Panther Environmental Solutions Ltd
Units 3 & 4, Innovation Centre
Institute of Technology
Green Road, Carlow
Ireland
R93 W248

Telephone: 059-9134222
Email: info@pantherwms.com
Website: www.pantherwms.com

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

PROPOSED BEEF ABATTOIR PLANT EXTENSION

BANAGHER CHILLING LIMITED,
BANAGHER,
CO. OFFALY

2019

REPORT NO:	PES_EIAR_19_9201	**AUTHOR:**	Martin O'Looney, BSc. Lorraine Wyse, BSc.
DATE:	24th June 2019	**REVIEWED:**	Mike Fraher, BSc.

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF TABLES

LIST OF TABLES

LIST OF TABLES

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES

LIST OF FIGURES

LIST OF ATTACHMENTS

Attachment	2.1	Site Location Map
	2.2	Existing Site Layout
	2.3	Proposed Site Layout
	2.4	Proposed Stormwater Drainage Design
Attachment	5.1	Odour, Air Quality and Greenhouse Gas Assessment
Attachment	6.1	Noise and Vibration Impact Assessment
Attachment	7.1	Photomontages
Attachment	8.1	Transportation Impact Assessment
Attachment	9.1	Field Survey Maps
	9.2	Consultations
	9.3	Maps of Designated Sites
	9.4	Habitat Map
	9.5	Photo Log
	9.6	Full List of Recorded Flora
	9.7	BCI Consultation & Bat Records
	9.8	Recorded Avifauna
Attachment	11.1	Drawings
	11.2	Conceptual Model
	11.3	Geophysics Survey Report
Attachment	12.1	Legal Status of Sites
	12.2	Field Inspection Photo Log

NON-TECHNICAL SUMMARY

General

This Environmental Impact Assessment Report has been prepared on behalf of, and for the exclusive use of Banagher Chilling Ltd by Panther Environmental Solutions Ltd., with respect to an application for planning permission to Offaly County Council. The following is the wording of the proposed development for which planning permission is being sought:

"We Banagher Chilling Limited intend to apply for permission for development at Boheradurrow and Meenwaun, Banagher, Co. Offaly R42HX24 the development will consist of a single storey extension to existing abattoir of 1061 square meters to include processing rooms, staff changing rooms, offices, increase roof height by 2 meters, extend existing lairage and elevation alterations. In addition the construction of a food processing factory of 4925 square meters with a part first floor of 2299 square meters to include processing rooms, cold store, loading bay, chill rooms, plant rooms, staff changing rooms, staff canteen and administration offices. External works consisting of staff car parking, service yards, new public road entrance, widening of existing public road, effluent treatment compound, water storage tank, gas storage tanks, truck wash bay, integrated constructed wetlands, security hut of 23 square meters, electrical room of 168 square meters, water treatment building of 72 square meters, effluent treatment control house of 30 square meters, all associated siteworks and landscaping works on a site of 19.60 hectares. This application is accompanied by an Environmental Impact Assessment Report (EIAR) and a Natura Impact Statement.

The planning application, EIAR and Natura Impact Statement may be inspected, or purchased at a fee not exceeding the reasonable cost of making a copy, at the offices of the Planning Authority during its public opening hours. A submission or observation in relation to the application may be made in writing to the planning authority on payment of the prescribed fee (€20) within the period of 5 weeks beginning on the date of receipt by the authority of the application."

The proposed development would involve the construction of a WWTP which would be anticipated to exceed the threshold population equivalent as defined under Class 11, Part 2 of Schedule 5 of the Planning and Development Regulations, 2001 as amended: "*Waste water treatment plants with a capacity greater than 10,000 population equivalent as defined in Article 2, point (6), of Directive 91/271/EEC not included in Part 1 of this Schedule."* Therefore, the submission of an EIS / EIAR is required.

The proposed development site is located in a rural, farming area predominately comprised of pastureland, hedgerows and peatland. The nearest settlement to the existing facility is the town of Banagher, located approximately 2.4km north-west of the site. The towns of Birr and Portumna are located approximately 8km and 20km respectively from the facility. Tullamore is the closest large-size town and is located approximately 31.5km to the north-east of the site. A site location map is included in Attachment 2.1.

The site is accessed via the L3010, a local road linking to the R438 road. The R438 road connects to the N62 National Primary Road approximately 7km to the north-east and the N65 National Primary Road some 21.5km to the south-west.

The site, measuring approximately 19.6 hectares, comprises of agricultural fields, an existing abattoir with associated structures, agricultural buildings, areas of previously disturbed ground and field boundaries consisting of hedgerows, treelines and drainage ditches. The Feeghroe Stream travels along the site's western boundary, which connects to the River Shannon via the Rapemills River.

Within the applicant's landholding, there is an established farmyard complex of buildings and an existing permitted abattoir. The existing site layout is included in Attachment 2.2. The existing abattoir facility was managed by Ossory Meats, and has ceased operation circa November 2016. At the time of their operation, Ossory Meats were slaughtering 100 cattle per week, and for a period, the site was also slaughtering horses under licence.

The proposed development would comprise of the refurbishment and extension of the existing abattoir on the site, to allow a maximum cattle slaughter rate of 140 per day. To achieve this, the existing slaughter line would be modified and lengthened within the existing abattoir building. The existing abattoir building would be extended to provide for additional cattle chills, processing rooms, waste-out rooms, offices and staff facilities, in addition to the construction of a meat cutting, packing, blast freezing and cold storage facility with an output of approximately 40 tonnes per day. Other facilities to be constructed would include the associated plant rooms, packaging storage, electrical sub-station, water treatment system and wastewater treatment plant (WWTP). The existing lairage would also be extended, and the livestock yard increased in size.

Slaughtering activities at the proposed facility would typically operate Monday to Friday. However, slaughtering may be undertaken at weekends for reasons such as casualty animals and demand. Upon completion of construction works, it is estimated the proposed development would provide employment for 110 personnel, with working hours varying from 7am to 10pm.

Two steam boilers, fuelled by liquefied petroleum gas (LPG), are proposed as part of the development, each with a capacity of approximately 900kgs per hour.

The refrigeration system would comprise of a primary ammonia (NH_3) system with work areas, chill rooms and packaging rooms refrigerated using a secondary Glycol refrigerant from a central chiller unit.

Should conditions allow, it is proposed that the site's water requirement would be sourced via water abstraction onsite. Water conservation measures have been included as part of the proposed development design. Rainwater harvesting would be implemented, with all roof water collected for use in staff sanitary facilities and site landscaping. The final WWTP design includes for the capture of treated effluent water in a holding tank (grey water tank) to be used in lairage and lorry wash-out.

New stormwater and effluent drainage systems would be constructed. Stormwater from clean-yard areas and car parking areas would pass through a silt trap and Class 1 By-Pass Separator before being directed to a modular underground attenuation system. From here, stormwater would be pumped to a manhole prior to discharge to the Feeghroe Stream.

All process drains, domestic drains and dirty yard surface water drains would be directed to the site's new WWTP, which would comprise of an inlet sump, meva screen, drum screen,

balancing tank, dissolved air flotation (DAF) unit, sludge tank, anoxic tank, two aeration tanks, clarifier, sand filters and an outlet sump. From here, the treated final effluent would be directed to the proposed integrated constructed wetlands (ICWs), comprising of a five-treatment cell system, prior to discharge to the Feeghroe Stream.

The proposed treated effluent emissions to the Feeghroe Stream have been based upon the assimilative capacity of the stream. The assimilative capacity assessment, which accompanies the planning application (Document Ref. PES_AC_19_9201) was used to predict the watercourse's ability to accommodate a treated effluent discharge of BOD_5, COD, Orthophosphate, Nitrogen, Total Ammonia and Suspended Solids from the proposed facility. The assimilative capacity assessment has concluded that the proposed discharge of $250m^3$ per day would not, in and of itself, result in the Feeghroe Stream failing to achieve good status.

The expected construction timeframe of the proposed development would be approximately 18 months, with hours of operation from 7am to 7pm Monday to Friday, and 8am to 2pm on Saturdays. The construction phase would provide temporary employment for an estimated 250 people for the duration of construction works. A temporary site compound would be established and would house the temporary offices, equipment and materials storage and construction staff welfare facilities. The temporary site compound would also be used for the storage of fuels and oils required for the various construction plant, in addition to housing waste receptacles.

Human Beings

The proposed development is located within a rural agricultural landscape, sparsely populated, with residential development primarily linearly aligned along the existing road network. A number of large farmsteads and agricultural facilities involved in cattle rearing and beef production are located in the surrounding area of the site. The area also supports a number of commercial developments.

The proposed development would have a positive impact upon the local economy by providing temporary employment for an estimated 250 people during the construction phase, and by providing employment for an estimated 110 people during the operational phase, in addition to indirect employment (haulier contractors, pest control contractors etc.). The creation of jobs would further contribute to the economy of the area through direct spending of goods and services in the Banagher area and surrounds. The development would also strengthen the local economy of the agri-food sector by sourcing cattle from farmers and suppliers within the catchment area.

The proposed development would have a potential nuisance upon human beings during the construction phase due to increased dust and noise emissions. However, the potential impact would be temporary given the transient nature of construction works. Noise and dust control measures would be implemented throughout the construction phase to reduce the potential impact. Therefore, noise and dust would not be considered to pose a significant impact.

During the operational phase, there would be potential for odour generation from the proposed development, particularly from the wastewater treatment process. However, the air quality assessment (Attachment 5.1) undertaken for the proposed development predicted that concentrations of odour would be well below the relevant odour criterion at sensitive receptors. Odour controls would be implemented at the proposed development to minimise

potential emissions, such as the capture and abatement of emissions from the balance tank and sludge holding tank at the onsite WWTP.

Noise generated during the construction and operational phases of the proposed development has the potential to impact upon human beings within the vicinity of the site. During the construction phase, it is not anticipated that there would be any significant impact, on local residences within close proximity to the proposed development. Applicable noise limits have been recommended in order to comply with standards for construction noise. Additional noise impact mitigation measures have been recommended in order to promote good practice in relation not noise, and have been included as part of an outline Construction Environmental Management Plan. No significant additional noise impact would be anticipated during the operational phase of the proposed development. The predicted noise levels for operational site equipment and traffic are likely to be below the existing background levels at all survey locations. These would therefore fall into the **No Observed Effect Level (NOEL)** criteria.

The proposed development has the potential to impact upon traffic volumes in the area, which may subsequently impact upon the generation of noise and dust emissions. While there would be increased vehicle movements during the construction phase, this would be for a limited period of time only and would not be considered significant. During the operational phase, the transportation assessment report prepared as part of the planning application notes that the total traffic generated by the development comprises an AADT of 283 PCUs within a 24 hour period. The report notes that while the local roads within the vicinity of the development are lightly trafficked, the increase in traffic movements due to the development can be considered small. The report concludes that there would be no traffic/transportation capacity, traffic safety or operational issues associated with the proposed development.

The proposed development would not be anticipated to have any significant impact upon the land use of the area, given that the proposed development would be an extension to the existing abattoir facility, and given that the development would be located mainly within agricultural lands, primarily pasture, belonging to the applicant.

The Landscape and Visual Impact Assessment for the development has concluded that the proposed extension, though substantial in scale, is appropriately sited; visually well contained; and, where visible, the design helps it to assimilate with the existing landscape and visual context. The proposed development would result in visual impacts that are very localised and in the lower order of magnitude.

There would be no adverse impacts to human beings due to a deterioration in water quality. During the construction phase, water quality would be protected by the implementation of mitigation measures and through the preparation and implementation of a Construction Environmental Management Plan by the construction works contractor. Standard best practice methods for construction, including construction works within drains would be adhered to at all times.

There would be no deterioration in water quality as treated final effluent values proposed by Banagher Chilling Limited have been based upon the Feeghroe Stream's assimilative capacity and current water quality. The proposed development and planned discharge of final treated effluent to the Feeghroe Stream would not be anticipated to have an adverse impact upon drinking water quality. The overall risk from the planned discharge to drinking water

from the Lough Derg (Portumna) water abstraction point would be considered low, based upon the proposed treatment process, the future planned discharge limits, the level of dilution and the anticipated impact of discharges during normal and abnormal operations. Furthermore, should sludges from the site be directed for landspreading, they would be landspread in accordance with the Nitrates Regulations as a matter of good environmental practice.

Air Quality, Odour and Climate

Katestone Environmental Pty Ltd (Katestone) was commissioned by Panther Environmental Ltd (Panther) on behalf of Banagher Chilling Ltd (Banagher Chilling) to complete air quality, traffic and climate assessments for the proposed beef processing plant. An Odour, Air Quality and Greenhouse Gas Assessment report is included as Attachment 5.1 to this EIAR.

The site is located in a rural area of the midlands in Ireland. Data from similar locations indicate that levels of nitrogen dioxide, carbon monoxide, particulate matter (as PM10 and PM2.5) and benzene are well below ambient air quality standards specified by the EPA and the European Union (EU).

An air quality and climate assessment was conducted that considered the construction phase and operational phase of the proposed beef processing plant.

Construction activities are expected to occur over a relatively short period of time. Potential emissions of construction related air pollutants will be minimised through the implementation of a construction management plan and therefore emissions during construction are not likely to adversely affect air quality.

A comprehensive greenhouse gas assessment of the operational phase of the proposed beef processing plant was conducted. The assessment of GHG generated from operations determined that the impact of the Plant on climate change will be very low in terms of national emissions. The potential vulnerability of the proposed development to climate change has been considered and limited water availability has been identified as potentially having consequences for operations at the site.

Operations of the proposed development will affect traffic in the region. An assessment of the potential change in road traffic emissions has been undertaken using the DMRB methodology. The road traffic assessment found that the proposed development's potential impact on roadside local air quality is negligible. The potential impact of the development on regional air quality was found to be low compared to major regional roads in the vicinity of the proposed development.

The potential impact of the development on air quality was assessed in accordance with recognised techniques for dispersion modelling specified in the EPA's Air Dispersion Modelling Guidance Note (AG4). AERMOD was used to predict ground-level concentrations of odour and other air contaminants across the model domain due to the development. The air quality assessment found predicted concentrations of odour would be well below the relevant odour criterion at sensitive receptors. The air quality assessment found that predicted concentrations of nitrogen dioxide, sulphur dioxide, carbon monoxide, particulate matter (as PM10 and PM2.5) and benzene would be well below the relevant criteria at sensitive receptors.

Odour controls will be implemented at the proposed development to minimise emissions. These will include capture and abatement of emissions from the balance tank and sludge holding tank at the onsite wastewater treatment plant.

The air quality assessment also considered the potential effect of the development on Natura 2000 sites. This assessment found that predicted concentrations of ammonia would be well below the relevant criteria at the Natura 2000 sites located near the proposed development.

Noise

A Noise and Vibration Impact Assessment Report has been prepared by Enfonic Ltd in support of this EIAR for the proposed Banagher Chilling Ltd facility, and is included as Attachment 6.1.

From a noise perspective, the impact from the construction and operation of the site, including the associated increase in traffic, was assessed.

In the first instance, an attended noise survey at several locations which represented nearby residents and the adjacent nursing home was conducted. The measured levels represent the existing ambient noise conditions before the site is developed.

Next, the types of plant, equipment, processes and traffic levels for both construction and operational phases were considered to estimate the noise levels from the site. For the purposes of the noise modelling, it was assumed that all sources were operational simultaneously in order to present a 'worst case scenario'.

Following guidance from national and international standards, the measured and predicted levels were then compared to produce an objective noise impact assessment across the community.

This assessment process demonstrated that the site is not expected to give rise to an adverse impact at any noise sensitive location (including residential dwellings) during either the construction or operational phases.

There are no habitable dwellings close to the proposed development and the expected vibration levels from the construction site are expected to be undetectable at the closest sensitive receptors.

In relation to construction noise, applicable noise limits have been recommended in order to comply with standards for construction noise. Additional noise impact mitigation measures have been recommended in order to promote good practice in relation not noise, and have been included as part of an outline Construction Environmental Management Plan.

Landscape and Visual Impact

The Landscape and Visual Impact Assessment (LVIA) describes the landscape context of the proposed development and assesses the likely landscape and visual impacts of the proposed development on the receiving environment. Although closely linked, landscape and visual

impacts are assessed separately. Production of this Landscape and Visual Impact Assessment involved;

- A desktop study to establish an appropriate study area, relevant landscape and visual designations in the Offaly County Development Plan as well as other sensitive visual receptors. This stage culminates in the selection of a set of potential viewpoints from which to study the effects of the proposal;
- Fieldwork to establish the landscape character of the receiving environment and to confirm and refine the set of viewpoints to be used for the visual assessment stage;
- Assessment of the significance of the landscape impact of the development as a function of landscape sensitivity weighed against the magnitude of the landscape impact; and
- Assessment of the significance of the visual impact of the development as a function of visual receptor sensitivity weighed against the magnitude of the visual impact. This aspect of the assessment is supported by photomontages prepared in respect of the selected viewpoints (Attachment 7.1).
- Incorporation of mitigation measures to reduce potential impacts and estimation of residual impacts once mitigation has become established.

In the interests of a comprehensive appraisal, a 2km radius study area is used for this project. However, there is a particular focus on receptors contained within 1km of the site.

With the exception of a small hill in the north-western periphery of the 2km study area, the terrain in surrounding the site is relatively flat. While no rivers pass through the study area, a small stream known locally as the Feeghroe Stream flows adjacent to the western boundary of the proposal site. Similarly, a small stream flowing in a westerly direction occurs c.600m south of the proposal site and drains into the Rapemills River situated just outside the southernmost boundary of the study area 2.3km from the site at its nearest point. The land use in the immediate vicinity of the site is predominantly contained in pastoral farmlands that are enclosed by dense tree line hedgerows. Large scale exploited peatlands are also present within the wider surrounds of the study area, most notably to the north of the proposal site. With regards to industry within the study area, Meenwaun Wind farm (Ireland's largest operating turbines) occur to the east of the proposal site and a number of farmsteads are scattered throughout the wider study area. The small existing abattoir facility is also situated in the southern corner of the proposal site.

The most notable centre of population in relation to the site is that of Banagher which is situated outside of the study area along the banks of the River Shannon approximately 3km northwest of the site. The immediate context of the proposal site is somewhat sparsely populated containing only a small number of isolated farmsteads and small linear clusters of dwellings. Similarly, the outer portions of the study area are also relatively sparsely populated.

Oriented in a general north south direction, the R438 regional road is situated immediately adjacent to the neighbouring pastoral field just over 200 meters to the west of the proposed site boundary. Extending from the settlement of Banagher in a south-easterly direction, the R439 regional road passes through the southern extents of the proposed development approximately 1.2km from the proposal site. Aside from these two regional routes, a small

network of local roads also traverses through the central and wider study area, the nearest of which is the L3010 local road, which follows the path of the southern site boundary.

In terms of landscape impacts it is not considered that this is a particularly sensitive setting. The wider context is that of a working rural landscape without particular landscape or visual designations in the County Development Plan. This is reflected within the Offaly County Development Plan, as a large proportion of the central study area as been designated as "*Low sensitivity areas*", which are those with the "*capacity to absorb a range of new development".*

There will be physical impacts on the land cover of the site as well as temporary construction related impacts from the movement of heavy machinery and stockpiling of materials, however, the main impacts considered are those relating to post-construction effects on the prevailing landscape character. In this respect, the proposal represents a substantial intensification of a rural/industrial land use that already exists within the site in the form of the much smaller meat processing facility. While there is a thematic relationship between the proposed facility and the previous use of the land, this will primarily be a transition from an area of pastoral farmlands to that of a sizable industrial facility and will represent a marked increase in the intensity of development of the immediate vicinity of the site.

Visual impacts are assessed at 11 no. viewpoint locations representing a range of viewing angles, distances and contexts. All of these are within 2km of the proposed extension to the existing abattoir, the majority of which are no further that 1km from the proposed development site as it is not readily visible from further afield in this flat landscape, which is enclosed by dense hedgerow vegetation and mature tree lines. Pre-mitigation visual impacts range from Imperceptible at the majority of viewpoint locations beyond 500m of the site, up to Moderate-slight for VP2 and VP4 immediately adjacent to the site. The close view of the nearest portion of the development will result in a marked change in the otherwise typical rural scene from both VP2 and VP4. This arises from the physical enclosure of the views as well as the increased scale and intensity of built development. However, the nature of the development is clearly rural industry and the buildings are readily screened / softened by proposed mitigation planting, resulting in 'Slight' residual impacts in both cases.

Overall, it is considered that the proposed extension to the existing abattoir, though substantial in scale, is appropriately sited; visually well contained; and, where visible, the design helps it to assimilate with the existing landscape and visual context. It will result in visual impacts that are very localised and in the lower order of magnitude. Overall, it is considered that such effects are not significant in EIA terms, especially once landscape mitigation proposals have become established.

Traffic and Transportation

A Transportation Assessment Report was prepared by NRB Consulting Engineers Ltd. for the proposed development, included as Attachment 8.1 and summarised in Section 8.

The report assesses the impact of the traffic associated with the proposed development, together with the established traffic on the local road network, for the AM and the PM Peak Hours. The report addresses the adequacy of the existing road network to safely and appropriately accommodate the worst case peak hour vehicular demands associated with the development, in particular the safety and capacity of the proposed vehicular access junction

onto the local road, along with an assessment of the impact on Boherdurrow crossroads. The report also includes an assessment and quantification of the 24 Hour AADT Traffic on local roads.

The assessment notes that during the operational phase of the proposed development, the total traffic generated by the development comprises an Annual Average Daily Traffic (AADT) of 283 Passenger Car Units (PCUs, or car equivalents) within a 24 hour period. The report notes that while the local roads within the vicinity of the development are lightly trafficked, the increase in traffic movements due to the development can be considered small. The report notes that the local road network can easily accommodate the traffic generated, and notes that the access junction and adjacent established road junctions would operate without any issues arising during the selected year of opening and the design year 15 years after opening. The report concludes that there would be no traffic/transportation capacity, traffic safety or operational issues associated with the proposed development.

Biodiversity

A Natura Impact Statement (NIS) has been prepared in support of this application (Document Ref. PES_NIS_19_9201). The Special Area of Conservation (SAC) and Special Protection Area (SPA) sites considered to be within the potential zone of influence of the proposed development are All Saints Bog and Esker SAC (Site Code: 000566), River Shannon Callows SAC (Site Code: 000216), Redwood Bog SAC (Site Code: 002353), All Saints Bog SPA (Site Code: 004103), Middle Shannon Callows SPA (Site Code: 004096), River Little Brosna Callows SPA (Site Code: 004086), Dovegrove Callows SPA (Site Code: 004137) and River Suck Callows SPA (Site Code: 004097), due to hydrological connectivity / potential hydrological connectivity, distances from the proposed development site and / or the potential for ex-situ impacts of the development upon wintering wildfowl.

As discussed in detail within the NIS, and as summarised in Sections 9 and 10 of this EIAR, the proposed development would not be considered to result in any adverse impact to the protected habitats and species of All Saints Bog and Esker SAC, River Shannon Callows SAC, Redwood Bog SAC, All Saints Bog SPA, Middle Shannon Callows SPA, River Little Brosna Callows SPA, Dovegrove Callows SPA or River Suck Callows SPA due to habitat fragmentation or loss, disturbance, reduction in species density or due to the potential introduction of invasive species.

However, it has been determined that during the construction phase, the proposed development has the potential to impact upon the qualifying interests of All Saints Bog and Esker SAC and River Shannon Callows SAC, and the special conservation interests of All Saints Bog SPA and Middle Shannon Callows SPA, due to a potential deterioration in water quality. During the operational phase, the proposed development has the potential to impact upon the qualifying interests of the River Shannon Callows SAC and the special conservation interests of the Middle Shannon Callows SPA, due to a potential deterioration in water quality. Therefore, control measures must be put in place, and are outlined within the NIS and within Section 10.

The proposed development would result in a change of habitat use a the development site, resulting in a loss of improved agricultural grassland (GA1), recolonising bare ground (ED3), hedgerows (WL1) and drainage ditches (FW4) to buildings and artificial surfaces (BL3), and potential scattered trees and parkland (WD5), ornamental / non-native shrub (WS3) and

flower beds and borders (BC4) habitats associated with the proposed site landscaping. A loss of improved agricultural grassland (GA1), wet grassland (GS4), recolonising bare ground (ED3), hedgerows (WL1), bog woodland (WN7) and drainage ditches (FW4) would occur to other artificial lakes and ponds (FL8) habitat and limited sections (comprising of access roads to the ICW system) of buildings and artificial surfaces (BL3) habitat.

The loss of GA1, ED3 and FW4 habitats would not be considered significant, given that these habitats can be considered modified and of low ecological value. While there would be a loss of areas of habitat of local importance (higher value), including WL1, GS4 and WN7, this would not be considered as significant, given that the majority of these habitats would be to facilitate the ICW system, best characterised by "other artificial lakes and ponds" (FL8) habitat, which would be considered as of local importance (higher value) and would add ecological value to the development site.

The ICW system would be densely planted with a selection of native emergent flora species, with the final cell, Cell 5, planted with a mixture of deciduous and evergreen tree species on mounds amongst the emergent wetland plants. It is estimated that approximately 77,500 emergent plant species and 2,500 native tree species would be planted within the ICW system, which would be a considerable positive impact of the development. The ICW system would likely provide wetland habitats for aquatic invertebrates, marginal and aquatic vegetation, amphibians and a range of breeding and wintering wildfowl.

With regards hedgerow / treeline / wood removal, the proposed development would result in a loss of approximately 985m of hedgerow and 200m^2 of bog woodland. A total of nine mature trees, comprised mostly of Ash, are present within the sections of hedgerow scheduled for removal. However, the loss of these areas would not be considered significant, given that approximately 400m of hedgerow along the southern site boundary and 115m along the eastern boundary of the ICW system would be replanted with native species, approximately 2,500 native trees common to the area would be planted within Cell 5 of the ICW system, the landscaping plan includes for the bolstering of hedgerows and treelines with native tree species where required and given that a section of new woodland planting is proposed adjacent to the internal site access to the rear yard.

Where possible, hedgerow / bog woodland removal would not take place during the bird nesting season (1st of March – 31st of August), greatly reducing the potential for mortality. However, it may be necessary to undertake some hedgerow / woodland removal works during the bird nesting season. In such instances, a suitably qualified ecologist would be engaged to carry out inspections for the presence of breeding birds prior to any clearance works taking place. Where nests are present, the ecologist would make a decision as to whether a "Licence to interfere with or destroy the breeding places of any wild animals", is required from the NPWS. Alternatively, the ecologist may establish a suitable buffer zone around an active nest, with removal works rescheduled until chicks have fledged. Where no evidence of nests are found during inspection, hedgerow removal works must be undertaken within three days of inspection.

Of the nine mature trees scheduled for removal as part of hedgerow removal works, four were assessed as having a moderate bat roost potential, due to dense ivy cover. Therefore, measures are proposed in Section 9.8.1 to ensure that the four trees are re-assessed prior to felling or soft-felled under supervision of a suitably qualified ecologist.

Where protected species, such as pine marten, any bat species or the common frog are found during the construction phase of the project, an officer of the NPWS would be notified prior to the resumption of activities.

No rare plant species or protected flora under the Flora (Protection) Order 2015, were recorded within the proposed development area. Therefore, the proposed development would not be considered to impact upon any rare or protected flora species.

No invasive flora species of concern were recorded during the onsite ecological assessments. Given the nature of the proposed development, it is considered that there would be no risk of introducing invasive species during the operational phase. The potential risk of introducing invasive species during the construction phase would be considered low, given that there would be no significant import of materials with the potential to contain invasive flora species and given that soils excavated during construction works would be re-used in site levelling and landscaping where possible. Where materials, such as topsoil or suitable soils for the lining of the ICW cells, may be required to be imported to the site, this would be considered a low risk material, as vector materials containing invasive species are a "controlled waste" and would not be brought onto the site.

Artificial lighting during the construction and operational phases has the potential to negatively impact upon bat species, as illumination can impact upon their roosting sites, commuting routes and foraging areas. During the construction phase, works are not anticipated to be conducted outside of normal working hours, which would considerably reduce the potential impacts upon bat species. Should lighting be required during construction, measures are included within Section 9.8 to reduce the potential impact of light pollution. Operational phase impacts on bats would be associated with permanent lighting associated with the existing slaughtering facility and new proposed development, including the carpark, yard areas and internal road network. No lighting is proposed for the ICW system. In the absence of mitigation measures, operational lighting has the potential to result in an adverse impact upon bat species. Therefore, measures with regards artificial lighting, as outlined in Section 9.8.2, would be required to be implemented.

It is not envisaged that fauna would be significantly impacted upon by the proposed development due to noise generated by the proposed facility or by noise generated from the associated site traffic during the construction or operational phases. The potential generation of noise has been considered in the design of the facility (for example compressors and boilers would be located internally within the facility) and a noise management plan would be put in place for the development to ensure minimal noise pollution outside the site boundary. Construction noise would not be considered to pose a significant risk to fauna owing to the transient nature of works and given that all vehicles where possible would be equipped with mufflers to suppress noise, as is standard practice.

Dust emissions may arise during construction activities, in particular during earth-moving works, which may have the potential to impact upon photosynthesis, respiration and transpiration processes of flora due to the blocking of leaf stomata. However, given the transient nature of construction works and standard working practices including dust control, the potential impact to flora would not be considered significant.

The potential impact of the proposed development upon biodiversity due to a deterioration in water quality is discussed in Section 10.

Water Quality and Aquatic Biodiversity

The entire area of the proposed Banagher Chilling Ltd facility drains to the Rapemills River, predominantly via the adjacent Feeghroe Stream. Areas of onsite field drainage may also be directed to the Milltown Stream.

Baseline water quality assessment were carried out on the Feeghroe Stream, and found that the stream would be classified as being of "bad status" under the Water Framework Directive. Physico-chemical status was found to be of "moderate status", due to elevated levels of Total Ammonia in the water. The macroinvertebrate status of the Feeghroe was found to be of "bad status" and was the limiting factor for this stream. The Small Streams Risk Score (SSRS) determined that the site would be considered "at risk of not achieving good status".

As the majority of the receiving waters for the Feeghroe Stream derive from Mullaghakaraun Bog, it is considered likely that concentrations of Nitrogen and Total Ammonia may be naturally elevated above water quality limits. During field surveys of the stream, substrates were found to be primarily mud and silt, with sections of dense leaf debris and little to no aquatic vegetation. The poor substrates and general slow flowing waters would make the stream an unfavourable habitat.

EPA river quality assessment of the Rapemills River and River Shannon in the vicinity of the site and catchment area indicated moderate ecological conditions in the 2017 round of surveys.

White Clawed crayfish and Brook lamprey were identified as key ecological receptor species which would have the potential to be found within the Rapemills catchment, however, it is unlikely that they would be found within the Feeghroe Stream. Other species of economic interest would include Brown trout and coarse fish species.

The principal risk of impacts to aquatic habitats and biodiversity would be via potential changes to water quality as a result of the proposed development.

The proposed development would include a combined discharge of storm-water and treated trade effluent to the Feeghroe Stream.

The proposed development would not result in any significant changes to the current stormwater run-off from the site. Stormwater from clean-yard areas and car parking areas would pass through a silt trap and Class 1 By-Pass Separator before being directed to a modular underground attenuation system. The proposed surface water drainage system would be designed to SUDS specifications, limiting storm runoff from the site to existing greenfield levels.

As part of the proposed development, a wastewater treatment plant would be constructed, comprising of primary, biological and tertiary treatment stages. The proposed effluent plant would discharge to an integrated constructed wetland (ICW) system and on to the Feeghroe Stream. The proposed effluent plant has been designed in order to minimise the potential for negative impacts of discharges upon the Rapemills River catchment.

The assimilative capacity assessment was used to predict the Feeghroe Stream's ability to accommodate a treated effluent discharge from the Banagher Chilling Facility. The assessment concluded that proposed discharge would not, in and of itself, cause to Feeghroe Stream to fail to achieve good status. It is further detailed in Section 10 of the EIAR that the proposed discharge to the Feeghroe Stream would be unlikely to have a significant impact upon the quality of the Rapemills River, primarily due to the dilution effect of the larger river.

Any trade discharge from the Banagher Chilling Limited facility would be required to be in compliance with a Local Authority Section 4 (Trade Effluent) Discharge Licence in agreement Offaly County Council. Such licencing would require a monitoring of final effluent to ensure compliance with discharge standards.

Due to the water quality protection mitigation measures which would be incorporated into the design and operation of the proposed development (including ensuring adequate bunding of chemicals, provision of precautionary spill kits, and WWTP design), it is not considered that the operation of the Banagher Chilling Ltd facility would pose a significant risk to the quality of the Rapemills River catchment.

During the construction phase of the proposed development, the main potential impact upon water quality would be through the release of suspended solids during soil disturbance works, the release of uncured concrete and the release of hydrocarbons from construction plant. Surface water quality would be protected during the construction phase through the implementation of standard construction mitigation measures, which include the use of appropriate silt control features, the regular maintenance and inspection of construction plant and the appropriate storage of potentially polluting substances. An outline Construction Environmental Management Plan (CEMP) has been prepared for the proposed development which includes measures for the protection of water quality.

Land - Soils, Geology, Hydrology and Hydrogeology

The soils across the site are dominated by peat along the north of the site with the remainder of the site covered in a 'fine loamy' drift with limestone clasts. The subsoils consist of till derived from limestone's with peat present in the North/North West. Topographic high points contain sand and gravels. Depth to bedrock ranges from 4 to 8.5 mbgl.

The Lucan Formation (dark-grey to black, fine-grained limestone) underlies the south east of the site, while the Waulsortian Limestone Formation underlies the remainder of the area. The Lucan Formation overlies the Waulsortian Formation. A geophysical survey completed on site identified the true location of the formation boundaries, indicating it is located in the North West of the site. The closest mapped, most probable location of a fault is 1.10 km south the proposed extension to the existing abattoir, which strikes North West – South East.

An extensive zone of karst is present in the Northwest of the site. A linear karst feature has been identified running in a South West – North East direction, immediately south of the abandoned farm yard. Elsewhere, localised karst anomalies were identified in the south of the site, running parallel to the L3010 road.

Groundwater vulnerability across the site is mapped as moderate with localised zone of low vulnerability mapped in the north west of the site. The limestone bedrock in the area is

classified as a Locally Important Aquifer (LI) - Bedrock which is Moderately Productive only in Local Zones.

It is the intention of Banagher Chilling Ltd to develop a groundwater supply onsite to serve the existing and proposed extension to the abattoir. Two potential targets have been identified for trial well drilling following geophysical surveying. It is estimated that water consumption at the site would be 150-200 m3/d. The Banagher Water Supply Scheme Source Protection Zone is located <500 m to the North West of the proposed extension to the existing abattoir.

The Feeghroe stream, also referred to as the Mountcarteret in the literature, forms the western boundary of the site. The flood risk assessment has determined that the majority of the proposed development site falls within Flood Zone 'C' - Low to Negligible Probability of Flooding. Throughout the site there are several drainage channels/ditches.

During the construction phase the main impacts anticipated are contamination of soils, the Feeghroe Stream and groundwater; activation of karst; and the excavation/storage of soils. These impacts will be mitigated as follows: contamination – silt fences to protect the Feeghroe Stream and the use of designated refuelling areas with bunded fuel tanks to protect soils and groundwater. Karst activation has been mitigated through avoidance at the design/planning stage. Appropriate procedures will be implemented to excavate and store soils.

Throughout the operation phase the following impacts are anticipated: contamination of groundwater, drainage diversions and culvert blockages. Operational impacts on groundwater will be mitigated by bunds, good housing keeping and safe handling procedures. Drainage ditch diversions will be designed to cope with 0.1% Annual Exceedance Probability flow rates, with a 20% increase in flows for climate change. Culvert blockages will be mitigated through quarterly inspections. Operation impacts on the Banagher Water Supply Scheme are unlikely, as the site does not encroach on the Source Protection Zone.

Archaeological, Architectural and Cultural Heritage

Shanarc Archaeology Ltd. has prepared an archaeological, architectural and cultural heritage impact assessment relating to the proposal to extend an existing abattoir, with associated development, in Meenwaun and Boheradurrow townlands, Banagher, Co. Offaly. The assessment has been prepared for inclusion in an Environmental Impact Assessment Report (EIAR) in support of a planning application to Offaly County Council.

The purpose of the chapter is to provide an archaeological, architectural and cultural heritage assessment of the receiving environment, to identify the likely and significant effects on the receiving environment and to propose ameliorative measures to mitigate these effects. The assessment is based on a desk-top study of the receiving environment supported by an on-site inspection.

No known archaeological monuments or protected structures are directly impacted by the proposed abattoir extension, and associated development.

The construction phase will have a likely direct and negative impact on two areas of archaeological potential, townland boundaries AP1 and AP2. AP1 relates to the boundary

between Boheradurrow and Clongawny Beg, and AP2 to the boundary between Boheradurrow and Meenwaun. Townland boundaries may preserve Gaelic *tuath* boundaries.

The construction phase will have a potential indirect impact on a recorded monument (A1), a cropmark of a possible circular enclosure situated 0.53km northeast of the proposed abattoir extension. There is a potential for hitherto unknown sub-surface remains to exist in the vicinity thereof, which would be negatively impacted by excavation and construction works.

Due to the potential presence of unknown sub-surface archaeological remains, to the scale of the overall proposed development, and to the proliferation of monuments in the wider vicinity of the site, it is recommended that pre-construction archaeological investigations in the form of targeted test trenching be undertaken at the site. Archaeological test trenching will assess the likelihood of archaeological remains being present.

For similar reasons, it is recommended that construction phase groundworks be subject to archaeological monitoring. Archaeological monitoring at the construction phase will be informed by the results of pre-construction archaeological investigations.

No operational phase effects or residual impacts have been identified in respect of archaeology, architecture and cultural heritage.

It should be noted that recommendations are subject to approval by the Department of Culture, Heritage and the Gaeltacht.

Material Assets – Agriculture

There would be no significant impacts upon agricultural properties / material assets due to the proposed development.

While the proposed development would result in a loss of agricultural grassland and a limited area of previously tilled land, the loss of this agricultural land would not have an adverse impact upon agricultural assets of the area, given that the lands are wholly within the ownership of the applicant, and given that the proposed development would strengthen the local economy of the agri-food sector by providing employment and by sourcing cattle from farmers and suppliers within the catchment area.

During the construction phase, there is potential for noise and dust to impact upon agricultural material assets. However the potential impact would not be considered significant, given the transient nature of construction works and given that noise and dust control measures would be implemented throughout the construction phase, as discussed in Sections 5 and 6 and as outlined in the Construction Environmental Management Plan.

There would be construction-related traffic during the construction phase of the proposed development. Discussions would take place with local landowners to ensure that construction traffic causes minimum interference with movements of stock and does not hinder farm operations.

The potential for operational noise associated with the proposed development to cause disturbance to livestock within grassland surrounding the proposed site would be considered

low. Animals would quickly become acclimatised to the new noise environment adjacent to the development, as with similar projects such as new roads and motorways.

A transportation assessment has been undertaken as part of the planning application (Attachment 8.1), which notes that the total traffic generated by the development comprises an Annual Average Daily Traffic (AADT) of 283 Passenger Car Units (PCUs, or car equivalents) within a 24 hour period. The report notes that while the local roads within the vicinity of the development are lightly trafficked, the increase in traffic movements due to the development can be considered small.

Material Assets – Utilities

There would be no significant impacts upon utilities due to the proposed development, during either the construction or operational phase.

During construction works, the development would be connected to the local electricity grid network and the mains water supply. Given the scale and transient nature of construction works, the demand on the local electricity and mains water systems would not be considered significant and would not be anticipated to impact upon local power or water supply. Foul water from staff welfare facilities would be collected on-site in designated waste holding containers / port-a-loo units and emptied on a regular basis by a licenced waste contractor.

The construction contractor would liaise with the relevant utilities provider prior to works commencing, with ongoing consultation throughout the proposed development. Where new services would be required, the construction contractor would apply to the relevant utility provider and adhere to the requirements outlined in the connection permit / licence.

During the operational phase, it is anticipated that 922 MWhrs would be required by the site annually. The estimated power requirement would not be considered significant in the overall context of the proposed development, and would not be anticipated to significantly impact upon the local power supply.

It is estimated that the annual consumption of LPG at the site would be 80m^3, which would not be considered significant in the overall context of the proposed development.

The estimated water demand for the proposed development would be between 150 – 200 m^3/day. No significant impact would be anticipated upon the Banagher regional water supply. Should conditions allow, it is hoped that the site's water requirement would be sourced via water abstraction onsite. Water conservation measures have been included as part of the proposed development design. Rainwater harvesting would be implemented, with all roof water collected for use in staff sanitary facilities and site landscaping. The development also proposes to utilise 'grey-water' from the on-site WWTP, to be used in lairage and lorry wash-out.

The estimated final treated effluent discharge for the proposed development would be a maximum of 250 m^3/day. Wastewater would be treated on-site at the new WWTP before discharge to the Feeghroe Stream.

Material Assets - Natural and Other Resources

There are no significant negative effects expected in relation to the use of natural and other resources.

The proposed development would occupy a 102,200 m^2 (approximate) footprint, including the proposed facility, ICW system and hardstand areas, which would result in a land take of mainly agricultural grassland, disturbed ground, sections of hedgerows and drainage ditches and a small section of bog woodland. All of the land take would take place within the applicant's landholding. Excavated soils from the proposed development footprint would be stockpiled for use in reinstatement and landscaping activities where possible, while excavated soils from the integrated constructed wetlands footprint would be used to construct the enclosing embankments around each pond and for use in cell lining where suitable. Any excess soils remaining following reinstatement and landscaping works would be collected by a licenced waste contractor and either reused for reinstatement / landscaping activities at other sites if suitable or disposed of as appropriate.

During the construction stage, the presence of HGVs and small commercial vehicles for deliveries of construction materials and transport of construction workers would be noted. During the operational phase of the proposed development, the total traffic generated by the development comprises an AADT of 283 PCUs within a 24 hour period. The Transportation Assessment report notes that while the local roads within the vicinity of the development are lightly trafficked, the increase in traffic movements due to the development can be considered small. The report concludes that there would be no traffic/transportation capacity, traffic safety or operational issues associated with the proposed development.

It is considered that the proposed development would have no significant impact on mineral resources in the vicinity of the area.

Construction material, when needed, would be brought in from nearby sources such as local quarries where practical.

Material Assets – Waste Management

During the construction phase of the development, construction and demolition waste (commonly referred to as "C&D waste") would be generated at the site, with the main likely waste streams including concrete, bricks, wood, metals, glass, plastic, soils and stones, biodegradable waste, insulation materials and bituminous mixtures. Limited volumes of waste would also be generated at the site compound, including office wastes such as paper and cardboard, in addition to canteen waste.

According to the EPA's "*Construction and Demolition Waste Statistics*" document, C&D waste typically comprises of 75% soil and stones, 12% mineral waste and 5% of metal waste. The estimated volumes of C&D waste anticipated to be generated during the construction phase of the proposed development are detailed in Section 16.6.1 of this EIAR.

During the operational phase of the development, the main likely by-products and wastes that would be generated by site would include blood, effluent and lairage sludge, category 1 material, category 3 material, belly paunch, mixed municipal waste, packaging (including cardboard, plastic, and wood), metals, office waste and food waste. The estimated volumes of

wastes to be generated during the operational phase are detailed in Section 16.6.2 of this EIAR.

During both the construction and operational phases, wastes would be managed in order of priority, in accordance with Section 21A of the Waste Management Act 1996, as amended. Wastes would be segregated as much as possible in order to avoid cross contamination. Where practical, the generation of wastes at source would be reduced through measures such as the efficient ordering and purchasing of materials to reduce surplus materials. Where it is not possible to avoid the generation of wastes, wastes would be sent for recycling or recovery as a priority. The generation of waste for disposal would be minimised as much as is practical, with any remaining waste directed to incineration.

During the construction phase, the construction contractor would reuse materials onsite where possible. In particular, inert wastes, such as concrete and soils and stones, would be used for infilling activities where suitable. Excavated soils would also be used in site reinstatement and landscaping activities where possible, for example in the construction of the earth berm proposed to the front of the facility.

Any hazardous waste generated would be managed in accordance with the Waste Management (Hazardous Waste) Regulations 1998 and 2000. Examples of potentially hazardous wastes include fuels and oils, batteries, paints, adhesives and sealants. Hazardous waste would be stored separately from non-hazardous waste, would be appropriately labelled and would be stored upon bunds where appropriate.

The collection of wastes from the site would be undertaken by suitably authorised waste hauliers, and would only be recycled / recovered or disposed of at suitably licenced waste facilities. The waste contractors would be appropriately licenced, holding the relevant waste collection permit and/or waste licences for the types of waste anticipated to be generated during the construction and operational phases. With regards the collection of organic fertilisers (such as lairage sludge and belly paunch) from the facility, Banagher Chilling Limited would ensure that only hauliers registered on the Department of Agriculture, Food and the Marine (DAFM) Animal By-Products (ABP) Transport Register would be employed.

For each waste movement and for each type of waste, the construction works contractor / Banagher Chilling Limited would obtain a signed waste docket from the waste contractor, detailing the weight, type of material, destination of material and whether the material is going for recycling, recovery or disposal. Copies of the waste contractors' relevant waste collection permits and waste licences would be maintained on file.

1.0 INTRODUCTION AND METHODOLOGY

1.1 INTRODUCTION

Panther Environmental Solutions Limited (PES Ltd.) has been commissioned by the applicant, Banagher Chilling Limited, to prepare an Environmental Impact Assessment Report (EIAR), for the proposed upgrade and extension of an existing abattoir facility within the townlands of Meenwaun and Boheradurrow at Banagher, Co. Offaly. The proposed upgrade and extension of the existing facility would facilitate a maximum cattle slaughter rate of 140 per day. The following is the wording of the proposed development for which planning permission is being sought:

"We Banagher Chilling Limited intend to apply for permission for development at Boheradurrow and Meenwaun, Banagher, Co. Offaly R42HX24 the development will consist of a single storey extension to existing abattoir of 1061 square meters to include processing rooms, staff changing rooms, offices, increase roof height by 2 meters, extend existing lairage and elevation alterations. In addition the construction of a food processing factory of 4925 square meters with a part first floor of 2299 square meters to include processing rooms, cold store, loading bay, chill rooms, plant rooms, staff changing rooms, staff canteen and administration offices. External works consisting of staff car parking, service yards, new public road entrance, widening of existing public road, effluent treatment compound, water storage tank, gas storage tanks, truck wash bay, integrated constructed wetlands, security hut of 23 square meters, electrical room of 168 square meters, water treatment building of 72 square meters, effluent treatment control house of 30 square meters, all associated siteworks and landscaping works on a site of 19.60 hectares. This application is accompanied by an Environmental Impact Assessment Report (EIAR) and a Natura Impact Statement.

The planning application, EIAR and Natura Impact Statement may be inspected, or purchased at a fee not exceeding the reasonable cost of making a copy, at the offices of the Planning Authority during its public opening hours. A submission or observation in relation to the application may be made in writing to the planning authority on payment of the prescribed fee (€20) within the period of 5 weeks beginning on the date of receipt by the authority of the application."

The existing abattoir facility is located in the townland of Meenwaun, while the proposed extension and associated development would be located within the townlands of Boheradurrow and Meenwaun, Co. Offaly. The development site is located approximately 2.4km south-east and 8km north-west of Banagher and Birr towns respectively. The site is located in a rural, farming area predominantly comprised of pastureland, hedgerows and peatland. The site is accessed via the L3010, a local road linking to the R438 regional road. The R438 connects to the N65 primary road some 21.5km to the south-west and the N62 primary road some 7km to the north-east of the site.

A full description of the existing and proposed development is provided in Section 2 of this EIAR document.

This EIAR is to be submitted to Offaly County Council in support of an application for planning permission for the proposed development, as described above, under the Planning and Development Regulations 2001 (S.1.No 600 of 2001).

1.2 ENVIRONMENTAL IMPACT ASSESSMENT & PLANNING LEGISLATION

This EIAR has been prepared in accordance with the requirements of the European Communities (Environmental Impact Assessment) Regulation, 1989 to 2001, the Planning and Development Act 2000 and the Planning and Development Regulations 2001, as amended. This legislation requires the assessment of the effects of certain public and private projects on the environment.

At a maximum slaughter rate of 140 cattle per day, the proposed development would fall below the threshold prescribed in Schedule 5, Part 2, as follows:

7. Food Industry:

> *(f) Installations for the slaughter of animals, where the daily capacity would exceed 1,500 units and where units have the following equivalents:-*
> *1 head of cattle = 5 units.*

However, the proposed development would involve the construction of a Waste Water Treatment Plant (WWTP) with an estimated population equivalent (p.e.) of 15,667 at the development site. This would exceed the threshold population of 10,000 as defined under Class 11, Part 2 of Schedule 5 of the Planning and Development Regulations, 2001, as amended:

> *(c) Waste water treatment plants with a capacity greater than 10,000 population equivalent as defined in Article 2, point (6), of Directive 91/271/EEC not included in Part 1 of this Schedule.*

This EIAR is drafted with particular regard to Article 94 and Schedule 6 in the 2018 planning regulations, and is submitted to provide information that may be helpful to the planning authority in making its decision on this application for planning permission.

The EIA Directive, 2014/52/EU, amending the EIA Directive 2011/92/EU, was transposed into Irish law by the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018). Circular letters issued by the Department of Housing, Planning, Community and Local Government on the 15th of May 2017 (Ref. PL1/2017) and 27th August 2018 (Ref. PL05/2018) have also been consulted in preparation of this report, advising planning authorities and An Bord Pleanála of the procedures and information necessary to comply with the EIA Directive required under the new regulations:

"The new Regulations transpose the requirements of Directive 2014/52/EU, amending previous Directive 2011/52/EU, on the assessment of the effects of certain public and private projects on the environment (the EIA Directive) into planning law with effect from 1 September 2018."

The following documents and guidelines have been consulted as part of the preparation of this report:

- *Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports* (EPA, 2017);

- *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* (Department of Housing, Planning and Local Government, 2018);
- *Development Management Guidelines* (Department of the Environment, Heritage and Local Government, 2007);
- *Guidelines on the information to be contained in Environmental Impact Statements* (EPA, 2002);
- *Advice Notes on Current Practice (in the Preparation of Environmental Impact Statements* (EPA, 2003);
- *Environmental Impact Assessment (EIA) Guidance for Consent Authorities Regarding Sub-Threshold Development* (Department of the Environment, Heritage and Local Government, 2003).

The guidelines state that in preparing an EIAR, the Developer will carry out an analysis of the likely effects of the project (positive or negative) on the environment. The Environmental Impact Assessment procedure commences at the project design stage when the scope of the study is determined. Studies are then carried out to investigate in detail, any potential environmental impacts. Where significant adverse impacts are identified, measures are recommended to mitigate or avoid the impact of the proposed development.

This Environmental Impact Assessment Report examines the potential significant impacts of the proposed development, comprising of an upgrade and extension to an existing abattoir facility and wastewater treatment infrastructure, to facilitate a maximum slaughter rate of 140 cattle per day at Banagher, Co. Offaly.

The extent of the proposed scheme is described in detail in Section 2 – Description of Development. The potential environmental impacts of the proposed scheme are addressed in Sections 4 – 17 of this volume of the report under the headings Human Environment, Natural Environment, Material Assets, Architecture, Archaeology and Cultural Heritage and Interactions and Inter-relationships.

1.3 EIA PROCESS OVERVIEW

Environmental Impact Assessment (EIA) is the process by which the anticipated effects on the environment due to a project are assessed or measured. The Environmental Impact Assessment Report (EIAR) summarises the environmental information collected during the impact assessment of the proposed development.

The steps of the EIA process can be described as follows:

(i) Screening;

(ii) Scoping;

(iii) Preparation of the EIAR:
- Consideration of Alternatives
- Project Description

- Description of Receiving Environment
- Identification and Assessment of Impacts
- Monitoring and Mitigation Proposals

(iv) Completion of EIAR:
- Scrutiny and Consent
- Enforcement and Monitoring

1.3.1 SCREENING

In order to determine if an EIA is required for the proposed development, it is necessary to determine whether the project is listed in one of the Annexes of Directive 2011/92/EU, as amended by Directive 2014/52/EU. These annexes have been transposed into Irish Law, with the prescribed classes of development requiring an EIAR outlined in Schedule 5 of the Planning and Development Regulations, 2001 (S.I. No. 600 of 2001), as amended.

Schedule 5, Part 1, of the above mentioned regulations, prescribes the mandatory thresholds in respect to Annex I projects. Annex II of the EIA Directive, transposed by Schedule 5, Part 2, of the Planning and Development Regulations, provides E.U. Member States discretion in determining the need for an EIA on a case-by-case basis for certain classes of projects, having regard to the overriding consideration that projects likely to have significant effects on the environment should be subject to EIA.

The proposed project is not listed in Schedule 5, Part 1, therefore, an EIA is not mandatory. The relevant class of development for the proposed project from Schedule 5, Part 2, is as follows:

11. Other projects:

(c) Waste water treatment plants with a capacity greater than 10,000 population equivalent as defined in Article 2, point (6), of Directive 91/271/EEC not included in Part 1 of this Schedule.

As the proposed development would include the construction of a WWTP with an estimated population equivalent (p.e.) of 15,667, an EIA is required.

1.3.2 SCOPING

Scoping is an essential part of the preparation of an EIAR as it ensures that all potential and important significant impacts on the receiving environment are taken into account at the earliest possible time. Scoping provides relevant information on the most important potential impacts of the project, which will have to be addressed in the EIAR. With regard to EPA criteria for scoping, the environmental areas that may be impacted by the proposed scheme were identified and are as follows:

Human Beings

During scoping, particular regard was given to the potential impact of the proposed development and operations on human beings. In particular, potential impacts which may

occur due to noise and dust during the construction phase, and noise, odour, visual impact and traffic during the operational phase were considered.

Natural Environment

The closest protected European sites to the proposed development are the All Saints Bog and Esker Special Area of Conservation (SAC) (Site Code: 000566) and the All Saints Bog Special Protection Area (SPA) (Site Code: 004103). There are a number of European sites located within 15km of the proposed development, 13 SACs and 5 SPAs, which include the callows of the River Shannon area and a number of fens and bogs. Eight Natural Heritage Areas (NHAs) are located within 15km of the development, which are mainly designated for their bog habitat.

The proposed development site is located on an aquifer categorised as a "Locally Important Aquifer – Bedrock which is moderately productive only in local zones". Groundwater vulnerability across the site is mapped as "Moderate" with a localised zone of "Low" vulnerability mapped in the north-west of the site. Within the wider region of the proposed development site, there are several karst features mapped.

The potential impacts on land, waters and biodiversity must be assessed with care to ensure that all impacts are clearly identified and where possible removed, reduced or minimised to a satisfactory level.

Material Assets

This involves assessing the impact of the development on land take, the availability of resources such as soils, utilities and natural resources and waste management in the area. Given the location of the proposed development site in an agricultural area, the development's potential impact upon agriculture must also be assessed.

Architecture, Archaeology & Culture Heritage

A number of monuments are present within the wider vicinity of the site. These include an enclosure, located approximately 0.5km to the north-east, and a cluster of toghers, with the nearest togher located approximately 1.1km to the north-east. Furthermore, two townland boundaries are located within the site, the boundary between Boheradurrow and Clongawny, and the boundary between Boheradurrow and Meenwaun.

1.4 INFORMATION TO BE CONTAINED IN AN EIS / EIAR

Schedule 6 of the Planning and Development Regulations, 2001, specifies the information to be contained within an EIS / EIAR, including:

1. (a) A description of the proposed development, comprising information on the site, design and size of the proposed development.

   (b) A description of the measures envisaged in order to avoid, reduce and, if possible, remedy significant adverse effects.

   (c) The data required to identify and assess the main effects which the proposed development is likely to have on the environment.

   (d) An outline of the main alternatives studied by the developer and an indication of the main reasons for his or her choice, taking into account the effects on the environment.

2. Further information, by way of explanation of the information referred to in paragraph 1, on the following matters:

   (a) (i) A description of the physical characteristics of the whole proposed development and the land-use requirements during the construction and operation phases.

   (ii) A description of the main characteristics of the production processes, for instance, nature and quantity of the materials used.

   (iii) An estimate, by type and quantity, of expected residues and emissions (including water, air, and soil pollution, noise, vibration, light, heat and radiation) resulting from the operation of the proposed development:

   (b) A description of the aspects of the environment likely to be significantly affected by the proposed development, including in particular:
   - Human beings, fauna and flora,
   - Soil, water, air, climate factors and the landscape
   - Material assets, including the architectural and archaeological heritage,
   - The cultural heritage,
   - The inter-relationship between the above factors

   (c) A description of the likely significant effects (including direct, indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative) of the proposed development on the environment resulting from:
   - The existence of the proposed road development
   - The use of natural resources
   - The emission of pollutants, the creation of nuisance and the elimination of waste and
   - A description of the forecasting methods used to assess the effects on the environment:

   (d) An indication of any difficulties (technical deficiencies or lack of know-how) encountered by the developer in compiling the required information.

1.5 IDENTIFICATION OF LIKELY SIGNIFICANT IMPACTS

Schedule 6 of the Planning and Development Regulations requires that an EIS describes likely, direct and indirect significant impacts of a proposed scheme. The EPA's draft "*Guidelines on the information to be contained in Environmental Impact Assessment Report, 2017*" defines an impact as the "change resulting from the implementation of project" and goes on to elaborate on impacts in terms of:

- Quality (positive, neutral or negative);
- Significance (imperceptible, not significant, slight, moderate, significant, very significant or profound);
- Extent and context;
- Probability of effects (likely, unlikely);
- Duration (momentary, brief, temporary, short-term, medium-term, long-term, permanent, reversible);
- Type (indirect, cumulative, Do-Nothing, worst-case, indeterminable, irreversible, residual, synergistic).

The following factors have been considered for this EIAR when determining the significance of the impacts, both positive and negative, of the proposed development on the various aspects of the receiving environment:

- The quality and sensitivity of the existing/baseline receiving environment.
- The relative importance of the environment in terms of national, regional, or local importance.
- The degree to which the quality of the environment is enhanced or impaired.
- The scale of change in terms of land are, number of people impacted, number and population of species affected including the scale of change resulting from all types of impacts.
- The consequence of that impact/change occurring.
- The certainty/risk of the impact/change occurring.
- Whether the impact is temporary or permanent.
- The degree of mitigation that can be achieved.

The magnitude of the impacts outlined in the sections which follow, take into account the guidelines given by the EPA and those scales used in other EIS / EIAR documents for significant developments in this country. A broad outline of the scale of impacts is given in Table 1.1.

Where mitigation in the form of design measures have been suggested throughout the evolution of the EIAR, these have been incorporated into the scheme design as far as is possible from an engineering perspective.

Table 1.1: General Criteria used to quantify the Potential Impacts of the Proposed Scheme

SIGNIFICANCE LEVEL	DEFINITION OF IMPACT
Profound	Significant Impact An impact, which obliterates sensitive characterisation
Major	An impact, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Moderate	An impact that alters the character of the environment in a manner that is consistent with existing and emerging trends
Slight	An impact, which causes noticeable changes in the character of the environment without affecting its sensitivities
Not significant	Neutral or imperceptible impact An impact which does not change the quality of the environment is capable of being measured but without noticeable consequences and causes changes in the character of the environment which are not significant or profound

1.5.1 SCENARIOS INVESTIGATED

A number of different scenarios should be examined when determining likely significant impacts. The "do nothing" scenario should compare the quality of the existing receiving environment with that of the likely environment should the proposed scheme not be built. The "do something" scenario should compare the quality of the existing receiving environment with that of the likely environment should the proposed scheme be built.

1.6 REPORT STRUCTURE

The main EIAR document is comprised of the following:

Non-Technical Summary:

A summary of the findings of the EIAR, in non-technical language.

Part I: Proposed Development:

Part I describes the existing and proposed development at the site, previous planning applicants and consents and a summary of consultations with the relevant statutory bodies and competent authorities. Part I includes the following sections:

Section 2: Description of the Development
Section 3: Alternatives

Part II: Environmental Impacts:

Part II describes the likely significant environmental impacts arising from the proposed development. Where possible, design measures have been included to reduce or eliminate potential impacts. Where this has not been possible, mitigation measures have been suggested to reduce or eliminate the identified impacts of the proposed development.

Part II has been divided into five main sections, as per the table below.

MAIN SECTION	SUB-SECTION
Section A – Human Environment	4. Population and Human Health
	5. Air Quality, Climate and Odour
	6. Noise and Vibration
	7. Landscape and Visual
	8. Traffic and Transport
Section B – The Natural Environment	9. Biodiversity – Terrestrial Environment
	10. Water Quality and Aquatic Biodiversity
	11. Land – Soils, Geology, Hydrology and Hydrogeology
Section C – Archaeological, Architectural and Cultural Heritage	12. Archaeological, Architectural and Cultural Heritage
Section D – Material Assets	13. Material Assets – Agriculture
	14. Material Assets – Utilities
	15. Material Assets – Natural and Other Resources
	16. Material Assets – Waste Management
Section E – Interactions and Inter-relationships	17. Interactions and Inter-relationships

1.7 COMPETENT EXPERTISE

Directive 2014/52/EU states that the preparation of EIAR documents should be undertaken by "competent experts", ensuring that the information provided is of high quality.

Panther Environmental Solutions Ltd. (PES Ltd.) is a leading Environmental Consulting Firm based in Carlow, Ireland. PES Ltd was established in 2005 by Environmental Consultant Mike Fraher who has over two decades of experience working in the Environmental Consultancy Industry, both in Ireland and in the UK. The PES Ltd. team are experienced in preparing EIS / EIAR documents, having completed a number of these reports for a range of industries including the food and drink and intensive agriculture sectors.

PES Ltd. has been requested by the applicant to prepare an EIAR in support of a planning permission application for the proposed development comprising of an extension to an existing abattoir facility at Banagher, Co. Offaly. This EIAR has been prepared by experienced environmental consultants with PES Ltd. Mr. Mike Fraher has over 25 years' of consultancy experience and has a B.Sc Degree in Environmental Sciences from the University of Glamorgan, Cardiff in Wales and a Diploma in Food Sciences from Cork Institute of Technology.

Mr. Martin O'Looney has over six years' consultancy experience and has a B.Sc Degree in Environmental Science and Technology from Sligo Institute of Technology. Ms. Lorraine Wyse has over four years' consultancy experience and has a B.Sc Degree in Environmental Science and Health from Dublin City University and a Diploma in Field Ecology from University College Cork. Mr. Nial Ryan has over two years' consultancy experience and has a B.Sc in Applied Physics from Dublin City University and an M.Sc in Regulatory Affairs from Institute of Technology Carlow.

Additional expertise was obtained for certain sections of the EIAR, as outlined in Table 1.2 below.

Table 1.2: Contributors to the EIAR

REF	EIAR TOPIC	COMPANY	PERSONNEL
1	Introduction	PES Ltd.	Ms. Lorraine Wyse
2	Description of Development	PES Ltd.	Mr. Martin O'Looney Mr. Nial Ryan Ms. Lorraine Wyse
3	Alternatives	PES Ltd.	Mr. Martin O'Looney Ms. Lorraine Wyse
4	Population and Human Health	PES Ltd.	Mr. Nial Ryan Ms. Lorraine Wyse
5	Air Quality, Climate & Odour	Katestone Environmental Pty Ltd. / PES Ltd.	Mr. Michael Fogarty (Odour, Air Quality & GHG Assessment) Mr. Martin O'Looney Ms. Lorraine Wyse (summarising assessment within section)
6	Noise & Vibration	Enfonic Ltd. / PES Ltd.	Mr. Gary Duffy Mr. David Courtney (Noise & Vibration Impact Assessment) Mr. Martin O'Looney (summarising assessment within section)
7	Landscaping and Visual	Macro Works Ltd.	Mr. Richard Barker Mr. Nik Hennessy Mr. Cian Doughan
8	Traffic and Transport	NRB Consulting Engineers Ltd.	Mr. Eoin Reynolds
9	Biodiversity – Terrestrial Environment	PES Ltd.	Ms. Lorraine Wyse
10	Water Quality and Aquatic Biodiversity	PES Ltd.	Mr. Martin O'Looney
11	Land – Soils, Geology and Hydrology	IE Consulting Ltd.	Mr. Jer Keohane Mr. Kevin Murphy
12	Archaeological, Architectural and Cultural Heritage	Shanarc Archaeology Ltd.	Mr. Seán Shanahan Ms. Edel Barry Ms. Marion Sutton
13	Material Assets – Agriculture	PES Ltd.	Mr. Nial Ryan Ms. Lorraine Wyse
14	Material Assets – Utilities	PES Ltd.	Mr. Nial Ryan
15	Material Assets – Natural and Other Resources	PES Ltd.	Mr. Nial Ryan
16	Material Assets – Waste Management	PES Ltd.	Mr. Nial Ryan Ms. Lorraine Wyse
17	Interactions and Inter-relationships	PES Ltd.	Mr. Martin O'Looney Mr. Nial Ryan Ms. Lorraine Wyse

Air Quality, Climate and Odour

This section has been prepared by Katestone Environmental Pty Ltd., an air quality and meteorlogy consultancy established in Australia in 1989, with an Irish base in operation since 2017.

This section has been managed by Mr. Micheal Fogarty. Mr. Fogarty completed a Bachelor of Engineering Degree (Biosystems) at University College Dublin in 2003. He subsequently spent five years researching various odour measurement, abatement and dispersion modelling subjects, being awarded a Masters of Engineering Science in 2006 and a PhD in 2009. Micheal joined Katestone as a Senior Consultant in 2013, bringing six years' of consulting experience in air quality impact assessment. Micheal specialises in odour impact assessment and has worked on many projects involving estimation of emissions from intensive poultry production, waste water treatment, pumping stations, landfills and asphalt production. He has designed and implemented odour monitoring campaigns involving olfactometry, field odour assessment and odour nuisance surveys. He has also utilised a range of numerical meteorological and dispersion modelling in odour assessments including Aermod Ausplume, Calmet/Calpuff, TAPM, CAL3QHCR (traffic modelling) and ISC.

Additional Katestone personnel have contributed to this section, including; Mr. Simon Welchman, an Environmental Engineer and Director of Katestone, with more than 19 years' experience; Ms. Natalie Shaw, a Principal Air Quality Consultant with over 13 years' experience; Ms. Lisa Smith, a Senior Consultant; Mr. Andrew Vernon, a Senior Consultant and Dr. Michael Burchill, a Senior Consultant.

Noise and Vibration

This section has been prepared by Mr. Gary Duffy and Mr. David Courtney of Enfonic Ltd. Enfonic Ltd. are specialists in the sound and vibration sector, with a background as the leading supplier of instrumentation, software and services for over 25 years.

Mr. Gary Duffy is a founder member of the Irish Branch of the Institute of Acoustics (IOA) and is Enfonic's founder and managing director. After ten years working at B&K, Gary established Enfonic. Gary has been advisor, educator and consultant; he co-wrote the EPA's original guidance note on noise and represented the IOA on the technical advisory committee of the Department of the Environment's revision of Part E (Sound Insulation) of the Building Regulations. He was the first student of the IOA Diploma in Acoustic and Noise in Ireland and went on to teach the diploma in 2010.

Mr. David Courtney studied Mechatronic Engineering in Dublin City University, and completed the IOA Certificate in Environmental Noise Assessment. As Enfonic's acoustic engineer, he undertakes all types of noise and vibration surveys in relation to wind turbines planning and compliance, IPPC & IE compliance, BS4142 and BZ5228 assessments, traffic noise and construction noise/vibration.

Landscaping and Visual

This section has been prepared by Macro Works Ltd., specialists in Landscape and Visual Impact Assessments. The company was established in 1999, providing a full suite of visual assessment, analysis, GIS mapping and simulation tools for all aspects of energy, civil

engineering infrastructure and commercial developments. This section has been prepared by Mr. Richard Barker, Mr. Nik Hennessy and Mr. Cian Doughan.

Mr. Richard Barker is a Principal Landscape Architect with Marco Works, who formerly worked as a Town Planner in New Zealand, London and Dublin prior to moving to the field of Landscape Architecture. He has spent the last 15 years working as a Landscape Architect in Ireland, with considerable experience in the fields of both Landscape and Visual Impact Assessment (LVIA) and landscape design, covering all stages from project feasibility through to construction. Richard is a Corporate Member of the Irish Landscape Institute, and has presented several conference papers relating to sustainable landscape design and LVIA. His qualifications include a MLA from Lincoln University, a PG Diploma in Forestry from Canterbury University and a BA in Environmental Science from Massey University.

Mr. Nik Hennessy is the Managing Director of Macro Works, with over 20 years' experience of visualisations, from small residential to large industrial projects. Nik specialises in the areas of visibility analysis and photo-real simulation for LVIA, and has developed a reputation as a pioneer in addressing the more complex issues of analysis and presentation of verifiable visuals for LVIA. Nik recently commissioned and oversaw the development of Ireland's only Glint and Glare modelling software for solar applications with NUI Maynooth. His qualifications include a Bachelor of Agricultural Science, Forestry with UCD and a MAgr(for) by research with UCD in the development of forest inventory and management software.

