground levels and the further development of the Magheraclaone Mitchells Gaelic Football Club facilities on lands adjacent to the Knocknacran Mine (the 'Community Sports Complex'). Management of the Community Sports Complex site is not considered within the proposed HMP. The HMP sets out a proposed management plan for the mine development only.

According to the National Parks and Wildlife Service's (NPWS) database of designated nature conservation areas, the Site is not located within or immediately adjacent to any designated areas of conservation.

There are no Special Protected Areas (SPAs), Special Areas of Conservation (SACs) or Natural Heritage Areas (NHAs) within at least 15 km of the Site. There are however a number of proposed Natural Heritage Areas (pNHAs) within 5 km, the closest one being Lough Fea Demesne (000560) ca. 3 km from the Site. Habitats within the Application Site include agricultural grassland, semi-natural grassland, scrub, hedgerows, treelines and waterbodies.

2.1.2 Site Status

According to the National Parks and Wildlife Service's (NPWS) database of designated nature conservation areas, the Site is not located within or immediately adjacent to any designated areas of conservation.

There are no Special Protected Areas (SPAs), Special Areas of Conservation (SACs) or Natural Heritage Areas (NHAs) within at least 15 km of the Site. There are however a number of proposed Natural Heritage Areas (pNHAs) within 15 km, the closest one being Lough Fea Demesne (000560) ca. 3 km from the Site. Habitats within the Application Site include agricultural grassland, semi-natural grassland, scrub, hedgerows, treelines and waterbodies.

2.2 Environmental Information

2.2.1 Physical

Climate

The Irish climate is subject to strong maritime influences, the effects decreasing with increasing distance from the Atlantic coast. The climate in the area of the Application Site is typical of the Irish climate, which is temperate maritime.

The existing Knocknacran Mine site has an active weather station (Met Éireann station 'Kingscourt (Drummond)') which has been recording precipitation at the mine site since 1990. The 10 year (2012 to 2021) monthly total precipitation data for this station is presented below in Table 1.

Dunsany synoptic station (45 km south of the Site) has an annual average potential evapotranspiration of 530.6 mm (2016 to 2021).

Table 1: Kingscourt (Drummond) Weather Station, Recorded Monthly Total Precipitation

Monthly Total Precipitation (mm)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2012	87.5	37	12	43.5	39.4	170.3	91.1	118.5	65.1	85.7	89.9	139.6
2013	136.5	77.7	81	69	67.3	55.7	78.1	37.3	47.2	212.9	44.5	152.8
2014	164.4	138.2	77.4	64.8	85.1	50.1	34.6	142.1	4.8	139.5	157.5	91.2
2015	112.2	65.2	87	66.1	130	44	103.5	90.8	33.9	61.8	181.6	224
2016	127	108	51.8	74.1	65.2	92.7	76.5	86	78.3	45.8	47.1	74.6
2017	29.8	79.5	86	8.2	67.6	95.1	91	79.7	110.1	96.4	67	76.5
2018	154.1	63.5	77.5	54.5	37.2	-	42.2	77.2	49.8	34.7	131.1	104.8
2019	26.9	53.6	156.7	77.3	40.3	105.1	92.2	170.6	-	-	-	100
2020	63.1	219.9	64.8	18.7	13.2	75.7	96.6	126.6	63.4	108.3	91.2	120.1
2021	129.5	107.8	71.6	19.3	108.3	-	-	N/A	N/A	N/A	N/A	N/A

Topography

The area around the Site is dominated by a rolling (drumlin) topography with agriculture being the main activity. The lands can be characterised as rural in nature, with land uses in the area being generally agricultural, single-house residential, commercial/industrial, with a church and primary school in the village of Drumgoosat to the north of the Site. Residential housing in the area is primarily confined to linear ribbon settlements along local roads or isolated properties.

The highest point on the Site is ca. 70 m OD (Malin Datum) with the lowest being the floor of the Knocknacran open-pit at ca. 0 m OD (Malin Datum).

Geology & Soils

The Site area is located within the Kingscourt Outlier, a half-graben structure formed of Carboniferous and Permo-Triassic rocks. The Kingscourt Fault forms the western boundary of the Kingscourt Outlier. The stratigraphy and geological structures have a dominant north-south strike.

The bedrock consists of the Kingscourt Gypsum Formation, which is described as consisting of mudstone with gypsum and anhydrite of Permian age. There is evidence of post-depositional weathering or solution (karst) on the upper surfaces of the gypsum beds as seen in the western part of the deposit currently exposed in the Knocknacran Open-Cast Mine. However, no major cave systems have been encountered in either the current open-cast mine or adjacent underground workings. There is no evidence from the underground workings at Drummond or Drumgoosat to suggest major north-south trending graben structures are important water-bearing features. Rather, the available data suggests they are barriers to groundwater flow across their strike plane.

Dolerite sills occur in the Permo-Triassic sequences at Kingscourt, with the principal intrusion in the Middle Mudstone between the two gypsum units/beds. A secondary intrusion is generally restricted to the Lower Mudstone but is known to occasionally cross-cut the Lower Gypsum in some areas. The sills are interpreted as having been hydrothermally altered as they were intruded, resulting in susceptibility to weathering and thereby acting as potential conduits for water where altered.

The Site is underlain by grey-brown podzolic and associated gley soils, which have generally originated from limestone glacial till. The soils are predominantly underlain by tills derived from Lower Palaeozoic rocks. The depth of overburden across the Site where it has not been stripped or re-worked is variable in thickness, reflecting the nature of the drumlin landscape.

Hydrology and Hydrogeology

In terms of the Hydrology of the Site, there are three primary local surface water courses in the area of the Proposed Development are:

- Magheraclone Stream which runs north to south along the western boundary of the Site;
- River Bursk (also known as River Rahans) which runs north to south in an artificially straightened channel along the eastern boundary and which receives discharge from the Site; and
- River Lagan (also known as the River Glyde) which receives water from both the Magheraclone and Bursk and flows from west to east to the south of the Site.

In addition, the Corduff Stream rises in an area above the Drumgoosat Mine and flows north-east to meet the River Bursk (WFD reach "GLYDE_030"). The River Bursk then flows towards Lough Fea and on to the River Lagan.

A drainage area of about 0.45 km² that currently contributes to the Corduff Stream will be captured by the proposed open-cast mine. The catchment area of the River Bursk to its inflow point to Rahan's Lough is approximately 30 km², with the catchment captured by the open-cast representing 1.5% of the total drainage area. The proportion of catchment is small so the effect on streamflow in the Corduff Stream and River Bursk is negligible. The Bursk flows south into Bursk Lough, then Rahan's Lough (Raffan's Lough), and then into the River

Lagan. Bursk Lough is also fed by Descart Lough. The overall drainage pattern in the area is principally northwest-southeast or north-south as defined by divides set by the local topography.

It is intended that the final post-mining waterbody in the Knocknacran West Open-Cast will enter the headwaters of the Corduff Stream.

Surface water quality monitoring is carried out at 3 locations in accordance with the IE Licence (P0519-04). Electrical conductivity, sulphate and flow are monitored on a daily basis at MSE-1. Electrical conductivity is monitored on a monthly basis at location B (5 m upstream of the discharge point). Electrical conductivity and sulphate are also monitored on a daily basis at compliance point CP-1 (70 m downstream of the discharge point).

In terms of the Hydrogeology of the Site, the existing open-cast area at Knocknacran Mine sits within a 'poor' bedrock aquifer unit, as does the majority of the Plant Site, and eastern side of the Knocknacran West Open-Cast Mine site. The western side of the Knocknacran West Open-Cast Mine site sits within a bedrock aquifer that is considered to be a 'Locally Important Aquifer – bedrock which is generally moderately productive'. Another Locally Important bedrock aquifer unit occurs to the east in the area of the discharge from the mine site to the River Bursk.

The EIAR contains details of third-party wells located within 500 m of the Site. Local supplies are generally low yield, supporting single household domestic properties in the immediate site area. In the wider area (7 km of the Site) there are 3 public groundwater supply schemes, however, these are considered to be hydraulically disconnected from the mining area.

The gypsum deposits and the mudstones of the Kingscourt Gypsum Formation are essentially aquicludes, which restrict the flow of groundwater from one aquifer to another and are characterised by low permeability. The dolerites of the Kingscourt Gypsum Formation are characterised by minor and discontinuous local-scale flow where they have been altered in the vicinity of the Site. Their low permeability restricts the flow of water between aquifer units, despite the evidence of local karstification in the gypsum. The dolerites which crosscut the formation tend to be altered in the locality of the Site (i.e., in many instances 'weathered' to 'free-diggable' doleritic sandy material). In places, the weathering process has created zones of enhanced permeability which is sufficient to support some localized flow over a small scale.

Groundwater Flow

The observed geological discontinuities within the underlying strata means there is limited lateral or vertical groundwater flow within the Kingscourt Gypsum Formation on a site scale. The layered nature of the strata impedes the downward flow of groundwater to the mine voids and creates strong vertical hydraulic gradients.

The north-south strike of many of the major faults helps to reinforce the groundwater compartmentalisation. The Kingscourt Gypsum Formation is located within the Kingscourt Outlier, which is a half-graben feature, approximately 1.2 km wide (east-west) and 12 km long (north-south). During mine dewatering, the boundaries of the half-graben have helped to localise the area of drawdown. The western limit of drawdown is a fault within the Kingscourt Sandstone Formation.

All historical and current extraction activities at the Site have occurred beneath the water table. Groundwater entering the existing Drumgoosat underground workings is pumped from a borehole to a series of settlement ponds which drain through an oil interceptor prior to being discharged to an existing licenced receiving water discharge point on the River Bursk. Pumping records for the mine during historical operations indicate groundwater inflows were seasonally variable between ca. 20 m³/d in September to ca. 870 m³/d in March (with an average of ca. 300 m³/d). Groundwater and surface water entering the existing Knocknacran Open-Cast Mine is pumped from a sump located on the existing pit floor and routed through the same system. Groundwater from the adjacent operating underground Drummond Mine also passes through the settlement ponds prior to discharge. The settlement ponds are located within the Knocknacran Open-Cast Mine site. It is proposed to maintain the existing and permitted pumping, treatment and discharge activity for the duration of this development, including the planned water management arrangement for the proposed Knocknacran West Open-Cast Mine.

Inflows to the historic and current mining operations (Drumgoosat, Knocknacran and Drummond) are pumped into the existing site water management system and routed to a licenced discharge point on the River Bursk. The EPA Licence P0519-04 for the existing Knocknacran Mine states that a maximum of 12,240 m³/day can be discharged. The discharge of mine water is automatically adjusted depending on the available flow and assimilative capacity in the receiving river to ensure that water quality standards are not breached.

Excess water during the summer months (when the River Bursk is low) was previously pumped into the Drumgoosat Mine for temporary storage. Following the subsidence event of September 2018, no more water has been pumped into the Drumgoosat workings, and the base of the Knocknacran Open-Cast Mine is now used for temporary water storage. Water levels in Drumgoosat have been reduced in a controlled manner to aid in the long-term stability of the underground workings by a dewatering borehole located on the Knocknacran site.

2.2.2 Biological

Sources of Information

Information on the habitats and biodiversity of the Site and surrounding environment has been collected from numerous surveys undertaken as part of the EIAR and Request for Further Information (RFI) response for the Project. Survey work included the following:

Habitat surveys

Walkover surveys were completed by Golder on 12th July 2018 and 21st May 2019. A Phase 1 habitat and flora assessment was carried out by Eamonn Delaney BSc MSc MCIEEM CEcol (Delichon Ecology) on 12th August 2021 in accordance with the Heritage Council's guidelines (Smith et al. 2011). The dominant habitats present were classified according to Fossitt (2000) and key botanical species were identified.

A botanical survey was conducted in-parallel with the habitats survey, where botanical species were identified and recorded according to dominant habitat type. Any other records of interest (e.g., invasive plant species) were also marked on field maps and locations were recorded using GPS handheld units.

The conservation status of habitats and flora was also considered. The conservation status of habitats and flora within Ireland and Europe is indicated by inclusion in one or more of the following: Irish Red Data Book for Vascular Plants (Wyse Jackson et al., 2016); Flora Protection Order (1999 as amended 2015); the EU Habitats Directive (92/43/EEC).

Bat surveys

Visual inspections for bat roosting potential were carried out on 30th April and 1st May 2019 in order to search for any features of bat roosting potential in buildings or trees. Preliminary roost assessments were carried out 10th, 11th and 12th August 2021 and followed guidance set out in Collins (2016).

Dusk emergence surveys were carried out in July and August 2019 and August 2021.

Active bat surveys were carried out from 10th to 12th August 2021 inclusive in order to characterise bat activity in the area and to seek to identify any behaviour indicative of bat roosting.

Bat survey work at the Site was based upon guidance set out within 'Bat Mitigation Guidelines for Ireland' (Marnell et al., 2022), and 'Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes' (NRA, 2006), with reference to good practice guidelines set out by the Bat Conservation Trust (Collins, 2016).

2022 Survey Work

Habitat

A Phase 1 habitat and flora assessment was carried out by Eamonn Delaney on 13th July 2022 in accordance with the Heritage Council's guidelines (Smith et al. 2011). The dominant habitats present were classified according to Fossitt (2000) and key botanical species were identified.

The survey identified and surveyed all linear woodland habitats (i.e., treelines and hedgerows) within the proposed Knocknacran West site.

Survey methodology was undertaken in accordance with the guidelines and parameters outlined in Hedgerow Appraisal System Best Practise Guidance on Hedgerow Surveying, Data Collation and Appraisal (Foulkes et al., 2013). The results of the 2022 habitat survey found no additional area of invasive species. The 2021 habitat survey was validated and no changes in habitat classification or significance are necessary.

Mammal

Survey for non-volant mammals were undertaken by Tom O'Donnell on 23rd June 2022 and 12th, 13th and 14th July 2022 with some additional visits in August and September 2022. Techniques used to identify mammal activity followed recognised guidelines (e.g., Clark 1988, Sutherland 1996, Bang & Dahlstrom 2004 and JNCC 2004).

Dusk bat emergence surveys were carried out on 12th, 13th and 14th July 2022 and 8th August 2022 at four key structures. Emergence and re-entry surveys were carried out during suitable weather conditions and followed guidelines set out in Collins (2016).

Bird

Bird surveys were carried out by Noel Linehan (BSc) on 23rd June 2022, 13th and 14th July 2022, and 8th and 9th August 2022. Transect and point count surveys were carried out to characterise the general breeding bird community. The transect survey methodology was based on that used for the Countryside Bird Survey (e.g., Coombes et al., 2009).

Point counts were carried following the methodology used in the BIOFOREST project (Wilson et al., 2005). Each point count was of ten minutes duration.

Wildlife Acoustics Song Meter detectors with acoustic microphones were deployed to passively record acoustic sound (e.g., bird calls) overnight at three locations.

Reptiles & Amphibians

The Common (*or Viviparous*) Lizard (*Zootoca vivipara*) is Ireland's only native species of reptile. Targeted surveys were carried out in June, July, August and September which sought to identify the presence or absence of this species on the proposed site. Survey methodology follows 'Froglife' (1999).

Aquatics

Aquatic habitat appraisals and macro-invertebrate assessment were carried out at two locations on the Corduff Stream. Survey work was carried out on 8th September 2022.

2.3 Habitats

The Site footprint supports the existing Knocknacran Open-Cast Mine and materials handling facility located to the south of the R179 regional road, in addition to an area of recently unmanaged pastoral land, areas of scrub and woodland located to the north of the R179. The existing open-cast mine site comprises open, expansive areas of mined and excavated ground, that are served by access tracks, hard standing areas and associated offices, welfare facilities, access roads and parking areas. The dominant habitats at this part of the site include active quarries and mines (ED4)³ and buildings and artificial surfaces (BL3).

Semi-natural habitats within the open-cast and materials handling facility footprint are restricted to the margins and field boundaries and include area of gorse scrub (WS1), young broadleaved woodland (WD1) established as

³ Alphanumeric codes assigned in accordance with Fossitt, J. (2000) *A Guide to Habitats in Ireland*. Heritage Council, Kilkenny

screen planting, and nascent growth of ruderal plant species recolonising areas of bare or previously disturbed ground (ED3). The open-cast mine also supports a number of settlement ponds that are fringed by tall aquatic macrophytes and areas of dense gorse scrub.

The lands located to the north of the R179, which is the site of the proposed Knocknacran West Open-Cast Mine, currently support a network of pastoral land (GA1), dry meadows and grassy verge grassland (GS2), wet grassland (GS4), hedgerows (WL1), treelines (WL2), scrub (WS1) and mixed broadleaved woodland (WD1). The northern lands are also underlain by the former Drumgoosat Underground Mine area. The Knocknacran West Open-Cast Mine site/former Drumgoosat Underground Mine also includes the lands that previously supported Magheraclone Mitchells GAA facility. These lands have been rehabilitated / reinstated and now support unmanaged grassland that is in transition toward dry meadows and grassy verge grassland (GS2).

The lands on the Knocknacran West site have received little or no ongoing management in the short to medium term as evidenced by the overgrown and rush dominated nature of the wet grassland habitats that are commonplace throughout. Areas of drier grassland are in transition or currently represent the dry meadows and grassland verge grassland habitat type.

The northernmost section of the Knocknacran West site supports an area of wet woodland and scrub mosaic. The footprint of the former Drumgoosat above ground plant site, near the Site's north-eastern boundary, supports an area of scrub in transition to woodland. Lands on the Knocknacran West site, north of the R179, support drainage channels along the field margins. The upper reaches of the Glyde_030 watercourse (IE_NB_06G020400) are located near the eastern boundary, and originate within areas of poor draining, low lying lands supporting rank, rush dominated wet grassland. The existing lands on the Knocknacran West site do not support habitats of high botanical diversity, however they do represent a continuum of semi-improved or unmanaged habitats that in turn may provide suitable refuge and foraging habitat for a range of breeding avifauna, mammals (volant and non-volant) and invertebrates.

The existing main habitats recorded within the mine site areas (Knocknacran and Knocknacran West) are listed below and shown in Figures 2 and 3.

- Active Mine (ED4);
- Dry Meadows and Grassy Verge Grassland (GS2);
- Mixed Broadleaved Woodland (WD1);
- Scrub (WS1)
- Semi-Natural Grassland (GS4);
- Hedgerows (WL1);
- Treelines (WL2);
- Buildings and hardstanding (BL3); and
- Recolonising Bare Ground (ED3).

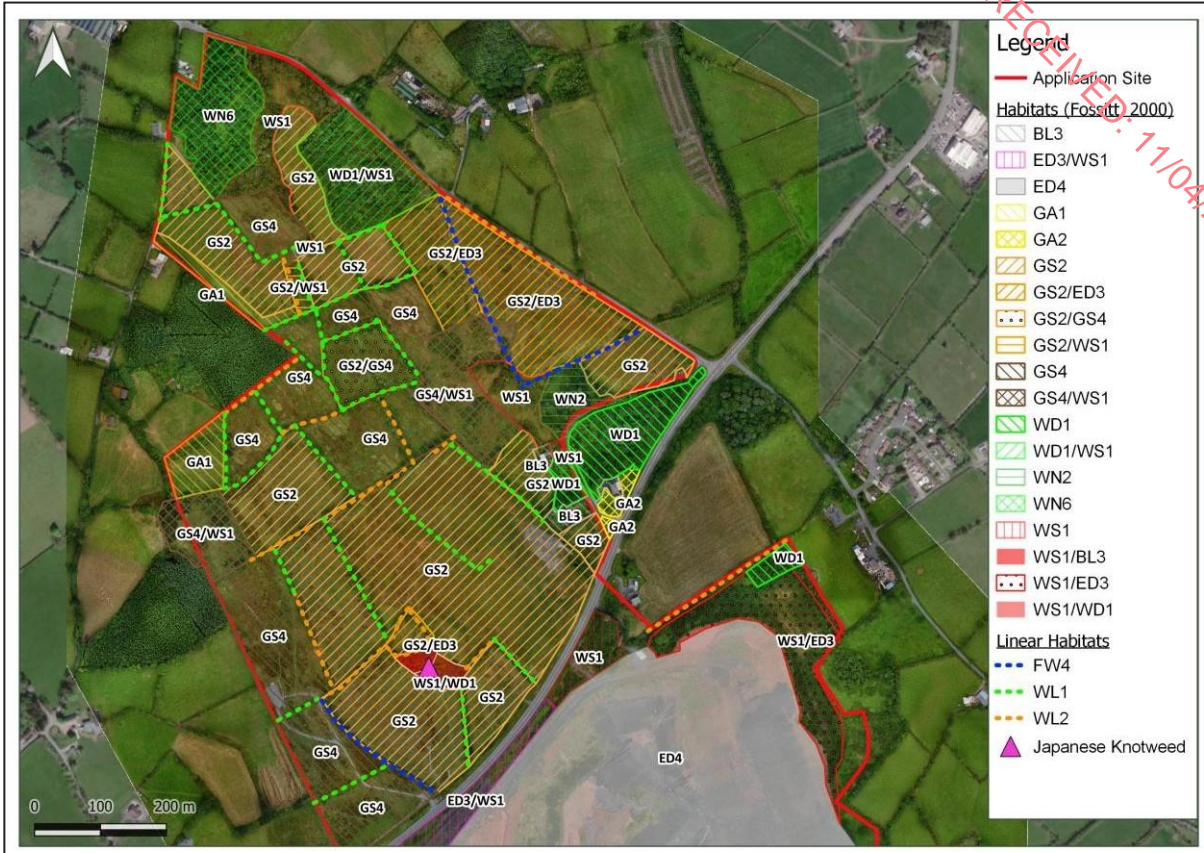


Figure 2: Habitat Map (North)

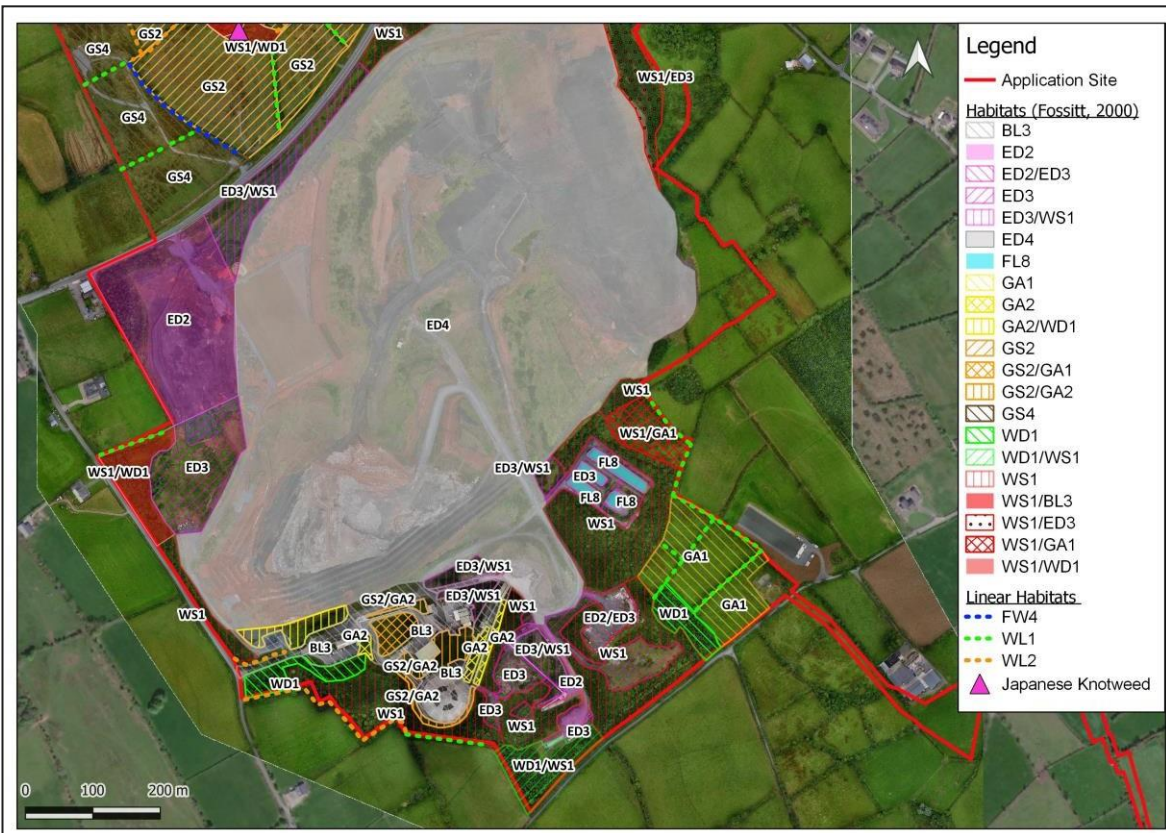


Figure 3: Habitat Map (South)

Improved Agricultural Grassland (GA1)

Improved agricultural grassland occurs at the southeastern margins of the Knocknacran site boundary and not within or immediate adjacent to the mine areas. These lands support beef farming and are highly improved and consequently support abundant perennial rye grass (*Lolium perenne*) and accompanying agricultural herbs including creeping buttercup (*Ranunculus repens*), mouse-ear chickweed (*Cerastium fontanum*) and broadleaved dock (*Rumex obtusifolius*).