Mr. Cian Doughan is an honours graduate of Landscape Architecture from UCD, and has worked as a Landscape Architect with Macro Works for four years, working in a variety of roles involving a combination of LVIA, landscape design and 3D modelling. Prior to joining Macro Works, Cian worked for a leading landscape design office (Hollander Design) in New York for a year. Cian's main field of interest in landscape architecture is that of landscape planning, and in particular, LVIA. Cian was recently involved in preparing the Draft Landscape Design Guidelines for Irish Water Infrastructure projects.

Traffic and Transport

This section has been prepared by NRB Consulting Engineers Ltd., specialists in the area of traffic, transport and road design. NRB Consulting Engineers have developed designs for roads, signalised junctions, priorty junctions and roundabouts throughout Ireland, from feasibility through to construction, in addition to undertaking detailed traffic studies.

This section has been preapred by Mr. Eoin Reynolds, a Chartered Engineer with over 29 years' experience in a range of civil engineering projects. Eoin specialises in the field of Traffic and Transportation and Roads Design, assessing the infrastructure needs of development, and is an expert in the use of Traffic Engineering Modelling Software (TRICS, ARCADY, PICADY, LINSIG, TRANSYT and Micro-Simulation Techniques). Eoin was previously Director of the Irish Office of Waterman Boreham Transport Planning and prior to that was Manager of the Belfast office of JMP Consultants Ltd (owners and managers of the TRICS Database). He is a noted Professional/Expert Witness in the field of Traffic/Roads & Road Safety.

Land – Soils, Geology and Hydrology

This section has been prepared by IE Consulting Ltd, a water, environmental and civil engineering consultancy established in 2001. IE Consulting provide specialist services in hydrogeology and environmental geology.

The soils, geology and hydrology section has been reviewed by Mr. Jer Keohane, Technical Director with IE Consulting, who has over 35 years' experience and whose qualifications include B.Sc and M.Sc and whose professional affiliations include CGeol, FCIWEM, and MIEI.

The soils, geology and water sections have been prepared by Mr. Kevin Murphy, under the supervision and guidance of Jer Keohane. Kevin has worked as a Graduate Project Hydrogeologist with IE Consulting since 2018. Kevin has a B.Sc Degree in Geology, an M.Sc degree in Hydrogeology & Water Management and up to 1 years' experience in the geoscience sector.

Archaeological, Architectural and Cultural Heritage

The Archaeological, Architectural and Cultural Heritage section has been prepared by Mr. Seán Shanahan, Ms. Edel Barry and Ms. Marion Sutton of Shanarc Archaeology Ltd. Shanarc Archaeology Ltd. was established in 2014 by Mr. Shanahan, specialising in archaeological and geophysical services.

Mr. Seán Shanahan has over 20 years' experience working in commercial archaeology and is a licence eligible director. Mr. Shanahan has an honours degree in Archaeology and Philosophy from NUI Galway and a Master's Degree in Geographical Information Systems and Remote Sensing from NUI Maynooth.

Ms. Edel Barry has several years' experience as both a recorder on built heritage surveys and an editor, as well as a site assistant and supervisor in the field. Ms. Barry has an honours degree in Archaeology and English from NUI Galway, a Masters in Philosophy from UCC and a Higher Diploma in ArcGIS from UCC.

Ms. Marion Sutton has several years' experience preparing environmental impact assessment reports in Ireland, and has worked overseas in public land management, preparing Heritage Assessments and supervising works on archaeology and cultural heritage sites. Ms. Sutton has an honours degree in Archaeology and Geography from NUI Cork and a Master's degree in Environmental Resource Management from NUI Dublin.

1.8 LINKS BETWEEN EIA AND APPROPRIATE ASSESSMENT

The EU Habitats Directive (92/43/EEC) on the conservation of natural habitats and of wild fauna and flora, as amended by council directive 97/62/EC, 2006/105/EC, and Regulation EC1882/2003 of September 2003, as transposed into Irish law by the European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. 477/11), provides the framework for legal protection for habitats and species of European importance.

Article 6(3) and 6(4) of the Habitats Directive lays down the procedure to be followed when planning new developments that might affect a European site (Natura 2000 site). Article 6(3) of the Habitats Directive states;

"*Any plan or project not directly connected with, or necessary to the management of the site, but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site, and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.*"

Article 6(4) would come into force following a determination that a plan or project may adversely affect the integrity of a European site.

In accordance with these requirements, the proposed development has been assessed to determine whether any likely significant effects would arise due to the proposed development upon European sites. The resulting Natura Impact Statement forms part of this application (Report Ref. PES_NIS_19_9201).

PART I – PROPOSED DEVELOPMENT

This section of the EIAR describes the proposed development, comprising an upgrade and extension of an existing abattoir facility within the townlands of Meenwaun and Boheradurrow, at Banagher, Co. Offaly, which includes the construction of stormwater and effluent drainage systems, water treatment plant, electrical sub-station, truck wash, security hut, waste and by-product area and gas compound, site access roads and all ancillary development including internal road surfacing, the provision of outdoor artificial lighting, an extension to the existing lairage facility and site landscaping.

A discharge to surface water is included in the proposed development for this application for planning consent.

This section also describes the existing development at the Banagher site, including a description of the current infrastructure and wastewater treatment system at the site, and summarises previous planning applications and consents for the site.

2.0 DESCRIPTION OF THE DEVELOPMENT

2.1 INTRODUCTION

The following is the wording of the proposed development for which planning permission is being sought by the applicant Banagher Chilling Limited:

"We Banagher Chilling Limited intend to apply for permission for development at Boheradurrow and Meenwaun, Banagher, Co. Offaly R42HX24 the development will consist of a single storey extension to existing abattoir of 1061 square meters to include processing rooms, staff changing rooms, offices, increase roof height by 2 meters, extend existing lairage and elevation alterations. In addition the construction of a food processing factory of 4925 square meters with a part first floor of 2299 square meters to include processing rooms, cold store, loading bay, chill rooms, plant rooms, staff changing rooms, staff canteen and administration offices. External works consisting of staff car parking, service yards, new public road entrance, widening of existing public road, effluent treatment compound, water storage tank, gas storage tanks, truck wash bay, integrated constructed wetlands, security hut of 23 square meters, electrical room of 168 square meters, water treatment building of 72 square meters, effluent treatment control house of 30 square meters, all associated siteworks and landscaping works on a site of 19.60 hectares. This application is accompanied by an Environmental Impact Assessment Report (EIAR) and a Natura Impact Statement.

The planning application, EIAR and Natura Impact Statement may be inspected, or purchased at a fee not exceeding the reasonable cost of making a copy, at the offices of the Planning Authority during its public opening hours. A submission or observation in relation to the application may be made in writing to the planning authority on payment of the prescribed fee (€20) within the period of 5 weeks beginning on the date of receipt by the authority of the application."

The existing abattoir facility is located in the townland of Meenwaun, while the proposed extension and associated development would be located within the townlands of Boheradurrow and Meenwaun, Co. Offaly. It should be noted that both "Boheradurrow" and "Boherdurrow" are referenced in this EIAR, with both variances referring to the same townland. This reflects the variances observed from mapping sites and other information sources.

The proposed upgrade and extension of the existing facility would facilitate a maximum cattle slaughter rate of 140 per day.

Banagher Chilling Limited intends to provide for the discharge of final treated effluent to the Feeghroe Stream, which passes along the western site boundary. Prior to discharge to this watercourse, the final treated effluent would be directed to newly constructed integrated wetlands. A preliminary assessment on the potential risks arising from the proposed discharge, including an assimilative capacity assessment, has been undertaken for the Feeghroe (discussed in detail in Section 10). It was concluded that the proposed discharge from the Banagher Chilling facility would not in and of itself result in the Feeghroe Stream failing to achieve good status.

The construction of the proposed development would take place over approximately 18 months, providing employment for approximately 250 personnel. Once operational, the facility would provide employment for approximately 110 personnel.

2.2 PLANNING AND CONSENTS HISTORY

The existing facility at Meenwaun was originally developed as an abattoir by the Lynch family in the 1990s and was acquired by Banagher Chilling Limited in 2018. An overview of planning permissions lodged for the site is included in Table 2.1 below.

Table 2.1: Overview of Planning for the Site at Meenwaun Townland, Co. Offaly

PLANNING REFERENCE	DECISION DATE	PERMISSION	DESCRIPTION
90465	24/05/1991	Permission	Construction of an Abattoir

According to the Offaly County Council planning map, an Enforcement Notice (Ref. No. UD 03043) was issued within the development site, to the west of the existing abattoir.

The most significant development within the vicinity of the proposed development site is the Meenwaun Wind Farm, which received conditional 10-year planning permission on the 22nd April, 2015 for the following:

"The construction of a wind farm comprising up to five turbines with a maximum tip height of up to 169m and associated turbine foundations, hardstanding areas and drainage, one permanent meteorological mast up to 80m in height, tree felling, a stream crossing, upgrading of existing and provision of new site tracks and associated drainage, provision of new site entrance".

This 10MW maximum export capacity (MEC) site consisting of four GE manufactured 2.75MW turbines, was energised in December 2017 via the 20kV on-site substation and an underground cable to the ESB's Dallow 110kV substation. The access road to the wind farm site, and the planning reference marker indicated upon the Offaly Country Council e-plan map, is located 1.6km to the south-east of the proposed site. However, the closest turbine to the proposed site boundary is approximately 500m to the north-east.

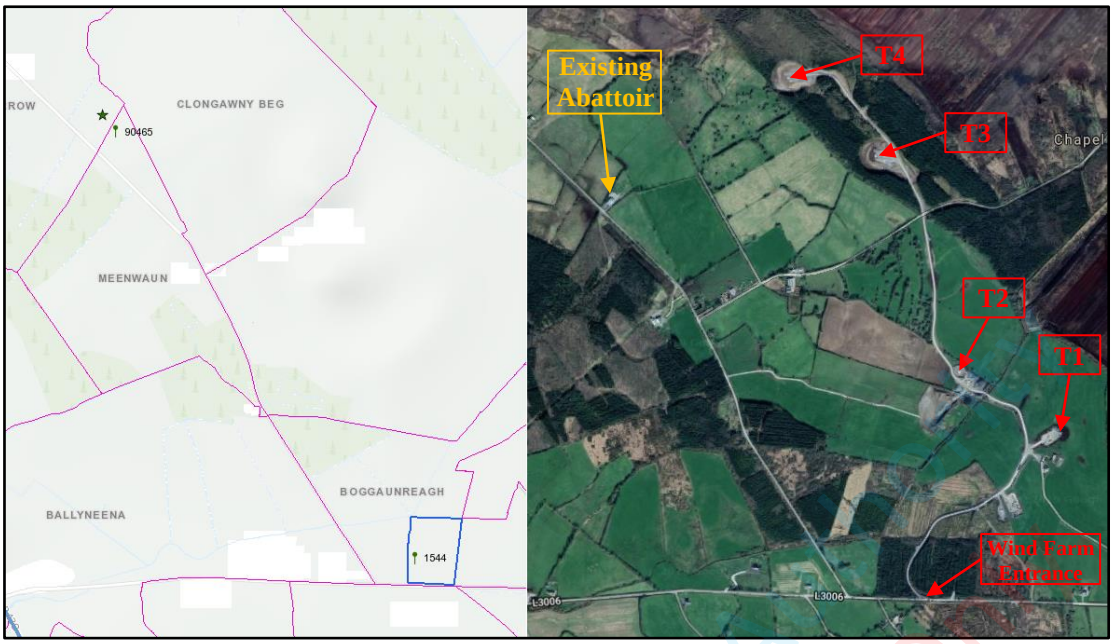

Figure 2.1: Planning Reference and Turbine Location Map

2.3 EXISTING DEVELOPMENT

2.3.1 SITE AND SURROUNDING AREA

The existing abattoir facility is located in the townland of Meenwaun, approximately 2.4km south-east of Banagher and 8.0km north-west of Birr, Co. Offaly. The remainder of the site comprising of agricultural land, is located in the townlands of Boheradurrow and Meenwaun. The approximate Irish National Grid (ING) reference for the site is 204143E, 213196N. A site location map is included as Attachment 2.1. The site is approximately 19.6 hectares in size and includes buildings, hardstanding areas and agricultural fields.

The nearest settlement to the existing facility is the town of Banagher, located approximately 2.4km north-west of the site. The towns of Birr and Portumna are located approximately 8km and 20km respectively from the facility. Tullamore is the closest large-size town and is located approximately 31.5km to the north-east of the site.

The site is accessed via the L3010, a local road linking to the R438 road. The R438 road connects to the N65 National Primary Road some 21.5km to the south-west and N62 National Primary Road some 7.0km to the north-east

The site is located in a rural, farming area predominantly comprised of pastureland, hedgerows and peatland. Arable fields and wooded areas can also be found scattered around the landscape. Residential development in the area is predominantly linearly aligned along the existing road network. A number of large farmsteads, as well as some commercial developments, are located within the area. The nearest national road to the site is the N62, which connects Athlone to Thurles. The Feeghroe Stream travels along the site's western boundary, which connects to the River Shannon via the Rapemills River. The River Shannon flows in a south-westerly direction and is located, at its closest, 4.4 km north-west of the site.

The topography surrounding the site is gently undulating between low points of around 48m AOD and a number of local highpoints of over 53m AOD. The existing facility is located between 48-50m AOD. Levels fall to under 33m AOD along the course of the local Rapemills and Shannon Rivers.

The proposed site does not lie within an area designated as a Special Area of Conservation (SAC), Special Protection Area (SPA) or Natural Heritage Area (NHA). The closest protected sites to the facility are the All Saints Bog and Esker SAC (Site Code: 000566) and the All Saints Bog SPA (Site Code: 004103), located approximately 2.1km and 2.4km south-west of the facility respectively.

2.3.2 EXISTING INFRASTRUCTURE AND UTILITIES

Within the landholding, there is an established farmyard complex of buildings and an existing permitted abattoir extending to approximately 748 m^2. The existing site layout is included in Attachment 2.2.

The existing abattoir facility was managed by Ossory Meats, and has ceased operation circa November 2016. At the time of their operation, Ossory Meats were slaughtering 100 cattle per week, and for a period, the site was also slaughtering horses under licence.
The existing abattoir development is comprised of the following:

- Main building housing the slaughter hall, boning hall, cold room, loading area and amenities (including offices, locker rooms, kitchen and toilets);
- Lairage and holding pen areas;
- Offal skip shed;
- Septic tank and percolation area servicing staff facilities;
- Surface water tank;
- Wastewater treatment system, comprising of inlet sump and storage sump;
- Lorry-wash.

Given that the site ceased operation in 2016 and has since changed ownership to Banagher Chilling Limited, there is limited information available on the existing utilities onsite.

Energy

The site is connected to the national grid for electricity supply. There are no existing boilers onsite.

Refrigeration

There are no available details on the existing refrigeration system.

Water Supply

It is not known if water was sourced from an onsite mains water supply, or if it was sourced from the onsite well located within the existing abattoir facility.

Drainage Networks

There were no discharges to sewer at the site. Foul sewer drainage from staff facilities was directed to a septic tank and percolation area. Process emissions from the factory, dirty yard drainage and lorry-wash run-off were all directed to a wastewater inlet sump and wastewater storage sump. The contents of the wastewater storage sump were tankered off-site for either landspreading or for treatment at a municipal WWTP. Further details of the wastewater drainage network are provided in Section 2.3.3.

Stormwater from the roof areas was directed to a surface water tank. It is presumed that the contents of this tank were directed to a percolation area.

2.3.3 EXISTING WASTEWATER INFRASTRUCTURE AND PROCESS

All process effluent, dirty yard drainage and lorry-wash material gravity drained to the inlet sump (107 M^3) located at the back of the factory. Raw effluent was stored in this inlet sump tank and an adjoining 113 M^3 storage tank, before being tankered off-site for either landspreading or for treatment at a municipal WWTP. No treatment of effluent was carried out onsite.

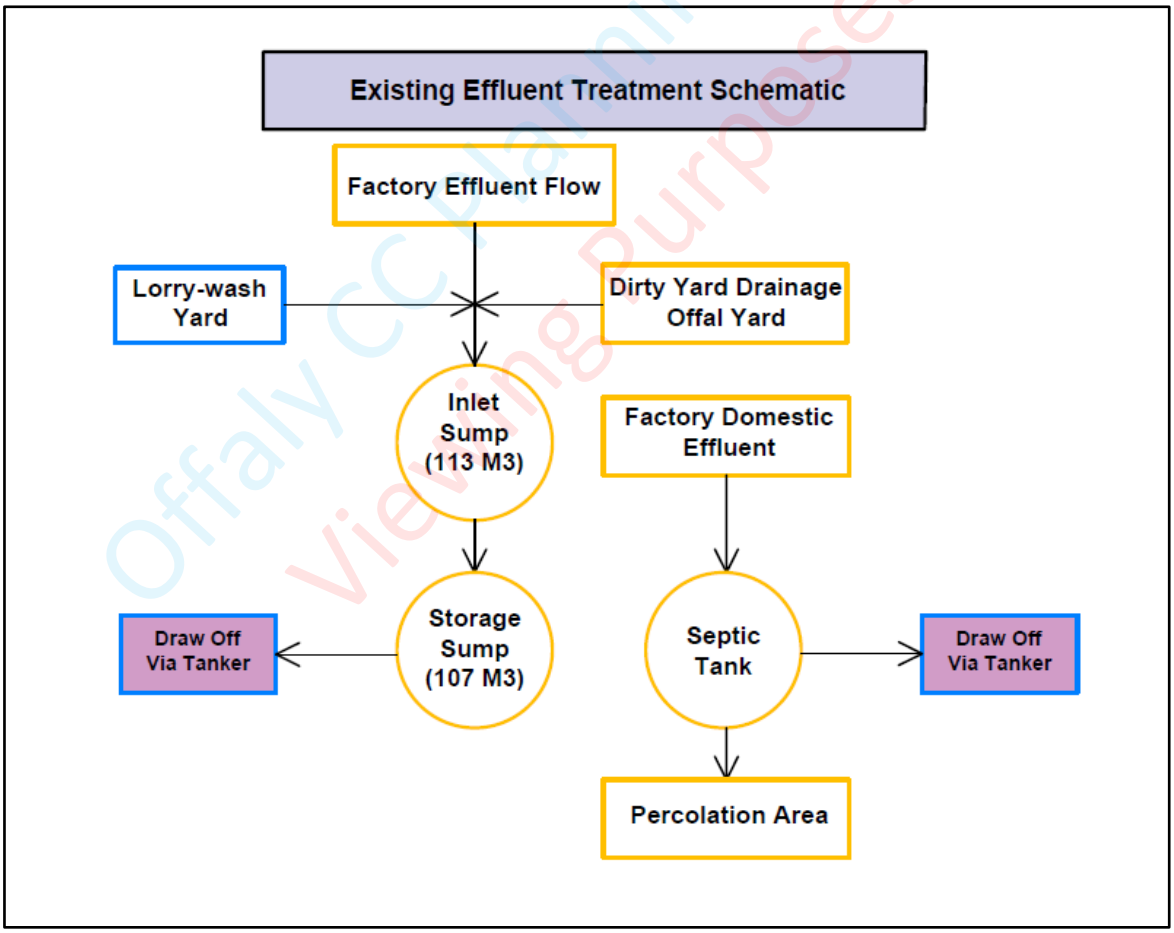

Figure 2.2: Schematic of Existing Effluent System

2.4 PROPOSED DEVELOPMENT

2.4.1 PROPOSED INFRASTRUCTURE AND UTILITIES

The proposed development would comprise of the refurbishment and extension of the existing abattoir on the site, to allow a maximum cattle slaughter rate of 140 per day. To achieve this, the existing slaughter line would be modified and lengthened within the existing abattoir building. The existing abattoir building would be extended to provide for additional cattle chills, processing rooms, waste-out rooms, offices and staff facilities, in addition to the construction of a meat cutting, packing, blast freezing and cold storage facility with an output of approximately 40 tonnes per day.

Other facilities to be constructed would include the associated plant rooms, packaging storage, electrical sub-station, water treatment system and wastewater treatment plant (WWTP). The existing lairage would also be extended, and the livestock yard increased in size.

The proposed site layout is included in Attachment 2.3. A summary of the proposed new infrastructure and areas is provided in Table 2.2.

Table 2.2: Proposed Development Infrastructure and Areas

INFRASTRUCTURE	AREA (M^2)
New buildings at Ground Floor Level	5,986
First Floor Facilities	2,299
Security Entrance Building	23
ESB Electrical Room	168
Waste Water Treatment Building	30
Water Treatment Building	72
Overall Total Proposed	**8,578**

A 3D model of the proposed development is included as Figure 2.3 below.

Figure 2.3: 3D Model of the Proposed Development

Abattoir and Lairage

It is proposed to extend the existing abattoir and lairage buildings onsite, which currently have a combined area of approximately 750m^2. The new extension would result in an overall area of 1,061m^2. The existing abattoir would be redesigned to contain the following areas: killing line, red offal chill and pack freeze, green offal chills (x2), dispatch, hides and gut room. The proposed extension would contain the following areas: hide, blood and feet storage, offices, staff and vet area, waste area, CAT1 and CAT3 trailer-bays. The existing lairage building, located to the north of the abattoir building would be extended to provide for further lairage facilities for the intake of animals. The new lairage extension would also include an extension to the underground lairage tank.

Food Processing Factory

The food processing factory onsite would have a ground floor area of 4,925m^2, and a first floor area of 2,299m^2. The structure would have a maximum height of 12.8m from the ground. The food processing factory would include processing rooms, cold store, loading bay, chill rooms, plant rooms, staff changing rooms, staff canteen and administration offices.

Security Hut

The security hut, which would be located inside the site access gate, would consist of a single room structure. The structure would have a maximum height of 3.61m from the ground level. The building would have an overall footprint of 23m^2. The finished internal floor height would be 36cm above the ground level. Within the structure, there would be a 1m x 2m washroom facility area.

ESB Substation

The ESB substation, which would be located within the rear yard area approximately 14.8m north of the plant room, would consist of a rectangular structure divided into two areas; the ESB Room and Electrical Room. The structure would have a maximum of height of 4.4m from the ground level. The building would have an overall footprint of 168m^2. The finished internal floor height would be 17.5cm above the ground level. The ESB room would have an internal area of 39m^2, while the Electrical Room would have an internal area of 129m^2.

Water Treatment Building

The water treatment building, which would be located within the rear yard area approximately 41m north-west of the plant room, would consist of a single room structure. The structure would have a maximum of height of 5.5m from the ground level. The building would have an overall footprint of 72m^2. The finished internal floor height be at ground level, with the first 34cm of wall being constructed from 215mm blockwork.

WWTP Compound

The waste-water treatment compound would consist of a 1,598m^2 area of concrete hardstand, and would contain the following structures:

Balance Tank	113 m^2	Clarifier Tank	50 m^2
Sludge Tank	50 m^2	Sand Filter	5 m^2
Sludge Press Gantry	8 m^2	Final Effluent Sump	9 m^2
Anoxic Tank	113 m^2	Operators Cabin	30 m^2
Aeration Tanks (x2)	95 m^2	Grey-water Tank	7 m^2
DAF Unit	10 m^2		

Total approximate area of all WWTP structures = 585m^2

Truck-Wash

The site truck-wash would be located within the rear yard area of the site. Wash-water would be supplied to this wash from a 20m^3 grey-water tank, located within the WWTP compound. This tank would be filled using water from the final effluent sump. It is anticipated that this wash would use approximately 5m^3 of water per day.

Waste and By-Product Area

The site waste storage area would be located in the rear yard area and would contain segregated waste bins including; cardboard recycling, plastic recycling, wood recycling, metal recycling and general waste. CAT1 and CAT 3 waste would be stored within designated trailers in this area, while blood would be stored within a refrigerated stainless steel tank adjacent the abattoir building. Sludge would be stored in a trailer within the WWTP compound.

Gas Compound

The site liquefied petroleum gas (LPG) tanks would be strategically placed within the rear yard area and would be surrounded by protective barriers. This structure would have an overall maximum length of 13.5m and an overall maximum width 5.8m.

Car Parking

The site carpark would be located to the south of the main building. The car park would be accessed from the main site entrance, and would contain 146 car parking spaces, 3 e-car spaces and 12 disabled parking spaces.

Site Access

The site would be accessed via a newly constructed site entrance on the L3010, as shown in Attachment 2.3. The existing site entrance to the existing abattoir would not be used for site traffic, with all traffic diverted to the new entrance, however this entrance would remain for emergency use only. The existing entrance to the agricultural buildings would be made redundant.

Energy

The site proposes to use the following energy sources:

1. LPG for the boilers and external forklifts;
2. Diesel for the back-up generator;
3. Electricity for process and offices.

Electricity would be used as efficiently as possible throughout the site. Significant investment has been put into the site planning and initial build programme to ensure good overall site energy monitoring and control.

All equipment where possible would be sourced to be energy efficient. Energy saving LED lights would be used throughout the facility where possible. LED lights are the most energy efficient and practical lighting source. They are longer lasting than compact fluorescents (CFL) and incandescents - up to 10 times as long as compact fluorescents, and far longer than typical incandescents. They are less hazardous as they do not contain mercury. They give better quality light. They are more efficient - using only 2-17 watts of electricity (1/3rd to 1/30th of Incandescent or CFL).

The main users of electricity on site would be the refrigeration plant, production lines and office areas. The facility would set energy efficiency targets as part of the site's Environmental Management Programme. The site would undertake regular energy audits to ensure maximum efficiency and to identify energy saving measures.

It is estimated that the annual consumption of LPG at the site would be 80m^3, with the annual consumption of electricity estimated to be 922 MWhrs. Figure 2.4 below provides an estimate of the energy consumption based on Sector Guidance information.

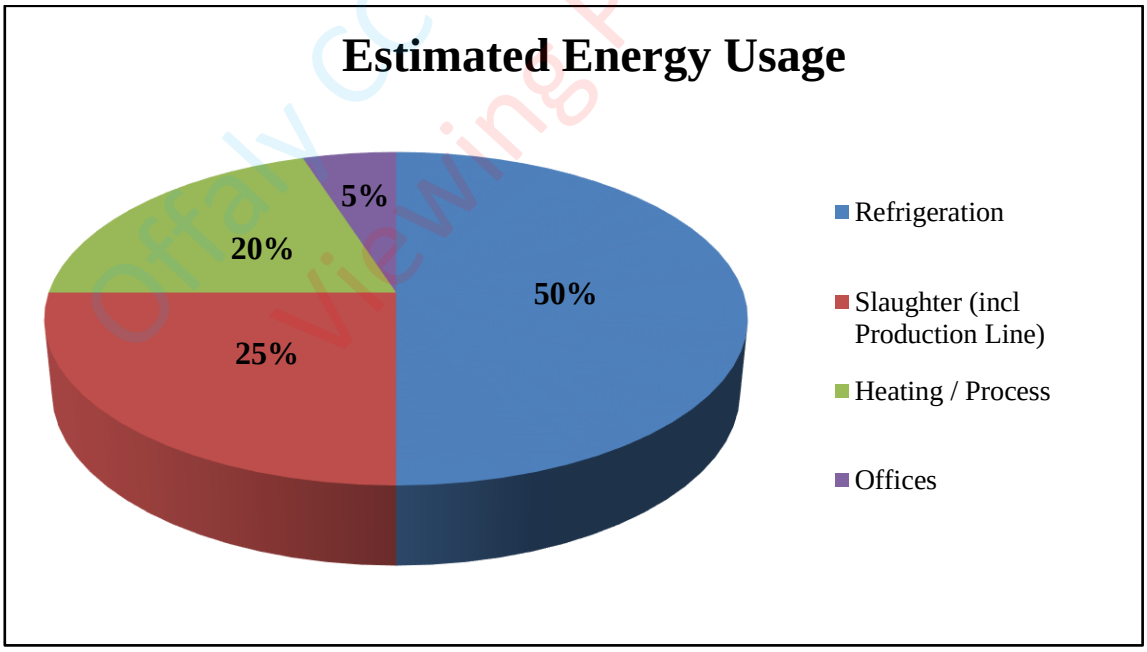

Figure 2.4: Estimated Energy Usage for Main Processes

Boilers

Two steam boilers are proposed as part of the development, each with a capacity of approximately 900kgs per hour. The boilers would be located within the plant room, to the rear of the abattoir facility. The specifications of the boilers would be determined following planning approval and the detailed design stage. However, it is likely that the boilers would each have a stack diameter of 0.6m, and would measure approximately 2m in height from the plant room roof level. Both stacks would be capped.

Refrigeration

The refrigeration system would comprise of a primary ammonia (NH_3) system with 7,500kgs of liquid ammonia contained within a sealed, pressurized system. Work areas, chill rooms and packaging rooms would be refrigerated using a secondary Glycol refrigerant from a central chiller unit.

Water Supply and Consumption

Should conditions allow, it is intended that the site's water requirement would be sourced via water abstraction onsite. A geophysics survey has been undertaken of the entire site, which identified two potential locations for trial wells. Upon approval of planning permission, site investigation works and water well drilling would be undertaken to assess the viability of the trial wells. It is estimated that water consumption at the site would be 150 – 200 m^3/day, however this is likely to be an overestimate.

Water conservation measures have been included as part of the proposed development design. Rainwater harvesting would be implemented, with all roof water collected for use in staff sanitary facilities and site landscaping.

The final WWTP design includes for the capture of treated effluent water in a holding tank (grey water tank) to be used in lairage and lorry wash-out. This practice is currently undertaken by a number of slaughtering facilities in Ireland. The grey water tank would be fed via level probes from the final sump when required. It is estimated that final treated effluent would be required at a rate of $5m^3$ per day for the lorry-wash and $5m^3$ per day for the lairage.

Drainage Network

There would be no discharges to sewer at the site.

It is intended to adopt best management practices in stormwater management as outlined in both the SuDS manual from CIRIA and the Technical Guidance document on SuDS published by British Water in conjunction with the Environment Agency along with other European and international industry standards.

Stormwater from clean-yard areas and car parking areas would pass through a silt trap and Class 1 By-Pass Separator before being directed to a modular underground attenuation system. From here, the stormwater would be pumped to a manhole prior to discharge to the Feeghroe Stream. The proposed stormwater drainage design is included as Attachment 2.4. Stormwater from the roof areas would be directed to the rainwater harvesting tank onsite, and

stored for use in toilets and site landscaping. This tank would contain an overflow valve, which would be directed to the site's stormwater network.

Run-off from "dirty" yard areas, process waters and sewage from staff welfare facilities would be directed to the site's new WWTP, and to constructed integrated wetlands following treatment, discussed in detail in Sections 2.4.3 and 2.4.4.

The lairage area floor would be slatted, with slurry and any bedding material collected within the underground lairage tank. The contents of the lairage tank would be likely tankered offsite for landspreading, or alternatively directed for anaerobic digestion or composting as appropriate.

Grey-water, sourced from the final treated effluent sump, would be used for lairage and lorry washing activities, supplementing the groundwater / mains water supply. The water from lorry washing activities would be directed back to the WWTP, while washings from the lairage would be directed to the lairage tank.

Waste Management

The waste arising at the facility would come under the broad European category of LoW 02 01 wastes – Wastes from Agriculture, Horticulture, Aquaculture, Forestry, Hunting and Fishing, Food preparation and processing.

Wastes generated at the facility would be managed in order of priority in accordance with Section 21A of the Waste Management Act 1996, as amended, commonly referred to as the waste hierarchy. Wastes would be segregated as much as possible in order to avoid cross contamination. Where practicable, the generation of wastes would be reduced at source. Where it is not possible to avoid the generation of wastes, wastes would be sent for recycling or recovery as a priority. The generation of waste for disposal would be minimised as much as is practicable, and would be sent for incineration, with no general waste going to landfill.

Measures to prevent any significant effect of the proposed development on environmental parameters would be directed towards ensuring that the systems for collecting wastes and removing them from the site for appropriate treatment in authorised waste treatment installations would be adequate for that purpose.

Solid animal derived wastes produced are CAT 1, CAT 3 and packaging waste generated during the production process. From an economic viewpoint, loss management control would be utilised to prevent or recover as much product as possible, however a certain base loss is attributable to each process. The only waste that would be produced at the effluent treatment operations would be screenings from the Meva and Drum Screens, which are disposed of as CAT 1 waste.

All waste handling contractors and waste disposal facilities to be used by Banagher Chilling would be fully permitted (by Local Authorities) and/or licensed by the EPA as relevant. In addition, all transportation of waste materials from the site would be undertaken by contractors whom have valid Waste Collection Permits (WCPs) in place.

All waste would be stored in an area designated specifically for each particular waste and would be clearly labelled. All putrescible wastes would be stored in an area of hardstanding

that drains to the foul drainage network. It would be site practice that all putrescible waste be removed regularly as required.

Details of estimated waste generation and waste management are included in Section 16 Material Assets – Waste Management.

Rodent Baiting

It is important to control vermin, rodents and other pests on the site in order to prevent disease spread and potential public nuisance. Rodent control at the proposed development site would be managed by baiting in designated areas around the site.

A pest control contractor would be employed by the site to carry out rodent control measures. This would involve the placing of rodent baiting boxes at strategic locations throughout the site. The pest control contractor would inspect and remove the boxes as necessary. Baiting locations, along with an accompanying map, would be determined upon completion of the construction phase of the proposed development and consultation with the pest control contractor.

2.4.2 PROCESS DESCRIPTION

The main stages of meat production and processing at the facility are discussed below and outlined in Figure 2.5.

Lairage

Cattle scheduled for slaughter would be delivered to the site by road. On arrival, the documentation for the animals would be checked; only those animals having the necessary documentation would be accepted. The animals would be placed in livestock holding pens in the lairage. After unloading, the cattle delivery vehicles would be taken to the lorry wash area for washing before leaving the site. The lairage would include a slatted tank for the collection of slurry, and the area would be washed down daily to prevent the build-up of organic material on concrete surfaces. The site procurement procedure would ensure that the number of breaks in slaughtering processing would be minimised, by ensuring that there is a constant supply of animals to the slaughter floor.

Slaughter and Bleed Lines

Cattle would be stunned / killed in a purpose designed stun box using a captive bolt pistol. The animals are then hung by their back legs on an overhead rail system. The cattle then have the main arteries in their throats cut by trained slaughter operatives. Slaughter lines would normally only operate on weekdays (i.e. Monday to Friday), however, slaughtering may be undertaken at weekends for reasons such as casualty animals and demand.

Blood from slaughtered animals would collected by means of a dedicated collection system. The blood trough is designed to facilitate ‘squeegeeing’ of partially congealed blood into the blood collection system. There would be no additional bleed points on the slaughter floor. Blood would then be transferred from the blood trough to the blood storage tank, where it would be held until it is removed off site by tanker. Citric acid would be added to the blood removal system and blood would be chilled to aid coagulation of the blood so that it can be used for plasma removal.

Head, Horn and Hoof Removal
Heads, horns and hooves would be manually removed from cattle carcass using hydraulically operated cropping shears and would be sent to Specified Risk Material (SRM) skips for staining with blue dye.

Hide Removal
After bleeding, cattle have the mask and ear manually removed. After removal, the mask, which is classed as SRM, would be stored in dedicated storage areas and stained with blue dye before disposal. Hides would be removed from cattle by means of an automated hide puller system and stored pending removal off-site for further processing.

Trimming and Evisceration
Green offal (lungs, trachea and paunches) would be collected and taken for processing as pet food at off-site facilities. The spleen, intestines and pancreas are classed as SRM and would be stained with blue dye and sent to the relevant skips. Gut (paunch) contents would also be removed at this stage and stored for collection by a contractor for land-spreading. The respiratory, pulmonary and digestive organs would then be removed and the resulting offal sent for disposal or further processing as required. Red offal (heart, liver and kidneys) would be removed and sent to the Red Offal processing area.

Red Offal Further Processing
Further to being initially chilled, red offal would be trimmed, packed, labelled and weighed and sent to the chill for storage. This process may produce some waste packaging such as broken boxes, backs of labels, transit packaging for the packaging materials etc. and as these volumes are so small they would be treated as general waste.

Carcass Quartering
After the removal of offal, the cattle carcasses would be split along the spine using purpose designed electric saws. The spinal cords would then be removed from the carcass using a vacuum suction system. The spinal cords are classed as SRM and would be stained with blue dye and sent to the correct SRM skip. Each side would be cut, resulting in beef quarters. Following quartering, the beef quarters would be sent to the chill.

Chilling
The beef quarters would be placed in chilled storage prior to deboning. Meat would be kept in chilled storage, at between 0-5°C, before being transferred to the de-bone area.

De-boning
Beef quarters would be de-boned, with bones directed to the designated bones skip. The product would then be weighed and inspected, before being packaged and palletised.

Freezing
The final product would be sent to the coldstore, in preparation for dispatch.

Cleaning
Procedures would ensure that residual material would be removed from floors, water would be used efficiently and employees would be trained in the handling and making up of working solutions and their applications.

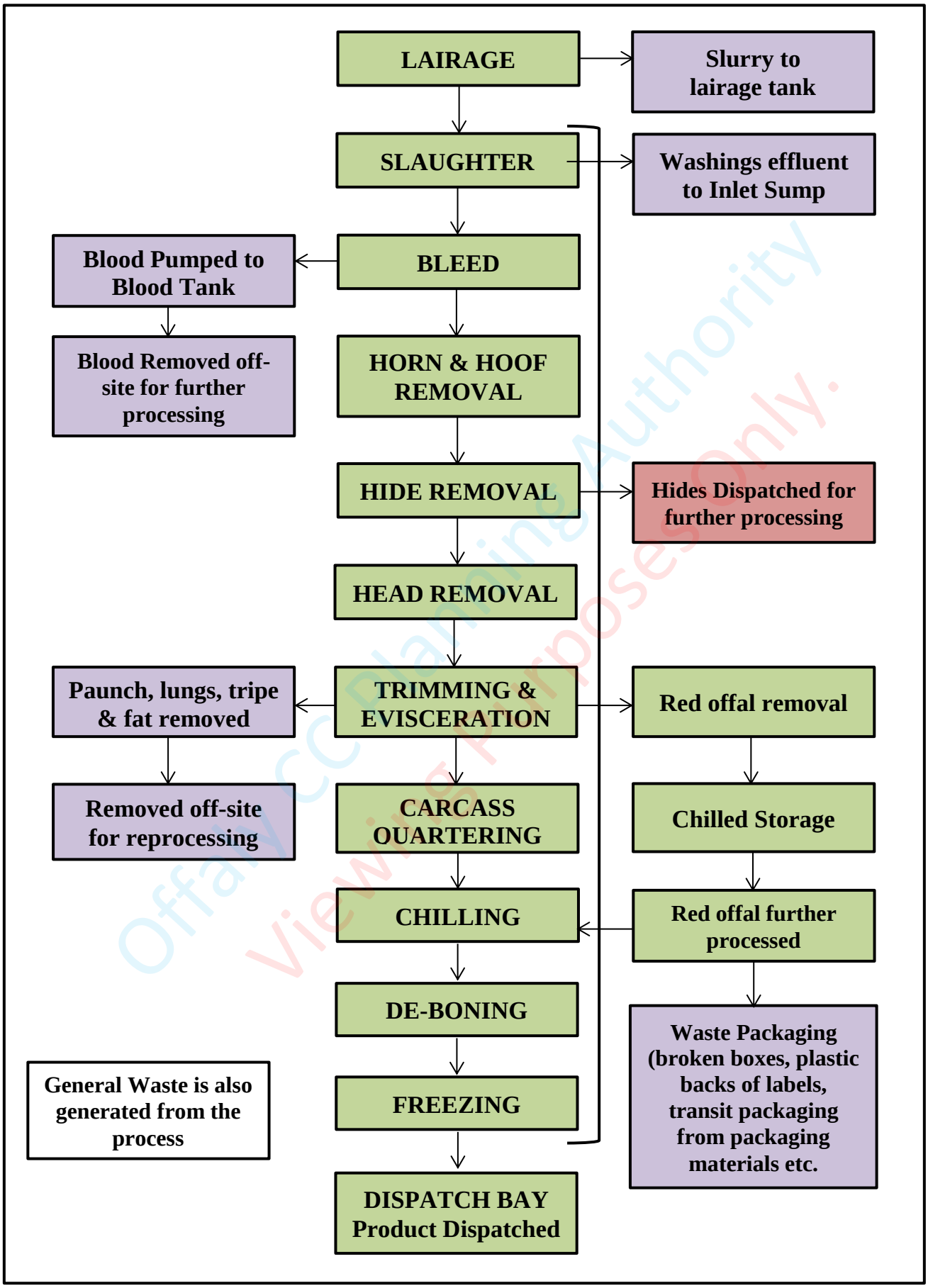

Figure 2.5: Process Flow Diagram

2.4.3 PROPOSED WASTEWATER INFRASTRUCTURE AND PROCESS

Banagher Chilling Limited are proposing to extend the existing on-site effluent system to provide treatment for the process effluent produced at the facility. The proposed layout for the WWTP can be seen in Figures 2.6 and 2.7.

Banagher Chilling Limited are proposing to develop a WWTP designed for a maximum capacity of 15,667 P.E. (where 1 P.E. = 64 g BOD / person / day) and 250 M^3 per day, and propose to discharge the final treated effluent to the Feeghroe Stream, which travels along the western site boundary.

Effluent generated on the site would comprise of wash-down of the production floor, drainage from dirty yard areas, drainage from the floor of chill areas, domestic effluent and centrate return from fertiliser by-product (belly-grass) dewatering.

All process drains, domestic drains and dirty yard surface water drains would be directed to the on-site effluent treatment plant and would firstly enter the raw effluent inlet sump.

The effluent treatment plant would consist of the following stages;

A. Primary Treatment

- Raw inlet sump,
- Meva Screen,
- Drum Screening,
- Balance Tank,
- Dissolved Air Flotation (DAF) Unit,
- Sludge Holding Tank,
- Sludge Screw Press,
- Grey water tank (final effluent re-use tank),

B. Biological Treatment

- Anoxic Tank,
- Aeration Basins x 2,
- Clarifier,
- Sand Filter (Tertiary treatment).

These stages can be described in more detail as follows:

A. Primary Treatment

The first stages of the primary treatment plant, the raw inlet sump and meva screen would be located to the back of the main factory. The drum screen, balancing tank, DAF unit and sludge press would be located in the designated effluent plant compound towards the north/west boundary of the facility.

The proposed primary effluent plant would comprise of the following stages:

A.1. Raw Inlet Sump

Raw process effluent, process wash waters, domestic effluent from the main production building and yard drainage from contaminated yard areas would be collected via a network of process drains and drain to the raw inlet sump.

A.2. Meva Screen

Located inside the inlet sump, a 20 M^3/hour meva screen with 5mm openings would be connected to the inlet pipe and receive effluent from the factory. This would be designed to remove all gross contaminants to prevent build-up of rejects and blockages in the effluent treatment equipment and piping. The Category 1 screening materials would be transferred to dolavs and from there to the Category 1 trailer in the main facility yard.

A.3. Drum Screen

Effluent from the inlet sump would be pumped to a 20 M^3/hour drum screen located in the main effluent treatment area, at which point, further secondary fine screening (1 mm) would take place to remove additional solids from the wastewater. This would be designed to remove all gross contaminants to prevent build-up of rejects in the balance tank and blockages in the effluent plant equipment and piping. Drum screen solids would be collected in dolavs which would be regularly emptied into the CAT 1 waste trailer in the main facility yard.

A.4. Balancing Tank

The proposed Balance Tank (12m diameter x 4.5m high) would have a maximum operating volume of 500 M^3. This would be an over-ground, glass-lined steel tank, with adequate mechanical propeller-type mixing provided. The tank would be a covered tank, with ventilation provided to an adjacent odour carbon scrubber in order to prevent potential odour emissions.

This new balance tank would provide storage capacity to buffer the effluent composition/loading and balance out flow fluctuations from the plant in order to facilitate the treatment of effluent via the DAF and biological stages at a steady rate. The balance tank would provide for approximately 2 days retention at the plant maximum hydraulic capacity of 250 M^3 per day.

The flow to the DAF unit would be maintained under flow control via a flow control valve in the feed line and an ultrasonic level sensor / controller on the balancing tank, which would be linked to a main control SCADA system.

A.5. DAF Unit

The DAF unit would treat the screened and balanced effluent. Solids would be removed from the raw effluent using a chemical programme with a coagulant and flocculent, followed by diffused air floatation. pH control would be achieved by the controlled addition of acid and caustic into the DAF inlet point as required.

The DAF unit would be designed to accept flows of 25 to 30 M^3 per hour. The aeration system would be sized to optimise fat removal and sludge concentration.

Treated effluent would be pumped to the anoxic tank for further biological treatment.

The DAF sludge would gravity feed into a sludge transfer tank/trough which would form an integral part of the DAF unit. The sludge transfer tank would be fitted with duty/standby sludge pumps and the level in this tank would be controlled by starting and stopping the duty pump between levels. Sludge would be fed from the DAF sludge transfer tank into the sludge holding tank.

A.6. Sludge Holding Tank

A 200 M^3 sludge holding tank (8m diameter x 4m high) would be required to store the DAF sludge and biological activated sludge prior to on-site dewatering and then off-site treatment. This would be an over-ground, glass lined steel tank, with adequate mixing (2.5 Kw/hr submersible mixer). The tank would be covered with ventilation provided to an adjacent odour carbon scrubber in order to prevent potential odour emissions.

At the proposed maximum 250 M^3/day effluent capacity, an estimated maximum 5 tonnes of DAF sludge (250*850mg/l = 212 Kgs = 5 tonnes @4% solids) and 30 tonnes of biological sludge (solids concentration of 1%) would be created daily.

This would be collected by a registered contractor for off-site treatment, such as anaerobic digestion, composting or land-spreading. Any land-spreading would be required to be completed in compliance with a Nutrient Management Plan in compliance with the Nitrates Regulations (S.I. 605 of 2017).

A.7. Sludge Screw Press

A sludge screw press is structured with a filter element that consists of two types of rings: a Fixed Ring and a Moving Ring; and a screw that thrusts the filter element and transfers and pressurizes the sludge. The gaps between the rings and the screw pitch gradually get narrower towards the direction of sludge cake outlet and the inner pressure of the filter element increases due to the volume compression effect, which thickens and dewaters the sludge.

The proposed sludge press would have the capacity to process 10 M^3/hour of sludge, producing a sludge cake at 20% solids content. This would result in 5 tonnes of dewatered sludge produced daily.

B. Biological Treatment

B.8. Anoxic Tank

The anoxic tank (12m x 6.5m high) would have a maximum operating volume of 700 M^3. This would be an over-ground, glass-lined steel tank, with an internal submersible mixer in order to ensure adequate treatment of all inflow.

Anoxic Mixers are used in de-nitrification basins in waste water treatment plants. The process involves the de-nitrification of waste streams through the use of bacteria which breaks down

the nitrate in the waste to use as an oxygen source (energy source). This breakdown of nitrate from the waste stream releases oxygen and nitrogen gas. The oxygen is consumed by the bacteria and the nitrogen gas releases to the atmosphere. The waste stream then has acceptable nitrogen levels so the water can be discharged into the environment (streams, ponds, lakes, etc.).

In the anaerobic/anoxic tank, denitrification would take place by mixing the food source (DAF out-flow), microorganisms (return activated sludge from clarifier) and nitrates (aeration tank mixed liquor return loop).

Mixed liquor containing nitrates would be pumped and recirculated from the aeration tanks back to the anoxic tank.

The anoxic tank would contain a submersible mixer to allow constant mixing of the tank contents. The nitrates would be converted to nitrogen gas and available oxygen (denitrification) in this tank. After this processing, the effluent would flow to the biological aeration tanks.

B.9. Aeration Tanks

The two aeration tanks, when constructed, would be arranged in a split flow format, where the effluent from the anoxic tank can be divided equally between both aeration tanks. The aeration tanks (11m x 5.7m high) would have a maximum operating volume of 500 M^3 each. These would be over-ground, glass-lined steel tanks, with adequate diffused-bubble aeration/mixing in order to ensure adequate oxygen for the microbial population.

This is where the biological breakdown of the effluent takes place. The aeration tanks would be fitted with an air diffuser network and three air blowers which run as duty, duty and assist to manage any high loading on the treatment plant from the effluent. The speed and operation of the blowers would be varied by the plant control system in response to signals received from the dissolved oxygen sensor mounted in the aeration basin. This sensor would also be linked to the sites building management system which allows continuous monitoring and real time readings.

Each aeration tank, anoxic tank and sludge tank would have manual valves between each tank which would enable tanks to be isolated / segregated if required.

B.10. Clarifier

The proposed clarifier would act as a settling tank, diameter 8 metres x height 2.5 metres.

The purpose of the secondary settlement tank is to:

- Remove suspended solids.
- Return settled sludge to the aeration tank.

Success in meeting the outflow quality objectives of the treatment system depends on the settleability of the mixed liquor. While settlement of solids is prevented from occurring in the aeration tank by the action of the aeration equipment, the secondary settlement tank is designed to promote settlement.

Design overflow rates are lower in a secondary settlement tank than in a primary settlement tank. Overflow rate are typically 21-28.8 m^3/m^2/day. Adequate retention time must be allowed in the settlement tank to allow good separation of the mixed liquor. Other design parameters to be considered include tank depth weir placement and shape, MLSS, sludge settleability and draw-off rate and solids flux. Solids (or sludge) mass flux, expressed as kg/m2h, bases the design of the settlement tank on the solids loading rate, the settleability of the sludge (SSVI) and the return sludge flow-rate.

Design Solids loading ($kg/m^2/h$) = $\frac{\text{Solids applied (kg/h)}}{\text{Clarifier surface are (m2)}}$

For activated sludge, the solids loading rate is typically 3.0 to 6.0 $kg/m^2/h$.

Mixed liquor from the aeration tanks would flow to the clarifier via an inter-connecting over-ground pipe. The heavier sludge settles to the bottom of the clarifier while the lighter clear water flows over the weir launder to a pump sump where it would be pumped through the column sand filter.

Waste sludge would be pumped from the clarifier to the sludge holding tank for a set time daily. Otherwise, activated settled sludge would be continuously returned to the anoxic tank via sludge return pumps.

B.11. Sand Filter – Tertiary Treatment

Clarified effluent from the clarifier would be pumped through a column sand filter. This is a simple sand filtration system, with a diameter of 2.5 M and height of 5 metres.

A sand filter is mainly used to reduce the suspended solids in the final effluent. Suspended solids removal at this stage would also lower the COD/BOD level of the effluent.

The method of backwash is important and the most common and acceptable method is a continuous backwash system.

Treated effluent from the sand filter would gravity feed to a final discharge sump.

12. Final Sump

From the final sump, treated effluent would be pumped to the constructed integrated wetlands (ICW) system using two submersible pumps (duty / stand-by) operated on ultra-sonic float level probe.

The expected dimensions of the final effluent sump would be 3M x 3M x 2M deep, giving a total capacity of 18 M^3. The sump would be split into two chambers, the first chamber over-flowing into the second one. Grey water would be pulled from the first chamber when required.

The final sump would have an emergency return connection to the balancing tank, providing storage for emergencies or other such contingency purposes.

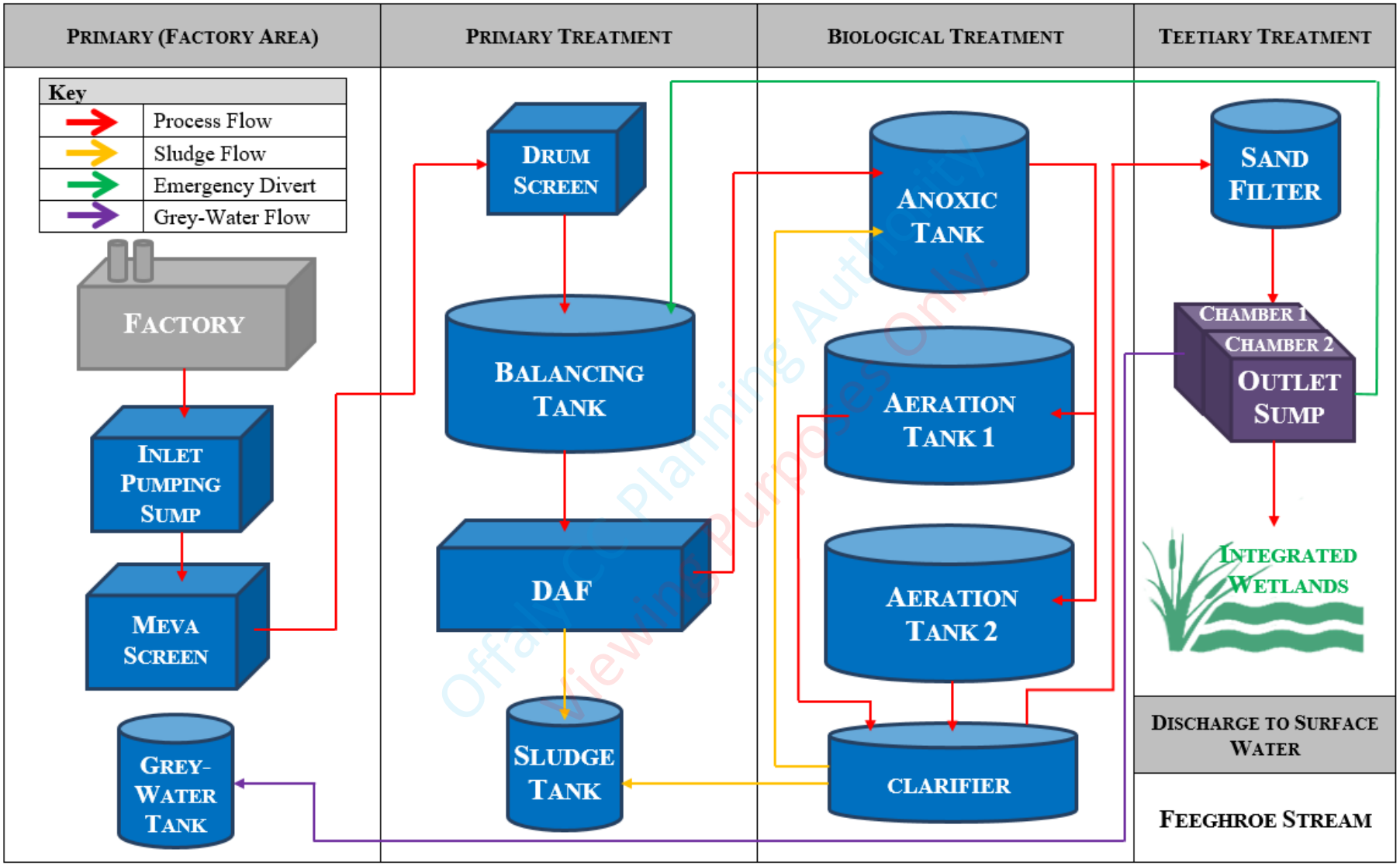

Figure 2.6: Proposed Stages of Wastewater Treatment and Associated WWTP Plant

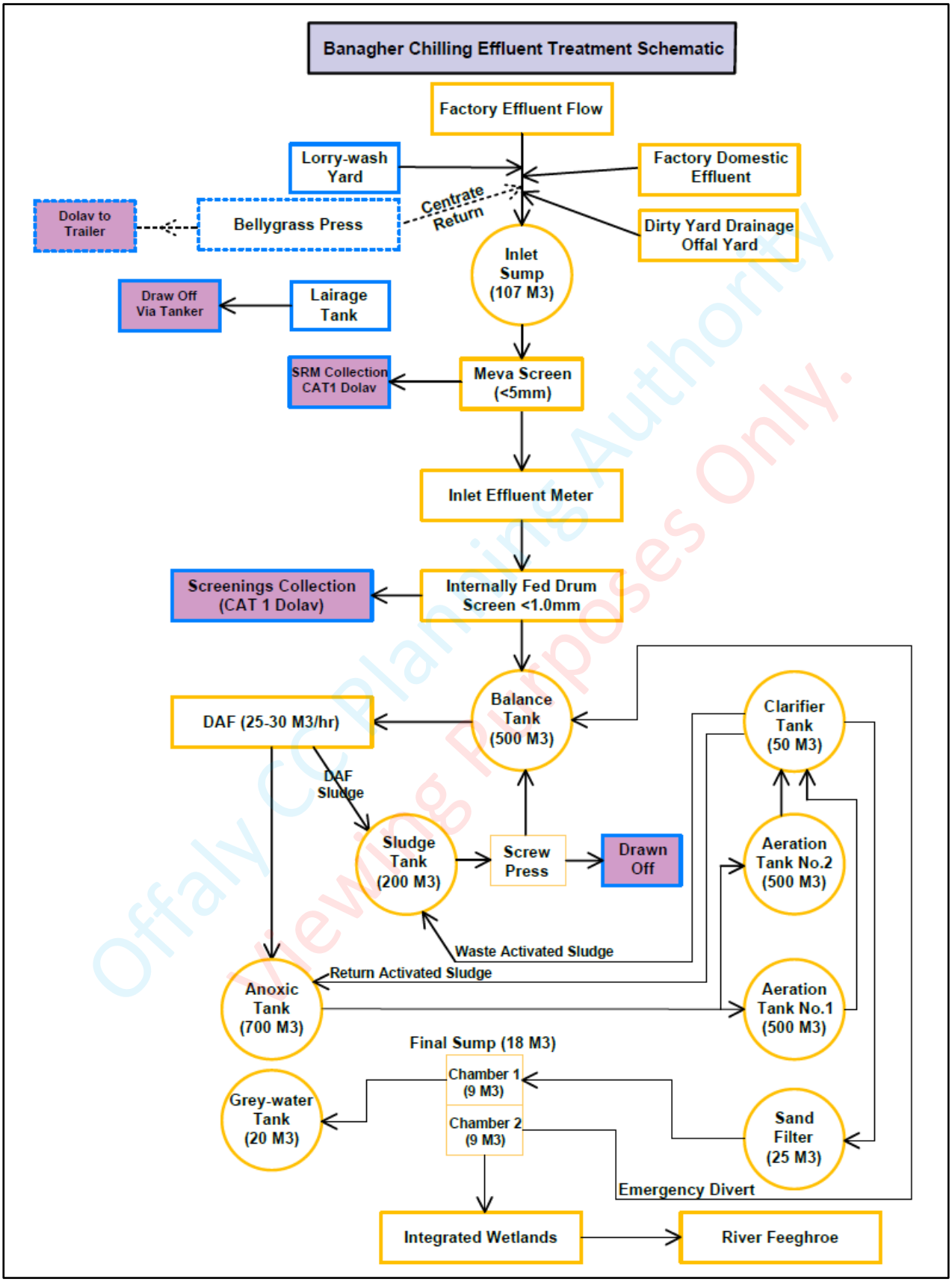

Figure 2.7: Schematic of Proposed Effluent Treatment System

2.4.4 PROPOSED INTEGRATED CONSTRUCTED WETLANDS

Following treatment at the proposed WWTP, treated effluent would be pumped to the proposed ICW system. The ICW system has been designed by Vesi Environmental Limited., who have prepared a Planning Report (Ref. 19315_3_PlanningReport) and Preliminary Operation and Maintenance Plan (Ref. 19315_3_O&MPlan) to accompany this planning application. The proposed ICW layout by Vesi Environmental has been included in Attachment 2.3.

The ICW configuration applied at the proposed development site comprises of a five-treatment cell system. The system is designed with cascading levels to enable gravity flow across the system, and has been designed to maximise the distance over which the influent must travel for optimum residence time and treatment. The treated effluent from the WWTP would be pumped to the first ICW cell, and from here would flow sequentially through the remaining cells via interconnecting pipework. The final treated effluent from the ICW would be directed to the Feeghroe Stream, located immediately to the west of the proposed ICW system.

The ICW would serve as a tertiary treatment system, and would treat up to 250m^3 of wastewater a day from the WWTP. An ICW treatment area of 150m^2 per m^3 of influent has been determined by Vesi Environmental to be appropriate to satisfy the required treatment performance and achieve proposed licence limits (discussed in Section 2.4.5). The functional wetland treatment area achieved in the proposed design is 40,000m^2, as detailed in the table below.

Table 2.3: ICW Treatment Cell Areas

CELL NO.	CELL AREA (M^2)
Cell 1	7,000
Cell 2	7,935
Cell 3	9,620
Cell 4	7,740
Cell 5	7,705
Total ICW Area	40,000

Each cell would be densely planted with a selection of emergent plant species, including Reed Sweet-grass (*Glyceria maxima*), Common Sedge (*Carex riparia*), Reed Mace (*Typha latifolia*), Lesser Reedmace (*Typha angustafolia*) and Yellow Flag (*Iris pseudacorus*), along with a quantity of other suitable emergent plant species. The final cell, Cell 5, would differ from Cells 1-4, in that it would also be planted with a mixture of deciduous and evergreen tree species on mounds amongst the emergent wetland plants. This arrangement is designed to reduce the overall outflow from the system. The proposed plants would assist in the many physical, chemical and biological processes that occur within the wetland system to reduce the through-flowing water of its various potential pollutant contaminants. The vegetation would also play a very important role in reducing the volume of final treated effluent discharging from the ICW to the receiving waters, especially through the process of evapotranspiration.

The operational water depth within each cell would be between 150 mm and 200 mm, with capacity to allow for increased water depth during high rainfall events. The treatment wetland cells would have a minimum embankment height of 1m.

The maximum expected discharge flow from the ICW system would be variable due to the open nature of the system. The flow rate into and out of the system would at times be similar, however it is likely that there would be no discharge from the ICW during summer months, with higher flows expected during winter months coinciding with typically heavier rainfall events.

Additional landscaping is proposed around the ICW site, using native trees and shrubs common to the area, including Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*), Birch (*Betula* spp.), Alder (*Alnus glutinosa*) and Willow (*Salix* spp.).

2.4.5 DISCHARGE OF TREATED EFFLUENT

Following treatment, it is proposed to discharge to the Feeghroe Stream. Table 2.4 details the proposed effluent quality following treatment onsite.

Table 2.4: Proposed Final Effluent Quality

PARAMETER	UNITS	FINAL EFFLUENT QUALITY
Volume Flow	M^3/Day	250
pH	pH Units	6 - 9
BOD_5	mg/l O_2	5
COD	mg/l O_2	50
Orthophosphate	mg/l PO_4-P	0.2
Nitrogen	mg/l N	5
Total Ammonia	mg/l N	0.4
Suspended Solids	mg/l SS	20

The following table indicates the expected effluent quality at each stage of the proposed treatment processes.

All data in rows 2 to 6 is based on average industry standards for the meat slaughtering sector.

Table 2.5: Expected Effluent Quality per Treatment Stage

1	2	3	4	5	6	7	8
PARAMETER	**RAW EFFLUENT (INDUSTRY AVERAGE)**	**AFTER DAF (INDUSTRY AVERAGE)**	**AFTER BIOLOGICAL CLARIFIER (EXPECTED)**	**AFTER BIOLOGICAL FILTER (EXPECTED)**	**AFTER ICWS (EXPECTED)**	**CURRENT RIVER QUALITY**	***PROPOSED LICENCE LIMITS**
Flow	250 M^3/day	250 M3/day	250 M3/day	250 M3/day			250 M3/day
pH (units)	7.11	7.17	7.0	7.0	7.0	7.0	6 - 9
BOD ($mg/l\ O_2$)	4,000	1,500	10	10	2.0	2.3	5
COD ($mg/l\ O_2$)	8,000	3,000	50	35	4.0	85	50
Total Phosphorus (mg/l)	100	15	4	2.5	0.075		
Orthophosphate ($mg/l\ PO_4$-P)	25	5	2.5	2.0	0.06	0.01	0.2
Total Nitrogen (mg/l N)	400	350	<10	10	2.4	3.67	5
Total Ammonia (mg/l N)	300	275	0.5	0.5	0.14	0.43	0.4
Total Suspended Solids (mg/l)	3,000	150	15	5	1	4.5	20

2.4.6 ORGANIC FERTILISER BY-PRODUCT MANAGEMENT AND STORAGE

Organic fertiliser by-product would include belly-grass, tank contents from the lairage tank, DAF sludge and biological sludge from the clarifier (Waste Activated Sludge). Lorry washings would be directed to the onsite effluent treatment plant.

Local hauliers, registered on the Department of Agriculture, Food and the Marine (DAFM) Animal By-Products (ABP) Transport Register, would be contracted for the collection of organic fertilisers from the facility.

The proposed development would comply with the Nitrates Regulations with regards the required storage facilities for organic fertiliser by-product. As is standard practice for the industry, exclusive use of appropriate offsite storage facilities would be secured with the by-product contractor.

The regulations require that storage facilities shall be maintained free of structural defect and be maintained and managed in such manner as is necessary to prevent run-off or seepage, directly or indirectly, into groundwater or surface water.

The European Union (Good Agricultural Practice for Protection of Waters) Regulations 2017 (S.I. 605 of 2017), require that storage facilities equal or exceed the capacity required to store all such livestock manure produced on the holding during the period specified in Schedule 3.

The required storage period for organic fertilisers for Co. Offaly, as per Schedule 3, is 18 weeks (i.e. the closed period of the 15th October to the 12th January plus 5 weeks).

The following table details the required storage volumes for organic fertiliser by-products generated at Banagher Chilling Ltd in an 18-week period.

Table 2.6: Required Storage Volume for Organic Fertiliser By-Products

ORGANIC FERTILISER BY-PRODUCT	GENERATION PER HEAD / DAY (M3)	GENERATION PER DAY (M3)	HEAD OF CATTLE / DAY	TOTAL STORAGE REQUIRED IN 18 WEEK PERIOD (M^3)	MAXIMUM PRODUCED PER ANNUM (M^3)
Lairage	0.0371	-	140	**655**	1,893
Bellygrass (wet)	0.12	-	140	**2,117**	6,115
DAF Sludge	-	5	-	**630**	1,820
Activated Sludge	-	30	-	**3,780**	10,920
Total Storage Volume Required	-	-	-	**7,182**	**20,748**

Therefore, an estimated maximum of 7,182 m^3 of storage volume would be required for organic fertilisers produced at the site. This storage requirement may be mitigated through the use of dewatering technologies.

2.4.7 SITE OPERATION AND MANAGEMENT

Site Personnel and Hours of Operation

Slaughtering activities at the facility would typically operate Monday to Friday. However, slaughtering may be undertaken at weekends for reasons such as casualty animals and demand. Upon completion of construction works, it is estimated the proposed development would provide employment for 110 personnel. Table 2.7 below provides a breakdown of the estimated breakdown of staff and working hours.

Table 2.7: Site Personnel and Working Hours

SITE PERSONNEL	ESTIMATED NO. OF STAFF	START TIME	FINISH TIME
Slaughtering and boning staff	80	7am	5pm
Administration Staff	20	9am	5pm
Cleaning Staff	10	5pm	10pm

Environmental Management

An Environmental Management System (EMS) would be put in place at the Banagher Chilling Limited facility. The form of the EMS would be based upon the principals of the ISO 14001 standard and would include the following:

- Environmental Policy;
- Management & Reporting;
- Schedule Objectives and Targets;
- Environmental Management Programme;
- Corrective Action;
- Awareness and Training;
- Environmental Management System Documentation;
- Communications Programme;
- Emergency Response and Accident Prevention Policy;
- Maintenance Programme;
- Efficient Process Control.

An Environmental Management Programme (EMP) would be put in place to implement the EMS onsite, with objectives and targets set. Objectives and targets would be reviewed regularly as part of on-going management of the facility.

Banagher Chilling Limited would put in place an experienced management team and operators at the facility, with the relevant meat industry experience.

Estimated Traffic Movements

The estimated traffic journeys (where a journey represents the travel to and from the site) for the operational phase are included in the table below. As is common practice, employee and visitor journeys have been calculated using a 1.8 car occupancy rate.

Table 2.8: Estimated Traffic Movements

PURPOSE	JOURNEYS	FREQUENCY: PER DAY / WEEK / MONTH	VEHICLE
Delivery of Cattle to Site (Variable)	2	Day	Large HGV
	2	Day	Rigid Large Truck
	5	Day	Towed Trailer
	15	Day	Towed Trailer
Finished Product Dispatch	5	Day	HGV 40 foot
Fuel Delivery	2	Month	Rigid Tanker
Waste Removal	3	Day	Rigid Truck
Sludge Removal	1	Day	Rigid Tanker
Chemical Delivery	1	Month	Rigid Truck
Staff	61	Day	Car
Visitors	5-6	Day	Car

2.4.8 CONSTRUCTION OF PROPOSED DEVELOPMENT

Outline Construction Environmental Management Plan

An Outline Construction Environmental Management Plan (CEMP) has been prepared as part of this application. The purpose of the Outline CEMP is to communicate key environmental obligations that apply to all construction site personnel and sub-contractors, while carrying out construction activities as part of the proposed development.

The outline CEMP defines the approach to environmental management at the proposed development site during the construction phase, outlining the work practices, construction procedures and responsibilities to be undertaken during the construction phase. The CEMP outlines, where necessary, the control measures that would be required to avoid, minimise or mitigate potential effects on the environment and surrounding area.