These lands are fringed by unmanaged hedgerow habitats comprising young ash (*Fraxinus excelsior*) trees and hawthorn (*Crataegus monogyna*) shrubs.

Evaluation: Local Importance – Lower Value.

Amenity Grassland (GA2)

Small areas of amenity grassland are located around the services buildings, offices and car parking areas associated with the Knocknacran mining facility. Some of these areas have been unmanaged in recent years and are classified under the dry meadows and grassy verge grassland habitat category. Those areas that have undergone recent maintenance support recently mown grass swards and support perennial rye grass, red fescue (*Festuca rubra*) dandelion (*Taraxacum officinale agg.*), white clover (*Trifolium repens*) and localised abundances of the moss *Rhytidiadelphus squarrosus*.

Evaluation: Negligible.

Dry Meadows and Grassy Verge Grassland (GS2)

Within the active mine site, this habitat is present locally along the margins of access roads and tracks and on areas of unmanaged amenity grassland. Plant species composition includes cock's-foot (*Dactylis glomerata*), creeping bent (*Agrostis stolonifera*), Yorkshire fog, ragwort (*Senecio jacobaea*), nettle and bush vetch (*Vicia sepium*).

Dry meadows and grassy verge grassland (GS2) are more extensive in its distribution to the north of the R179, where it has established due to the recent lack of management of pastoral lands. Plant species composition typically comprises Yorkshire fog (*Holcus lanatus*), false oat grass (*Arrhenatherum elatius*), common couch grass (*Elytrigia repens*), common rush (*Juncus effusus*), creeping bent (*Agrostis stolonifera*), common bent (*Agrostis capillaris*), broadleaved dock, ribwort plantain (*Plantago lanceolata*) and sweet vernal grass (*Anthoxanthum odoratum*).

The lands that once supported Magheraclone GAA pitch have been reinstated and reseeded to form a pastoral grassland. However, this area hasn't been managed through grazing or mowing in recent years and has therefore transitioned to a dry meadow type grassland habitat, exhibited by an establishing sward comprising, tall and overgrown grasses. Plant species composition includes abundant perennial rye grass (*Lolium perenne*), creeping bent, creeping buttercup (*Ranunculus repens*), white clover (*Trifolium repens*), greater bird's foot trefoil (*Lotus pedunculatus*), broad-leaved dock, red clover (*Trifolium pratense*) and Yorkshire fog.

This habitat also occurs in mosaic with areas of recolonising bare ground, near the eastern boundary of the site, north of the R179. This area has been recently reclaimed and reinstated and has been left unmanaged in recent years. As a result, a mosaic of recolonising bare ground and dry meadows and grassy verge grassland habitats has established. Plant species composition includes creeping bent, common bent, Yorkshire fog, false oat grass, greater bird's foot trefoil, marsh thistle (*Cirsium palustre*), sweet vernal grass, ribwort plantain, compact rush (*Juncus conglomeratus*), common rush, red bartsia (*Odontites vernus*), common knapweed (*Centaurea nigra*), meadow vetchling (*Lathyrus pratensis*), creeping cinquefoil (*Potentilla reptans*) and lesser stitchwort (*Stellaria graminea*).

Evaluation: Local Importance – Lower Value.

Wet Grassland (GS4)

Wet grassland occurs throughout much of the study area, north of the R179 where it occurs near the centre and southwest. Like most of the pastoral lands located to the north R179, these wet grassland habitats have been

unmanaged in recent years resulting in the development of dense rushy swards, most of which are dominated by common rush. In addition to common rush other species occur locally and include Yorkshire fog, greater bird's-foot trefoil, sweet vernal grass, creeping bent, marsh thistle, meadowsweet (*Filipendula ulmaria*), marsh willowherb (*Epilobium palustre*), angelica (*Angelica sylvestris*), silverweed (*Potentilla anserina*), jointed rush (*Juncus articulatus*), compact rush and meadow vetchling.

Wet grassland also occurs in mosaic with scrub, where the lack of recent management has resulted in the colonisation and spread of scrub species including bramble (*Rubus fruticosus agg.*), grey willow (*Salix cinerea subsp. oleifolia*) and gorse (*Ulex europaeus*).

Evaluation: Local Importance – Lower Value.

Spoil and Bare Ground (ED2)

This habitat is located within the mine facility, occurring in mosaic with recolonising bare ground or along the immediate margins of the mine and the site's access tracks. During the site visit, this habitat occurred within the footprint of the recently permitted (Reg. Ref. 20/365) Community Sports Complex site, which is under construction. Plant species assemblage is sparse and includes localised and individual occurrences of those species identified for the recolonising bare ground habitat described below.

Evaluation: Local Importance – Lower Value.

Recolonising Bare Ground (ED3)

This habitat occurs as large, relatively extensive areas within the Knocknacran Open-Cast Mine and plant-site as well as occurring in mosaic with (or in transition from) areas of spoil and bare ground. To the north of the R179, this habitat occurs in mosaic with dry meadows and grassy verge grassland, where it has established and transitioned from recently regraded and reinstated lands. It represents one of the more species rich areas within the study including a range of ephemeral, wetland, and dry grassland plant species.

Within the mine site, areas of recolonising bare ground occur along access tracks margins and within the sections of the open-cast footprint that are starting to recolonise with ruderal plant species. Areas of recolonising bare ground and nascent scrub also occur on sloping open-cast faces and margins near the north and northwest, that have not been worked in the recent past. Plant species composition includes colt's-foot (*Tussilago farfara*), Yorkshire fog, broad leaved willowherb (*Epilobium montanum*), yarrow (*Achillea millefolium*), wild carrot (*Daucus carota*), greater bird's foot trefoil, lesser trefoil (*Trifolium dubium*), ribwort plantain, cock's-foot, mayweed (*Matricaria chamomilla*), common bent, cat's ear (*Hypochaeris radicata*), sweet vernal grass, field horsetail (*Equisetum arvense*), ox-eye daisy (*Leucanthemum vulgare*), rosebay willowherb (*Chamerion angustifolium*), weld (*Reseda luteola*), creeping thistle (*Cirsium arvense*), black medick (*Medicago lupulina*), black knapweed (*Centaurea nigra*), common centaury (*Centaureum erythraea*), silverweed (*Potentilla anserina*), prickly sow thistle (*Sonchus asper*) and redshank (*Persicaria maculosa*).

Evaluation: Local Importance – Lower Value.

Other Artificial Lakes and Ponds (FL8)

This habitat relates to the network of attenuation pond cells located near the southeastern corner of the Knocknacran mine site. These ponds are active and continually receive turbid water from the mine. As a result, instream aquatic macrophytes are not abundant. However, the margins of these habitats support emergent aquatic macrophytes including bulrush (*Typha latifolia*), greater willowherb (*Epilobium hirsutum*), rosebay willowherb, wild carrot and angelica. These ponds also support wetland waterbirds including Coot and Mallard. Another area of standing water occurs near the northern boundary of the mining void and includes bulrush. A disused attenuation pond also occurs near the southern boundary of the mine site and supports emergent bulrush and fringing grey willow and gorse.

Evaluation: Local Importance – Lower Value.

Reed and Large Sedge Swamp (FS1)

This habitat occurs in mosaic with the extensive attenuation ponds located near the southeastern corner of the Knocknacran mine site. Species composition includes bulrush (*Typha latifolia*) with accompanying aquatic emergent macrophytes as listed above.

Evaluation: Local Importance – Lower Value.

Mixed Broadleaved Woodland (WD1)

The boundaries of the Knocknacran Open-Cast Mine and associated facilities support young mixed broadleaved woodland blocks that have been established for screening and landscaping purposes. This includes young ash plantations at the southeastern and northeastern boundary of the mine facility. Other areas of mixed broadleaved woodland are located to the southwest of the mine offices and weighbridge and located to the east of the local access road serving the western boundary of the mine site. These are young woodland habitats with undeveloped shrub and ground layers. Plant species composition includes ash (*Fraxinus excelsior*), cherry (*Prunus sp.*), pubescent birch (*Betula pubescens*), sycamore (*Acer pseudoplatanus*) and hybrid poplar (*Populus sp.*).

Mixed broadleaved woodland also occurs in mosaic with scrub on those lands located to the north of the R179. One area occurs immediately south of a ruined farmhouse and outbuildings and has formed from an overgrown garden and converging hedgerows and treelines and comprises semi-mature ash and Lawson cypress (*Chamaecyparis lawsoniana*) trees and underlying elder (*Sambucus nigra*), hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*), grey willow, plum (*Prunus sp.*) and apple (*Malus sp.*) trees. Another area of mixed broadleaved woodland in mosaic with scrub, occurs near the northeastern boundary of the site, north of the R179. These habitats have colonised the footprint of the old Drumgoosat mine plant-site and now support pubescent birch, grey willow, sycamore and ash overtopping more extensive gorse (*Ulex europaeus*) scrub.

Evaluation: Local Importance – Lower Value.

Wet Willow-Alder-Ash Woodland (WN6)

A small copse of wet-willow-alder-ash woodland has developed at the northernmost location of the study area. This is a recently developed woodland habitat comprising young ash and grey willow, with gorse and bramble in the understorey.

Evaluation: Local Importance – Higher Value.

Oak-Ash-Hazel Woodland (WN2)

A small area of developing semi-natural woodland comprising pedunculate oak (*Quercus robur*) and ash is located near the eastern boundary of the study area, north of the R179. This woodland supports pedunculate oak, ash and occasional pubescent birch in the canopy. The shrub and ground layers are poorly developed, with localised holly (*Ilex aquifolium*), regenerating ash, ivy (*Hedera hibernica*) and bramble.

Evaluation: Local Importance – Higher Value.

Scrub (WS1)

Localised pockets of scrub occur throughout the study area and include gorse, grey willow and bramble. These habitats occur singularly or in mosaic with other habitats such as wet grassland, dry meadows and grassy verge grassland and mixed broadleaved woodland.

Areas of dense gorse scrub with some grey willow has established within the mine site, its immediate environs and site boundary. Dense gorse, willow and broom (*Cytisus scoparius*) scrub occur on the fringes of the silt ponds located near the southeastern boundary of the site, while the southern, western and northeastern fringes of the mining void support gorse dominated scrub.

The lands located to the north of the R179 support localised areas of gorse and grey willow scrub, in addition to areas of scrub occurring in mosaic with mixed broadleaved woodland.

Evaluation: Local Importance – Lower Value.

Drainage Ditches (FW4)

Poorly defined, narrow and sinuous drainage channels are located toward the centre and northeast of the Knocknacran site, north of the R179. These drainage channels supported shallow water and little to no waterflow. These drainage channels are contributory watercourses of the Glyde_030 river (IE_NB_06G020400).

Evaluation: Local Importance – Higher Value.

Hedgerows (WL1)

Hedgerows occur along the boundaries of the unused pastoral fields located north of the R179. Like the pastoral field networks, these hedgerows have been unmanaged over the short- to medium-term. Hawthorn is the most common and dominant shrub species within these linear woodland habitats. Other regularly occurring species include elder, blackthorn (*Prunus spinosa*), grey willow, gorse, wych elm (*Ulmus glabra*) and young ash trees. Nearer the ruined and abandoned farmhouses and outbuildings, species such as apple, plum, cherry and elm occur.

Evaluation: Local Importance – Higher Value.

Treelines (WL2)

Similar to hedgerows, treeline habitats typically occur to the north of the R179 along the boundaries of abandoned farm buildings, on the margins of the old Magheraclone GAA field and where overgrown hedgerows have formed into treeline habitats. Treelines around the old Magheraclone GAA field include tall hybrid poplar trees. Hybrid poplar trees also fringe the northeastern boundary of the study area, north of the R179. Where treelines border the pastoral lands north of the R179, they mostly comprise semi-mature ash trees occurring with or overtopping hawthorn and blackthorn trees.

Evaluation: Local Importance – Higher Value.

Aquatic Habitat FW4 & FL4

As described by Aecom (2020) the River Bursk and River Glyde support the following notable species that may be affected by mine water discharge: Atlantic salmon (*Salmo salar*); and brook lamprey (*Lampetra planeri*) (both Habitats Directive Annex II, requiring establishment of SACs for their protection and indicating importance on a European scale), brown trout (*Salmo trutta*), and European eel (critically endangered by IUCN criteria).

A variety of other species that are not protected or notable are also present, known to include perch (*Perca fluviatilis*), pike (*Esox Lucius*), roach (*Rutilus rutilus*), stone loach (*Cobitis elongatoides*) and three-spined stickleback (*Gasterosteus aculeatus*) in the watercourses, and also bream (*Abramis brama*) and tench (*Tinca tinca*) at Rahans Lough. The upper reaches of the River Bursk are reported to contain salmonid spawning and nursery habitat. However, downstream of the mine water discharge point there is reported to be cyprinid and coarse fish habitat but no salmonid spawning and nursery habitat (IFI, 2019; SLR, 2019). All the notable fish species (salmon, trout, lamprey and European eel) are migratory species, meaning they migrate up and downstream to complete their life cycle, and therefore connectivity between spawning, feeding and refuge habitat is important.

2.4 Invasive Species

Japanese knotweed was identified at one location (Figure 4) on the margins of an abandoned farm dwelling, north of the R179 at 0680601 0799957 (Grid Reference provided in Irish Transverse Mercator ITM). The stand when surveyed was made up of 4 individual plants measuring up to ca. 4 m in height and ca. 10 m² in area.

The Applicant has commissioned Shaffrey Landscaping to eradicate the Japanese knotweed onsite. It is proposed that direct chemical injection of pesticide will be undertaken each September for 3 to 4 years. The first chemical injection treatment was carried out on 14th September 2022.

The area has been fenced off to ensure no one enters the area and signage has been posted on the fence identifying the area contains knotweed (Figure 5).

An assessment will be carried out in year 3 to see if further treatment is required.



Figure 4: Location of Japanese Knotweed recorded on Site



Figure 5: Fencing and signage around the Japanese Knotweed identified on the Knocknacran West site

3.0 EVALUATION AND RATIONALE FOR HABITAT MANAGEMENT

3.1 Assigning Biodiversity Value to Habitats

The evaluation of biodiversity value has taken the following into consideration:

- Frequency of a habitat at a local and national level;
- Spatial extent of the habitat at a local and national level;
- Species diversity supported by any particular habitat or feature at the Site;
- Presence of local, national and international important species;
- Presence of other notable species; and
- Presence of invasive species.

For example, if a habitat is uncommon and/or small in spatial extent at a local level, it is likely to have a higher biodiversity value than a habitat that is common and covers a greater spatial extent within the local landscape. The biodiversity value of habitats also takes into account the range of species likely to be supported by the habitat and the ease at which it can be recreated.

Table 2 provides a summary of the criteria used in determining the biodiversity value at the Site.

Table 2: Criteria for Determining Biodiversity Value

Evaluation	Criteria
Very High	<p>Habitats conforming to an Annex I habitats under the EU Habitats Directive.</p> <p>A complex habitat and/or supporting or likely to support a range of species and/or which is not readily re-created.</p> <p>A resident or regularly occurring population of an internationally important bird species listed in Annex I and/or referred to in Article 4(2) of the EU Birds Directive and/or a species of animal or plant listed in Annex II and/or IV of the EU Habitats Directive and which is threatened or rare in Ireland or of uncertain conservation status or of globally threatened species (IUCN Red List).</p>
High	<p>A nationally important and/or threatened habitat.</p> <p>A habitat listed as being a priority at a national level and/or supporting or likely to support a range of species and/or which is not readily re-created.</p> <p>A resident or regularly occurring population of a nationally important or threatened species which is protected under the Wildlife Acts and or listed on a relevant Red Data list.</p>

Evaluation	Criteria
Moderate	<p>A locally important and/or threatened habitat and/or supporting or likely to support a range of species and/or which is not readily re-created.</p> <p>A resident or regularly occurring population of a locally important or threatened species or species.</p> <p>Sites containing semi-natural habitat types with ecological value in a local context and a high degree of naturalness, or populations of species that are uncommon within a local context.</p> <p>Sites or features containing common habitats of limited ecological value, but which are nevertheless essential in maintaining links and ecological corridors between features of higher biodiversity value.</p>
Low	<p>Sites containing small areas of semi-natural habitat and or heavily modified habitats that are of some local importance for wildlife.</p>

3.2 Defining Habitat (Biodiversity) Management Areas (HMA's)

Following the site visits, five proposed HMAs were identified to be developed as part of the mine site restoration plans, in agreement with SGMI. The location of the HMAs are shown in Figure 6.

- HMA-1: Enhance and improve woodland area to the north;
- HMA-2: Improve and maintain hedgerow connectivity;
- HMA-3: Development of grassland and associated hedgerows, treelines and drains/ditches;
- HMA-4: Development of scrub; and
- HMA-5: Development of waterbody and associated wetland habitats.

For each HMA, the information presented comprises a brief summary of the key habitats, highlighting features which either enhance, or detract, from the relevant HMA area. Biodiversity management objectives are also identified for each of the HMA areas.

HMAs will be developed, where possible, during the operational life of the mine sites. Habitat areas within the Knocknacran Mine site, to the south of the R179 will be developed during the operational life of the Knocknacran West Open-Cast Mine, with the exception of the removal of the overland conveyor and an access track for vehicles to enter the tunnel connecting the two mine sites. These features would be removed during the restoration of the Knocknacran West Open-Cast Mine.

HMA-2 will be established during the construction phase of the Knocknacran West Open-Cast Mine, when screening berms will be created and planted. During the operational life, these will be maintained to ensure habitat connectivity around the perimeter of the Site.



Figure 6: Location of proposed Habitat Management Areas (HMAs)

3.2.1 Habitat Management Area 1 (HMA-1)

Description

HMA-1 forms part of an existing woodland area in the north of the Site supporting a woodland-scrub-grassland mosaic habitat. Specific habitat types present include:

- WN6 - Wet-willow-alder-ash woodland
- WD1 - Mixed broadleaved woodland
- WS1 - Scrub
- GS2 - Dry meadows and grassy verge grassland

A small copse of wet-willow-alder-ash woodland has developed at the northernmost part this area. This is a recently developed woodland habitat comprising young ash and grey willow, with gorse and bramble in the understorey.

The boundaries of the Site support young mixed broadleaved woodland blocks that have been established for screening and landscaping purposes. This includes young ash plantations at the northeastern boundary of the Site. This location comprises an area of mixed broadleaved woodland in mosaic with scrub, and now supports pubescent birch, grey willow, sycamore and ash overtopping more extensive gorse (*Ulex europaeus*) scrub.

The grassland over much of this area has become rank and species-poor due to the lack of management. Plant species composition typically comprises Yorkshire fog (*Holcus lanatus*), false oat grass (*Arrhenatherum elatius*), common couch grass (*Elytrigia repens*), common rush (*Juncus effusus*), creeping bent (*Agrostis stolonifera*), common bent (*Agrostis capillaris*), broadleaved dock, ribwort plantain (*Plantago lanceolata*) and sweet vernal grass (*Anthoxanthum odoratum*).

This area will largely be retained as part of the proposed development, some areas of woodland to the south will be removed by extraction activities, however, enhancement measures will occur within this area during the operational life and into restoration. A bespoke bat roost will be located within this HMA during the operational life of the development and an existing badger sett will be relocated further within this HMA.



Figure 7: Mixed broadleaved woodland (WD1) copse

Evaluation of Habitat Value

Overall HMA-1 is assessed as having an overall 'moderate' habitat - biodiversity value in that it contains a copse of wet-willow-alder-ash woodland habitat which has high ecological value in a local context, in a mosaic with

mixed broadleaved woodland, scrub, and dry meadows and grassy verge grassland, which are of low ecological importance locally.

Habitat - Biodiversity Objectives

The habitat - biodiversity objectives for HMA-1 are to:

- Enhance the existing wet-willow-alder-ash woodland and mixed broadleaved woodland during restoration at the site. Replace, on a like-for-like basis at a minimum, the woodland areas which will be lost during the extraction operations in the Knocknacran West Open-Cast Mine;
- Provision of bespoke bat roost area and enhancement of badger habitat; and
- Manage areas dominated by tall grasses and scrub to maintain and develop a mosaic of habitats to improve the diversity of this area.

3.2.2 Habitat Management Area 2 (HMA-2)

Description

HMA-2 has been designed to improve and maintain hedgerow connectivity throughout the overall Site, where applicable. This will become a feature following the construction and planting of screening berms around the proposed Knocknacran West Open-Cast Mine. Existing habitats will be enhanced by further planting to maintain and encourage connectivity, in particular for bats and hedgerow nesting bird species.

Specific habitat type present include:

- WL1 - Hedgerows
- WL2 - Treelines
- WD1 - Mixed broadleaved woodland
- FW4 - Aquatic Habitat

Existing hedgerows occur along the boundaries of the unused pastoral fields located within the Knocknacran West site. Like the pastoral field networks, these hedgerows have been unmanaged over the short- to medium-term. Hawthorn is the most common and dominant shrub species within these linear woodland habitats. Other regularly occurring species include elder, blackthorn (*Prunus spinosa*), grey willow, gorse, wych elm (*Ulmus glabra*) and young ash trees. Nearer the ruined and abandoned farmhouses and outbuildings, species such as apple, plum, cherry and elm occur. However, hedgerows away from the overall Knocknacran West site boundary will be removed during the extraction of gypsum, and so it is essential that a hedgerow corridor is maintained and further developed around the perimeter of the site for the movement of fauna. In addition, the restoration of the Knocknacran Open-Cast Mine area to near original ground level will facilitate the planting of new additional hedgerows with native species, in keeping with the overall mosaic pattern of hedgerows in the area. Restoration of hedgerows within Knocknacran will occur during the operational life of Knocknacran West Open-Cast Mine.

Similar to hedgerows, existing treeline (including an area of broad-leaved woodland) habitats typically occur on the Knocknacran West site along the boundaries of abandoned farm buildings, on the margins of the old Magheraclone GAA field and where overgrown hedgerows have formed into treeline habitats. Treelines around the former Magheraclone GAA field include tall hybrid poplar trees. Hybrid poplar trees also fringe the northeastern boundary of the site. Where treelines border the pastoral lands within Knocknacran West, they mostly comprise semi-mature ash trees occurring with or overtopping hawthorn and blackthorn trees. As with the hedgerows away from the overall Site boundary, the treeline habitat will be removed during the extraction of gypsum on the Knocknacran West site, and so it is essential that a hedgerow and treeline corridor is maintained and further developed around the perimeter of the Site (planted screening berms) for the movement of fauna, in particular for bat connectivity around the perimeter of the site. The existing Shirley House will be

upgraded to offer further roosting potential for bats on the site and connectivity between the planted berms along the perimeter and the bespoke roost in HMA-1, will be key characteristics to enhance.

A number of small water courses/drains/ditches will be removed as part of the development of the open-cast mine at Knocknacran West, including the upper part of the Corduff Stream which is ephemeral in nature. On cessation of mining the open-cast excavation at Knocknacran West will be restored to include a waterbody which will drain into the Corduff Stream, thus creating additional aquatic habitats in the future. In addition, the restoration of the Knocknacran Open-Cast Mine area to near original ground level will facilitate the development of drains/ditches, in keeping with the overall mosaic pattern of drainage in the area.

Evaluation of Habitat Value

HMA-2 is assessed as currently having an overall 'high' habitat - biodiversity value in that it contains large areas of hedgerow and treeline, and a lesser amount of aquatic habitat.

Habitat - Biodiversity Objectives

The biodiversity objectives for HMA-2 are to:

- Maintain and enhance proposed perimeter hedgerows, treelines and drains/ditches to maintain a corridor for the movement of fauna during the life and restoration of the Knocknacran West Mine; and
- Provision of suitable roosting habitat within the Shirley House and enhanced connectivity for bats with HMA-2 by the provision of planted perimeter berms.



Figure 8: Hedgerow and treeline with grassland in the foreground

3.2.3 Habitat Management Area 3 (HMA-3)

HMA-3 will form areas supporting the development of grassland and hedgerows following the restoration of the Knocknacran Open-Cast Mine area to near original ground level, by facilitating the development of grassland in a mosaic of fields with hedgerow and drains/ditches, in keeping with the overall rural landscape of the surrounding area.

Specific habitat type present include:

- GA1 - Improved agricultural grassland
- GA2 - Amenity grassland
- GS2 - Dry meadows and grassy verge grassland
- GS4 - Wet grassland

- WL1 - Hedgerows
- WL2 - Treelines
- FW4 - Aquatic habitat (drainage ditches)

Currently improved agricultural grassland occurs at the southeastern margins of the Knocknacran site boundary and not within or immediate adjacent to the mine area. These lands support beef farming and are highly improved and consequently support abundant perennial rye grass (*Lolium perenne*) and accompanying agricultural herbs including creeping buttercup (*Ranunculus repens*), mouse-ear chickweed (*Cerastium fontanum*) and broadleaved dock (*Rumex obtusifolius*).

These lands are fringed by unmanaged hedgerow habitats comprising young ash (*Fraxinus excelsior*) trees and hawthorn (*Crataegus monogyna*) shrubs.

In the future, as the proposed Knocknacran West open-cast is developed and the Knocknacran open-cast restored to close to original ground levels, it is planned to develop a mosaic of grassland fields with hedgerows (and treeline) in keeping with the surrounding landscape. It is proposed that the new grassland areas will have a mixture of native grasses and flower species, rather than solely more species-poor intensely managed agricultural grassland, thereby increasing biodiversity.

A similar planting scheme is proposed for the northern area of the Knocknacran West site adjacent to the L4900 road, where the Site will also be restored to near original ground levels.



Figure 9: Rank wet grassland (GS4) & dry meadows & grassy verge grassland (GS2) mosaic

Evaluation of Habitat Value

HMA-3 in relation to the Knocknacran open-cast site is currently an active mine, with the habitat on the Knocknacran West open-cast site currently comprising of unmanaged agricultural lands and hedgerows, having an overall 'low' habitat-biodiversity value. In time, following restoration, the introduction of a grassland mixture of native grasses and flower species, rather than agricultural grassland, will provide a 'high' habitat - biodiversity value.

Habitat - Biodiversity Objective

The biodiversity objective for HMA-3 is to:

- Following the restoration of the Knocknacran Open-Cast Mine and the northern part of the Knocknacran West Open-Cast Mine, develop a mosaic of fields (with hedgerows (inc. treeline) and drains/ditches) seeded with a mixture of native grass and flower species to provide enhanced habitat and biodiversity.

3.2.4 Habitat Management Area 4 (HMA-4)

Description

HMA-4 covers localised pockets of scrub which occur throughout the Site, which include gorse, grey willow and bramble. These habitats occur singularly or in mosaic with other habitats such as wet grassland, dry meadows and grassy verge grassland and mixed broadleaved woodland.

Areas of dense gorse scrub with some grey willow has established within the existing Knocknacran Mine plant site, its immediate environs and site boundary. Dense gorse, willow and broom (*Cytisus scoparius*) scrub occur on the fringes of the silt lagoons located near the southeastern boundary of the Site, while the southern, western and northeastern fringes of the existing mining void support gorse dominated scrub.

Specific habitats present within HMA-4 include:

- WS 1 - Scrub

It is proposed to manage and maintain the current areas of scrub, unless removed by mining activities. In the future, as the mine areas are restored, areas of scrub will be developed to form a mosaic of habitats with the other Habitat Management Areas.



Figure 10: An area of scrub adjacent to the Drummond Mine portal

Evaluation of Habitat Value

While the scrub habitat is of 'low value' in terms of habitat-biodiversity locally, it plays an important part in the overall connectivity – linkage of the various habitats in the area.

Habitat - Biodiversity Objective

The biodiversity objective for HMA-4 is to:

- Maintain and develop connectivity between the various habitats on and adjacent to the mine sites, thereby maintaining biodiversity into the future.

3.2.5 Habitat Management Area 5 (HMA-5)

Description

HMA-5 consists of aquatic habitats, consisting of a combination of drainage ditches, streams (including ephemeral in the case of the Corduff Stream), and surface water lagoons at the mine plant-site.

As described in the EIA the main rivers in the vicinity of the Site, River Bursk and River Glyde support the following notable species that may be affected by mine water discharge: Atlantic salmon *Salmo salar*; and brook lamprey *Lampetra planeri*, brown trout *Salmo trutta*, and European eel (critically endangered by IUCN criteria).

A variety of other species that are also present, include perch *Perca fluviatilis*, pike *Esox lucius*, roach *Rutilus rutilus*, stone loach *Cobitis elongatoides* and three-spined stickleback *Gasterosteus aculeatus* in the watercourses, and also bream *Abramis brama* and tench *Tinca tinca* at Rahans Lough. The upper reaches of the River Bursk are reported to contain salmonid spawning and nursery habitat. However, downstream of the mine water discharge point there is reported to be cyprinid and coarse fish habitat but no salmonid spawning and nursery habitat (IFI, 2019; SLR, 2019). All the notable fish species (salmon, trout, lamprey and European eel) are migratory species, meaning they migrate up and downstream to complete their life cycle, and therefore connectivity between spawning, feeding and refuge habitat is important.

In addition, a network of surface water lagoons (attenuation ponds) is located near the southeastern corner of the Knocknacran plant-site. These lagoons are active and continually receive water from the mine. As a result, instream aquatic macrophytes are not abundant. However, the margins of these habitats support emergent aquatic macrophytes including bulrush (*Typha latifolia*), greater willowherb (*Epilobium hirsutum*), rosebay willowherb, wild carrot and angelica. These lagoons also support wetland waterbirds including Coot and Mallard. A disused attenuation pond also occurs near the southern boundary of the Knocknacran mine site and supports emergent bulrush and fringing grey willow and gorse.



Figure 11: Surface water lagoon (FL8) located near the southeastern Boundary of the mine site

Specific habitats present within HMA-5 include:

- FW4 - Aquatic habitat (drainage ditches)
- FL4 - Aquatic habitat (ponds), adjacent to the Site
- FL8 - Other artificial lakes and ponds

In the future, the Site will contain an open waterbody (FL8) on the Knocknacran West site following cessation of mining and subsequent rebound of the water-table.

The existing lagoons on the Knocknacran site will be removed during final restoration at the site and returned to scrubland.

The former Corduff Stream/drainage ditch on the Knocknacran West site will be reinstated and will flow from an outfall point at the waterbody to meet the existing downstream stream section. This feature will be ephemeral in nature, as is the existing stream.

The development of the waterbody on the Knocknacran West site will allow for the creation of areas of shallow water that will support the development of habitat, including a shallow water littoral zone. The reinstated Corduff Stream will be designed to enhance and promote aquatic habitat and marginal plant succession, and to also to provide habitat for wading birds and wildfowl.

Essentially there will be two distinct habitats that will be created during the creation of the waterbody at Knocknacran West:

- Open Water Habitat
- Shoreline / Washland Habitat

Evaluation of Habitat Value

While the FL8 waterbody on the Site is of 'low value', the FW4 aquatic features in terms of habitat-biodiversity are of 'higher value' locally, as they play an important part in the overall connectivity – linkage of the various habitats in the area.

The introduction of an open water-body on the Knocknacran West Site will provide a 'high value' feature in terms of habitat-biodiversity in the area following cessation of mining, and subsequent rebound of the water-table.

Habitat - Biodiversity Objective

The biodiversity objective for HMA-5 is to:

- Maintain and develop connectivity between the various aquatic and terrestrial habitats on and adjacent to the Site, thereby maintaining biodiversity into the future.

4.0 MANAGEMENT OBJECTIVE & ACTION PLAN

4.1 Objective

The primary objective of the HMP is to:

Integrate biodiversity management into the activities at the existing Knocknacran Open-Cast Mine and the proposed Knocknacran West Open-Cast Mine (including the materials handling area adjacent to the existing Knocknacran Mine), specifically to maintain and enhance existing key habitat areas for biodiversity within the context of the Site and provide a biological resource to aid the ultimate restoration of the Site on cessation of mining operations.

This HMP sets out a provisional programme for biodiversity management at a habitat level which is appropriate for the continuation of mining and related activities at the Site. Proposed objectives and actions are based on the SMART principle, i.e., Specific, Measurable, Achievable, Relevant and Time-based. The proposed actions are aligned with the principles set out in *Biodiversity and Heritage Strategic Plan 2020 - 2025* (Monaghan Council).

4.2 Management Action Plan

The proposed habitat management action plan for the five HMA's are presented in the table below.

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Table 3: Proposed Habitat Management Plan

HMA	Habitat Objective	Management Prescriptions	Management Actions	Timings ⁴
HMA-1	Maintain and enhance the wet-willow-alder-ash woodland.	A programme of management to control gorse and scrub encroachment and arrest the development of tall rank grasses, to a level consistent to maintain and enhance the botanical richness of the woodland. Whilst the overall management aim is to maintain the woodland type, any management should ensure that this HMA maintains a good connectivity with adjacent habitats to the benefit of wildlife.	Gated access to HMA-1 to be provided through the existing fence with appropriate safety signage to be erected.	Spring 2024
			Cutting of gorse / scrub growing in the area of the woodland. All material to be removed from the woodland habitat and disposed at a predefined location within HMA-1 to create habitat piles for wildlife. Where deemed necessary any stumps will be spot treated with an appropriate herbicide to prevent regrowth.	Spring 2024
	Provision of bespoke bat roost area and enhancement of badger and pine marten habitat.	A programme of management to enhance the existing habitat for both badger and bat roosting potential. Enhance habitat to encourage pine marten activity.	The creation of a bespoke bat roost in this HMA and for the establishment of a badger sett within this area. Maintain connectivity of the perimeter berms within HMA-2 to allow connectivity along site boundaries to foraging opportunities in the wider site area. Four pine marten boxes to be erected as directed by a suitably qualified ecologist.	As appropriate throughout the construction and operation period of the mine
	Manage areas dominated by tall grasses and scrub to maintain and develop a mosaic of habitats to improve the diversity of this area.	A programme of management to arrest the development of tall rank grasses and encroachment of scrub, and encourage the development of more herbaceous species to enhance the botanical richness of the grassland sward. Whilst the overall management aim is to maintain the mosaic within HMA-1, any management prescriptions should ensure that this site maintains a good mosaic of sub-habitats	Cutting of selected gorse / scrub growing in the habitat. Any large pieces of cut timber and brash should be used to create wood piles to provide suitable habitat for invertebrates at predefined locations within the HMA. All stumps will be treated with an appropriate herbicide to prevent re-growth.	Autumn 2024

⁴ Timings are dependent on the proposed development being permitted.

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HMA	Habitat Objective	Management Prescriptions	Management Actions	Timings ⁴
		including areas of short turf, long grass and some scrub to the benefit of wildlife, and therefore connectivity with the wet-willow-alder-ash woodland habitat.	<p>Areas dominated by tall grasses to be managed through cutting in early spring before the onset of flowering of most species of plants. All arisings will be collected and disposed of at a predefined location to create habitat piles for wildlife. Patches of tall grass will be left in-situ around the margins of the HMA to maintain a mosaic of sub-habitats.</p> <p>The areas cut in early spring will then be re-cut in late summer / early autumn once most of the plant species have finished flowering and set seed.</p> <p>Establishment of an annual cutting regime that will be based on monitoring of the cuts and could include either of the following options:</p> <ul style="list-style-type: none"> • mid-June to early July where a cut is required to weaken the most vigorous grass species but providing the opportunity for late-flowering species to flower and set seed; or • late July to early August after many spring and early summer species have flowered and set seed; or • September to October where the maximum time is allowed for plants to flower and set seed. 	<p>Late Summer / Early Autumn</p>
HMA-2	Maintain and enhance existing perimeter hedgerows, treelines and drains/ditches to maintain a corridor for the movement of both aquatic and terrestrial fauna (inc. bats) during	A programme of management to maintain and add to hedgerow and treeline development with native species, thereby creating connectivity	Plant with native species along stretches of poorly developed and neglected hedgerows.	Spring 2024

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HMA	Habitat Objective	Management Prescriptions	Management Actions	Timings ⁴
	the life and restoration of the Knocknacran West Mine.	<p>across the Site for birds, bats and terrestrial mammals.</p> <p>Any management programme should ensure that the Site provides a good mosaic of sub-habitats to the benefit of wildlife.</p> <p>A programme of management to maintain and add to drains and ditches where appropriate, thereby creating connectivity across the Site for aquatic species in particular.</p>	<p>Any cut material to be chipped and removed from site and disposed of in an appropriate manner. All stumps will be treated with an appropriate herbicide to prevent re-growth.</p> <p>Drains and ditches to be enhanced to allow flow of water and development of pools where appropriate, to maintain connectivity to the surrounding aquatic environment.</p>	
	Provision of suitable roosting habitat within the Shirley House and enhanced connectivity for bats with HMA-1 by the provision of planted perimeter berms.	A programme of management to provide enhanced roosting habitat within the Shirley House (e.g., roof patching, easier access for monitoring by fixing the door/window).	Repair works to the Shirley House so existing building is enhanced (e.g., patch roof) and so monitoring access of progress is easier to observe by fixing a window/door. Ensure planting of screening berms is as planned (dense and native plants) to provide a corridor for bats (and other mammals) to use and connect HMAs around the site perimeter.	As appropriate throughout the life of the mine
HMA-3	Following the restoration of the Knocknacran Open-Cast Mine and the northern part of the Knocknacran West Open-Cast Mine, develop a mosaic of fields (with hedgerows (inc. treeline) and drains/ditches) seeded with a mixture of native grass and flower species to provide enhanced habitat and biodiversity.	A programme of management to create a mosaic of grassland (with native species), hedgerows and ditches/drain in keeping with surrounding landscape of the area.	<p>Backfilling of the open-cast mining voids in stages over the life of the mine, with materials stripped from the Knocknacran West site to provide a base for seeding and planting, and development of drains/ditches.</p> <p>Design and time restoration activities to allow for the maximum area(s) to be planted at any one time, and connectivity to be established to the surrounding habitats/landscape.</p>	As appropriate throughout the life of the mine
HMA-4	Maintain and develop connectivity between the various habitats on and adjacent to the Site, thereby maintaining biodiversity into the future.	Programme of management to link the various habitat areas both existing and planned within the Site, by planting and maintaining areas of scrub with native species.	Design and time restoration activities to allow for the maximum area(s) to be planted at any one time.	As appropriate throughout the life of the mine

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HMA	Habitat Objective	Management Prescriptions	Management Actions	Timings ⁴
HMA-5	Maintain and develop connectivity between the various aquatic and terrestrial habitats on and adjacent to the Site, thereby maintaining biodiversity into the future.	<p>Programme of management to link drains and ditches to the existing surface water network curation the phased restoration of the Site and following cessation of mining.</p> <p>Provide shallow littoral areas along the edge of the open waterbody to increase habitats.</p>	Design and time restoration activities to allow for the maximum area(s) to be developed at any one time.	As appropriate throughout the life of the mine

5.0 PERFORMANCE INDICATORS

The performance indicators for the success of management actions undertaken as part of the proposed HMP will be to:

- i) HMA-1: Maintain and enhance the existing wet-willow-alder-ash woodland in the north of the Site.
 HMA-1: Provide a bespoke bat roost area and enhancement of badger habitat.
 HMA-1: Manage areas dominated by tall grasses and scrub to maintain and develop a mosaic of habitats to improve the diversity of this area.
- ii) HMA-2: Maintain and enhance existing perimeter hedgerows and treelines to maintain a corridor for the movement of fauna during the life and restoration of the Knocknacran West Mine.
 HMA-2: Provide a suitable roosting habitat within the Shirley House and enhanced connectivity for bats with HMA-2 by the provision of planted perimeter berms.
- iii) HMA-3: Following the restoration of the Knocknacran Open-Cast Mine and the northern part of the Knocknacran West Open-Cast Mine, develop a mosaic of fields (with hedgerows (inc. treeline) and drains/ditches) seeded with a mixture of native grass and flower species to provide enhanced habitat and biodiversity.
- iv) HMA-4: Maintain and develop connectivity between the various habitats on and adjacent to the Site, thereby maintaining biodiversity into the future.
- v) HMA-5: Maintain and develop connectivity between the various aquatic and terrestrial habitats on and adjacent to the Site, thereby maintaining biodiversity into the future.

The criteria that will be used to measure the success of the proposed management actions is based on the assessment used for the status of EU Protected Habitats⁵.

The proposed performance indicators set for the HMAs are summarised in the table below. As the HMAs are developed more specific indicators relevant to each HMA will be put in place.

Table 4: Performance Indicators for HMA's

Attributes	Targets	Feature Objective	Method of Assessment
Extent	No significant loss of extent of existing habitat Increase the extent of habitat at the expense of scrub. Maintain and increase connectivity between habitats.	Overall increase in extent over the lifetime of this HMP	Regular monitoring and mapping

⁵ NPWS (2013). *The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2*. Version 1.0. Unpublished Report, National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin.

Attributes	Targets	Feature Objective	Method of Assessment
Vegetation Composition: Positive Indicator Species Present	Total number of positive species present	At least five positive indicator species	Regular monitoring and structured observation
Vegetation Composition: High Quality Species Present	A number of high quality species present	A minimum of two high quality	Regular monitoring and structured observation
Vegetation composition: Cover of non-native species	No non-native invasive species present	No presence of any non-native invasive species	Regular monitoring and structured observation
Vegetation composition: Cover of negative indicator species	Cover of negative species collectively not greater than 20% and individually less than 10% of any HMA	Negative species to include species currently found in each HMA	Regular monitoring and structured observation
Physical structure: cover of bare soil	Area of bare ground should be no more than 5% in each HMA once fully established, except for HMA-5 (i.e., around the shoreline of the open waterbody in Knocknacran West)	Localised bare ground around animal (rabbits, badgers) burrows should not exceed 1% of the total area within any given HMA	Regular monitoring and structured observation

6.0 IMPLEMENTATION

6.1.1 Implementation

This proposed HMP will be implemented and delivered by SGMI with technical support where necessary from outside suitably qualified ecologists and other areas of technical expertise.

In order to increase opportunities of roosting bats and nesting birds, a number of bat and bird boxes (including barn owl) will be incorporated in the restoration of the Site, placed on trees of a suitable size. Also, four Pine Marten boxes will be erected on site as directed by a suitably qualified ecologist. More information on Pine Marten boxes is available through the Vincent Wildlife Trust (A new design for a pine marten den box (vwt.org.uk). In addition, to increase opportunities for invertebrates within the site, invertebrate boxes and habitat piles will be provided under the restoration plan; these will be located in sheltered areas of new and retained vegetation, such as in association with hedgerows.

Following final restoration of the open-cast mine sites, which includes hedgerows, grassland and aquatic habitat, the proposed project will result in an increase in high-value foraging availability for the local badger population. In addition, improved ground stability and a reduced likelihood of crownhole development on the Knocknacran West site after final restoration, will offer better habitat development opportunities to the local badger population in the long-term. Further mitigation measures during this phase of the development are not proposed for badgers.

In order to protect retained hedgerows and trees (including woodland habitat), such vegetation will be protected with secure fencing prior to the commencement of decommissioning works on Site (in line Monaghan County Council's County Development Plan). This protection will be designed following NRA guidance (NRA, 2005 or equivalent guidance), in particular with regard to root protection areas and fencing specifications (unless otherwise advised by a suitably qualified arboriculturist).

Where possible, restoration will include habitats of elevated value, such as species-rich hedgerows and wildflower grassland. Planting will comprise native species of local provenance. Where this is not possible, plants will be selected for their fruit, berry, or nectar bearing qualities. All landscape planting within the site will be managed for the benefit of wildlife.

The restoration of the Site, following the decommissioning of the mine, offers vast opportunities for habitat enhancement over and above the existing situation, will be developed over time in the HMP as the development progresses.

In addition, based on a review of *"Monaghan Hedgerow Appraisal Survey, 2021. A Decade of Change"*, SGMI commits to following the recommendations set out in the plan, and will also incorporate the following into the HMP:

- SGMI commit to managing their site with consideration of the long-term outcomes and with the purpose of the hedgerows in mind;
- Hedge cutting will not take place between 1st March to 31st August except where absolutely necessary for safety reasons;
- All relevant staff (and any contractors used) will have the necessary skills and data sources to implement or evaluate best practice hedgerow conservation; and
- Native plant species will be used for any hedgerow planting (including hedgerow trees).

6.1.2 Integrating HMP Actions in future Mining Operations

It is important that actions to manage habitats are integrated into and given consideration as part of any current and future operations and associated development at the Site.

Full consideration of the implications of the implementation of the identified management areas will need to be taken as part of any decision making process in the overall extraction and restoration plans for the Site.

6.1.3 Funding and Implementation

All management and other actions contained within the HMP will be funded directly by SGM.

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7.0 MONITORING AND SURVEILLANCE

The delivery of the HMP objectives, through the setting of targets and measurable indicators, will be dependent upon monitoring / surveillance of key habitats and/or species by which to measure any biodiversity gains.

7.1 Monitoring

A system of measures will be implemented by SGMI to record all actions undertaken as part of this HMP, and to monitor the results of any changes in management actions and/or procedures carried out as part of this plan, and which will be used to inform any future review of this document.

Prior to the implementation of any management actions, each HMA will be re-surveyed to map the positions of vegetation communities and the transition between communities. During this survey fixed point quadrats will be established to allow future measurement of performance indicators.