Construction Schedule

The approximate construction period for the proposed development is estimated to be 18 months, with hours of operation from 7am to 7pm Monday to Friday, and 8am to 2pm on Saturdays. Upon receipt of planning approval, the construction schedule would be finalised at a detailed design stage. The proposed development would include the following main construction activities:

General

- Mobilisation of personnel and equipment to site;
- Establishment of temporary site compound, including designated materials storage area;
- Site inductions and relevant training;
- Erection of health and safety / construction works signage;
- Installation of external lighting;
- Site clearance, including vegetation removal;
- Installation of silt control features where appropriate, such as silt fencing.

Upgrade Works to Existing Facility, Construction of Extensions and Ancillary Structures

- Excavations and earth moving activity;
- Stockpiling of topsoil for use in reinstatement / landscaping;
- Development of drainage network, water supply and services;
- Upgrade works to existing abattoir at the site;
- Pouring of building foundations;
- Construction of new buildings / extensions to existing facility;
- Construction of bases / plinths for proposed WWTP tanks;
- Construction of new WWTP tanks;
- Installation of interconnecting pipework;
- Installation of external lighting;
- Construction of internal access roads and car parking facilities;
- Construction of external yard hardstanding.

Integrated Constructed Wetlands

- Excavations and earth-moving activity;
- Stockpiling of excavated soils for use in enclosing embankments around each pond and for use in cell lining;
- Distribution of soils over the base of each cell;
- Placement of headwalls, pipe laying and connections to inlet and outlet chambers;
- Planting of cells with emergent vegetation;
- Landscaping of ICW cells;
- Construction of access roads on the ICW embankments and construction of access roads from the proposed facility to the ICW system.

Reinstatement / Landscaping

- Construction and landscaping of earth berm to the front of the proposed development site;
- Removal of temporary construction site compound;
- Reinstatement of temporary construction compound using stockpiled topsoil;
- Finishing / landscaping of proposed development site, in accordance with the Landscape Plan prepared by Macro Works Ltd.;
- Removal from site of any excess soils remaining following reinstatement and landscape works;
- Removal of silt control features once soil stabilisation has taken place / temporary storage of excavated materials has been removed.

Main Stages of Construction

Site Clearance and Excavations

During site clearance works, the top layer of vegetation of the proposed development footprint would be removed and would be either stored for re-use in landscaping activities at the development site upon completion of construction works, or, in the instances of larger vegetation (i.e. shrubs and trees) would be removed from the development site and appropriately disposed of to a licenced waste contractor.

To facilitate the proposed development, approximately 985m of hedgerow would require removal. This would include approximately 290m for the proposed abattoir building, 265m for the ICWs and 430m to accommodate site access sightlines and road widening works. It should be noted that a section of the 265m hedgerow scheduled for removal along the eastern boundary of the ICW system may not require removal once the ICW system layout and site layout have been finalised at the detailed design stage. However, for the purpose of the EIAR, it has been assumed that this section would be removed.

Where possible, no hedgerow removal works would be undertaken during the bird nesting season, from the 1st of March to the 31st of August. Where removal works are required during the bird nesting season, the sections of hedgerows which require removal would be inspected for the presence of breeding birds prior to any clearance works taking place. Where nests are identified, a qualified ecologist would determine if a licence from the National Parks and Wildlife Services (NPWS) is required, or if it is possible to establish a suitable buffer zone around the active nest.

During excavation works, subsoil and topsoil would be temporarily stored for re-use in landscaping and reinstatement where possible. Any excess soils would be transported offsite by a licenced contractor for disposal at a suitably licenced facility. The storage of excavated material on site would be temporary, until the completion of site reinstatement and landscaping activities.

Archaeological monitoring would be undertaken during excavation works and earth moving activities to ensure that should any archaeological features be present, they would be

identified and recorded, and the appropriate course of action taken. A cultural, archaeological and architectural assessment has been included as part of this EIAR, prepared by Shanarc Archaeology.

Provision / Upgrade of Services

Following site clearance and excavations, works would commence on the installation / upgrade of underground utilities to the site required for water supply, wastewater, electricity and telecommunications.

As discussed in Sections 2.4.1 and 2.4.3, new stormwater and effluent drainage systems would be constructed. The new stormwater drainage system would comprise of a silt trap, by-pass separator and modular underground attenuation tank, prior to being discharged to the Feeghroe Stream. Run-off from "dirty" yard areas, process waters and sewage from staff welfare facilities would be directed to the site's new WWTP, with final treated effluent directed to ICWs prior to discharge to the Feeghroe Stream.

Artificial outdoor lighting would be installed along the internal access network and within the main site yard. The lighting design for the development would be determined at a detailed design stage.

Construction of New Buildings, New Tanks and Upgrade Works to Existing Structures

Following site clearance, excavations and works for the provision of services, works would commence on the construction of the extensions to the existing abattoir and lairage area, the construction of ancillary development including the Security Hut, ESB Substation, WWTP Compound, ICWs, Water Treatment Building, the construction / upgrade of drainage systems and the construction of site hardstanding. The pouring of concrete foundations and bases / plinths would be supervised at all times.

Site Reinstatement and Landscaping

The reinstatement and landscaping process shall commence upon completion of construction activities at the proposed development site. Reinstatement and landscaping activities would include the levelling of the development site with stockpiled soil from excavations where possible, the removal of the temporary site compound and associated plant, equipment and materials, the reseeding of exposed soil where required and the planting of trees and shrubs. Reinstatement and landscaping activities would also include the removal of silt control features, once soil stabilisation has taken place.

A landscaping plan has been prepared for the proposed development by Macro Works Ltd., and accompanies the planning application (Document Ref. LD.BNGHMPF 1.0). As noted above, hedgerow removal works would be required to accommodate the development. Landscaping activities would include replacement planting for approximately 400m along the southern site boundary, set-back from the site boundary and 115m along the eastern boundary of the ICW system. Native species, including Hawthorn, Blackthorn and Holly (*Ilex aquifolium*) would be used. The landscape plan also includes a section of proposed woodland planting adjacent the internal site access to the rear yard, which would be comprised of native species including Pendunculate Oak (*Quercus robur*), Scots Pine (*Pinus sylvestris*), Alder,

Birch, Wild Cherry (*Prunus avium*), Crab Apple (*Prunus padus*), Hazel (*Corylus avellana*), Holly, Hawthorn, Blackthorn and Spindle (*Euonymus europaeus*).

Additional landscaping is proposed around the ICW site, using native trees and shrubs common to the area, including Hawthorn, Blackthorn, Birch, Alder and Willow.

Temporary Construction Site Compound

A temporary site compound would be established by the construction works contractor for the storage of all machinery and plant when not in use, dedicated storage for oils and fuels required for construction plant and for the re-fuelling of plant. The temporary site compound would also house the temporary site offices and construction staff welfare facilities including a canteen, toilets and first aid supplies. The construction works contractor, once appointed, would determine the location for the temporary site compound at the development site.

Works to establish the compound would include removing and storing the existing topsoil on site for reinstatement and constructing a new hardcored area by laying a geotextile membrane over the entire compound area and covering with a suitable layer of graded granular material / hardcore.

Portable cabin structures would be used to provide the temporary site office and staff canteen. A storage container would be provided for the storage of construction equipment, tools and materials required for construction. All fuels and oils required would be stored within a designated bunded area, located within the storage container or at an alternative designated location with the temporary site compound.

Self-contained port-a-loo toilets / holding tanks would be installed at the temporary compound, and would be emptied by a licenced contractor on a weekly basis or earlier if required.

The site compound would also be the designated location for waste receptacles onsite. Waste would be segregated where possible and placed within recycling and general waste skips provided by a licenced waste contractor.

During the construction phase, a portable water supply would be provided via a mobile water tanker, or alternatively a connection to the mains water supply would be obtained. Power would be provided via the existing electricity supply to the site. Telecommunications would be provided using mobile phones and broadband.

Following the completion of construction works, the temporary structures, hardcore and geotextile would be removed and the area landscaped or reinstated as required using the stockpiled topsoil.

2.5 CONSULTATION

Consultation has been undertaken with the following statutory bodies and competent authorities in relation to the potential impact of the proposed development. Details of any concerns raised relating to the EIAR are outlined in the table below. Concerns have been addressed as part of this EIAR.

Table 2.9: Consultation with Statutory Bodies and Competent Authorities

STATUTORY BODY / AUTHORITY	PERSONNEL	DATE OF MEETING / CONTACTED	COMMENT
Inland Fisheries Ireland (IFI)	Limerick Office	07/03/2019	A copy of the correspondence is contained in Attachment 9.2. No response has been received to date.
Development Applications Unit (DAU), Department of Culture, Heritage and the Gaeltacht	Manager of DAU	05/03/2019	A copy of the correspondence is contained in Attachment 9.2. A response was received from the DAU on the 14th of June 2019. The recommendations within the response letter have been incorporated into this EIAR and relevant documents.
Offaly County Council	Mr. Andrew Murray Mr. Joe Dunican Mr. Hugh McConnell Ms. Mary Hussey Mr. Aidan Grant Mr. Martin Quinn	04/02/2019	• Given that the proposed development is located in close proximity to a number of designated sites, an Appropriate Assessment would be required as part of the application. *A Natura Impact Statement has been prepared for the development and accompanies the application (Report Ref. PES_NIS_19_9201).* • The application should be undertaken at a detailed level, and should address all potential concerns. *The EIAR and associated documents have been undertaken at a detailed level. Where required, additional expertise was contracted.* • The L3010 road to the development site may require road widening works or passing bays to accommodate the development. *A Transportation Assessment Report has been undertaken for the development (Section 8), and recommends that road widening works are undertaken. Existing hedgerows would be removed and set-back to facilitate the necessary sightlines.* • A pre-condition road survey should be completed as part of the application. *A pre-condition road survey has been undertaken, and is included as part of this application.*

STATUTORY BODY / AUTHORITY	PERSONNEL	DATE OF MEETING / CONTACTED	COMMENT
Department of Agriculture, Food and the Marine	-	July 2018	Initial discussions. Banagher Chilling Limited will be the subject of an E.U. Licence to Operate a Meat Processing / Cold Store Establishment for specified activities under the European Communities (Food & Feed Hygiene) Regulations 2009 (S.I. No. 432 of 2009)
	-	04/12/2018	The applicant formally submitted a Notification of Intent form
	Ms. Eilish O'Brien (Regional Superintending Veterinary Inspector) Senior Veterinary Inspector	06/02/2019	DAFM Officials carried out a site inspection
	Ms. Eilish O'Brien (Regional Superintending Veterinary Inspector)	07/02/2019	Email correspondence noting that the applicant will contact the DAFM with additional drawings and details once received from the slaughter line contractor.

3.0 ALTERNATIVES

3.1 EXAMINATION OF POSSIBLE ALTERNATIVES

Schedule 6, Article 94 of the Planning and Development Regulations 2001 requires that:

Information to be contained in an Environmental Impact Statement shall include –

(1d) an outline of the main alternatives studied by the developer and an indication of the main reasons for his or her choice, taking into account the effects on the environment.

This section investigates the following alternatives to the proposed development:

- Alternative Location;
- Alternative Layout and Design;
- Alternative Process.

3.2 ALTERNATIVE LOCATION

Banagher Chilling Ltd. considered the option of constructing a new abattoir facility at a greenfield site. However, this was ruled out at an early stage as the preferred option was to upgrade and extend an existing abattoir facility which would have utility connections (removing the need and cost associated with connecting to the relevant utilities) and existing slaughtering and de-boning equipment in place.

Furthermore, as an established abattoir facility would be part of the existing landscape of the area, an extension and upgrade to the existing infrastructure was considered to have the potential to pose a lesser risk of generating a significant additional visual impact.

Banagher Chilling Ltd. assessed three existing abattoir facilities which could be expanded to provide a phased development of a large throughput primary beef processing plant. The potential sites assessed included the following:

- Ard Na Rí Meats Limited, Rathfeigh, Co. Meath;
- Glynn Meats Company Limited, Patrickswell, Co. Limerick;
- Ossory Meats, Banagher, Co. Offaly.

Each of the sites were assessed under the following criteria:

- Condition of the building;
- Condition of abattoir equipment;
- Site layout;
- Traffic and road network;
- Proximity of residential dwellings;

- Effluent treatment facilities;
- Ability to extend existing buildings.

The site at Banagher was chosen, as it gave the best potential to expand the existing facility into adjacent lands, which were large enough to accommodate the required expansion for the proposed development, the abattoir equipment was in good condition, existing effluent treatment / holding tanks are present which could be used for the proposed development, and there are few residential dwellings located within the vicinity. The Banagher site was also the most preferable in terms of the road network, with access to a regional road,

As part of the decision process, Banagher Chilling Limited considered the options for the treatment and discharge of treated final effluent from the facility. The site at Banagher was the most preferable, as the site had sufficient lands to accommodate a new waste water treatment plant (WWTP) and integrated constructed wetlands (ICW) system, and had the potential for the discharge of treated final effluent to a watercourse, the Feeghroe Stream. As the Feeghroe Stream passes along the western site boundary, the construction of a treated effluent rising main is not required.

3.3 ALTERNATIVE LAYOUT AND DESIGN

The layout and design of the proposed abattoir and extensions has been primarily based upon the existing structures and process requirements, as discussed below.

The layout and design of the proposed WWTP extension has been based upon feasibility, potential for environmental impacts, efficiency of wastewater treatment and operational cost.

The ICW system has been designed in order to achieve the required water retention and flow rates in each pond.

The proposed WWTP has been designed to ensure wastewater treatment would be as efficient as possible, while ensuring treated effluent would be of high quality. Tanks have been designed to ensure adequate storage and treatment capacity.

Measures to improve environmental risk at the effluent plant have been incorporated by design. These include placing the entire effluent treatment works within a constructed bunded concrete compound, with internal drainage directed to the Balance Tank. This would ensure that any spills within the area would be effectively contained and treated.

An emergency return line from the final effluent sump on the biological plant (stage 2), prior to discharge to the ICW system. Effluent which may be found to exceed licenced quality specifications would be redirected to the start of the effluent treatment plant for re-treatment.

Access for tankers to the balance tank and final effluent tank have also been included in the design as a redundancy safety measure in the unlikely event of a critical plant failure. This would allow for the tankering of effluent offsite as a final measure to ensure adequate management of site effluent in a worst case scenario.

With regards odour, tanks have been designed to reduce the potential for odorous conditions through the provision of adequate aeration / mixing systems. In order to minimise the potential for environmental nuisance emissions, the Balance Tank and Sludge Holding Tank have also been designed to be covered tanks, ventilated to a carbon odour scrubber unit. While the operation of the effluent plant would not be anticipated to have a significant noise impact offsite, pumps, motors and aeration equipment have been placed to avoid noise break out from the area, in so far as was practical.

To improve resource use on the site as a whole, a greywater tank has been included within the effluent plant. Greywater would be used onsite for lairage and lorry-washing in order to offset the use of abstracted groundwater.

3.4 ALTERNATIVE PROCESSES

The slaughtering and primal de-boning processes proposed for the development are standard for the industry, and take cognisance of the BREF document for Slaughterhouses and Animals By-products Industries (2005).

With regards wastewater generated from the proposed development, the option of tankering untreated wastewater to Banagher WWTP was considered. However, this was ruled out at an early stage as Banagher WWTP has no available capacity. Furthermore, the onsite treatment of wastewater would eliminate the potential negative impacts associated with the transport of raw effluent from the site (such as a risk of spillage and subsequent deterioration in water quality and increased vehicle emissions to air).

While alternative wastewater treatment processes are available, the biological treatment process is the standard for the industry. The biological treatment process is also noted by the BREF document for Slaughterhouses and Animals By-products Industries (2005) as being the best available technique (BAT).

The following table summarises BAT for the treatment of wastewater from slaughterhouses and animal by-products installations, as per Section 5.1.5 – Treatment of Waste Water, and the proposed implementation of these measures as part of the proposed WWTP development.

Table 3.1: BAT for Wastewater Treatment and Proposed WWTP Measures

BAT	PROPOSED WWTP DEVELOPMENT
Prevent waste water stagnation	Drainage would be laid with sufficient gradient to avoid stagnation and / or pumps would be used. Tanks would be installed with sufficient aeration and mixing to ensure stagnation does not occur.
Apply an initial screening of solids using sieves at the slaughterhouse or animal by-products installation	A meva screen with an aperture of <5mm would be connected to the inlet sump pipe. A drum screen would be installed before the proposed balance tank.
Remove fat from waste water, using a fat trap	A Dissolved Air Floatation (DAF) unit would be installed after the balance tank, with fats solidifying and floating at the top, allowing for removal.

BAT	PROPOSED WWTP DEVELOPMENT
Use a flotation plant, possibly combined with the use of flocculants, to remove additional solids	A Dissolved Air Flotation (DAF) would be installed to treat effluent from the balance tank. The DAF unit would remove solids using a chemical programme with a coagulant and flocculent, followed by diffused air.
Use a waste water equalisation tank	The proposed balance tank would provide storage capacity to buffer the effluent composition / loading and balance out flow fluctuations from the facility.
Provide a waste water holding capacity in excess of routine requirements	The balance tank would have sufficient capacity for approximately 2 days at the maximum hydraulic capacity of 250m^3. An emergency return connection would be installed from the outlet sump to the balance tank, providing storage for emergencies or other such contingency purposes.
Prevent liquid seepage and odour emissions from waste water treatment tanks, by sealing their sides and bases and either covering them or aerating them	Tanks would be lined and sealed as standard practice, and constructed on a base. Integrity testing would be undertaken every three years, as is best practice. Tanks would be mixed / aerated where necessary to minimise the potential for odour generation. The Balance Tank and Sludge Holding Tank would be covered and ventilated to an Odour Scrubber to prevent odour impacts offsite.
Subject the effluent to a biological treatment process	Effluent would undergo biological treatment via the aeration basins and the anoxic tank.
Remove nitrogen and phosphorus	Nitrogen removal would take place in the aeration basins and anoxic tank, through the use of bacteria in nitrification and denitrification processes. While some phosphorous removal would be achieved during biological treatment, the proposed addition of a coagulant and subsequent solids removal would significantly reduce phosphorous levels in wastewater.
Remove the sludges produced and subject them to further animal by-product uses.	Sludges would be either directed for landspreading, anaerobic digestion or composting as appropriate. Should sludges be landspread, landspreading would be in accordance with the Nitrates Regulations.
Use CH4 gas produced during anaerobic treatment for the production of heat and/or power	Not applicable.
Subject the resulting effluent to tertiary treatment	The proposed WWTP would include a sand filtration system and an Integrated Constructed Wetlands (ICW) system, which would reduce further the suspended solids in the final effluent. This would also lower the COD / BOD level of the effluent.
Regularly conduct laboratory analyses of the effluent composition and maintain records	Should planning consent be granted, Banagher Chilling Limited would apply to Offaly County Council for a Local Authority Section 4 (Trade

BAT	PROPOSED WWTP DEVELOPMENT
	Effluent) Discharge Licence. Proposed emission limit values would be assessed by Offaly County Council, and once agreed, would be specified within the discharge licence. Banagher Chilling Limited would be required to undertake scheduled monitoring of the discharge for the parameters specified by the County Council in the discharge licence. This monitoring would ensure that final treated effluent quality would remain high.

With regards sludge dewatering, a belt press and centrifuge were considered, however the proposed sludge screw press was considered standard for the industry, and was viewed as being BAT for the proposed development.

A membrane bioreactor (MBR) was considered as an alternative to the proposed clarifier and sand filter system. MBR units combine activated sludge treatment with a membrane liquid-solid separation process, with the membrane component using either low pressure microfiltration or ultrafiltration membranes. An MBR unit has a greater amount of operational maintenance and has an increase susceptibility to clogging with fats and grits. In making an informed decision, several sites were visited in order to assess the wastewater treatment systems. The use of a clarifier and sand filter were standard for the industry in Ireland, and were viewed as being BAT for the project.

3.5 "DO-NOTHING" SCENARIO

The "Do-Nothing" alternative would result in no upgrade and extension to the existing abattoir facility within the townlands of Meenwaun and Boheradurrow at Banagher, Co. Offaly. The existing abattoir at the site would remain in a derelict state, while the remainder of the site, comprising of agricultural land, would continue to be used for agricultural purposes.

The "Do-Nothing" alternative would deny the locality the opportunity to gain from the economic benefits associated with the construction and operation of the facility – namely the employment of 250 construction workers for approximately 18 months, the full time employment of 110 workers (including administration staff, slaughtering and boning staff and cleaning staff), and indirect employment opportunities, for example, via haulier contractors, gardening and landscaping contractors and pest control contractors. The provision of employment would likely contribute to the economy of the area through direct spending of goods and services in the Banagher area and surrounds.

According to the Offaly County Development Plan, 2014 – 2020, Banagher town is classified as a Tier 4 Local Service Town. Local Service Towns perform "*important local level residential, retailing, social and leisure functions and provide appropriate local services to a wider rural hinterland. Local enterprise is encouraged within this settlement tier and the location of industry where appropriate may also be considered."*

The following Settlement Strategy Policy relates to Local Service Towns:

SSP-11 *It is Council policy to conserve, enhance and strengthen the Local Service Towns within the county ensuring that the appropriate scale of growth is supported by sufficient physical and social infrastructure. Growth in these towns should be commensurate with their envisaged role.*

Should the proposed development proceed, it would support the following policies outlined in the Offaly County Development Plan, 2014 - 2020:

RDP–01 *It is Council policy to support the development of agriculture where it is compatible with the sustainable development of the county and commensurate with sustaining the farming community.*

RDP–03 *It is Council policy to favourably consider proposals for the expansion of existing industrial or new business enterprise in the countryside where the proposal is;*
a) an appropriate size and scale,
b) does not negatively impact on the character and amenity of the surrounding area, and
c) has regard to and complies with other guidelines/standards including traffic, noise and environmental considerations.
This policy will generally relate to enterprises which are rural resource based and which have the potential to strengthen rural areas.

RDP–11 *It is Council policy to encourage expansion and employment in industries such as agriculture, horticulture, forestry, peatlands, food, crafts, tourism and energy.*

EntP-04 *It is Council policy to support local employment creation where it can mitigate against long distance commuting.*

The "do-nothing" alternative would deny local farmers, composting facilities and / or anaerobic digestion facilities of a potential valuable source of fertiliser / feedstock. The former legal definition of organic fertilisers as a 'waste' requiring disposal has changed and has been redefined as a by-product, indicating that this product is recognised as an economically valuable resource. Due to increasing costs for chemical fertilisers, manure and effluent sludge by-products are becoming an essential part of the agricultural industry in Ireland. Higher transportation costs in the future will make the availability of local organic fertiliser by-product producers an asset to local agri-business.

PART II - ENVIRONMENTAL IMPACTS

This section of the EIAR describes the likely significant environmental impacts arising from the proposed upgrade and extension of an existing abattoir facility within the townlands of Meenwaun and Boheradurrow, at Banagher, Co. Offaly, which includes the construction of stormwater and effluent drainage systems, water treatment plant, electrical sub-station, truck wash, security hut, waste and by-product area and gas compound, site access roads and all ancillary development including internal road surfacing, the provision of outdoor artificial lighting, an extension to the existing lairage facility and site landscaping.

Where possible, design measures have been included to reduce or eliminate possible impacts. Where this has not been possible, mitigation measures have been suggested to reduce or eliminate the identified impacts of the proposed development.

SECTION A - HUMAN ENVIRONMENT

This section of the Environmental Impact Assessment Report deals with the potential effects of the proposed scheme on human beings.

These effects have been grouped into:

Air Quality, Climate and Odour Impacts

The impact of emissions to air generated by the proposed development. The impact of potential odours generated by the proposed development on nuisance odour in the general vicinity has been assessed.

Noise and Vibration Impacts

The impact of noise and vibration generated by the proposed development on noise and vibration levels in the general vicinity has been assessed.

Landscape and Visual Impacts

The impact of the proposed development on the visual amenity of the landscape has been assessed.

Traffic and Transport

The traffic and transportation impact associated with the construction of an extension to the existing abattoir development has been assessed. The assessment has addressed the adequacy of the existing road network to safely and appropriately accommodate the additional traffic associated with the proposed development, in particular the safety and capacity of the proposed vehicular access junction onto the local road along with an assessment of the impact on the Boheradurrow crossroads.

While human beings interact in some way with every aspect of the environment, the above interactions are considered the most significant in this case. The impacts of the proposed development on human beings in relation to effects on the natural environment are further considered in **Section B**, while the impacts of effects on material assets and archaeology, architecture, and cultural heritage are considered in **Sections C and D** respectively.

4.0 POPULATION AND HUMAN HEALTH

4.1 INTRODUCTION

Any development that alters the existing environment has the potential to impact upon human beings at a local and/or regional scale, through impacts upon socio-economic factors including demographics, land use, economic development and employment.

This section of the EIAR provides an overview of the receiving social-economic environment of the area. This section briefly outlines the main potential impacts of the proposed development, comprising of an upgrade and extension to the site's existing abattoir facilities at both the construction and operational phases on human beings.

The following sections of this EIAR provide detailed assessments of potential impacts to human beings and detail proposed mitigation measures to address the identified impacts.

4.2 METHODOLOGY

A study was undertaken to assess the potential impact of the proposed development on the receiving socio-economic environment. This study comprised a review of available information with regards population and dynamics, economic activity, employment, land use and residential amenity. Information was obtained from the Central Statistics Office (CSO) and the Offaly County Development Plan 2014 – 2020.

4.3 DESCRIPTION OF EXISTING ENVIRONMENT

4.3.1 POPULATION AND DYNAMICS

According to the 2016 Census, County Offaly had a population of 78,003, comprising 38,896 males and 39,107 females, growing from 76,687 in 2011. This represents a population increase of approximately 1.7% since the previous Census in 2011.

The settlement of Banagher Town had a population of 1,760 in April 2016, compared to 1,653 in April 2011, a change of 107 persons or 6.5%.

The Electoral Division of Banagher (12004), which includes the townland of Boheradurrow, had a total age dependency ratio of 57.9 in 2016 compared with 57.3 in 2011, while the Electoral Division of Mounterin (12028) which includes the townland of Meenwaun, had a total age dependency ratio of 50.9 in 2016 compared with 58.5 in 2011.

Table 5.1 below shows the changes in the population of Banagher Town by age group between the 2011 Census and 2016 Census. Considerable increases are noted for the older age groups, with an increase of 21.6% for the 65+ age group. Decreases were only noted in the younger age groups, with decreases of 2.1% and 1.4% for the 0-14 and 15-24 age groups respectively.

Table 4.1: Banagher Population Change between 2011 and 2016 per Age Group

AGE GROUP (YEARS)	2011 CENSUS	2016 CENSUS	% CHANGE
0 – 14	337	330	–2.1
15 – 24	218	215	–1.4
25 – 44	475	508	+6.9
45 – 64	391	425	+8.7
65+	232	282	+21.6
Total	1,653	1,760	+6.5

The nearest urban areas to the facility include Shannonbridge, Eyrecourt, Cloghan, Belmont and Birr. Table 5.2 details the population change within these areas between the 2011 Census and 2016 Census. The majority of the urban areas within the vicinity of the facility experienced population increases since the previous 2011 Census.

Table 4.2: Population Changes in Towns within the vicinity of Banagher 2011 – 2016

AREA	2011 POPULATION	2016 POPULATION	% CHANGE
Shannonbridge	206	175	–15
Eyrecourt	252	264	+4.5
Cloghan	601	612	+1.8
Belmont	200	209	+4.3
Birr	5,822	4,370	–25

4.3.2 ECONOMIC ACTIVITY

The Department of Agriculture, Food and the Marine (DAFM) reports that the agri-food sector is Ireland's largest indigenous industry, contributing €26 billion to the national economy in 2015, employing 8.4% of the working population and accounting for 10.7% of Ireland's exports. The DAFM's report, "Food Wise 2025", identifies further growth opportunities for the sector, with the aim to position Ireland as a world leader in sustainable agri-food production.

The proposed Banagher facility would be a long-term employer for the area. Staff employed would make contributions to the local economy in the Banagher area and surrounds by direct spending of goods and services. In addition to providing employment, the facility would strengthen the local economy of the agri-food sector by sourcing cattle from farmers and suppliers within the catchment area.

A number of small-scale commercial enterprises are located within the vicinity of proposed development. These include Eliza Lodge - Nursing Home and Meenwaun Wind Farm. Several facilities licenced by the EPA are located within 15km of the Banagher Chilling Limited site, including two facilities with an "Intensive Agriculture" class of activity. Further details are provided in Section 4.3.5.

4.3.3 EMPLOYMENT

The total labour force for 2016 in County Offaly was 35,478 individuals, which represents 45.5% of the total population of 77,961.

Table 4.3: Persons at Work by Occupation 2016

OCCUPATION	TOTAL	% OF WORKFORCE	% OF POPULATION
Managers, Directors and Senior Officials	2,213	6.2	2.8
Professional Occupations	4,383	12.4	5.6
Associate Professional and Technical Occupations	3,014	8.5	3.9
Administrative and Secretarial Occupations	3,210	9.0	4.1
Skilled Trades Occupations	6,559	18.5	8.4
Caring, Leisure and Other Service Occupations	2,836	8.0	3.6
Sales and Customer Service Occupations	2,234	6.3	2.9
Process, Plant and Machine Operatives	3,478	9.8	4.5
Elementary Occupations	3,300	9.3	4.2
Not stated	4,251	12.0	5.5
Total	35,478	100.0	45.5

The labour force participation rate was calculated by expressing the labour force, aged 15 years and over whom are at work, looking for their first regular job or unemployed, as a percentage of the total population aged 15 years and over. The labour force participation rate for 2016 was 59%, with 35,478 employed out of a potential 60,234. Table 4.4 below provides a summary of the working population for County Offaly. The agriculture, forestry and fishing sector accounted for 6.2% employment of the labour force in 2016.

Table 4.4: Population aged 15 years and over by principal economic status 2016

AREA	NO. OF PEOPLE	% OF POP 15-YEARS +
At work	30,287	50.3
Looking for first regular job	553	0.9
Unemployed having lost or given up previous job	5,191	8.6
Student	6,449	10.7
Looking after home/family	5,931	9.8
Retired	8,596	14.3
Unable to work due to permanent sickness or disability	3,033	5.0
Other	194	0.3
Total	60,234	100.0

4.3.4 LAND USE AND SETTLEMENT PATTERNS

The existing slaughtering facility is located in the townland of Meenwaun, while the proposed development would be located within the townlands of Boheradurrow and Meenwaun, approximately 2.4km south-east of Banagher Town.

The proposed development is located within a rural agricultural landscape, sparsely populated, with residential development primarily linearly aligned along the existing road network. A number of large farmsteads and agricultural facilities involved in cattle rearing and beef production are located in the surrounding area of the site. The area also supports a number of commercial developments.

The nearest settlement to the existing and proposed facility is the town of Banagher, located approximately 2.4km north-west of the site. The towns of Birr and Portumna are located approximately 8km and 20km respectively from the facility. Tullamore is the largest closest town and is located approximately 31.5km to the north-east of the site.

Figure 4.1 below shows the address points of properties within the vicinity of the existing facility and proposed development. Points in yellow represent residential properties, points in purple represent commercial only properties, points in aqua represent properties accommodating both residential and commercial uses. It can be seen that the majority of buildings within the surrounding area of the proposed development are residential properties. Residential properties are primarily dispersed along the existing road network.

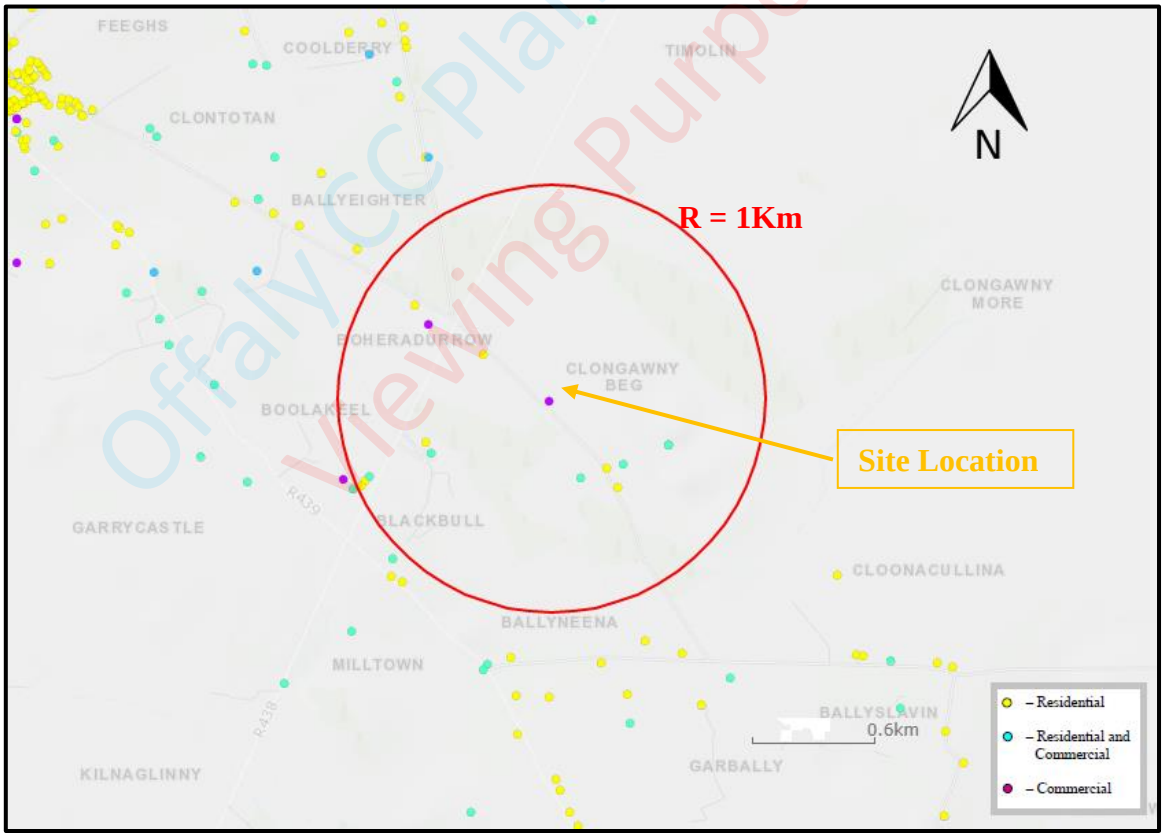

Figure 4.1: Address Points by Buildings for Properties within the vicinity of the Proposed Development (Source: myplan.ie)

4.3.5 COMMERCIAL AND INDUSTRIAL ACTIVITIES

A number of small-scale commercial enterprises are located within the vicinity of the proposed development, with those situated within approximately 1km of the development shown in Figure 4.2. Figure 4.2 below shows commercial properties categorised per NACE Code, a pan-European classification system, in the surrounding area of the proposed development.

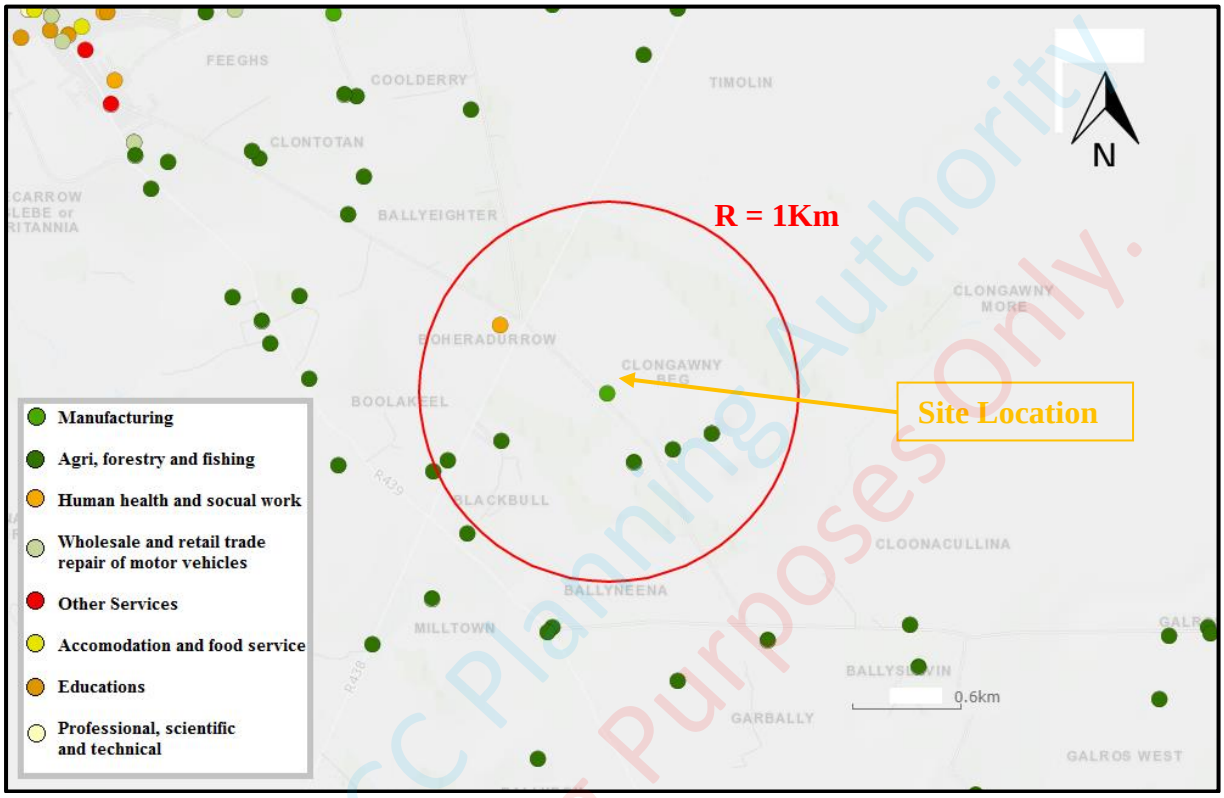

Figure 4.2: Commercial Activities per NACE Code within the vicinity of the Proposed Development (Source: myplan.ie)

In addition to the above, a number of facilities licenced by the EPA are located within 15km of the proposed development, as outlined in the table below.

Table 4.5: EPA Licenced Facilities within 15km of the Proposed Development

NO.	LICENCE NO.	LICENSEE NAME	LICENCE TYPE (FIRST SCHEDULE OF EPA ACT, 1992, AS AMENDED)	APPROXIMATE DISTANCE FROM PROPOSED DEVELOPMENT
1	P0294-01	Grant Engineering	3.9: Metals	10.6km South-South-East
2	P0932-01	Lumcloon Energy Ltd	2.1: Energy	11.5km North-East
3	P0412-01	Harvest Lodge Pigs Ltd	6.2 (b): Intensive Agriculture	12.8km East
4	P0502-01	Bord na Móna Energy Limited (Blackwater)	1.4: Minerals and Other Materials	12.5km North-North-West
5	P0437-02	Mr Michael Monagle (Sharragh Pig farms)	6.2 (a): Intensive Agriculture	12.9km South-East

NO.	LICENCE NO.	LICENSEE NAME	LICENCE TYPE (FIRST SCHEDULE OF EPA ACT, 1992, AS AMENDED)	APPROXIMATE DISTANCE FROM PROPOSED DEVELOPMENT
6	P0611-02	Electricity Supply Board (West Offaly Power	2.1: Energy	13.5km North-West

Figure 4.3 below shows the location of all EPA Licenced Facilities in the surrounding area of the proposed development, which are listed in Table 4.5 above.

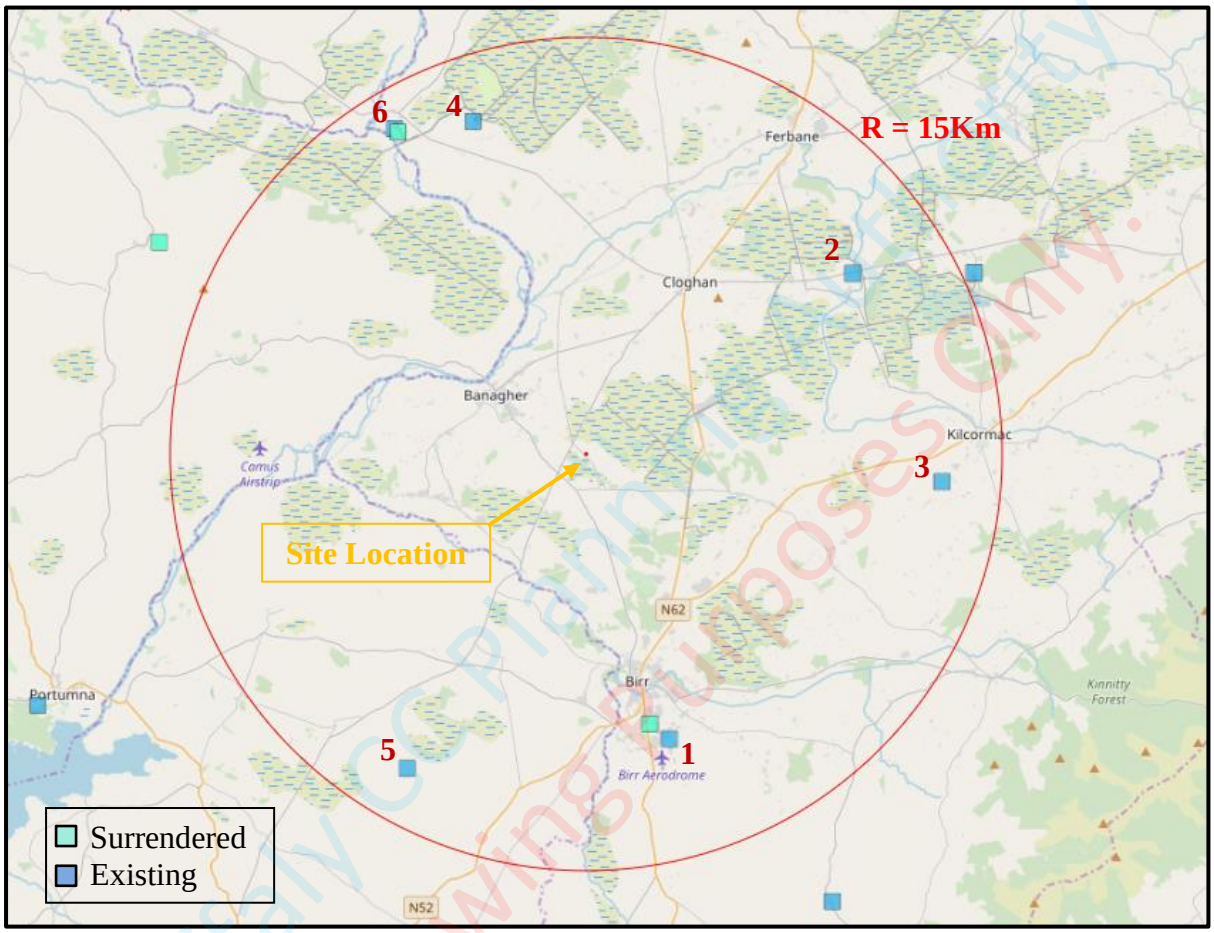

Figure 4.3: EPA Licenced Facilities within 15km of the Proposed Development

4.3.6 COMMUNITY AND SOCIAL INFRASTRUCTURE

Community infrastructure within the vicinity of the proposed development is primarily located within Banagher Town, located approximately 2.4km north-west of the existing site. Community and social infrastructure within Banagher town and the surrounds includes the following:

Educational: St. Ryanagh's College of Further Education (Laois Offaly ETB); Banagher College; Coláiste Na Sionna; St. Ryanagh's National School; Scoil Naomh Raghnach.

Financial: Bank of Ireland; Banagher Credit Union.

Health: Medical Centre, Primary Care Services that includes GPs, Practice Nurses, Public Health Nurses, Physiotherapist, Phycologist.

Public Services: Library; Post Office; An Garda Síochána.

Community services: Community Employment Scheme, Offaly Local Development Company; West & South Offaly Homefix; Youthreach; West Offaly Training; SVP; Community Centre; GAA facilities; Soccer facilities.

4.3.7 AMENITIES AND TOURISM

According to Fáilte Ireland (2018), in 2016 approximately 226,000 overseas tourists visited the Midlands region, contributing approximately €72 million to the local economy. County Offaly received approximately 52,000 overseas visitors in 2016, contributing approximately €14 million in revenue to the county.

Locally, a range of amenities exist within Banagher Town, which are a valuable resource. Banagher has in the region of 72 businesses currently operating locally. These business range across manufacturing, service, retail, construction and tourism sectors. Examples of the town's primary amenities are detailed in Section 4.3.6 above, with other amenities including watersports activities, sub-aqua clubs, pitch and putt, playground and local parks.

Banagher town has a strong tourism sector. Being situated on the banks of the River Shannon and having its own marina, Banagher town is a popular tourist hub for Shannon river boats and cruisers. The area is well-known for its angling, and is particularly favoured by pike anglers.

The area is also known for its cultural heritage tourism, with its Napoleonic fortifications, Banagher Bridge, Fort Eliza, Cuba Court, Georgian architecture buildings, Martello tower and nearby castles. In particular, Banagher town is a stopping point for Clonmacnoise Monastic Site, which is located 15km to the north of the town.

Banagher town and surrounds is also an important area for ecotourism. The Shannon Callows, grassy meadows which flood in wintertime, support a vast range of waterbirds, including endangered and rare species such as Corncrake (*Crex crex*). Lough Boora Discovery Park, a popular tourist attraction, is located approximately 17km from Banagher town and approximately 15km from the proposed development site.

4.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development would comprise of the proposed upgrade and extension of an existing abattoir facility within the townlands of Meenwaun and Boheradurrow, at Banagher, Co. Offaly. The proposed development would also include the construction of stormwater and effluent drainage systems, water treatment plant, electrical sub-station, truck wash, security hut, waste and by-product area and gas compound, site access roads and all ancillary development including internal road surfacing, the provision of outdoor artificial lighting, an extension to the existing lairage facility and site landscaping.

The proposed development would facilitate a maximum slaughter rate of 140 cattle per day. Slaughtering activities at the proposed facility would typically operate Monday to Friday. However, slaughtering may be undertaken at weekends for reasons such as casualty animals and demand. Upon completion of construction works, it is estimated the proposed development would provide employment for 110 personnel, with working hours varying from 7am to 10pm.

Two steam boilers, to be located within the plant room, are proposed as part of the development, each with a capacity of approximately 900kgs per hour.

Artificial outdoor lighting would be installed along the internal access network and within the main site yard. The lighting design for the development would be determined at a detailed design stage.

Should conditions allow, it is proposed that the site's water requirement would be sourced via water abstraction onsite. It is estimated that water consumption at the site would be 150 – 200 m^3/day. Water conservation measures have been included as part of the proposed development design. Rainwater harvesting would be implemented, with all roof water collected for use in staff sanitary facilities and site landscaping. The final WWTP design includes for the capture of treated effluent water in a holding tank (grey water tank) to be used in lairage and lorry wash-out.

New stormwater and effluent drainage systems would be constructed. Stormwater from clean-yard areas and car parking areas would pass through a silt trap and Class 1 By-Pass Separator before being directed to a modular underground attenuation system. From here, stormwater would be pumped to a manhole prior to discharge to the Feeghroe Stream.

All process drains, domestic drains and dirty yard surface water drains would be directed to the site's new WWTP, which would comprise of an inlet sump, meva screen, drum screen, balancing tank, dissolved air flotation (DAF) unit, sludge tank, anoxic tank, two aeration tanks, clarifier, sand filters and an outlet sump. From here, the treated final effluent would be directed to the proposed integrated constructed wetlands (ICWs), comprising of a five-treatment cell system, prior to discharge to the Feeghroe Stream.

The proposed upgrade and extension of the existing abattoir facility would result in a loss of agricultural grassland, disturbed ground (including a section of previously tilled land), sections of hedgerows and drainage ditches and a limited area of bog woodland.

A landscaping plan has been prepared for the proposed development, which includes the replacement planting of approximately 400m of hedgerow along the southern site boundary, set-back from the site boundary, the replanting of approximately 115m along the eastern boundary of the ICW system, the bolstering of existing hedgerows / treelines with native species, and the proposed planting of new woodland adjacent the internal site access to the rear yard area.

The expected construction timeframe would be approximately 18 months, with hours of operation from 7am to 7pm Monday to Friday, and 8am to 2pm on Saturdays. The construction phase would provide temporary employment for an estimated 250 people for the duration of construction works. A temporary site compound would be established and would house the temporary offices, equipment and materials storage and construction staff welfare

facilities. The temporary site compound would also be used for the storage of fuels and oils required for the various construction plant, in addition to housing waste receptacles.

4.5 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

A brief overview of the potential impacts upon human beings during the construction and operational phases is provided below. More detailed assessments are discussed in the following sections of this EIAR.

4.5.1 ECONOMY AND EMPLOYMENT

The proposed development would have a positive impact upon the local economy by providing temporary employment for an estimated 250 people for the duration of the construction phase (approximately 18 months), and by providing new employment opportunities, estimated at 110 new jobs, during the operational phase. The creation of jobs during the construction and operational phases would further contribute to the economy of the area through direct spending of goods and services in the Banagher area and surrounds.

The proposed development would also provide indirect employment during the operational phase, for example, via haulier contractors, gardening and landscaping contractors and pest control contractors. In addition to providing employment, the development would strengthen the local economy of the agri-food sector by sourcing cattle from farmers and suppliers within the catchment area.

In October 2018, the Department of Rural and Community Development announced that Banagher town had been chosen as one of six rural towns to take part in a pilot initiative to encourage people to live in town centres in rural Ireland. The pilot initiative is described as complementing the Rural Regeneration Fund and the Town and Village Renewal Scheme. The press release notes that the factors which attract people to live in a particular area can be many and varied, and include the availability of schools, transport, shops and retail, recreational areas and other services. The proposed development, by providing direct and indirect employment and by contributing to the local economy through direct spending of goods and services, may influence people to live in Banagher town and the immediate area.

4.5.2 AMENITIES AND TOURISM

There may be greater use of local amenities and tourism facilities during the construction phase by contractors, but the construction of the proposed development would not affect the tourism profile of the area.

There are no predicted negative impacts on local amenities and tourism arising from the operational phase. Approximately 110 people would be directly employed during the operational phase. Their potential use, both personal and business-related, of local amenities and tourism facilities may positively benefit the business community in the area, including amenity providers.

4.5.3 AIR, DUST AND ODOUR

While it is not considered that the proposed development would adversely impact upon air quality, there would be a potential nuisance impact upon human beings with regards the generation of dust during the construction phase and odour during the operational phase. An assessment of the potential air quality impacts and odour impacts arising from the proposed development are discussed in detail in Section 5 of this EIAR and in Attachment 5.1 "*Odour, Air Quality and Greenhouse Gas Assessment*".

The potential for dust generation during construction works may impact upon the community and residents on the local roads within the vicinity of the site. However, the potential impact of dust would be temporary, given the transient nature of construction works. Dust control measures would be implemented throughout the construction phase to reduce the potential impact. Mitigation measures for dust control are outlined in Attachment 5.1 and within the Outline Construction Environmental Management Plan which accompanies this planning application (Document Ref. PES_Outline CEMP_19_9201).

During the operational phase of the proposed development, there would be potential for odour generation, particularly from the wastewater treatment process. As detailed in Attachment 5.1, the air quality assessment undertaken for the proposed development predicted that concentrations of odour would be well below the relevant odour criterion at sensitive receptors. Odour controls would be implemented at the proposed development to minimise potential emissions, which are detailed within Attachment 5.1. Such measures would include the capture and abatement of emissions from the balance tank and sludge holding tank at the onsite WWTP.

The air quality assessment (Attachment 5.1) found that predicted concentrations of nitrogen dioxide, sulphur dioxide, carbon monoxide, particulate matter (as PM10 and PM2.5) and benzene would be well below the relevant criteria at sensitive receptors. The report also assessed the potential impacts of the development upon traffic in the region, and concluded that the development's potential impact on roadside local air quality would be negligible.

4.5.4 NOISE

Noise generated during the construction and operational phases of the proposed development has the potential to impact upon human beings within the vicinity of the site. An assessment of potential impacts upon human beings due to noise associated with the proposed development is discussed in Section 6, based upon a Noise and Vibration Impact Assessment Report prepared by Enfonic Ltd which in support of this EIAR.

During the construction phase, it is not anticipated that there would be any significant impact, on local residences within close proximity to the proposed development. Applicable noise limits have been recommended in order to comply with standards for construction noise. Additional noise impact mitigation measures have been recommended in order to promote good practice in relation not noise, and have been included as part of an outline Construction Environmental Management Plan.

No significant additional noise impact would be anticipated during the operational phase of the proposed development. The predicted noise levels for operational site equipment and

traffic are likely to be below the existing background levels at all survey locations. These would therefore fall into the **No Observed Effect Level (NOEL)** criteria.

4.5.5 TRAFFIC

The proposed development has the potential to impact upon traffic volumes in the area, which may subsequently impact upon the generation of noise and dust emissions. While there would be increased vehicle movements during the construction phase of the development, this would be for a limited period of time only (approximately 18 months), owing to the transient nature of construction activities.

The transportation assessment report, undertaken by NRB Consulting Engineers Ltd., notes that during the operational phase of the proposed development, the total traffic generated by the development comprises an Annual Average Daily Traffic (AADT) of 283 Passenger Car Units (PCUs, or car equivalents) within a 24 hour period. The report notes that while the local roads within the vicinity of the development are lightly trafficked, the increase in traffic movements due to the development can be considered small. The traffic assessment notes that the local road network can easily accommodate the traffic generated, and notes that the access junction and adjacent established road junctions would operate without any issues arising during the selected year of opening and the design year 15 years after opening. The report concludes that there would be no traffic/transportation capacity, traffic safety or operational issues associated with the proposed development.

4.5.6 LAND-USE

The proposed development would not be anticipated to have any significant impact upon the land use of the area, given that the proposed development would be an extension to the existing abattoir facility, and given that the development would be located mainly within agricultural lands, primarily pasture, belonging to the applicant.

4.5.7 VISUAL AMENITY

A 2km radius study was used for the landscape and visual assessment of the proposed development, with a particular focus on receptors contained within 1km of the site. The most notable centre of population in relation to the site is that of Banagher town, which is situated outside of the study area, approximately 3km northwest of the site. The immediate context of the proposal site is somewhat sparsely populated containing only a small number of isolated farmsteads and small linear clusters of dwellings. Similarly, the outer portions of the study area are also relatively sparsely populated.

In terms of landscape impacts, it is not considered that the site is located within a particularly sensitive setting. The wider context is that of a working rural landscape without particular landscape or visual designations in the Offaly County Development Plan.

There would be physical impacts on the land cover of the site, as well as temporary construction related impacts from the movement of heavy machinery and stockpiling of materials. However, the main impacts considered are those relating to post-construction effects on the prevailing landscape character. In this respect, the proposal represents a substantial intensification of a rural/industrial land use that already exists within the site in the form of the much smaller meat processing facility.

While there is a thematic relationship between the proposed facility and the previous use of the land, this would primarily be a transition from an area of pastoral farmlands to that of a sizable industrial facility and would represent a marked increase in the intensity of development of the immediate vicinity of the site.

A detailed assessment of the potential impacts upon visual amenity arising from the proposed development is discussed in detail in Section 7 of this EIAR. This section notes that overall, it is considered that the proposed extension, though substantial in scale, is appropriately sited; visually well contained; and, where visible, the design helps it to assimilate with the existing landscape and visual context. The proposed development would result in visual impacts that are very localised and in the lower order of magnitude. Overall, it is considered that such effects are not significant in EIA terms, especially once landscape mitigation proposals, outlined in Section 7.3, have become established.

4.5.8 WATER

A deterioration in water quality may have the potential to adversely impact upon the quality of drinking water, particularly with regards microbial loading. A detailed assessment of potential impacts to water quality is included in Section 10 of this EIAR.

Discharges from slaughtering facilities have the potential to cause a microbial impact upon receiving waters due to the presence of total coliform, faecal coliform (including *Escherichia coli*) and streptococci groups of bacteria, in addition to parasites such as *Cryptosporidium parvum*. Sources of micro-organisms present within wastewaters at the Banagher Chilling facility include sanitary facilities for staff, blood and cleaning waters from the slaughter hall and dirty yard areas. The treatment of human waste arising from staff welfare facilities at the Banagher Chilling facility would also contribute to populations of enteric bacteria. While these groups of bacteria are not generally considered as pathogenic, they can be used to indicate the possible presence of pathogenic enteric organisms, such as *Salmonella* ssp., *Campylobacter jejuni* and *Listeria monocytogenes*, gastrointestinal parasites including *Ascaris* sp., *Giardia lamblia*, and *Cryptosporidium parvum*, and enteric viruses.

As enteric micro-organisms leave their optimal environmental conditions (intestinal tract of animals), their survivability would be impacted upon during the wastewater treatment process and discharge to surface water. While viruses can survive adverse conditions, they can only multiply within their hosts and are therefore limited in population once they enter the wastewater process.

The Banagher Water Treatment Works river water abstraction (2500PUB1001) [E 200864, N 216181] is located upstream of the Rapemills-Shannon confluence, and would not be affected by the proposed discharge. Due to the nature of the area hydrology, streams are generally gaining and there is a low risk of impact from the proposed discharge to the Banagher WTW groundwater abstraction, located <0.5km from the boundary of the proposed site. The Portumna Water Treatment Works (1200PUB1042) is located downstream of the Rapemills-Shannon confluence in Lough Derg [E 185210, N 203730]. The abstraction point is located approximately 30km downstream of the proposed discharge location.

As part of the proposed development, clarified effluent would be directed to a sand filtration system. While the sand filter serves to reduce the suspended solids in the final effluent, this

would also reduce the microbial content of the wastewaters by filtering and retaining micro-organisms from the treated effluent. Sand filtration is estimated to remove enteric bacteria by over 90% with the World Health Organisation estimating that 99% of larger parasites and between 50-90% of enteric viruses are removed.

The effluent would then be passed through an integrated constructed wetland system, which removes solids due to filtration and sedimentation, and reduces pathogens through predation and natural die-off.

A Drinking Water Risk Assessment has been prepared as part of this planning application (Reference: PES_DWRA_19_9201). The Drinking Water Risk Assessment report concluded that the overall risk from the proposed discharge to the Banagher and Portumna water abstraction plants would be considered low. This conclusion was based upon the nature of generated wastewaters, proposed discharge limits, the wastewater treatment process, the level of dilution, nature of the area hydrology, the quality of receiving water and the anticipated impact of discharges during normal and abnormal operations.

It is anticipated that there would be no significant impact upon the quality of drinking water at the Banagher and Portumna supply schemes as a result of the proposed development.

4.6 MAJOR ACCIDENTS AND NATURAL DISASTERS

As noted in Directive 2014/52/EU, precautionary actions need to be put in place for certain projects which, '*due to their vulnerability to major accidents and/or natural disasters (such as flooding, sea level rise or earthquakes) are likely to have significant adverse effects on the environment*'.

The proposed development would not fall within the Seveso III Regulations or European Communities (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015, as no dangerous substances / significant volumes of chemicals would be used at the site.

The site does not propose to store significant volumes of any chemicals or materials which could pose a significant spill risk to the aquatic environment. The fuel for the proposed onsite boilers would be liquefied petroleum gas (LPG), which would be stored within designated tanks, strategically placed within the rear yard area, surrounded by protective barriers to reduce the risk of collision.

Banagher Chilling Limited would ensure that all potentially polluting substances, including chemicals and fuels, would be stored in accordance with the EPA guidance on the storage of materials, in designated, bunded areas, with adequate bund provision to contain 110% of the largest drum volume or 25% of the total volume of containers. Outdoor bunded chemical storage areas would be located upon hardstanding. Bunds and bunded areas would undergo integrity testing every three years, as is best practice. Spill kits would be located throughout the site, and would be easily accessible and regularly inspected to ensure kits contain adequate stock.

As part of the proposed Environmental Management System, Banagher Chilling Limited would put in place an "Emergency Response and Accident Prevention" procedure. This

procedure would outline the actions to be taken to deal with all potential site emergencies, including fire and chemical / process spills. This procedure would be communicated to all staff, and the relevant personnel would be trained to a basic level in fire-fighting procedures, in addition to receiving training in spill response.

During the construction phase of the proposed development, the risk of spills to the environment would be minimised through the implementation of measures, such as the appropriate storage of potentially polluting substances (e.g. oils, fuels), the regular maintenance and inspection of construction plant, the implementation of good housekeeping practices and the provision of spill kits. Further details are provided in Sections 10.7 and 11.10.

It is considered that the most likely natural disaster to which the proposed development may be vulnerable to and could have significant adverse effects on the environment, is fluvial or pluvial flooding. A site specific Flood Risk Assessment was undertaken for the development by IE Consulting (Ref. IE 1796-3149), to accompany the planning application, which included a detailed hydrological analysis of the Feeghroe Stream and the drainage ditches at the development site. The report noted that the fluvial and pluvial flood risk to the proposed development site is considered to be low. The report noted that secondary flood risk can be attributed to a potential surcharge due to a blockage of the culverts located on the Feeghroe Stream and drainage channels, which may result in localised areas of flooding within the site. However, given the proposed works as part of the development (such as diverting sections of drainage channels and installing new culverts) and with the implementation of a maintenance regime, as recommended in the report, the potential residual risk of culvert blockage to the site is considered to be low. Further details are provided in Section 11 of this EIAR.

4.7 MITIGATION MEASURES

The following sections of this EIAR provide further information on the potential impacts to human beings as a result of the proposed development. Mitigation measures have been proposed to address the potential impacts and are detailed under the following sections:

- Air Quality, Climate and Odour;
- Noise and Vibration
- Landscape and Visual
- Biodiversity – Aquatic Environment;
- Soils, Geology and Hydrology;
- Architectural, Archaeological and Cultural Heritage;
- Material Assets.

4.8 DIFFICULTIES ENCOUNTERED IN COMPILING INFORMATION

No difficulties were encountered during the assessment of potential impacts of the proposed development on population and human health.

4.9 REFERENCES

Banagher Community Plan 2018 – 2023, Available at http://banagher.ie/banagher-community-plan-2018-2023/, Accessed November 2018.

Central Statistics Office – Census 2016 Reports, Available at https://www.cso.ie/en/census/, Accessed November 2018.

Department of Agriculture, Food and the Marine. Available at: https://www.agriculture.gov.ie/agri-foodindustry/

Environmental Protection Agency Licence public access information, Available at: http://www.epa.ie/licensing/iedipcse/

Fáilte Ireland (2018) *Regional tourism performance in 2016*. Available at: http://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/3_Research_Insights/4_Visitor_Insights/Regional-tourism-performance-in-2016-(Revised-March-2018.pdf?ext=.pdf Accessed April 2019.

Myplan.ie Viewer. Available at: http://www.myplan.ie/viewer/

Offaly County Council (2014) *Offaly County Development Plan 2014 – 2020*. Available at: https://www.offaly.ie/eng/Services/Planning/Development-Plans/County-Development-Plan-2014-2020/

5.0 AIR QUALITY, CLIMATE & ODOUR

5.1 INTRODUCTION

This section has been prepared by Panther Environmental Solutions Ltd., using the information provided within Attachment 5.1 Odour, Air Quality and Greenhouse Gas Assessment by Katestone Environmental Pty Ltd. The assessment (Attachment 5.1) addresses the potential impact of the proposed development upon air quality and climate.

The scope of works for the assessment include:

- Odour Impact Assessment:
    - Development of an odour emissions inventory for the plant;
    - Development of meteorological dataset suitable for the site;
    - Dispersion modelling to assess the potential for odour impacts.
- Air Quality Impact:
    - Development of an inventory of air contaminants from sources at the plant;
    - Dispersion modelling to assess the potential for adverse impacts;
    - Assessment of the potential traffic impacts of NO_2, CO, PM_{10}, $PM_{2.5}$ and benzene using the screening model methods described in the Design Manual for Roads and Bridges (DMRB) published by the UK Highways Agency;
    - Compare predicted pollutant concentrations with the relevant air quality standards.
- Climate Change Assessment

5.2 DESCRIPTION OF EXISTING ENVIRONMENT

5.2.1 LOCAL TERRAIN AND LAND-USE

The site is located in a rural location surrounded by pasture to the west and east and peat bogs and forest to the north and south. The Mullaghakaraun Bog is immediately north of the site's most northerly boundary and there is a forest immediately south of the most southern boundary.

The River Feeghroe runs from northeast to southwest along the site's eastern boundary.

The site is in an area of very flat terrain. It sits at an elevation of approximately 51 metres (m) above sea level. The terrain rises gently to the northeast of the site and falls gently to the south and west of the site. There are no major terrain features that would affect local wind flows in the vicinity of the site.

5.2.2 LOCAL METEOROLOGY

Meteorological parameters recorded at the closest Met Eireann Observation Station to the site at Gurteen College were extracted and processed to assess meteorological conditions. The observation station at Gurteen College is approximately 15 km southwest of the site and is 70 m above sea level. The terrain surrounding the observation station is relatively flat and used

as pasture. The land between the observation station and the site is also flat. There are peat bogs to the north and northeast of the observation station. The data from the observation station at Gurteen College is considered representative of the site due to:

- The close proximity of the observation station to the site;
- The similar nature of the terrain at both locations;
- The similar nature of land use at both locations;
- The absence of major terrain features between the observation station and the site.

5.2.2.1 Windspeed and Direction

Wind speed and wind direction are important parameters for the transport and dispersion of air pollutants from a source. A wind rose representing the annual distribution of winds between 2013 and 2017 is presented in Figure 3 of Attachment 5.1. The annual distribution for each modelled year is presented in Figure 4 of Attachment 5.1.

The prevailing wind direction in Ireland is between south and west. These winds have a strong influence on wind patterns at Gurteen College. Winds at all times of day are heavily influenced by the prevailing winds. During the afternoon there is a greater component of winds from the west-southwest compared to all other times of day as indicated in the diurnal wind roses.

The seasonal distribution of wind speed and wind direction is presented in Figure 6 of Attachment 5.1. The strongest winds at Gurteen College occur most frequently from the southwest during the winter months. The greatest proportion of light winds occur during summer and autumn. There is a distinct north-easterly component to the wind rose in spring. A significant proportion of light northerly winds occur during spring.

5.2.3 SENSITIVE RECEPTORS

The sensitive receptors that are of interest are located in close proximity to the site, and are presented in Figure 7 of Attachment 5.1.

Under the Birds Directive (79/409/EEC) and Habitats Directive (92/43/EEC), Ireland has identified 154 sites as Special Protection Areas (SPA) (NPWS, 2018a) and approximately 13,500 square kilometres of land, lakes and marine environments as Special Areas of Conservation (SAC) (NPWS, 2018b). These are known as Natura 2000 sites and the biodiversity of these sites is required to be protected.

It is well documented that certain forms of atmospheric nitrogen and their deposition into the environment are a threat to biodiversity. Ammonia has been found to reduce biodiversity at Natura 2000 sites. There are two Natura 2000 sites in the vicinity of the site, namely: Shannon Callows and All Saints Bog. There is also a proposed Natural Heritage Area at Lough Coura, east of the site.

5.2.4 BACKGROUND AIR QUALITY

Under the Clean Air for Europe Directive, EU member states must designate "Zones" for the purpose of managing air quality. In Ireland, four zones were defined in the Air Quality Standards Regulations (2011). The site of the proposed development is in Zone D, that represents rural Ireland.

Background air quality data for Zone D was obtained from the report Air Quality in Ireland 2017 – Indicators of Air Quality by the EPA. A summary of the background data is provided in Table 5.1.

Table 5.1: Ambient background data

POLLUTANT	AVERAGING PERIOD	VALUE (µG/M^3)	SOURCE
Nitrogen dioxide	1-hour	112	Maximum from Castlebar
	Annual	7.4	Average from Castlebar
Sulfur dioxide	1-hour	14.8	Maximum from Shannon Estuary
	24-hour	4.1	Maximum from Shannon Estuary
	Annual	2.3	Annual from Shannon Estuary
Carbon monoxide	8-hour	1,240	Maximum from Portlaoise (Zone C)
PM_{10}	24-hour	11.1[1]	Average from Castlebar
	Annual	11.2	Average from Castlebar
$PM_{2.5}$	Annual	9.2	Average from Longford

Note:
[1] UK DEFRA and EPA advise that the 36th high 24-hour mean process contribution can be added to the annual mean background PM10

5.3 METHODOLOGY

The assessment was conducted in accordance with recognised techniques for dispersion modelling specified in EPA's Air Dispersion Modelling Guidance Note (AG4). AERMOD was used to predict ground-level concentrations of odour and air contaminants across the model domain due to sources at the site.

The assessment methodology included:

- For odour:
  - Selection of relevant odour assessment criteria
  - Derivation of an odour emissions inventory for the site based on data from the literature.

- For air contaminants

- Selection of relevant air quality assessment criteria
- Derivation of an emissions inventory for the site based on data from the literature.

- Characterisation of meteorological conditions in the region and generation of a representative meteorological dataset using observations from Gurteen College.

- Dispersion modelling using the regulatory dispersion model, AERMOD, to predict ground-level concentrations of odour across a Cartesian grid that covers the study area.

- Comparison of the predicted ground-level concentrations of odour against the relevant odour/air contaminant assessment criteria.

The methodologies used for the Odour, Air Quality and Greenhouse Gas Assessment are discussed in detail in Attachment 5.1.

5.4 REGULATORY FRAMEWORK AND ASSESSMENT CRITERIA

Environmental Protection Agency Act 1992

The Environmental Protection Agency Act 1992 (EPA Act) and Part 2 of the Protection of the Environment Act 2003 are collectively referred to as the Environmental Protection Agency Acts 1992 and 2003. The Environmental Protection Agency Acts 1992 and 2003 provide for the management of air emissions from activities (meaning any process, development or operation) specified in the First Schedule of the Environmental Protection Agency Acts 1992 and 2003.

Odour

In 2001, the EPA issued an assessment framework that "aims to define a set of criteria for odour exposure to achieve a common environmental quality objective in licencing procedures" (EPA, 2001). This framework is specific to intensive pig units; however, in the absence of other environmental quality objectives specified by EPA, the criterion for odour exposure to intensive pig units has been adopted for this assessment. The Environmental Quality criteria are:

- Target value: C98, 1-hour ≤ 1.5 ouE/m^3
- Limit value for new pig production units: C98, 1- hour ≤ 3.0 ouE/m^3
- Limit value for existing pig production units: C98, 1-hour ≤ 6.0 ouE/m^3

Air contaminants

The Ambient Air Quality and Cleaner Air for Europe (CAFE) Directive (2008/50/EC) was published in May 2008. It replaced the Framework Directive and the first, second and third Daughter Directives. The fourth Daughter Directive (2004/107/EC) will be included in CAFE at a later stage. The limit and target values for both Directives are outlined below.

The CAFE Directive was transposed into Irish legislation by the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011) (DEHLG, 2011). It replaces the Air Quality

Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and S.I. No. 33 of 1999.

Ammonia

EPA is currently working on an assessment approach to consider the impacts from intensive agricultural developments on Natura 2000 sites, including relevant assessment criteria. EPA currently adopts the assessment approach detailed by the Environment Agency in England (Environment Agency, 2018), which allows approval without further consideration of a development in isolation if is likely to cause an impact less than 4% of the "Critical Level".

The regulatory framework and assessment criteria with regards the Odour, Air Quality and Greenhouse Gas Assessment are discussed in detail in Attachment 5.1.

5.5 EMISSIONS

Air contaminants and greenhouse gases will be generated from:

- Construction activities,
- Emissions from the combustion of LPG in onsite boilers,
- Emissions from logistics associated with the site,
- Cattle contained at the site,
- Manure storage,
- Treatment of wastewater.

Emissions data with regards the Odour, Air Quality and Greenhouse Gas Assessment are discussed in detail in Attachment 5.1.

5.6 RESULTS

The sensitive receptors that are of interest are located in close proximity to the site. The closest sensitive receptors are presented in Figure 5.1 below.

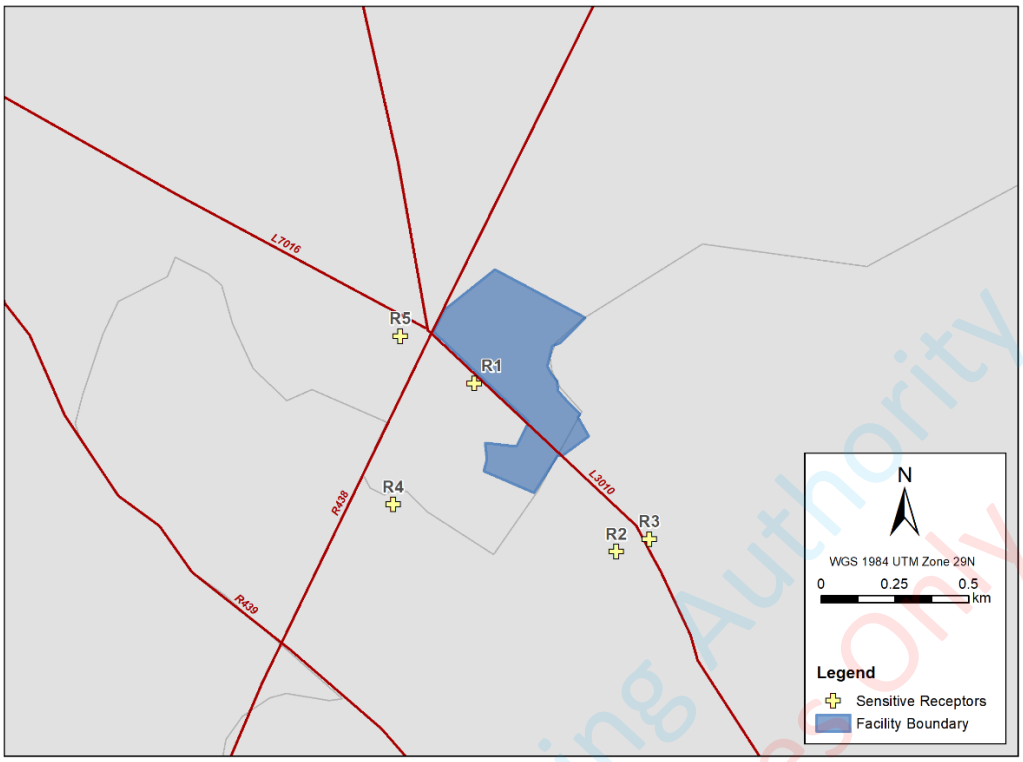

Figure 5.1: Modelled sensitive receptors in the assessment of odour and air contaminant emissions

5.6.1 ODOUR RESULTS

Predicted 1-hour average, 98th percentile, ground-level concentrations of odour due to the proposed development at the nearest sensitive receptors are presented in Table 9. Plate 1 is a contour plot presenting the highest 1-hour, 98th percentile ground-level concentrations across the model domain during the five-year period.

The results show that predicted concentrations are well below the criterion of 1.5 ouE/m3.

Table 5.2: Predicted 1-hour, 98th percentile concentrations of odour

RECEPTOR	ODOUR (OU_E/m^3) 1-HOUR, 98TH PERCENTILE
R1	1.2
R2	0.3
R3	0.3
R4	0.5
R5	0.4
Criteria Level	1.5 OU_E/m^3

5.6.2 AIR CONTAMINANT RESULTS

The predicted ground-level concentrations of CO, NO2, SO2, PM10 and PM2.5 due to the proposed development at the nearest sensitive receptors are presented in Table 5.3 Also provided in Table 5.2 is the highest cumulative ground-level concentrations at any sensitive receptor due to the proposed development and ambient background.

Table 5.3: Predicted ground-level concentrations of air contaminants

Receptor	CO (µg/M^3)	NO (µg/M^3)		PM_{10} (µg/M^3)		$PM_{2.5}$ (µg/M^3)	SO_2 (µg/M^3)		
	Maximum 8-hr	1-hour 19th high	Annual	24-hour 36th high	Annual	Annual	1-hour 19th high	24-hour 4th high	Annual
R1	0.55	8.1	0.15	0.03	0.008	0.0026	0.7	0.11	0.013
R2	0.27	2.5	0.03	0.006	0.002	0.0006	0.2	0.03	0.003
R3	0.16	1.6	0.03	0.005	0.002	0.0005	0.1	0.02	0.003
R4	0.19	2.2	0.04	0.008	0.002	0.0007	0.2	0.04	0.003
R5	0.22	2.7	0.05	0.011	0.003	0.0009	0.2	0.04	0.005
Background	1240	122	7.4	11.2[1]	11.2	9.2	14.8	4.1	2.3
Max including Background	1240	120	7.6	11.2[1]	11.2	9.2	15.5	4.2	2.3
Criteria Level	10000	200	40	50	40	25	350	125	20

1 UK DEFRA and EPA advise that 36th high 24-hour mean process contribution can be added to the annual mean background PM_{10}

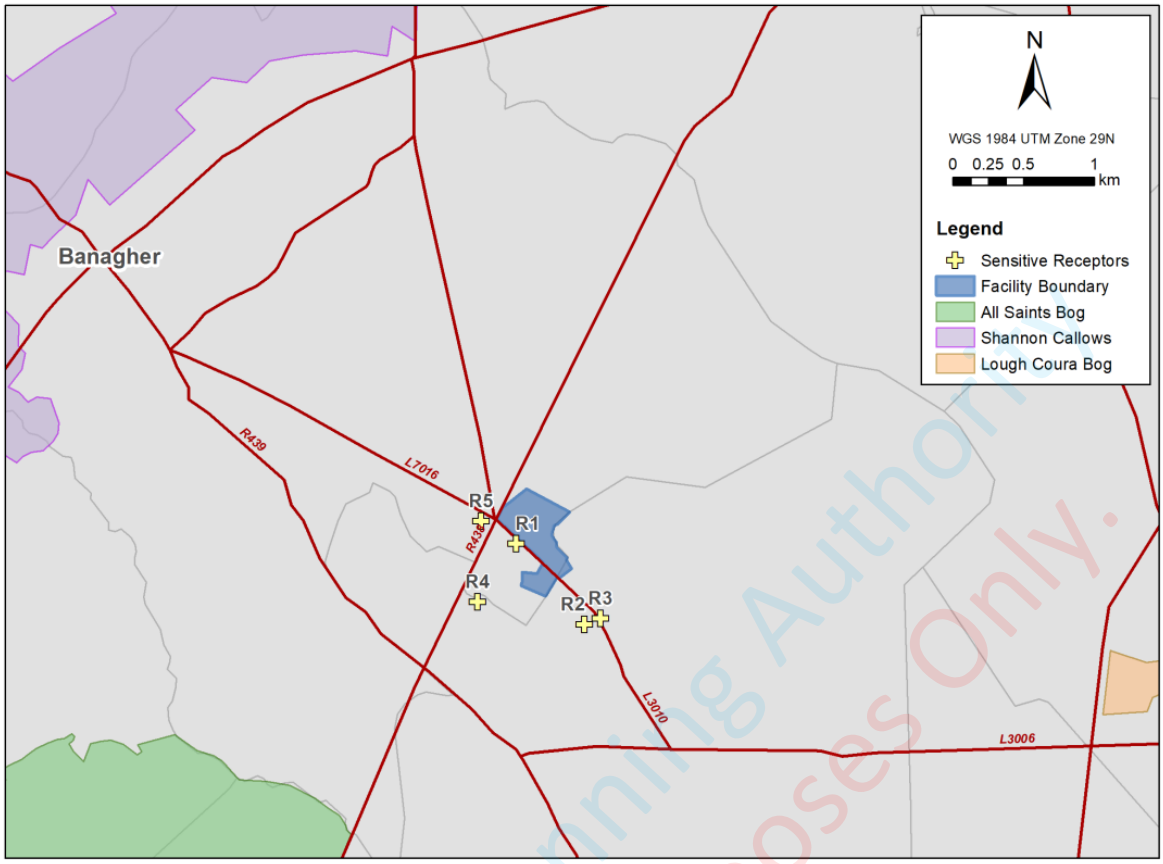

Figure 5.2: Modelled sensitive receptors in the assessment of ammonia emissions

Predicted ground-level concentrations of ammonia due to the proposed development in isolation at the Natura sites near the site are presented in Table 5.4.

Table 5.4: Predicted annual average concentrations of ammonia

NATURA SITE	AMMONIA (µg/M^3)
	ANNUAL AVERAGE
All Saints Bog	0.01
Shannon Callows	0.006
Lough Coura Bog	0.004
Criteria Level	**0.04**

The results of air modelling for airborne contaminants show:

- Ground-level concentrations of NO2 due to the proposed development plus ambient background are predicted to comply with the criteria levels at all the sensitive receptors. The incremental increase in NO2 concentrations predicted due to the proposed development is less than 4% of the criteria levels.

- Ground-level concentrations of CO due to the proposed development plus ambient background are predicted to comply with the criterion level at all the sensitive receptors. The incremental increase in CO concentrations predicted due to the proposed development is less than 0.01% of the criterion level.

- Ground-level concentrations of SO2 due to the proposed development plus ambient background are predicted to comply with the criteria levels at all the sensitive receptors. The incremental increase in SO2 concentrations predicted due to the proposed development is less than 0.2% of the criteria levels.

- Ground-level concentrations of PM10 due to the proposed development plus ambient background are predicted to comply with the criteria levels at all the sensitive receptors. The incremental increase in PM10 concentrations predicted due to the proposed development is less than 0.06% of the criteria levels.

- Ground-level concentrations of PM2.5 due to the proposed development plus ambient background are predicted to comply with the criteria levels at all the sensitive receptors. The incremental increase in PM2.5 concentrations predicted due to the proposed development is less than 0.01% of the criteria levels.

- Ground-level concentrations of NH3 due to the proposed development are predicted to comply with the criteria levels at all the sensitive receptors. The incremental increase in NH3 concentrations predicted due to the proposed development is approximately 25% of the screening criteria levels.

Contour plots are provided for the various air contaminants due to the proposed development in Attachment 5.1.

5.7 ROAD TRAFFIC ASSESSMENT

Road transport sources from a development can account for emissions of several air pollutants, although most of the pollutants emitted by road vehicles are also produced by a wide range of industrial, commercial and domestic processes. The pollutants of most concern near roads are nitrogen dioxide (NO_2) and particles (PM_{10}) in relation to human health and oxides of nitrogen (NOx) in relation to vegetation and ecosystems.

The assessment of potential transport related air quality impacts for the proposed development was conducted using the screening method set out in the Design Manual for Roads and Bridges (DMRB) Section 11.3.1, published in May 2007 (DMRB HA207/07).

A regional air quality simple assessment has been conducted for the proposed development using the DMRB Screening Method spreadsheet (v1.03c). The screening level assessment

uses the traffic information for the proposed development coupled with road length to estimate the change in annual emissions of air pollutants released by vehicles.

The results of the regional air quality assessment are detailed in Table 5.4 and show that based on the anticipated traffic data, annual emissions of CO, THC, NOx, PM10 and carbon increase with the proposed development. This is due to the increase in vehicle movements per year. The largest change in annual emissions is for NOx which increase by 22% on the L3010 due to increased movements on this road with the proposed development. However, the magnitude of annual emissions regionally is small compared to likely annual emissions from vehicles using the major roads in the region (M6 and M4), located approximately 20km away.

Table 5.5: Simple regional air quality assessment results

Scenario	Year	Total Emissions				
		CO	THC	NOx	PM10	Carbon
		Kg/year				1 / year
Without Development	2021	2,287	307	1,341	37	177
With Development		2,542	359	1,630	42	207
Change with development		255	52	289	5	30
		11%	17%	22%	15%	17%

5.8 CLIMATE CHANGE ASSESSMENT

5.8.1 METHODOLOGY AND EMISSION SOURCES

The highest annual GHG emissions associated with the proposed development have been considered on an annual basis. In addition to this, GHG emissions have been categorised according the 'scope' of emissions as defined by the Greenhouse Gas Protocol:

- Scope 1 – direct emissions from owned or controlled sources
- Scope 2 – indirect emissions associated with the use of purchased electricity
- Scope 3 – indirect emissions (excluding Scope 2 emissions) associated with the value chain of the reporting company.

Scope 1 and Scope 2 emissions have been reported in assessment (Attachment 5.1). A summary of estimated emissions associated with the proposed development, expressed as tonnes carbon dioxide equivalent (tCO2-e) is presented. The emissions factors (EF) and substance properties used in the assessment are summarised in Table 5.6.

Table 5.6: Greenhouse gas source substances - properties

SUBSTANCE	PROPERTIES						REFERENCE
	NET CALORIFIC VALUE		EMISSION FACTOR (EF)		DENSITY		
LPG	47.3	GJ/t	63	kgCO2-e/ GJ	0.55	t/m3	European Commission, 2012
Electricity	3.6	MJ/kWh	0.428	kgCO2-e/ GJ			National Inventory Report, 2019
Methane (CH_4)			25	kgCO2-e/ kgCH4			European Commission, 2018
Nitrous Oxide (N_2O)			298	kgCO2-e/ kgN2O			European Commission, 2018

GHG emissions associated with manure management have been estimated based on country specific EF provided in Ireland's National Inventory Report 2019. The range of EF associated with non-dairy cattle range from 0.25 kgCH4/head/year for "female cattle >2 years" (1990) to 7.09 kgCH4/head/year for "male cattle 1-2 years" (1990). To provide an indication of maximum annual emissions associated with manure management an EF of 7.09 kgCH4/head/year has been used in this assessment.

Activities associated with the operational phase of the proposed development that will result in GHG emissions, organised according to scope, are:

- Scope 1
  - LPG combustion for boilers and forklifts
  - Treatment of wastewater
  - Manure management

- Scope 2
  - Purchased electricity.

The estimation of the highest anticipated annual GHG emissions associated with each of these activities has been made based on the following activity data:

- LPG
  - Annual consumption – 80m3.

- WWTP
  - Effluent throughput of 250 L/day
  - Effluent COD 8,000 mg/L
  - Water treatment consists of a combination of aerobic and anoxic treatment processes.

- Manure management
  - 450 head of cattle onsite on a continuous basis (to provide an indication of maximum.

- Purchased electricity.
  - Annual consumption - 922 MWh

5.8.2 GREENHOUSE GAS ASSESSMENT

The energy use and GHG emissions associated with the proposed development are summarised in Table 5.7. The highest annual GHG emissions associated with the proposed development have been estimated to be 1,111 tCO2-e (Scope 1: 716 tCO2-e and Scope 2: 395 tCO2-e) with annual energy used estimated to be 5,398 GJ.

Table 5.7: Summary of annual energy use and GHG emissions

EMISSION SOURCE	ENERGY (GJ)	GHG EMISSIONS (TCO2-E)		
		SCOPE 1	SCOPE 2	TOTAL EMISSIONS (SCOPE 1 + SCOPE 2)
LPG	2,079	131	-	131
WWTP		473	-	473
Manure Management		113	-	113
Electricity	3,319	-	395	395
TOTAL	5,398	716	395	1,111

Annual GHG emissions, of 1,111 tCO2-e, associated with the project compared to 2017 emissions are:

- 0.002% of annual total national GHG emissions
- 0.006% of annual GHG emissions for the agriculture sector.

5.8.3 MANAGEMENT AND MITIGATION OF GHG EMISSIONS

Management and mitigation of GHG emissions has been integrated into the design of the proposed development including:

- Selection of an aerobic/anoxic WWTP (avoiding the need for anaerobic digestion)
- Use of LPG fuel for boilers
- LED lighting throughout the facility.

Other factors that have the potential to further mitigate GHG emissions associated with the proposed development, but have not been factored into the estimates of annual GHG emissions, include:

- The constructed wetland is likely to act as carbon (GHG) sink.
- Waste segregation, management and disposal practices that will be adopted for animal by-products will mitigate Scope 3 GHG emissions.

5.8.4 CLIMATE VULNERABILITY

In addition to the potential impact of the proposed development on climate change as a result of GHG emissions, the potential vulnerability of the proposed development to the impacts of climate change is considered within Attachment 5.1, and discussed briefly within this section. The key impacts of climate change on agriculture based on 'Integrating Climate Change into Strategic Environmental Assessment in Ireland – A Guidance Note' (EPA, 2015) are summarised in Table 5.8. The nature of operations of the proposed development, including short term housing of cattle and enclosed beef processing operations, provide a high level of resilience to the potential impacts of climate change. Water availability is likely to have the most significant impact on operation of the project in terms of:

- Animal welfare – cattle require access the water
- Cleaning operations – water relied upon for the majority of cleaning operations.

Table 5.8: Key impacts of climate change on agriculture (EPA, 2015)

RELATED ASPECTS	EFFECTS ON AGRICULTURE
• Air temperature • Soil temperature • Extreme weather events • Water availability	• Decrease in soil condition • Increase in pests, pathogens and invasive species • Increase in plant growth • Animal welfare • Infrastructure and access to the land

5.9 CONCLUSIONS

The air quality assessment was conducted in accordance with recognised techniques for dispersion modelling specified in EPA's Air Dispersion Modelling Guidance Note (AG4). AERMOD was used to predict ground-level concentrations of odour and air contaminants across the model domain due to sources at the site.

The air quality assessment found:

- The predicted concentrations of odour are well below the criterion of 1.5 ouE/m3 due to the proposed development at sensitive receptors;
- The predicted concentrations of NO2, CO, SO2, PM10 and PM2.5 are well below the relevant criteria levels due to the proposed development at sensitive receptors;
- the predicted concentrations of ammonia are well be the relevant criteria due to the proposed development at the Natura sites located near the site.

The road traffic assessment found the proposed development's potential impact on roadside local air quality is negligible and the magnitude of annual emission on regional air quality is low compared to major regional roads in the vicinity of the proposed development.

An assessment of the potential change in road traffic emissions with the proposed development has been undertaken using the DMRB methodology. The assessment found that changes in local air quality (at the roadside) due to the proposed development are likely to be negligible. This is due to the relatively small volume of traffic on the existing road network and the small addition from the proposed development.
The assessment of regional air quality found that the proposed development is likely to result in increases in annual emissions of air pollutants; however, the magnitude of these is small compared to emissions from the major roads in the region.

5.10 REFERENCES

Any reference documentation is referred to directly within the EIAR or within Attachment 5.1.

6.0 NOISE & VIBRATION

6.1 INTRODUCTION

A Noise and Vibration Impact Assessment report has been prepared by Enfonic Ltd, included as Attachment 6.1, to accompany this EIAR for Banagher Chilling Limited.

The study identifies, describes and assesses the impact of the proposed development in terms of noise, in particular, the potential noise impacts on residential locations (sensitive receptors) in the vicinity of the proposed development.

This section of the EIAR is a summary of the findings of the Noise Assessment Report by PES Ltd.

6.2 APPLICABLE GUIDANCE

BS:4142

Suitable guidance on environmental noise for planning purposes can be found in the standard BS 4142:2014 Methods for rating and assessing industrial and commercial sound.

This standard describes a method for assessing the impact of a proposed or existing industrial or commercial sound source. Its principal uses are to assess noise from new or changed industrial or commercial premises, to accompany a planning application, or to assess noise which may be giving rise to complaints.

The standard is basic in principle, but the details can be complex. In the simplest terms, the procedure rates the noise levels from an operation (the 'Specific' noise) and compares it with the 'Background' noise levels in the absence of the noise source(s) under investigation. The level difference is an indication of the impact that the operation might have.

If for example, if the 'Rated' noise level (the Specific noise + any penalties for particular noise characteristics) exceeds the Background noise by 10dB or more, it is likely to be an indication of a significant adverse impact. A difference of around 5dB indicates an adverse impact. If the level does not exceed the background, it is likely to have a low impact.

This however is dependent on the 'context' of the site and its environs e.g. time of day, nature of the neighbourhood, local attitudes to the development etc. There is also a degree of uncertainty applicable to the results e.g. for weather, instrumentation, measurement duration, calculation errors etc. which ought to be considered.

ISO:1996

This standard defines the basic quantities to be used for the description of noise in community environments and describes basic assessment procedures. It also specifies methods to assess environmental noise and gives guidance on predicting the potential annoyance response of a community to long-term exposure from various types of environmental noises.

For example, it stipulates that noise measurements taken when it's raining are invalid†. It also advises on microphone positioning and other relevant procedures such as recording weather conditions.

ISO9613

Acoustics -- Attenuation of sound during propagation outdoors is used to predict the noise level from sources within the development.

CRTN

U.K. Department of Transport (Welsh Office) Document 'Calculation of Road Traffic Noise' (CRTN) 1988 is used for the prediction of road traffic noise following guidelines issued by Transport Infrastructure Ireland (TII)

BS5228

The impact of noise and vibration from construction activities can be assessed using this Code of practice for noise and vibration control on construction and open sites.

The guidance adopted in this standard designates noise sensitive locations into a specific category, based on the existing ambient noise levels i.e. in the absence of construction noise. This then sets threshold noise values for construction related noise that if exceeded, indicates a significant noise impact is associated with the construction activities.

6.3 ASSESSMENT CRITERIA & METHODOLOGY

In order to assess the noise impact of any proposed development, the following methodology is adopted.

6.3.1 BASELINE

The first stage is to assess and quantify the existing noise environment close to nearby sensitive receptors that may be affected by the proposed development.

Attended noise measurements were taken during the day at four locations close to the site of the proposed development. Being representative of the closest residential dwellings. A series of three non-consecutive 15min noise measurements were taken in calm, dry conditions on Mar 8, 2019 using a B&K Type 2250 Sound Level Meter which was calibrated before and checked after the survey.

Table 6.1: Baseline Noise Monitoring Locations

LOCATION	DESCRIPTION
1	At the entrance to a dwelling off the R438 SW of the proposed development
2	Outside a nursing home on the L7016 W of the proposed development
3	Adjacent to the entrance to the proposed development on the L7016
4	SE of the proposed development on the L7016

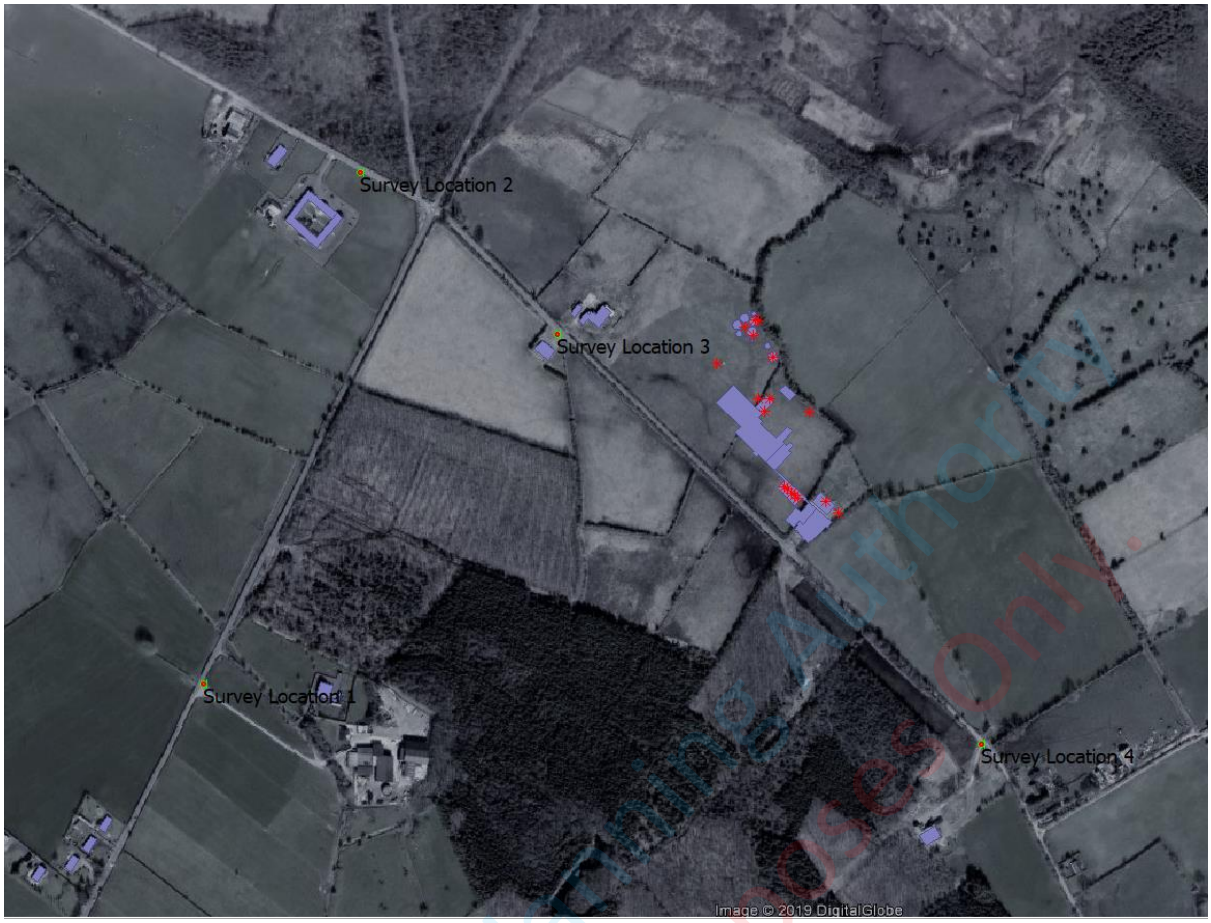

Figure 6.1: Attended Noise Survey Locations (green microphone symbols). Other model elements include: buildings (purple features) and noise sources (red asterisks).

6.3.2 OPERATIONAL PHASE

Operational noise levels are predicted, and the impact at the sensitive receptors assessed.

Operational sources considered are;

- External noise sources associated with the operational of the development. These are primarily items of plant e.g. compressors, pumps etc. and idling trailer and the Lairage Area.
- Road Traffic including changes to traffic flows on the existing road network as a result of the development.

6.3.3 CONSTRUCTION PHASE

The results of the baseline noise assessment are used for the initial impact assessment of construction noise and vibration. Details of the construction plant and processed to be used is not yet finalised, but typical best practice is discussed and recommendations to be included in the final plan offered.

6.4 EXISTING NOISE CLIMATE

The results of the noise measurement are presented in Table 6.2 below.

Table 6.2: Baseline Noise Measurements at Closest Residential Dwellings

Day-time		**dB (re. 2x10^{-5}Pa)**			
Survey Location	**Start Time**	**L_{Aeq}**	**$L_{AF10.0}$**	**$L_{AF90.0}$**	**Main Noise Sources (ranked in significance)**
1a	08/03/2019 11:15	69.9	61.7	41.0	Local Road Traffic Noise (RTN) from R438, Bird Song, Farm activity to east, HGV X4, Distant RTN
1b	08/03/2019 12:24	72.9	70.8	45.8	Local RTN from R438, Bird Song, Farm activity to east, Farm machinery, HGV X6, Distant RTN
1c	08/03/2019 13:34	71.2	66.9	44.0	Local RTN from R438, Bird Song, Farm activity to east, HGV X5, Distant RTN
	Average:	**71.3**	**66.5**	**43.6**	
2a	08/03/2019 11:32	63.1	58.2	42.6	Bird Song, occasional local RTN, occasional HGV, RTN from R438
2b	08/03/2019 12:42	57.2	55.9	39.9	Bird Song, Local RTN, HGV
Survey Location	**Start Time**	**L_{Aeq}**	**$L_{AF10.0}$**	**$L_{AF90.0}$**	**Main Noise Sources (ranked in significance)**
2c	08/03/2019 13:51	55.7	56.5	45.4	Bird Song, Local RTN, HGV
	Average:	**58.6**	**56.9**	**42.6**	
	08/03/2019 11:49	56.9	51.3	39.2	Bird Song, occasional local RTN, Farm machinery noise to south, Wind Turbine
3a	08/03/2019 12:58	56.7	49.4	37.9	Bird Song, Wind Turbines, occasional local RTN
3b	08/03/2019 14:09	57.2	56.9	42.8	Bird Song, Wind Turbines, occasional local RTN
3c	**Average:**	**56.9**	**52.5**	**39.9**	
4a	08/03/2019 12:07	57.4	47.5	41.0	Bird Song, Wind Turbines, occasional local RTN
4b	08/03/2019 13:17	54.3	50.2	41.5	Bird Song, Wind Turbines, occasional local RTN
4c	08/03/2019 14:28	60.2	59.6	44.7	Bird Song, Wind Turbines, occasional local RTN
	Average:	**57.3**	**52.4**	**42.4**	

The Mean Value of the LAeq parameter is considered representative of the Ambient noise level under the measurement conditions.

The Mean Value of the LAF90 parameter is considered representative of the Background noise level under the measurement conditions.

The Mean Value of the LAF10 parameter is considered representative of the Traffic noise level under the measurement conditions.

An evening-time or night-time survey was not required as significant operational activities will not occur outside of 07:00-19:00hrs.

6.5 IMPACT ASSESSMENT

6.5.1 LEGISLATIVE CONTEXT

There is no statutory Irish guidance relating to the maximum permissible noise level that may be generated by such a development. Local authorities may control operations by imposing limits on the hours of operation and/or may consider noise limits at their discretion. In the absence of specific noise limits, appropriate criteria relating to permissible operational noise levels for a development of this scale may be found in the following guidance:

- **Environmental Protection Agency (EPA) – Noise Guidance (NG4)**
  This guidance is only applicable to industrial operations which full within the remit of the EPA and so cannot be directly applied to this development.

  However, typical limits set would likely be 55dBA for day-time operations and 45dBA for night-time which may, nonetheless be useful in this context.

- **World Health Organisation (WHO) - Environmental Noise Guideline**
  This sets health-based recommendations on average environmental noise exposure of five relevant sources of environmental noise.

  There are no prescribed limits set but rather a comparative assessment is recommended, based on noise levels of the existing receiving environment. This approach is also followed in the BS4142 methodology used in this assessment.

  The WHO guidelines use established concepts from toxicology as follows:

  NOEL – No Observed Effect Level
  This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

  LOAEL – Lowest Observed Adverse Effect Level
  This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level
This is the level above which significant adverse effects on health and quality of life occur.

UOAEL – Unacceptable Observed Adverse Effect Level
This is the level above which unacceptable adverse effects on health and quality of life occur.

Table 6.3 presents a hierarchy of these terms, related examples, impact in terms of noise levels and recommended actions.

Table 6.3: Noise Exposure Hierarchy (based on WHO Guidance)

Perception	Examples of Outcomes	Noise Level Criteria	Action
No Observed Effect Level (NOEL):			
Not noticeable	No Effect	Noise Rating Level ($L_{Aeq,T}$) is below background noise level ($L_{A90,T}$)	No specific measures required
Lowest Observed Adverse Effect Level (LOAEL):			
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life	Noise Rating Level (LAeq,T) between 0-5 dB above the background noise level (LA90,T). LOAEL is equivalent to background noise level	No specific measures required
Significant Observed Adverse Effect Level (SOAEL):			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. having to keep windows closed most of the time, avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area	Noise Rating Level ($L_{Aeq,T}$) 10 dB or greater above the background noise level ($L_{A90,T}$).	Avoid
Unacceptable Observed Adverse Effect Level (UOAEL):			
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and nonauditory	Noise Rating Level ($L_{Aeq,T}$) 15 dB or greater above the background noise level ($L_{A90,T}$).	Prevent

6.5.2 IMPACT ASSESSMENT RESULTS - OPERATIONAL

Following the guidelines of BS4142, the 'Specific' noise at sensitive receptor as a result of the operations of the proposed development must first be calculated. Proprietary noise calculation software was used for the purposes of this impact assessment, Brüel & Kjær Type 7810 Predictor.

It has been assumed that for the purposes of the noise model that all sources are operational simultaneously. While this might not be the case for the true operation of the site, it represents a 'worse-case' in terms of the impact assessment.

Following the procedures of BS4142:2014, penalties/adjustments to the predicted 'Specific' noise levels may be applied. These include penalties for Tonal and Impulsive characteristics of the site noise and its intermittency. The noise is not expected to exhibit any of these characteristics, so no penalties have been applied.

Uncertainty in the predicted noise levels is a factor that ought also to be considered. The penalties and uncertainties are added to the predicted noise level to give the Rating Level, Lr.

Table 6.4: Impact Results for Operational Sources

Description	Specific Noise	Penalties	Uncertainty	Rated Level (Lr)	Background L_{AF90}	Impact Level Difference
Survey Location 1	22.8	0	3	26	44	-18
Survey Location 2	29.8	0	3	33	43	-10
Survey Location 3	35.4	0	3	38	40	-2
Survey Location 4	32.9	0	3	36	42	-6

As can be seen from the results, the predicted noise levels are likely to be below the existing background levels at all Survey Locations. These would therefore fall into the No Observed Effect Level (NOEL) criteria and no specific measures (of noise control) need apply.

Therefore, no adverse impact identified by BS4142 at any location due to the operational noise sources is likely.

The predicted noise levels are also well below a typical limit of 55dBA that may apply were this an EPA scheduled activity.

6.5.3 IMPACT ASSESSMENT RESULTS - TRAFFIC

A noise model was developed for the associated increase in traffic from the proposed development. The applicable guidance as recommended by Transport Infrastructure Ireland (TII) is the CRTN standard. This uses traffic flow data including quantity of vehicles, velocity and percentage of heavy goods vehicles (HGVs.

Figures for Annual Average Daily Traffic (AADT) for two scenarios were provided by Panther Environmental from a traffic impact assessment completed in support of this EIAR.

Traffic is predicted to increase in the area regardless of whether the proposed development proceeds.

As all other inputs are fixed e.g. traffic speed, road surface type etc., the result differences are attributable solely the change in traffic volume and mix of HGVs. The difference in the results is therefore the important consideration rather than the respective predicated levels

Table 6.5: Predicted Day-time Noise Levels from the Proposed Development.

LOCATION	DO NOTHING	DO SOMETHING	DIFFERENCE
Survey Location 1	65.7	66.3	0.6
Survey Location 2	55.6	65.6	10.0
Survey Location 3	44.5	51.6	7.1
Survey Location 4	36.6	38.1	1.5

In terms of traffic noise impact; Location 2, which is outside the nursing home close to the junction of all roads in this assessment, exhibits a large increase in noise of 10dB.

The Survey Location 2 is set beside the L7016 road with the building approximately 50m back. To better represent the impact at this building, the noise level outside the Nursing home has also been predicted.

The predicted level at this location was 58.8dBA, some 6.8dB less than for the position of Survey Location 2. The measured background level from Survey Location 2 is likely to be similar at the Nursing home, therefore the impact is 3.2dB.

This impact falls with the **Lowest Observed Adverse Effect Level (LOAEL)** criteria and no specific measures (of noise control) need apply.

In addition, it is understood that the design of the Nursing home is such that only offices face the roads and a quiet courtyard exists within the building envelope.

6.5.4 IMPACT ASSESSMENT RESULTS - CONSTRUCTION

The guidance adopted in the BS5228 standard designates noise sensitive locations into a specific category; A, B or C, based on existing ambient noise levels i.e. in the absence of construction noise. This then sets threshold noise values for construction related noise that if exceeded, indicates a significant noise impact is associated with the construction activities.

Construction for the proposed development will only take place from 07:00 – 19:00 Mon-Fri, 08:00 to 14:00 Sat. The L_{Aeq} Ambient noise levels at the Survey Locations are presented in Table 6.2 and following the guidelines, the resultant limits are shown in Table 6.6.

Table 6.6: Applicable Construction Noise Limits

Survey Location	Ambient Noise Level	Rounded to nearest 5dB	Applicable Category (Day-time)	Applicable L_{Aeq} Limit
1	71.3	70	B	**70**
2	58.6	60	A	**65**
3	56.1	60	A	**65**
4	57.3	60	A	**65**

6.5.5 IMPACT ASSESSMENT RESULTS - VIBRATION

There are no habitable dwellings close to the proposed development and the expected vibration levels from the construction site are expected to be undetectable at the closest sensitive receptors.

6.6 MITIGATION MEASURES

No impacts are predicted as a result of the operational phase of the proposed development and no specific measures (of noise control) need apply.

Operations carried out during the construction phase would be required to comply with the recommended noise limits detailed in Table 6.6 above.

Based on information in the Construction Details document provided and given the likely requirements of a site of this scale, it is considered that there is little likelihood of a significant adverse impact from the construction works. Nonetheless, a comprehensive Construction Environmental Management Plan which includes adopting appropriate mitigation measures will manage the risk of noise impacting the community.

The following is a broad outline of recommended actions to include in the plan.

- No plant used on site will be permitted to cause an ongoing public nuisance due to noise;
- The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on site operations;
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract;
- Compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers;
- Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use;
- Any plant, such as generators or pumps, which is required to operate before 07:00hrs or after 19:00hrs will be surrounded by an acoustic enclosure or portable screen;

- Location of plant shall consider the likely noise propagation to nearby sensitive receptors;

- During the course of the construction programme, supervision of the works will include ensuring compliance with the limits detailed in Table 2 using methods outlined in BS5228:2009 Part 1.

Working Hours

Normal working times will be 07:00 to 19:00hrs Monday to Friday, 08:00 to 14:00 Saturdays. Works other than the pumping out of excavations, security and emergency works will not be undertaken outside these working hours without the written permission of the Contracting Authority.

Works other than the pumping out of excavations, security and emergency works will not be undertaken at night and on Sundays without the written permission of the Contracting Authority.

Emergency Work

The emergency work referred to above may include the replacement of warning lights, signs and other safety items on public roads, the repair of damaged fences, repair of water supplies and other services which have been interrupted, repair to any damaged temporary works and all repairs associated with working on public roads.

6.7 REFERENCES

EN BS 5228-1:2009 "*Code of practice for noise and vibration control on construction and open sites*"

EN BS 4142:2014. *Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas*.

ISO 9613-2:1996. *Attenuation of Sound during Propagation Outdoors*.

UK DoT (Welsh Office) (1988) *Calculation of Road Traffic Noise (CRTN)*

WHO (2018) *Environmental Noise Guidelines for the European Region*

WHO (1999) *Guidelines for community noise*

7.0 LANDSCAPE AND VISUAL

7.1 INTRODUCTION

Macro Works Ltd. has been commissioned to carry out a Landscape and Visual Impact Assessment ("LVIA") on behalf of 'Banagher Chilling Limited' for a proposed an extension to an existing abattoir in the townland of Clongawny Beg, Co Offaly.

The LVIA describes the landscape context of the proposed development and assesses the likely landscape and visual impacts of the proposed abattoir extension on the receiving environment. Although closely linked, landscape and visual impacts are assessed separately.

Landscape Impact Assessment (LIA) relates to assessing effects of a development on the landscape as a resource in its own right and is concerned with how the proposal will affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character.

Visual Impact Assessment (VIA) relates to assessing effects of a development on specific views and on the general visual amenity experienced by people. This deals with how the surroundings of individuals or groups of people may be specifically affected by changes in the content and character of views as a result of the change or loss of existing elements of the landscape and/or introduction of new elements. Visual impacts may occur from; Visual Obstruction (blocking of a view, be it full, partial or intermittent) or; Visual Intrusion (interruption of a view without blocking).

Cumulative landscape and visual impact assessment is concerned with additional changes to the landscape or visual amenity caused by the proposed development in conjunction with other developments (associated or separate to it), or actions that occurred in the past, present or are likely to occur in the foreseeable future.

This LVIA uses methodology as prescribed in the following guidance documents:

- Environmental Protection Agency (EPA) publication 'Guidelines on the Information to be contained in Environmental Impact Statements (revised draft 2017) and the accompanying Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (revised draft 2017); and
- Landscape Institute and the Institute of Environmental Management and Assessment publication entitled Guidelines for Landscape and Visual Impact Assessment (2013).

7.1.1 STATEMENT OF AUTHORITY

This LVIA was prepared by Macro Works Ltd. Relevant experience includes landscape and visual assessments for a range of industrial, commercial and infrastructural developments in Ireland over a period of 20 years.

7.1.2 DESCRIPTION OF THE PROPOSED DEVELOPMENT

The development will comprise the refurbishment and extending of the existing abattoir on the site to allow a maximum slaughter rate of 140 per day. To achieve this, the existing

slaughter line will be modified and lengthened within the existing abattoir building. Additional cattle chills will be constructed along with offices and staff facilities. The existing Lairage will be extended and the livestock yard increased in size. The existing abattoir building will be extended to provide additional processing rooms and waste out rooms. In addition the construction of a meat cutting, packing, blast freezing and cold storage facility with an output of approximately 40 tons per day. Other facilities to be constructed will comprise, plant rooms, electrical sub-station, water treatment, waste water treatment, packaging storage and staff facilities. The development will extend to 8,578 square meters / 92,333 square feet and an estimated cost €25.59 million. Construction employment will average 250 for an 18 month construction programme.

7.1.3 ASSESSMENT METHODOLOGY

Production of this Landscape and Visual Impact Assessment involved;

- A desktop study to establish an appropriate study area, relevant landscape and visual designations in the Offaly County Development Plan as well as other sensitive visual receptors. This stage culminates in the selection of a set of potential viewpoints from which to study the effects of the proposal;
- Fieldwork to establish the landscape character of the receiving environment and to confirm and refine the set of viewpoints to be used for the visual assessment stage;
- Assessment of the significance of the landscape impact of the Development as a function of landscape sensitivity weighed against the magnitude of the landscape impact; and
- Assessment of the significance of the visual impact of the Development as a function of visual receptor sensitivity weighed against the magnitude of the visual impact. This aspect of the assessment is supported by photomontages prepared in respect of the selected viewpoints (Attachment 7.1).
- Incorporation of mitigation measures to reduce potential impacts and estimation of residual impacts once mitigation has become established.

7.1.3.1 Landscape Impact Assessment Criteria

When assessing the potential impacts on the landscape resulting from a proposed development, the following criteria are considered:

- Landscape character, value and sensitivity;
- Magnitude of likely impacts; and
- Significance of landscape effects

The sensitivity of the landscape to change is the degree to which a particular landscape receptor (Landscape Character Area (LCA) or feature) can accommodate changes or new elements without unacceptable detrimental effects to its essential characteristics. Landscape Value and Sensitivity is classified using the following criteria set out in Table 7.1.

Table 7.1: Landscape Value and Sensitivity

SENSITIVITY	DESCRIPTION
Very High	Areas where the landscape character exhibits a very low capacity for change in the form of development. Examples of which are high value landscapes, protected at an international or national level (World Heritage Site/National Park), where the principal management objectives are likely to be protection of the existing character.
High	Areas where the landscape character exhibits a low capacity for change in the form of development. Examples of which are high value landscapes, protected at a national or regional level (Area of Outstanding Natural Beauty), where the principal management objectives are likely to be considered conservation of the existing character.
Medium	Areas where the landscape character exhibits some capacity and scope for development. Examples of which are landscapes, which have a designation of protection at a county level or at non-designated local level where there is evidence of local value and use.
Low	Areas where the landscape character exhibits a higher capacity for change from development. Typically this would include lower value, non-designated landscapes that may also have some elements or features of recognisable quality, where landscape management objectives include, enhancement, repair and restoration.
Negligible	Areas of landscape character that include derelict, mining, industrial land or are part of the urban fringe where there would be a reasonable capacity to embrace change or the capacity to include the development proposals. Management objectives in such areas could be focused on change, creation of landscape improvements and/or restoration to realise a higher landscape value.

The magnitude of a predicted landscape impact is a product of the scale, extent or degree of change that is likely to be experienced as a result of the proposed development. The magnitude takes into account whether there is a direct physical impact resulting from the loss of landscape components and/or a change that extends beyond the site boundary that may have an effect on the landscape character of the area. Table 7.2 refers.

Table 7.2: Magnitude of Landscape Impacts

MAGNITUDE OF IMPACT	DESCRIPTION
Very High	Change that would be large in extent and scale with the loss of critically important landscape elements and features, that may also involve the introduction of new uncharacteristic elements or features that contribute to an overall change of the landscape in terms of character, value and quality.
High	Change that would be more limited in extent and scale with the loss of important landscape elements and features, that may also involve the introduction of new uncharacteristic elements or features that contribute to an overall change of the landscape in terms of character, value and quality.
Medium	Changes that are modest in extent and scale involving the loss of landscape characteristics or elements that may also involve the introduction of new uncharacteristic elements or features that would lead to changes in landscape character, and quality.
Low	Changes affecting small areas of landscape character and quality, together with the loss of some less characteristic landscape elements or the addition of new features or elements.
Negligible	Changes affecting small or very restricted areas of landscape character. This may include the limited loss of some elements or the addition of some new features or elements that are characteristic of the existing landscape or are hardly perceivable.

The significance of a landscape impact is based on a balance between the sensitivity of the landscape receptor and the magnitude of the impact. The significance of landscape impacts is arrived at using the following matrix set out in Table 7.3.

Table 7.3: Impact Significance Matrix

	SENSITIVITY OF RECEPTOR				
SCALE/MAGNITUDE	*Very High*	*High*	*Medium*	*Low*	*Negligible*
Very High	Profound	Profound-substantial	Substantial	Moderate	Minor
High	Profound-substantial	Substantial	Substantial-moderate	Moderate-slight	Slight-imperceptible
Medium	Substantial	Substantial-moderate	Moderate	Slight	Imperceptible
Low	Moderate	Moderate-slight	Slight	Slight-imperceptible	Imperceptible
Negligible	Slight	Slight-imperceptible	Imperceptible	Imperceptible	Imperceptible

Note: The significance matrix provides an indicative framework from which the significance of impact is derived. The significance judgement is ultimately determined by the assessor using professional judgement. Due to nuances within the constituent sensitivity and

magnitude judgements, this may be up to one category higher or lower than indicated by the matrix. Judgements indicated in orange are considered to be 'significant impacts' in EIA terms.

7.1.3.2 Visual Impact Assessment Criteria

As with the landscape impact, the visual impact of the proposed development will be assessed as a function of sensitivity versus magnitude. In this instance, the sensitivity of the visual receptor, weighed against the magnitude of the visual effect.

7.1.3.3 Sensitivity of Visual Receptors

Unlike landscape sensitivity, the sensitivity of visual receptors has an anthropocentric basis. It considers factors such as the perceived quality and values associated with the view, the landscape context of the viewer, the likely activity they are engaged in and whether this heightens their awareness of the surrounding landscape. A list of the factors considered by the assessor in estimating the level of sensitivity for a particular visual receptor is outlined below and used in Table 7.5 to establish visual receptor sensitivity at each VRP:

1. **Susceptibility of Receptors** - In accordance with the Institute of Environmental Management and Assessment (IEMA) Guidelines for Landscape and Visual Assessment (3rd edition 2013) visual receptors most susceptible to changes in views and visual amenity are;
    - "*Residents at home;*
    - *People, whether residents or visitors, who are engaged in outdoor recreation, including use of public rights of way, whose attention or interest is likely to be focussed on the landscape and on particular views;*
    - *Visitors to heritage assets, or to other attractions, where views of the surroundings are an important contributor to the experience;*
    - *Communities where views contribute to the landscape setting enjoyed by residents in the area; and*
    - *Travellers on road rail or other transport routes where such travel involves recognised scenic routes and awareness of views is likely to be heightened*".

    Visual receptors that are less susceptible to changes in views and visual amenity include;
    - "*People engaged in outdoor sport or recreation, which does not involve or depend upon appreciation of views of the landscape; and*
    - *People at their place of work whose attention may be focussed on their work or activity, not their surroundings and where the setting is not important to the quality of working life*".

2. **Recognised scenic value of the view** (County Development Plan designations, guidebooks, touring maps, postcards etc.). These represent a consensus in terms of which scenic views and routes within an area are strongly valued by the population because in the case of County Developments Plans, for example, a public consultation process is required;

3. **Views from within highly sensitive landscape areas**. Again, highly sensitive landscape designations are usually part of a county's Landscape Character

Assessment, which is then incorporated within the County Development Plan and is therefore subject to the public consultation process. Viewers within such areas are likely to be highly attuned to the landscape around them;

4. **Primary views from dwellings**. A proposed development might be seen from anywhere within a particular residential property with varying degrees of sensitivity. Therefore, this category is reserved for those instances in which the design of dwellings or housing estates, has been influenced by the desire to take in a particular view. This might involve the use of a slope or the specific orientation of a house and/or its internal social rooms and exterior spaces;

5. **Intensity of use, popularity**. This relates to the number of viewers likely to experience a view on a regular basis and whether this is significant at county or regional scale;

6. **Connection with the landscape**. This considers whether or not receptors are likely to be highly attuned to views of the landscape i.e. commuters hurriedly driving on busy national route versus hill walkers directly engaged with the landscape enjoying changing sequential views over it;

7. **Provision of elevated panoramic views**. This relates to the extent of the view on offer and the tendency for receptors to become more attuned to the surrounding landscape at locations that afford broad vistas;

8. **Sense of remoteness and/or tranquillity.** Receptors taking in a remote and tranquil scene, which is likely to be fairly static, are likely to be more receptive to changes in the view than those taking in the view of a busy street scene, for example;

9. **Degree of perceived naturalness**. Where a view is valued for the sense of naturalness of the surrounding landscape it is likely to be highly sensitive to visual intrusion by distinctly manmade features;

10. **Presence of striking or noteworthy features.** A view might be strongly valued because it contains a distinctive and memorable landscape feature such as a promontory headland, lough or castle;

11. **Historical, cultural and / or spiritual significance.** Such attributes may be evident or sensed by receptors at certain viewing locations, which may attract visitors for the purposes of contemplation or reflection heightening the sense of their surroundings;

12. **Rarity or uniqueness of the view**. This might include the noteworthy representativeness of a certain landscape type and considers whether the receptor could take in similar views anywhere in the broader region or the country;

13. **Integrity of the landscape character**. This looks at the condition and intactness of the landscape in view and whether the landscape pattern is a regular one of few strongly related components or an irregular one containing a variety of disparate components;

14. **Sense of place**. This considers whether there is special sense of wholeness and harmony at the viewing location; and

15. **Sense of awe**. This considers whether the view inspires an overwhelming sense of scale or the power of nature.

Those locations which are deemed to satisfy many of the above criteria are likely to be of higher sensitivity. No relative importance is inferred by the order of listing in the Table 7.5 below. Overall sensitivity may be a result of a number of these factors or, alternatively, a strong association with one or two in particular.

7.1.3.4 Visual Impact Magnitude

The magnitude of visual effects is determined on the basis of two factors; the visual presence (relative visual dominance) of the proposal and its effect on visual amenity.

The magnitude of visual impacts is classified in Table 7.4.

Table 7.4: Magnitude of Visual Impacts

CRITERIA	DESCRIPTION
Very High	The proposal intrudes into a large proportion or critical part of the available vista and is without question the most noticeable element. A high degree of visual clutter or disharmony is also generated, strongly reducing the visual amenity of the scene
High	The proposal intrudes into a significant proportion or important part of the available vista and is one of the most noticeable elements. A considerable degree of visual clutter or disharmony is also likely to be generated, appreciably reducing the visual amenity of the scene
Medium	The proposal represents a moderate intrusion into the available vista, is a readily noticeable element and/or it may generate a degree of visual clutter or disharmony, thereby reducing the visual amenity of the scene. Alternatively, it may represent a balance of higher and lower order estimates in relation to visual presence and visual amenity
Low	The proposal intrudes to a minor extent into the available vista and may not be noticed by a casual observer and/or the proposal would not have a marked effect on the visual amenity of the scene
Negligible	The proposal would be barely discernible within the available vista and/or it would not detract from, and may even enhance, the visual amenity of the scene

7.1.3.5 Visual Impact Significance

As stated above, the significance of visual impacts is a function of visual receptor sensitivity and visual impact magnitude. This relationship is expressed in the same significance matrix

and applies the same EPA definitions of significance as used earlier in respect of landscape impacts (Table 7.3 refers).

7.1.4 EXTENT OF STUDY AREA

Within this primarily flat landscape setting the proposed development is likely to be difficult to discern beyond approximately 500m – 1000m due to screening afforded by intervening vegetation. Even if discernible from greater distances it is not likely to give rise to significant landscape or visual impacts beyond this threshold. In the interests of a comprehensive appraisal, a 2km radius study area is used in this instance. However, there will a particular focus on receptors contained within 1km of the site.

7.1.5 LANDSCAPE AND VISUAL POLICY CONTEXT AND DESIGNATIONS

7.1.5.1 Offaly County Development Plan 2014-2020

Although a landscape character assessment has not currently been completed for County Offaly, Chapter 7 – Heritage and Landscape in the current Offaly County Development Plan (CDP) 2014-2020 identifies a number of general landscape units and their associated sensitivity designations (Figure 7.1).

Offaly CDP Sensitivity Classification:

> "**Low sensitivity areas:** *This class largely encompasses the county's main urban and farming areas. These areas comprise natural enclosing features (e.g. topography, vegetation) which have the capacity to absorb a range of new development.*
>
> **Moderate Sensitivity areas:** *Areas which are generally 'open' in character with intrinsic quality and moderate capacity to absorb new development.*
>
> **High sensitivity areas:** *Identified features or areas of natural beauty or interest which have extremely low capacity to absorb new development. Areas included within this class are designated Areas of High Amenity.*"

The proposed beef processing facility is located in a 'rural and agricultural area' which is designated as an area of '**low'** sensitivity (**Figure 7.1** below). Sensitivities associated with rural and agricultural areas that are relevant to the proposed development include;

- *"These areas in general can absorb quite effectively, appropriately designed and located development in all categories (including: telecommunication masts and wind energy installations, afforestation and agricultural structures).*
- *Due to the rural nature of the area, development shall be screened by appropriate natural boundaries that are sympathetic to the landscape generally, where possible."*

Within the northern and eastern portions of the study area '*moderate sensitivity'* landscape units occur and relate to large open peatlands. A number of areas of 'high amenity' have also been designated throughout County Offaly within the County Development Plan 2014-2020, though none of these are situated within the study area.

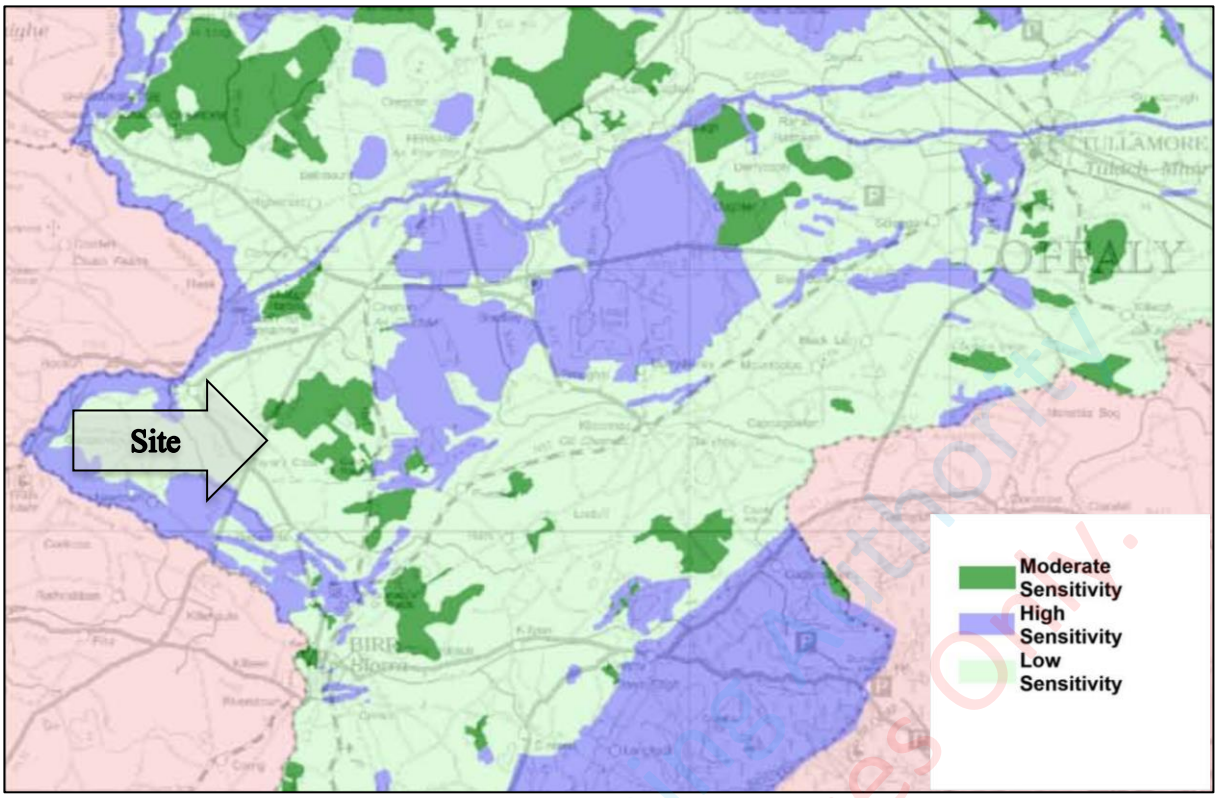

Figure 7.1: Excerpt from Offaly County Development Plan, map 7.15 showing approximate location of proposed proposed site in relation to sensitive landscape designations.

A number of landscape and amenity policies are outlined within the Offaly county development plan in Chapter 7: Heritage and Landscape (subsection 7.13 Landscape and Amenity Policies), some of which are relevant to the development in question and are outlined below:

LAP-01: *It is Council policy that landscape considerations will be an important factor in all land use policy and decision making for the county, ensuring that a pro-active view of development is undertaken whilst maintaining respect for the environment and heritage, as per the general principles of sustainable development. Further it is policy to conserve, protect and enhance the landscape of Offaly at a number of levels:*

- *The value of the landscape itself, as open countryside and the associated form and character of settlements.*
- *The value of the landscape as a resource for economic growth in accordance with its physical and visual attributes.*
- *The value of the landscape and its role with habitats and species whose diversity enriches the environment.*

LAP-03: *It is Council policy to protect the county's scenic amenity routes from insensitive levels of roadside development and excessive levels of development. For development directly accessing onto restricted regional routes (key amenity routes) as shown on Map 7.19 (Chapter 4, Infrastructure and Environment Strategy) and on map 4.1, restrictions as per policy STAP-19 will apply.*

LAP-04: *It is Council policy that existing local landscape features, including hedgerows, shelter belts and stone walls are retained, protected and enhanced where appropriate, so as to preserve the local landscape and character of an area, whilst providing for future development.*

LAP 06*: It is Council policy that new development should ensure the protection of mature trees, hedgerows and the conservation of existing stone walls, and their integration into new development. Where the provision of new boundaries is required, these should comprise native hedgerow planting of Irish provenance, or stone walls which consist of stone found in the locality. Where comprehensive new development occurs, it should take into account the pattern of existing hedgerows and incorporate same into layouts or plant connecting hedgerows where hedgerow removal to facilitate development works is necessary. The Council will require that all new development will respect the existing character of the settlement, in particular through the provision of sensitive landscaping schemes. In the event that the removal of tree(s) is deemed to be necessary, it will be generally conditional on replacement with appropriate species.*

Within the same chapter (Chapter 7: Heritage and Landscape), subsection 7.14 outlines several landscape and amenity objectives. Those that are relevant to the proposed development are outlined below:

LAO-01: *It is an objective of the Council to preserve and enhance the character of the county's landscape where, and to the extent that in the opinion of Offaly County Council, the proper planning and sustainable of the area requires it.*

LAO-02: *It is an objective of the Council to preserve scenic views and prospects throughout the county which will be assessed on a case-by-case basis, as part of the development management process (Views are listed in Table 7.11.5 and shown on Map 7.18).*

7.1.5.2 Views of Recognised Scenic Value

Table 7.11.5 of the Offaly County Development Plan 2014-2020 lists views and prospects of special amenity value or special interest within County Offaly. None of these occur within the study area.

Section 7.12.2 identifies key scenic amenity routes to be protected. None of these occur within the study area.

7.2 EXISTING ENVIRONMENT

7.2.1 LANDSCAPE AND VISUAL BASELINE

The landscape baseline represents the existing landscape context and is the scenario against which any changes to the landscape and visual context brought about by the development will be assessed.

A description of the landscape context of the proposed application site and wider study area is provided below under the headings of landform and drainage, vegetation and land use, centres of population and houses, transport routes and public amenities and facilities and the site context. Although this description forms part of the landscape baseline, many of the landscape elements identified also relate to visual receptors i.e. places and transport routes from which viewers can potentially see the proposed Development. The visual resource will be described in greater detail in Section 7.2.2.

7.2.1.1 Landform and Drainage

With the exception of a small hill in the north-western periphery of the 2km study area, the terrain in surrounding the site is relatively flat. While no rivers pass through the study area, a small stream known locally as the Feeghroe Stream flows adjacent to the western boundary of the proposal site. Similarly, a small stream flowing in a westerly direction occurs c.600m south of the proposal site and drains into the Rapemills River situated just outside the southernmost boundary of the study area 2.3km from the site at its nearest point. The meandering corridor of the River Shannon is the most prominent feature within the wider landscape passing west of the settlement of Banagher approximately 3.8km west of the site at its nearest point.

Figure 7.2: Typical example of the relatively flat and enclosed nature of the central study area. Turbines from the Meenwaun Wind Farm in the background

7.2.1.2 Vegetation and Land Use

The landscape of the study area is generally contained in pastoral farmland comprising of small to medium sized geometric fields. These fields are predominately enclosed by dense mature tree lined hedgerows. The remnants of Claremount demesne are situated to the west of the site and are still evident in the form of mature woodlands and large mature broadleaved tree lines. Large scale exploited peatlands are also prominent in the surrounding area, the largest and nearest of which is that of Mullaghakaraun Bog northeast of the proposal site. Blocks of conifer forest plantations are also scattered throughout the 2km study area and are often to be found on the outer periphery of large peat bogs. With regards to industry within the study area, Meenwaun Wind farm (Irelands largest operating turbines) occur to the east of the proposal site and a number of farmsteads are scattered throughout the wider study area.

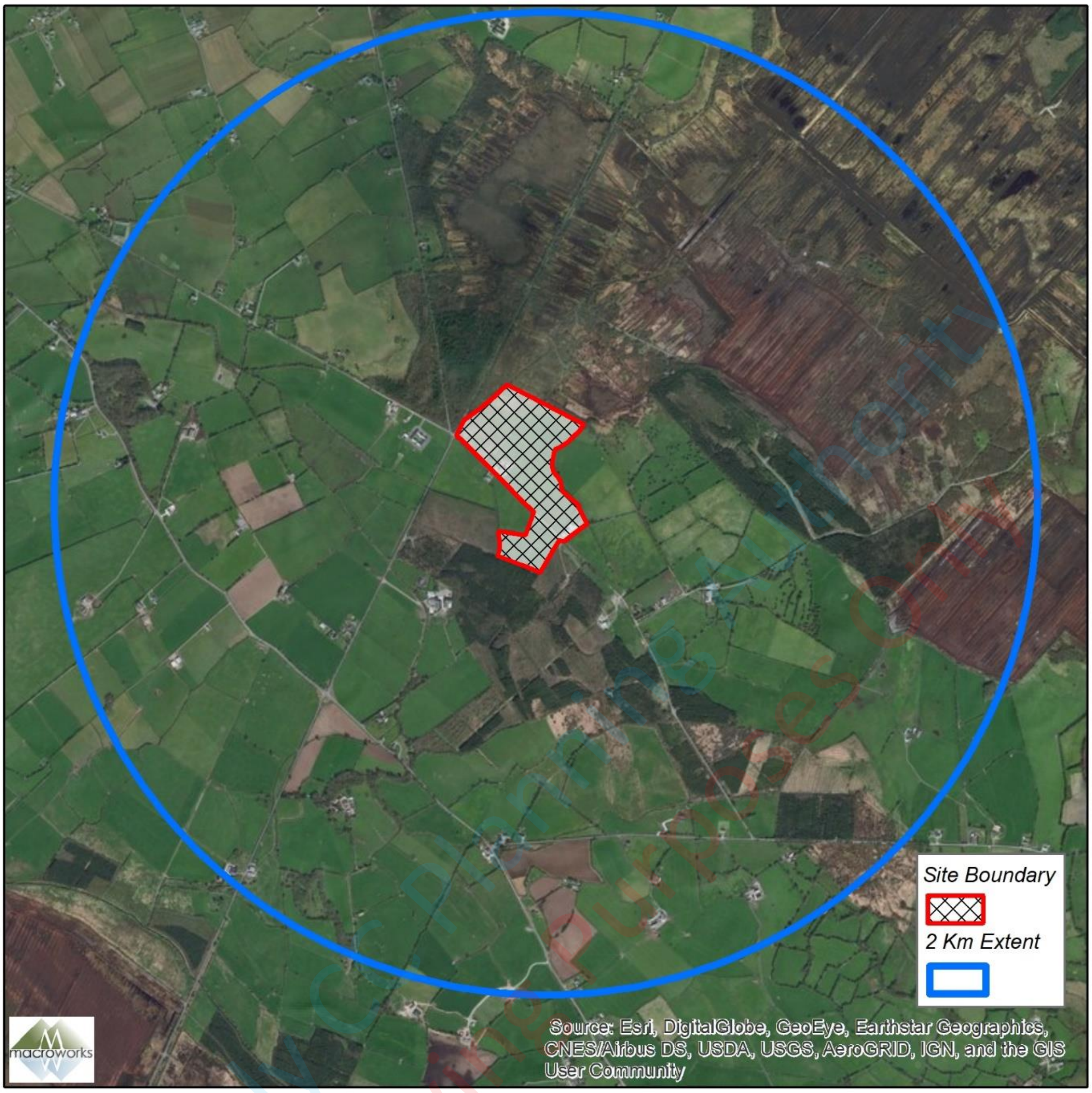

Figure 7.3: Aerial view of the site and its immediate landscape context (Google Earth Pro)

7.2.1.3 Centres of Population and Houses

The most notable centre of population in relation to the site is that of Banagher which is situated outside of the study area along the banks of the River Shannon approximately 3km northwest of the site. Although a moderate number of residential dwellings are located along the local and regional roads that extend out from the settlement of Banagher, the immediate context of the proposal site is somewhat sparsely populated containing only a small number of isolated farmsteads and small linear clusters of dwellings. Similarly, the outer portions of the study area are also relatively sparsely populated.