7.2 Surveillance

7.2.1 Recording New and Additional Data

A database will be maintained of the species recorded at the Site with all employees encouraged to submit records for any species of flora and/or fauna recorded.

7.2.2 Species Specific Surveys

As part of the Habitat Management Plan, SGMI will continue the programme of bat, pine marten and badger surveys. The results of these surveys will be reviewed on a regular basis.

Additional specialist surveys may be instigated by SGMI during the lifetime of the HMP, or through the requirements of any future planning applications for mining and/or associated operations, and which will feed into and be incorporated into any future review of this document.

8.0 REVIEWING AND REPORTING PROGRESS

8.1 Reviewing Performance Against Targets

An internal review of performance against targets will be undertaken by SGMI on an annual basis to determine how habitat and biodiversity management has benefited from any management actions, and informed through any monitoring and surveillance and, if necessary, minor amendments made to the HMP.

8.2 HMP Review / Update

The HMP shall be subject to a full and comprehensive review / update every five years throughout the operational lifetime of the Site to consider any major revisions that may be required for objectives, targets and management actions. Any changes required as a result of significant new baseline data being made available through any monitoring and surveillance should also trigger a review of the HMP.

If any significant alterations to the management prescriptions / actions are required before the end of each five-year period any such changes and/or actions will be enacted as interim measures pending the full review of the HMP.

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APPENDIX 6.8
Landscape Plan – Boundary Treatment Plan Community Sports Complex

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- Legend:**
- PROPOSED WOODLAND MIX
 - PROPOSED HEDGEROW
 - SHRUB/PERENNIAL MIX AND WILDFLOWER SEEDING (NORTHERN BOUNDARY)

NOTES:

Boundary 1: 1366sq m of woodland mix. Woodland planting mix to comprise of High Canopy Dominants (<10%), Low-canopy; Sub-dominants (25-30%), Understorey and Fringe: High-Shrubs (25-40%) and Understorey and Edge: Lower-Shrubs (15-25%).
Larger Trees to be planted at 1.5m centres. Smaller shrubs to be planted at spacing between 900mm and 1500mm centres depending on species.

Boundary 2 : TBD

Boundary 3: 525 sqm of shrub and perennial plantings. Stock to be planted in blocks of 5-10 plants across the existing berm and to the north of the berm.

Boundary 5: 203 linear meters of hedgerow. Hedgerow planted with a native whip planting mix in a triple staggered row as per figure LMP1.2.

Boundary 6: 161 linear meters of hedgerow. Hedgerow planted with a native whip planting mix in a triple staggered row as per figure LMP1.2.

Boundary 7: 176 linear meters of hedgerow. Hedgerow planted with a native whip planting mix in a triple staggered row as per figure LMP1.2.

Boundary 8: 69 linear meters of hedgerow. Hedgerow planted with a native whip planting mix in a triple staggered row as per figure LMP1.2.

Boundary 9: 1456sq m of woodland mix. Woodland planting mix to comprise of High Canopy Dominants (<10%), Low-canopy; Sub-dominants (25-30%), Understorey and Fringe: High-Shrubs (25-40%) and Understorey and Edge: Lower-Shrubs (15-25%).
Larger Trees to be planted at 1.5m centres. Smaller shrubs to be planted at spacing between 900mm and 1500mm centres depending on species.

All planting must be true to form & size.

See BS 5837:2012 Guide to Trees in Relation to Construction, BS 3998:2010 Recommendations for Tree Work, BS 3936 1:1992 Nursery Stock Trees & Shrubs

SHRUB/PERENNIAL MIX SPECIES:

Botanical name	Size	Density
<i>Viburnum opulus</i>	2tr	1 per sqm
<i>Rosmarinus officinalis</i>	2tr	1 per sqm
<i>Cornus alba</i>	2tr	1 per sqm
<i>Ilex 'Silver Queen'</i>	2tr	1 per sqm
<i>Ilex 'Golden King'</i>	2tr	1 per sqm
<i>Euonymus</i> in variety	2tr	3 per sqm
<i>Helleborus</i> in variety	2tr	3 per sqm
<i>Carex 'Phoenix Green'</i>	2tr	5 per sqm
<i>Stipa arundinacea</i>	2tr	3 per sqm
<i>Helianthus annuus</i>	2tr	5 per sqm
<i>Achillea 'Summer Berries'</i>	2tr	5 per sqm
<i>Geranium 'Brookside'</i>	2tr	5 per sqm
<i>Rudbeckia 'Goldstrum'</i>	2tr	5 per sqm
<i>Helianthus</i> varieties	2tr	5 per sqm
<i>Seedum 'Autumn Joy'</i>	2tr	3 per sqm
<i>Lavandula</i> varieties	2tr	3 per sqm
<i>Nepeta 'Walkers Low'</i>	2tr	3 per sqm

LOW CANOPY WOODLAND MIX SPECIES:

Botanical name	Common name	Size	%
<i>Quercus robur</i>	Pedunculated Oak	1+1tr 80-100cm	<10%
<i>Pinus sylvestris</i>	Scots Pine	1+1tr 80-100cm	<10%
<i>Alnus glutinosa</i>	Alder	1+1tr 80-100cm	25-30%
<i>Betula pubescens</i>	Downy Birch	1+1tr 80-100cm	25-30%
<i>Prunus avium</i>	Wild Cherry	1+1tr 80-100cm	25-30%
<i>Prunus Padus</i>	Crab Apple	1+1tr 90-120cm	25-40%
<i>Corylus avellana</i>	Hazel	1+1tr 90-120cm	25-40%
<i>Ilex aquifolium</i>	Holly	1+1tr 90-120cm	25-40%
<i>Crataegus monogyna</i>	Hawthorn	1+1tr 90-120cm	25-40%
<i>Prunus spinosa</i>	Blackthorn	1+1tr 40-60cm	15-25%
<i>Rosa canina</i>	Dog-rose	1+1tr 40-60cm	15-25%
<i>Euonymus europaeus</i>	Spindle	1+1tr 40-60cm	15-25%

NATIVE HEDGEROW SPECIES:

Botanical name	Common name	Size	%
<i>Crataegus monogyna</i>	Hawthorn	1+2tr 80-100cm	60%
<i>Prunus spinosa</i>	Blackthorn	1+2tr 80-100cm	15%
<i>Ilex aquifolium</i>	Holly	1+2tr 80-100cm	15%
<i>Rubus fruticosus</i>	Bramble	1+1tr 40-60cm	2.5%
<i>Corylus avellana</i>	Hazel	1+1tr 40-60cm	2.5%
<i>Rosa canina</i>	Dog-rose	1+1tr 40-60cm	2.5%
<i>Euonymus europaeus</i>	Spindle	1+1tr 40-60cm	2.5%

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Site location:
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COUNTY MONAGHAN

Drawing Title:
LANDSCAPE PLAN - BOUNDARY TREATMENT PLAN

Project:
KNOCKANACRAN GAA COMPLEX

Drawn by:
CD

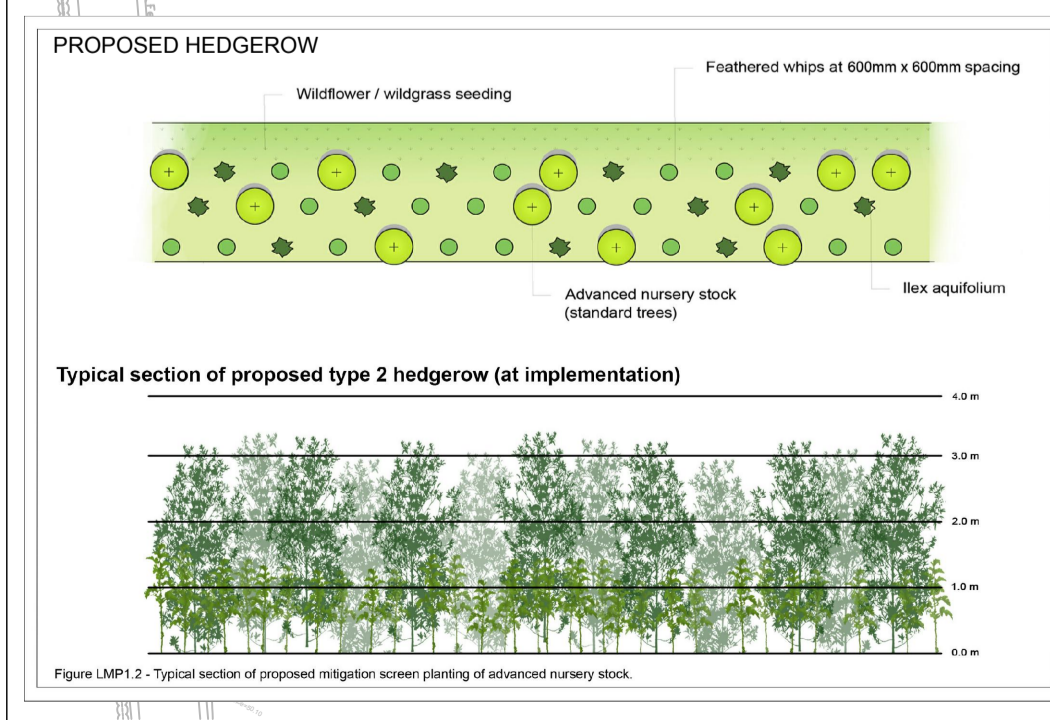
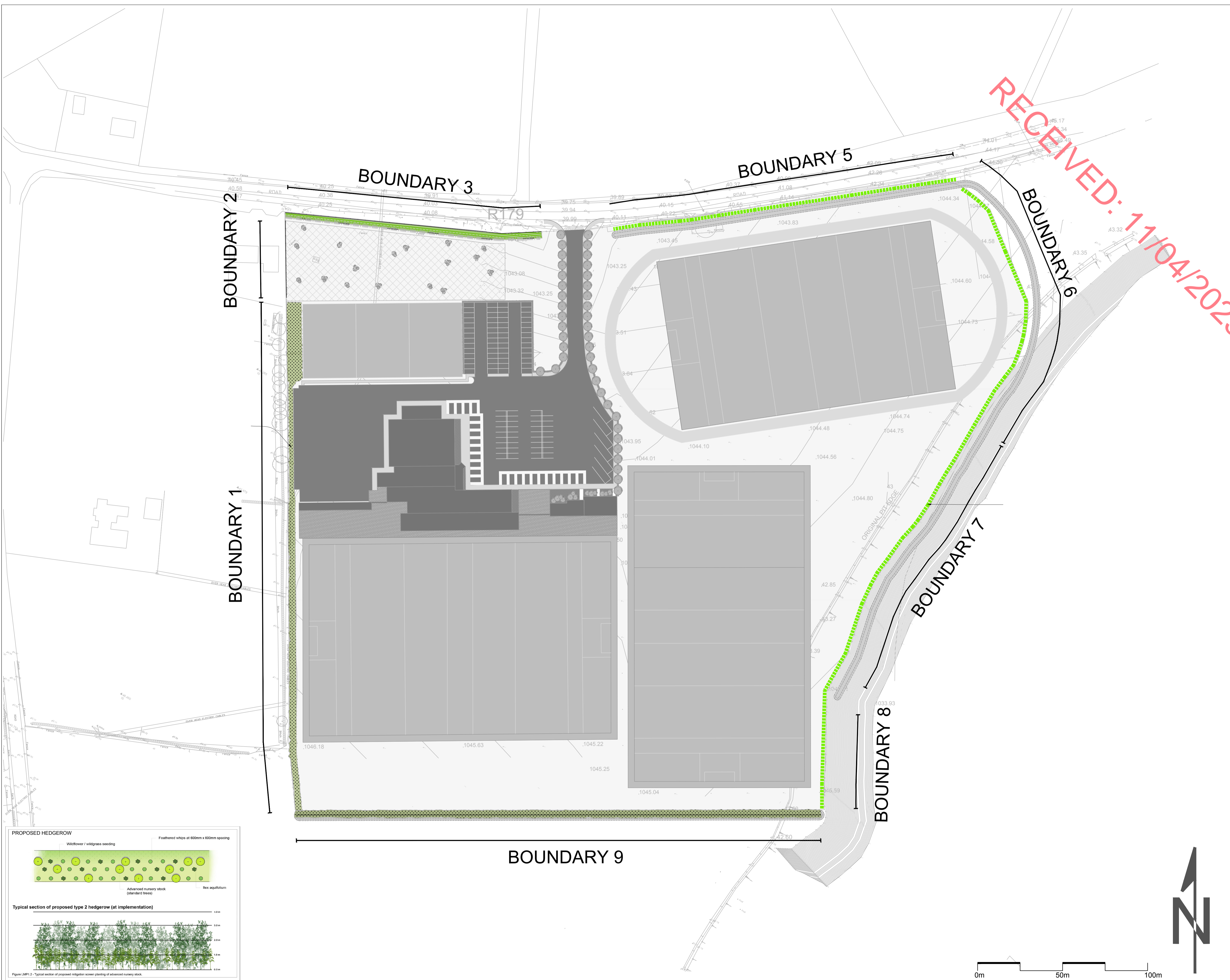
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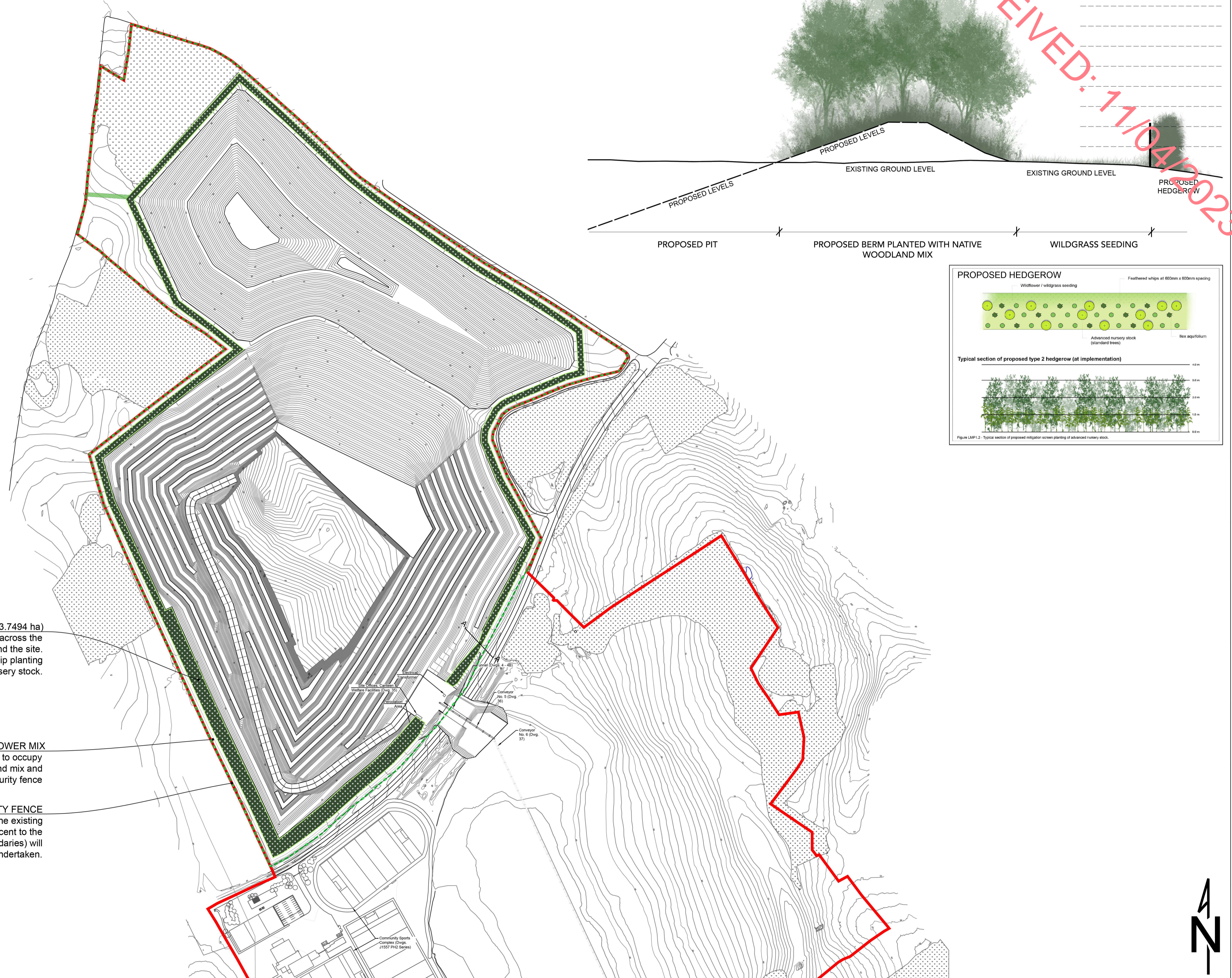
APPENDIX 6.9

Landscape Management Plan Knocknacran West Site

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SECTION AA: TYPICAL BOUNDARY BERM DETAIL

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- Legend**
- PROPOSED WOODLAND MIX
 - PROPOSED HEDGEROW
 - PROPOSED SECURITY FENCE
 - EXISTING HEDGEROW RETAINED
 - SITE BOUNDARY

Notes:
 The function of the proposed mitigation planting is primarily for screening, but it will also enhance the ecological corridors that area already present within the surrounding trees lines and hedgerows.

Proposed Woodland Mix
 Species mix to comprise of High-Canopy: Dominants (<20%), Low-canopy: Sub-dominants (<20-25%), Understorey and Fringe: High-Shrubs (20-40%) and Understorey and Edge: Lower-Shrubs (15%-25%). Planting on embankments to be allowed to grow to reach maturity and to be concentrated on the lower portions of the embankments. Trees to be planted at 1.5m centres, whilst a mixed arrangement of shrubs are to be planted at 900mm centres.

Hedgerows
 Mitigation screen planting shall consist of a mixture of native hedgerow species that are prevalent in the immediate area. Planting to consist of feathered whips (of various sizes) and advanced nursery stock in staggered rows at a spacing of 600mm.

All native species will be planted as whips, with the primary and secondary structure species to be of a minimum height of 80-100cm and the other shrub species to be of a minimum height of 40-60cm.

Existing and new sections of hedgerow to be planted and bolstered as per diagram LMP1.2 and maintained at a height of 3-4m unless otherwise specified.

Species mix to be finalised in conjunction with the project ecologist. All species to be from certified native stock and preferably from an approved supplier of the Green, Low-Carbon, Agri Environment Scheme (GLAS).

Pollinator Friendly Wildflower seeding
 Birdsfoot Trefoil, Black Meddock, Cowslip, Devil's Bit Scabious, Meadow Buttercup, Field Scabious, Hemp Agrimony, Kidney Vetch, Lady's Bedstraw, Lady's Ann lace, Lesser Knapweed, Meadowweet, Mullein, Ox-eye Daisy, Purple Loosetrife, Ragged Robin, Red Campion, Red Clover, Ribwort Plantain, Rough Hawkbit, Sorrel, St Johnswort, Wild Angelica, Wild Carrot, Yarrow, Yellow Agrimony, Yellow Rattle, Teasel and more. Also includes 35% annuals: Corn Marigold, Corn Poppy, Corncockle, Cornflower, Scented Mayweed.

Species mix to be finalised in conjunction with the project ecologist. All species to be from certified native stock and preferably from an approved supplier of the Green, Low-Carbon, Agri Environment Scheme (GLAS).

NATIVE HEDGEROW SPECIES:

Botanical name	Common name	Size	%
Primary structure:			
<i>Crataegus monogyna</i>	Hawthorn	90-120cm / 8-10cm girth 3m for standard trees	60%
Secondary structure:			
<i>Prunus spinosa</i>	Blackthorn	90-120cm	15%
<i>Ilex aquifolium</i>	Holly	90-120cm	15%
Shrub species structure:			
<i>Viburnum opulus</i>	Guiselder Rose	60-90cm	2.5%
<i>Corylus avellana</i>	Hazel	60-90cm	2.5%
<i>Rosa canina</i>	Dog-rose	60-90cm	2.5%
<i>Euonymus europaeus</i>	Spindle	60-90cm	2.5%

WOODLAND MIX:

Botanical name	Common name	Size	%
High Canopy (Dominants):			
<i>Quercus robur</i>	Pedunculata Oak	Standard tree, 16-18cm girth	<20%
<i>Quercus petraea</i>	Sessile Oak	Standard tree, 16-18cm girth	<20%
<i>Pinus sylvestris</i>	Scots Pine	Standard tree, 200-300cm, 40	
Low Canopy (Sub-dominants):			
<i>Alnus glutinosa</i>	Alder	90-120cm	
<i>Betula pubescens</i>	Downy Birch	90-120cm	20-25%
<i>Prunus avium</i>	Wild Cherry	90-120cm	
Understorey and fringe (higher shrubs):			
<i>Prunus Padus</i>	Bird Cherry	60-90cm	
<i>Corylus avellana</i>	Hazel	60-90cm	
<i>Ilex aquifolium</i>	Holly	60-90cm	20-40%
<i>Crataegus monogyna</i>	Hawthorn	60-90cm	
<i>Salix caprea</i>	Goat Willow	60-90cm	
<i>Salix purpurea</i>	Purple Willow	60-90cm	
Understorey and edge (lower shrubs):			
<i>Prunus spinosa</i>	Blackthorn	40-60cm	
<i>Rosa-canina</i>	Dog-rose	40-60cm	
<i>Euonymus europaeus</i>	Spindle	40-60cm	15-25%
<i>Salix aurita</i>	Eared Willow	40-60cm	
<i>Rubus fruticosus</i>	Bramble	40-60cm	

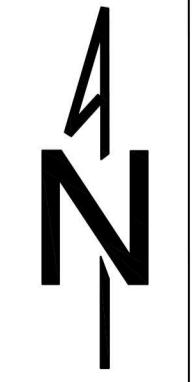
PROPOSED NATIVE WOODLAND MIX (3.7494 ha)
 Native woodland mix to be planted across the proposed embankments that surround the site. Woodland mix to comprise a native whip planting mix and advanced nursery stock.

NATIVE POLLINATOR FRIENDLY WILDFLOWER MIX
 Native wildflower mix of local provenance to occupy residual space between the proposed woodland mix and the proposed site security fence

PROPOSED SECURITY FENCE
 Proposed security fence and bolstering of the existing perimeter boundary hedgerow (which runs adjacent to the exterior of the fence line along the field boundaries) will be undertaken.

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 Drawing Title:
 LANDSCAPE PLAN
 Project:
 KNOCKNACRAN OPEN-CAST MINE
 Drawn by:
 CD
 Checked by:
 RB
 Drawing Ref:
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APPENDIX 6.10
Environmental Management Plan

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PROPOSED ENVIRONMENTAL MANAGEMENT PLAN (EMP)

Knocknacran West Project
Prepared for: Saint-Gobain Mining (Ireland) Ltd.

SLR Ref: 501.00545.008624
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April 2023



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BASIS OF REPORT

This document has been prepared by SLR with reasonable skill, care and diligence, and taking account of the manpower, timescales and resources devoted to it by agreement with Saint-Gobain Mining (Ireland) Ltd. (the Client) as part or all of the services it has been appointed by the Client to carry out. It is subject to the terms and conditions of that appointment.

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1.0 INTRODUCTION

1.1 Purpose and Scope

This proposed Environmental Management Plan (EMP) has been prepared by SLR Consulting ('SLR') on behalf of Saint-Gobain Mining (Ireland) Limited ('SGMI') for the Knocknacran West Open-Cast Mine and Community Sports Complex Project (the 'Project') in response to a request for further information from Monaghan County Council ('MCC') in response to Reg. Ref.: 22/34, and in order to comply where possible with environmental legislation and to promote a proactive approach to environmental management at the Site.