7.2.1.4 Transport Routes

Oriented in a general north south direction, the R438 regional road is situated immediately adjacent to the neighbouring pastoral field just over 200 meters to the west of the proposed

site boundary. Extending from the settlement of Banagher in a south-easterly direction, the R439 regional road passes through the southern extents of the proposed development approximately 1.2km from the proposal site. Aside from these two regional routes, a small network of local roads also traverses through the central and wider study area, the nearest of which is the L3010 local road, which follows the path of the southern site boundary.

7.2.1.5 Public Amenities and Facilities

Banagher United sports fields are situated 1.5km west of the proposed development and are the only notable public amenities within the bounds of the study area.

7.2.2 IDENTIFICATION OF VIEWSHED REFERENCE POINTS AS A BASIS FOR ASSESSMENT

Viewshed Reference Points (VRP's) are the locations used to study the visual impacts of a proposal in detail. It is not warranted to include each and every location that provides a view of a development as this would result in an unwieldy report and make it extremely difficult to draw out the key impacts arising from the extension to the existing abattoir. Instead, the selected viewpoints are intended to reflect a range of different receptor types, distances and angles, The visual impact of a proposed development has been assessed using up to 6 no. categories of receptor type as listed below:

- Key Views (from features of national or international importance);
- Designated Scenic Routes and Views;
- Local Community views;
- Centres of Population;
- Major Routes; and
- Amenity and heritage features.

VRP's might be relevant to more than one category and this makes them even more valid for inclusion in the assessment. The receptors that are intended to be represented by a particular VRP are listed at the beginning of each viewpoint appraisal.

The Viewshed Reference Points selected in this instance are set out in the Table 7.5 below.

Table 7.5: Outline Description of Selected Viewshed Reference Points (VRPs)

VRP NO.	LOCATION	DIRECTION OF VIEW
VP1	L3010 local road immediately south of site	N
VP2	L3010 local road immediately south of site	N
VP3	Intersection of the R438 and L3010 west of site	E
VP4	L3010 local road immediately south of site	N
VP5	L3010 local road southeast of site	NW
VP6	Intersection of L3010 and L3006 southeast of site	NW
VP7	R439 south of site	N
VP8	Intersection of R438 and R439 southwest of site (Taylors cross)	NE
VP9	R438 north of site	S
VP10	L7016 local road west of site (Banagher United FC)	E
VP11	L7016 local road west of site	E

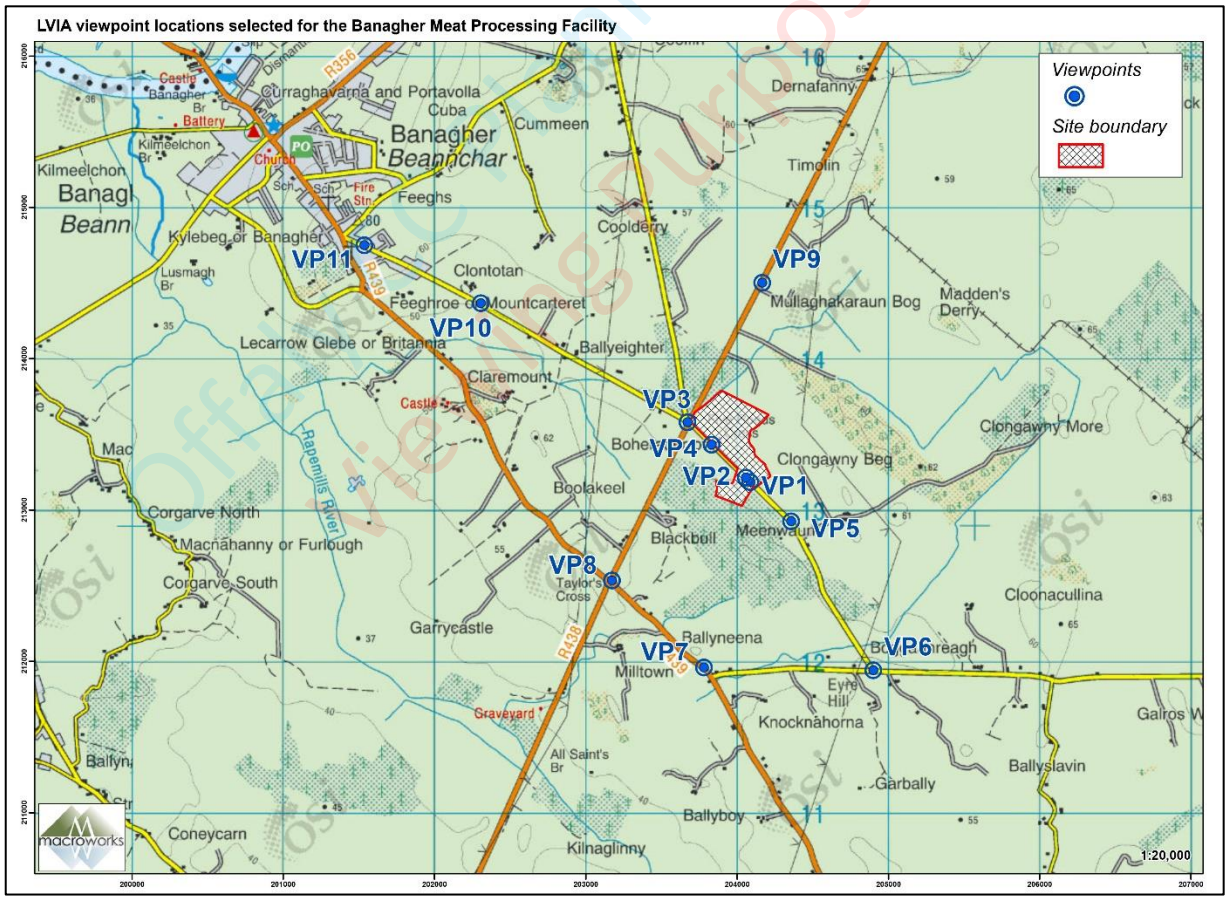

Figure 7.4: Map of viewpoint locations

7.3 MITIGATION AND RESTORATION MEASURES

The main mitigation measure employed in this instance is the siting of the extension to the existing abattoir in a robust rural hinterland that avails of considerable screening from dense intervening mature tree lines and hedgerows

It is proposed to bolster all remaining existing perimeter and internal hedgerows as per Hedge Type 1 (Figure 7.5 refers) with under-planting and inter-planting of whip transplants in order to ensure dense and consistent screening of the site in perpetuity. Advanced nursery stock will also be implemented where any gaps or inconsistent patches of hedgerow vegetation occur. Species will be selected to complement the existing broadleaf hedgerow species mix around the site and will be of local provenance. It is intended to manage hedgerows at a minimum of 3-4m in height.

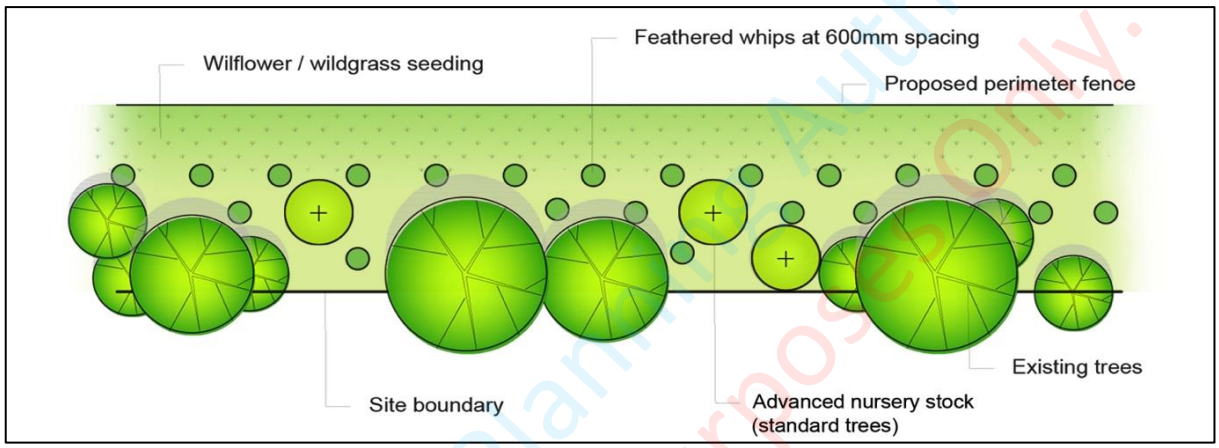

Figure 7.5: Hedgerow Type 1: indicative boundary planting detail showing the approach to inter-planting and under-planting of existing hedgerows (where consolidation is needed).

In addition to supplementing all hedgerows within and surrounding the site, it is proposed to plant an informal wooded area to the north of the proposed building which will aid in screening the proposed development from any receptors to the north and west of the proposed development. This will be provided in the form of high canopy (dominants) species, low canopy (sub-dominant) species, understory and fringe (higher shrubs) species and understory and edge (lower shrub) species, and will comprise of a mix of advanced nursery stock and whip planting (refer to drawing LD.BNGHMPF 1.0 for details). A mounded berm is also proposed along the south/ south-western boundary of the site which will be planted with additional advanced nursery stock and will reinforce the already dense hedgerows between the site and the L3010 local road.

It is also proposed to plant new 'Type 2' hedgerows (Figure 7.6 refers), with whips and a high proportion of advance nursery stock trees (c.3m planted height) to replace any hedgerows lost to facilitate sightlines along the newly proposed entrance to the site (refer to drawing LD.BNGHMPF 1.0 for details). It is also proposed to replant a section of hedgerow to the east of the ICW that will need to be removed to facilitate construction. This planting will be allowed to mature up to a maintained height of 3-4m to provide consistent screening of the proposal site from the adjacent local road.

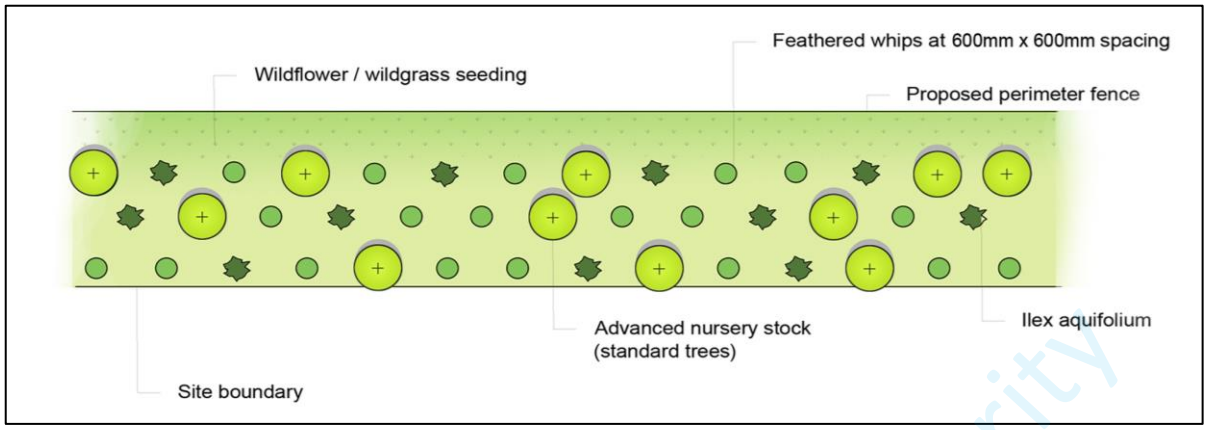

Figure 7.6: Indicative boundary planting detail showing the introduction of new boundary hedgerow TYPE 2.

Space has also been provided for soft landscaping in the form of ornamental shrub planting along the entrance roads and to the front of the extension to the existing abattoir. This has the benefits of softening the appearance of the scheme, providing a high quality of design and serving as a scale transition to the production buildings and ancillary equipment beyond. This planting will provide only a minor degree of screening, but its key purpose is to improve the landscape and visual assimilation of the abattoir extension.

Immediately north-west of the built infrastructure is the proposed Integrated Constructed Wetland (ICW). The proposed ICW will be constructed within lands owned by the applicant and comprises of a five-treatment cell system designed with cascading levels to enable gravity flow across the system. The surrounds of the ICW and cell 5 of the ICW are to be planted with a native tree planting mix in the form of whips and advanced nursery stock. Furthermore, the internal embankments of the ICW are to be planted with a mix of wetland vegetation. Refer to LD.BNGHMPF 1.0 and the Operation and Maintenance plan for further details.

7.4 IMPACT ASSESSMENT

7.4.1 LANDSCAPE IMPACT

7.4.1.1 Landscape Value and Sensitivity

Landscape value and sensitivity are considered in relation to a number of factors highlighted in the Guidelines for Landscape and Visual Impact Assessment 2013, which are set out below and discussed relative to the proposal site and wider study area.

7.4.1.2 Landscape quality (condition)

This attribute is often measured in terms of the integrity of the landscape in question and whether there is a consistent and consolidated use of the land, be it for recreation, conservation rural production or industry. Also, whether there are degraded, untidy or underutilised areas.

Although a pleasant pastoral aesthetic is presented within the study area especially to the south and southeast, the exploitation of peatlands has left some sense of a degraded landscape in the northern portions of the study area. However, once a strongly anthropogenic feature of this landscape, the large open peatlands have begun the process of natural re-vegetation giving some sense of the naturalistic back to the surrounding area. Aside from pockets in the northern portions of the study area, space is generally well utilised with few fallow or untidy areas.

7.4.1.3 Scenic quality

Predominately flat landscapes such as those within the study area are not often associated with scenic quality, as clusters of mature vegetation will foreshorten the possibility of long distance views and vistas. This is the case within the study area in question where dense tree lines and hedgerows enclose the surrounding road network screening any potential long distance views and vistas.

In the immediate context of the proposed development there is little scenic quality. Mature tree lines and dense hedgerows enclose much of the surrounding landscape. Whilst some longer-range views are afforded in the northern portions of the study area, as a result of the large open peatlands, none of these have any recognised scenic quality and such views are relatively common within the midlands of Ireland.

7.4.1.4 Rarity and Representativeness

Whilst some designed landscapes (demesne remnants) and exploited peatlands occur within the study area, these are not particularly rare or distinctive within the midlands of Ireland. This is reflected within the Offaly County Development Plan, as a large proportion of the central study area has been designated as "*Low sensitivity areas*", which are those with the "*capacity to absorb a range of new development". Low sensitivity areas* are noted as areas that *"can absorb quite effectively, appropriately designed and located development in all categories (including: telecommunication masts and wind energy installations, afforestation and agricultural structures)"*. Mullaghakaraun Bog carpets much of the northern and north-western extents of the study area and has been classified as a "*Moderate sensitivity area*".

7.4.1.5 Conservation interests

There are no designated Special Areas of Conservation (SAC), Natural Heritage Areas (NHA), proposed Natural Heritage Areas (pNHA) or Special Protection Areas (SPA) within the wider study.

7.4.1.6 Recreation Value

Whilst the landscape in the immediate vicinity of the site and its study area are not synonymous with recreation, the main aspect of recreational value relates to the River Shannon and its waterways, which are situated outside of the 2km study area.

7.4.1.7 Perceptual aspects

Some sense of rural tranquillity occurs in the immediate context of the site as a result of its low population density and the containment by surrounding dense tree lines and hedgerow vegetation. However, in general this is a landscape heavily influenced by human activity both in the past by harvesting of peat for fuel, and at present through harvesting of wind for energy.

7.4.1.8 Associations

In general there would not appear to be any strong landscape associations to particular people, historic events or mythology in this area. That is not to say that none exist, as all areas have local landscape associations with particular families or historic incidents, but these would not necessarily be associated with landscape values for the wider population.

7.4.1.9 Summary of Landscape Value and Sensitivity

On the basis of the reasons outlined above it is considered that this is a robust hinterland landscape with a **Low** degree of landscape sensitivity.

7.4.2 MAGNITUDE OF LANDSCAPE EFFECTS

During all construction stages there will be a much higher intensity of activity on site and along the surrounding local and regional road network as a result of HGVs and construction machinery travelling to and from the site. The existing abattoir at the southern end of the site is to be retrofitted and extended while the existing farm sheds in the northeastern portions of the site will remain. A new vehicular/livestock entrance will be situated along the L3010 local road and in turn some hedgerow removal may need to take place to facilitate this access way and its associated sightlines. However, new sections of hedgerow are to be replanted behind the sightlines as per hedgerow Type 2. In addition to this, there will be a loss of two existing hedgerows within the southern extents of the site to facilitate to full footprint of the extension to the existing abattoir.

There will be permanent physical effects to the land cover of the site, which are not readily reversible. These relate to the excavation of large areas of the site to facilitate foundations for the incoming buildings, roads and ancillary equipment, with any excess topsoil being used to create a mounded berm to the front of the proposed development which will rise to a maximum of 2 meters above the existing ground level. Several buildings and a range of ancillary equipment and holding tanks will be constructed on the site with the maximum building height peaking at 12.8m and the highest piece of ancillary equipment reaching a height of 6.5m. While there will be a general loss of agricultural production as a result of the proposed meat processing facility, this will be substituted for more intensive industrial production albeit the end stage of the agricultural process.

The Integrated Constructed Wetlands (ICW) will also require a reasonable degree of excavation and movement of topsoil to create the embankments and roads (3.5m wide) that surround the cells. The earthworks are not expected to take longer than 2-3 months to complete and the height of the embankments will not exceed 1m and will have a maximum slope of 2:1.

Whilst productive rural land uses have long been the dominant land use in the vicinity of the site, which includes the harvesting of peat for fuel and other general agricultural practices, a new form of industry has emerged within the wider study area. The Meenwaun wind farm sits just east of the proposal site comprising of 4 existing turbines and one further permitted turbine, and introduces a new form of built development to the area.

The scale of the extension to the existing abattoir could be considered large relative to the existing agricultural buildings in the area, but could equally be considered modest compared with the existing industrial facilities in the wider context of the site. This a relatively sizable industrial development, but also an appropriately sited development within an area identified in the CDP as a '*low sensitivity area'* with the capacity to *"absorb quite effectively, appropriately designed and located development in all categories (including: telecommunication masts and wind energy installations, afforestation and agricultural structures)".*

In terms of effects on landscape character within the study area, the proposal represents the introduction of a relatively large meat processing facility in to a primarily rural context. Although there is a thematic relationship between the previous agricultural use of the land and the proposed meat processing facility, the proposed land use will be that of a highly productive industrial facility and therefore represents a change to the predominant agricultural character of the site itself which also contains a much smaller existing meat processing facility. Once all phases of the proposed extension to the existing abattoir is complete, it is likely to be a prominent land use within the immediate context of the site(i.e. within 100-200m), with other forms of land use becoming somewhat subservient. However, comparable integral relationships between rural settlements and rural industries can be found throughout the country and are not necessarily negative associations; such a relationship helps ensure that rural communities remain viable, sustainable, self-sufficient and/or in employment. This, in turn, can have a major bearing on how additional development is perceived by that population, in terms of its appropriateness within the landscape context.

The proposed extension to the existing abattoir is a facility of local and regional importance, directly related to and inter-dependant with the rural modes of production and the rural economy, it is considered that the magnitude of landscape impact is **Medium** for the site and its immediate environs. Beyond approximately 500m it is less likely to be noticed and will have a 'Low' then 'Negligible' effect over greater distances as it becomes a proportionately smaller component of the overall hinterland landscape fabric.

With reference to the significance matrix (Table 7.4) above, the **Low** landscape sensitivity judgement attributed to the study area coupled with a **Medium** magnitude of landscape impact in the immediate vicinity (<500m) of the proposed extension to the existing abattoir is considered to result in an overall significance of no greater than **Slight**.

7.4.3 VISUAL IMPACT ASSESSMENT

7.4.3.1 Sensitivity of Visual Receptors

Table 7.6: Analysis of Visual Receptor Sensitivity at Viewshed Reference Points

Scale of value for each criterion

Strong association	Moderate association	Mild association	Negligible association

Values associated with the view	**VP1**	**VP2**	**VP3**	**VP4**	**VP5**	**VP6**	**VP7**	**VP8**	**VP9**	**VP1**	**VP1**
Susceptibility of viewers to changes in views											
Recognised scenic value of the view											
Views from within highly sensitive landscape areas											
Primary views from residences											
Intensity of use, popularity (number of viewers)											
Viewer connection with the landscape											
Provision of vast, elevated panoramic views											
Sense of remoteness / tranquillity at the viewing location											
Degree of perceived naturalness											
Presence of striking or noteworthy features											
Sense of Historical, cultural and / or spiritual significance											
Rarity or uniqueness of the view											
Integrity of the landscape character within the view											
Sense of place at the viewing location											
Sense of awe											
Overall sensitivity assessment	**L**	**L**	**ML**	**L**	**L**	**ML**	**ML**	**L**	**ML**	**ML**	**M**

N = Negligible; **L** = low sensitivity; **ML** = medium-low sensitivity **M** = medium sensitivity; **HM** = High-medium sensitivity; **H** = high sensitivity; **VH** = very high sensitivity

7.4.3.2 Magnitude of Visual Effects

The assessment of visual impacts at each of the selected viewpoints is aided by photomontages of the proposed extension to the existing abattoir (Attachment 7.1). Photomontages are a 'photo-real' depiction of the scheme within the view utilising a rendered three-dimensional model of the development, which has been geo-referenced to allow accurate placement and scale. For each viewpoint, the following images have been produced;

1. Existing View
2. Montage View with Mitigation Planting Established

VIEWSHED REFERENCE POINT		VIEWING DISTANCE	DIRECTION OF VIEW
VP1	L3010 local road immediately south of site	0.002km	N

Representative of:
- Local community views

Receptor Sensitivity **Low**

Existing View This is a heavily contained view from the L3010 local road immediately adjacent to the southeast corner of the site. In the foreground a dense mature hedgerow sits just beyond the grassy verge of the local road and contains this view at a short distance.

Visual Impact of proposed extension The proposed extension to the existing abattoir will be heavily screened from this viewpoint even at such a close viewing distance. Glimpses of the south-eastern extents of the proposed extension will be afforded here through and above a heavy veil of dense hedgerow vegetation that lines the local road immediately adjacent to the viewpoint. Any visibility afforded of the proposed buildings will be in the form of a dull mass backing the dense hedgerow vegetation. The development is likely to slightly increase the already enclosed nature of this local road here due to its height and near distance to the local road corridor. This will also increase the intensity of built development in this quiet rural setting. Overall, it is considered that the magnitude of visual impact is **Medium-Low**.

Visual Impact following mitigation establishment In this instance the proposed mitigation will strengthen and fill gaps in the already dense boundary hedgerow. The embankment planted with advanced nursery stock will also supplement the bolstered boundary hedgerow and provide and additional layer of vegetative screening. Whilst the proposed extension will not be entirely screened here due to its height and near distance to the road, the proposed mitigation will soften the strict lines of the building when viewed against the sky. On balance the magnitude of visual impact is deemed to reduce to **Low** in a post mitigation scenario.

Summary Based on the assessment criteria and matrices outlined at **Section 7.1.3** the significance of residual visual impact is summarised below.

	Visual Receptor Sensitivity	Visual Impact Magnitude	**Significance of Visual Impact**
Pre-mitigation	Low	Medium-low	Slight
Residual	Low	Low	**Slight-Imperceptible**

VIEWSHED REFERENCE POINT		VIEWING DISTANCE	DIRECTION OF VIEW
VP2	L3010 local road immediately south of site	0.002km	N

Representative of:
- Local community views

Receptor Sensitivity
Low

Existing View
This is a contained view from a gateway in a dense hedgerow along a L3010 local road immediately south of the site. The brief view encompasses a flat pastoral field enclosed by mature tree lined hedgerows where it is contained at a near distance. Filtered glimpses of pastoral fields beyond are afforded through small gaps in these otherwise dense hedgerows.

Visual Impact of proposed extension
This is a brief and filtered view of the proposed extension to the existing abattoir through a gateway in the roadside hedgerow and over top of the dense tree lined hedgerow. A clear view of the nearest portion of the proposed building will be afforded here through a security fence where the existing gateway is located. The proposed buildings will occupy the entire lateral extent of the gap in roadside vegetation and will be a prominent feature of this view from this close viewing distance. The entire vertical extent of the proposed building will be revealed here with the subtle variations in the buildings elevations slightly reducing the overall perceived mass of the building.

The large extension to the existing abattoir represents a substantial change to this typical rural view and will represent a marked increase in the intensity of development here. However, the dull tone of the proposed building will also help it to assimilate the building with the existing hedgerow vegetation when viewed through any gaps in the dense roadside hedgerow. Overall, it is considered that the magnitude of visual impact is **High-Medium**.

Visual Impact following mitigation establishment
Once fully established, the proposed mitigation will fill any existing gaps in the existing hedgerow vegetation in this view. The proposed bolstered hedgerow will screen much of the vertical extent of the building with only views of the upper floor and roofline afforded from here. The proposed berm backing the boundary hedgerow will also provide an additional layer of screening whilst the advanced nursery stock planted on top of the berm will rise high enough to break up the hard lateral lines of the building's rooftop. On balance the magnitude of visual impact is deemed to reduce to **Medium-Low** in a post mitigation scenario.

Summary
Based on the assessment criteria and matrices outlined at **Section 7.1.3** the significance of residual visual impact is summarised below.

	Visual Receptor Sensitivity	Visual Impact Magnitude	**Significance of Visual Impact**
Pre-mitigation	Low	High-Medium	Moderate-slight
Residual	Low	Medium-low	**Slight**

VIEWSHED REFERENCE POINT		VIEWING DISTANCE	DIRECTION OF VIEW
VP3	Intersection of the R438 and L3010 west of site	0.023km	E

Representative of:
- Major Route
- Local community views

Receptor Sensitivity **Medium-low**

Existing View This is a relatively short distance view from the intersection of the R438 regional road and the beginning of the L3010 local road that flanks the southern boundary of the proposal site. Dense tree lined hedgerows extend along the fringe of both the local and regional roads and contain much of this view in the foreground. One of the large Meenwaun turbines rises in the background of the view and is framed by two mature trees in the foreground.

Visual Impact of proposed extension The proposed abattoir extension will be almost entirely screened by the existing roadside hedgerow from this viewpoint. Consequently, the magnitude of visual impact is deemed to be negligible by default.

Visual Impact following mitigation establishment The already dense roadside hedgerows will be bolstered here with supplementary hedgerow vegetation which will slightly increase their height and create a more consolidated appearance. The visual impact will remain at negligible.

Summary Based on the assessment criteria and matrices outlined at **Section 7.1.3** the significance of residual visual impact is summarised below.

	Visual Receptor Sensitivity	Visual Impact Magnitude	**Significance of Visual Impact**
Pre-mitigation	Medium-low	Negligible	Imperceptible
Residual	Medium-low	Negligible	**Imperceptible**

VIEWSHED REFERENCE POINT		VIEWING DISTANCE	DIRECTION OF VIEW
VP4	L3010 local road immediately south of site	0.010km	N

Representative of:
- Local community views

Receptor Sensitivity
Low

Existing View
This is a view from the entrance of an existing agricultural yard along the L3010 immediately south of the proposal site. The view looks out over a gravel and concrete yard encompassing typical farm buildings and is enclosed by post and wire fencing. Pastoral farmlands encircle this paddock and are similarly bound by post and wire fencing and scrubby hedgerows. A mature tree lined hedgerow to the rear of this farmstead contains the view in the middle distance.

Visual Impact of proposed extension
A considerable portion of the west facing elevation of the proposed building will be visible here through the proposed new entranceway of the beef processing facility. Several pieces of ancillary equipment to the rear of the proposed building and the security hut adjacent to the entrance will also be visible from this viewing location. The proposed development presents as a substantial increase in the scale and intensity of rural / industrial built development within this scene especially in a cumulative sense with the existing farm buildings and turbines in the background. Views from the road will be enclosed to a slightly greater degree, but this is not currently an extensive view. The muted green tone of the buildings aids visual assimilation, but the angular geometric roofline will rise slightly above the vegetated skyline beyond. On balance of these reasons, the magnitude of visual impact is deemed to be High medium.

Visual Impact following mitigation establishment
Following the establishment of mitigation planting, the view in the direction of the existing farm sheds will be foreshortened at the roadside, but the lower, more formal hedge around the site entrance will still allow views of the main building, albeit considerably softened by typical hedgerow planting along its southern (road) side. Overall, the magnitude of visual impact is considered to reduce to Medium following mitigation.

Summary
Based on the assessment criteria and matrices outlined at **Section 7.1.3** the significance of residual visual impact is summarised below.

	Visual Receptor Sensitivity	Visual Impact Magnitude	**Significance of Visual Impact**
Pre-mitigation	Low	High medium	**Moderate slight**
Residual	Low	Medium	**Slight**

VIEWSHED REFERENCE POINT		VIEWING DISTANCE	DIRECTION OF VIEW
VP5	L3010 local road southeast of site	0.326km	NW

Representative of:
- Local community views

Receptor Sensitivity
Low

Existing View
This is a relatively contained view from a slight bend in the L3010 local road to the east of the proposal site. The view extends out over the L3010 road corridor and is bound by a grassy mound and some scrubby hedgerow vegetation on its northern verge as well as a mature tree lined hedgerow along the opposite side. Beyond the grassy mound on the northern side of the local road, a narrow pastoral field extends in the direction of the proposal site. The hedgerow at the opposite end of this field and some stacked mature vegetation beyond contains this view in the middle ground.

Visual Impact of proposed extension
A view of the uppermost portions of the proposed building will be afforded from here over top of and between a series of roadside and mature tree lined hedgerows and will be identified by the strong horizontal roofline it creates above the softer hedgerows. While the development will not be a prominent feature of this view, it will represent an increase in the intensity of development in this otherwise relatively undeveloped scene. Consequently it is considered the magnitude of visual impact is **Low-negligible**.

Visual Impact following mitigation establishment
Due to the dense tree lined hedgerow that lines the south-eastern boundary of the site mitigation planting is unlikely to be visible from here and instead, will contribute to the strengthening of the existing tree lines and hedgerows. As a result the magnitude of visual impact will remain at **Low-negligible.**

Summary
Based on the assessment criteria and matrices outlined at **Section 7.1.3** the significance of residual visual impact is summarised below.

	Visual Receptor Sensitivity	Visual Impact Magnitude	**Significance of Visual Impact**
Pre-mitigation	Low	Low-Negligible	**Slight-Imperceptible**
Residual	Low	Low-Negligible	**Slight-Imperceptible**

VIEWSHED REFERENCE POINT		VIEWING DISTANCE	DIRECTION OF VIEW
VP6	Intersection of L3010 and L3006 southeast of site	1.39km	NW

Representative of:
- Local community views

Receptor Sensitivity
Medium-Low

Existing View
This is a flat somewhat open view from the intersection of the L3010 local road and the L3006 local road to the east of the proposed development. Low clipped hedgerows line the corridor of the L3010 local road along which the view is directed. A clump of mature broadleaved trees within the pastoral field in the foreground and some stacked hedgerow vegetation beyond contain this view in the middle distance.

Visual Impact of proposed extension
The proposed extension to the existing abattoir will not be visible from here due to screening by the dense intervening tree lines and hedgerows. The magnitude of visual impact is, therefore, Negligible by default.

Visual Impact following mitigation establishment
Mitigation planting will not be visible and the impact remains Negligible.

Summary
Based on the assessment criteria and matrices outlined at **Section 7.1.3** the significance of residual visual impact is summarised below.

	Visual Receptor Sensitivity	Visual Impact Magnitude	**Significance of Visual Impact**
Pre-mitigation	Medium-Low	Negligible	**Imperceptible**
Residual	Medium-Low	Negligible	**Imperceptible**

VIEWSHED REFERENCE POINT		VIEWING DISTANCE	DIRECTION OF VIEW
VP7	R439 south of site	1.08km	N

Representative of:
- Local community views

Receptor Sensitivity
Medium-low

Existing View
This is a view over a mildly undulating pastoral field along the R439 regional road south of the site. A low hedgerow separates the low rolling field in the foreground from the regional road. In addition to the undulations in foreground field, a mature tree lined hedgerow and some dense conifer plantations beyond contain this view in the middle distance. In the background, the turbines from the Meenwaun wind farm stand clear in silhouette against the sky.

Visual Impact of proposed extension
The proposed extension to the existing abattoir will not be visible from here due to screening by the dense intervening tree lines and hedgerows. The magnitude of visual impact is, therefore, Negligible by default.

Visual Impact following mitigation establishment
Mitigation planting will not be visible and the impact remains Negligible.

Summary
Based on the assessment criteria and matrices outlined at **Section 7.1.3** the significance of residual visual impact is summarised below.

	Visual Receptor Sensitivity	Visual Impact Magnitude	**Significance of Visual Impact**
Pre-mitigation	Medium-low	Negligible	**Imperceptible**
Residual	Medium-low	Negligible	**Imperceptible**

VIEWSHED REFERENCE POINT		VIEWING DISTANCE	DIRECTION OF VIEW
VP8	Intersection of R438 and R439 southwest of site (Taylors cross)	0.88km	NE

Representative of:
- Local community views
- Major route

Receptor Sensitivity **Low**

Existing View This is an open view over relatively flat pastoral fields from the intersection of the R438 and R439 regional roads known as Taylor's cross. In the foreground, a scrubby, roadside, grass covered mound borders a pastoral field, which is enclosed by a concrete post and wire fence and low clipped hedgerows. A dense coniferous hedgerow cuts across this field in the middle ground of the view. This along with some stacked vegetation beyond contains this view in the middle distance. All of the Meenwaun wind farm turbines stand tall in silhouette against the sky in the background of this view.

Visual Impact of proposed extension The proposed extension to the existing abattoir will not be visible from here due to screening by the dense intervening tree lines and hedgerows. The magnitude of visual impact is, therefore, Negligible by default.

Visual Impact following mitigation establishment Mitigation planting will not be visible and the impact remains Negligible.

Summary Based on the assessment criteria and matrices outlined at **Section 7.1.3** the significance of residual visual impact is summarised below.

	Visual Receptor Sensitivity	Visual Impact Magnitude	**Significance of Visual Impact**
Pre-mitigation	Low	Negligible	**Imperceptible**
Residual	Low	Negligible	**Imperceptible**

VIEWSHED REFERENCE POINT		VIEWING DISTANCE	DIRECTION OF VIEW
VP9	R438 north of site	0.73km	S

Representative of:
- Major route

Receptor Sensitivity
Medium-Low

Existing View
This is a relatively enclosed view from the R438 regional road north of the proposal site. The view looks over the scrubby fringe of a cutaway peatland where natural re-vegetation is already beginning to occur. The layers of scrubby vegetation contain this view at a relatively short distance. The Meenwaun turbines rise above the vegetated skyline in the background of this view.

Visual Impact of proposed extension
The proposed extension to the existing abattoir will not be visible from here due to layers of intervening scrub and hedgerows north of the site. The magnitude of visual impact is, therefore, Negligible by default.

Visual Impact following mitigation establishment
Mitigation planting will not be visible and the impact remains Negligible.

Summary
Based on the assessment criteria and matrices outlined at **Section 7.1.3** the significance of residual visual impact is summarised below.

	Visual Receptor Sensitivity	Visual Impact Magnitude	**Significance of Visual Impact**
Pre-mitigation	Medium-Low	Negligible	**Imperceptible**
Residual	Medium-Low	Negligible	**Imperceptible**

VIEWSHED REFERENCE POINT		VIEWING DISTANCE	DIRECTION OF VIEW
VP10	L7016 local road west of site (Banagher United FC)	1.58km	E

Representative of:
- Local community views
- Amenity feature

Receptor Sensitivity **Medium-low**

Existing View This is a relatively channelled view along the L7016 local road adjacent to the entrance of Banagher United Football Club. Both sides of the local road are bound by dense mature tree line hedgerows that contain much of this view at a short distance.

Visual Impact of proposed extension The proposed extension to the existing abattoir will not be visible from here due to screening by the dense intervening tree lines and hedgerows. The magnitude of visual impact is, therefore, Negligible by default.

Visual Impact following mitigation establishment Mitigation planting will not be visible and the impact remains Negligible.

Summary Based on the assessment criteria and matrices outlined at **Section 7.1.3** the significance of residual visual impact is summarised below.

	Visual Receptor Sensitivity	Visual Impact Magnitude	**Significance of Visual Impact**
Pre-mitigation	Medium-low	Negligible	**Imperceptible**
Residual	Medium-low	Negligible	**Imperceptible**

VIEWSHED REFERENCE POINT		VIEWING DISTANCE	DIRECTION OF VIEW
VP11	L7016 local road west of site	2.44km	E

Representative of:
- Local community views

Receptor Sensitivity
Medium

Existing View
This is a locally elevated view from a local road on the south-eastern outskirts of Banagher. The foreground context of the view encompasses a number of single storey residential dwellings situated on slightly sloping terrain. The view is directed along the alignment of the local road which descends away from the viewer. Several patches of mature vegetation in the foreground, and areas of stacked vegetation beyond, contain much of this view at a relatively short distance. The rotating blade sets of the Meenwaun turbines are noted just above the vegetated skyline. The broad rolling ridgeline of the Slieve Bloom Mountains can also be discerned in the background of this view.

Visual Impact of proposed extension
The proposed extension to the existing abattoir will not be visible from here due to screening by the dense intervening tree lines and hedgerows. The magnitude of visual impact is, therefore, Negligible by default.

Visual Impact following mitigation establishment
Mitigation planting will not be visible and the impact remains Negligible.

Summary
Based on the assessment criteria and matrices outlined at **Section 7.1.3** the significance of residual visual impact is summarised below.

	Visual Receptor Sensitivity	Visual Impact Magnitude	**Significance of Visual Impact**
Pre-mitigation	Medium	Negligible	**Imperceptible**
Residual	Medium	Negligible	**Imperceptible**

7.5 CONCLUSION

In terms of landscape impacts it is not considered that this is a highly sensitive landscape setting. The wider context is that of a combination of small-medium sized settlements and a working rural landscape without any particular landscape or visual designations in the Offaly County Development Plan 2014-2020. For these reasons the landscape sensitivity judgement is 'Low' – reflecting its robustness rather than its quality / condition.

There will be physical impacts on the land cover of the site as well as temporary construction related impacts from the movement of heavy machinery and stockpiling of materials, however, the main impacts considered are those relating to post-construction effects on the prevailing landscape character. In this respect, the proposal represents a substantial intensification of a rural/industrial land use that already exists within the site in the form of the much smaller meat processing facility. While there is a thematic relationship between the proposed facility and the previous use of the land, this will primarily be a transition from an area of pastoral farmlands to that of a sizable industrial facility and will represent a marked increase in the intensity of development of the immediate vicinity of the site.

Visual impacts are assessed at 11 no. viewpoint locations representing a range of viewing angles, distances and contexts. All of these are within 2km of the proposed extension to the existing abattoir as it is not readily visible from further afield in this flat landscape, which is enclosed by dense hedgerow vegetation and mature tree lines.

Pre-mitigation visual impacts range from Imperceptible at the majority of viewpoint locations beyond 500m of the site, up to Moderate-slight for VP2 and VP4 immediately adjacent to the site. The close view of the nearest portion of the development will result in a marked change in the otherwise typical rural scene from both VP2 and VP4. This arises from the physical enclosure of the views as well as the increased scale and intensity of built development. However, the nature of the development is clearly rural industry and the buildings are readily screened / softened by proposed mitigation planting, resulting in 'Slight' residual impacts in both cases.

7.5.1 OVERALL SIGNIFICANCE OF IMPACT

Overall, it is considered that the proposed extension to the existing abattoir, though substantial in scale, is appropriately sited; visually well contained; and, where visible, the design helps it to assimilate with the existing landscape and visual context. It will result in visual impacts that are very localised and in the lower order of magnitude. Overall, it is considered that such effects are not significant in EIA terms, especially once landscape mitigation proposals have become established.

8.0 TRAFFIC AND TRANSPORT

8.1 INTRODUCTION

The Transportation Assessment (TA) section of the EIAR has been prepared by NRB Consulting Engineers Ltd and addresses the road traffic capacity and Transport considerations relating to the proposal to construct an Abattoir extension adjacent Boherdurrow Crossroads south of Banagher Co Offaly. The TA Report, which is included herewith as Attachment 8.1 addresses the impact of the proposed development which is accessed from the Local Road L3010, and the implications for the adjacent road network for the weekday AM and weekday PM Peak Hours (including an assessment of AADT for the circumstances Pre and Post Development).

8.2 LEGISLATIVE FRAMEWORK AND PLANNING POLICY

Recommendations contained within this Transportation Assessment are based on the following sources of information and industry-standard practices:

- Transport Infrastructure Ireland (TII) Traffic & Transport Assessment Guidelines;
- TII PE-PAG-02017 Project Appraisal Guidelines for National Roads Unit 5.3;
- Comprehensive new interval Classified Traffic Surveys undertaken in November 2018 during normal school term.

The Report has been prepared fully in accordance with the requirements of TII's Traffic & Transport Assessment Guidelines. These are the professional Guidelines used to assess the impact of developments on public roads

8.3 METHODOLOGY

A detailed classified traffic survey was undertaken of the key junctions and links in proximity to the site in November 2018 during normal school term. This included a comprehensive classified interval survey for each of the 2 modelled periods and an ATC Survey to supplement the turning movement surveys. This data was then used to establish current peak hour traffic conditions and to establish the current usage of the roadways. Details of the surveys undertaken are included within the appended TA, with the Peak Hour Network flows (expressed as PCUs) identified. The traffic survey data was used as the basis for the study.

With the addition of worst case traffic associated with the proposed development, detailed modelling and analysis of the proposed priority controlled access junction, the existing Boherdurrow Crossroads and the adjacent off-set spur T Junction of the L3010/L7016 was undertaken. Capacity Modelling using TII-approved software was undertaken for a year of opening 2021 and design year 2036 in accordance with industry Guidelines. It should be noted that in light of the very positive capacity results, any requirement to select a later opening or design year is considered very unlikely to affect the conclusions of the study.

8.4 CONSULTATION

The TA was undertaken in accordance with Industry Standard Professional Guidelines, and it was therefore not considered necessary at this stage to consult with Roads Officials in Offaly County Council. It is understood by NRB Consulting Engineers Ltd. that the design team has engaged with Offaly County Council in advance of this submission.

8.5 DESCRIPTION OF EXISTING ENVIRONMENT

The proposed development extension is located on a rural site adjacent Boherdurrow Crossroads to the south of Banagher in Offaly. (Refer to site location as ***Figure 1.1*** within the appended TA Report). The site is bounded to the west by the Local Road L3010, a local road connecting to the Regional Road R438 at Boherdurrow Crossroads. The site is currently use for agricultural support and abattoir purposes and is bound to the north, south and east by agricultural lands.

The L3010 Local Road serving the site, is a narrow rural road which is subject to an 80kph speed limit. There is also an existing 3T weight limit on the L3010 serving the site. This is illustrated in ***Figure 2.1*** within the appended TA.

A 3T ban (RUS 015) (for traffic management purposes) does not prevent trucks travelling on a road to reach a business, or vehicles which have business on such a road. Trucks would not be prevented from travelling on it by a 3T ban as per S.I. No. 332/2012 - Road Traffic (Traffic and Parking) (Amendment) (No. 2) Regulations 2012, which states;

> ***"17. (1) Where traffic sign number RUS 015 (maximum design gross vehicle weight — traffic management) is provided at the entrance to a road, the driver of a vehicle, the design gross vehicle weight of which exceeds the weight specified on the sign, shall not proceed beyond the sign.***
>
> ***(2) Sub-article (1) does not apply where it is necessary for a vehicle to enter a road solely for the purpose of gaining access to or egress from premises accessible only from that road."***

In the case of the subject site, it is proposed to supplement the 3T Weight Restriction Advisory Signs to include a sign for "***EXCEPT FOR LOCAL ACCESS***" so that vehicles accessing this site are aware that this access to the premises is allowable. This is shown on the drawings at ***Appendix A*** of the appended TA.

The L3010 currently carries a 24Hr Annual Average Daily Traffic (AADT) of 120 Passenger Car Units (PCUs, or car equivalents) at the site access point. This is therefore currently a very lightly trafficked road. The L3010 meets the R438 Regional Road approximately 200m northwards from the site by way of a priority controlled crossroads junction.

The R438 Regional Road is relatively flat in nature, is generally orientated in a N-S direction, and facilitates rural traffic to join the N62 approximately 7km Northeast of the site at Cloghan and approximately 9km southeast of the site at Birr.

The R438 currently carries a 24Hr Annual Average Daily Traffic (AADT) of approximately 1449 PCUs just north of Boherdurrow Crossroads. To set this flow in context, a road of this nature has a traffic carrying capacity of approximately 1,000 PCUs per-direction per-hour. Given the hourly 2-way link capacity is approximately 2,000 PCUs and the fact that the existing 24 Hr AADT is 1,449 PCUs, this is therefore clearly a very lightly trafficked Regional Road. It is recognised that the capacity of roads of this nature are ordinarily determined by the capacity of terminal junctions. However, strictly in terms of link capacity the road is clearly very lightly trafficked.

The fourth arm of the crossroads is another local road, the L7016. The L7016 currently carries a 24Hr Annual Average Daily Traffic (AADT) of approximately 403 PCUs immediately NW of Boherdurrow Crossroads. This is also a very lightly trafficked road.

8.6 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development consists of a significant extension to the existing abattoir. An assessment of the Traffic Generated has been undertaken based on anticipated staffing and production levels.

The proposed development consists of the following elements:

- The construction of an abattoir extension for the continued processing of Meat and Meat Products;
- Approximately 110 Full Time equivalent employees (between Operatives, Administration and Cleaning Staff on shifts);
- A safe design-led layout of the internal roads and infrastructure;
- The means of vehicular access to the site will be via a new high quality Priority T Junction onto the local road;
- Adequate off-street parking spaces for staff commensurate with the development;
- Adequate internal safe footpath linkages;
- Landscaping, signage and surface treatment.

The development has been designed to be accessible via 16.5m HGVs and ~10m HGVs plus a towed trailer, however these are expected to constitute a small proportion of the entire vehicular traffic associated with the development.

The small scale of the entire facility is confirmed through the robust assessment of Traffic Generated, which is addressed further within Section 3 of the appended TA Report.

8.7 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

8.7.1 CONSTRUCTION PHASE

It is considered that the traffic generated during the construction phase will be lower in nature and volume than the traffic generated during the operational stages, particularly given the nature of the operation and the levels of staffing deployed. In this regard, given that a full assessment of operational stage has been undertaken it is considered to represent a robust analysis.

8.7.2 OPERATIONAL PHASE

A detailed breakdown and robust estimation of total traffic generated by the subject site during the weekday periods, with the resulting worst case Traffic Generated, as illustrated in Table 8.1 below, is provided within ***Appendix C*** of the TA Report.

Table 8.1: Worst Case Traffic Generated by Proposed Development (Production and Staffing Combined)

PROPOSED DEVELOPMENT - TRAFFIC GENERATION CALCULATIONS.				
PLANT PRODUCTION AND ACTIVITIES - DAILY MOVEMENTS				
DESCRIPTION	**NUMBER**	**VEHICLE TYPE (AXLES)**	**PCU FACTOR**	**ONE-WAY EQUIV PCU/DAY**
Cattle Deliveries Per Day*	2	3	2.5	5
	2	3	2.5	5
	5	2	2	10
	15	2	2	30
Meat Products Out*	5	5	3	15
Waste Out*	3	2	2.5	7.5
Sludge Removal*	1	2	2.5	2.5
Chemical Deliveries/Fuel - per Mth	3	3	2.5	Negligible
Visitors to Site (Non Employees)	10	2	1	6
Production Staff 7am to 5pm	80	2	1	44
Administration Staff 9am-5pm	20	2	1	11
Cleaning Staff (5pm Start)	10	2	1	6
Total Equivalent One-Way PCUs Generated per Day				***142***
Total Equivalent 2-WAY Annual Average Daily Traffic Generated by Facility (PCUs)				***283***

For the purposes of assessment, for Staffing Arrivals and Departures, it has been conservatively assumed that the Car Occupancy will be 1.8 people per car. It has also robustly been assumed that the production related vehicles are distributed over an 8 Hour Working Day, and this underscores the robustness of the assessment. The resulting breakdown of the impact of the development on the key-critical weekday AM and PM Commuter Peak Hours are as set out below as Table 8.2;

Table 8.2: Worst Case Traffic Generated by Proposed Fully Operational Facility

WORST CASE PEAK HOUR ARRIVALS AND DEPARTURES (PCUS OR CAR EQUIVALENTS)			
Hour	**Arrivals**	**Departures**	**2-Way**
Weekday AM Peak Hour (8-9am)	21	10	31
Weekday PM Peak Hour (5-6pm)	15	66	81

The total traffic generated by the development comprises an AADT of 283 PCUs within a 24 Hr Period. Whilst it is appreciated that the local roads are lightly trafficked, nonetheless this is a very small amount of traffic by any measure.

8.8 CUMULATIVE IMPACT

A Traffic Survey was undertaken of the existing road and affected junctions in order to establish background traffic conditions. Details of the surveys are also included within the attached TA as Attachment 8.1 and are reproduced as Traffic Flow Diagrams in Appendix C.

In Traffic Engineering all vehicles are expressed in terms of "Passenger Car Units" (PCUs), sometimes referred to as "Car Equivalents". This is the methodology that has been employed here, with specific industry standard conversion factors to convert HGVs, Skip Lorries, Cars/Trailers and Bin Lorries to PCUs. The conversion factors used are in accordance with industry-standard recommendations.

The anticipated worst case development traffic as set out in Table 8.1 and Table 8.2 above was then assigned to the road network and the impact was assessed by way of approved road capacity modelling techniques.

8.9 "DO-NOTHING" IMPACT

This would mean that the established existing Traffic Conditions would remain, and there would therefore be no measurable impact of Do-Nothing.

8.10 MITIGATION MEASURES

It is proposed to create a dedicated improved vehicular access and internal layout of the proposed development that meets the highest standards in terms of Geometry and Design adherence to the TII Design Manual for Roads and Bridges (DMRB). It is proposed to amend the local 3T weight limit signage as set out in Section 8.5 above. In addition it is proposed to widen the local road to the junction with Boherdurrow Crossroads to provide a 6m wide pavement with verges, thereby providing for the significantly safer passage of the increased volume of traffic and the higher proportion of associated larger vehicles.

8.10.1 CONSTRUCTION PHASE

It is considered that the proposed amended signage and local road widening should be implemented at an early stage so that construction operations benefit from their effects.

8.10.2 OPERATIONAL PHASE

The resulting local road improvements will be in place, taken in charge, and therefore under the control of Offaly County Council and the operational phase of the proposed development will continue to benefit from these.

8.11 RESIDUAL IMPACTS

There are not considered to be any residual impacts associated with the proposed development in terms of Traffic & Transport, as the impact of the daily worst case traffic at full operation has been assessed for opening and design years (15 years following opening) in accordance with the Transportation Assessment Guidelines.

8.12 DIFFICULTIES IN COMPILING INFORMATION

No notable difficulties were encountered in compiling this information

8.13 REFERENCES

Any reference documentation is referred to directly within the EIAR or within the appended TA Report (Attachment 8.1).

SECTION B - THE NATURAL ENVIRONMENT

This Section of the Environmental Impact Assessment Report deals with the potential effects of the proposed development on the natural environment. The effects have been grouped as follows:

Impacts on Biodiversity – Terrestrial Environment
Impacts on Water Quality and Aquatic Biodiversity
Impacts on Land – Soils, Geology, Hydrogeology and Hydrogeology

The various aspects of the natural environment interact to some degree with each other so that assessing one aspect in isolation can be misleading. For example, the survival of terrestrial fauna can be dependent on floral composition, which is in turn dependent on soil composition and groundwater levels. Similarly, the diversity of aquatic flora and fauna would be impacted by both hydrology and the quality of waters receiving drainage from the proposed scheme.

Human Beings also interact with the natural environment, often by altering land-use and landscape patterns for the purpose of agriculture and settlement.

9.0 BIODIVERSITY – TERRESTRIAL ENVIRONMENT

9.1 INTRODUCTION

This section outlines the terrestrial biodiversity currently present in the area of the proposed development and assesses the impact of the proposal on terrestrial habitats and species identified. This section should be read in conjunction with the site layout plans for the proposed development and project description sections of the EIAR. Mitigation measures have been proposed where required.

The ecological assessment involved a desktop review and the undertaking of field assessments of the site to identify habitats and species of flora and fauna present in order to determine the ecological diversity of this area. A Natura Impact Statement has been prepared for the proposed development and accompanies the planning application (Report Ref. PES_NIS_19_9201).

The objectives of the ecological assessment were as follows:

- To undertake a comprehensive desktop review to identify European sites within the vicinity of the proposed development and to determine previously recorded fauna for the area;
- To undertake field assessments of the proposed development site and surroundings;
- To evaluate the biodiversity value of the proposed development and surroundings;
- To determine and assess the potential impacts of the proposed development on terrestrial biodiversity;
- To propose mitigation measures for both the construction and operational phases of the development to reduce potential impacts upon terrestrial biodiversity.

9.2 LEGISLATIVE FRAMEWORK AND PLANNING POLICY

9.2.1 LEGISLATIVE CONTEXT

The main legislation pertaining to biodiversity and nature conservation in Ireland is outlined below.

The Wildlife Act, 1976 and Wildlife (Amendment) Act, 2000

The Wildlife Act is the primary piece of Irish legislation providing for the protection and conservation of wildlife and provides for the control of specific activities which could adversely affect wildlife, for example the regulation of hunting and wildlife trading. Under the Wildlife Act, all bird species, 22 other fauna species and 86 flora species in Ireland are afforded protected status. The Wildlife Act, 1976 allows for the designation of specific areas of ecological value such as Statutory Nature Reserves and Refuges for Fauna. The Wildlife (Amendment) Act, 2000 provides for greater protection and conservation of wildlife and also provides for the designation and statutory protection of Natural Heritage Areas (NHA).

The Flora (Protection) Order, 2015 (S.I. 356 of 2015)

This order provides statutory protection to flora listed in Section 21 of the Wildlife Act, 1976 and Wildlife (Amendment) Act, 2000. Under the Order, it is illegal to wilfully cut, uproot or damage the listed species or interfere in any way with their habitats.

European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. 477 of 2011)

These regulations transpose the European Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Fauna and Flora (known as the "Habitats Directive") and the European Council Directive 2009/147/EC on the Conservation of Wild Birds (known as the "Birds Directive") into Irish Law. The regulations provide for the designation and protection of Natura 2000 sites comprising of Special Areas of Conservation (SAC) and Special Protection Areas (SPA). The regulations safeguard the SAC and SPA sites from developments with the potential to significantly impact upon them. The EC (Birds and Natural Habitats) Regulations also address invasive species, making it an offence without a licence to plant, allow to disperse, escape or spread, to reproduce or propagate, to transport, to sell or advertise invasive species specified in the regulations.

Planning and Development Regulations, 2001 to 2018

These regulations transpose the requirements of Directive 2014/52/EU (and previous Directive 2011/52/EU) on the assessment of the effects of certain projects on the environment into planning law. Under these regulations, development plans must include mandatory objectives for the conservation of natural heritage and for the conservation of European sites.

9.2.2 PLANNING POLICIES

National Policies

A number of documents have been published in relation to the Government's commitment to sustainable development, including the National Spatial Strategy 2002-2020 and the Sustainable Development: A Strategy for Ireland 1997.

Regional Policies

The Regional Planning Guidelines (RPGs) for the Midland Region 2010-2022, which includes the counties of Laois, Offaly, Westmeath and Longford, outlines the long-term spatial planning strategy for the area. As part of the guidelines, a number of policies relating to biodiversity, and relevant to the proposed development, were outlined, as per Table 9.1 below.

Table 9.1: Regional Policies Relevant to Biodiversity and the Proposed Development

STRATEGIC POLICY REFERENCE	POLICY
EP 12	Promote the protection, conservation and enhancement of the region's biodiversity and natural and geological heritage. This includes wildlife (flora and fauna), Species protected under the Wildlife Acts and listed for strict protection on Annex IV of the Habitats Directive; and Wildlife corridors and stepping stones as envisaged under Article 10 of the Habitats Directive, habitats, sites with no statutory protection, proposed National Heritage Areas, landscapes and/or landscape features of importance to wildlife or which play a key role in the conservation and management of natural resources such as water.
EP 13	Facilitate the protection of sites designated in National and European legislation, and in other relevant International Conventions, Agreements and Processes. This includes sites designated or proposed to be designated as: Ramsar sites, Special Areas of Conservation, Special Protection Areas, National Heritage Areas, nature reserves, and refuges for flora or fauna.

Local Policies and Objectives

Local planning policies and objectives are detailed in the Offaly County Development Plan, 2014-2020. Policies and objectives relating to biodiversity, and relevant to the proposed development, are outlined in Table 9.2.

Table 9.2: Local Policies and Objectives Relevant to Biodiversity and the Proposed Development

POLICY / OBJECTIVE REFERENCE	POLICY / OBJECTIVE
NHP-01	It is Council policy to prohibit any development that would be harmful to or that would result in a significant deterioration of habitats and/or disturbance of species in a Special Protection Area (SPA), Special Area of Conservation (SAC) and candidate Special Area of Conservation (cSAC), Natural Heritage Area (NHA) and Proposed Natural Heritage Area (pNHA)…
NHP-02	It is the policy of the Council to ensure an Appropriate Assessment in accordance with Article 6(3) and Article 6(4) of the Habitats Directive, and in accordance with the Department of Environment, Heritage and Local Government Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities, 2009 and relevant EPA and European Commission guidance documents, is carried out in respect of any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect on a European site(s), either individually or in combination with other plans or projects, in view of the site's conservation objectives.
NHP-04	It is Council policy to ensure that development proposals are screened to determine whether they are likely to have a significant direct, indirect or cumulative effect on the integrity or conservation objectives of any European Site and, where significant effects are likely or uncertain, there will be a requirement for consultation with the relevant environmental authorities as part of any Habitats Directive Assessment that may be required.
NHP-08	It is Council policy to protect, conserve and enhance the county's biodiversity and natural heritage including wildlife (flora and fauna), habitats, landscapes and/or landscape features of importance to wildlife or which play a key role in the

POLICY / OBJECTIVE REFERENCE	POLICY / OBJECTIVE
	conservation and management of natural resources such as water.
NHP-09	It is Council policy to promote the protection and preservation of existing hedgerows and to encourage planting of native hedgerow species. It is also Council policy to encourage the replanting and extension of the treescape within the county (in particular mixed forests and broadleaf forests) in order to ensure the preservation and enhancement of this attractive element of County Offaly's landscape.
NHP-11	It is Council policy to conserve, protect and enhance where possible wildlife habitats such as rivers, streams, canals, lakes, and associated wetlands including reed-beds and swamps, ponds, springs, bogs, fens, trees, woodlands and scrub, hedgerows and other boundary types such as stone walls and ditches which occur outside of designated areas providing a network of habitats and corridors essential for wildlife to flourish.
NHP-12	It is Council policy to ensure that peatland areas, which are designated for protection under international and national legislation, are conserved and managed appropriately to conserve their ecological, archaeological, cultural and educational significance.
NHP-13	It is Council policy to protect riparian corridors by reserving land along their banks for ecological corridors and maintain them free from inappropriate development, where appropriate clear span structures will be promoted where fisheries exist, and culverting and/or realignment of streams will be discouraged…
NHP-18	It is Council policy to encourage the retention, where possible, of hedgerows and other distinctive boundary treatments in rural areas. Where removal of a hedgerow, stone wall or other distinctive boundary treatment is unavoidable, provision of the same type of boundary will be required of similar length set back within the site. The hedgerow will be composed of a variety of native species of Irish provenance…
NHP-19	It is Council policy to promote the preservation and enhancement of native and semi-natural woodlands, groups of trees and individual trees
NHP-20	It is Council policy to use native species wherever possible in the county…
NHP-21	It is Council policy to discourage the felling of mature trees to facilitate development and to encourage tree surgery rather than felling where necessary.
NHP-22	It is Council policy to encourage, pursuant to Article 10 of the Habitats Directive, the management of features of the landscape, such as traditional field boundaries, important for the ecological coherence of the Natura 2000 site(s) network and essential for the migration, dispersal and genetic exchange of wild species.
NHP-24	It is Council policy to protect, conserve and enhance the county's biodiversity and natural heritage including wildlife (flora and fauna), habitats, landscapes and / or landscape features of importance to wildlife or which play a key role in the conservation and management of natural resources such as water.
NHO-01	It is an objective of the Council to ensure that any development proposal in the vicinity of, or affecting a designated site, complies with the provisions relating Appropriate Assessment and SEA requirements and the Council will consult with the appropriate statutory environmental authority in this regard.
NHO-02	It is an objective of the Council to conserve and protect the natural heritage of the county and to conserve and protect European and National designated sites within the county including Special Protection Areas (SPAs), Special Areas of Conservation (SACs), candidate Special Areas of Conservation (cSACs), Natural Heritage Areas (NHAs), Proposed Natural Heritage Areas (pNHAs), Ramsar Sites, Statutory Nature Reserves, Biogenetic Reserves and Wildfowl Sanctuaries.
NHO-03	It is an objective of the Council to protect, conserve and enhance the county's biodiversity and natural heritage and the principle of enhancement will be taken into account in the Development Management process. It is a particular objective to protect plants, animal species and habitats which have been identified by the Habitats Directive, Birds Directive, Wildlife Act and the Flora Protection Order.

Biodiversity Plans

Ireland's third National Biodiversity Plan 2017–2021, identifies actions towards understanding and protecting biodiversity with a 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*".

A number of Local Biodiversity Action Plans have been prepared, including the Offaly Biodiversity Action Plan, which has been incorporated into the Offaly Heritage Plan 2018-2022.

All-Ireland Pollinator Plan

In 2015, Ireland joined a number of other European countries in developing a strategy to address pollinator decline and protect pollination services. 68 governmental and non-governmental organisations agreed a shared plan, the "All-Ireland Pollinator Plan", which identifies 81 actions to make Ireland pollinator friendly. The plan provides recommendations for six different sectors, including farmers, county councils, communities, businesses, homeowners and schools.

9.3 METHODOLOGY

9.3.1 RELEVANT GUIDELINES

The following guidance documents have been consulted for this assessment, with a full list of consulted documentation and guidelines included within Section 9.11:

- *Guidelines for Ecological Impact Assessment in the UK and Ireland* (CIEEM, 2016);
- *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (Draft) (EPA, 2017);
- *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (NRA, 2009);
- *A Guide to Habitats in Ireland* (Fossitt, 2000);
- *Best Practice Guidance for Habitat Survey and Mapping* (Smith *et al*., 2011);
- *Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes* (NRA, 2009);
- *Expedition Field Techniques: Bird Surveys* (Bibby *et al*., 2000);
- *Bird census and survey techniques* (Gregory *et al*., 2004);
- *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn.) (Collins 2016);
- *Bat Mitigation Guidelines for Ireland* (Kelleher and Marnell, 2006);
- *Bats and artificial lighting in the UK* (Bat Conservation Trust, 2018);

- *Bats & Lighting: Guidance Notes for Planners, Engineers, Architects and Developers* (Bat Conservation Ireland, 2010).

9.3.2 STUDY AREA / ZONE OF INFLUENCE

Following guidance set out by the Chartered Institute of Ecology and Environmental Management (CIEEM) (2016) and the National Roads Authority (2009), a Zone of Influence should be determined, which identifies the area in which the development could potentially impact upon ecological receptors. The zone of influence takes into consideration the assigned ecological value of the receptors, which ranges from international, national, county to local, and potential pathways for impacts to occur.

Taking into consideration best practice guidance and the nature of the development, the study area for the assessment ranges from the site boundary for habitats, to buffers of 100m for specific species. However, it should be noted that these buffers were extended where required.

9.3.3 DESKTOP RESEARCH

Desktop research comprised of gathering information on designated sites within 15km of the proposed development, reviewing mapping sites to provisionally identify any potential ecologically important features prior to the site assessment and reviewing online resources to determine what notable species, including protected, rare or invasive, had previously been recorded for the proposed development area and environs. The following online resources were consulted as part of this process:

- National Parks and Wildlife Service (NPWS) website: mapping of designated sites and information on designated sites within the vicinity of the development;
- NPWS Wildlife Manuals for certain habitats and species;
- National Biodiversity Data Centre (NBDC) website: data on notable species (protected, rare or invasive) within a 10km radius of the development;
- NPWS reports on "*The Status of Protected EU Habitats and Species in Ireland*";
- NPWS Ireland Red Lists for species;
- Botanical Society of Britain and Ireland website: flora distribution maps;
- Data on the status of bird species from "*Birds of Conservation Concern in Ireland 2014-2019*", (Coulhoun and Cummins, 2013);
- Various mapping websites, including EPA Envision, Google Maps, Myplan and OSI;
- Meenwaun Wind Farm Ltd. (located adjacent the proposed development site): EIAR and NIS produced by Fehily Timoney and Company in 2015.

In addition to the above, the NPWS was contacted on the 2nd of January 2019 in relation to records for sensitive, rare, threatened and protected species within 10km of the development location. Results were returned on the 16th of January 2019.

A data request for bat records within 10km of the proposed development site was received from Bat Conservation Ireland (BCI) on the 20th of March 2019.

9.3.4 FIELD SURVEYS METHODOLOGY

Site assessments were undertaken on various dates in September and October 2018 and January 2019 to examine the ecological context of the proposed development, as outlined in Table 9.3 below. Surveys had due consideration for the relevant best practice guidelines as referenced in Section 9.3.1.

Table 9.3: Ecological Surveys Informing the EIAR

SURVEY	STUDY AREA	SURVEY DATES
Habitat Survey	100m	6th September 2018 21st September 2018
Fauna Survey	100m	21st September 2018
Daytime Assessment of Bat Roost Potential	20m	21st September 2018 4th January 2019
Bat Activity Survey	50m	26th September 2018
Bird Survey	50m	22nd October 2018 4th January 2019
Water Quality / Macroinvertebrate Monitoring	Monitoring points located within Feeghroe Stream onsite and on Rapemills River	24th September 2018

Habitats and Flora Survey

These assessments involved determining the habitats and flora present within the proposed development. The habitat survey was undertaken in accordance with the standard methodology outlined in Fossitt's "*A Guide to Habitats in Ireland*", (Fossitt, 2000), a hierarchical classification scheme based upon the characteristics of vegetation present. The Fossitt system also indicates when there are potential links with Annex I habitats of the E.U. Habitats Directive (92/43/EEC). Cognisance was also taken of the Heritage Council guidelines, "*Best Practice Guidance for Habitat Survey and Mapping*", (Smith *et al.*, 2011). The relative abundances of flora was determined using the DAFOR Scale, an acronym for the abundance levels – Dominant, Abundant, Frequent, Occasional and Rare.

During site walkovers, any notable flora species were recorded, with an emphasis on statutorily protected or rare species, species of conservation significance and invasive species.

Fauna Survey (Excluding Bats)

A dedicated fauna survey was undertaken during bright and dry weather conditions, with any signs of fauna activity detected during other ecological surveys also recorded. Direct observation methods were used for the survey of fauna, however, these methods may not be suitable for shy and nocturnal species. Therefore, indirect methods were also employed, focusing on evidence of fauna including tracks, burrows/setts/nests, droppings, food items

and hair. The habitats on site were assessed for signs of usage by fauna, and the potential to support protected or red-listed species.

A general invertebrate survey was included as part of the fauna survey. In particular, areas of the site with Devil's-bit Scabious (*Succisa pratensis*), or with the potential to support Devil's-bit Scabious, were surveyed for the presence of Marsh fritillary (*Euphydryas aurinia*).

Any fauna, or signs of fauna, encountered during other ecological assessments, such as the habitat and flora survey, were also recorded as part of this assessment.

Bat Survey

Areas within the proposed development site with the potential to support bat roosts and / or foraging / commuting routes, and which have the potential to be impacted upon by the proposed development were the main focus of the surveys outlined below. No assessments were undertaken for the parcel of land to the south of the L3010, as no works are proposed for this area.

Assessment of Bat Roost Potential

Two daytime assessments of individual trees, treelines and hedgerows within the proposed development site potentially affected by the proposed development were undertaken on the 21st of September 2018 and the 4th of January 2019. Assessments were also undertaken on the existing abattoir building scheduled for upgrade and the agricultural buildings onsite.

The assessments comprised of an external inspection of trees and external and / or internal inspection of buildings to identify potential roost features (PRFs) and evidence of bat activity, using close focusing binoculars. The criteria used to categorise the PRFs or suitability of trees and buildings as a potential roost are summarised in the table below, based upon the guidelines by Collins (2016) and Hundt (2012).

Table 9.4: Bat Roost Potential Categories

CATEGORY	DESCRIPTION
High Trees / buildings that are suitable for use by large numbers of bats on a regular basis	Features include holes, cracks or crevices that extend or appear to extend back to cavities suitable for bats. In buildings, examples include eaves, barge boards, gable ends and corners of adjoining beams, ridge and hanging tiles, behind roofing felt or within cavity walls. In trees, examples include hollows and cavities, rot holes, cracks/splits and flaking or raised bark which could provide roosting opportunities. Any ivy cover is sufficiently well-established and matted so as to create potential crevices beneath. **Further survey work would be required to determine whether or not bats are present, and if so, the species present. Appropriate mitigation and potential licencing requirements may then be determined.**
Moderate Moderate potential is assigned to trees /	From the ground, building / tree appears to have features (e.g. holes, cavities, cracks or dense ivy cover) that may extend back into a cavity. However, owing to the characteristics of the feature, they are

CATEGORY	DESCRIPTION
structures with potential to support bat roosts but supports fewer features than a high potential building / tree and is unlikely to support a roost of high conservation value.	deemed to be sub-optimal for roosting bats. **Further survey work would be required to determine whether or not bats are present, and if so, the species present. Appropriate mitigation and potential licencing requirements may then be determined.**
Low Low potential is assigned to structures and trees with features that could support individual bats opportunistically.	If no features are visible, but owing to the size, age and/or structure, hidden features, sub-optimal for roosting bats, may occur that only an elevated inspection may reveal. In respect of ivy cover, this is not dense (i.e. providing PRF in itself) but may mask presence of PRF features. **Further survey work may be required for buildings only or works may proceed using reasonable precautions (e.g. controlled working methods, under license or supervision of a bat worker).**

Bat Activity Survey

A bat activity survey was undertaken on the 26th of September 2018 to provide a sample of the species present at the site and the level of activity. The survey was undertaken in good weather conditions, in dry and calm conditions, with temperatures ranging from 14-16°C, which is above the guidance level of 10°C and above.

The main areas of focus for the bat activity survey comprised the area in which the main slaughtering facility would be constructed, which would require some hedgerow removal works and the installation of artificial lighting. A bat activity survey was not undertaken in the western and northern sections of the site as the change in site boundary occurred after the activity survey on the 26th of September 2018. This is further discussed in the "*Survey Limitations*" section below.

The bat activity survey commenced approximately 15 minutes before dusk, and continued for approximately two hours. The activity survey comprised of a series of transects, as shown in Attachment 9.1.1. The transects included listening points approximately every 60-80m along each transect, with the exception of Transect Line No. 3, which had listening points approximately every 100m. Transects were walked at a consistent pace, with surveyors stopping for approximately five minutes at each listening point. Bat activity and the use of potential foraging and commuting habitats were recorded along each transect using a handheld heterodyne bat detector.

Bird Survey

General bird usage of the proposed development site was assessed on the 22nd of October 2018 and the 4th of January 2019. The two bird surveys were undertaken using the point transect method (Gregory *et al.*, 2004), a combination of the line transect method and point count method, which increases the probability of detection of shyer bird species. Additional point counts were also undertaken on both occasions. Cognisance was also taken from Bibby *et al*. (2000) and Brown and Shepherd (1993).

As recommended by Bibby *et al*. (2000), the surveys were undertaken at least 30 minutes

after dawn, during a period of high bird activity, but when birds are not too vocal to make distinguishing them difficult. Pre-determined routes were walked at a standard pace of approximately 8-10m/minute, with a two minute stop approximately every 50-60 metres. During these intervals, the area was scanned with binoculars as far as the terrain or weather conditions allowed. Additional point counts lasted from five to ten minutes in duration. The locations of the point transect routes and point counts are included as Attachment 9.1.2.

Birds were identified by visual sightings and auditory identification of songs and calls and recorded on field sheets. Birds flying overhead were also included as part of the surveys. Given that the layout of the routes covered a large proportion of the proposed development site, distance bands were not used. Records of all bird species encountered were later transferred to summary tables and maps.

Field surveys were complemented by desktop research, including baseline assessments undertaken by Fehily Timoney and Company for the Meenwaun Wind Farm (located adjacent the proposed development site) in 2015. Bird species encountered during other ecological assessments, such as the habitat and flora survey, were also recorded as part of this assessment.

Water Quality / Macroinvertebrate Monitoring

This survey is discussed in detail in Section 10 of this EIAR.

Surveys Scoped Out

The following ecological features were scoped out:

Fish surveys: The aquatic features identified at the proposed development site comprise of drainage ditches and the Feeghroe Stream. The majority of the drainage ditches are limited in size and water volume, with many of the ditches dry during some of the ecological site assessments. It is not considered that the drainage ditches onsite would have the potential to support fish species. No works, with the exception of the construction of an outlet pipe, would take place within the vicinity of the Feeghroe Stream. It is considered that the water quality and macroinvertebrate monitoring undertaken as part of this EIAR, and discussed in Section 10, is sufficient in assessing the potential impact of the development upon current water quality, which would indicate if there is a potential for the proposed development to impact upon fish species present within the immediate area.

Reptile surveys: Areas of the study area may provide suitable basking and refuge habitat for protected viviparous lizard (*Zootoca vivipara).* The numbers of viviparous lizard, if present at the site, are likely to be low and unlikely to be picked up in survey.

Survey Limitations

Every effort has been made to provide an accurate assessment of the situation pertaining to the site. However, an ecological survey can only assess a site at a particular time, and is limited by various factors such as the season, timing of the survey, climatic conditions and species behaviour. Ecological surveys are therefore snapshots in time and should not be regarded as a complete study. Direct observations or evidence of protected species is not

always recorded during ecological surveys. However, this does not indicate that the species is absent from the site.

The project's timeframe resulted in site assessments being undertaken during the September – December period. Therefore, breeding bird surveys, including for breeding waders, were not undertaken as part of this project.

To ensure any limitations encountered did not significantly impact upon the findings of the ecological assessments, the ecological surveys undertaken also assessed the potential of the habitats to support protected species and breeding birds, and cognisance has been taken of available online baseline data (e.g. flora and fauna records from the NBDC, consultation with NPWS regarding protected / threatened species, previous surveys undertaken by Fehily Timoney and Company for the Meenwaun Wind Farm) and a precautionary approach taken.

Bats

The bat activity survey was undertaken at the end of the optimal survey season, May to September. While surveys undertaken in September may pick up mating or transitory roosts, they may fail to pick up maternity roosts which are best identified in May to July.

It should be noted that the extent of the proposed site boundary was increased in January 2019 to facilitate revisions in the proposed development design, the site access and the proposed ICW system. It was also established in February 2019 that road widening works from the Boheradurrow crossroads to the proposed site access would be required. As these amendments to the overall proposed development design arose after September 2018, outside of the optimal bat survey season, it was not possible to undertake a bat activity survey within these areas.

However, the above are not considered major limitations at the proposed development site, given that the PRF assessment was undertaken for all areas of hedgerow and treeline removal, in addition to the buildings onsite, and given that the bat activity survey undertaken for the eastern and central portions of the site would likely be representative of the proposed development site in general for its usage by bats for commuting and foraging. Furthermore, cognisance has been taken of available baseline data, including consultation with Bat Conservation Ireland, for records of bats and bat roosts in the area. While a number of trees scheduled for removal had dense ivy cover, mitigation measures are included in Section 9.8 to ensure trees are re-examined prior to felling.

9.3.5 ECOLOGICAL VALUATION CRITERIA

The ecological value of the habitats and species identified at the development site have been assessed following the criteria outlined in the 2009 NRA guidelines, and is consistent with *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal* (CIEEM, 2016).

9.4 CONSULTATION

Consultation has been undertaken with the following statutory bodies and competent authorities with regards biodiversity:

- National Parks and Wildlife Service (NPWS);
- Inland Fisheries Ireland (IFI);
- Offaly County Council.

Further details of consultations are included in Section 2.4 and Attachment 9.2.

9.5 DESCRIPTION OF EXISTING ENVIRONMENT

9.5.1 DESIGNATED SITES

The proposed development does not directly impinge on any designated site. In total, there are 26 designated sites located within 15km of the proposed development: 13 Special Area of Conservation (SAC), 5 Special Protection Area (SPA) and 8 Natural Heritage Area (NHA). There are also 25 proposed Natural Heritage Area (pNHA) sites.

It should be noted that a number (12) of NHA and pNHA sites are also designated as SAC or SPA sites. Furthermore, a small number of sites are designated as both SAC and SPA sites. Maps detailing these designated sites in relation to the proposed development are included in Attachment 9.3.

The following tables detail the SAC, SPA, NHA and pNHA sites located within 15km of the proposed development.

Table 9.5: SAC Sites within 15km of the Proposed Development

SITE NAME	SITE CODE	DISTANCE TO PROPOSED DEVELOPMENT	QUALIFYING INTERESTS
All Saints Bog and Esker SAC	000566	2.1km S-W	[6210] Orchid-rich Calcareous Grassland* [7110] Raised Bog (Active)* [7120] Degraded Raised Bog [7150] Rhynchosporion Vegetation [91D0] Bog Woodland*
River Shannon Callows SAC	000216	3.2km N-W	[6410] Molinia Meadows [6510] Lowland Hay Meadows [8240] Limestone Pavement* [91E0] Alluvial Forests* [1355] Otter (*Lutra lutra*)
Ridge Road, SW of Rapemills SAC	000919	3.7km S	[6210] Orchid-rich Calcareous Grassland*
Redwood Bog SAC	002353	7.9km S-W	[7110] Raised Bog (Active)* [7120] Degraded Raised Bog [7150] Rhynchosporion Vegetation
Ballyduff / Clonfinane Bog SAC	000641	9.5km S-W	[7110] Raised Bog (Active)* [7120] Degraded Raised Bog [7150] Rhynchosporion Vegetation [91D0] Bog Woodland*
Moyclare Bog SAC	000581	10.4km N	[7110] Raised Bog (Active)* [7120] Degraded Raised Bog [7150] Rhynchosporion Vegetation
Arragh More (Derrybreen) Bog SAC	002207	12.1km S-W	[7120] Degraded Raised Bog
Kilcarren-Firville Bog SAC	000647	12.9km S-W	[7110] Raised Bog (Active)* [7120] Degraded Raised Bog [7150] Rhynchosporion Vegetation
Lisduff Fen SAC	002147	13km S-E	[7220] Petrifying Springs* [7230] Alkaline Fens

SITE NAME	SITE CODE	DISTANCE TO PROPOSED DEVELOPMENT	QUALIFYING INTERESTS
			[1013] Geyer's Whorl Snail (*Vertigo geyeri*)
Sharavogue Bog SAC	000585	13.3km S	[7110] Raised Bog (Active)* [7120] Degraded Raised Bog [7150] Rhynchosporion Vegetation
Ferbane Bog SAC	000575	13.3km N-E	[7110] Raised Bog (Active)* [7120] Degraded Raised Bog [7150] Rhynchosporion Vegetation
Island Fen SAC	002236	14.km S-E	[5130] Juniper Scrub [7230] Alkaline Fens
Finn Lough (Offaly) SAC	000576	15km N	[7230] Alkaline Fens [1013] Geyer's Whorl Snail (*Vertigo geyeri*)

**Denotes a priority habitat*

Table 9.6: SPA Sites within 15km of the Proposed Development

SITE NAME	SITE CODE	DISTANCE TO PROPOSED DEVELOPMENT	SPECIAL CONSERVATION INTEREST
All Saints Bog SPA	004103	2.4km S-W	[A395] Greenland White-fronted Goose (*Anser albifrons flavirostris*)
Middle Shannon Callows SPA	004096	3.2km W	[A038] Whooper Swan (*Cygnus cygnus*) [A050] Wigeon (*Anas penelope*) [A122] Corncrake (*Crex crex*) [A140] Golden Plover (*Pluvialis apricaria*) [A142] Lapwing (*Vanellus vanellus*) [A156] Black-tailed Godwit (*Limosa limosa*) [A179] Black-headed Gull (*Chroicocephalus ridibundus*) [A999] Wetland and Waterbirds
River Little Brosna Callows SPA	004086	4.3km S-W	[A038] Whooper Swan (*Cygnus cygnus*) [A050] Wigeon (*Anas penelope*)

SITE NAME	SITE CODE	DISTANCE TO PROPOSED DEVELOPMENT	SPECIAL CONSERVATION INTEREST
			[A052] Teal (*Anas crecca*) [A054] Pintail (*Anas acuta*) [A056] Shoveler (*Anas clypeata*) [A140] Golden Plover (*Pluvialis apricaria*) [A142] Lapwing (*Vanellus vanellus*) [A156] Black-tailed Godwit (*Limosa limosa*) [A179] Black-headed Gull (*Chroicocephalus ridibundus*) [A395] Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A999] Wetland and Waterbirds
Dovegrove Callows SPA	004137	4.8km S	[A395] Greenland White-fronted Goose (*Anser albifrons flavirostris*)
River Suck Callows SPA	004097	13.2km N-W	[A038] Whooper Swan (*Cygnus cygnus*) [A050] Wigeon (*Anas penelope*) [A140] Golden Plover (*Pluvialis apricaria*) [A142] Lapwing (*Vanellus vanellus*) [A395] Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A999] Wetland and Waterbirds

Table 9.7: NHA Sites within 15km of the Proposed Development

SITE NAME	SITE CODE	DISTANCE TO PROPOSED DEVELOPMENT
River Little Brosna Callows NHA	000564	4.3km S-W
Kilnaborris Bog NHA	000284	7.4km N-W
Killeen Bog NHA	000648	8.8km S
Ballymacegan Bog NHA	000642	11km W
Arragh More Bog NHA	000640	12km S-W
Lorrha Bog NHA	001684	12.6km S-W
Meeneen Bog NHA	000310	13.1km W
Suck River Callows NHA	000222	13.1km N

Table 9.8: pNHA Sites within 15km of the Proposed Development

SITE NAME	SITE CODE	DISTANCE TO PROPOSED DEVELOPMENT
All Saints Bog and Esker pNHA	000566	2.1km S-W
Banagher (Domestic Dwelling) pNHA	000567	3km N-E
River Shannon Callows pNHA	000216	3.2km N-W
Ridge Road, SW of Rapemills pNHA	000919	3.7km S
Lough Coura pNHA	000909	3.8km E
Ross and Glenns Eskers pNHA	000920	4.1km S
Woodville Woods pNHA	000927	4.3km S-E
Grand Canal pNHA	002104	5.1km N
Dovegrove Callows pNHA	000010	5.4km S
Cloghanbeg pNHA	002059	5.5km W
Redwood Bog pNHA	000654	8km S-W
Birr (Domestic Dwelling No.1) pNHA	000569	8.5km S
Birr (Domestic Dwelling No.2) pNHA	000568	8.7km S-E
Ballyduff / Clonfinane Bog pNHA	000641	9.6km S-W
Bracken's Dwelling pNHA	002058	10.2km S-E
Moyclare Bog pNHA	000581	10.4km N
Clonfert Cathedral pNHA	000244	10.6km N-W
Lough Boora pNHA	001365	12.3km N-E
Kilcarren-Firville Bog pNHA	000647	13km S-W
Sharavogue Bog pNHA	000585	13.3km S
Ferbane Bog pNHA	000575	13.3km N-E
Clonlyon Glebe Bog pNHA	000893	13.9km N-E
Derrykeel Meadows pNHA	000897	14.1km S-E
Clorhane Wood pNHA	000894	14.7km N-W
Finn Lough (Offaly) pNHA	000576	15km N

There are no RAMSAR sites or national parks located within 15km of the proposed development. Redwood Bog, designated as an SAC and pNHA, is also designated as a nature reserve.

For this assessment, the SAC and SPA sites considered to be within the potential zone of influence of the proposed development are All Saints Bog and Esker SAC (Site Code: 000566), River Shannon Callows SAC (Site Code: 000216), Redwood Bog SAC (Site Code: 002353), All Saints Bog SPA (Site Code: 004103), Middle Shannon Callows SPA (Site Code: 004096), River Little Brosna Callows SPA (Site Code: 004086), Dovegrove Callows SPA (Site Code: 004137) and River Suck Callows SPA (Site Code: 004097), due to hydrological connectivity / potential hydrological connectivity, distances from the proposed development site and / or the potential for ex-situ impacts of the development upon wintering wildfowl.

The remainder of the SAC and SPA sites within 15km of the development site are not considered to be within the potential zone of influence of the proposed development, as they are not hydrologically connected to the site and / or are located a considerable distance from the site.

For this assessment, only one NHA site is considered to be within the potential zone of influence of the proposed development site, River little Brosna Callows NHA, given the potential ex-situ impacts of the proposed development upon wintering wildfowl. The remainder of the NHA sites within 15km of the proposed development site, as listed in Table 9.7 above, are not considered to be within the zone of influence of the proposed development, given that these NHA sites are not located within the same catchment or immediately downstream of the proposed site, and given their distances to development site and in the absence of hydrological connectivity.

All Saints Bog and Esker SAC (Site Code: 000566)

The conservation objectives for the SAC site are to maintain or restore the favourable conservation condition of the qualifying interests. An excerpt from the site's Natura 2000 Data Form is included below.

This site contains good examples of the Annex I priority habitats active raised bog, bog woodland and orchid-rich dry grassland. In addition it contains examples of the non-priority habitats degraded raised bog and Rhynchosporion vegetation. The Birch (*Betula* spp.) woodland is of high quality and is the best developed bog woodland of its type in Ireland. The site supports a rich invertebrate fauna, including several insect species which are rare in Ireland or found only on this site. Part of the Little Brosna flock of Greenland White-fronted Geese may occasionally use the site during disturbance on the Little Brosna Callows. Another species listed on Annex I of the Birds Directive, Merlin (*Falco columbarius*) is also found on the site. The esker grassland on the site supports a large population of the rare Green-winged orchid (*Orchis morio*). Other rare plant species, Blue Fleabane (*Erigeron acer*) and Red Hemp-nettle (*Galeopsis angustifolia*), the latter protected in Ireland, are found in a quarry on the southern side of the site.

The main site vulnerabilities, including any key pressures or trends within and around the All Saints Bog and Esker SAC that have been identified as impacting upon the site, may be summarised as:

- Burning;
- Peat extraction;

- Sand and gravel extraction;
- Human induced changes in hydraulic conditions.

River Shannon Callows SAC (Site Code: 000216)

The conservation objectives for the SAC site are to maintain or restore the favourable conservation condition of the qualifying interests. An excerpt from the site's Natura 2000 Data Form is included below.

This site is the largest area of semi-natural floodplain grassland in Ireland and Britain and has very many features of a natural ecosystem. It has been placed among the most 'natural' floodplains in western Europe. It is subject to regular and prolonged annual winter flooding. Wooded alluvial islands which flood regularly occur at one location. A number of Red Data Book and scarce plant species occur on the site, the scarce species including Summer Snowflake (*Leucojum aestivum*), Great water-parsnip (*Sium latifolium*) and Gibbous Duckweed (*Lemna gibba*). In addition, the site contains a very wide variety of native plant species. A small area of limestone pavement at Clorhane is of particular importance as it is the only example of this habitat in the region.

Along with its tributary the Little Brosna (designated separately) this is one of the great waterfowl sites in Ireland, with huge numbers of a wide range of species occurring in winter. A small flock of Greenland White-fronted Goose regularly use a few locations on the site and these are part of the Internationally Important flocks of both the Little Brosna and the River Suck. It is one of very few significant inland sites in Britain or Ireland for Dunlin (*Calidris alpine*). It is the top site in the country for Mute Swan (*Cygnus olor*) and close to that for Whooper Swan, Lapwing and Golden Plover. The E.U. Birds Directive Annex I species, Hen Harrier (*Circus cyaneus*), regularly uses the site for hunting in autumn and winter. Perhaps even more important are its nesting Corncrake, Quail and breeding waders. In 1987, 1204 pairs of breeding waders were recorded (including adjacent parts of the Shannon), mainly Lapwing, Snipe (*Gallinago gallinago*), Curlew (*Numenius arquata*) and Redshank (*Tringa totanus*). Corncrake has one of its last strongholds here with 70 and 66 calling birds present in 1998 and 1999 respectively. The Shannon Callows is one of the few areas in Ireland where Quail breeds. There are high populations of ground-nesting passerines, such as Skylark (*Alauda arvensis*), Meadow Pipit (*Anthus pratensis*), Grasshopper Warbler (*Locustella naevia*) and Reed Bunting (*Emberiza schoeniclus*) on the site. The River Shannon Callows is a breeding site for two Red Data Book waterbird species: Black-tailed Godwit and Shoveler. The Red Data Book species Pintail has also bred on the site though its current status is unknown. The E.U. Birds Directive Annex I species Merlin, bred on the site in 1996. Large rivers flowing unfettered through lowland floodplains are now rare anywhere in Europe. This river, and its associated habitats, are of the highest conservation importance.

The main site vulnerabilities, including any key pressures or trends within and around the River Shannon Callows SAC that have been identified as impacting upon the site, may be summarised as:

- Human induced changes in hydraulic conditions;
- Lack of grazing;
- Abandonment of cultivation, lack of mowing;

- Use of biocides, hormones and chemicals.

Redwood Bog SAC (Site Code: 002353)

The conservation objectives for the SAC are to restore the favourable conservation condition of the qualifying interests. An excerpt from the site's Natura 2000 Data Form is included below.

This extensive site contains good examples of active raised bog, degraded raised bog and Rhynchosporion vegetation. The area of active raised bog present is one of the largest in counties Tipperary and Offaly. The location of the bog within the flood-plain of the Shannon and Little Brosna rivers adds to its interest. Redwood Bog is a feeding site for the Little Brosna flock of Greenland White-fronted Goose, though its usage nowadays appears to be low. Overall, this site, part of which is a state-owned nature reserve, is considered as one of the most important, relatively intact raised bogs along the banks of the River Shannon.

The main site vulnerability, including any key pressures or trends within and around the Redwood Bog SAC that has been identified as impacting upon the site, may be summarised as peat extraction.

All Saints Bog SPA (Site Code: 004103)

The conservation objectives for the site are to maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA. An excerpt from the site's Natura 2000 Data Form is included below.

The site is an important raised bog site with good examples of active raised bog, degraded raised bog, Rhynchoporian vegetation, as well as orchid-rich calcareous grassland. All Saints bog was formerly an important refuge for part of the internationally important population of Greenland White-fronted Goose based on the Little Brosna. The geese would utilise the bog when disturbed from the callows. In recent years, however, there has been less use of All Saint's following a general trend of less usage of raised bogs and also probably due to disturbance from peat milling activities on the bog adjacent to the site. Merlin has been seen on the bog during the breeding season and probably nests. The site supports several rare invertebrate species and the esker ridge supports three Red Data plant species.

The main site vulnerabilities, including any key pressures or trends within and around the All Saints Bog SPA that have been identified as impacting upon the site, may be summarised as:

- Peat extraction;
- Sand and gravel extraction;
- Agricultural practices including fertilisation and grazing.

Middle Shannon Callows SPA (Site Code: 004096)

The conservation objectives for the SPA site are to maintain or restore the favourable conservation condition of the bird species and habitat listed as Special Conservation Interests for this SPA. An excerpt from the site's Natura 2000 Data Form is included below.

This site is the largest area of semi-natural floodplain grassland in Ireland and has very many features of a natural ecosystem. Along with its main tributaries the River Suck and River Brosna, it represents one of the most important wetland systems in the country. It is of International Importance for wintering waterfowl as numbers regularly exceed the 20,000 threshold. Of particular note is the presence of an Internationally Important population of Whooper Swan. A further five species have populations of national importance: Mute Swan, Wigeon, Golden Plover, Lapwing and Black-tailed Godwit.

The Shannon callows are also of high importance for breeding birds. In particular, it has the largest concentration of Corncrake in Ireland. Quail, a very rare species in Ireland, also breeds in the grasslands. Several wader species, notably Lapwing, Snipe and Redshank, have important breeding populations though these have declined substantially since the 1980s. The scarce breeding species, Shoveler, nests in small numbers each year. The callows is one of the very few sites in Ireland where Black-tailed Godwit has bred. The habitats also support a range of ground nesting passerine species, notably Grasshopper Warbler and Skylark. In autumn and winter, Hen Harrier is a regular visitor.

The main site vulnerabilities, including any key pressures or trends within and around the Middle Shannon Callows SPA that have been identified as impacting upon the site, may be summarised as:

- Grazing;
- Nautical sports;
- Human habitation.

River Little Brosna Callows SPA (Site Code: 004086)

The conservation objectives for the SPA site are to maintain or restore the favourable conservation condition of the bird species and habitat listed as Special Conservation Interests for this SPA. An excerpt from the site's Natura 2000 Data Form is included below.

The site follows the River Brosna from its confluence with the River Shannon for approximately 9km south-eastwards. The main habitat present is grassland that is improved to varying extents and which is seasonally flooded. The less improved areas are species-rich. The grassland is used mainly for pasture but some is used for hay-making. The river channel is fringed by swamp and marsh vegetation. The site adjoins several raised bogs and cutover bogs.

This site is of international importance because it regularly supports in excess of 30,000 waterfowl and is rated among the top five sites in the country for numbers of wintering birds. At a species level it supports internationally important populations of Greenland White-fronted Goose and Black-tailed Godwit. The Greenland White-fronted Goose flock is the largest outside of the Wexford Slobs, whilst the Black-tailed Godwit population accounts for over 15% of the national total and is the largest in the country. It has nationally important populations of a further seven species: Whooper Swan, Wigeon, Teal, Pintail, Shoveler, Golden Plover and Lapwing. The Wigeon population is over 10% of the national total, whilst the Pintail, Shoveler and Golden Plover populations are over 5% of the respective totals. The Dunlin population is notable as inland populations of this species are rare. It has substantial nesting populations of Snipe and Redshank, though the numbers of nesting waders has

decreased since the 1980s. Corncrake formerly bred but not since the early 1990s. This site provides one of the few remaining examples in the country of a large river system which still floods in a fairly natural way.

The main site vulnerabilities, including any key pressures or trends within and around the River Little Brosna Callows SPA that have been identified as impacting upon the site, may be summarised as:

- Mowing / cutting of grassland;
- Grazing;
- Agricultural fertilisation;
- Hunting.

Dovegrove Callows SPA (Site Code: 004137)

The conservation objectives for the SPA site are to maintain or restore the favourable conservation condition of the bird species and habitat listed as Special Conservation Interests for this SPA. An excerpt from the site's Natura 2000 Data Form is included below.

The site is situated on the Little Brosna River approximately 2km downstream of Birr and 11km from the confluence with the River Shannon. It is typical wet, callow grassland that floods regularly. Grazing is the principal landuse. Dovegrove Callows is of importance as a high water feeding site for the internationally important Little Brosna population of Greenland White-fronted Goose. Of particular significance is that it can support the entire flock when most other feeding sites are submerged by floodwater.

The main site vulnerability, including any key pressures or trends within and around the Dovegrove Callows SPA that has been identified as impacting upon the site is agricultural fertilisation.

River Suck Callows SPA (Site Code: 004097)

The conservation objectives for the SPA site are to maintain or restore the favourable conservation condition of the bird species and habitat listed as Special Conservation Interests for this SPA. An excerpt from the site's Natura 2000 Data Form is included below.

The River Suck is the largest tributary of the River Shannon. The site follows the river from Castlecoote, near Fuerty to its confluence with the River Shannon, a distance of approximately 70km. The main habitat is grassland, improved to varying extents, that is seasonally flooded. The less improved areas are species-rich. The grassland is used mainly for pasture but some is used for silage or occasionally hay-making. The river channel is fringed in places by swamp and marsh vegetation. The site adjoins several raised bogs and cutover bogs and there are turloughs in the vicinity.

The River Suck Callows is an important site for wintering waterfowl, with an internationally important population of Greenland White-fronted Goose centred within the site. This is one of the largest flocks in the country outside of the Wexford Slobs. Despite poor survey data for recent years, it is known that at least three species have populations of national importance:

Whooper Swan, Wigeon and Lapwing. Bewick's Swan (*Cygnus columbarius bewickii*) formerly occurred in significant numbers but has abandoned the site, in line with a marked contraction of range at a national level. Corncrake formerly bred but not since the early 1990s. This site provides one of the few remaining examples in the country of a large river system of which parts still flood in a fairly natural way.

The main site vulnerabilities, including any key pressures or trends within and around the River Suck Callows SPA that have been identified as impacting upon the site, are grazing and agricultural fertilisation.

River Little Brosna Callows NHA (Site Code: 000564)

The River Little Brosna Callows NHA is located 5km south-west of Banagher, Co. Offaly and stretches from the canal at the junction with the River Shannon, some 9km along the River Little Brosna. An excerpt from the site's Site Synopsis is included below.

The main habitat is the extensive area of low-lying callows on the floodplains of the River Little Brosna and River Shannon. These wet meadows are subject to prolonged flooding in winter and early spring. A wide range of callow pasture is present, with the vegetation influenced by the exact flooding regime and the peat content of the soil. The main grassland types present are alluvial, sedge-rich, calcareous and improved grasslands. Some improved agricultural pasture is included in the site and dry grassland occurs in the well-drained calcareous areas.

The raised bog habitat at Cloghan Demesne consists of a small dome of high bog with associated cutover, which supports characteristic raised bog vegetation and well developed hummock/ hollow complexes. A number of softer areas occur but none of these are quaking. There is a small flush to the east. Cutover surrounds all of the bog margins, and scrub encroachment has occurred to the north and north-east on old abandoned cutover. Mixed deciduous woodland, east of Cloghan Demesne is included in the site. Four remnants of raised bog are also included on the southern side of the Little Brosna with Annagh bog, the most easterly, being the largest and most intact.

The River Little Brosna Callows is an internationally important site for wintering waterfowl. Populations of Greenland White-fronted Geese and Black-tailed Godwit are of international importance. Populations of Whooper Swan, Wigeon, Teal, Pintail, Shoveler, Golden Plover and Lapwing are of national importance, while populations of Mute Swan, Mallard and Dunlin are of regional importance. The Brosna callows are also of importance for breeding waders, including Redshank, Snipe and Lapwing. The globally endangered Corn Crake formerly bred on the Brosna callows.

Damaging activities associated with this landuse include drainage and burning. These are all activities that have resulted in loss of habitat and damage to the hydrological status of the high bog, and pose a continuing threat to its viability.

The River Little Brosna Callows NHA is a site of considerable conservation significance, including as it does, a raised bog, a rare habitat in the E.U. and one that is becoming increasingly scarce and under threat in Ireland. The site supports a good diversity of raised bog microhabitats including some hummock/hollow complexes. The presence of mature deciduous woodland adds to the overall habitat diversity. The close proximity to the River

Shannon increases the ecological interest and conservation value of the site. The site is of international importance for its waterfowl and is designated a Special Protection Area under the E.U. Birds Directive.

9.5.2 FLORA & HABITATS

The proposed development is located within a rural area, approximately 2.4km south-east of Banagher town, in an area primarily dominated by pasture land and peat bogs. The site is bordered to the north by bog woodland, to the south and east by agricultural grassland and to the west by the Feeghroe Stream and bog woodland.

Throughout the area, the land is farmed with fields enclosed with a varied mix of hedges, treelines, banks, drainage ditches and fences. Pasture is the primary agriculture type in the area. Residential property is generally dispersed along local roads. A number of one-off residences and farmyard complexes exist in the area. Meenwaun Wind Farm, currently comprising of four turbines, is located to the north of the proposed site, with the nearest turbine approximately 500m from the site boundary.

The proposed development site comprises of a number of agricultural fields, an existing abattoir with associated structures, agricultural buildings, two areas of previously disturbed ground, with field boundaries consisting of hedgerows, treelines, drainage ditches and the Feeghroe Stream.

During the site walkover, ten main habitats were identified. The dominant habitat at the site is improved agricultural grassland (GA1), measuring approximately 12 hectares in size. This habitat is dominated by ryegrasses (*Lolium* spp.), with some Buttercup (*Ranunculus* spp.), Clover (*Trifolium* spp.), Daisy (*Bellis perennis*), Dandelion (*Taraxacum* spp.), Dock (*Rumex* spp.), Ribwort Plantain (*Plantago lanceolata*) and Silverweed (*Potentilla anserina*) also present.

In the northern section of the site, wet grassland (GS4) habitat was identified, mainly comprised of rushes (*Juncus* spp.), including Soft Rush (*Juncus effusus*), and sedges (*Carex* spp.), with some Buttercup, Dock, Gorse (*Ulex europaeus*), Meadowsweet (*Filipendula ulmaria*), Nettle (*Urtica dioica*) and Silverweed.

A small section of the proposed site can be described as buildings and artificial surfaces (BL3) habitat, comprising of the existing abattoir and associated structures, the existing agricultural buildings and areas of hardstanding. Some vegetation has colonised certain areas of this habitat, including Cleavers (*Galium aparine*), Dandelion, Dock, Nettle and Ribwort Plantain.

Areas of previously disturbed ground, located to the north of the abattoir and in the surrounds of the agricultural buildings, were identified as recolonising bare ground (ED3) habitat, with frequently recorded grasses, including Cock's-foot (*Dactylis glomerata*), Yorkshire Fog (*Holcus lanatus*) and Bent grasses (*Agrostis* spp.), and frequently recorded Dock and Nettle. Other flora species present occasionally include Buttercup, Cleavers, Clover, Dandelion, Greater Plantain (*Plantago major*), Hedge Bindweed (*Calystegia sepium*), Knotgrass (*Polygonum aviculare*), Ribwort Plantain, Silverweed and Thistle (*Cirsium* spp.).

The field in the western portion of the development site was harvested and tilled, prior to the onsite habitat assessments. This area was not re-sown, and has been recolonised over time. It is now best characterised as recolonising bare ground, with various grasses, Cleavers, Daisy, Dandelion, Nettle, Shepherd's-purse (*Capsella bursa-pastoris*) and Thistle present.

The boundaries of the site and the internal field boundaries are comprised of hedgerows and treelines. Hedgerows (WL1) habitat at site mainly comprises of the internal field boundaries, in addition to the south-western boundary with the local L3010 road. Hedgerows (WL1) habitat at the site, with the exception of the south-western boundary, is mainly comprised of Blackthorn (*Prunus spinosa*) and Hawthorn (*Crataegus monogyna*). Tree and shrub species occasionally recorded include Ash (*Fraxinus excelsior*), Birch (*Betula* spp.), Elder (*Sambucus nigra*), Gorse and Willow (*Salix* spp.). The south-western boundary is mainly comprised of Blackthorn, Hawthorn and Elm (*Ulmus* sp.), with some Ash, Guelder-rose (*Viburnum opulus*), Sycamore (*Acer pseudoplatanus*) and Willow also present.

Ground and field layer flora recorded includes Bramble (*Rubus fruticosus*), Cleavers, Common Bird's-foot-trefoil (*Lotus corniculatus*), Cow Parsley (*Anthriscus sylvestris*), Nettle, Dandelion, Dock, Dog-rose (*Rosa canina agg.*), Hedge Bindweed, Herb-Robert (*Geranium robertianum*), Ivy (*Hedera helix*), Marsh Woundwort (*Stachys palustris*), Meadowsweet, Short-fruited Willowherb (*Epilobium obscurum*), Thistle and Vetch (*Vicia* spp.).

Treelines (WL2) habitat is located along the north-eastern boundary, and a small section (approximately 65m) of the western boundary. The north-eastern boundary is mainly comprised of Ash, Blackthorn and Hawthorn, while the western boundary is mainly comprised of Ash and Sycamore. Other trees / shrubs present include Birch, Elder, Guelder-rose, Oak (*Quercus* spp.) and Willow. Ground and field layer species recorded include Bramble, Dock, Dog-rose, Ferns, Herb-Robert, Hogweed (*Heracleum sphondylium*), Ivy, Nettle, Silverweed and Thistle. A section of treelines WL2 habitat is also present along the south-eastern boundary, and is comprised primarily of Alder (*Alnus glutinosa*) and Birch, with ground and field flora similar to that of the north-eastern boundary.

A section of bog woodland (WN7) habitat is present along the northern site boundary. This habitat is dominated by Downy Birch (*Betula pubescens*), with some Gorse, Hawthorn and Willow also present. Ground and field layer flora recorded includes Bramble, Bracken (*Pteridium aquilinum*), Ling (*Calluna vulgaris*), Marsh Woundwort, Meadowsweet and Silverweed.

An area of recently-felled woodland (WS5) occurs at the northern section of the site, where bog woodland (WN7) has been cleared. Brash and some tree stumps were noted in this area. The area has started to be recolonised by flora from adjacent habitats, comprising abundant sedges and rushes, including Soft Rush, frequently observed Purple Moor-grass (*Molinia caerulea*) and occasional Dock, Gorse and Ling.

Drainage ditches (FW4) habitat borders some sections of hedgerows and a section of treeline. Some sections of drainage ditches were dry during the habitat assessments on the 6th and 21st of September 2018, but contained water during other ecological surveys undertaken in October 2018 and January 2019. Flora noted within this habitat included Great Willowherb (*Epilobium hirsutum*), Redshank (*Persicaria maculosa*), Silverweed, Water-cress (*Rorippa nasturtium-aquaticum*) and Water Mint (*Mentha aquatica*).

The Feeghroe Stream, which flows along the north-western site boundary, was identified as depositing / lowland rivers (FW2) habitat. There was little to no aquatic vegetation within the stream itself, however flora recorded on the river margins included Bramble, Bulrush (*Typha latifolia*), Dock, Meadowsweet, Purple-loosestrife (*Lythrum salicaria*), Short-fruited Willowherb and Vetch.

The ten habitats identified as per the Fossitt habitat classification scheme for the proposed development are summarised in Table 9.9, and are shown on a habitat map included as Figure 9.1, and as Attachment 9.4. A photo log and full list of plants recorded are included in Attachments 9.5 and 9.6 respectively.

Table 9.9: Summary of Habitats Identified at the Proposed Development Site

HABITAT CLASSIFICATION HIERARCHY		
LEVEL 1	**LEVEL 2**	**LEVEL 3**
F – Freshwater	**FW** – Watercourses	**FW2 –** Depositing / lowland rivers
		FW4 – Drainage ditches
G – Grassland and marsh	**GA** – Improved grassland	**GA1** – Improved agricultural grassland
	GS – Semi-natural grassland	**GS4** – Wet grassland
W – Woodland and scrub	**WN** – Semi-natural woodland	**WN7** – Bog woodland
	WS – Scrub / transitional woodland	**WS5** – Recently-felled woodland
	WL – Linear woodland / scrub	**WL1** – Hedgerows
		WL2 – Treelines
E – Exposed rock and disturbed ground	**ED** – Disturbed ground	**ED3** – Recolonising bare ground
B – Cultivated and built land	**BL** – Built land	**BL3** – Buildings and artificial surfaces

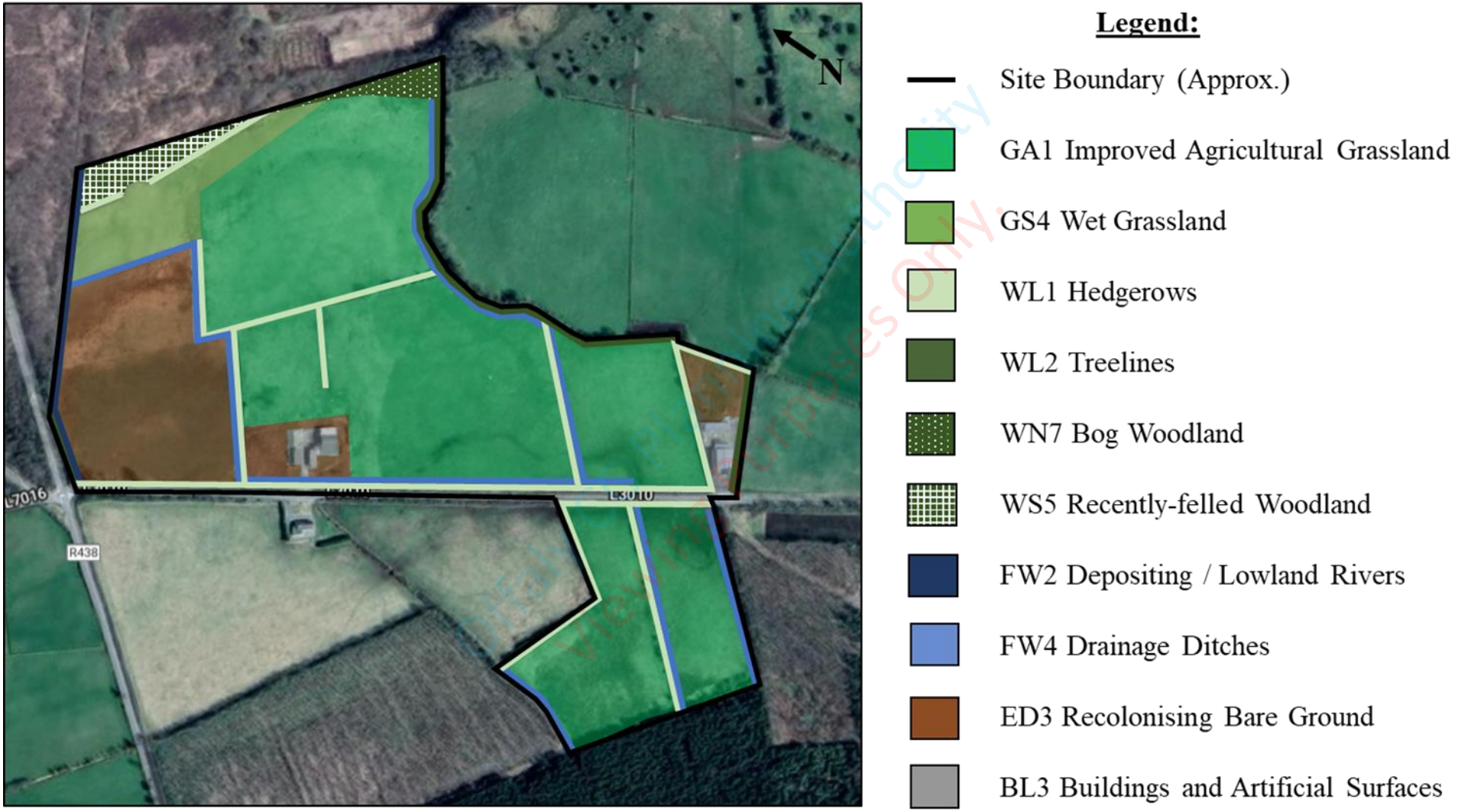

Figure 9.1: Habitat Map of Encountered Habitats at the Proposed Development Site, Banagher

The majority of the development site (approximately 80%), being comprised of improved agricultural grassland, buildings and artificial surfaces and recolonising bare ground habitat, can be considered to be of low ecological value. The remainder of the habitats of the site, comprising approximately 20% of the overall site, can be considered to be of moderate to high ecological value. No plant species of conservation significance or invasive plant species were noted during the site assessment.

Beyond the site boundary, improved agricultural grassland (GA1), dry siliceous heath (HH1), cutover bog (PB4), bog woodland (WN7) and conifer plantation (WD4) dominate.

9.5.3 FAUNA (EXCLUDING BATS)

Evidence of two species were recorded during ecological assessments of the development site; a Pine Martin (*Martes martes*) was observed on the 21st of September 2018, travelling along the southern site boundary, and Fox (*Vulpes vulpes*) tracks were recorded on the 4th of January 2019. There was no evidence of Badger (*Meles meles*), including setts or latrines, or of Otter (*Lutra lutra*), including spraints, tracks or holts, at the proposed development site.

Given the proposed development's location in a rural area, with agricultural land, bog woodland, hedgerows, treelines, peatlands and watercourses all within the surrounding area, mammals that would be expected to be found in the general area include Badger, Otter, Stoat (*Mustela erminea hibernica*), Hedgehog (*Erinaceus europaeus*), Irish Hare (*Lepus timidus hibernicus*), Rabbit (*Oryctalagus cuniculus*), Red Squirrel (*Sciurus vulgaris*), Grey Squirrel (*Sciurus carolinensis*), Pygmy Shrew (*Sorex minutus*), Wood Mouse (*Apodemus sylvaticus*), Common Rat (*Rattus norvegicus*), Red Deer (*Cervus elaphus*) and Fallow Deer (*Dama dama*).

Areas of the proposed development site may provide suitable basking and refuge habitat for Viviparous Lizard (*Zootoca vivipara*). The drainage ditches onsite, while limited in size and water volume, may have the potential to support Frog (*Rana temporaria*) and Smooth Newt (*Lissotriton vulgaris*). However, no evidence of these amphibians were recorded during the ecological site assessments.

With regards terrestrial invertebrates, the butterflies Small Copper (*Lycaena phlaeas*) and Speckled Wood (*Pararge aegeria*) were recorded. No Marsh Fritillary adults or caterpillars were recorded. It was considered that the study area does not contain suitable habitat for protected whorl snail species (*Vertigo* spp.).

9.5.4 FAUNA - BATS

Desk Based Review

Records of bat roosts were obtained from Bat Conservation Ireland (BCI) for the centre of the proposed development site to a distance of 10km. The consultation with BCI is provided in Attachment 9.7, in addition to the BCI bat records received within an approximate 10km radius of the proposed site. In summary, 11 known roosts have been recorded within 10km of the proposed development site, with the nearest known roost located approximately 4.5km to the west of the site close to Gortraven. This roost supported Leisler's Bat (*Nyctalus leisleri*). According to the BCI records for roosts, transects and ad hoc observations within 10km of the proposed development site, a total of eight species have been recorded, as follows:

- Common Pipistrelle (*Pipistrellus pipistrellus*);
- Soprano Pipistrelle (*Pipistrellus pygmaeus*);
- Nathusius' Pipistrelle (*Pipistrellus nathusii*);
- Daubenton's Bat (*Myotis daubentonii*);
- Natterer's Bat (*Myotis nattereri*);
- Whiskered Bat (*Myotis mystacinus*);
- Leisler's Bat (*Nyctalus leisleri*);
- Brown long-eared Bat (*Plecotus auratus*).

The NPWS's National Lesser Horseshoe Bat Roost Database was also consulted with regards any roost records for Lesser Horseshoe Bat (*Rhinolophus hipposideros*). The Lesser Horseshoe Bat is mainly confined to the west of Ireland, with the NPWS database indicating that this bat is absent from the midlands area.

Field Survey Results

Given the mainly agricultural use of the development site, with numerous hedgerows and some sections of treelines, the proposed development site can be considered to support suitable foraging and commuting habitat for bats.

Assessment of Bat Roost Potential – Trees

A total of nine mature trees were identified onsite which require removal to facilitate the proposed development, in addition to two areas which may require removal / thinning, as shown in Figure 9.2.

Figure 9.2: Locations of Proposed Tree Removal

The assessment of trees was based on external surveys undertaken visually from the ground. Five of the trees scheduled for removal were considered to have low potential to support a bat roost (see Table 9.10 below). Although no significant potential roost features were observed in any of the trees for removal, four mature trees were assessed as having moderate potential to support a bat roost, due to the fact that they had dense ivy cover which could provide suitable roosting opportunities for individual bats, or which could hide other suitable roost features.

Table 9.10: Trees Scheduled for Removal – Bat Roost Potential Categories

TREE NO.	SPECIES	PRF CATEGORY	COMMENT
1	Ash	Moderate	Young tree, unlikely to support significant PRFs. However, dense ivy cover obstructs view of potential PRF features.
2	Ash	Low	No PRFs visible. Limited ivy cover.
3	Sycamore	Low	No PRFs visible. Limited ivy cover.
4	Ash (dying)	Moderate	Unlikely to support significant PRFs. However, dense ivy cover obstructs view of potential PRF features.
5	Ash	Moderate	Unlikely to support significant PRFs. However, dense ivy cover obstructs view of potential PRF features.
6	Ash	Moderate	Unlikely to support significant PRFs. However, dense ivy cover obstructs view of potential PRF features.
7	Ash	Low	No PRFs visible. Some ivy cover.
8	Ash	Low	Young tree, unlikely to support significant PRFs. Some ivy cover.
9	Ash	Low	Young tree, unlikely to support significant PRFs. Some ivy cover.

The two areas of trees shown in Figure 9.2 above were also assessed for bat roost potential. Area 1 is comprised of young Alder and Birch, while Area 2 is comprised mainly of Downy Birch, Hawthorn and Willow. Given the relatively young age of the trees present in Areas 1 and 2, and in the absence of PRF features and ivy cover, these areas were assigned a "low" PRF category.

Assessment of Bat Roost Potential – Buildings

The existing abattoir building is constructed of concrete floors and walls, some metal cladding walls and a metal cladding roof. As this building was used for slaughtering and deboning activities, the building would have been appropriately sealed from a quality control perspective, with seals around openings (doors, windows, vents) and mesh screens over any vents or exhausts. An external inspection of the building confirmed that there were no potential bat access points to the main building. No evidence of bat usage (including droppings, urine staining, grease markings or prey remains) was recorded for this building. This building would therefore have a negligible potential to support a bat roost.

A small lean-to at the rear of the abattoir building was noted to have an opening in its roof. However, on inspection, this area was noted to be open in nature, uninsulated and unheated,

and would likely be penetrated by frost and damp during cold weather. Therefore, this area would have negligible bat roost potential.

The existing lairage, to the rear of the abattoir, was also considered to have a negligible potential to support a bat roost, given that it is open in nature, uninsulated and unheated, and would likely be penetrated by frost and damp during cold weather.

An assemblage of agricultural buildings / structures is located within the central portion of the site, comprising of a portal frame construction barn with concrete base walls and galvanised sheeting, with additional lean-to buildings. All roofs, with the exception of one lean-to structure, are comprised of steel and wood supports with galvanised sheeting. These structures therefore have negligible potential roost features, given their materials of construction and given that they are open in nature. One lean-to structure has a roof comprised of steel and wood supports with galvanised steel, similar to the other structures onsite, with the addition of roof felting. However, the roof felting was in disrepair and placed in contact with the galvanised sheeting, and therefore was considered to have negligible roosting potential. No evidence of bat usage (including droppings, urine staining, grease markings or prey remains) was recorded for these agricultural structures.

Figure 9.3: Example of structures at the proposed development site. Clockwise from top left: front of existing abattoir, lairage area, agricultural barn, agricultural structure.

Bat Activity

A total of three bat species were recorded using the proposed development site; Common Pipistrelle, Soprano Pipistrelle and Leisler's Bat. The following table summarises the bat activity recorded onsite.

Table 9.11: Summary of Findings of Bat Activity Survey

TRANSECT NO.	SPECIES	TIME
1	Soprano Pipistrelle	20:01
	Soprano Pipistrelle	20:13
	Common Pipistrelle	20:21
2	Common Pipistrelle	20:26
3	Common Pipistrelle	21:05
	Leisler's	21:06
4	Leisler's	20:39
	Common Pipistrelle	20:45
	Soprano Pipistrelle	20:48
	Common Pipistrelle	20:51
	Leisler's	20:52

Bat activity was relatively low throughout the survey, which is not uncommon for the time of the year the survey was undertaken, when bats are starting to move into hibernation. Bat activity appeared to be the highest along Transect No. 4, which is an area of treeline habitat, with five recorded bat passes.

9.5.5 AVIFAUNA

Tables detailing all the bird species recorded during the two bird surveys, in addition to birds noted during other ecological assessments, are included within Attachment 9.8. A summary table of the species recorded is included below, which also details the protection and conservation concern statuses of the bird species encountered during the site assessments.

Table 9.12: Protection and Conservation Concern Statuses for Recorded Birds

COMMON NAME	SCIENTIFIC NAME	E.U. BIRDS DIRECTIVE	BOCCI* RED LIST	BOCCI* AMBER LIST
Blackbird	*Turdus merula*	-	-	-
Blue Tit	*Parus caeruleus*	-	-	-
Bullfinch	*Pyrrhula pyrrhula*	-	-	-
Buzzard	*Buteo buteo*	-	-	-
Chaffinch	*Fringilla coelebs*	-	-	-
Coal Tit	*Parus ater*	-	-	-
Dunnock	*Prunella modularis*	-	-	-
Goldfinch	*Carduelis carduelis*	-	-	-
Great Tit	*Parus major*	-	-	-
Hen Harrier	*Circus cyaneus*	✓	-	✓
Hooded Crow	*Corvus cornix*	-	-	-
House Sparrow	*Passer domesticus*	-	-	✓
Jackdaw	*Corvus monedula*	-	-	-
Jay	*Garrulus glandarius*	-	-	-
Kestrel	*Falco tinnunculus*	-	-	✓
Linnet	*Carduelis cannabina*	-	-	✓
Magpie	*Pica pica*	-	-	-
Meadow Pipit	*Anthus pratensis*	-	✓	-
Mistle Thrush	*Turdus viscivorus*	-	-	✓

COMMON NAME	SCIENTIFIC NAME	E.U. BIRDS DIRECTIVE	BOCCI* RED LIST	BOCCI* AMBER LIST
Pied Wagtail	*Motacilla alba*	-	-	-
Reed Bunting	*Emberiza schoeniclus*	-	-	-
Robin	*Erithacus rubecula*	-	-	✓
Rook	*Corvus frugilegus*	-	-	-
Snipe	*Gallinago gallinago*	-	-	✓
Starling	*Sturnus vulagaris*	-	-	✓
Swallow	*Hirundo rustica*	-	-	✓
Tree Sparrow	*Passer montanus*	-	-	✓
Woodpigeon	*Columba palumbus*	-	-	-
Wren	*Troglodytes troglodytes*	-	-	-

**The BoCCI (Birds of Conservation Concern in Ireland) List classifies bird species into one of three lists (Red, Amber or Green) based on their conservation status and conservation priority.*

A total of 29 bird species were recorded during the two bird surveys and other ecological assessments. One species, Meadow Pipit, is red listed under the BoCCI classification, while ten species are amber listed: Hen Harrier, House Sparrow, Kestrel, Linnet, Mistle Thrush, Robin, Snipe, Starling, Swallow and Tree Sparrow. One of the bird species recorded is listed under Annex I of the E.U. Birds Directive – Hen Harrier.

The species of birds with the most numbers recorded during the site assessments included Chaffinch, Linnet, Rook and Starling, all of which would be considered common in the area.

Three bird of prey species were recorded; Buzzard, Kestrel and Hen Harrier. A single sighting of a buzzard was recorded on the 21st of September 2018, with the individual passing over the proposed development site. A pair of kestrels was also recorded passing overhead on the 21st of September 2018, and were periodically observed hunting in the general area during the proceeding hour.

During the bird survey on the 4th of January 2019, a female hen harrier was recorded flying approximately 50m to the north of the site boundary at approximately 09:09, travelling in an east to west direction. The female was periodically observed flying over an area of bog to the north-west of the site from 09:09 to 10:20.

9.5.6 RECORDS OF PROTECTED, RARE AND INVASIVE SPECIES

National Biodiversity Data Centre Records

Flora and fauna records were reviewed on the National Biodiversity Data Centre (NBDC) website for the proposed development site and vicinity. Only one protected plant species under the Flora (Protection) Order, 2015 (S.I. No. 356 of 2015), Meadow Barley (*Hordeum secalinum*), was recorded within approximately 10km from the proposed development site.

A number of invasive plant species have been recorded within approximately 10km of the development site; Black Currant (*Ribes nigrum*), Canadian Waterweed (*Elodea canadensis*), Cherry Laurel (*Prunus laurocerasus*), Douglas Fir (*Pseudotsuga menziesii*), False-acacia (*Robinia pseudoacacia*), Fringed Water-lily (*Nymphoides peltata*), Giant Hogweed (*Heracleum mantegazzianum*), Giant Knotweed (*Fallopia sachalinensis*), Giant-rhubarb

(*Gunnera tinctoria*), Indian Balsam (*Impatiens glandulifera*), Japanese Knotweed (*Fallopia japonica*), Nuttall's Waterweed (*Elodea nuttallii*), Pitcherplant (*Sarracenia purpurea*), *Rhododendron ponticum*, Spanish Bluebell (*Hyacinthoides hispanica*), Sycamore (*Acer pseudoplatanus*), Three-cornered Garlic (*Allium triquetrum*), Traveller's-joy (*Clematis vitalba*), Wall Cotoneaster (*Cotoneaster horizontalis*) and Water Fern (*Azolla filiculoides*). Twelve of these invasive species are listed in the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011); Canadian Waterweed, Fringed Water-lily, Giant Hogweed, Giant Knotweed, Giant-rhubarb, Indian Balsam, Japanese Knotweed, Nuttall's Waterweed, Rhododendron, Spanish Bluebell, Three-cornered Garlic and Water Fern.

Fauna records for the previous forty years were reviewed on the NBDC website for the two 2km squares (N01G and N01L) in which the proposed development is located. The bird species of note which may be present include Skylark (*Alauda arvensis*), House Sparrow, Starling, Woodpigeon, Stock Pigeon (*Columba oenas*), Golden Plover (*Pluvialis apricaria*), Northern Lapwing (*Vanellus vanellus*), Kestrel, Hen Harrier and Merlin (*Falco columbarius*), and the invasive species Greylag Goose (*Anser anser*).

Mammals of note include the protected species Otter, Badger, Red Squirrel, Pine Marten and Hedgehog, and the invasive species Grey Squirrel and Fallow Deer.

National Parks and Wildlife Services Records

Records of protected, rare or threatened flora and fauna species within 10km of the proposed development obtained from the NPWS are included in Tables 9.13 and 9.14 below.

Table 9.13: Records of Protected, Rare or Threatened Flora Species from the NPWS

COMMON NAME	SCIENTIFIC NAME	PROTECTION[1]	CONSERVATION STATUS[2,3]
Alder Buckthorn	*Frangula Alnus*	None	Least Concern
Blue Fleabane	*Erigeron acer*	None	Least Concern
Cephalozia macrostachya var. *macrostachya*	*Cephalozia macrostachya* var. *macrostachya*	None	Least Concern
Cladonia arbuscula	*Cladonia arbuscula*	None	Not Assessed
Cladonia ciliata	*Cladonia ciliata*	None	Not Assessed
Cladonia ciliate var. *ciliata*	*Cladonia tenuis*	None	Not Assessed
Cladonia ciliate var. *tenuis*	*Cladonia ciliate* var. *tenuis*	None	Not Assessed
Ephemerum hibernicum	*Ephemerum hibernicum*	None	Not Assessed
Fir Clubmoss	*Huperzia selago*	None	Not Assessed
Green-Winged Orchid	*Orchis morio*	None	Vulnerable
Henbane	*Hyoscyamus niger*	None	Near Threatened
Lustrous Bog-moss	*Sphagnum subnitens*	None	Least Concern
Magellanic Bog-moss	*Sphagnum magellanicum*	None	Least Concern
Meadow Barley	*Hordeum secalinum*	FPO	Vulnerable

COMMON NAME	SCIENTIFIC NAME	PROTECTION[1]	CONSERVATION STATUS[2,3]
Opposite-leaved Pondweed	*Groenlandia densa*	FPO	Near Threatened
Red Hemp-Nettle	*Galeopsis angustifolia*	FPO	Vulnerable
Reindeer Moss	*Cladonia rangiferina*	None	Not Assessed
Reindeer Moss	*Cladonia portentosa*	None	Not Assessed
Shepherd's-needle	*Scandix pecten-veneris*	None	Regionally Extinct
Smooth brome	*Bromus racemosus*	None	Near Threatened
Weissia controversa var. *densifolia*	*Weissia controversa* var. *densifolia*	None	Least Concern
Yellow Bird's-nest	*Monotropa hypopitys*	None	Near Threatened

Notes:
[1] HD II/IV = Habitats Directive Annexes II/IV; FPO = Flora Protection Order.
[2] Vascular flora from the Irish Red Data Book 1 Vascular Plants (Curtis and McGough, 1988; Wyse Jackson *et al.*, 2016); Bryophytes from the Irish Red List No. 8 (Lockhart *et al.*, 2012).
[3] IUCN Red list http://www.iucnredlist.org/ - accessed January 2019

Table 9.14: Records of Protected, Rare or Threatened Fauna Species from the NPWS

COMMON NAME	SCIENTIFIC NAME	PROTECTION[1]	CONSERVATION STATUS[2,3]
Badger	*Meles meles*	WA	Least Concern
Barn owl	*Tyto alba*	WA	High Concern - Red
Common Frog	*Rana temporaria*	WA	Least Concern
Fallow Deer	*Dama dama*	WA	Least Concern
Hedgehog	*Erinaceus europaeus*	WA	Least Concern
Irish Hare	*Lepus timidus hibernicus*	WA	Least Concern
Irish Stoat	*Mustela erminea hibernica*	WA	Least Concern
Marsh Fritillary	*Eurodryas aurinia*	HD II	Vulnerable
Otter	*Lutra lutra*	HD II/IV, WA	Near Threatened
Pine Marten	*Martes martes*	WA	Least Concern
Pygmy Shrew	*Sorex minutus*	WA	Least Concern
Red Squirrel	*Sciurus vulgaris*	WA	Near Threatened
Smooth Newt	*Lissotriton vulgaris*	WA	Least Concern
Viviparous Lizard	*Lacerta vivipara / Zootoca vivipara*	WA	Least Concern
White-clawed Crayfish	*Austropotamobius pallipes*	HD II, WA	Endangered

Notes:
[1] HD II/IV = Habitats Directive Annexes II/IV; WA = Wildlife Acts; BDI = Birds Directive Annex I.
[2] Terrestrial Mammal Red List (Marnell *et al.* 2009); Birds of Conservation Concern in Ireland 2014-2019 (Colhoun and Cummins, 2013); Red-listed Amphibians, Reptiles and Freshwater Fish (King *et al.* 2011); Red-listed Non-marine Molluscs (Byrne *et al.*, 2009).
[3] IUCN Red list http://www.iucnredlist.org/ - accessed January 2019

9.5.7 BASELINE ASSESSMENTS UNDERTAKEN FOR MEENWAUN WIND FARM

Ecological baseline assessments were undertaken by Fehily Timoney and Company for the Meenwaun Wind Farm in 2015, which is located adjacent the proposed development site.

Fauna – Excluding Bats

Fauna species recorded within the Meenwaun Wind Farm area, not recorded during onsite ecological assessments for the Banagher Chilling Limited proposed development, include the following:

- Red Squirrel: Two were observed in woodland within the Wind Farm site in January 2015;
- Irish Hare: Present throughout the Wind Farm site;
- Deer: Evidence of deer noted during winter surveys.

Fauna – Bats

The Meenwaun Wind Farm Bat Assessment Study notes that activity surveys were undertaken in June and August 2013. The results of these activity surveys were similar to the activity survey undertaken for Banagher Chilling Limited, with three species of bat (Common Pipistrelle, Soprano Pipistrelle and Leisler's Bat) recorded for the area, with low activity. No roosts were identified for the area of trees within the vicinity of the wind turbine locations.

Avifauna

Bird species recorded within the Meenwaun Wind Farm area, not recorded during onsite ecological assessments for the Banagher Chilling Limited proposed development, are included within the following table:

Table 9.15: Protection and Conservation Concern Statuses for Recorded Birds during Baseline Studies for Meenwaun Wind Farm

COMMON NAME	SCIENTIFIC NAME	E.U. BIRDS DIRECTIVE	BOCCI* RED LIST	BOCCI* AMBER LIST
Blackcap	*Sylvia atricapilla*	-	-	-
Collared Dove	*Streptopelia decaocto*	-	-	-
Crossbill	*Loxia curvirostra*	-	-	-
Fieldfare	*Turdus pilaris*	-	-	-
Goldcrest	*Regulus regulus*	-	-	✓
Golden Plover	*Pluvialis apricaria*	✓	✓	-
Lesser Redpoll	*Carduelis cabaret*	-	-	-
Pheasant	*Phasianus colchicus*	-	-	-
Raven	*Corvus corax*	-	-	-
Redwing	*Turdus iliacus*	-	-	-
Siskin	*Carduelis spinus*	-	-	-
Song Thrush	*Turdus philomelos*	-	-	-
Sparrowhawk	*Accipiter nisus*	-	-	✓
Willow Warbler	*Phylloscopus trochilus*	-	-	-

The Environmental Impact Statement prepared for the Meenwaun Wind Farm notes that other bird species recorded in the general area, but not recorded within the wind farm development area, include the following:

- Whooper Swan (*Cygnus cygnus*): Flight observation of nine birds recorded flying overhead approximately 1.5km and 2km from the wind farm site;
- Golden Plover (*Pluvialis apricaria*): Maximum flock size of 41 birds recorded in an industrial bog to the north-east of the wind farm;
- Woodcock (*Scolopax rusticola*): Breeding territory identified within 500m of Turbine 1 (approximately 660m from the landholding boundary of Banagher Chilling Limited).

9.6 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development would comprise of the proposed upgrade and extension of an existing abattoir facility within the townlands of Meenwaun and Boheradurrow, at Banagher, Co. Offaly. The proposed development would also include the construction of stormwater and effluent drainage systems, water treatment plant, electrical sub-station, truck wash, security hut, waste and by-product area and gas compound, site access roads and all ancillary development including internal road surfacing, the provision of outdoor artificial lighting, an extension to the existing lairage facility and site landscaping.

Slaughtering activities at the proposed facility would typically operate Monday to Friday. However, slaughtering may be undertaken at weekends for reasons such as casualty animals and demand.

New stormwater and effluent drainage systems would be constructed. Stormwater from clean-yard areas and car parking areas would pass through a silt trap and Class 1 By-Pass Separator before being directed to a modular underground attenuation system. From here, stormwater would be pumped to a manhole prior to discharge to the Feeghroe Stream.

All process drains, domestic drains and dirty yard surface water drains would be directed to the site's new WWTP, which would comprise of an inlet sump, meva screen, drum screen, balancing tank, dissolved air flotation (DAF) unit, sludge tank, anoxic tank, two aeration tanks, clarifier, sand filters and an outlet sump. From here, the treated final effluent would be directed to the proposed integrated constructed wetlands (ICWs), prior to discharge to the Feeghroe Stream.

The ICW system would comprise of a five-treatment cell system, with a functional wetland treatment area of 40,000m^2. Each cell would be densely planted with a selection of emergent plant species, including Reed Sweet-grass (*Glyceria maxima*), Common Sedge (*Carex riparia*), Reed Mace (*Typha latifolia*), Lesser Reedmace (*Typha angustafolia*) and Yellow Flag (*Iris pseudacorus*), along with a quantity of other suitable emergent plant species. The final cell, Cell 5, would differ from Cells 1-4, in that it would also be planted with a mixture of deciduous and evergreen tree species on mounds amongst the emergent wetland plants. These plants would assist in the many physical, chemical and biological processes that occur within the wetland system to reduce the through-flowing water of its various potential

pollutant contaminants, in addition to reducing the volume of final treated effluent discharging from the ICW to the receiving waters.

The replacement of agricultural land with the ICW system would add ecological value to the proposed development site, by providing wetland habitats for aquatic invertebrates, marginal and aquatic vegetation, amphibians and a range of breeding and wintering wildfowl.

Artificial outdoor lighting would be installed along the internal access network and within the main site yard. The lighting design for the development would be determined at a detailed design stage.

The expected construction timeframe would be approximately 18 months, with hours of operation from 7am to 7pm Monday to Friday, and 8am to 2pm on Saturdays. A temporary site compound would be established and would house the temporary offices, equipment and materials storage and construction staff welfare facilities. The temporary site compound would also be used for the storage of fuels and oils required for the various construction plant, in addition to housing waste receptacles.

To facilitate the proposed development, approximately 985m of hedgerow would require removal. This would include approximately 290m for the proposed abattoir extension, 265m for the ICW system and 430m to accommodate site access sightlines and road widening works. In addition to hedgerow removal works, an estimated 110m of treeline along the eastern boundary would require thinning to accommodate new boundary fencing, while an area of approximately 200m^2 of bog woodland would require removal to accommodate Cell 1 of the ICW system. The locations of hedgerow, treeline and woodland removal are detailed in Figure 9.4 below. It should be noted that a section of the hedgerow identified as "Hedgerow C" in Figure 9.4 below may not require removal, depending upon the final ICW design at the detailed design stage. However, for the purpose of the biodiversity assessment, it has been assumed that this section would be removed.