The purpose of the EMP is to:

- Minimise the environmental impact of the proposed development;
- Ensure compliance with environmental legislation;
- Provide a system of continuous improvement in environmental performance; and
- Provide a means to achieve the operation's environmental policy.

The site owner who is the site operator regards environmental protection as an essential requirement of operations. The operator undertakes to conduct their business in a manner, which protects the environment, customers, employees and the community in which the business operates.

This EMP has been prepared in accordance with appropriate environmental guidance:

- Environmental Protection Agency (EPA), 2006, Environmental Management in the Extractive Industry (Non-Scheduled Minerals);
- Irish Concrete Federation (ICF), 2005, Environmental Code, Second Edition; and
- Department of the Environment, Heritage and Local Government (DoEHLG), 2004, Quarries and Ancillary Activities: Guidelines for planning Authorities.

The EMP is a tool to be used for the continuous environmental improvement of the operation, and compliance with appropriate regulatory requirements. The EMP is a preventative tool which will protect the environment and avoid impacts on the surrounding community and relevant concerned stakeholders. This document is therefore used as a working management tool and is the central location for all environmental related documents.

The primary purpose and objectives of the EMP are to:

- Provide all employees and contractors of SGMI with a clear description and understanding of responsibilities and requirements regarding environmental management;
- Comply with all approval requirements, guidelines, standards and legislative requirements relevant to this EMP;
- Ensure environmental risk is considered in all risk assessments conducted across the Site;
- Minimise environmental and community impacts and consequences by identifying and managing risks;
- Provide processes to monitor ongoing compliance with regulatory and legislative requirements;
- Provide for effective communication in relation to environmental management and planning;
- Facilitate continual improvement of environmental and community performance;
- Provide direction and resources to operations for environmental management;

- Assist in developing and maintaining good relations with the community and stakeholders; and
- Reduce the likelihood of incidents and community complaints.

1.2 Company Background

Saint-Gobain Mining Ireland Ltd., (SGMI), which is a wholly owned subsidiary of Saint-Gobain, owns and operates two existing gypsum mines in Ireland; the Drummond underground mine and the Knocknacran open-cast mine. Saint-Gobain operates all its mines in accordance with its own corporate social responsibility and sustainability practices, and current best practice for the mining industry, as set out in the publication Guidelines on Environmental Management in the Extractive Industries published by the Environmental Protection Agency (EPA, 2006). The existing mines at Drummond and Knocknacran, along with the proposed open-cast mine at Knocknacran West will operate in compliance with the Guidelines to the Safety, Health and Welfare at Work (Quarries) Regulations 2008 (2020 updated version).

Established in 1665, Saint-Gobain is a world leader in design, production and distribution of construction materials, delivering innovative products and services. Today, Saint-Gobain operates in 64 countries, employing ca. 191,500 people across four sectors: Construction Products (including plaster, plasterboard and dry-lining systems), Innovative Materials, Building Distribution and Packaging. Saint-Gobain's Gypsum business (Gyproc) in Ireland has been operating since 1936. Saint-Gobain has become a major contributor to the Irish construction industry, employing ca. 250 people.

Saint-Gobain is committed to achieving and maintaining industry leading environmental standards. Saint-Gobain strives to develop and maintain good working relationships with the local community, businesses and the Local Authority.

Saint-Gobain is one of the leading manufacturers and suppliers of gypsum related construction/building materials in Ireland and is a major supplier of plaster, plasterboard and dry-lining systems, to the Irish Building and Construction Industry.

The success of the Applicant has been built upon three vital elements – people, products and progress. Materials and products are manufactured at plants operating independently assessed assurance schemes to ISO 9001. The Company is a progressive employer and neighbour in its areas of operation and remains steadfastly committed to providing a service to their customers that focuses on people, products and progress.

1.3 Description of Activities

A summary of the key activities associated with the proposed development are presented below:

- The extraction of gypsum from the former (Drumgoosat) underground mine at Knocknacran West by open-cast mining methods, located in the townlands of Knocknacran (East & West) and Drumgoosat, Co. Monaghan, and the construction of a Cut-and-Cover Tunnel under the main Carrickmacross to Kingscourt regional road (R179) for the transport of gypsum (by haulage truck and covered conveyor) to the existing processing plant at Knocknacran Mine (an existing open-cast mine), and for the transport of overburden and interburden (by haulage truck) to the Knocknacran Mine for restoration purposes;
- The continued restoration of the existing Knocknacran Mine located in the townlands of Derrynascobe, Derrynaglah, Enagh, Knocknacran (East & West) and Drummond, Co. Monaghan, currently operating under Planning Reg. Ref. 17/217, Industrial Emissions (IE) Licence P0519-03 and Mining Lease M139;
- The continuation of use and refurbishment of the existing processing plant, water treatment facilities and associated infrastructure on the existing Knocknacran Mine site located in the townlands of Enagh, Derrynaglah, Drummond and Derrynascobe, Co. Monaghan currently

operating under Planning Reg. Ref. 03/578, Industrial Emissions (IE) Licence P0519-03 and Mining Lease M139;

- The demolition of one residential house and three unoccupied houses and sheds in the townlands of Knocknacran West and Knocknacran East, Co. Monaghan; and
- The development of a Community Sports Complex located in the townlands of Drummond, Derrynaglah and Knocknacran West, Co. Monaghan.

It is proposed that the operating and maintenance hours for the proposed Knocknacran West Mine will be from 08:00 hours to 20:00 hours Monday to Saturday. Pump inspections will take place as required. Transport of gypsum from the Knocknacran Processing Plant will continue to take place between 06:00 hours and 21:00 hours Monday to Saturday.

No blasting will take place on Sundays or Public Holidays. The mine site will not be operated on Sundays or Public Holidays.

1.4 Saint-Gobain Environment Policy

Saint-Gobain's environmental vision is to ensure the sustainable development of its activities, while protecting the environment from the impacts of its processes and services over their whole life cycle. Saint-Gobain operates an independently audited and accredited ISO 14001 Environmental Management System (EMS); and an ISO 50001 independently audited and accredited Energy Management System.

The Company recognises that the successful implementation of this policy depends on the on-going commitment of all those working in the organisation.

Environmental management is critical to the future of Saint-Gobain, and this is a management priority. Saint-Gobain aims for continuous improvement in its EMP with regard to the following:

- Minimise the environmental impact of their activities;
- Conserve mineral and energy resources;
- Reduce the visual impact of their operations; and
- Minimise waste generation.

The Applicant seeks to exist as a good neighbour in the areas they operate and to adopt an open communication policy on environmental performance. The Applicant as a market leader continues to set the environmental standard for best industry practice. Appendix 01 provides a copy of the Saint-Gobain Group's Biodiversity Policy (2018).

1.5 Saint-Gobain Sustainability

Saint-Gobain are committed to environmental sustainability and in addition to operating internationally recognised standards of Environmental and Energy Management also operate BES6001.

Saint-Gobain products are utilised throughout the building industry including new residential developments and renovations, commercial construction, education and healthcare building projects. With this involvement comes a responsibility and a commitment to produce and provide the best quality, and highest performing products and services, and a continuously raising of the bar for their operational and business practices.

Saint-Gobain's ambition is the preservation of the environment and to offer its customers the greatest added value with the minimum environmental impact. Saint-Gobain have therefore set two objectives: (i) zero environmental accidents; and (ii) the minimization of the impact of their activities on the environment thanks to actions associated with the following five priorities:

- A policy of sustainable resource management with minimal production waste, reuse, and integration of maximum recycled content into their products;
- A reduction in energy consumption and greenhouse gas emissions of their industrial processes, infrastructure and transport, thanks to their industrial excellence programs, the involvement of all operators, the sharing of best practices;
- A reduction in water withdrawals to move towards "zero discharge" of industrial water, starting with areas of water stress and ensuring that it does not interfere with the local population's access to drinking water;
- Preserve, restore, strengthen and enhance the biodiversity of all their sites; and
- Anticipate and deal with risk factors related to environmental accidents and nuisances.

Saint-Gobain's eco-innovation strategy is developing products and solutions that help reduce the environmental impact of buildings and considers the whole life cycle from their product's initial conception to end of life. These products and solutions then help improve system durability and adaptability while reducing the operational use of resources (particularly energy and water) in buildings and infrastructure.

1.6 Responsibility, Authority and Resource

SGMI have an Environmental Officer and management representative. The Environmental Officer will be responsible for the day-to-day running of the Environmental Management Plan and continuous improvement therein.

General Environmental Officer responsibilities include:

- Overall responsibility for environment and community compliance;
- Coordinate environmental monitoring, reporting, rehabilitation planning, community liaison;
- Review outcomes of environment and community incident investigations;
- Record, investigate and respond to complaints and/or enquiries and review outcomes of investigations;
- The implementation and adherence to the EMP and other key management plans;
- Monitor relevant site environmental performance – compliance, risk assessment and improvement actions;
- Planning for adequate resources to implement the EMP; and
- Develop and implement an audit and review schedule for the site.
- All employees and contractors have specific environmental responsibilities including:
 - Become familiar and comply with the EMP and key environmental management plans;
 - Support SGMI's commitment to environmental management;
 - Work in a manner that will not harm the environment;
 - Report all environmental incidents/complaints; and
 - Report any inappropriate environmental management practices and take immediate action.

2.0 Environmental Risk Management

The process of identifying the Site's environmental aspects involves the identification of operational environmental risks, which will capture any actual and/or potential environmental impacts, as follows:

1. Systematic identification of all activities undertaken by the mine. Activities will include those that are infrequent, supporting activities such as administration and maintenance, and services provided by contractors.
2. Identification of how those activities can interact with the environment.
3. Identification of the environmental impacts associated with the environmental aspects. The following key areas are considered to be relevant to the mine:
 - Air quality and in particular disperse dust emissions;
 - Noise emissions from operations;
 - Water management and discharge;
 - Spillage of hydrocarbons;
 - Generated wastes;
 - Energy consumption from activities;
 - Cultural heritage surrounding the Site;
 - Issues associated with traffic management;
 - Ecology and biodiversity on-site and off-site Natura 2000 designated sites;
 - Rehabilitation and closure; and
 - Visual impacts of the operations.
4. Evaluation of the risks to determine which environment and community aspects and impacts are significant risks to the environment and/or the community. To define the management of these risks the EMP has been divided into the following sections:
 - Air Quality;
 - Noise;
 - Water Quality;
 - Waste Management;
 - Energy Usage;
 - Archaeology and Cultural Heritage;
 - Ecology;
 - Transport and Traffic;
 - Landscape and Restoration; and
 - Strategic Management.

Figures showing the extent of the mine site and environmental monitoring points is provided in Appendix 02. These figures will be updated as required when additional monitoring points are added to the network.

3.0 Environmental Effects & Proposed Mitigation

The design of the Proposed Development takes environmental constraints and considerations into account, and has embedded mitigation as a fundamental component of the design that enables many potential environmental impacts to be avoided entirely. Where environmental impacts cannot be avoided by embedded mitigation, additional mitigation and monitoring measures have been recommended in the EIAR. These are collated and presented below.

3.1 Proposed Mitigation Measures

Mitigation and environmental commitments have been identified as general requirements which will help to avoid, reduce or offset potential impacts and are relevant to a number of the environmental aspects of the Proposed Development.

General environmental mitigation measures specified for the Proposed Development are provided in Table 1 below.

Specific mitigation measures are provided in Tables 2 to 14 below.

The timing of the implementation of the mitigation measures is indicated within the tables as:

Construction Phase¹: This phase comprises Phase 1 of the mining operational plan, as well as construction of sports pitches and ancillary building works and is expected to be of ca. 24 months duration overall (i.e., short-term);

Operational Phase: Proposed mining activities (thirty-to-thirty-five-year timeframe) will be of long-term duration (defined as lasting for fifteen to sixty years in accordance with the EPA's 2017 draft 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports').

The operational phase of the Community Sports Complex will be a permanent duration (i.e., lasting greater than sixty years). Therefore, the operational phase for the overall Proposed Development ranges between long-term and permanent. Clarity is provided within Tables 2 to 14 about the proposed duration of specific mitigation measures proposed; and

Aftercare (Decommissioning) Phase: On cessation of mining activities, the proposed Closure, Restoration and Aftercare Management Plan (CRAMP) for Knocknacran West will be invoked to rehabilitate the mining sites and to enhance biodiversity opportunities there. The CRAMP will evolve throughout the life of the mine, taking community and statutory interests into account.

The aftercare phase will commence with an active closure phase (anticipated for 6 months), then a passive closure phase (anticipated for 12 months). This active and passive closure phase will, collectively, be of short-term duration (<2 years) and will comprise of physical closure works such as demolition (active closure) and environmental monitoring/ reporting (passive closure). The purpose of the latter is to demonstrate that the closure works have been successful, and that all environmental metrics for the Site are stable.

Once monitoring and measurement have demonstrated that the Site is in an environmentally stable state, the aftercare period will be fully established. The Site will remain in aftercare for a period to be agreed with the Regulatory Authorities, but it is currently anticipated to be 30 years.

¹ Construction activities associated with mining works are similar in nature to operational activities as both involve earthworks. The specific construction phase for mine development is described as Phase 1 in Chapter 3.0 of the EIAR and includes construction of a Cut-and-Cover Tunnel under the R179, stripping of overburden and interburden material within the northern portion of the proposed open-cast, and the construction of an internal haul road and conveyor route from the mining area through the tunnel to the existing Knocknacran Processing Plant.

A decommissioning phase for the Community Sports Complex has not been considered given its permanent nature.

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Table 1: General Environmental Mitigation Requirements

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
GM0	Activities on the Site will adhere to EU and National Guidelines and Legislation where applicable, and also follow Best Available Techniques (BAT) to prevent and minimise emissions and impacts on the environment. Mitigation and monitoring presented in the chapters of this EIAR will be implemented and adhered to.	All phases
GM1	<p>Two Construction Environmental Management Plan (CEMP) will be prepared for the Mine Development and take into account the requirements of ISO 14001. The appointed Main Contractor will review and amend the CEMP, as required. The appointed Main Contractor will implement the CEMP. The purpose of the CEMP is to:</p> <ul style="list-style-type: none"> • Minimise the environmental impact of the construction phase of the development through the incorporation of the planning consent’s mitigating principles; • Ensure compliance with environmental legislation during this phase; • Identify relevant environmental risks and their management during construction; • Provide a system of continuous improvement in environmental performance for the construction activities; and • Identify the environmental management responsibility structure. <p>The CEMP is required to be approved by Monaghan County Council. The CEMP will contain all the construction phase mitigation measures and plans identified in the EIAR.</p> <p>The appointed Main Contractor shall incorporate all the conditions set out in the planning approval into the CEMP and implement these on-site.</p> <p>The CEMP will set out all the intended methods to manage potential environmental impacts from the construction of the Mine Development. Other key elements will include:</p> <ul style="list-style-type: none"> • The appointment of an on-site Environmental Officer for the construction period of the Mine Development; • Incorporation of all environmental commitments, including purpose and objective; • Incorporation of procedures to record any environmental incidents on site and procedures for implementing appropriate corrective 	Construction Phase

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Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
	<p>and preventative measures;</p> <ul style="list-style-type: none"> • Incorporation of procedures for staff environmental awareness; • Incorporation of environmental monitoring procedures; and • Incorporation of a system of audit and review. <p>The CEMP will be a live document and will be reviewed on a regular basis (i.e. as procedures are updated/revised) and updated accordingly by the appointed Main Contractor.</p>	
GM2	<p>The appointed Main Contractor shall ensure that the approved CEMP is fully implemented during the construction phase, to prevent or reduce the impacts identified in the impact assessment. This includes maintaining and implementing all relevant management plans specified in the EIAR.</p>	Construction Phase
GM3	<p>SGMI will continue to implement its ISO14001 Environmental Management System (EMS) at the Mine Development. The purpose of the system is to:</p> <ul style="list-style-type: none"> • Identify key environmental aspects and impacts; • Develop and implement controls to eliminate and minimise the environmental impact of the operation; • Ensure compliance with environmental legislation; • Carry out monitoring and checking to ensure control systems are working; and • Achieve continuous improvement by a process of review. <p>The EMS identifies the operational mitigation measures and plans identified in the EIAR, and the following Sections.</p> <p>The EMS shall govern all the intended methods to manage potential environmental impacts from the operation of the Mine Development.</p>	Operational and Restoration/Closure Phase
GM4	<p>The key elements of the EMS that will be updated accordingly throughout the duration of the Mine Development include:</p> <ul style="list-style-type: none"> • Appointment of and maintenance of an Environmental Officer by SGMI for the duration of the activities; • The documentation and record of any environmental incidents on Site, and the actions taken for implementing appropriate corrective and preventative measures; 	Operational and Restoration/Closure Phase

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Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
	<ul style="list-style-type: none"> The review and application of relevant guidance informing the environmental performance of the Proposed Development; Ongoing training of environmental awareness for all staff; The documentation, compilation and review of environmental monitoring results; and Periodic review of the EMS. 	
GM5	The Mine Manager, with the support of the appointed Environmental Officer shall ensure that the EMS is fully implemented during the operation phase in agreement with the EPA, Monaghan County Council, and the Department of the Environment, Climate and Communications (DECC) to prevent or reduce the impacts identified in the impact assessment. SGMI will be responsible for ensuring that all embedded mitigation and relevant operational management plans required by the EIAR are appropriately maintained.	Operational and Restoration/Closure Phase
GM6	SGMI will implement the Closure, Restoration and Aftercare Management Plan (CRAMP) at the Mine Development. This plan will identify the methods by which works will be managed to meet these commitments and requirements. The CRAMP will be carried out in accordance with the provisions of the EMS procedures and requirements of the site's IE Licence.	Restoration/Closure Phase
GM7	The appointed Environmental Officer shall ensure that the CRAMP is fully implemented in agreement with the EPA, Monaghan County Council, and the DECC to ensure that the Site is restored in the interest of environmental sustainability, visual amenity, traffic safety, adjoining residential amenity, and proper planning and sustainable development of the area.	Restoration/Closure Phase
	NOTE: Any further general environmental mitigation measures within authorisation or consents to be included in this section and adhered to.	Construction, Operational and Restoration/Closure Phase

Table 2: Specific Environmental Mitigation Requirements - Population, Human Health and Community

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
PHHC1	<p>Population Nuisance to the local population from noise, vibration, dusts, landscape and visual impacts, and impacts to groundwater and surface waters will be mitigated during the construction phases for the construction, operation and aftercare phases of the Mine Development. Specific mitigation and best practices have been discussed in the respective chapters of this EIAR: Land, Soils and Geology (Chapter 7.0), Water (Chapter 8.0), Climate (Chapter 9.0), Air Quality (Chapter 10.0), Noise (Chapter 11.0), Vibration (Chapter 12.0), Landscape and Visual (Chapter 13.0), and Traffic and Transport (Chapter 14.0).</p> <p>To mitigate potential nuisance during construction, a CEMP will be implemented in full.</p> <p>To mitigate potential nuisance during operation, SGMI will be required to demonstrate compliance with environmental limits as set out within IE Licence P0519-04 (and any subsequent revision) for the Mine Development.</p>	Construction, Operational and Restoration/Closure Phase
PHHC2	<p>Amenity Mitigation measures related to the management of nuisance dusts and noise have been discussed in Climate (Chapter 9.0), Air Quality (Chapter 10.0), Noise (Chapter 11.0) and Vibration (Chapter 12.0).</p> <p>A CEMP(s) will be developed for the construction phase of the Mine Development. This will provide provisions for the mitigation of nuisance and the management of the site.</p>	Construction, Operational and Restoration/Closure Phase
PHHC3	<p>Amenity The Applicant will continue to undertake community consultation through its Community Liaison Officer, updates on the company's website and community events as required for the Mine Development. The Applicant will have continued dialogue with the local community on the progress of the development and land rehabilitation plans. The Applicant will continue to recognise that a change to the sense of place is arising from the Mine Development. In the event of a grant of permission and subsequent development, SGMI will undertake to develop a records pack that will create a permanent record of the area to be developed.</p>	Construction, Operational and Restoration/Closure Phase
PHHC4	<p>Amenity The design of the Mine Development to link the northern and southern areas of the site include a tunnel under the R179. Therefore, traffic impacts associated with movements between mining areas and the processing plant will be minimised.</p>	Construction and Operational Phase
PHHC5	<p>Human Health, and Health and Safety Specific mitigation measures and best practices have been discussed in the respective chapters of this EIAR: Air Quality (Chapter 10.0), Noise (Chapter 11.0) and Vibration (Chapter 12.0).</p> <p>Site operations are managed in accordance with relevant Health and Safety legislation (Safety, Health & Welfare at Work Act (2005, as amended)); and the Mines and Quarries Act (1965, as amended)) and subsequent Regulations relating to health and safety, training, and appropriate site</p>	Construction, Operational and Restoration/Closure Phase

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Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
	<p>management.</p> <p>The development of a CEMP for the Mine Development and associated site Health and Safety Management Plan will ensure that hazards which may affect any relevant parties during the construction, operation and aftercare phases are appropriately mitigated.</p>	
PHHC6	<p>Health and Safety - A Construction Traffic Management Plan for the Mine Development will be developed in order to manage instances where construction traffic may affect local road users. Methods and approaches in this plan will be agreed with Monaghan County Council as appropriate.</p>	Construction Phase
PHHC7	<p>Health and Safety - The main contractor's CEMP will contain provisions for site security for the Proposed Development. These provisions will detail appropriate measures to ensure access is restricted to authorised personnel only. Fencing and berms will be erected along boundaries as appropriate.</p>	Construction Phase
	<p>NOTE: Any further mitigation measures related to Population and Human Health detailed within authorisation or consents to be included in this section and adhered to.</p>	

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Table 3: Specific Environmental Mitigation Requirements - Biodiversity

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
B1	All Site construction will be undertaken in accordance with the CIRIA (2016) Environmental Good Practice on Site Guide (fourth edition) or any subsequent relevant revisions.	Construction Phase
B2	Environmental Management Plan The Environmental Management Plan (EMP), detailing all environmental mitigation measures will be updated and adhered to during the operational life of the Mine Development. The Habitat Management Plan (HMP) which accompanies the EMP and details relevant and necessary prescriptions for management of features, will be updated and implemented during all phases of the Mine Development. Both the EMP and HMP are live documents.	Construction, Operational and Restoration/Closure Phase
B3	Lighting Lighting will be minimised during hours of darkness and will not illuminate peripheral mature trees and vegetation to ensure no adverse effects on bats and other nocturnal species. The lighting strategy will maintain any opportunities within the Site for nocturnal and crepuscular species by using timers, cowls and hoods to maintain dark skies and avoid illuminating features such as woodland and hedgerow habitat.	Construction, Operational and Restoration/Closure Phase
B4	Water Management System Any discharge water will be strictly monitored and only discharged once in compliance with IE Licence P0519-04 (or any subsequent revision).	Construction, Operational and Restoration/Closure Phase
B5	<ul style="list-style-type: none"> • Hydrocarbons/Chemical Safeguards & Protection of Site Water • The following measures will be implemented to prevent the release of hydrocarbons or other chemicals harmful to biodiversity into the environment: • All soil / overburden stockpiles shall be covered (i.e. vegetated) to minimise the risk of rain / wind erosion; • Restoration of topsoil and overburden will be carried out on a phased basis to reduce the vulnerability of the underlying aquifer to possible contamination; • Continued operation and maintenance of the existing bunds and hydrocarbon interceptor will occur; 	Construction, Operational and Restoration/Closure Phase