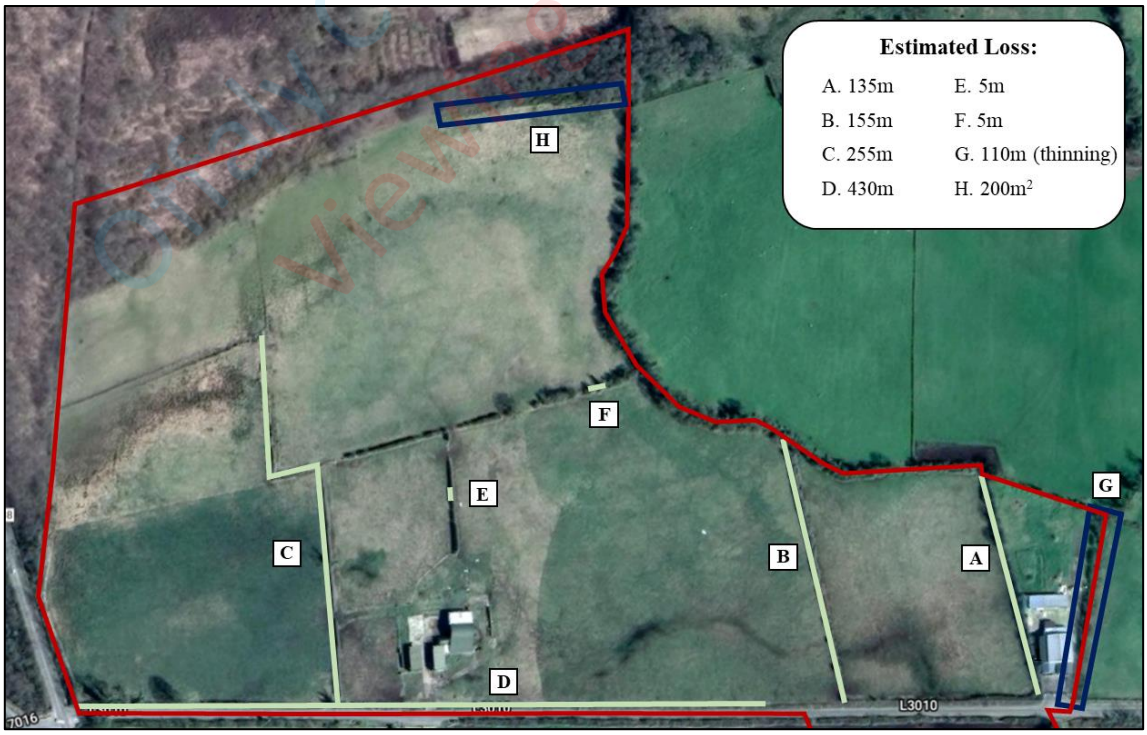

Figure 9.4: Locations of hedgerow, treeline and woodland removal

A landscaping plan has been prepared for the proposed development by Macro Works Ltd., and accompanies the application (Document Ref. LD.BNGHMPF). The landscape plan includes the replacement planting of approximately 400m of hedgerow, comprising of native species including Hawthorn, Blackthorn and Holly (*Ilex aquifolium*), along the southern site boundary, set-back from the site boundary, in addition to approximately 115m of hedgerow along the eastern ICW boundary.

Existing hedgerows and treelines would be bolstered with native tree species where required. The landscape plan also includes a section of proposed woodland planting adjacent the internal site access to the rear yard, which would be comprised of native species including Pendunculate Oak (*Quercus robur*), Scots Pine (*Pinus sylvestris*), Alder, Birch, Wild Cherry (*Prunus avium*), Crab Apple (*Prunus padus*), Hazel (*Corylus avellana*), Holly, Hawthorn, Blackthorn and Spindle (*Euonymus europaeus*).

Additional landscaping is proposed around the ICW site, using native trees and shrubs common to the area, including Hawthorn, Blackthorn, Birch, Alder and Willow.

9.7 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

9.7.1 DETERMINATION OF ECOLOGICAL VALUE

The ecological value of the habitat types and species identified at the proposed development site have been assessed following the criteria outlined in the National Roads Authority (NRA) guidelines (2009). Tables 9.16 and 9.17 below detail the habitats recorded and potential species, and their associated ecological value.

Table 9.16: Ecological Value of Identified Habitats of the Proposed Development

HABITAT TYPE	HABITAT RATING	KEY ECOLOGICAL RECEPTOR?
Depositing / lowland rivers (FW2)	Local importance, higher value	Yes. Joins with the River Shannon Callows SAC and Middle Shannon Callows SPA approximately 4km downstream of the site.
Drainage ditches (FW4)	Local importance, lower value	No. Mainly small in extent with limited volume. May provide suitable habitat for amphibians at times. Low ecological value.
Improved agricultural grassland (GA1)	Local importance, lower value	No. Species poor habitat. Low ecological value.
Wet grassland (GS4)	Local importance, higher value	Yes. May contain a high biodiversity.
Bog woodland (WN7)	Local importance, higher value	Yes. Area of semi-natural habitat, comprising mainly of native species.
Recently-felled woodland (WS5)	Local importance, higher value	No. While this area may contain a high biodiversity as flora recolonises from adjacent habitats, no works are proposed for this area.
Hedgerows (WL1)	Local importance,	Yes. Area of semi-natural habitat,

HABITAT TYPE	HABITAT RATING	KEY ECOLOGICAL RECEPTOR?
	higher value	comprising mainly of native species. May provide opportunities for bird nesting and foraging for bats.
Treelines (WL2)	Local importance, higher value	Yes. Area of semi-natural habitat, comprising of native and non-native species. May provide opportunities for bird nesting and foraging for bats.
Recolonising bare ground (ED3)	Local importance, lower value	No. Area of disturbed ground with recolonising vegetation. Low ecological value.
Buildings and artificial surfaces (BL3)	Local importance, lower value	No. Comprised of existing buildings and structures and areas of hardstanding. Low ecological value.

Table 9.17: Ecological Value of Species of the Proposed Development

SPECIES	SPECIES RATING	KEY ECOLOGICAL RECEPTOR?
Badger	Local importance, higher value	No. Not recorded within the vicinity of the proposed site.
Otter	Local importance, higher value	Yes. While not recorded within the vicinity of the development, it is possible otter are present within the area, given the presence of the Feeghroe Stream onsite and nearby Rapemills River and River Shannon.
Pine Marten	Local importance, higher value	Yes. One individual was sighted during a site walkover. Pine Marten are protected under the Wildlife Act.
Bats (foraging and commuting habitat only – no bat roosts identified)	Local importance, higher value	Yes. The hedgerows / treelines within and adjacent to the proposed development are likely to be utilised by bats for both foraging and commuting.
Other Fauna	Local importance, low to high value	No. Limited sightings / evidence of other fauna. Site has limited potential to support other fauna species.
Breeding Birds	Local importance, higher value	Yes. All birds, their nests, eggs and young are protected under the Wildlife Act.
Aquatic Fauna	Local importance, low to high value	Yes. Drainage ditches onsite may provide suitable habitat for amphibians, which are protected under the Wildlife Act.
Common Lizard	Local importance, higher value	Yes. Presumed present, but likely in low numbers. Protected under the Wildlife Act.

9.7.2 CONSTRUCTION PHASE

Designated Sites – SAC and SPA Sites

As discussed in detail in the NIS prepared for the project (Ref. No. PES_NIS_19_9201), and within Section 9.5.1 above, the SAC and SPA sites considered to be within the potential zone of influence of the proposed development are All Saints Bog and Esker SAC (Site Code: 000566), River Shannon Callows SAC (Site Code: 000216), Redwood Bog SAC (Site Code: 002353), All Saints Bog SPA (Site Code: 004103), Middle Shannon Callows SPA (Site Code: 004096), River Little Brosna Callows SPA (Site Code: 004086), Dovegrove Callows SPA (Site Code: 004137) and River Suck Callows SPA (Site Code: 004097), due to hydrological connectivity / potential hydrological connectivity, distances from the proposed development site and / or the potential for ex-situ impacts of the development upon wintering wildfowl.

The proposed development does not directly impinge on any part of a European site, and as such, would not be expected to have any in-situ effects upon a protected site through loss or destruction of habitat, fragmentation of habitat, disturbance of habitat or direct reduction in species density.

As the proposed development site is located in close proximity to a number of sites designated for wildfowl, the majority of which are wintering wildfowl, in addition to the River Shannon Callows SAC which is designated for otter, ex-situ habitat loss or fragmentation impacts due to the proposed development could occur.

While no evidence of otter (including holts, slides, spraints and tracks) were recorded during the ecological site assessments, given that the Feeghroe Stream passes along the western boundary of the site, and given that the development site is located in close proximity to the River Rapemills and River Shannon, it is likely that otter may be present within the vicinity. As noted in the NIS (Ref. No. PES_NIS_19_9201), the majority of the land-take required for the proposed development would comprise of habitats that are considered modified and of limited value to otter. The loss of wet grassland (GS4), hedgerows (WL1) and bog woodland (WN7) would not have a significant potential impact upon otter due to habitat loss or fragmentation, given the limited land-take required of these habitats and given the availability of more suitable otter habitat in the general area. Furthermore, the loss of these habitats would be mainly to facilitate the ICW system. The ICW system would be considered to benefit otter in the area by providing a wetland habitat that would support aquatic fauna, and which would potentially provide foraging opportunities for otters.

It is considered unlikely that the proposed development site would be of importance to the special conservation interests, given the distances from the SPA sites and given that no areas of fens, bogs, marshes, swamps, lakes or other open bodies of water are present on the proposed development site. However, in the unlikely event that designated wildfowl utilise the proposed development site, the proposed development would not have a significant adverse impact upon wildfowl due to habitat loss or fragmentation. The majority of the land-take required for the proposed development would comprise of habitats that are considered modified and of limited value to wildfowl. Furthermore, it is considered that the construction of the ICW system would be of benefit to wildfowl in the area by providing a wetland habitat, measuring approximately 40,000m^2 in size, which would provide suitable cover, resting and / or foraging areas.

The potential disturbance on protected species due to construction noise would not be considered significant, given transient nature of construction works and the distances between the development site and designated sites (with the nearest site with designated fauna, All Saints Bog SPA, located approximately 2.4km from the development site).

The potential disturbance on protected habitats and species due to dust during the construction phase would not be considered significant, given the transient nature of construction works, the scale of the proposed development and given the distances to the to the designated sites.

Activities as part of the construction of the development would not have the potential to cause a significant impact upon designated sites due to invasive species. There would be no significant import of materials with the potential to contain invasive flora species. Soils excavated during construction works would be stockpiled and re-used for site levelling and site landscaping where possible. Should topsoil be required to be imported to the site for landscaping purposes, this would be considered a low risk material, as vector materials containing invasive species are a "controlled waste" and would not be brought onto the site.

The proposed development is located within the Lower Shannon catchment (Shannon (lower) sub-catchment SC_040). Drainage from the site is currently directed to the Feeghroe Stream, with some drainage ditches to the south of the site either joining with the Feeghroe Stream or joining with the Milltown Stream. The Feeghroe and Milltown Streams join with the Rapemills River, which ultimately joins with the River Shannon.

Of the eight designated SAC and SPA sites considered to be within the potential zone of influence of the proposed development, three sites are located upstream of drainage from the site and are therefore not considered to be hydrologically connected: River Little Brosna Callows SPA, Dovegrove Callows SPA and River Suck Callows SPA. It is not considered that the proposed development would have the potential to impact upon Redwood Bog SAC, given that this site is located a considerable distance (13.25km) downstream of the development site and given the considerable dilution of the site's drainage within the Feeghroe Stream, Rapemills River and River Shannon. Furthermore, Redwood Bog SAC is located approximately 100m inland from the River Shannon watercourse.

During the construction phase of projects, a deterioration in water quality can arise through the release of uncured concrete, the release of suspended solids during soil disturbance works and the release of hydrocarbons (fuels and oils), which could potentially impact upon the River Shannon Callows SAC, Middle Shannon Callows SPA, All Saints Bog and Esker SAC and All Saints Bog SPA.

Construction works would last approximately 18 months in duration, and would be confined to the proposed development footprint. While the risk of water quality deterioration due to the proposed development would be considered low given the nature and scale of the development, the potential for construction works to impact upon the River Shannon Callows SAC, Middle Shannon Callows SPA, All Saints Bog and Esker SAC and All Saints Bog SPA cannot be ruled out in entirety, given that works would be undertaken in close proximity to the Feeghroe Stream and drainage ditches, in addition to the proposed outfall works at the Feeghroe Stream, which are hydrologically connected to the aforementioned designated sites.

Therefore, control measures are required to ensure that there would be no potential adverse impacts upon these designated sites. These control measures are outlined in Section 10.7.

Designated Sites – NHA Sites

As noted in Section 9.5.1, one NHA site, the River Little Brosna Callows NHA (Site Code: 000564), is considered to be within the potential zone of influence of the proposed development site. This NHA is also designated as the River Little Brosna Callows SPA, which is discussed above.

The proposed development does not directly impinge on this NHA site, and therefore would not be expected to have any in-situ effects through loss or destruction of habitat, fragmentation of habitat, disturbance of habitat or direct reduction in species density.

As noted in the section above, the NIS prepared for the development considered that there would be no significant adverse potential impact upon wildfowl due to habitat loss or fragmentation or due to potential disturbance including construction noise and dust.

It is not considered that the proposed development has the potential to impact upon this NHA site due to invasive species, given that there would be no significant import of materials with the potential to contain invasive flora species and excavated soils would be re-used in site levelling and landscaping. Should topsoil be required to be imported to the site for landscaping purposes, this would be considered a low risk material, as vector materials containing invasive species are a "controlled waste" and would not be brought onto the site.

It is not considered that the proposed development would have the potential to impact upon the River Little Brosna Callows NHA due to a potential deterioration in water quality, given that the NHA site is located upstream of drainage from the proposed development site, and therefore is not considered to be hydrologically connected to the development.

Habitats and Flora

The construction phase of the development would result in a direct and permanent loss of the existing habitats improved agricultural grassland (GA1), wet grassland (GS4), hedgerows (WL1), bog woodland (WN7), drainage ditches (FW4) and recolonising bare ground (ED3). While thinning / tree removal works would be required for a section of treelines (WL2) habitat along the eastern boundary, works would be minimal and would not result in the loss of this habitat. There would be no loss of the existing habitats depositing / lowland rivers (FW2), recently-felled woodland (WS5) or buildings and artificial surfaces (BL3). There would be no alternation in habitat use for the parcel of land to the south of the L3010, as there are no proposed development works for this area.

The majority of the land take would comprise of improved agricultural grassland and recolonising bare ground habitats, which are considered modified and of low ecological value. Some sections of drainage ditches (FW4) habitat would be lost to the proposed development, however, this habitat is considered to be of local importance (lower value) and is common to and typical of agricultural land in Ireland. Therefore, the loss of these habitats would not be considered significant.

The construction phase of the development would also result in a direct and permanent loss of some sections of habitats of local importance (higher value): wet grassland (GS4), hedgerows (WL1) and bog woodland (WN7). Approximately 2.3 acres of wet grassland, 985m of hedgerows and 200m^2 of bog woodland would be lost to the development footprint. It should be noted that a total of nine mature trees, comprised mostly of Ash, are present within the sections of hedgerows scheduled for removal to accommodate the proposed development.

However, the loss of the habitats considered as of local importance (higher value) at the site would not be considered significant, as the majority of these habitats would be lost to accommodate the integrated constructed wetlands (ICW) system, which may be best characterised as other artificial lakes and ponds (FL8) habitat. The ICW system would add ecological value to the development site, and may be considered as of local importance (higher value). As noted in Section 9.6, the area would be densely planted with a selection of native emergent species, including Reed Sweet-grass, Common Sedge, Reed Mace, Lesser Reedmace and Yellow Flag. The final cell, Cell 5, would be planted with a mixture of deciduous and evergreen tree species on mounds amongst the emergent wetland plants. It is estimated that approximately 77,500 emergent plant species and 2,500 native tree species would be planted within the ICW system, which would be a considerable positive impact of the development.

With regards hedgerow habitat loss and the removal of nine mature trees, it is proposed to replant approximately 400m of the hedgerow along the southern site boundary with native species, in addition to the replanting of approximately 115m of hedgerow along the eastern boundary of the ICW system. Furthermore, as outlined in the landscaping plan prepared for the site by Macro Works Ltd. (Document Ref. LD.BNGHMPF), existing hedgerows and treelines would be bolstered with native tree species where required, and a section of new woodland planting is proposed adjacent to the internal site access to the rear yard.

No rare plant species or protected flora under the Flora (Protection) Order 2015, were recorded within the proposed development area. Therefore, the proposed development would not be considered to impact upon any rare or protected flora species.

During construction works, there is potential for invasive species to be introduced to the proposed development site through the movement of materials, such as soil and stone, and the arrival of construction plant and equipment from an area with invasive species.

Under Regulation 49(2) of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011), save in accordance with a licence granted under paragraph (7), any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow in any place specified in relation to any plant which is included in Part 1 of the Third Schedule shall be guilty of an offence. Materials containing invasive species such as Japanese Knotweed are considered “controlled waste” and, as such, there are legal restrictions on their handling and disposal. Under Regulation 49(7) of the European Communities (Birds and Natural Habitats) Regulations 2011, it is a legal requirement to obtain a license to move “vector materials” listed in the Third Schedule, Part 3.

The potential risk of introducing invasive species during the construction phase would be considered low. No invasive flora species of concern were recorded during the onsite

ecological assessments. During the construction phase, there would be no significant import of materials with the potential to contain invasive flora species. Soils excavated during construction works would be stockpiled and re-used for site levelling and site landscaping where possible, to reduce the volume of material imported to the site. Where materials, such as topsoil or suitable soils for the lining of the ICW cells, may be required to be imported to the site, this would be considered a low risk material, as vector materials containing invasive species are a "controlled waste" and would not be brought onto the site. Any stone required would be sourced locally where possible and would be inspected prior to arrival onsite for the presence of invasive species.

The construction works contractor would also ensure that all equipment and plant would be thoroughly washed and inspected prior to arriving to the development site. Therefore, it is considered that there would be no significant risk of introducing invasive species during construction works from importation of materials or the arrival to site of construction plant and equipment.

Dust emissions may arise during construction activities, in particular during earth-moving works, which may have the potential to impact upon photosynthesis, respiration and transpiration processes of flora due to the blocking of leaf stomata. However, given the transient nature of construction works and standard working practices including dust control, the potential impact to flora would not be considered significant.

The potential impact upon flora and habitats due to a deterioration in water quality is discussed in detail in Section 10.

Fauna and Avifauna

As noted above, the majority of the land take required for the proposed development would comprise of improved agricultural grassland (GA1), recolonising bare ground (ED3) and drainage ditches (FW4), which are considered modified and of low ecological value. Therefore, the potential impact upon fauna due to habitat loss or habitat fragmentation would be reduced.

The loss of wet grassland (GS4), hedgerows (WL1) and bog woodland (WN7) habitats, identified as habitats of local importance (higher value), would be considered as having a moderate impact upon fauna species. However, as the loss of these habitats would be to facilitate the ICW system, the potential impact upon fauna species would be greatly reduced, given that the ICW system would be considered as of local importance (higher value) and would add ecological value to the proposed development site by providing wetland habitats for aquatic invertebrates, marginal and aquatic vegetation, amphibians and a range of breeding and wintering wildfowl. Significant planting would be undertaken at the ICW system, as discussed above, which would provide suitable cover and foraging areas for many species of fauna. Furthermore, it is proposed to replant approximately 400m of hedgerow habitat along the southern site boundary and approximately 115m of hedgerow along the eastern boundary of the ICW with native species, and the landscaping plan prepared for the site includes for the bolstering of existing hedgerows / treelines with native species, and the proposed planting of new woodland adjacent the internal site access to the rear yard area.

One protected fauna species, pine marten, was recorded as present on the proposed development site. Pine marten favour wooded areas and areas of good cover, therefore the

proposed ICW system, in particular Cell 5 which would be planted with approximately 2,500 trees, in addition to the proposed planting of a new woodland area adjacent the facility (as shown in Document Ref. LD.BNGHMPF), would benefit pine marten in the area. No other protected fauna, or evidence of protected fauna, were noted as present on the development site. There was no evidence of badger, including setts or latrines, or evidence of otter including holts, slides, tracks or spraints. Similar to the pine marten, it is considered that the construction of the ICW system would benefit these species once vegetation within the system has been established.

While no evidence of amphibians was recorded during the ecological site assessments, the drainage ditches onsite may have the potential to support amphibians. Should amphibians be present onsite, there would be no significant potential habitat loss or habitat disturbance due to the loss of sections of drainage ditches onsite, given that the construction of the ICW system would significantly increase the overall area of suitable habitat for amphibians.

In the event a protected species is encountered during construction or vegetation removal works, an officer of the NPWS would be notified prior to the resumption of construction works.

Direct mortality of fauna may occur due to the removal of vegetation at the site, in addition to the use of heavy construction plant and machinery. Mortality of fauna is most likely to occur during the mammal and bird breeding season, when young are at their most vulnerable.

Where possible, hedgerow / bog woodland removal would not take place during the bird nesting season (1st of March – 31st of August), greatly reducing the potential for mortality. However, it may be necessary to undertake some hedgerow / bog woodland removal works during the bird nesting season. In such instances, a suitably qualified ecologist would be engaged to carry out inspections for the presence of breeding birds prior to any clearance works taking place. Where nests are present, the ecologist would make a decision as to whether a "Licence to interfere with or destroy the breeding places of any wild animals", is required from the NPWS. Alternatively, the ecologist may establish a suitable buffer zone around an active nest, with removal works rescheduled until chicks have fledged. Where no evidence of nests are found during inspection, hedgerow / bog woodland removal works must be undertaken within three days of inspection.

Construction work has the potential to disturb fauna due to the generation of construction noise. However, construction noise would not be considered to pose a significant risk to fauna owing to the transient nature of works and given that all vehicles where possible would be equipped with mufflers to suppress noise, as is standard practice. Where possible, no construction works would be conducted outside of normal working hours, therefore there would be no disturbance to nocturnal species.

The potential impact upon fauna due to a deterioration in water quality is discussed in Section 10.

Bats

The construction phase of the proposed development has the potential to result in direct and indirect impacts on local bat populations, through habitat loss and disturbance which has the potential to impact upon foraging and commuting areas.

The majority of bat species utilise linear features, such as hedgerows and treelines, and areas of mature vegetation for foraging and commuting. The proposed development would result in the removal of approximately 985m of hedgerow habitat and the thinning of approximately 110m^2 of treeline along the eastern boundary, in addition to 200m^2 of bog woodland, the loss of which would be considered to have an adverse impact upon bat species. However, as noted in the "*Fauna and Avifauna*" section above, the proposed ICW system would be planted with a considerable number of emergent plants and approximately 2,500 native trees, approximately 400m of the southern site boundary and 115m of the eastern boundary of the ICW system would be replanted with native hedgerow species and the landscaping plan for the development site would include bolstering of existing hedgerows / treelines with native tree species where required and the proposed planting of new woodland adjacent the internal site access to the rear yard area. Therefore, the potential impact upon bats due to habitat loss would be greatly reduced.

There would be no loss of any known bat roosts during the construction phase. However, mitigation measures, outlined in Section 9.8.1, are proposed to ensure that the four trees assessed as having a moderate bat roost potential, due to dense ivy cover, are re-assessed prior to felling or soft-felled under the supervision of a suitably qualified ecologist (given the limitations to survey outlined in Section 9.3.4).

Artificial lighting during the construction phase has the potential to negatively impact upon bat species, as illumination can impact upon their roosting sites, commuting routes and foraging areas. While some bat species, such as Leisler's bats (*Nyctalus leisleri*), may take advantage of prey concentrating around light sources, other bat species are sensitive to lighting and will avoid artificially lit up areas. This can potentially sever commuting and foraging routes. As noted above, construction works are not anticipated to be conducted outside of normal working hours, which would considerably reduce the potential impacts upon bat species. However, measures with regards artificial lighting, as outlined in Section 9.8.1, would be required to be implemented to reduce the potential impact of light pollution.

9.7.3 OPERATIONAL PHASE

Designated Sites – SAC and SPA Sites

The potential impacts of the proposed development upon designated sites due to land-take is discussed in Section 9.7.2. As the development site does not directly impinge upon any part of a European site, no in-situ effects upon designated sites are expected due to loss or destruction of habitat, fragmentation of habitat, disturbance of habitat or direct reduction in species density.

As the proposed development site is located in close proximity to a number of sites designated for wildfowl, in addition to the River Shannon Callows SAC which is designated for otter, ex-situ impacts due to the proposed development could occur.

As outlined in the NIS and Section 9.7.2 above, it is not considered that there would be any potential adverse impacts upon the qualifying interest otter, or upon the special conservation interest wildfowl, due to a change in land-use at the development site. The proposed ICW system would be considered to benefit otter and wildfowl in the area by providing a wetland habitat which would also potentially provide foraging opportunities.

It is not envisaged that protected species would be adversely impacted upon by the proposed development due to noise generated by the proposed facility or by noise generated from the associated site traffic, given the nature of the proposed development and the distances to the designated sites (with the nearest site with designated fauna, All Saints Bog SPA, located approximately 2.4km from the development site).

It is not considered that the operational phase of the development would have the potential to adversely impact upon designated sites due to air emissions. As noted in the Odour, Air Quality and Greenhouse Gas Assessment report (Attachment 5.1) prepared for the proposed development, certain forms of atmospheric nitrogen and their deposition into the environment can potentially impact upon the biodiversity of European sites. However, the report concludes that ground-level concentrations of NO_2 due to the proposed development, in addition to ambient background levels, are predicted to comply with the criteria levels at all sensitive receptors, while ground-level concentrations of ammonia due to the proposed development are below the relevant criteria at European sites located within the vicinity of the development.

During the operational phase, final treated effluent and stormwater from the proposed development would be directed to the Feeghroe Stream. Therefore, during the operational phase, the development would be hydrologically linked to the River Shannon Callows SAC and Middle Shannon Callows SPA, both of which are located approximately 4km downstream of the site.

Both All Saints Bog and Esker SAC and All Saints Bog SPA were identified as Groundwater Dependant Terrestrial Ecosystems (GWDTE) sites, as discussed in Section 11. According to the EPA GIS Portal, the proposed development is mapped as a Groundwater in SAC Habitats as listed on the WFD Register of Protected Areas. While the SAC and SPA are located approximately 2.4km south-west of the proposed development, where a large scale groundwater abstraction is planned, it is unlikely that any measurable impact would occur to these sites by virtue of distance (2.4km).

It is not considered that the proposed development has the potential to adversely impact upon the remainder of the SAC and SPA sites within the zone of influence due to a potential deterioration in water quality, as the remainder of the sites are located either upstream of the proposed drainage for the site, or are located a considerable distance downstream.

There would be no anticipated impacts upon the River Shannon Callows SAC and Middle Shannon Callows SPA due to stormwater discharges from the site. Stormwater from the proposed development would comprise of clean rainwater run-off from clean-yard areas and car parking areas, and would be directed to a silt trap and Class 1 By-Pass Separator before being directed to a modular underground attenuation system.

The primary potential impact upon the River Shannon Callows SAC and Middle Shannon Callows SPA during the operational phase of the proposed development would be a deterioration in water quality arising from the proposed discharge of final treated effluent to the Feeghroe Stream.

As briefly discussed in Section 2.4, and outlined in detail in Section 10, the proposed treated effluent emission values have been calculated based upon the current water quality in the

Feeghroe Stream and the stream's assimilative capacity. The assimilative capacity assessment concluded that the proposed discharge of 250m^3 per day would not, in and of itself, result in the Feeghroe Stream failing to achieve good status. While it is considered that the proposed discharge of final treated effluent to the Feeghroe Stream would not have any significant impacts upon the River Shannon Callows SAC or Middle Shannon Callows SPA, measures would need to be implemented to ensure that the proposed final treated effluent meets the proposed emission limit values. These measures are included in Section 10.7.

Should effluent sludge, lairage sludge and belly paunch be directed for landspreading as use as organic fertiliser, the proposed development could result in a potential impact upon the biodiversity of designated sites, either through pollution of waterbodies or the enrichment of natural vegetation. However, should sludges and belly paunch be directed for landspreading, they would be collected by a registered contractor / farmer, for application to lands held by third parties in the area. It would be a legal requirement that the transport and spreading of sludges / belly paunch would be managed in compliance with the Nitrates Regulations (S.I. No. 605 of 2017). The regulations provide for controls designed to protect groundwater and surface water from impacts due to the application of fertiliser on agricultural lands. Acceptable spreading times are limited, prohibitions on weather and ground conditions are defined and set back distances from waterbodies and wells/springs and limitations for areas of extreme groundwater vulnerability are established.

The spreading of sludges / belly paunch would be undertaken in accordance with the setback distances from surface waterbodies and abstraction points specified in the Nitrates Regulations. This would minimise the risk of any pollution occurring and protected sites being impacted due to the spreading of organic fertilisers. As effluent sludge, lairage sludge and belly paunch from the development would be a replacement for other chemical and organic fertilisers on any future potential spreadlands, it is considered that the impact of sludges / belly paunch being used as a fertiliser would have a neutral to no significant additional impact upon the biodiversity of landspreading areas.

Designated Sites – NHA Sites

The proposed development does not directly impinge on the River Little Brosna NHA site, and therefore would not be expected to have any in-situ effects through loss or destruction of habitat, fragmentation of habitat, disturbance of habitat or direct reduction in species density.

As noted in the previous section, it is not considered that there would be any potential adverse impacts upon wildfowl due to land-use change at the development site.

It is not considered that the proposed development has the potential to impact upon wildfowl of the NHA site due to operational noise, given the nature of the proposed development and the distance to the River Little Brosna NHA site (approximately 4.3km south-west of the proposed site).

As noted in the previous section, it is not considered that the operational phase of the development would have the potential to adversely impact upon designated sites due to air emissions. The Odour, Air Quality and Greenhouse Gas Assessment (Attachment 5.1) notes that ground-level concentrations of NO_2 due to the proposed development are predicted to comply with the criteria levels at all sensitive receptors, while ground-level concentrations of

ammonia are below the relevant criteria at European sites located within the vicinity of the development.

The proposed development site is not hydrologically connected to the River Little Brosna Callows NHA. Therefore, the proposed development would not have the potential to impact upon the NHA due to a potential deterioration in water quality.

Should sludges and belly paunch generated by the proposed development be directed for landspreading, they would be landspread in accordance with the Nitrates Regulations, as discussed in further detail within the NIS and Section 10.

Habitats and Flora

The proposed extension to the existing abattoir and associated ancillary development would result in a change of habitat use a the development site, resulting in a loss of improved agricultural grassland (GA1), recolonising bare ground (ED3), hedgerows (WL1) and drainage ditches (FW4) to buildings and artificial surfaces (BL3), and potential scattered trees and parkland (WD5), ornamental / non-native shrub (WS3) and flower beds and borders (BC4) habitats associated with the proposed site landscaping.

In addition to the above, a loss of improved agricultural grassland (GA1), wet grassland (GS4), recolonising bare ground (ED3), hedgerows (WL1), bog woodland (WN7) and drainage ditches (FW4) would occur to other artificial lakes and ponds (FL8) habitat and limited sections (comprising of access roads to the ICW system) of buildings and artificial surfaces (BL3) habitat.

The loss of GA1, ED3 and FW4 habitats would not be considered significant, given that these habitats can be considered modified and of low ecological value. While there would be a loss of areas of habitat of local importance (higher value), including WL1, GS4 and WN7, this would not be considered as significant, given that the majority of these habitats would be replaced by a habitat of local importance (higher value), other artificial lakes and ponds (FL8) habitat, which would add ecological value to the development site.

As noted in Section 9.7.2, while the proposed development would result in a loss of approximately 985m of hedgerow, approximately 400m of hedgerow along the southern site boundary and 115m of hedgerow along the eastern boundary of the ICW system would be replanted with native species. The potential impact of hedgerow removal would be further reduced, given that approximately 2,500 native trees common to the area would be planted within Cell 5 of the ICW system. Furthermore, as outlined in the landscaping plan for the proposed development, existing hedgerows and treelines would be bolstered with native tree species where required, and a section of new woodland planting is proposed adjacent to the internal site access to the rear yard. Therefore, the potential impact upon flora and habitats due to hedgerow removal would not be considered significant.

Fauna and Avifauna

The alteration in habitat type at the site due to the proposed development would not be anticipated to have a significant impact upon the fauna of the area. The majority of the land take comprises of modified habitats of low ecological value (GA1, ED3 and FW4). Furthermore, the majority of the land take of habitats of higher ecological value (GS4, WN7

and WL1) would be to facilitate the ICW system, which, given its wetland habitat and considerable proposed planting scheme, would add ecological value to the development site, as discussed in Section 9.7.2.

The loss of sections of hedgerow and bog woodland habitat may result in a displacement of fauna, however, this would not be considered to have a significant impact upon fauna given that the proposed ICW system would incorporate considerable planting of native plants and trees, a 400m hedgerow section would be replanted with native species along the southern site boundary and a 115m hedgerow section would be replanted along the eastern boundary of the ICW system, and given that the proposed landscaping plan for the development site includes for the bolstering of existing hedgerows / treelines with native tree species where required and the proposed planting of new woodland adjacent the internal site access to the rear yard area, which would provide considerable areas of replacement habitat.

It is not envisaged that fauna would be significantly impacted upon by the proposed development due to noise generated by the proposed facility or by noise generated from the associated site traffic. The potential generation of noise has been considered in the design of the facility, for example the equipment with the greatest potential for noise generation, compressors and boilers, would be stored internally and the equipment sourced for the facility would be modern and of low noise generation. A noise management plan would be put in place for the development to ensure minimal noise pollution outside the site boundary, which would include measures such as a "closed door" policy and the regular maintenance of equipment.

The potential impact upon fauna due to a deterioration in water quality is discussed in Section 10.

Bats

Operational phase impacts on bats would be associated with permanent lighting associated with the existing slaughtering facility and new proposed development, including the carpark, yard areas and internal road network. No lighting is proposed for the ICW system. As noted in Section 9.7.2, artificial lighting can potentially impact upon bat roosting sites, commuting routes and foraging areas. In the absence of mitigation measures, operational lighting has the potential to result in an adverse impact upon bat species. Therefore, measures with regards artificial lighting, as outlined in Section 9.8.2, would be required to be implemented.

The operational phase of developments can result in an increase in human activity, which can potentially impact upon bat species due to increased noise and increased traffic. However, it is not considered that the proposed development would have a significant impact upon bat species, given that the majority of all slaughtering, boning and packaging activities would be during day-time hours (7am to 5pm), with only cleaning activities occurring after 5pm (5pm to 10pm). As it is anticipated that approximately ten cleaning staff would be employed, the associated noise and traffic movements would be minimal.

9.7.4 CUMULATIVE IMPACT

Considering the nature of the development and the surrounding agricultural landuse, it is considered that the main potential cumulative impact upon biodiversity would be a deterioration in water quality resulting in an impact upon aquatic flora and fauna species and / or loss or fragmentation of natural habitat.

Potential impacts arising from the development in relation to aquatic biodiversity are discussed in Section 10.

With regards potential habitat loss or fragmentation of habitat, the proposed development is not anticipated to result in a significant impact upon habitat loss / fragmentation during either the construction or operational phases, given that the majority of the land take would comprise of modified habitats of low ecological value, the construction of the ICW system would add ecological value to the proposed site and given that the landscaping plan includes for native tree and shrub planting. Therefore, there would be no cumulative habitat loss or fragmentation impacts which could pose a significant risk to biodiversity.

Another potential cumulative impact upon biodiversity during the operational phase would be the generation of noise emissions, particularly with the location of Meenwaun Wind Farm in close proximity to the site. However, it is considered that there would be no significant impact upon biodiversity due to noise generated by the proposed facility or by noise generated from associated site traffic, which could result in a cumulative impact with Meenwaun Wind Farm, given that the potential generation of noise has been considered in the design of the facility and given that a noise management plan would be put in place for the development (details are provided in Section 9.7.3 above).

9.7.5 "DO-NOTHING" IMPACT

Should the development not be built, there would be no change to the environmental impacts of the existing site. The lands would likely be continued to be used for agricultural purposes, while the existing facility and associated structures would either remain derelict or would be put into use once more in its current condition. Given that the majority of the proposed development site is comprised of either habitats of low ecological value or habitats which can be considered as modified, it is unlikely that the proposed site would be of significant ecological value in the future.

9.7.6 POTENTIAL IMPACTS PRE-MITIGATION

Table 9.18 below provides a summary of the potential impacts of the proposed development pre-mitigation, during the construction and operational phases.

Table 9.18: Summary of Predicted Impacts Pre-Mitigation

IMPACT	DEVELOPMENT PHASE	DIRECT / INDIRECT	LIKELIHOOD	DURATION	REVERSIBLE	SIGNIFICANCE	IMPACT TYPE
Habitat Loss	Construction & Operational	Direct	Certain	Permanent	No	Slight to Moderate significance	Negative
Introduction of Invasive Flora Species	Construction	Direct	Unlikely	Temporary	Yes	Slight significance	Negative
Fauna Disturbance	Construction	Indirect	Possible	Temporary	Yes	Slight significance	Negative
	Operational	Indirect	Unlikely	Permanent	Yes	Not significant	Neutral
Fauna Mortality	Construction	Direct	Dependent upon timing of works relevant to breeding season	Permanent	No	Moderate significance	Negative
Bats – Disturbance / Severance of Habitat	Construction	Direct & Indirect	Certain	Temporary	Yes	Adverse significance	Negative
	Operational	Indirect	Certain	Permanent	Yes	Adverse significance	Negative
Designated Sites	Construction	Indirect	Possible	Temporary	Yes	Moderate significance	Negative
	Operational	Indirect	Possible	Permanent	Yes	Slight to moderate significance	Negative

9.8 MITIGATION MEASURES

9.8.1 CONSTRUCTION PHASE

The mitigation measures outlined below would be implemented to ensure there is no significant impact upon the biodiversity of the area and designated sites during the construction phase of the development. These measures have also been incorporated into the Construction Environmental Management Plan, which has been prepared for the project. Mitigation measures for the protection of water quality are included in Section 10.7.

General Mitigation Measures

- All construction works would be confined as far as possible to the development footprint;
- All plant machinery and equipment would be maintained in good working order and regularly inspected;
- Where possible, no construction works would be conducted outside of normal working hours;
- The construction work contractor would prepare a detailed Construction Environmental Management Plan (CEMP) for all construction activities, in line with the outline CEMP prepared as part of this application. The CEMP would describe how construction work would be undertaken in an environmentally sensitive manner and would include measures for the protection of water quality.

Habitats and Flora

- Regular site inspections would be undertaken to ensure that no growth of invasive species has taken place;
- The construction works contractor would ensure that all equipment and plant is inspected for the presence of invasive species and thoroughly washed prior to arriving to the development site. All construction plant would pass through a wheel-wash system prior to entering or leaving the development site;
- All relevant construction personnel would be trained in invasive flora species (main species of concern, including Japanese Knotweed) identification and control measures;
- In the event of any invasive species listed in Part 1 of the Third Schedule appearing onsite, works within the immediate vicinity would cease until the invasive plant has been appropriately treated and disposed of, in accordance with Regulation 49 of the European Communities (Birds and Natural Habitats) Regulations 2011;
- Cognisance would be taken of National Roads Authority's Guidelines on "*The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads*";
- Excavated soil during earth-moving activities and excavations would be segregated into subsoil and topsoil and reused in reinstatement and landscaping activities. Where possible, natural recolonisation would be allowed to take place;

- The ICW system would be planted with a considerable number of native emergent species, with approximately 2,500 native tree species to be planted within Cell 5;
- A 400m section of the southern site boundary and a 115m section of the eastern boundary of the ICW system would be replanted, using native flora species including Hawthorn, Blackthorn and Ash;
- The landscaping plan for the development site would include the bolstering of existing hedgerows / treelines with native tree species where required, in addition to the proposed planting of a new woodland area, using native species, adjacent the internal site access to the rear yard area.

Fauna

- As a minimum, the construction work contractor would comply with all legislative provisions relating to hedgerow / tree removal and the protection of birds, and would have regard to reducing impacts on nesting birds;
- In instances where hedgerow / bog woodland removal is required during the bird nesting season, the sections required for removal would be inspected by a suitably qualified ecologist prior to any removal works for the presence of breeding birds. Where nests are present, the ecologist would make a decision as to whether a "Licence to interfere with or destroy the breeding places of any wild animals", is required from the NPWS. Alternatively, the ecologist may establish a suitable buffer zone around an active nest, with removal works rescheduled until chicks have fledged. Where no evidence of nests are found during inspection, hedgerow / bog woodland removal works must be undertaken within three days of inspection;
- Should a protected fauna species such as badger or the common frog be found during the construction phase of the project, an officer of the NPWS would be notified prior to the resumption of construction works;
- Replacement habitat would be created via the construction of the ICW system, the replanting of a 400m hedgerow section along the southern site boundary and a 115m section along the eastern boundary of the ICW system using native species, the proposed bolstering of existing hedgerows / treelines with native tree species where required, and the proposed planting of a new woodland area, using native species, adjacent the internal site access to the rear yard area;
- To reduce the potential for disturbance due to noise, all plant and machinery would be maintained in good working order and regularly inspected, where possible vehicles would be equipped with mufflers to suppress noise and where possible, no construction works would be conducted outside of normal working hours.

Bats

Habitat Loss

- Replacement habitat would be created via the construction of the ICW system, including the planting of approximately 2,500 native trees within Cell 5, the replanting of a 400m hedgerow section along the southern site boundary and a 115m section along the eastern boundary of the ICW system using native species, the

proposed bolstering of existing hedgerows / treelines with native tree species where required, and the proposed planting of a new woodland area, using native species, adjacent the internal site access to the rear yard area.

Loss of Potential Roosts

- The four mature trees scheduled for removal, which have been assessed as having a moderate bat roost potential due to dense ivy cover, would be re-assessed by a suitably qualified ecologist prior to felling, or alternatively, would be soft-felled under supervision of a suitably qualified ecologist;
- Ivy on the four mature trees scheduled for removal would be cut in advance of re-assessment / soft-felling, to enable the ecologist to adequately assess the trees for any previously hidden potential roost features. Should potential roost features be identified, the ecologist would advise if further survey work would be required.

Artificial Lighting

- Construction works in the hours of darkness, when bats are active (April – October), would be kept to a minimum;
- Lighting of hedgerows, treelines and bog woodland would be avoided where possible;
- Should lighting be required during construction works, it would be of a low height (without compromising safe working conditions) to ensure minimal light spill. Where possible and where practicable to do so, timers or motion sensors would be used;
- Directional lighting would be used where possible, by use of louvres or shields fitted to the lighting;
- White light emitting diode (LED) would be used where possible, which is considered to be low impact in comparison to other lighting types.

9.8.2 OPERATIONAL PHASE

The design and operational measures outlined below would be implemented to ensure there is no significant impact upon the biodiversity of the area and designated sites during the operational phase of the development. Potential impacts upon biodiversity and European sites due to a potential deterioration in water quality are discussed in Section 10.

General Mitigation Measures

- Good housekeeping practices would be observed throughout the site during the operational phase;
- The proposed facility would prepare and put in place a documented Environmental Management System;
- The site would ensure that any fuels, oils or chemicals would be stored in accordance with the EPA guidance on the storage of materials, in designated, bunded areas, with adequate bund provision to contain 110% of the largest drum volume or 25% of the

total volume of containers. Bunds and bunded areas would undergo integrity testing every three years, as is best practice;

- The site would ensure that an adequate supply of spill clean-up material is readily available, in the event of any spillages onsite, thereby minimising the potential for spills / leaks to impact upon the biodiversity of the area;
- Rodent populations would be controlled by a combination of rodenticide (managed by an appointed pest control contractor), high spec buildings and good housekeeping;
- Native flora species would be incorporated in the landscaping plan as much as possible.

Bats

The lighting design for the proposed development would be finalised at the detailed design stage. The lighting design would take cognisance of the following mitigation measures:

- Lighting would be directed to where it is required only;
- Lighting of hedgerows, treelines and bog woodland would be avoided where possible;
- Building, carpark and site entrance lighting would be angled away from hedgerows, treelines and bog woodland;
- Lighting would be of low height where possible, to minimise light spill;
- Where possible and practicable to do so, timers or motion sensors would be used;
- White LED or amber coloured LED outdoor lighting would be used where possible, which is considered to be low impact in comparison to other lighting types.

9.8.3 "WORST CASE" SCENARIO

If the proposed development proceeded without the mitigation measures outlined in Section 9.8.1 and 9.8.2, there would be a potential adverse impact upon bat species due to the removal of commuting and foraging habitat, in addition to lighting impacts during the construction phase. There would also be a potential moderate impact upon fauna, should vegetation clearance be undertaken during the mammal and bird breeding season. However, this is unlikely to occur, given that there are legal restrictions under the Wildlife Act 1976 as amended, with regards the removal of vegetation from uncultivated land.

In the absence of mitigation measures, such as replacement hedgerow planting and native tree planting as part of landscaping, habitat loss due to the proposed development has the potential to have a slight to moderate impact upon biodiversity. However, the potential impact would be reduced, given that a proportion of the habitat loss would be to facilitate the ICW system, which would be considered to add ecological value to the site, providing wetland habitats for aquatic invertebrates, marginal and aquatic vegetation, amphibians and a range of breeding and wintering wildfowl. Furthermore, the ICW system, once established, would likely provide cover and foraging opportunities for fauna.

During construction works, there would be potential to inadvertently introduce invasive species to the area. However, even in the absence of mitigation measures, this would be

considered unlikely given that delivery of materials would be inspected prior to removal from the site of origin. Where invasive species are confirmed, the loads would be required to be adequately treated or disposed of appropriately and therefore, would not be transported to the proposed development site.

9.9 PREDICTED IMPACTS WITH MITIGATION

The following table provides a summary of the residual effects the proposed development may have, once recommended mitigation measures are implemented. It is not envisaged that there would be any considerable adverse impacts upon biodiversity due to the proposed development.

Table 9.19: Summary of Residual Impacts Post-Mitigation

IMPACT	DEVELOPMENT PHASE	SIGNIFICANCE	MITIGATION MEASURES	RESIDUAL SIGNIFICANCE	RESIDUAL IMPACT TYPE
Habitat Loss	Construction & Operational	Slight to moderate significance	• Excavated soils would be segregated into subsoil and topsoil, and reused in reinstatement and landscaping works. Where possible, natural recolonisation would be allowed to take place • The ICWs would be planted with a native emergent species, with Cell 5 planted with approximately 2,500 native tree species • A 400m section of the southern boundary and 115m section of the eastern boundary of the ICW system would be replanted using native species • The landscaping plan for the development site would include the bolstering of existing hedgerows / treelines with native species and the planting of a new woodland area using native species adjacent the internal site access to the rear yard area.	Not significant	Neutral
Introduction of Invasive Flora Species	Construction	Slight significance	• Construction plant would be inspected and washed prior to arriving onsite • Construction plant would pass through a wheel-wash system prior to entering/leaving the development site • Regular site inspections for the presence of invasive species would be undertaken • Should invasive species appear onsite, works would immediately cease until the plant was appropriately treated and disposed of	Not significant	Neutral
Fauna	Construction	Slight	• Where possible, no construction works would be	Slight	Minor

IMPACT	DEVELOPMENT PHASE	SIGNIFICANCE	MITIGATION MEASURES	RESIDUAL SIGNIFICANCE	RESIDUAL IMPACT TYPE
Disturbance		significance	conducted outside of normal working hours • All plant machinery and equipment would be maintained in good working order and regularly inspected • Where possible, vehicles would be equipped with mufflers to suppress noise • As a minimum, the construction work contractor would comply with all legislative provisions relating to hedgerow / tree removal • Should a protected fauna species be found during the construction phase, the NPWS would be notified prior to the resumption of construction works	significance	Negative
	Operational	Not significant	None required	Not significant	Neutral
Fauna Mortality	Construction	Moderate significance	• As a minimum, the construction work contractor would comply with all legislative provisions relating to hedgerow / tree removal • Where hedgerow removal works are required during the bird nesting season (1st March to 31st August), the sections for removal would be inspected by an ecologist for the presence of breeding birds. Where nests are present, a decision would be made as to whether a licence is required from the NPWS, or whether a suitable buffer zone could be established around the active nest with removal works rescheduled until chicks have fledged	Slight significance	Minor Negative
Bats – Disturbance / Severance of	Construction	Adverse significance	• Replacement habitat would be created via the construction of the ICW system, including the planting of approximately 2,500 native trees	Not significant	Neutral

IMPACT	DEVELOPMENT PHASE	SIGNIFICANCE	MITIGATION MEASURES	RESIDUAL SIGNIFICANCE	RESIDUAL IMPACT TYPE
Habitat			within Cell 5, the replanting of a 400m hedgerow section along the southern site boundary and a 115m section of the eastern boundary of the ICW system using native species, the proposed bolstering of existing hedgerows / treelines with native tree species where required, and the proposed planting of a new woodland area, using native species, adjacent the internal site access to the rear yard area • Trees classed as having moderate potential to support a bat roost would be re-assessed by a qualified ecologist prior to felling or soft-felled under supervision of a qualified ecologist. Ivy would be cut in advance of re-assessment / soft-felling, to enable an assessment for potential roost features which may be obscured due to ivy cover • Measures would be implemented to reduce the potential for light pollution • Construction works in the hours of darkness would be kept to a minimum		
	Operational	Adverse significance	• Lighting design measures would be implemented to reduce the potential for light pollution	Not significant	Neutral
Designated Sites	Construction	Moderate significance	• Mitigation measures are outlined in Section 10	Not significant	Neutral
	Operational	Slight to moderate significance	• Mitigation measures are outlined in Section 10	Not significant	Neutral

9.10 DIFFICULTIES ENCOUNTERED IN COMPILING INFORMATION

Survey limitations are discussed in detail in Section 9.3.4. No other difficulties were encountered in compiling this chapter.

9.11 REFERENCES

Averis, B. (2013) *Plants and Habitats: An introduction to common plants and their habitats in Britain and Ireland*. United Kingdom: Swallowtail Print Ltd.

Bat Conservation Ireland (2010) *Bats & Lighting: Guidance Notes for Planners, Engineers, Architects and Developers*.

Bat Conservation Trust (2018) *Bats and artificial lighting in the UK. Bats and the Built Environment series*. Guidance Note 08/18.

Bibby, C., Jones, M. and Marsden, S. (2000) "Expedition Field Techniques: Bird Surveys".

Botanical Society of Britain and Ireland flora distribution maps, available at: https://bsbi.org/maps

Brown, A.F. and Shepherd, K.B. (1993) A method for censusing upland breeding waders. *Bird Study*, 40(3), pp. 189-195.

Byrne, A., Moorkens, E.A., Anderson, R., Killeen, I.J. & Regan, E.C. (2009) *Ireland Red List No. 2 – Non Marine Molluscs*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

Chartered Institute of Ecology and Environmental Management (2016) *Guidelines for Ecological Impact Assessment in the UK and Ireland*.

Colhoun, K. and Cummins, S. (2013) Birds of Conservation Concern in Ireland 2014-2019, *Irish Birds*, 9, pp. 523-544.

Collins, J. (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn.). The Bat Conservation Trust.

Council Directive (EC) 2009/147/EC of 30 November 2009 on the conservation of wild birds.

Council Directive (EC) 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

Council Directive (EC) 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy – more commonly known as the Water Framework Directive.

Curtis, T.G.F. and McGough, H.N. (1988) *The Irish Red Data Book 1 Vascular Plants*. Wildlife Service Ireland.

Department of Culture, Heritage and the Gaeltacht (2017) *National Biodiversity Action Plan 2017-2021*.

Devlin, Z. (2014) *Wildflowers of Ireland: A Field Guide*. Cork: Collins Press.

DoEHLG (2009) *Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities*.

Environment DG, European Commission (2002) *Assessment of plans and projects significantly affecting Natura 2000 sites - Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*.

Environmental Protection Agency (2017) Draft. *Guidelines on the information to be contained in Environmental Impact Assessment Reports*.

Environmental Protection Agency (2015) Draft. *Advice Notes for Preparing Environmental Impact Statements*.

Environmental Protection Agency Licence public access information, Available at: http://www.epa.ie/licensing/iedipcse/

Environmental Protection Agency Envision Online Mapping, Available at: http://gis.epa.ie/Envision/

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

Gregory, R.D., Gibbons, D.W. and Donald, P.F. (2004) Bird census and survey techniques. *Bird Ecology and Conservation*, pp.17-56. United States: Oxford University Press.

Hundt, L. (2012) *Bat Surveys: Good Practice Guidelines, 2nd edition*. Bat Conservation Trust.

Inland Fisheries Ireland (2016). *Guidelines on Protection of Fisheries During Construction Works in and adjacent to Waters.*

Johnson, O. and More, D. (2006) *Collins Tree Guide: The Most Complete Field Guide to the Trees of Britain and Europe.* London: HarperCollins Publishers.

Kelleher, C. and Marnell, F. (2006) Bat Mitigation Guidelines for Ireland. *Irish Wildlife Manuals*, No. 25. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

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

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

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

Midland Regional Authority (2010) *Regional Planning Guidelines for the Midland Region 2010 – 2022*.

National Parks & Wildlife Service, Available at: http://www.npws.ie/protected-sites

National Roads Authority (2010) *The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads.*

National Roads Authority (2009) *Guidelines for Assessment of Ecological Impacts of National Road Schemes.*

National Roads Authority (2009) *Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*.

National Roads Authority (2006a) *Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes.*

National Roads Authority (2006b) *Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes.*

National Roads Authority (2006c) *Guidelines for the Treatment of Bats during the Construction of National Road Schemes.*

National Roads Authority (2006d) *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes.*

NPWS (2018) *Conservation Objectives: All Saints Bog SPA 004103*. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2018) *Conservation Objectives: Dovegrove Callows SPA 004137*. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2018) *Conservation Objectives: Middle Shannon Callows SPA 004096*. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2018) *Conservation Objectives: River Little Brosna Callows SPA 004086*. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2018) *Conservation Objectives: River Shannon Callows SAC 000216*. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2018) *Conservation Objectives: River Suck Callows SPA 004097*. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2016) *Conservation Objectives: All Saints Bog and Esker SAC 000566*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2015) *Conservation Objectives: Redwood Bog SAC 002353*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2014) *Site Synopsis: Redwood Bog SAC 002353.* National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2014) *Site Synopsis: River Little Brosna Callows SPA 004086.* National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2014) *Site Synopsis: River Suck Callows SPA 004097.* National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013) *Site Synopsis: All Saints Bog and Esker SAC 000566.* National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013) *Site Synopsis: River Shannon Callows SAC 000216.* National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013a) *The Status of Protected EU Habitats and Species in Ireland*. Volume 1. Unpublished Report, National Parks and Wildlife Services, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013b) *The Status of EU Protected Habitats and Species in Ireland.* Habitats Assessments Volume 2. Version 1.0. Unpublished report. National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin.

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

NPWS (2012) *Site Synopsis: All Saints Bog SPA 004103.* National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2012) *Site Synopsis: Middle Shannon Callows SPA 004096.* National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2011) *Site Synopsis: Dovegrove Callows SPA 004137.* National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2002) *Site Synopsis: River Little Brosna Callows NHA 000564.* National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government.

Offaly County Council (2014) *Offaly County Development Plan 2014 – 2020*. Available at: https://www.offaly.ie/eng/Services/Planning/Development-Plans/County-Development-Plan-2014-2020/

Parnell, J. and Curtis, T. (2012) *Webb's An Irish Flora*. Cork: Cork University Press.

Regan, E.C., Nelson, B., Aldwell, B., Bertrand, C., Bond, K., Harding, J., Nash, D., Nixon, D., & Wilson, C.J. (2010) *Ireland Red List No. 4 – Butterflies*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Ireland.

Reid, N., Hayden, B., Lundy, M.G., Pietravalle, S., McDonald, R.A. & Montgomery, W.I. (2013) National Otter Survey of Ireland 2010/12. *Irish Wildlife Manuals*, No. 76. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Roche, N., Aughney, T., Marnell, F. and Lundy, M. (2014) *Irish Bats in the 21st Century*. Cavan, Ireland: Bat Conservation Ireland.

Rose, F. (2006) *The Wildflower Key: How to identify wild flowers, trees and shrubs in Britain and Ireland*. China: Frederick Warne & Co.

Smith, G.F., O'Donoghue, P., O'Hora, K. and Delaney, E. (2011) *Best Practice Guidance for habitat survey and mapping*. The Heritage Council, Kilkenny. Available at: www.heritagecouncil.ie/wildlife/publications/

Strachan, R. (2010) *The Mammal Detective*. Cambridge: Whittet Books Ltd.

Sutherland, W.J. (Ed.). (2006) *Ecological Census Techniques*. United Kingdom: Cambridge University Press.

Wheater, C.P., Bell, J.R. and Cook, P.A. (2011) *Practical Field Ecology: A Project Guide.* John Wiley & Sons.

Wyse Jackson, M., FitzPatrick, Ú., Cole, E., Jebb, M., McFerran, D., Sheehy Skeffington, M. & Wright, M. (2016) *Ireland Red List No. 10: Vascular Plants*. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin, Ireland.

10.0 WATER QUALITY & AQUATIC BIODIVERSITY

10.1 INTRODUCTION

The abundant supplies of surface and groundwater within Ireland dictate the importance of measures to protect the aquatic environment. This section outlines the aquatic environment currently present in the area and assesses the impact of the proposed development.

This section should be read in conjunction with the site layout plans for the proposed development and the project description sections of the EIAR. Risks to the aquatic environment were considered during the design of the proposed development and mitigation measures have been proposed where feasible.

10.2 LEGISLATIVE FRAMEWORK AND PLANNING POLICY

10.2.1 LEGISLATIVE CONTEXT

The main legislation pertaining to aquatic biodiversity and nature conservation in Ireland is briefly outlined below.

The Local Government (Water Pollution) Act, 1977, as Amended

This Act provides for the control of water pollution, by prohibiting the discharge of un-licenced polluting matter into waters.

European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (S.I. 272 of 2009)

The regulations give statutory effect to Directive 2008/105/EC and provide legal status to quality objectives for all surface waters and environmental quality standards for pollutants. The regulations allow for the classification of surface waters by the Environmental Protection Agency (EPA) in accordance with the ecological objectives approach of the Water Framework Directive. The regulations also provide for the establishment of inventories of priority substances by the EPA and the preparation of pollution reduction plans.

The Fisheries (Consolidation) Act, 1959, as Amended

The Act prohibits the entry of polluting substances into waters which have the potential to adversely impact upon fish, prohibits the obstruction of passage of certain fish species and provides legal protection to the spawn/fry of eels, salmon and trout, in addition to their spawning or nursery grounds.

Fisheries (Amendment) Act, 1999

This Act outlines the responsibilities of the Regional Fisheries Board to ensure the protection and conservation of fish and their habitats within its area of jurisdiction.

European Communities (Quality of Salmonid Waters) Regulations, 1988 (S.I. 293 of 1988)

These regulations give statutory effect to Directive 78/659/EEC. The regulations designate salmonid waters, specify the quality standards for designated salmonid waters and outline the monitoring requirements.

Water Framework Directive (2000/60/EC)

The Water Framework Directive (WFD) aims to improve the water environment (including groundwater, rivers, lakes, estuaries and coastal waters) of E.U. Member States. The aim of the WFD is for Member States to achieve and maintain "good status" in all water bodies.

The Wildlife Act, 1976 and Wildlife (Amendment) Act, 2000

The Wildlife Act is the primary piece of Irish legislation providing for the protection and conservation of wildlife. Under the Amendment Act of 2000, the scope was broadened to include freshwater aquatic species, including the majority of fish. The Act provides for the control of specific activities which could adversely affect wildlife. Under the Wildlife Act, all bird species, 22 other fauna species and 86 flora species in Ireland are afforded protected status. The Wildlife Act, 1976 allows for the designation of specific areas of ecological value such as Statutory Nature Reserves and Refuges for Fauna. The Wildlife (Amendment) Act, 2000 provides for greater protection and conservation of wildlife and also provides for the designation and statutory protection of Natural Heritage Areas (NHA).

European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. 477 of 2011)

These regulations transpose the European Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Fauna and Flora (known as the "Habitats Directive") and the European Council Directive 2009/147/EC on the Conservation of Wild Birds (known as the "Birds Directive") into Irish Law. The regulations provide for the designation and protection of Natura 2000 sites comprising of Special Areas of Conservation (SAC) and Special Protection Areas (SPA). The regulations safeguard the SAC and SPA sites from developments with the potential to significantly impact upon them. Under the Habitats Directive, a number of Annex I habitats are aquatic habitats, while Annex II species include Atlantic salmon, white-clawed crayfish and the three species (Brook, River and Sea) lamprey.

The Flora (Protection) Order, 2015 (S.I. 356 of 2015)

This order provides statutory protection to flora listed in Section 21 of the Wildlife Act, 1976 and Wildlife (Amendment) Act, 2000. Under the Order, it is illegal to wilfully cut, uproot or damage the listed species or interfere in any way with their habitats. The Flora (Protection) Order includes aquatic species such Opposite-leaved Pondweed (*Groenlandia densa*) and Short-leaved Water-Starwort (*Callitriche truncata*).

Planning and Development Regulations, 2001 to 2018

These regulations transpose the requirements of Directive 2014/52/EU (and previous Directive 2011/52/EU) on the assessment of the effects of certain projects on the environment into planning law. Under these regulations, development plans must include mandatory objectives for the conservation of natural heritage and for the conservation of European sites.

10.2.2 PLANNING POLICIES

Regional Policies

The Regional Planning Guidelines (RPGs) for the Midland Region 2010-2022, which includes the counties of Laois, Offaly, Westmeath and Longford, outlines the long-term spatial planning strategy for the area. As part of the guidelines, a number of policies relating to aquatic biodiversity and relevant to the proposed development were outlined, as per Table 10.1 below.

Table 10.1: Regional Policies Relevant to Aquatic Biodiversity and the Proposed Development

STRATEGIC POLICY REFERENCE	POLICY
EP 5	Conserve and enhance the nature conservation resources of the waterways throughout the Midland Region, including the Shannon and Lough Ree.
EP 12	Promote the protection, conservation and enhancement of the region's biodiversity and natural and geological heritage. This includes wildlife (flora and fauna), Species protected under the Wildlife Acts and listed for strict protection on Annex IV of the Habitats Directive; and Wildlife corridors and stepping stones as envisaged under Article 10 of the Habitats Directive, habitats, sites with no statutory protection, proposed National Heritage Areas, landscapes and/or landscape features of importance to wildlife or which play a key role in the conservation and management of natural resources such as water.
EP 13	Facilitate the protection of sites designated in National and European legislation, and in other relevant International Conventions, Agreements and Processes. This includes sites designated or proposed to be designated as: Ramsar sites, Special Areas of Conservation, Special Protection Areas, National Heritage Areas, nature reserves, and refuges for flora or fauna.

Local Policies and Objectives

Local planning policies and objectives are detailed in the Offaly County Development Plan, 2014-2020. Policies and objectives relating to aquatic biodiversity and relevant to the proposed development are outlined in Table 10.2.

Table 10.2: Local Policies and Objectives Relevant to Aquatic Biodiversity and the Proposed Development

POLICY / OBJECTIVE REFERENCE	POLICY / OBJECTIVE
WSP-17	It is Council policy to limit and manage the permitted stormwater run-off from all new developments. The maximum permitted surface water outflow from any new development is to be restricted to that of a Greenfield site before any development took place unless otherwise agreed by the Environment & Water Services Section of Offaly County Council…

POLICY / OBJECTIVE REFERENCE	POLICY / OBJECTIVE
WSO-03	It is an objective of the Council to promote and comply with all environmental standards and objectives established for bodies of surface water, by the European Communities (Surface Waters) Regulations 2009 and to meet the requirements of the Water Framework Directive and River Basin District Management Plans' Programme of Measures.
EnvP-02	It is Council policy to comply with the provisions of the EU Water Framework Directive in order to fulfil obligations relating to water quality in the county and to implement the provisions of the River Basin Management Plans... To this end, the Council will continue to co-operate with other statutory authorities / agencies and stakeholders in the preparation and implementation of existing water quality monitoring and management plans and also implementation of River Basin District Management Plans. In the assessment of development proposals due regard shall be given to the requirements of the plans.
EnvP-24	It is policy of the Council that all planning applications whether for new development or redevelopment are required to make an assessment of the suitability of the proposed development for the incorporation of sustainable drainage systems and provide accordingly on site. All development sites will require the following: • The drainage system to be designed to accommodate all storm events up to and including the 1% AEP (1 in 100 year) event, with an appropriate allowance for climate change • A hierarchical approach should be applied to the SuDS used, in order of priority… • A hierarchical approach should be applied to the disposal of surface water from the site referencing in order of priority… • Where prevention, source control/infiltration cannot deal with all on-site site drainage, for both Greenfield and Brownfield sites, the development runoff volumes and peak flow rates leaving the site should be attenuated to the Greenfield discharge conditions… • Exceedance design measures to be applied to ensure that extreme events above the design standards of the system do not pose adverse impacts. A sequential approach should be applied to the site layout to specifically set aside appropriate location for SuDS. • SuDS should be designed for the lifetime of the development, with suitable provisions for likely future permitted and minor development.
EnvO-02	It is an objective of the Council to promote and comply with the Environmental standards and objectives established for: (i) Bodies of Surface water, by EC (Surface Water Regulations) 2009 and (ii) Groundwater, by the EC (Groundwater) Regulations 2010, of which standards and objectives are included in the River Basin Management Plans.
EnvO-03	It is an objective of the Council to Protect and preserve the quality of surface water, ground water and drinking water in the county through the relevant legislative provisions.
EnvO-07	It is an objective of the Council to protect the county's waters from pollution.
EnvO-08	It is an objective of the Council to issue and monitor, where appropriate, effluent licences for discharges to sewers and waterbodies.

POLICY / OBJECTIVE REFERENCE	POLICY / OBJECTIVE
NHP-01	It is Council policy to prohibit any development that would be harmful to or that would result in a significant deterioration of habitats and/or disturbance of species in a Special Protection Area (SPA), Special Area of Conservation (SAC) and candidate Special Area of Conservation (cSAC), Natural Heritage Area (NHA) and Proposed Natural Heritage Area (pNHA)…
NHP-02	It is the policy of the Council to ensure an Appropriate Assessment in accordance with Article 6(3) and Article 6(4) of the Habitats Directive, and in accordance with the Department of Environment, Heritage and Local Government Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities, 2009 and relevant EPA and European Commission guidance documents, is carried out in respect of any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect on a European site(s), either individually or in combination with other plans or projects, in view of the site's conservation objectives.
NHP-04	It is Council policy to ensure that development proposals are screened to determine whether they are likely to have a significant direct, indirect or cumulative effect on the integrity or conservation objectives of any European Site and, where significant effects are likely or uncertain, there will be a requirement for consultation with the relevant environmental authorities as part of any Habitats Directive Assessment that may be required.
NHP-08	It is Council policy to protect, conserve and enhance the county's biodiversity and natural heritage including wildlife (flora and fauna), habitats, landscapes and/or landscape features of importance to wildlife or which play a key role in the conservation and management of natural resources such as water.
NHP-11	It is Council policy to conserve, protect and enhance where possible wildlife habitats such as rivers, streams, canals, lakes, and associated wetlands including reed-beds and swamps, ponds, springs, bogs, fens, trees, woodlands and scrub, hedgerows and other boundary types such as stone walls and ditches which occur outside of designated areas providing a network of habitats and corridors essential for wildlife to flourish.
NHP-13	It is Council policy to protect riparian corridors by reserving land along their banks for ecological corridors and maintain them free from inappropriate development, where appropriate clear span structures will be promoted where fisheries exist, and culverting and/or realignment of streams will be discouraged…
NHP-24	It is Council policy to protect, conserve and enhance the county's biodiversity and natural heritage including wildlife (flora and fauna), habitats, landscapes and / or landscape features of importance to wildlife or which play a key role in the conservation and management of natural resources such as water.
NHO-01	It is an objective of the Council to ensure that any development proposal in the vicinity of, or affecting a designated site, complies with the provisions relating Appropriate Assessment and SEA requirements and the Council will consult with the appropriate statutory environmental authority in this regard.
NHO-02	It is an objective of the Council to conserve and protect the natural heritage of the county and to conserve and protect European and National designated sites within the county including Special Protection Areas (SPAs), Special Areas of Conservation (SACs), candidate Special Areas of Conservation (cSACs), Natural Heritage Areas (NHAs), Proposed Natural Heritage Areas (pNHAs), Ramsar Sites, Statutory Nature Reserves, Biogenetic Reserves and Wildfowl Sanctuaries.
NHO-03	It is an objective of the Council to protect, conserve and enhance the county's biodiversity and natural heritage and the principle of enhancement will be taken into account in the Development Management process. It is a particular objective to protect plants, animal species and habitats which have been identified by the Habitats Directive, Birds Directive, Wildlife Act and the Flora Protection Order.

10.3 METHODOLOGY

This chapter has been prepared in accordance with the following guidelines from the Environmental Protection Agency (EPA):

- Environmental Protection Agency (EPA). Guidelines on Information to be contained in Environmental Impact Statements (EPA, 2002).
- EPA (2017). Guidelines on the Information to be contained in Environmental Impact Assessment Reports, Draft 2017.

This section has been prepared following a desktop review, the undertaking of an assimilative capacity study, a field assessment by Mr. Martin O'Looney on the 24th September 2018 and a review of the Natura Impact Statement Report prepared for the proposed development following the outline of the NPWS Guidance document (DoEHLG, 2009) (Document Ref. PES_NIS_19_9201).

The objectives of the ecological assessment were as follows:

- To undertake a comprehensive desktop review of the aquatic habitats and species, in particular the Feeghroe Stream, within the vicinity of the proposed development;
- To assess the current water quality status of the Feeghroe Stream;
- To undertake a field assessment of the proposed development site and surroundings in the context of aquatic ecology;
- To assess the impact from the proposed discharge of treated effluent to the Feeghroe Stream;
- To determine and assess the potential impacts of the proposed development on aquatic habitats, flora and fauna;
- To propose mitigation measures for both the construction and operational phases of the development to reduce potential impacts upon aquatic flora and fauna.

10.3.1 DESKTOP REVIEW

The desktop review comprised gathering information pertaining to the Shannon and Rapemills watercourses and catchments, reviewing mapping sites and determining if notable aquatic species, including protected, rare or invasive, had previously been recorded for the watercourses in the vicinity of the proposed development. The desktop review also served to provide supporting documentation for the assimilative capacity assessment.