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Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
	<ul style="list-style-type: none"> • Regular maintenance and emptying of the hydrocarbon interceptor as per manufacturer’s recommendations will be implemented; • All plant and machinery will continue to be regularly serviced before being used on site; • Mobile plant will be refuelled on an existing dedicated concrete hardstanding apron (with associated interceptor) on the permitted adjacent mine site. Static plant or tracked excavators will refuel over a drip tray with an absorbent mat. In addition, spill kits will be maintained on site to deal with all spills and leaks, and spill training will be provided to relevant staff members; • Mobile bowsers, tanks and drums will be stored in secure, impermeable storage areas away from open water; • Dust suppression will be achieved by bowsers operating on haul roads or by providing hardstanding surfaces on permanently trafficked areas; • Fuel and oil containers will be stored within a secondary containment system, e.g. bunds for static tanks or a drip tray for mobile stores; • Containers and bunding for storage of hydrocarbons and chemicals will have a holding capacity of 110% of the volume to be stored; • Fuel and oil stores including tanks and drums will be regularly inspected for leaks and signs of damage; • Drip-trays will be used for fixed or mobile plant such as pumps and generators in order to retain oil leaks and spills; • Only designated trained operators will be authorised to refuel mobile plant on site; • Procedures and contingency plans will be set up to deal with emergency accidents or spills; and • Emergency spill kits (including absorbers) will be available for use in the event of an accidental spill on the mine floor and key personnel trained in their use. 	
B6	<ul style="list-style-type: none"> • General Faunal Safeguards • The following safeguarding measures will be implemented to mitigate risk to fauna (such as badgers and small mammals) which enter the site during works: • Any excavations that will remain overnight will include measures to ensure any mammals that may enter the excavation have a way to get out, such as graded banks, or a rough plank of wood to act as a ‘crawl board’; 	Construction and Operational Phase

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
	<ul style="list-style-type: none"> • Provision of Bat boxes. <p>A minimum of 15 bat boxes will be installed at appropriate locations. The boxes will be installed on trees which are in good health. The selection of bat box locations will be decided in consultation with an Ecologist and with cognisance of the following:</p> <ul style="list-style-type: none"> • Bat boxes should be installed at a minimum height of 4 m above ground level, and in locations which are inaccessible to unaided climbing (to minimise risk of vandalism). • Two bat boxes should be installed on each of the three of the most suitable trees. • Locations should be chosen which are not vulnerable to artificial light pollution. <p>Boxes will be installed so that they have southern or westerly aspects and preferably in locations where they will receive some direct sunlight.</p>	<p>RECEIVED: 11/04/2023</p>
B10	<p>Foraging/Commuting - Suitable screening and planting will take place in proximity to the proposed roosts and connectively between the roosts and surrounding landscape will be maintained. Planting along the L4900 would provide a corridor to connect 'Building 4' (Shirley House) to the woodland area to the north that will be largely retained (south of Drumgoosat Village).</p> <p>To compensate for the loss of hedgerows and trees (utilised by foraging/commuting bats), replacement habitats will be provided under the restoration plan for the mine, including provision of hedgerows, wildflower grassland, scrub, and a central lake. This planting will have regard to restoring connectivity across the Site and with the wider landscape. In the short-term, the restoration of the current mine (to the south of the R179) will include the provision of habitats similar to those which will be lost in the north of the Site, increasing the habitat available for foraging/commuting bats in the wider area.</p>	All phases
B11	<p>Badgers</p> <p>Alternative habitat surrounds the extraction area, and these lands are in the ownership of the Applicant. Engagement is ongoing with the NPWS about the relocation of the onsite badger setts, and will continue for the timely and safe relocation of the animals to take place.</p> <p>Other badger mitigation measures which will be put in place at the site during construction works are as follows:</p> <ul style="list-style-type: none"> • Pre-construction badger surveys will be undertaken prior to site clearance works, in order to identify the extent of use by badgers, or absence of use of the setts; • Where excavation works are required onsite, mitigation measures will be put in place to prevent mammal ingress; • Fencing will be put in place along the perimeter of the work areas; and • If setts are found within the works area, the Ecological Clerk of Works (ECoW) will be contacted for advice and the ECoW 	Construction Phase

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
	<p>will liaise with the NPWS and regulatory authority, where necessary.</p> <p>The proposed development area includes the entirety of the Site area. Within the overall Site blasting will only take place in the Knocknacran West open-cast mine during the extraction of gypsum.</p> <ul style="list-style-type: none"> In terms of the impacts of blasting on badgers (blasting associated with the Knocknacran West site lies further within the site interior than the redline development boundary), a 150 m stand-off/offset from the edge of the active gypsum faces (i.e., the blast line) for the protection of badgers is proposed. Badger mitigation measures which will be put in place at the site during operational works are as follows: Fencing will be put in place along the perimeter of the works areas to prevent badger access to open-cast work areas; Badger surveys will be undertaken prior to ground clearance works (stripping campaigns which would require overburden removal); and If setts are found within the works area or in advance of stripping campaigns in new work areas, the Ecological Clerk of Works (ECoW) will be contacted for advice. 	Operational Phase
B12	<p>Birds</p> <p>Any demolition of buildings with potential to support nesting birds will be undertaken outside of the bird nesting season (March to August inclusive). Consultation will occur with the Regulatory Authority regarding the provision of a barn owl derogation licence (if required based on pre-construction surveys) and a mitigation strategy will be delivered for this species and documented within the EMP. This will include the provision of alternative nesting habitat as appropriate.</p> <p>If there is a necessity for vegetation clearance within the nesting season, a suitably qualified ecologist will carry out a series of nesting bird checks in advance of any works to ascertain breeding activity in affected areas.</p> <p>Habitat compensation measures (as set out above) will serve to ensure the maintenance of foraging, shelter, and nesting opportunities within the site in the long-term. In the short-term, nest boxes will be provided on suitable retained trees at the periphery of the site, in order to ensure replacement nesting opportunities are immediately available.</p>	Construction and Operational Phase
B13	<p>Invasive Species</p> <p>Measures will be implemented throughout site works to safeguard against the spread of any invasive non-native species (such as cotoneaster, Japanese knotweed or rhododendron). Indeed, where possible such plants will be removed from the Site (and disposed of appropriately, following an appropriate method statement). Japanese knotweed is confirmed on Site and will continue to be dealt with</p>	Construction, Operational and Restoration/Closure Phase

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Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
	by an appropriately qualified contractor.	
B14	Protection of Retained habitat Retained vegetation (hedgerows and trees, including woodland habitat), will be protected with secure fencing prior to the commencement of construction works on site (in line with Chapter 17 of the Monaghan Local Plan and NRA guidance).	Construction Phase
B15	Habitat Compensation Removal of boundary hedgerows and trees outside the development footprint will be avoided where possible. Planting will be required to mitigate for tree removal and future restoration plans will be required to replace any trees and shrub species removed on a "like for like" basis (as a minimum). Consideration will be given towards hawthorn, blackthorn mix with individual alder and birch (to form native tree hedges) and deciduous trees (native tree species include oak, alder and birch).	Construction and Restoration/Closure Phase
B16	Habitat Provision In the short-term, hedgerows will be planted as part of buffer zones to maintain ecological connectivity.	Construction and Operational Phase
B17	Restoration The restoration plan for the Mine Development will be updated annually as part of the Applicant's commitments under the Site's IE Licence (P0519-04, and any subsequent revisions) and the provisions of the Closure, Restoration and Aftercare Management Plan (CRAMP) outlined in Appendix 3.3. The HMP includes for the provision of aquatic habitat, woodland and hedgerow planting, plus grassland creation. The Mine Development also allows for the retention of woodland within the Application Site boundary to the north.	Restoration/Closure Phase
B18	Enhancement A phased restoration plan will replace lost key habitats which will have been of importance to birds, bats and small mammals within the Mine Development. Final profiling of the open-cast slopes will be completed to ensure that any in-situ gypsum is covered, and benches are made safe. This will allow the planting of native grasses, wildflowers, scrub and trees to be undertaken and biodiverse habitats to be developed. Features will include a lake and areas of natural grassland/wildflowers and woodland. The area where the haul ramp enters the water will be graded and planted with plants suitable to that environment, adding additional biodiversity to the Site as a whole.	Operational and Restoration/Closure Phase
B19	Enhancement Habitat - Where possible, the restoration plan for the Mine Development will include habitats of elevated value, such as species-rich hedgerows and wildflower grassland. Planting will comprise native species of local provenance. Where this is not possible, plants will be selected for their fruit, berry, or nectar bearing qualities. All landscape planting within the site will be managed for the benefit of wildlife.	Restoration/Closure Phase
B20	Enhancement Fauna - Several bat and bird boxes will be incorporated in the restoration of the site, placed on trees of a suitable size. In addition, to	Restoration/Closure Phase

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Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
	increase opportunities for invertebrates within the site, invertebrate boxes and habitat piles will be provided under the restoration plan; these will be in sheltered areas of new and retained vegetation, such as in association with hedgerows.	
	NOTE: Any further mitigation measures related to Biodiversity detailed within authorisation or consents to be included in this section and adhered to.	

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Table 4: Specific Environmental Mitigation Requirements - Land, Soils and Geology

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
LSG1	Site operations will be managed in accordance with relevant health and Safety legislation (Safety, Health & Welfare at Work Act (2005, as amended)); and the Mines and Quarries Act (1965, as amended)).	Construction, Operational and Restoration/Closure Phase
LSG2	Fencing will be maintained at the Site to ensure that the risk of injury to the public and livestock is minimised. All entrance gates will be locked and controlled by the Site's management.	Construction, Operational and Restoration/Closure Phase
LSG3	The extraction of gypsum will take place using the mining industry standard method of cyclical drilling, blasting, loading, hauling and ground support.	Construction and Operational Phase
LSG4	The removal of soils will be conducted on a phased basis to reduce the overall potential impact on the land use and underlying groundwater.	Construction and Operational Phase
LSG5	Re-handling of the topsoil will be kept to a minimum to preserve the integrity of the material.	Construction, Operational and Restoration/Closure Phase
LSG6	All plant on the Site be regularly maintained, and where plant is damaged or leaking, it will be fixed or replaced immediately, as part of ongoing operational management of the site.	Construction and Operational Phase
LSG7	Refuelling and the addition of hydraulic oils or lubricants to vehicles or generators will take place on-site only in designated areas. Mobile plant will use the existing refuelling facilities at the Plant Site garage for refuelling. Static plant and tracked excavators will refuel over a drip tray with an absorbent mat.	Construction and Operational Phase
LSG8	Existing groundwater wells will be continuously monitored on site during mining operations and for a period following cessation of mining (to be agreed with the relevant authorities).	Construction, Operational and Restoration/Closure Phase
LSG9	Blasting will take place at the Site using licenced and experienced operators. Site management will give advance notification of blasting events to nearby residents in line with current standard procedures in operation at the existing mine.	Construction and Operational Phase
LSG10	Geotechnical assessments will be conducted on a regular basis by an experienced and suitably qualified geotechnical engineer. The current slope angles are designed to ensure that the risk of slope failure is effectively eliminated by using a suitable safety factor.	Construction, Operational and Restoration/Closure Phase
LSG11	The mine manager will ensure compliance with relevant safety and statutory legislation and best practices recommended by national legislation (and guidelines).	Restoration/Closure Phase

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
LSG12	Stockpiles will be evaluated and monitored and kept stable for safety and to minimise erosion.	Construction and Operational Phase
LSG13	During mining of Knocknacran West, where underground workings are exposed (which would remain in situ) the opportunity and practicalities of accessing the workings to carryout support work to ensure continued ground stability under the roadways where the mine workings occur will be assessed.	Construction and Operational Phase
LSG14	On-going Geotechnical monitoring by means of extensometers will continue throughout the life of the mine along the R179 and L4900 and after cessation of mining.	Construction, Operational and Restoration/Closure Phase
LSG15	The provision of adequate drainage along the upper benches of the proposed Knocknacran West Mine in the overburden will be employed as is the current arrangement in the existing Knocknacran Mine.	Construction and Operational Phase
	NOTE: Any further mitigation measures related to Land, Soils and Geology detailed within authorisation or consents to be included in this section and adhered to.	

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Table 5: Specific Environmental Mitigation Requirements - Water

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
W1	<p>Open Cast Mining Areas</p> <p>The current mine water management system will be maintained throughout the entire period of mining and until such time as full restoration of the entire site has been completed:</p> <p style="padding-left: 40px;">The water balance model confirms that existing infrastructure will be sufficient for the purposes of managing all water from the proposed future extraction and restoration phases of the mine;</p> <p style="padding-left: 40px;">All future gypsum mining will be from an area that has previously been mined by underground means; and</p> <p style="padding-left: 40px;">The ability to temporarily store water in the base of existing Knocknacran Mine and subsequently in the Knocknacran West Mine will be retained, until the flows and assimilative capacity in the receiving River Bursk are sufficient to allow discharge. This mitigates against the impact of releasing high sulphate water into the River Bursk, thereby preventing degradation of the river environment.</p>	Construction, Operational and Restoration/Closure Phase
W2	Backfill material (stripped mudstone) will be placed against the pit slopes of the Knocknacran West Open-Cast Mine to provide hydraulic isolation of the gypsum strata that remain below the R179 and L4900 roads. The north and west slopes of the existing Knocknacran Mine have already been backfilled in this manner to minimize circulation of groundwater beneath the R179.	Construction, Operational and Restoration/Closure Phase
W3	Areas identified with current or potential future surface settlement above the historic Drumgoosat workings will be stripped and incorporated into the Knocknacran West Open-Cast Mine.	Construction and Operational Phase
W4	All topsoil, overburden and interburden (mudstone and dolerite) from within the proposed Knocknacran West Mine not used in ongoing restoration will be stored in temporary stockpiles and vegetated to minimise the risk of rain/wind erosion. All temporarily stockpiled material will be subsequently used in the final restoration of the Knocknacran West Mine.	Construction and Operational Phase
W5	Restoration of any remaining gypsum that may be exposed in the sides of the Open-Cast Mine will be covered with low permeability material (i.e. previously stripped mudstone) to help optimize pumped water quality from the mine during operations and final water quality post-restoration of the site.	Operational and Restoration/Closure Phase
W6	Control of suspended solids will be carried out using settlement on the pit floor and in a sump(s).	Construction and Operational Phase
W7	Whenever possible, water from the pit sump(s) will be preferentially used for dust suppression.	Construction and Operational Phase

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
W8	The pit sump(s) will be regularly cleaned to remove fine grained material, with the material being used in rehabilitation and restoration work.	Construction and Operational Phase
W9	An on-going programme of regular cleaning and maintenance will be carried out for the sump(s), attenuation ponds and other on-site water management infrastructure.	Construction and Operational Phase
W10	Mobile plant will use the existing refuelling facilities at the Plant Site garage for refuelling. Static plant and tracked excavators will refuel over a drip tray with an absorbent mat.	Construction and Operational Phase
W11	All mobile plant shall be regularly maintained, and where plant is damaged or leaking it will be fixed or replaced immediately, as part of the ongoing operational management of the mine to reduce the risk of leaks.	Construction and Operational Phase
W12	No storage of hydrocarbons will take place in the Open-Cast area.	Construction and Operational Phase
W13	Emergency spill kits (including absorbers) will be available for use in the event of an accidental spill in the Open-Cast area.	Construction and Operational Phase
W14	Regular monitoring of groundwater (levels and quality) will continue to take place using existing monitoring boreholes in compliance with IE Licence P0519-04.	Construction, Operational and Restoration/Closure Phase
W15	Ongoing (real-time) monitoring of surface (mine) water discharge to the River Bursk will continue to take place in compliance with IE Licence P0519-04.	Construction, Operational and Restoration/Closure Phase
W16	If any potential for accumulating water is identified during development, additional field drains will be installed to minimise the potential for accumulating water.	Construction, Operational and Restoration/Closure Phase
W17	<p>Plant Site Area</p> <p>In the Plant Site area, local surface water runoff is prevented from discharging to surface water by a series of gullies and drains prior to passing through a hydrocarbon interceptor. In addition:</p> <ul style="list-style-type: none"> Maintenance of vehicles will be confined to the workshop area where practical; Hydraulic oils and engine oils will be adequately bunded; Fuel tanks will be bunded or have double skins; Waste oils will be collected and stored prior to collection by a hazardous waste contractor; and The continuation of good housekeeping during operations, by adhering to best practices, will continue to mitigate against potential 	Construction and Operational Phase

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
	impacts on the surrounding water environment.	
W18	<p>Community Sports Complex</p> <p>Good site management and efficient working practices (not leaving exposed trenches) will be implemented to mitigate any impact of earthworks on water courses. Surface run-off will be managed by attenuation measures and wastewater will be managed by a fully designed and engineered wastewater management system.</p>	Construction and Operational Phase
	<p>NOTE: Any further mitigation measures related to Water detailed within authorisation or consents to be included in this section and adhered to.</p>	

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Table 6: Specific Environmental Mitigation Requirements - Climate

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
C1	Saint-Gobain is committed to reducing its CO ₂ emissions by 20% by 2025. The end-use product, which is produced from the gypsum at the Mine Development, is used in technology which has been designed to be innovative and increase the energy efficiency of new builds, and also increase the thermal renovation of the current building stock.	Construction and Operational Phase
C2	<p>Direct Emissions</p> <p>The following mitigation measures will be put in place to limit vehicle and plant emissions from mining activities:</p> <ul style="list-style-type: none"> • No vehicles or plant will be left idling unnecessarily; • Vehicles and plant will be well maintained. Should any emissions of dark smoke occur (except during start up) then the relevant machinery will be stopped immediately, and any problem rectified before being used; • Engines and exhaust systems will be regularly serviced according to the manufacturer's recommendations and maintained to meet statutory limits/opacity tests; • Full loads will be used in road haulage in order to minimise the carbon footprint per load of exported materials; and • Minimising the double handling of materials. 	Construction and Operational Phase
C3	Overburden will be stockpiled on the mine site within the screening berms, which will be planted. Coupled with the ecological screening areas set aside, the perimeter berms will seek to minimise carbon loss through soil stripping. Soils stripping during wetter periods will also ensure that carbon losses are reduced compared with warmer drier periods.	Construction and Operational Phase
C4	The Knocknacran Mine will be actively restored, and it is considered that the screening areas and final site restoration of both mines will positively contribute to the carbon sequestration of the sites.	Operational and Restoration Phase
C5	<p>Indirect Emissions</p> <p>Energy efficiencies and incentives will be inbuilt into the Site's electrical infrastructure and management practices. Energy consumption and greenhouse gas emissions will be reduced by buying 100% green energy. This energy reduction and efficient use will be promoted in areas of the Site including efficient site lighting using LED lighting, particularly in relation to the lighting of the sports pitches.</p>	Construction, Operational and Restoration/Closure Phase

C6	<p>Indirect Emissions Not Under Control of the Project</p> <p>SGMI have developed an onsite recycling process for off-cut plasterboard produced on construction sites. These off-cuts are collected and brought back to the plasterboard manufacturing facility for recycling and reuse, where traceability certificates outlining the lifecycle of the construction material cut-offs are issued. SGMI will also ensure that they are able to influence their supply chains towards more environmentally sustainable practices.</p>	Construction and Operational Phase
	<p>NOTE: Any further mitigation measures related to Climate detailed within authorisation or consents to be included in this section and adhered to.</p>	

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Table 7: Specific Environmental Mitigation Requirements - Air Quality

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
AQ1	Dust monitoring will continue to be carried out monthly at the designated monitoring locations on the Mine Development. The additional monitoring locations on the Knocknacran West Mine site will be incorporated into the EPA IE licence in consultation with the EPA (and relevant stakeholders) during the IE licence revision process. An ambient monitoring station (i.e. PM10 and PM25 will be established on the Knocknacran West Mine site for the operational life of the mine, this will be agreed in consultation with the EPA during a licence revision of the existing IE licence).	Construction and Operational Phase
AQ2	The timing of operations will be optimised in relation to meteorological conditions – taking into account periods of prolonged rainfall, high winds and snow/ice.	Construction and Operational Phase
AQ3	Overburden will be stripped in stages according to the mining schedule, reducing the risk of mass dust emissions on the Mine Development.	Construction and Operational Phase
AQ4	Material in outdoor stockpiling will be located within the mining void to take advantage of shelter from wind for the Mine Development.	Construction and Operational Phase
AQ5	Overburden mounds will be grass-seeded and planted to eliminate wind-blown dust.	Construction and Operational Phase
AQ6	Existing hedgerows will be used as a means of screening, with a security fence and a vegetated berm for dust, noise and visual screening. Berms will be 2 m high and 2 m wide and planted, with a section of 4 m by 4 m berm along the western and southern boundaries of the proposed Knocknacran West Mine.	Construction and Operational Phase
AQ7	The existing woodland area to the north of the proposed boundary of the open-cast mine will be kept (and enhanced with additional planting of native species), to act as a natural buffer.	Construction and Operational Phase
AQ8	Plant will be regularly maintained. Internal haul roads will be compacted and maintained (a water-bowser will be available at all times should haul roads need dampening to minimise dust blow during working hours).	Construction and Operational Phase
AQ9	Equipment will be enclosed, such as the semi-mobile crusher and covered conveyor.	Construction and Operational Phase
AQ10	On site speed restrictions (<20 kph) will be maintained in order to limit the generation of fugitive dust emissions for the Mine Development.	Construction and Operational Phase

AQ11	The proposed Knocknacran West Site will operate as a closed site, with access to the site via a proposed Cut-and-Cover Tunnel under the R179 road.	Construction and Operational Phase
AQ12	<p>Mitigation Measures that will be employed during construction activities include:</p> <ul style="list-style-type: none"> • At the Site Entrance, provide the name and contact details of person(s) responsible for the overall and environmental management of the Site; • Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken; • Record any exceptional incidents that cause dust and/or air emissions, either on-or off-site, and the action taken to resolve the situation in a log book; • Carry out regular site inspections; • Plan site layout so that machinery and dust causing activities including stockpiling are located away from receptors, as far as is possible; • Erect solid screens or barriers around dusty activities and/or at the site boundary; • Avoid site runoff of water or mud; • Ensure all vehicles switch off engines when stationary – no idling vehicles; • Avoid the use of diesel or petrol-powered generators and use mains electricity or battery powered equipment where practicable; • Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression systems, such as water sprays; • Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate; • Use enclosed chutes and conveyors and covered transfer points; • Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate; • Avoid bonfires and burning of waste materials; • Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site; • Avoid dry sweeping of large areas; • Ensure vehicles entering and leaving Site are covered to prevent escape of materials during transport; and • Record all inspections of haul routes and any subsequent action in a site log book. 	Construction and Operational Phase

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AQS13	<p>The following mitigation measures will be put in place to limit vehicle and plant emissions:</p> <ul style="list-style-type: none"> • No vehicles or plant will be left idling unnecessarily; • Vehicles and plant will be well maintained. Should any emissions of dark smoke occur (except during start up) then the relevant machinery will be stopped immediately, and any problem rectified before being used; • Engines and exhaust systems will be regularly serviced according to the manufacturer’s recommendations and maintained to meet statutory limits/opacity tests; and • All vehicles will hold a current Department of Environment certificate where required. 	Construction and Operational Phase
AQS14	All vehicles entering and leaving the mine plant site will use the existing vehicle wash facilities.	Construction and Operational Phase
	NOTE: Any further mitigation measures related to Air Quality detailed within authorisation or consents to be included in this section and adhered to.	

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Table 8: Specific Environmental Mitigation Requirements - Noise

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
N1	<p>Mine Development</p> <p>A noise monitoring programme will be maintained at the existing mine monitoring locations and additional monitoring locations around the Knocknacran West Mine site will be incorporated into the IE Licence in consultation with the EPA (and relevant stakeholders) as part of the licence revision.</p>	Construction and Operational Phase
N2	When the Knocknacran West Mine is at its full pit boundary extent (given favourable market conditions), the work practices and site activities will be coordinated and timed in such a manner to ensure concurrent rock-breaking and crushing operations in the pit floor do not exceed noise levels and cause nuisance to the local environment.	Construction and Operational Phase
N3	Perimeter screening berms will be constructed along the site boundary and screening berms will be planted with native tree and shrub species.	Construction Phase
N4	All haul roads will be kept clean and maintained in a good state of repair.	Construction and Operational Phase
N5	Heavy goods vehicles entering and leaving the Site will have tailgates securely fastened; all mobile plant used will have noise emission levels that comply with relevant guidance.	Construction and Operational Phase
N6	Plant will be operated in a proper manner with respect to minimising noise emissions, e.g. minimisation of drop heights, no unnecessary revving of engines, plant used intermittently not left idling.	Construction and Operational Phase
N7	Plant will be subject to regular maintenance, i.e. all moving parts kept well lubricated, the integrity of silencers and acoustic hoods maintained.	Operational Phase
N8	Plant will be fitted with effective exhaust silencers and maintained in good working order to meet manufacturers' noise rating levels. Defective silencers will be replaced.	Operational Phase

Table 9: Specific Environmental Mitigation Requirements - Vibration

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
V1	The proposed screening berms to be located around the perimeter of the Application Site will be left intact for the life of the mine (and in perpetuity to continue to provide biodiversity to the Site and the local environment). They will also serve to mitigate against noise, as well as offer reduced visibility of the Site from the public road network and surrounding lands.	Construction and Operational Phase
V2	All blasts will be initiated by electronic detonation system.	Construction and Operational Phase
V3	Ensure that the optimum blast ratio is maintained, and that the maximum instantaneous charge is optimised so that the ground vibration levels are kept below those specified.	Construction and Operational Phase
V4	Explosive charges are properly and adequately confined by using a sufficient quantity of stemming.	Construction and Operational Phase
V5	Adequate confinement of all charges by means of accurate face survey and the subsequent judicious placement of explosives.	Construction and Operational Phase
V6	No blasting carried out at weekends or public holidays.	Construction and Operational Phase
V7	No exposed detonating fuse used in blasting.	Construction and Operational Phase
V8	The proposed mine design has incorporated the proximal receptors into the early design process and boundaries have been offset so that the cut of the excavation will be 100 m from the nearest receptor, at a minimum.	Construction and Operational Phase
V9	An area which is densely populated by woodland separates Drumgoosat village from the proposed Knocknacran West Mine. As part of the mine design process, this woodland area will be retained to buffer potential impacts from the proposed extraction activities.	Construction and Operational Phase
V10	Notice of blasting times will continue to be given as currently practiced.	Construction and Operational Phase
V11	Blasting to be carried out by professionally trained blast engineers.	Construction and Operational Phase
V12	Blasts will be measured (ground vibration & air overpressure) at monitoring locations to ensure compliance with the limits. Information collected to be used in any necessary modification of future blast designs.	Construction and Operational Phase

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V13	All monitoring equipment calibrated regularly to ensure that peak particle velocity and air overpressure generated from each blast is accurately measured.	Construction and Operational Phase
	NOTE: Any further mitigation measures related to Vibration detailed within authorisation or consents to be included in this section and adhered to.	

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Table 10: Specific Environmental Mitigation Requirements - Landscape and Visual

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
LV1	Prior to excavation, a perimeter screening berm will be constructed on all sides of the Knocknacran West Mine site. This will assist in screening works in the proposed Knocknacran West Open-Cast Mine from sensitive views to the south (i.e. along the busy R1797 road), and, less so, to the eastern and north-western boundaries of the Site, which are aligned by local/third class roads. In addition, the proposed berms will be planted in a native woodland mix to provide a 'green' screen surrounding the Knocknacran West boundary within a decade.	Construction and Operational Phase
LV2	All existing roadside trees and vegetation will be retained along adjacent roads to the Knocknacran West Mine site, to further assist in screening the Proposed Development.	Construction and Operational Phase
LV3	An area of existing wooded, higher to the north of the proposed extraction area will be left in place and will screen any potential views of the proposed excavation at Knocknacran West from the village of Drumgoosat.	Construction and Operational Phase
LV4	The material (overburden and interburden) will be transferred from the proposed Knocknacran West Mine via haul truck, through a cut-and-cover tunnel beneath the R179, to be used in the phased restoration of Knocknacran Mine site.	Restoration/Closure Phase
LV5	The restoration of the Knocknacran West site will be achieved through re-profiling and re-grading of benches with the use of previously stripped material. Slope stabilisation will be achieved through grass seeding which will minimise any long-term visible presence of the excavation on the landscape and will help facilitate the re-establishment of grassland and hedgerows, and their accompanying ecological habitats. In addition, post-excavation, the site of the Knocknacran West Mine will be partially restored, with a lake at the centre of the site.	Restoration/Closure Phase
LV6	The existing Knocknacran Mine site will be restored to close to its original ground level for agricultural use. This agricultural land will consist of regular-sized fields bordered by field boundaries consisting of native vegetation; compatible and consistent with the topography, land use, field sizes and field boundaries of agricultural lands bordering the Site within the central study area. Such a restoration will reduce any long-term or lasting visible presence of the excavation on the landscape and will help facilitate the re-establishment of pasture, and its accompanying ecological habitat. This land will be dressed with ca. 0.3 m of topsoil (originally stored in stockpiles from the Knocknacran West excavation) and re-seeded with an agricultural grade grass seed mixture.	Restoration/Closure Phase
LV7	The proposed Knocknacran West Mine open-cast void will never be revealed in its entirety as a completely excavated pit with bare faces. By the time that the later phases (immediately due north of the R179) of the Knocknacran West Mine Site are excavated, the earlier phases of the excavation immediately due south of the L4900 will have been restored. The majority of all works, including vehicular movement, will take place in a visually obscured area towards the pit floor, and so will have reduced visual effects beyond the mine area.	Operational and Restoration/Closure Phase

LV8	Physical stabilisation of slopes through precise profiling and contouring.	Restoration/Closure Phase
LV9	Removal and remodelling of any conspicuous, 'unnatural-looking' localised contour profiles to ensure they seamlessly 'marry-in' with existing/undisturbed contour profiles.	Restoration/Closure Phase
LV11	All fixed plant, infrastructure and detritus will be permanently removed off-site.	Restoration/Closure Phase
	NOTE: Any further mitigation measures related to Landscape detailed within authorisation or consents to be included in this section and adhered to.	

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Table 11: Specific Environmental Mitigation Requirements - Traffic and Transport

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
TT1	Relocation of the existing Knocknacran Mine entrance to maximise sightlines to the south of the access onto the L4816. A new proposed mine access will provide 90 m sightlines to the south, which is consistent with the prevailing 85%ile speed (60-63kph) recorded on the L4816.	Construction and Operational Phase
TT2	New Stop sign and associated road markings to be provided at the Mine Access.	Construction and Operational Phase
TT3	Cutting back of vegetation and tree canopy that is currently reducing visibility to the Stop sign at the L4816/R179 T-Junction.	Construction and Operational Phase
	NOTE: Any further mitigation measures related to Traffic and Transport detailed within authorisation or consents to be included in this section and adhered to.	

Table 12: Specific Environmental Mitigation Requirements - Archaeology and Cultural Heritage

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
ACH1	Due to the possibility of the survival of previously unknown subsurface archaeological deposits or finds within the unstripped part of the new proposed mining area (Knocknacran West Mine site) in all areas except No. 28 topsoil-stripping in the application area should be archaeologically monitored.	Construction and Operational Phase
	NOTE: Any further mitigation measures related to Cultural Heritage detailed within authorisation or consents to be included in this section and adhered to.	

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Table 13: Specific Environmental Mitigation Requirements - Material Assets

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
MA1	All works to the electrical power lines, gas network, water network and telecommunications network during the construction phase will be carried out in accordance with appropriate requirements and guidelines. Locations and capacity of the network services will be agreed in consultation with relevant service providers.	Construction Phase
MA2	Screening will be put in place as part of the Knocknacran West Mine development to assimilate the developments into the landscape. In the case of Knocknacran West Mine this will also provide mitigation until final restoration is completed.	Construction and Operational, Restoration/Closure Phase
MA3	Signage will be maintained and erected within the Mine Site to maintain a safe and orderly traffic regime on the Site.	Construction and Operational Phase
MA4	Pre-construction consultation and authorisation will be achieved for all of the relevant infrastructure connections.	Construction Phase
MA5	Any works required to Material Assets on or around the Site will be carried out in conjunction with the relevant provider to ensure minimal disruption to the existing users.	Construction and Operational Phase
MA6	Any works required to Material Assets on or around the Site will be carried out strictly in accordance with the relevant provider's Code of Practices.	Construction and Operational Phase
MA7	The appointed Main Contractor will be required to produce a CEMP which will document appropriate procedures and responsible persons when working on and around utilities and services infrastructure within and around the Site.	Construction Phase
MA8	Efficiencies in water usage should be considered throughout the engineering design and construction phase of the Mine Development.	Construction and Operational Phase
MA9	Any processing plant and / or mobile plant on the mine sites will be regularly maintained and kept in good working order, plant will also be regularly maintained and kept in good order on the proposed Community Sports Complex site.	Construction and Operational Phase
MA10	Measures to minimise dust, noise and vibration impacts at nearby residences (already in place for dust on the Knocknacran West site) will continue (and be added to for Knocknacran West Mine) to be implemented.	Construction and Operational Phase
MA11	Mitigation measures for environmental indicators are already in place at the existing Knocknacran Mine and are included in the Environmental Management System (EMS) procedures. The effective implementation of these mitigation measures will continue to be monitored and will encompass Knocknacran West Mine in the EMS.	Construction, Operational and Restoration/Closure Phase
MA12	Non-marketable materials (i.e. mudstone and dolerite) will be utilised in phased restoration activities on the mine sites.	Restoration/Closure Phase

MA13	A qualified mine manager will ensure compliance with relevant safety and statutory legislation and best practices as set out in the HSA's 'Guidelines to the Safety, Health and Welfare at Work (Quarries) Regulations 2008', and other relevant statutory and industry guidelines from Government Departments and the EPA for the mine sites.	Construction, Operational and Restoration/Closure Phase
	NOTE: Any further mitigation measures related to Material Assets detailed within authorisation or consents to be included in this section and adhered to.	

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Table 14: Specific Environmental Mitigation Requirements - Major Accidents and Disasters

Mitigation No.	Description of Mitigation Measure / Environmental Commitments	Stage of Proposed Development
MAAD1	Activities will be managed in accordance with a Construction Environmental Management Plan (CEMP).	Construction Phase
MAAD2	Instability and Failure of Open-Cast Faces - The current slope angles are designed to ensure that the risk of slope failure is effectively eliminated by using a suitable safety factor. In addition, on-going geotechnical monitoring by means of extensometers will continue throughout the life of the mine along the adjacent R179 and L4900 roads.	Construction and Operational Phase
MAAD3	Instability and Failure of Public Road Infrastructure - A Trigger Action Response Plan (TARP) has been developed for both the L4900 and R179 to provide an early warning system of potential failure of the gypsum roof beams associated with the underground mine workings that lie below the carriageways of the L4900 and R179, and the potential migration of instability to surface that might affect the stability of the road. This will act as an early warning system to identify potential arising problems and will allow for mitigation measures to be implemented before a major event can occur.	Construction, Operational and Aftercare Phase
MAAD4	The future monitoring programme at the Application Site will include on-going monitoring of underground pillar integrity along the R179 and L4900, subsidence monitoring and regular stability surveys of the open-pit slopes (and benches).	Construction, Operational and Restoration/Closure Phase
MAAD5	Emergency response provision will be maintained on Site and updated accordingly with the Site's management practices. SGMI's emergency response planning will cover all foreseeable risks on site. Appropriate training for site personnel will be maintained, including the incident and rescue teams, as well as first aiders and fire marshals. In addition, appropriate staff will be trained in environmental issues and spill response procedures.	Construction and Restoration/Closure Phase
	NOTE: Any further mitigation measures related to Major Accidents and Disasters detailed within authorisation or consents to be included in this section and adhered to.	

3.2 Waste Management

3.2.1 Environmental Guidelines and Practices

Aspects of the Site's management are subject to waste legislation, as follows:

The Litter Pollution Act, 1997, as amended by the Waste Management (Amendment) Act 2001 and the Protection of the Environment Act 2003, which introduced strong penalties in Ireland to help combat the problems of litter pollution more effectively. Failure to keep property free of litter can result in a fine or prosecution by the local authority.

Other laws introduced by the Waste Management Act, 1996 (No. 10 of 1996) set out the responsibilities and functions of various persons in relation to waste. This Act:

- Prohibits any person from holding, transporting, recovering or disposing of waste in a manner which causes or is likely to cause environmental pollution;
- Requires any person who carries on activities of a commercial or industrial nature to take all such reasonable steps as are necessary to prevent or minimise the production of waste; and
- Regulations under this Act impose obligations on all suppliers of packaged goods, packaging and packaging materials to take steps to recover packaging waste.

The European Communities (Waste Oils) Regulations, 1992 (S.I. No. 399 of 1992) is responsible for the introduction of permits for the disposal and/or recovery of waste oils.

3.2.2 Mitigation Measures

In accordance with the above requirements the following management practices are recommended:

- Eliminate and minimise the production of waste where possible;
- Reuse and recycle unsuitable materials;
- No burning, disposal or mixing of waste materials, or use of waste materials should take place without prior consent of the local authority;
- Appropriate security and signage around entrance(s) and boundaries to deter and prevent illegal fly-tipping of waste materials by third parties; and
- Particular waste materials, such as oils, oil filters, batteries, empty oil drums, tyres are classified as hazardous waste materials. These materials will be stored on site in designated areas and collected and recycled or disposed of by an authorised waste contractor.

3.3 Energy Management

3.3.1 Environmental Guidelines and Practices

Energy consumption is associated with processing plant, on-site and off-site vehicles.

The following guidelines are considered for energy management at the Site:

- Identify opportunities and implement appropriate measures for energy use reduction and efficiency, e.g., use of variable speed drives; and
- Provide regular maintenance of the materials handling plant.

4.0 Monitoring Requirements

A number of environmental monitoring activities are to be continued during the construction, operation, and aftercare phases. These monitoring activities are required to confirm the effectiveness of the mitigations, to define the quality of the surrounding environment, and to establish if there are any trends in environmental parameters.

Environmental monitoring will be a combination of prescriptive monitoring required as per permitting conditions, and additional monitoring carried out as deemed necessary to successfully manage the business. The proposals for mitigation have been informed by the previous experience of the management team at the existing Knocknacran Open-Cast Mine. The location of monitoring points are presents in Appendix 02.

The frequency of these monitoring requirements has been collated and provided in a schedule displayed in Table 15.

4.1 Monitoring Proposals

The EMP (Environmental Management Plan) for the Site will be maintained and updated, with regular environmental monitoring of noise, vibration, dust, water quality and water discharge to ensure that they remain within permitted levels for the life of the mine, pending future IE Licence agreement with the EPA for the Knocknacran West Mine Site.

Activities on the Site will adhere to Best Available Techniques (BAT) to prevent and minimise emissions and impacts on the environment.

Environmental monitoring requirements have been identified in the specific chapters of the EIAR for the Proposed Development.

4.1.1 Population and Human Health

Monitoring for the protection of population and human health during the operational and restoration phase will be carried out in accordance with the wider environmental monitoring programme for the protection of water, air quality, noise and vibration.

Further monitoring in respect to site Health and Safety during the construction stage will be identified in the CEMP to be prepared and approved prior to construction.

The Knocknacran West Mine Site is currently subject to ongoing monitoring and management. In the case of the R179 and L4900, a Trigger Action Response Plan (TARP) (Appendices 7.7 and 7.8 respectively of the EIAR) have been put in place based on real-time monitoring of extensometers installed into the underlying bedrock (through a series of boreholes) to provide an early warning system of potential failure of the gypsum roof beams associated with the underground mine workings that lie below the carriageways of the R179 and L4900, and the potential migration of instability to surface that might affect the stability of the road.

4.1.2 Biodiversity

The flow of water from the holding tanks to the River Bursk is monitored on a real time basis from the Site Administration Building. Any discharge water will be strictly monitored and only discharged once in compliance with the IE Licence P0519-04. The River Bursk is subject to regular monitoring to ensure the maintenance of water quality of the river and to ensure that the water quality 70 m downstream of the discharge point on the river complies with IE Licence P0519-04.

Monitoring of surface and groundwater will also be undertaken, as defined in the Water section below.

4.13 Land, Soils and Geology

As part of the construction and operational management of the Proposed Development and mining activities, the following systems/procedures and documents will be put in place:

- Emergency Plan (EP) (Appendix 3.7 of the EIAR);
- Waste Management Plan (WMP) (Appendix 3.5 of the EIAR);
- Extractive Waste Management Plan (EWMP) (Appendix 3.6 of the EIAR); and
- Closure, Restoration and Aftercare Management Plan (CRAMP) (Appendix 3.3 of the EIAR).

The future monitoring programme at the Application Site will include on-going monitoring of underground pillar integrity along the R179 and L4900, subsidence monitoring and regular stability surveys of the open-pit slopes (and benches).

The existing benches at Knocknacran are regularly monitored for instability and the Proposed Development at Knocknacran West will also be regularly monitored. Continuous monitoring will be undertaken of ground stability throughout the life of the proposed mine and specific measures will be controlled through EMP procedures and IE Licencing requirements for the Site.

4.14 Water

Surface water quality monitoring is carried out at 3 locations (Appendix 02) in accordance with IE Licence P0519-04:

- i) MSE-1 (at outfall from holding tank to the River Bursk);
- ii) B (baseline conditions in the River Bursk at 5 m upstream of the discharge point to the River Bursk); and
- iii) CP-1 (conditions 70 m downstream of the discharge point to the River Bursk).

Periodic (non-continuous) monitoring is carried out by grab sample at these sampling points. The analytical programme uses a tiered approach, whereby some parameters are analysed continuously, daily, monthly, quarterly, and biannually at various locations. Sample analysis can include dissolved oxygen, suspended solids, settleable solids, electrical conductivity, pH, temperature, sulphate, barium, nitrate, ammonia, BOD, COD, total phosphorus, mineral oil, manganese, chloride and total metals (antimony, arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, tellurium, thallium, and tin). Specific sample analysis schedules are detailed for each location in IE Licence P0519-04. As the Proposed Development will continue to use the existing licenced water management system, it is envisaged that the future licence revision will be in keeping with the existing licence parameters for surface water monitoring points.

Ongoing (real-time) monitoring of surface (mine) water discharge to the River Bursk will continue to take place in compliance with IE Licence P0519-04. Electrical conductivity, sulphate and flow are monitored on a daily basis at MSE-1. Electrical conductivity and sulphate are monitored on a monthly basis at location B (5 m upstream of the discharge point). Electrical conductivity and sulphate are also monitored on a daily basis at compliance point CP-1 (70 m downstream of the discharge point).

The Applicant carries out groundwater monitoring onsite, at both upgradient and downgradient wells. Monitoring is specified for pH, electrical conductivity, COD, calcium, sulphate, ammonia, chloride, manganese, barium, TPH, nitrate, sodium, potassium, magnesium and alkalinity. Biannual reports are submitted for groundwater monitoring. Regular monitoring of groundwater (levels and quality) will continue to take place using existing monitoring boreholes in compliance with IE Licence P0519-04 and the Proposed Development will incorporate additional wells on the Knocknacran West Open-Cast Mine site.

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Monitoring will also be undertaken at three additional surface water monitoring locations on the Corduff Stream and the Magheraclaone Stream.

Monitoring will be undertaken on the Magheraclaone/Lagan catchment twice yearly for quality to build up an improved profile of the river with sampling taking place at the location of "SW Flow A".

Figure 19.1 also shows the locations of additional groundwater and surface water monitoring locations for the Proposed Development. Several well locations shown on Figure 19.1 include wells at varying depths at one location (i.e. multiple wells at one location are monitored).

4.15 Air Quality and Climate

Dust monitoring will continue to be carried out monthly at the designated monitoring locations. It is recommended that daily on and offsite inspection take place, where receptors are nearby. There should be a higher frequency of site inspections by the person responsible for air quality and dust monitoring on-site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

An ambient monitoring station (i.e. PM10 and PM25 will be established on the Knocknacran West Mine site for the operational life of the mine, this will be agreed in consultation with the EPA during a licence revision of the existing IE licence).

Once the Proposed Development is operational it is proposed that indicative locations such as those shown in Appendix 02 will be used for monitoring of activities at the Knocknacran West and Knocknacran mine sites. The locations will be subject agreement as part of a revision to the IE Licence with the EPA.

4.16 Noise

It is anticipated that the Knocknacran West Mine will be integrated into the existing IE Licence. Noise monitoring will be conducted at several proposed locations, subject to agreement with the EPA. It is proposed that 4 locations will be monitored for noise in and around the Knocknacran West Mine Site, in addition to the three existing locations on the Knocknacran Mine Site (Appendix 02).

4.17 Vibration

It is proposed that the blasting of materials will meet the current maximum vibration limit of 7.5 mm/s ppv and air overpressure limit of 125 dB(Lin) as permitted in IE Licence P0519-04. Blasting will be carried out by trained personnel to ensure these limits are adhered to.

Blast monitoring locations (vibration and air overpressure) will be formally agreed with the EPA as part of a future IE Licence revision; however, it is currently proposed that monitoring locations will be set up at the northern, western, eastern and southern boundaries of the site (indicated locations are presented in Figure 19.2). It is also proposed that monitoring at 3rd party residential dwellings and commercial/amenity facilities (dependent on their proximity to blasts) will be carried out as is currently undertaken for existing mining operations.

Subject to later agreement with the EPA as part of a later licence review, it will be proposed that the existing blast monitoring locations (MS1-MS3 as identified within IE Licence P0519-04) which are used to monitor blasting in Knocknacran Open-Cast Mine would no longer be used once Knocknacran West Open-Cast Mine is operational, as the former open-cast will be restored, and no blasting will take place here.

4.18 Landscape and Visual

No monitoring is deemed necessary in relation to Landscape and Visual.

4.1.9 Traffic and Transport

No ongoing monitoring is proposed for traffic and transport related impacts or mitigation.

4.1.10 Archaeology and Cultural Heritage

Topsoil-stripping in the Application Area should be archaeologically monitored due to the possibility of the survival of previously unknown subsurface archaeological deposits or finds within the unstripped part of the new proposed mining area (except in Area No. 28, where recent subsidence events have occurred).

4.1.11 Material Assets

Any monitoring associated with authorisation or consents (e.g., construction discharges or those associated with operational activities) will be incorporated into the CEMP and EMP and will be adhered to.

4.1.12 Major Accidents and Disasters

On-going geotechnical monitoring by means of extensometers will continue throughout the life of the mine along the adjacent R179 and L4900 roads. Implementation of the Trigger Action Response Plan (TARP) for each of the roads involves an early warning system of potential failure of the gypsum roof beams associated with the underground mine workings that lie below the carriageway of the L4900 and R179. On-going monitoring of underground pillar integrity beneath the R179 and L4900, surface subsidence monitoring and regular stability surveys of the open-pit slopes (and benches) will also be undertaken.

4.2 Complaints Register

SGMI will continue to maintain a Complaints Register. This register will record complaints in relation to the operation of the mine and associated infrastructure. Each entry will record the date and time of the complaint, the name of the complainant (if provided), and will give details of the nature of the complaint. A record shall also be kept of any response made in the case of each complaint.

Table 15: Monitoring Commitments for the Proposed Development

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Type of Monitoring	Details	Location	Method/s	Survey Frequency	Limit/Trigger or Control	Submitted to	Reporting Frequency	Document Submitted	
Blasting/Vibration	Monitoring of Knocknacran West Open-Cast Mine Blasts	IE licenced locations indicated on Figure 19.2 of the EIAR within the mine site, to be finalised and agreed with the EPA. Monitoring will also be undertaken at proximal receptors to blasts.	Vibrograph	Every Blast	Within the IE Licence – 7.5 mm/s ppv and 125 air overpressure 125 dB(Lin) at licenced locations, subject to agreement with the EPA during the licence review	MCC	Monthly	Data results	
Subsidence-Drumgoosat Area	Drumgoosat Field	Beside L4900	Precise levelling	Twice yearly	No adverse change	SRK DCCA	Twice yearly	Data results SRK Report	
	L4900 Road Survey	Drumgoosat Road L4900		Monthly *	TARP for the L4900, Table 5.1 of the L4900 details trigger levels. Medium Risk and High Risk triggers require further investigations. MCC and Dept. informed if there is any change in the TARP risk category (risk categories range from Extremely Low Risk to High Risk). The TARP for the L4900 is Appendix 7.8 of the EIAR.	SRK DCCA MCC	Every 3 months	Data results SRK Report	
	R179 Road survey	Main Road R179		Monthly *	TARP for the R179, Table 5.1 of the R179 details trigger levels. Medium Risk and High Risk triggers require further investigations. MCC and Dept. informed if there is any change in the TARP risk category (risk categories range from Extremely Low Risk to High Risk). The TARP for the R179 is Appendix 7.7 of the EIAR	SRK DCCA MCC	Every 3 months	Data results SRK Report	
	Drone Survey	Drumgoosat Area - see map		Drone Photogrammetry	Monthly *	No adverse change	DCCA MCC	Monthly	Data results/ photo image Data results/ photo image
	Laser Scanning	R179	L4900	Laser scanning	selected holes - Annual	TARP for the R179, Table 5.1 of the R179 details trigger levels. Medium Risk and High Risk triggers require further investigations. MCC and Dept. informed if there is any change in the TARP risk category (risk categories range from Extremely Low Risk to High Risk). The TARP for the R179 is Appendix 7.7 of the EIAR	SRK MCC / DCCA	Annual	Results Report
					Selected holes - Annual	TARP for the L4900, Table 5.1 of the L4900 details trigger levels. Medium Risk and High Risk triggers require further investigations. MCC and Dept. informed if there is any change in the TARP risk category (risk categories range from Extremely Low Risk to High Risk). The TARP for the L4900 is Appendix 7.8 of the EIAR	SRK MCC / DCCA		Results Report
	Water	Piezometers	Mine site area as outlined in Figure 19.1 of the EIAR, subject to agreement with the EPA during the licence review process	Dip meter	Monthly	Compliance with European Communities Environmental Objectives (Groundwater) Regulations 2010, S.I. No 9 of 2010. However, given the unique geology of the mine site, a trigger level review is currently ongoing (as part of the existing IE Licence	MCC	Monthly	Data results
				Dip meter & water samples	6 monthly		EPA	Twice Yearly	

					conditions) to determine appropriate trigger levels compared to the Groundwater Regs. for the mine site. This is subject to EPA approval.			
Emissions to Water	MSE1/ CP1	Continuous online water monitoring system with Discreet Grab sampling programme	Continuous	MSE1 (IE Licence, subject to agreement with EPA during licence review, limits below to be read in conjunction with note definitions defined in the IE Licence):	EPA	MSE1 – as per IE Licenced schedule CP1 – as per Licenced schedule	Data results	
				<ul style="list-style-type: none"> Water level monitoring in holding tank and lagoon (IE Licence). Maximum volume in any one day to be emitted from holding tank - 12,240 m3 Maximum volume in any one hour to be emitted from holding tank – 510 m3 Temperature – 1.5oC (max increase)^{Note 2} pH - 6 -9 BOD - 2.6 mg/l COD - 40 mg/l Suspended solids – 25 mg/l Settleable solids – 5 ml/l Total Ammonia (as N) – 0.14 mg/l Molybdate Reactive Phosphorus (as P) – 0.075 mg/l Total Phosphorus (as P) – 0.062 mg/l Copper^{Note 1} – 0.03 mg/l Manganese – 0.25 mg/l Chromium^{Note 1} – 0.0047 mg/l Nickel^{Note 1} – 0.02 mg/l Mineral oil – 0.3 mg/l Chlorides – 200 mg/l 				
				CP1 (IE Licence, subject to agreement with EPA during licence review):				
				<ul style="list-style-type: none"> Conductivity – Daily Average^{Note 1} 1,370 µs/cm Sulphate (as SO4) – Daily Avg. 625 mg/l, Monthly Avg.^{Note 2} 500 mg/l, Annual Avg.^{Note 3} 400 mg/l. Barium – Monthly^{Note 4} 0.1 mg/l 				
				Subject to EPA IE licence review				
Drumgoosat water	Drumgoosat Mine water levels	Dip meter	Twice weekly	No adverse change	Mine Manager	3 monthly		
	Water pumped from Drumgoosat	Water chemistry (sulphate/ conductivity)	2 weekly when pumping	No adverse change				

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Dust	Dust emission from Mine site during operations.	Subject to agreement on mine site locations shown in Figure 19.2 of the EIAR with the EPA during the IE licence review process	Dust Jar	Monthly	IE licence - 350 mg/m ² /day at licenced locations. Locations to be confirmed during the EPA IE licence review.	MCC	Monthly	Data results
Ambient	PM ₁₀ /PM _{2.5} monitoring on the Knocknacran West site	Subject to agreement on mine site location shown in Figure 19.2 of the EIAR with the EPA during the IE licence review process	Continuous monitoring	Continuous	Subject to agreement with the EPA – to be in line with air quality standards specified by the CAFE Directive 2008/50/EC for annual mean	EPA	Annual	AER Report
Noise	Noise emission from Mine Site during operations.	Subject to agreement locations shown in Figure 19.2 of the EIAR with the EPA during the IE licence review process	24hr period	Monthly	As per NG4 guidance.	MCC	Monthly	Data results
			24hr & 15 minute attended	Monthly	Subject to agreement with the EPA during the IE licence review.			
Perimeter Fence inspections	Perimeter fence inspections	Perimeter Fence around mine site	Walkover survey	6 monthly	If damage or wear is observed, then fencing to be repaired.	Mine Manager	6 monthly	Report
Construction Environmental Management Plan(s) (CEMP)	This will outline the general activities required for the construction phase.	Mine site and Community Sports Complex	Written Plan	Prior to works and during works (continuous)	Controls to be outlined within the CMP for agreement with MCC prior to construction works. Construction noise limits proposed to Category A of the ABC method. Dust limits proposed to be 350 mg/m ² /day.	MCC	Prior to works commencing	CEMP
AER	Annual	IE Licence Area	Written report	Annual	Document provides reporting on environmental status and	EPA	Annual	AER Report

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	Environmental Report				compliance of the mine site for the previous year, as part of the IE Licence requirements.	MCC		
Emergency Plan	Emergency response plan for the mine site	Mine sites	Written Plan		Plan provides detail on procedures in the event of an emergency that are to be followed at the mine site.	Mine Manager	Annual	Emergency Plan
Waste Management Plan	Waste management plan for the mine site	Mine sites	Written Plan		Plan provides detail on procedures to manage waste on the mine site.	Mine Manager	Annual	Waste Management Plan
Extractive Waste Management Plan	Extractive waste management plan for the mine sites	Mine sites	Written Plan		Plan provides detail on procedures to manage extractive waste on the mine site.	Mine Manager	Annual	Extractive Waste Management Plan
Water Management Plan	Reviewed Plan submitted to EPA	Mine Site	Written report	Annual	Document provides reporting on water management and control as part of the IE Licence requirements.	EPA	Annual	Water management Plan
Closure, Restoration and Aftercare Management Plan (CRAMP)	Annual CRAMP	IE Licence Area - Mine sites (to include future Knocknacran West site) and processing site in Kingscourt	Written Plan		Plan provides detail on the procedures to be followed once mining ceases to ensure the site is restored. It outlines the financial cost that closure will cost and is updated annually for the EPA.	EPA	Annual	CRAMP
ELRA	Environmental Liabilities Risk Assessment	Mine Site	Written report	Annual	Document provides reporting on water management and control as part of the IE Licence requirements.	EPA	Annual	Environmental Liabilities Risk Assessment
		Mine site area as outlined in Figure 19.1 of the EIAR, subject to agreement with the EPA during the licence review process	Dip meter & water samples	6 monthly	Compliance with European Communities Environmental Objectives (Groundwater) Regulations 2010, S.I. No 9 of 2010. However, given the unique geology of the mine site, a trigger level review is currently ongoing (as part of the existing IE Licence conditions) to determine appropriate trigger levels compared to the Groundwater Regs. for the mine site. This is subject to EPA approval.	EPA	Twice Yearly	

	Emissions to Water	MSE1/ CP1	Continuous online water monitoring system with Discreet Grab sampling programme	Continuous	<p>MSE1 (IE Licence, subject to agreement with EPA during licence review, limits below to be read in conjunction with note definitions defined in the IE Licence):</p> <ul style="list-style-type: none"> • Water level monitoring in holding tank and lagoon (IE Licence). • Maximum volume in any one day to be emitted from holding tank - 12,240 m3 • Maximum volume in any one hour to be emitted from holding tank – 510 m3 • Temperature – 1.5oC (max increase)Note 2 • pH - 6 -9 • BOD - 2.6 mg/l • COD - 40 mg/l • Suspended solids – 25 mg/l • Settleable solids – 5 ml/l • Total Ammonia (as N) – 0.14 mg/l • Molybdate Reactive Phosphorus (as P) – 0.075 mg/l • Total Phosphorus (as P) – 0.062 mg/l • CopperNote 1 – 0.03 mg/l • Manganese – 0.25 mg/l • ChromiumNote 1 – 0.0047 mg/l • NickelNote 1 – 0.02 mg/l • Mineral oil – 0.3 mg/l • Chlorides – 200 mg/l <p>CP1 (IE Licence, subject to agreement with EPA during licence review):</p> <ul style="list-style-type: none"> • Conductivity – Daily AverageNote 1 1,370 µs/cm • Sulphate (as S04) – Daily Avg. 625 mg/l, Monthly Avg.Note 2 500 mg/l, Annual Avg.Note 3 400 mg/l. • Barium – MonthlyNote 4 0.1 mg/l 	EPA	MSE1 – as per IE Licenced schedule CP1 – as per Licenced schedule	Data results
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* Frequency varies as agreed with MCC and DCCA.E.

5.0 STRATEGIC SITE MANAGEMENT

5.1 Community Engagement

Paramount to the Site's environmental consideration is the protecting of the existing residential amenity of the area and harmonious relations throughout the lifespan of the mine.

SGMI actively engage with the community surrounding the Knocknacran and Drummond mines, providing a Community Liaison Officer and link to a 'Community Updates and Media Statement' page on their website - (<https://www.gyproc.ie/community-updates-media-statements>). This link provides the Community with up-to-date information and reassurance in relation to recent subsidence events.

Since the subsidence event in September 2018, a series of meetings between community representatives, the Local Authority, local Councillors, SGMI and a number of statutory bodies have taken place. Concerns can be raised at these meetings by the Community. The 'Community Updates and Media Statement' page on their website initially made reference to the planning application and EIAR on 12th August 2019 and updates on the progress have been mentioned in statements since then.

Prior to the submission of the Planning Application and EIAR, a community information event took place at the Nuremore Hotel & Country Club, Carrickmacross, Co. Monaghan. The event was run over two consecutive days, on Tuesday 21st and Wednesday 22nd, September 2021, from 2 pm to 9 pm each day. A flyer was delivered to approximately 800 local residents inviting them to view plans relating to the Proposed Development in pre-booked 30 minute slots. In total, 198 residents attended the event over the two days.

A separate information day was held on Monday 20th September for public representatives, which attracted ca. 20 visitors, made up of local county councillors and politicians. The information days included stands presenting the history of mining in the area, Saint-Gobain, the proposed Community Sports Complex and the proposed Knocknacran West Open-Cast Mine development. A presentation was also provided on the proposed Community Centre for Drumgoosat, which does not form part of the Proposed Development and is subject to a separate planning application process.

5.2 Reporting

The following data will be recorded and/or reported in the appropriate Sections of the EMP:

- Air, noise and water quality data, and details of any exceedances/breaches of the appropriate thresholds;
- Any waste, energy, traffic and general environmental audits undertaken;
- Updated reports on Archaeology and Ecology; and
- Written record of complaints and actions taken by SGMI.

The site incident report forms part of the Health and Safety programme and thus any accidents and incidents are recorded in these files.

5.3 Environmental Management Review

The Environmental Management Plan file will be reviewed on an annual basis to take into account any changes that may have been undertaken at the Site and any legislative requirements.

Opportunities for continuous improvement will be noted and audit items (such as energy improvement opportunities) actioned for close out.

6.0 Annual Environmental Audits

An environmental audit of the Site operations is required annually. Environmental audits are required to be undertaken on behalf of SGMI by a competent environmental consultant. The audits shall be carried out annually (by the end of January).

The Environmental Audit shall be prepared with reference to, and should take into account, the requirements of the 2006 Environmental Protection Agency publication 'Environmental Management Guidelines in the Extractive Industry (Non-Scheduled Minerals)'. The audit will contain a summary of all the environmental monitoring results of the year. A full record of any environmental breaches over the previous year of noise, dust and water quality will be documented and also a written record of all complaints, and the action taken on each complaint recorded

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APPENDIX 01 Biodiversity Policy (2018)

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BIODIVERSITY POLICY - June 2018



Saint-Gobain bases its development on the respect for people and their environment. As a major player in the construction sector, and being aware of the potential impact of human activities on the planet, Saint-Gobain considers that managing and reducing its impact to biodiversity along the whole value chain of its activities is part of the Group's responsibilities.

Saint-Gobain has the ambition of preserving, restoring, increasing and enhancing biodiversity, and doing all this by involving the concerned parties. To fulfill this ambition of mitigating its impact on biodiversity, the Group sets itself the following goals:

- **Identify, set priorities and follow-up the risks and opportunities related to biodiversity**, by pursuing for each sector an analysis about interdependence to ecosystem services, and establishing a priority list of sensitive sites that will have to deploy a Biodiversity Management Action Plan (B'MAP),
- **Reduce the direct pressures of our activities on biodiversity**, by using the general principles of the Mitigation Hierarchy (primarily avoid, reduce and ultimately offset), together with the implementation of dedicated actions on operating sites, new sites, mineral resources extraction operations, living resources exploitations, and for transportation,
- **Manage our indirect impacts through our supply chain**, by integrating a biodiversity-component dimension in our suppliers commitments and by ensuring that the suppliers in purchasing categories identified as sensitive, natural and mineral resources particularly, adopt responsible operations practices,
- **Turn biodiversity into a source of innovation and business opportunities**, by ensuring that our products, from the production of natural raw materials to the final stage of their life cycle after use by consumers, do not damage ecosystems, and by providing the market of the city of tomorrow with solutions and services that support the development of nature in the built environment,
- **Involve all stakeholders, contribute to reinforcing collective knowledge and mainstreaming biodiversity**, by promoting awareness about the value of biodiversity to our concerned parties, including our employees and local external stakeholders.

Through this Biodiversity Policy, Saint-Gobain confirms its commitment to reducing the environmental impact of its activities as much as possible and reaffirms its ambition to be recognized as a responsible company committed to continuous improvement.



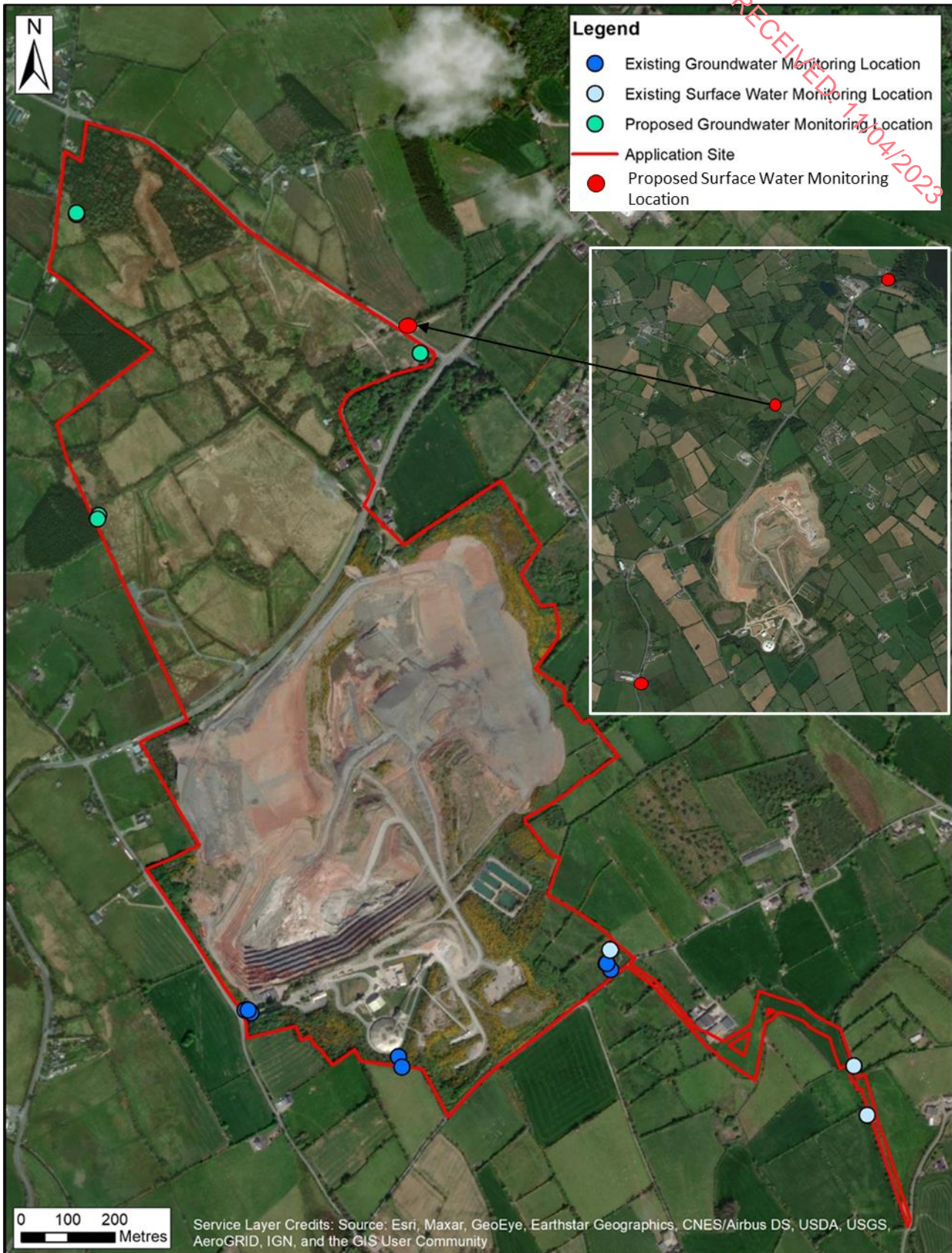
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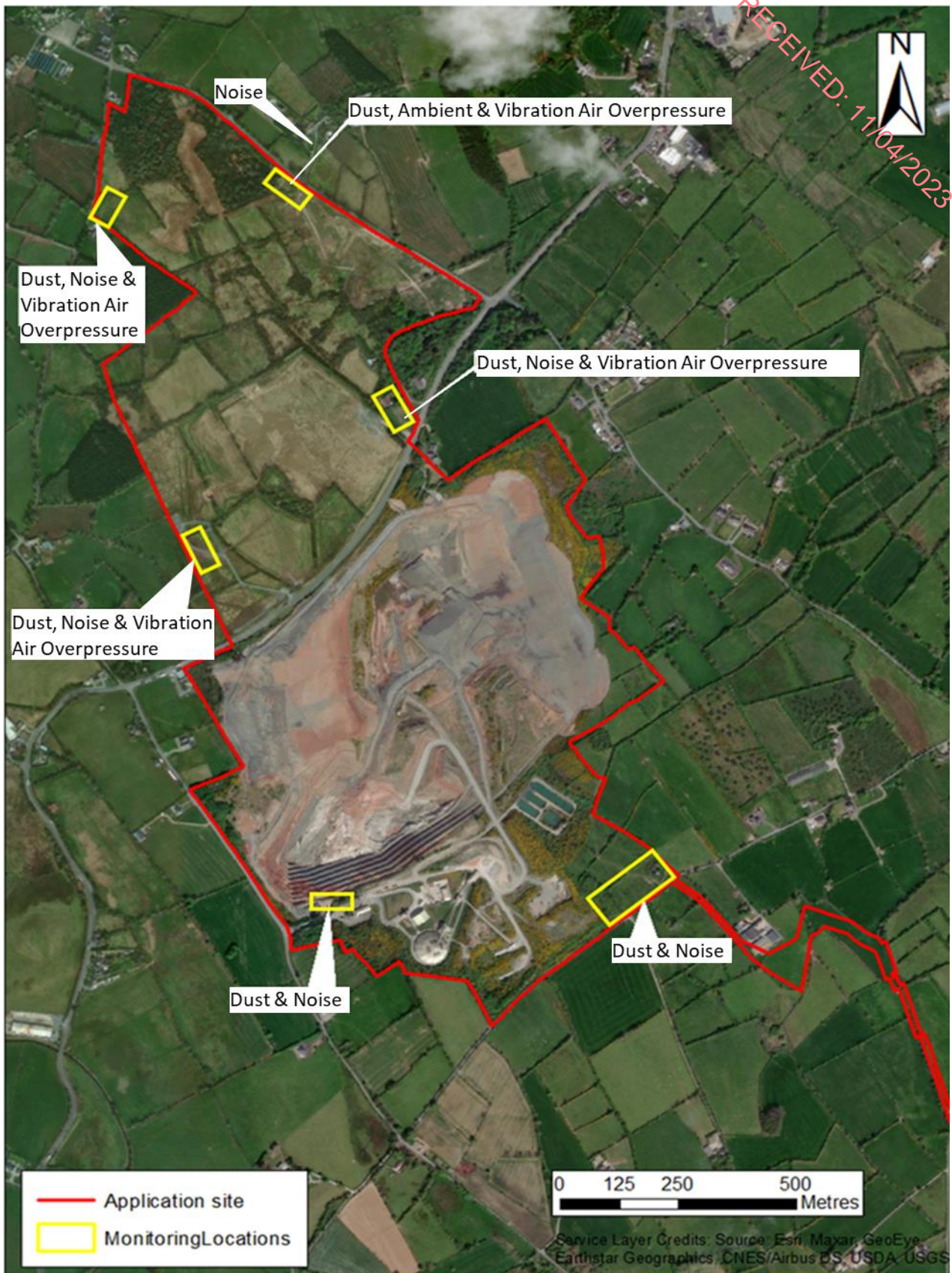
APPENDIX 02

Environmental Monitoring Locations

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Proposed Water Monitoring Locations



Proposed Dust, Ambient, Noise and Vibration monitoring locations

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