10.3.2 ASSIMILATIVE CAPACITY

An assimilative capacity assessment was conducted on the Feeghroe Stream to determine the risk of negative impacts from a potential future discharge of treated effluent from the Banagher facility.

For the purposes of this assessment, a candidate discharge location to the west of the facility (E203696, N213595) was used as this is the closest point of the Feeghroe Stream to the site.

Other tributaries in the vicinity of the Rapemills River, and the Rapemills River, itself were considered as part of scoping for this assessment, the Feeghroe Stream was chosen due to practicality.

The assimilative capacity assessment was used to predict the Feeghroe Stream's ability to accommodate a treated effluent discharge of BOD_5, COD, Orthophosphate, Nitrogen, Total Ammonia and Suspended Solids. The assessment concluded that proposed discharge would not, in and of itself, cause to Feeghroe Stream to fail to achieve good status. The assimilative capacity assessment is included as part of the planning application for this development (Document Ref. PES_AC_19_9201).

10.3.3 FIELD ASSESSMENT

A field assessment was undertaken on the 24th September 2018 by Mr. Martin O'Looney, BSc. of Panther Environmental Solutions Limited to examine the ecological context of the proposed development. This comprised a walkover of the proposed development at the Banagher Chilling Ltd site and the surrounding area, including the Feeghroe Stream and Rapemills River.

This included an assessment of the watercourses in the vicinity of the site and any associated aquatic flora and fauna.

10.4 CHARACTERISTICS OF THE EXISTING & PROPOSED DEVELOPMENT

The existing facility at Meenwaun was originally developed as an abattoir by the Lynch family in the 1990s and was acquired by Banagher Chilling Limited in 2018. The remainder of the site comprising of agricultural land, is located in the townland of Boheradurrow. The site is approximately 19.6 hectares in size and includes buildings, hardstanding areas, car parking areas, and seven agricultural fields.

The existing abattoir development is comprised of the following:

- Main building housing the slaughter hall, boning hall, cold room, loading area and amenities (including offices, locker rooms, kitchen and toilets);
- Lairage and holding pen areas;
- Offal skip shed;
- Septic tank and percolation area servicing staff facilities;
- Surface water tank;
- Wastewater treatment system, comprising of inlet sump and storage sump;
- Lorry-wash.

The proposed development would comprise of the refurbishment and extension of the existing abattoir on the site, to allow a maximum cattle slaughter rate of 140 per day. To achieve this, the existing slaughter line would be modified and lengthened within the existing abattoir building. The existing abattoir building would be extended to provide for additional cattle chills, processing rooms, waste-out rooms, offices and staff facilities, in addition to the

construction of a meat cutting, packing, blast freezing and cold storage facility with an output of approximately 40 tonnes per day.

Other facilities to be constructed would include the associated plant rooms, packaging storage, electrical sub-station, water treatment system and wastewater treatment plant (WWTP). The existing lairage would also be extended, and the livestock yard increased in size.

A detailed description of the development is provided in Section 2.0 of this EIAR report.

Run-off from "dirty" yard areas, process waters and sewage from staff welfare facilities would be directed to the site's new WWTP.

A discharge to surface water is included in the proposed development for this application for planning consent. A wastewater treatment plant would be constructed, comprising of primary, biological and tertiary treatment stages. The proposed effluent plant would discharge to an integrated constructed wetland (ICW) system, which would discharge to a manhole and the Feeghroe Stream.

Stormwater from clean-yard areas and car parking areas would pass through a silt trap and Class 1 By-Pass Separator before being directed to a modular underground attenuation system. From here, the stormwater would be pumped to the final manhole prior to discharge to the Feeghroe Stream.

The proposed effluent treatment process has been designed with the potential for a future discharge to surface water in mind. It should be noted that any such discharge in the future would be subject to an application for a Section 4 (discharge to waters) licence to Offaly County Council.

The proposed final treated effluent quality parameters are included in Table 10.3 below.

Table 10.3: Proposed Final Effluent Quality discharging to the Feeghroe Stream

PARAMETER	UNITS	PROPOSED DISCHARGE
Volume Flow	M^3/Day	250
pH	pH Units	6 - 9
BOD_5	mg/l O_2	5
COD	mg/l O_2	50
Orthophosphate	mg/l PO_4-P	0.2
Nitrogen	mg/l N	5
Total Ammonia	mg/l N	0.4
Suspended Solids	mg/l SS	20

An Assimilative Capacity Assessment (Reference: PES_AC_19_9201) has been prepared as part of the design of the proposed wastewater treatment process for the site, and is submitted as part of this planning application.

The following table summarises the existing background quality of the watercourse, the legislated limits and surface-water objectives downstream of the proposed discharge location, the proposed final effluent quality from the facility and the resultant concentration within the Feeghroe Stream at 95%ile (low flow) conditions due to a proposed discharge at 250 M^3/day.

Table 10.4: Assimilative Capacity of proposed discharge to the Feeghroe Stream

Parameter	Units	Background Quality	Legislated Quality	Proposed Discharge Quality	Predicted Levels Post Discharge (mg/l)	% Headroom Utilised
BOD_5	mg/l O_2	2.3	2.6	5.0	3.0	243.3%
Orthophosphate	mg/l PO_4-P	0.010	0.075	0.2	0.056	71.1%
Total Ammonia	mg/l N	0.43	0.14	0.4	0.43	N/A
Un-ionised Ammonia	*mg/l NH_3-N*	*0.0067*	*0.0164*	*0.0063*	*0.0066*	*-1.1%*

**Unionised ammonia concentration calculated at average monitored pH 7.7 and 15°C.*

10.5 DESCRIPTION OF EXISTING ENVIRONMENT

The proposed abattoir extension is located in the townland of Meenwaun, approximately 2.4km south-east of Banagher and 8.0km north-west of Birr, Co. Offaly. The remainder of the site comprising of agricultural land, is located in the townland of Boheradurrow. The approximate Irish National Grid (ING) reference for the site is 204143E, 213196N.

Figure 10.1: Proposed Site Location

The site is located in a rural, farming area predominantly comprised of pastureland, hedgerows and peatland. Arable fields and wooded areas can also be found scattered around

the landscape. Residential development in the area is predominantly linearly aligned along the existing road network. A number of large farmsteads, as well as some commercial developments, are located within the area.

The nearest national road to the site is the N62, which connects Athlone to Thurles. The site is accessed via the L3010, a local road linking to the R438 road. The R438 road connects to the N65 National Primary Road some 21.5km to the south-west and N62 National Primary Road some 7.0km to the north-east.

The topography surrounding the site is gently undulating between low points of around 48m AOD and a number of local highpoints of over 53m AOD. The existing facility is located between 48-50m AOD. Levels fall to under 33m AOD along the course of the local Rapemills and Shannon Rivers.

The Feeghroe Stream travels along the site's western boundary, which connects to the River Shannon via the Rapemills River. The River Shannon flows in a south-westerly direction and is located, at its closest, 4.4 km north-west of the site. Throughout the site, there are several culverts to allow livestock/farm machinery pass over the drainage ditches to access each field. The current onsite drainage network is outlined in Figure 10.2 below.

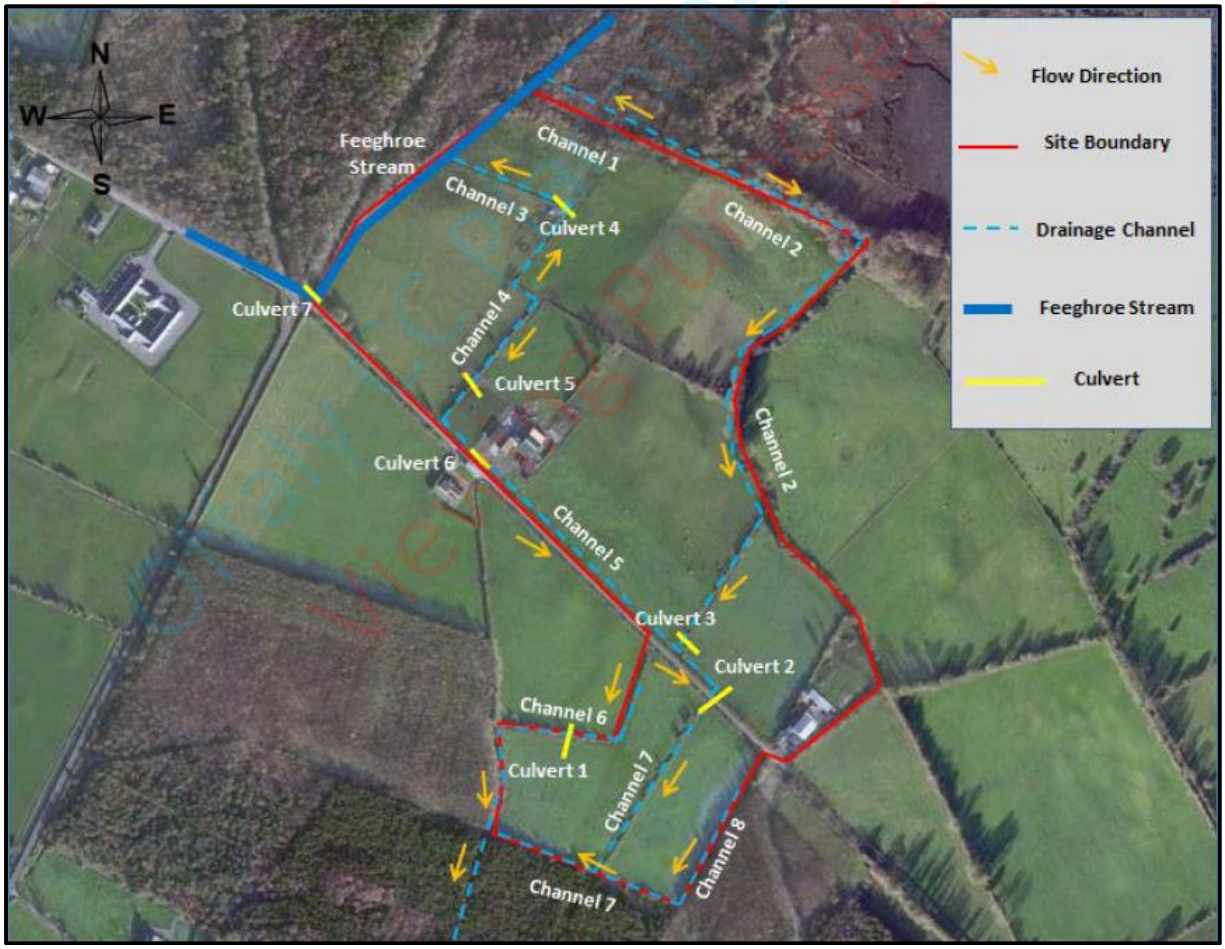

Figure 10.2: Existing site drainage network

10.5.1 WATER QUALITY

Feeghroe Stream (25F41)

The proposed development would involve works in the vicinity the Feeghroe River (EPA Code 25F41). This area is located within the Lower Shannon River catchment (25B_1) (EPA Code 25S01), in the Rapemills River sub-catchment (Sub-catchment Shannon[Lower]_SC_040 or RAPEMILLS_020) (EPA Code 25R01).

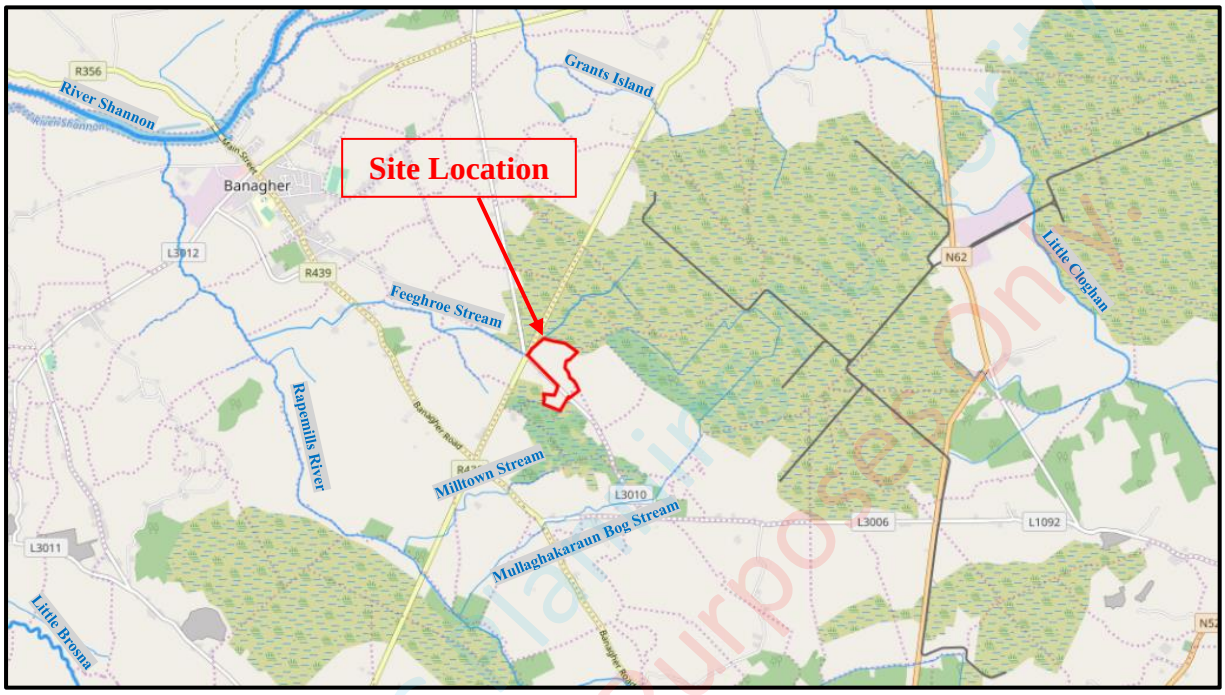

Figure 10.3: Watercourses within the vicinity of the site

The Feeghroe Stream rises just north of the site in Mullaghakaraun Bog, approximately 1.5km upstream of the proposed discharge point. The stream flows approximately west to north-west for approximately 3.25km to its confluence with the Rapemills River. The confluence with the Rapemills occurs approximately 2.5km upstream of the River Shannon.

There are no currently licenced discharges to the Feeghroe Stream.

Physico Chemical Status – Feeghroe Stream

There are no EPA monitoring stations located on the Feeghroe Stream.

As part of the assimilative capacity assessment, three water samples were taken on the 24th of September 2018, the 22nd of October 2018 and the 30th of October 2018 at the proposed discharge point on the Feeghroe Stream. The average results of monitoring on the Feeghroe Stream have been used to represent the typical water quality of the watercourse and are included in Table 10.5 below.

Table 10.5: Background Water Quality Values for the Feeghroe Stream

PARAMETER	UNIT	AVERAGE RESULTS 24/09/2018 – 30/10/2018	SURFACE WATERS OBJECTIVES REGULATIONS (SI 272 OF 2009)
BOD_5	mg/l O_2	2.3	2.6
COD	mg/l O_2	85.0	-
Orthophosphate	mg/l PO_4-P	0.010	0.075
Total Nitrogen	mg/l N	3.67	-
Total Ammonia	mg/l N	**0.43**	0.14
Unionised Ammonia	*mg/l NH_3-N*	*0.007**	-
Suspended Solids	mg/l SS	4.5	-

**Unionised ammonia concentration calculated at average monitored pH 7.7 and 15°C.*

Given the current Total Ammonia concentration of 0.43 mg/l N, the Feeghroe Stream would be classified as being of "*moderate status*".

The Feeghroe Stream is currently not achieving "good status" due to the high levels of Total Ammonia present. As the majority of the receiving waters for this stream derive from Mullaghakaraun Bog, it is considered likely that concentrations of Nitrogen and Total Ammonia may be naturally elevated above water quality limits.

The Water Framework Directive risk status of the Feeghroe Stream, as part of the Lower Rapemills River, is currently under review (accessed at https://www.catchments.ie/maps/ on 24/04/2019). However, the Upper Rapemills Stream and stretches of the River Shannon downstream of the Rapemills River are classified as "not at risk".

Macroinvertebrate Status – Feeghroe Stream

The Feeghroe Stream, which flows along the north-western site boundary of the site, would be classified as depositing / lowland rivers (FW2) habitat as per Fossitt's "*A Guide to Habitats in Ireland*", (Fossitt, 2000). Substrate was comprised of mud and particularly leaf detritus. There was little to no aquatic vegetation within the stream itself.

Kick samples of macroinvertebrates were collected from Feeghroe Stream in the vicinity of the proposed discharge location. The macroinvertebrate community within the Feeghroe were found to be composed of pollution tolerant species, typical of slow flowing waters in first order streams and arterial drainage.

The *Gammarus duebeni* and *Asellus aquaticus* were numerous within the community, and were the most represented species. The caseless caddisfly *Polycentropus sp*. and the beetles Elminthidae and Dytiscidae were present in fair numbers. Segmented worms, Tubificidae and Hydracarina were also present in small numbers.

The macroinvertebrate status of the Feeghroe Stream was rated as Q2 (*bad status*), due to the absence of Group A and Group B pollution intolerant species. The Small Streams Risk Score (SSRS) determined that the site would be considered "*at risk of not achieving good status*".

Rapemills River (25R01)

The Rapemills River rises in bogland north-east of the townland of Ballymaddock, Co. Offaly, approximately 5 kilometres north of Kinnitty. The river flows for approximately 22.5 km to the confluence with the Feeghroe Stream, and continues for approximately 2.5 km to the confluence with the River Shannon.

Table 10.6: EPA Monitoring Points on the Rapemills River

STATION NO.	STATION LOCATION	NATIONAL X	NATIONAL Y	APPROX. LOCATION RELATIVE TO CONFLUENCE
0500	RAPEMILLS – Lusmagh Br	200175	214603	c. 1.25 km d/s
0400	RAPEMILLS – Br SW of Taylors X Rds	202696	211284	c. 3.4 km u/s
0300	Br at Rapemills	204818	210194	c. 6.25 km u/s
0200	RAPEMILLS – Boolinarig Br	207614	209296	c. 9.5 km u/s
0100	RAPEMILLS – Br nr Eglish Castle	210068	209618	c. 12.4 km u/s

Source: http://www.epa.ie/qvalue/webusers/PDFS/HA25.pdf?Submit=Get+Results

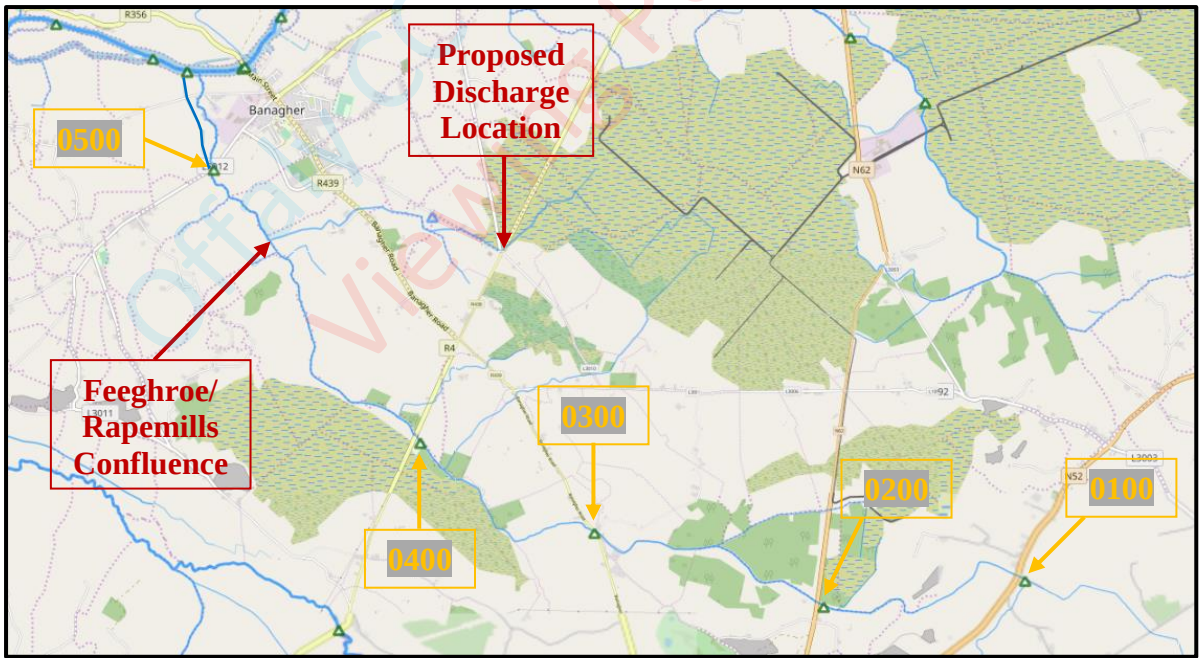

Figure 10.4: Rapemills River EPA monitoring locations

It should be noted that path of the Rapemills River was redirected downstream of Lusmagh Br, and the discharge to the River Shannon as redirected to approximately 200m downstream of the pre-existing location, as shown in Figure 10.4 above.

There is a historic Section 4 discharge licence to the Rapemills River at the confluence with the Feeghroe Stream [E 200850, N 213730]. Midlands Malting Company Ltd / Minch Malting Ltd (Greencore Ltd) closed at this site in 2005.

Banagher Precast Concrete Ltd hold a Section 4 discharge licence (Discharge Licence: WP/W9/10) with Offaly County Council [E 200200, N 215115]. This discharge is to the old Rapemills River route, which discharges to the River Shannon upstream of the current confluence.

Table 10.7: EPA Ecological Monitoring of the Rapemills River (1984 – 2017)

REF.	BIOLOGICAL QUALITY RATING (Q VALUES)					
0100	4	4	-	-	-	-
0200	4	4	-	-	-	-
0300	4-5	4-5	3-4	4	4	3-4
0400	4	4-5	-	-	-	-
0500	4-5	3-4	-	-	-	-
Year	**1984**	**1987**	**2008**	**2011**	**2014**	**2017**

As can be seen in the above table, the quality of the Rapemills River upstream of the confluence with the Feeghroe Stream has varied from a "*moderate status*" to "*good status*" since 2008.

Reporting by the EPA on river quality assessments of the Rapemills River (accessed at http://www.epa.ie/QValue/webusers/ on 24/04/2019) stated "*The macroinvertebrate fauna indicated an unwelcome decline to moderate ecological conditions on the Rapemills stream (0300) when surveyed in 2017. Enhanced filamentous algal growth observed was indicative of some enrichment.*"

The Water Framework Directive risk status of the Lower Rapemills River, is currently under review (accessed at https://www.catchments.ie/maps/ on 24/04/2019). The Upper Rapemills Stream and stretches of the River Shannon downstream of the Rapemills River are classified as "not at risk".

Shannon River (River Code: 25S01)

The River Shannon is the longest river in Ireland at approximately 360.5km. It drains the Shannon River Basin, which has an area of 16,865km2, which equates to one-fifth of the area of Ireland.

The river flows generally southwards from the Shannon Pot in County Cavan before turning west and emptying into the Atlantic Ocean via the 102.1 km long Shannon Estuary.

Further Q-Value information is available for the six EPA monitoring points located along the section of the Lower Shannon River within the vicinity of the tributary point with the Rapemills River. The stations and locations relative to the tributary point are included in Table 10.8 below, with the Q-Value results summarised in Table 10.9.

Table 10.8: EPA Monitoring Points on the River Shannon Lower

STATION NO.	STATION LOCATION	NATIONAL X	NATIONAL Y	APPROX. LOCATION RELATIVE TO TRIBUTARY POINT
2010	Shannon (Lower) – 0.8km d/s Banagher Br(LHS)	199853	215797	c. 60m u/s
2030	Shannon (Lower) – 2.5km d/s Banagher Br (RHS)	198254	216377	c. 1.6 km d/s
2050	Shannon (Lower) – 4km d/s Banagher Br	197010	215895	c. 3.3Km d/s
2060	Incherky Quay (d/s Banagher)	195270	214307	c. 5.8Km d/s
2110	Shannon (Lower) – Meelick- d/s L Brosna R confl	193367	212289	c. 9.1Km d/s
2300	Shannon (Lower) – Killaloe Br (RHS)	187343	204881	c. 19.6Km d/s

Source: http://www.epa.ie/qvalue/webusers/PDFS/HA25.pdf?Submit=Get+Results

The main environmental pressures within the catchment were identified as agriculture and urban waste water according to the WFD Cycle 2 – Lower Shannon – Sub Catchment Shannon [Lower]-SC-40 Assessment Report (EPA, 2018).

The Banagher Agglomeration Wastewater Treatment Plant (Discharge Licence: D0141-01) [E 200200, N 215350]. The agglomeration is served by a wastewater treatment plant with a Plant Capacity PE of 2,500. The treatment process includes preliminary treatment (screening and grit removal) and secondary treatment (oxidation ditch with settlement chamber). Banagher UWWTP discharges to the River Shannon [E 200015, N 215725], approximately 225 metres upstream of the Rapemills-Shannon confluence and just upstream of the old Rapemills-Shannon confluence.

Figure 10.5: Lower River Shannon EPA monitoring locations

Table 10.9: EPA Ecological Monitoring of the Lower River Shannon (1972 – 2017)

REF.	BIOLOGICAL QUALITY RATING (Q VALUES)														
1960	-	-	4.5	-	-	-	-	-	-	-	-	-	-	-	-
2010	-	-	4.5	-	-	-	-	-	-	-	-	-	-	-	-
2030	-	4.5	4	-	-	-	-	-	-	-	-	-	-	-	-
2050	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-
2060	-	-	-	-	-	-	-	-	-	3.5	4	-	4	-	3.5
2110	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-
2300	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Year	**72**	**76**	**84**	**87**	**90**	**93**	**96**	**99**	**02**	**08**	**11**	**12**	**14**	**15**	**17**

As can be seen in the above table, the quality of the River Shannon downstream of the confluence with the Rapemills River has varied from a "*moderate status*" to "*good status*" since 2008.

The Lower River Shannon was classified as being of "*moderate status*" in the last round of monitoring in 2017.

The Lower River Shannon has been classified as being "*not at risk of failing to achieve good status*" downstream of Banagher. However, the risk status of the watercourse between station 2060 and Lough Derg is currently under review (accessed at https://www.catchments.ie/maps/ on 24/04/2019).

10.5.2 DRINKING WATER ABSTRACTION POINTS

A Drinking Water Risk Assessment has been prepared as part of the planning application documentation (Reference: PES_DWRA_19_9201)

The Banagher Water Treatment Works river water abstraction (2500PUB1001) [E 200864, N 216181] is located upstream of the Rapemills-Shannon confluence, and also is supplied by a groundwater abstraction [E 202850, N214030] located <0.5km from the boundary of the proposed site.

The Portumna Water Treatment Works (1200PUB1042) is located downstream of the Rapemills-Shannon confluence in Lough Derg [E 185210, N 203730]. The abstraction point is located approximately 30km downstream of the proposed discharge location.

This abstraction point serves the Portumna agglomeration, providing in the region of 1,100 M^3/day of drinking water. The following map details the locations of the proposed discharge point in relation to the Portumna Water Abstraction Point.

Figure 10.6: Drinking Water Supply Abstraction Locations

10.5.3 ECOLOGICAL VALUE

The Feeghroe Stream and majority of the Rapemills River are not designated for the protection of habitats or species.

A Natura Impact Statement (Reference: PES_NIS_19_9201) has been prepared in support of the planning application for the proposed development, and considered the potential impacts upon protected sites within 2km and 15 km radius of the proposed site. The SAC and SPA sites considered to be within the potential zone of influence of the proposed development were;

- All Saints Bog and Esker SAC (Site Code: 000566);
- River Shannon Callows SAC (Site Code: 000216);
- Redwood Bog SAC (Site Code: 002353);
- All Saints Bog SPA (Site Code: 004103);
- Middle Shannon Callows SPA (Site Code: 004096);
- River Little Brosna Callows SPA (Site Code: 004086);
- Dovegrove Callows SPA (Site Code: 004137) and
- River Suck Callows SPA (Site Code: 004097)

due to hydrological connectivity / potential hydrological connectivity, distances from the proposed development site and / or the potential for ex-situ impacts of the development upon wintering wildfowl.

The closest of these, and most likely to be at risk of potential impacts, are;

- All Saints Bog and Esker SAC (Site Code: 000566),
- All Saints Bog SPA (Site Code: 004103),
- River Shannon Callows SAC (Site Code: 000216), and
- Middle Shannon Callows SPA (Site Code: 004096),

The All Saints Bog and Esker Special Area of Conservation (SAC code: 000556) is located approximately 2.3km south of the proposed site, and is bordered to the north by the Rapemills River. This site is also designated as a Special Protection Area (SPA code: 004103). This site is located upstream of proposed discharges from Banagher Chilling Ltd.

The Shannon River Callows Special Area of Conservation (SAC code: 000216) is located approximately 3.2km west of the proposed site, and includes the lower c.1.75km of the Rapemills River prior to entering the River Shannon. The SAC includes the protected Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0] habitat and *Lutra lutra* (Otter) [1355] species.

This Middle Shannon Callows site is also designated as a Special Protection Area (SPA code: 004096). The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Whooper Swan, Wigeon, Corncrake, Golden Plover, Lapwing, Black-tailed Godwit and Black-Headed Gull. It is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The site also supports a nationally important breeding population of Corncrake.

The Shannon River is not designated as a salmonid water under the European Commission (Quality of Salmonid Waters) Regulations, 1988.

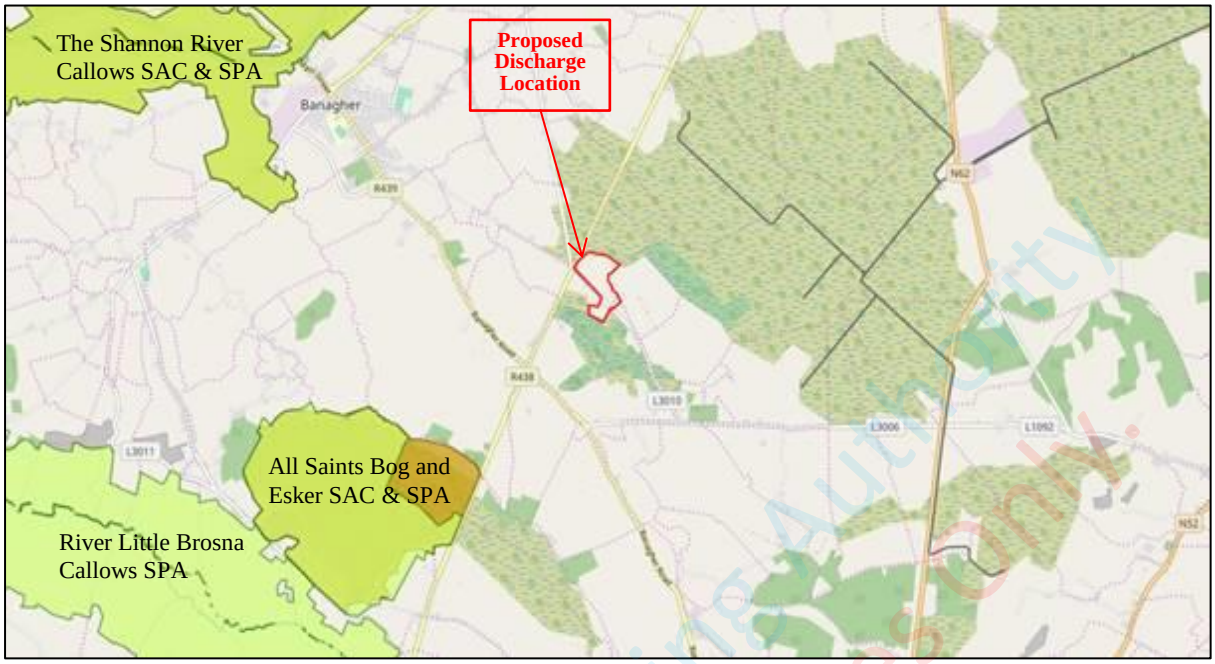

Figure 10.7: Designated Habitat and Species Protection Sites Map

The ecological value of the aquatic habitat types and species potentially at the proposed development site have been assessed following the criteria outlined in the National Roads Authority (NRA) guidelines (2009). Tables 10.10 and 10.11 below detail the habitats recorded and potential species, and their associated ecological value.

Table 10.10: Ecological Value of Aquatic Habitats of the Proposed Development

AQUATIC HABITAT	HABITAT RATING	KEY ECOLOGICAL RECEPTOR?
Depositing / lowland rivers (FW2)	Local importance, higher value	Yes. Joins with the River Shannon Callows SAC and Middle Shannon Callows SPA approximately 4km downstream of the site.
Drainage ditches (FW4)	Local importance, lower value	No. Mainly small in extent with limited volume. Low ecological value.

Table 10.11: Ecological Value of Species of the Proposed Development

SPECIES	SPECIES RATING	KEY ECOLOGICAL RECEPTOR?
Atlantic Salmon (1106)	Local importance, low value	No. Not recorded within the vicinity of the proposed site. Little Brosna River has a population of introduced salmon from the ESB Parteen Salmon hatchery. Ardnacurisha and the Parteen weir present a significant barrier to wild populations.
Freshwater pearl mussel (1029)	Local importance, lower value	No. Proposed development and local catchment is outside of the recorded range and distribution for this species.
White Clawed crayfish (1092)	Local importance, lower value	Yes. There are no records of crayfish within the tributaries of the Rapemills and the tributary habitats are unfavourable. However, the Rapemills main channel would be within the recorded range and distribution of the species.
Brook lamprey (1096)	Local importance, lower value	Yes. There are no records of brook lamprey within the tributaries of the Rapemills and the tributary habitats are unfavourable. However, the Rapemills main channel would be within the recorded range and distribution of the species. Adults may be present in silt deposits in the main Rapemills channel, however, gravel substrate for spawning sites in local tributaries appears to be rare.
River lamprey (1099)	Local importance, low value	No. There are no records of river lamprey within the tributaries of the Rapemills and the tributary habitats are unfavourable. However, the Rapemills main channel would be within the recorded range and distribution of the species. Ardnacurisha and the Parteen weir present a significant barrier to migration, and the species is unlikely to be present.
Sea lamprey (1095)	Local importance, low value	No. Proposed development and local catchment is outside of the recorded range and distribution for this species. The species migration is also impacted by barriers on the Shannon.

10.5.4 FISHERY VALUE

The river Shannon is predominantly a Brown Trout and coarse fishery upstream of the Ardnacrusha Power Station and the Parteen Weir. Limited numbers of Atlantic salmon pass these barriers, supplemented by an ESB scheme for the restocking of the River Shannon with juvenile salmon produced at the Parteen Salmon hatchery. Salmon fishing is generally found in tributaries of the lower reaches of the Shannon catchment.

ESB fisheries studies for West Offaly Power Station (WOP) in 2016 and 2017, found perch, roach, bream, roach-bream hybrids, eel, pike, gudgeon and trout in the sampled sites along the River Shannon near WOP, Shannonbridge (approximately 11 km upstream of the

Rapemills – Shannon confluence). No juvenile or adult salmon were recorded at any sampling site (ESBI & Aquatic Services Unit, 2018).

This is consistent with the findings of IFI as part of the WFD fish assessments carried out in 2010 and also in 2016. The overwhelming numerical dominance of cyprinid fish, as well as the greater diversity of this group at WOP, indicates that the main channel of the Shannon at this location can be classified as a cyprinid water (ESBI & Aquatic Services Unit, 2018).

As part of its restocking campaign on the River Shannon, the ESB carry out electrofishing and genetic surveys to monitor the performance of hatchery reared planted stock, and to assess naturally spawned juvenile salmon in the Shannon catchment.

Monitoring was conducted at three locations on the Rapemills River during the 2013 round of monitoring.

Table 10.12: ESB electrical fishing surveys of the Rapemills sub-catchment (ESB, 2013)

	m2	Min-1			
Site Name	**Area fished**	**Time fished**	**No. Trout**	**No. Salmon**	**Other Species**
Boolinarig Bridge	37.02	8	9	0	none
Rapemills Bridge	162.03	19	68	0	none
Lusmagh Bridge	137.28	9	9	0	Eel, stoneloach, minnow, stickleback, gudgeon
Average	112.1m2	12 min-1	Total = 86	Total = 0	

The report summarised the Rapemills catchment as follows; *"The Rapemills River: No salmon were found at any sites but the habitat was very poor being almost exclusively a deep drained canal-like channel. The exception to this was the Rapemills bridge site which was undrained for a short distance."* (ESB, 2013)

As part of baseline assessments undertaken by Fehily Timoney and Company in completion of an EIAR for the Meenwaun Wind Farm, electrofishing surveys were undertaken on tributaries of the Rapemills River.

Electrofishing was carried out on the Milltown and Mullaghakaraun Streams, located east of the Feeghroe Stream. The assessment found no fish present in either of the streams, and it was noted that this indicated the low value of these habitats for fish. The tributaries in the survey area were noted to be unsuitable with regard to salmon spawning considering the lack of gravel substrates, poor aeration, sluggish flows and degree of siltation.

As noted in section 10.5.1 above, the substrates within the Feeghroe stream were found to be composed predominantly of mud and detritus. It is considered that the Feeghroe Stream would also be of low habitat value for salmon. It is also noted that high ammonia levels would indicate a poor habitat.

The Feeghroe Stream may be of Local Importance (low value) with respect to fish, due to the poor habitat and water quality for salmonids. The Rapemills River has been rated as being of Local Importance (higher value) with respect to salmonids as it is likely to support populations of brown trout.

10.6 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

The following sections detail the potential impact from the proposed development upon the water quality, habitats and species within the aquatic environment. Mitigation measures recommended to alleviate potential impacts are presented in Section 10.7.

10.6.1 WATER QUALITY IMPACTS

10.6.1.1 – Water Quality – Construction Impacts

The proposed site includes several surface water drains surrounding the site, which connect within the Feeghroe and Rapemills catchments. Proposed works include alterations to existing structures onsite and development works on green field areas to include building extensions, outbuildings, internal roadways any yards, the wastewater treatment compound, integrated constructed wetland (ICW), as well as provision of services.

During the construction phase, a deterioration in water quality could arise through the release of suspended solids during soil disturbance works and storage / landscaping, the release of uncured concrete and the accidental release of hydrocarbons (fuels and oils). Suspended solids could become entrained in surface water run-off and could affect aquatic habitats through reduction in water quality and deposition.

Surface waters in the vicinity of the site are also known to be gaining, with receiving water being composed of groundwater additions to varying degrees. Therefore, potential contamination of groundwaters also has the potential to impact upon the quality of nearby surface-waters.

An increase in sediments has the potential to impact upon fish, including Brown Trout and Brook Lamprey, by damaging gravel beds required for spawning, smothering fish eggs and in extreme cases, by interfering with the gills of fish. There is considered the be a low risk of such impacts occurring at this site as no such potential spawning habitats were noted during onsite surveys.

An increase in suspended solids has the potential to reduce water clarity, which can impact the light penetration of water and may also affect certain behaviours of aquatic fauna such as foraging success. Aquatic flora and fauna could also be impacted upon by an increase in nutrients which are bound to suspended solids. A significant increase in nutrients can result in eutrophication, leading to an increased risk of deoxygenation of waters and subsequent asphyxia of aquatic species.

In the event of uncured concrete entering a waterbody, the pH would be altered locally, potentially leading to the death of aquatic flora, fish and macroinvertebrates and alteration to the river substrate.

There is also a potential for releases of hydrocarbons from the operation of heavy construction plant and associated equipment. Hydrocarbons can affect water quality, potentially resulting in toxic and / or de-oxygenating conditions for aquatic flora and fauna.

During the construction phase, there would be a risk of a significant, negative and short term impact upon the water quality of nearby surface waters.

10.6.1.2 Water Quality –Operational Impacts

The primary potential impact upon the River Shannon catchment from the proposed development would be a deterioration in water quality arising from a discharge of treated effluent.

There would be no anticipated impacts upon the water quality of the Feeghroe Stream or the Rapemills and Shannon catchments due to stormwater discharges from the site. Stormwater from the proposed development would comprise of clean rainwater run-off from clean-yard areas and car parking areas, and would be directed to a silt trap and Class 1 By-Pass Separator before being directed to a modular underground attenuation system.

The BREF (2005) document for Slaughterhouses and Animals By-Products Industries note that the most significant environmental impact arising from slaughterhouses is the emissions to water. Generated wastewaters typically have a high organic strength owing to the high BOD (biochemical oxygen demand) and COD (chemical oxygen demand) properties of blood and animal by-products. Additionally, wastewaters from slaughtering facilities and meat processing facilities generally have a high suspended solids and nutrient content (phosphorous and nitrogen).

Organic pollution to rivers can occur when high organic wastewaters are insufficiently treated and discharged to waterbodies. When a high organic load enters a waterbody, the growth of bacteria and other micro-organisms increase significantly in response to the available food supply. The rapid break down of organic compounds by bacteria and micro-organisms results in the deoxygenation of the water. Where significant organic pollution takes place, the river can become uninhabitable for aquatic flora and fauna due to the lack of required oxygen.

Bacteria also break down the protein content of the wastewater into various nitrogen compounds including nitrate, nitrite, ammonia and ammonium. Depending on the concentration, these compounds can have further impacts upon water quality and aquatic flora and fauna. For example, the compound ammonia (NH_3) is considered toxic to freshwater fish at low concentrations (EPA, 2001).

Oils and fats from wastewaters can cause deoxygenation of waters due to the consumption of oxygen during bacterial breakdown and, in the instance of an oil film, by disrupting oxygen diffusion from the atmosphere to water.

An increase in suspended solids can affect aquatic habitats by reducing water clarity, affecting the light availability to flora and visibility required by fauna for feeding and other behaviour. Furthermore, an increase in suspended solids can have significant impacts upon fish by damaging spawning beds, smothering eggs and, in extreme cases, interfering with gills.

Aquatic flora and fauna could also be impacted upon by an increase in the nutrients nitrogen and phosphorous. A significant increase in nutrients (particularly phosphorous for freshwater bodies), could result in excessive eutrophication, whereby an increase in nutrients results in the significant growth of aquatic plants, particularly algae (EPA, 2015). As plant growth increases, oxygen depletion occurs due to increased photosynthesis and through the decomposition of plant organic material. The increase in plant growth can also limit the availability of sunlight.

The principal legislation governing the control of the ambient quality of surface waters under the Water Framework Directive is the European Communities Environmental Objectives (Surface Waters) Regulations [S.I. No. 272 of 2009] as amended. This legislation sets out legal limits for parameters of water quality in the form of thresholds for quality status; pristine, good, moderate, and poor. All waters are required to achieve at least "good status" within timeframes set under the regulations. Under the Surface Water Regulations classification system, a waterbody is classified based upon the lowest score attained for any of the determining parameters (River Waterbody: Q-rating, BOD, orthophosphate, ammonia, temperature, pH, heavy metals and priority substances).

The Feeghroe Stream is currently not achieving "good status" due to the high levels of Total Ammonia present. As the majority of the receiving waters for this stream derive from Mullaghakaraun Bog, it is considered likely that concentrations of Nitrogen and Total Ammonia may be naturally elevated above water quality limits.

The macroinvertebrate status of the Feeghroe Stream was rated as Q2 (bad status). The Small Streams Risk Score (SSRS) determined that the site would be considered "*at risk of not achieving good status*".

Following an assimilative capacity assessment of the Feeghroe Stream during 95%ile (low flow) conditions, as summarised in Table 10.4 above, it was concluded that the proposed discharge from the effluent treatment plant and ICW system would not, in and of itself, result in the Feeghroe Stream failing to achieve "good status". However, it is noted that existing monitored concentrations of BOD would be expected to moderately exceed "good status" post discharge.

As the existing monitored quality of the Feeghroe Stream appears to be naturally of physico-chemically "moderate status" or poorer, with a macroinvertebrate "bad status", it is considered that the proposed discharge would have a permanent and slight, negative impact upon the quality of the Feeghroe Stream.

The Feeghroe Stream discharges to the Rapemills River. The following table provides an estimation of the potential impact of the combined effluent discharge and Feeghroe Stream upon the Rapemills River water quality at 95%ile flow rates, following the methodology used in the Assimilative Capacity Report (Reference: PES_AC_19_9201). The background quality provided for the Rapemills River assumes identical water quality as the Feeghroe.

As can be seen in the following table, there would not be anticipated to cause a significant deviation in the existing water quality of the Rapemills River should the proposed development go ahead.

It is anticipated that the proposed discharge to the Feeghroe Stream would have a permanent and slight, negative impact upon the quality of the Rapemills River and catchment.

Table 10.13: Assimilative Capacity of the Rapemills River

Parameter	Units	Assumed Background Quality (based on Feeghroe)	Legislated Quality	Quality of Feeghroe + Proposed Discharge	Rise in Levels due to Discharge (mg/l)	Predicted Levels Post Discharge (mg/l)
BOD_5	mg/l O_2	2.3	2.6	3.0	0.03	2.4
Orthophosphate	mg/l PO_4-P	0.010	0.075	0.056	0.002	0.012
Total Ammonia	mg/l N	0.433	0.14	0.425	-0.0004	0.43
Un-ionised Ammonia	*mg/l NH_3-N*	*0.0067*	*0.0164*	*0.0066*	*-0.000007*	*0.0067*

**Unionised ammonia concentration calculated at average monitored pH 7.7 and 15°C.*

It is considered that operational risks to water quality would be mitigated through the proposed design of the effluent treatment process in view of the existing water quality of the Feeghroe Stream. Any trade discharge from the Banagher Chilling Limited facility would be required to be in compliance with a Local Authority Section 4 (Trade Effluent) Discharge Licence in agreement Offaly County Council.

There would also be a potential risk to surface water quality due to accidents and potential spills and leaks from chemicals and materials stored onsite during operation. The proposed development would be typical of abattoirs in Ireland, and aside from animal by-products, particularly animal slurry, the volumes of stored chemicals would be relatively low. However, shock loads would have the potential to significantly impact upon water quality.

There would be a risk of a major, negative and short term impact upon water quality within the Feeghroe and Rapemills watercourses as a result of potential accidents onsite.

10.6.1.3 Water Quality – Impacts to Drinking Water Abstractions

A deterioration in water quality may have the potential to adversely impact upon the quality of drinking water, particularly with regards microbial loading.

Discharges from slaughtering facilities have the potential to cause a microbial impact upon receiving waters due to the presence of total coliform, faecal coliform (including *Escherichia coli*) and streptococci groups of bacteria, in addition to parasites such as *Cryptosporidium parvum*. It has been estimated that densities of total and faecal coliforms and streptococci are in the order of several million colony forming units (cfu) per 100ml of wastewaters generated at slaughtering facilities (USEPA, 2004).

Sources of micro-organisms present within wastewaters at the Banagher Chilling facility include sanitary facilities for staff, blood and cleaning waters from the slaughter hall and dirty yard areas.

Total coliform, faecal coliform and streptococci groups of bacteria present in slaughtering facility wastewaters are primarily enteric in origin, coming from the intestinal tract of warm-blooded animals. The treatment of human waste arising from staff welfare facilities at the Banagher Chilling facility would also contribute to populations of enteric bacteria.

While these groups of bacteria are not generally considered as pathogenic, they can be used to indicate the possible presence of pathogenic enteric organisms, such as *Salmonella* ssp., *Campylobacter jejuni* and *Listeria monocytogenes*, gastrointestinal parasites including *Ascaris* sp., *Giardia lamblia*, and *Cryptosporidium parvum*, and enteric viruses (Mittal, 2004).

As enteric micro-organisms leave their optimal environmental conditions (intestinal tract of animals), their survivability would be impacted upon during the wastewater treatment process and discharge to surface water. For instance, studies undertaken on E. Coli have indicated that their survival in freshwater is adversely affected by the cooler temperatures, visible light and predation by endemic micro-organisms such as flagellates and ciliates (Wcislo and Chróst, 2000). While viruses can survive adverse conditions, they can only multiply within their hosts and are therefore limited in population once they enter the wastewater process.

A Drinking Water Risk Assessment has been prepared as part of this planning application (Reference: PES_DWRA_19_9201). The Drinking Water Risk Assessment has been based upon the methodology described in guidance documents published by the EPA, including the "*Drinking Water Regulations Guidance Booklet No.4*", and the "*Handbook on the Implementation of the Regulations for Water Service Authorities for Public Water Supplies*".

The Banagher Water Treatment Works river water abstraction (2500PUB1001) [E 200864, N 216181] is located upstream of the Rapemills-Shannon confluence, and would not be affected by the proposed discharge. Due to the nature of the area hydrology, streams are generally gaining and there is a low risk of impact from the proposed discharge to the Banagher WTW groundwater abstraction, located <0.5km from the boundary of the proposed site.

The Portumna Water Treatment Works (1200PUB1042) is located downstream of the Rapemills-Shannon confluence in Lough Derg [E 185210, N 203730]. The abstraction point is located approximately 30km downstream of the proposed discharge location.

As part of the proposed development, clarified effluent would be directed to a sand filtration system. While the sand filter serves to reduce the suspended solids in the final effluent, this would also reduce the microbial content of the wastewaters by filtering and retaining micro-organisms from the treated effluent. Sand filtration is estimated to remove enteric bacteria by over 90% with the World Health Organisation estimating that 99% of larger parasites and between 50-90% of enteric viruses are removed.

The effluent would then be passed through an integrated constructed wetland system, which removes solids due to filtration and sedimentation, and reduces pathogens through predation and natural die-off.

The Drinking Water Risk Assessment report concluded that the overall risk from the proposed discharge to the Banagher and Portumna water abstraction plants would be considered low. This conclusion was based upon the nature of generated wastewaters, proposed discharge limits, the wastewater treatment process, the level of dilution, nature of

the area hydrology, the quality of receiving water and the anticipated impact of discharges during normal and abnormal operations.

There would remain a risk of potential impacts due to accidental release and spills from the proposed site. However, as discussed in the drinking water risk assessment report, design and operation measures would substantially reduce this potential risk.

It is anticipated that there would be no significant impact upon the quality of drinking water at the Banagher and Portumna supply schemes as a result of the proposed development.

10.6.2 PROTECTED SITES (SAC & SPA) – AQUATIC ENVIRONMENT

Of the eight designated SAC and SPA sites considered to be within the potential zone of influence of the proposed development, three sites are located upstream of drainage from the site and are therefore not considered to be hydrologically connected: River Little Brosna Callows SPA, Dovegrove Callows SPA and River Suck Callows SPA.

It is not considered that the proposed development would have the potential to impact upon Redwood Bog SAC, given that this site is located a considerable distance (13.25km) downstream of the development site and given the considerable dilution of the site's drainage within the Feeghroe Stream, Rapemills River and River Shannon. Furthermore, Redwood Bog SAC is located approximately 100m inland from the River Shannon watercourse.

The proposed development would be hydrologically linked to the River Shannon Callows SAC and Middle Shannon Callows SPA, both of which are located approximately 4km downstream of the site. The proposed discharge to the Feeghroe Stream would be within the upstream catchment of the River Shannon.

As drainage from the site potentially flows to the Milltown Stream, the proposed development may also be hydrologically connected to All Saints Bog and Esker SAC and All Saints Bog SPA, located approximately 2.6km and 3.2km downstream of the development site respectively.

The principal vector for impacts upon designated European sites would be through changes in water quality arising from the proposed developments. Water quality changes could have the potential to have a negative impact upon food sources (such as fish species and vegetation) for qualifying interests.

Potential impacts upon water quality have been addressed in detail in section 10.6.1.

10.6.3 AQUATIC HABITATS

There would be a permanent loss of sections of aquatic habitat due to the culverting of section of site drainage and the development of land in sections where drainage occurs, particularly in the area of the ICW. The loss of internal site drains (FW4) would not be considered significant, due to the existing moderate to poor water quality and absence of spawning habitats. It is also noted that drainage channels are common in the area, and the volume of habitat loss would be minor. This would be considered a minor, permanent negative impact upon local habitats.

There would be no additional loss of aquatic habitats, following the construction phase of the development.

The proposed surface water drainage system would be designed to SUDS specifications, limiting storm runoff from the site to existing greenfield levels. Therefore, it is not considered that the proposed development would have a significant impact upon existing aquatic habitat through changes in the existing hydrological regime.

During the operational phase, potential long term changes to water quality would pose a risk of impacts upon habitats within the catchment, through eutrophication and macrophyte growth and siltation of gravel substrates, as discussed further in section 10.6.1.

10.6.4 PROTECTED SPECIES (FLORA & FAUNA)

There is potential to impact upon existing flora and fauna within the Feeghroe, Rapemills and Shannon catchments downstream of the site through impacts upon water quality.

During onsite assessments of the Feeghroe Stream, no rare aquatic plant species or protected flora under the Flora (Protection) Order 2015 (S.I. 356 of 2015), were recorded within the likely development area or immediate vicinity. No protected aquatic plant records for the area were submitted to the National Biodiversity Data Centre within the last decade. It is considered that there would be no significant risk of introducing invasive species during the discharge of treated effluent.

It is not anticipated that the Feeghroe Stream would be of a suitable water quality or contain suitable habitats to contain locally important populations of salmonids (brown trout) or coarse fish (cyprinids). However, the Rapemills River would be considered locally important for such species. The proposed confluence of the Feeghroe Stream and the Rapemills River is located approximately 2.5 km upstream of the confluence within the River Shannon. Significant changes to the water quality of the Rapemills in the vicinity of the Feeghroe confluence could act as a barrier to fish species from the Shannon migrating into the upper reaches of the Rapemills.

Protected species which have been identified as having the potential to be found within the Rapemills River include the White-clawed Crayfish (*Austropotamobius pallipes*) and Brook Lamprey (*Lampetra planeri*).

The White-clawed Crayfish is generally associated with good quality waters but this is not necessarily the case in Ireland where it can occur in water of lower quality, down to a Q value of around 3 or an ASPT of 4. It is now generally considered as a keystone or heritage species rather than as a bio-indicator, because of its traditional importance and its large size, longevity and dominant position in the ecosystem. The species prefers relatively cool temperatures and adequate dissolved oxygen and lime, although tolerating significant fluctuations in these parameters (King *et al.*, 2011).

As occurs with fish species, excessive suspended solids concentration in surface waters have the potential to significantly impact on white-clawed crayfish, through abrasion, disruption or clogging of gills.

Lampreys spend much of their life cycle in river sediments. Changes in siltation patterns can significantly impact on lamprey habitat (King *et al.*, 2011). Therefore, it would be considered that Brook Lamprey would be comparatively robust to potential impacts from suspended solids and siltation.

However, pollution to surface water, from diffuse and point sources, is a constant threat to all aquatic organisms. Both adult and ammocoete life stages for lamprey have been shown to be vulnerable to the effects of pollution in Irish systems (King *et al.*, 2011).

It is not considered that the proposed development would pose a significant risk to aquatic flora and fauna from changes to water quality, as discussed further in section 10.6.1.

The construction phase would result in increased noise emissions. The effect of noise on fish and aquatic fauna is not fully known, though some studies have shown that significant noise sources can halt migrating fish or result in death in extreme cases. However, noise emissions are not considered to pose a significant risk to aquatic species owing to the transient nature of the proposed works and the distance to main river channels.

10.6.4.1 Protected Species – Ammonia Toxicity

Under intensive culture conditions or in highly alkaline waters (pH >9), ammonia may have sub-lethal effects, such as a reduction in growth rate, or may be acutely toxic [Stickney, 1991] at un-ionised ammonia levels above 0.02 mg/l NH_3 N [Hellawell, 1986]. Exposure to sub-lethal doses affects the gills and may predispose fish to higher rates of bacterial infections, especially in poor quality water [Stevensen, 1987].

The 96 hour LC_{50} for ammonia (concentration where 50% of fish will die after 96 hours of exposure), as NH_3, is typically approximately 1.1 mg/l for most species of freshwater fishes [Russo and Thurston, 1991]. In acute toxicity tests, 24 hour LC_{50} for ammonia (NH_3 N) were between 0.07-0.39 mg/l for Rainbow trout (*O. mykiss*) [Russo *et al.*, 1974, Solbé and Shurben, 1989] and 0.28 mg/l for Atlantic Salmon (*Salmo salar*) [Hellawell, 1986], a close relative of Brown Trout (*S. trutta*).

The standard prescribed for un-ionised ammonia in Salmonid Rivers is 0.02 mg/l as NH_3 (0.0164 mg/l NH_3-N), as per the revoked Salmonid Regulations (S.I. No. 273 of 1988).

Total Ammonia in water exists as an equilibrium of toxic Un-ionised Ammonia (NH_3) and benign Ionised Ammonium (NH_4^+); [NH3 + H2O ↔ NH_4^+ +OH^-]. The principal factors mediating this equilibrium are pH and temperature. As pH and temperature increase, the levels of Un-ionised Ammonia in solution increase.

It should be noted that, in the absence of the proposed discharge and at existing monitored Total Ammonia levels, the Feeghroe Stream alone has been predicted to reach toxic levels of Un-ionised Ammonia (> 0.016 mg/l NH_3-N) at a pH of 8 and temperature of 20°C. These conditions may be common in un-shaded stretches of the Feeghroe Stream, particularly in summer months.

As outlined in assimilative capacity summary table for the Feeghroe (Table 10.4), while the proposed discharge would slightly reduce the levels of Un-ionised Ammonia in the stream,

the proposed discharge would not significantly mitigate against existing toxicity levels during periods with these ambient pH and temperature conditions.

The proposed maximum discharge of Total Ammonia is at a lower concentration than the existing monitored levels within the Feeghroe Stream. Therefore, the proposed discharge would dilute the existing concentration of Ammonia, and Un-ionised Ammonia, within the stream in proportion to the relative volume of the discharge.

It is not considered that that there would be a significant positive or negative deviation in existing toxic effects from Un-ionised Ammonia within the Feeghroe Stream as a result of this proposed discharge.

10.6.5 CUMULATIVE IMPACT

There are no other licenced industrial discharges to the Feeghroe Stream. Therefore, it is not anticipated that there would be a significant cumulative effect on the Feeghroe.

It is not considered that there would be a cumulative impact upon the quality of the Rapemills River, as there are no other discharges to the current river upstream or downstream of the proposed site.

The existing discharge from Banagher Concrete is to a historic section of the Rapemills River which is now isolated from the main channel. There is potential for cumulative impacts with this discharge during flood events on the River Shannon.

Owing to the similar nature of treated effluents, there is potential for cumulative impacts of discharges from Banagher UWWTP, other wastewater treatment plant emissions within the catchment and diffuse domestic pollution on the quality of the River Shannon.

The contribution to cumulative impacts from the proposed Banagher Chilling Ltd effluent discharge to water quality on the Shannon Catchment would be considered to be long term, slight negative impact.

10.6.6 "DO-NOTHING" IMPACT

Should the development not go ahead, there would be no changes to the existing water quality, habitats or species within the Feeghroe Stream, Rapemills Stream or wider Shannon catchment.

Water quality within the Feeghroe Stream would be expected to remain of "moderate" to "bad" status under the water framework directive, due to the influence of feed-waters from the Mullaghakaraun Bog.

There would be no loss of field drain (FW4) habitat within the boundary of the proposed development. As these habitats are of low ecological value, predominantly due to existing water quality and substrates, it is unlikely that the proposed site would be of significant ecological value in the future.

10.7 MITIGATION MEASURES

10.7.1 CONSTRUCTION PHASE

The following mitigation measures would be proposed to ensure there is no significant impact upon water quality or the aquatic biodiversity of the area owing to a deterioration in water quality:

- The construction works contractor would adhere to standard construction best practice, taking cognisance of the Construction Industry Research and Information Association (CIRIA) guidelines "*Control of Water Pollution from Construction Sites; guidance for consultants and contractors*" 2001 and "*Control of Water Pollution from Construction Sites – Guide to Good Practice*", 2002;
- Cognisance would be taken of the 2016 guidelines published by Inland Fisheries Ireland, "*Guidelines on Protection of Fisheries During Construction Works in and adjacent to Waters*";
- Daily visual inspections would be undertaken of the Feeghroe Stream during construction works;
- Provision of silt control features where appropriate, such as silt fencing;
- Silt fencing (comprising of a porous filter fabric which detains sediment) would be provided along the entirety of the boundary of the Feeghroe Stream. Silt fencing would remain in place until the completion of construction works;
- Silt fencing would also be provided adjacent the drainage ditches onsite where required (it was noted during ecological visits that a number of the ditches were dry). Silt fencing would remain in place until such time as works have commenced on re-directing drainage channels (as per drawing IE1796-003 of the Site Specific Flood Risk Assessment report);
- Additional silt fencing would be placed adjacent to storage areas of stockpiled soil, until such time as the excavated soil has been used in landscaping / re-instatement works or removed offsite by a licenced waste contractor;
- Silt control features would be inspected on a daily basis and maintained as appropriate;
- Where spoil is generated, this would only be stored temporarily and away from watercourses. Where possible, spoil would be covered or alternatively, graded to avoid ponding or water saturation;
- Excavations and earth-moving activities would be planned outside periods of heavy rainfall, to limit the potential for suspended solids to become entrained within surface water run-off;
- Should water be encountered during excavation works, water would be pumped to a constructed silt control feature, such as a settlement pond or detention pond. A filter would be provided at the pump inlet and, where required, dewatering bags or silt fences would be used at the outlet to retain any potential silt entrained in the water. Pumping operations would be supervised at all times;
- Where possible, surface water run-off would be diverted from any areas of bare / exposed ground;

- All construction plant machinery and equipment would be maintained in good working order and regularly inspected;
- The temporary site compound would be used for the storage of all machinery and plant when not in use, the re-fuelling of plant and the storage of all associated oils and fuels for plant;
- Self-contained port-a-loos / holding tanks would be located at the temporary site compound and would be emptied by a licenced contractor on a regular basis;
- Any fuels, oils or chemicals would be stored in accordance with the EPA guidance on the storage of materials, in designated bunded areas at the temporary site compound, with adequate bund provision to contain 110% of the largest drum volume or 25% of the total volume of containers;
- Material storage areas would be appropriately labelled and marked;
- The designated area for the storage of hydrocarbons would be inspected on a regular basis;
- Deliveries of fuels and oils to the site would be supervised and records maintained;
- All loading and unloading of hydrocarbons would take place within the bunded area where possible;
- Fuels / oils would be handled and stored with care to avoid spillage or leakage;
- Where appropriate, small construction plant equipment would be placed on drip trays;
- Any waste fuel / oils would be collected in bunded containers at a designated area within the temporary construction compound and properly disposed of to an authorised waste contractor;
- Spill kits, adequately stocked with spill clean-up materials such as booms and absorbent pads, would be readily available onsite;
- In the unlikely event of a hydrocarbon spillage, contaminated spill clean-up material would be properly disposed of to an authorised waste contractor;
- Where re-fuelling of construction plant is required to take place onsite, re-fuelling would take place within a bunded area, within the temporary site compound. Under no circumstances would re-fuelling take place within the immediate vicinity of watercourses, including drainage ditches;
- Where construction plant shows signs of hydrocarbon leakage, site personnel would cease the operation of the item in plant in question. Any defective plant would be kept out of service until the necessary repairs are undertaken;
- The use of pre-cast concrete where possible;
- The delivery and pouring of concrete would be supervised at all times;
- The pouring of concrete would be avoided during periods of expected heavy rainfall;
- Concrete would be poured directly into the shuttered formwork from the Ready-Mix Truck, reducing the risk of spillage;
- The wash-out of Ready-Mix Truck drums would not be permitted onsite, in the environs of the site, or at a location which could result in a discharge to surface water;

- Surplus uncured concrete would be returned to the batching plant where possible;
- An impermeable concrete washout area would be installed, if required, by the construction works contractor at the temporary site compound. Excess uncured concrete not returned to the batching plant, in addition to chute washings, would be deposited in the designated concrete washout area. The construction works contractor would arrange for the removal of concrete from this area at regular intervals during the construction phase;
- It is not envisaged that vehicle wheel wash facilities would be required. However, in particularly dry weather, additional dust control measures may be required, including the provision of a wheel wash facility. Should a wheel wash facility be required, it would be located at an area isolated from any watercourses. The associated run-off would be collected via a settling pond;
- Particular care would be taken during the construction of the discharge point outfall. Plant operation within the Feeghroe Stream would be avoided. Mitigation measures specified above for suspended solids, concrete and hydrocarbons would be followed;
- To minimise any potential impacts on salmonid fish, outfall works would be undertaken in the July to September period where possible, which would avoid the salmonid spawning season. Should outfall works be required outside the July – September timeframe, works would only commence upon prior agreement with IFI;
- Where possible, works on re-directing drainage ditches would be undertaken in dry weather conditions, preferably when the drainage ditches are dry. The proposed new channels would be first constructed, with the existing drains then blocked off / diverted to the new channels. The existing channel within the western portion of the site would be incorporated within the proposed ICW system;
- Monitoring of receiving water for suspended solids would be undertaken where required;
- In the unlikely event of a suspected deterioration in water quality within any of the watercourses due to construction works at the development site, works would immediately cease, an investigation into the cause undertaken and the relevant NPWS and Inland Fisheries Ireland personnel informed;
- The construction work contractor would prepare a detailed Construction Environmental Management Plan (CEMP) for all construction activities, in line with the Outline CEMP prepared as part of this application. The CEMP would describe how construction work would be undertaken in an environmentally sensitive manner and would include measures for the protection of water quality such as the implementation of silt control features.

10.7.2 OPERATIONAL PHASE

The following mitigation measures would be proposed to ensure there is no significant impact upon water quality or aquatic biodiversity of the area owing to a deterioration in water quality during the operational phase:

- The site would ensure that any fuels, oils or chemicals would be stored in accordance with the EPA guidance on the storage of materials, in designated, bunded areas, with adequate bund provision to contain 110% of the largest drum volume or 25% of the total volume of containers. Bunds and bunded areas would undergo integrity testing every three years, as is best practice;
- The site would ensure that an adequate supply of spill clean-up material is readily available, in the event of any spillages onsite, thereby minimising the potential for spills / leaks to impact upon the biodiversity of the area;
- The proposed WWTP would be bunded by design, which would ensure that any potential spills within this area would be returned to the wastewater treatment process;
- Drainage from hardstand areas would pass through a SuDS storm water system, which would reduce the rate of emissions and remove suspended solids. The system would include a silt trap and by-pass separator;
- The final sump of the WWTP would have an emergency return connection to the balancing tank, providing storage for emergencies or other such contingency purposes;
- Should planning consent be granted, Banagher Chilling Limited would apply to Offaly County Council for a Local Authority Section 4 (Trade Effluent) Discharge Licence. Proposed emission limit values would be assessed by Offaly County Council, and once agreed, would be specified within the discharge licence;
- Banagher Chilling Limited would be required to undertake scheduled monitoring of the discharge for the parameters specified by the County Council in the discharge licence. This monitoring would ensure that final treated effluent quality would remain high, and that any slight increases in parameter results would be identified and addressed prior to the potential for impact upon the Feeghroe Stream.

10.8 RESIDUAL IMPACTS

Assuming all mitigation measures are put in place, there would be no significant residual impacts to the aquatic environment from the proposed development.

10.9 DIFFICULTIES ENCOUNTERED IN COMPILING INFORMATION

Surface water physico-chemical monitoring results, which informed the Assimilative Capacity Assessment of the Feeghroe Stream, were average results of three samples taken over the course of approximately 1 month, between September 2018 and October 2018. There were no other historic monitoring records for the Feeghroe Stream. While these results provide representative samples of the existing water quality of the stream, they comprise a small sample of the overall water quality regime.

Every effort has been made to provide an accurate assessment of the situation pertaining to the site. However, an ecological survey can only assess a site at a particular time, and is limited by various factors such as the season, timing of the survey, climatic conditions and species behaviour. Ecological surveys are therefore snapshots in time and should not be regarded as a complete study. Direct observations or evidence of protected species is not always recorded during ecological surveys. However, this does not indicate that the species is absent from the site.

10.10 REFERENCES

BREF Document for Slaughterhouses and Animals By-products Industries (2005). *Reference Document on Best Available Techniques in the Slaughterhouses and Animal By-Products Industries.*

Chartered Institute of Ecology and Environmental Management (2016) *Guidelines for Ecological Impact Assessment in the UK and Ireland*.

CIRIA (2002) *Control of Water Pollution from Construction Sites – Guide to Good Practice.*

CIRIA (2001) *Control of Water Pollution from Construction Sites; guidance for consultants and contractors*.

Council Directive (EC) 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy – more commonly known as the Water Framework Directive.

DoEHLG (2009) *Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities*.

Environmental Protection Agency Ireland (Environmental Protection Agency) (2001). *Parameters of Water Quality: Interpretation and Standards.* Environmental Protection Agency, Wexford.

Environmental Protection Agency (2017) Draft. *Guidelines on the information to be contained in Environmental Impact Assessment Reports*.

Environmental Protection Agency (2010). *A Handbook on the Implementation of the Regulations for Water Service Authorities for Public Water Supplies.* Available at: http://www.epa.ie/pubs/advice/drinkingwater/publicwatersupplieshandbook/Introduction.pdf

Environmental Protection Agency (2008). *Drinking Water Regulations Guidance Booklet No.4*.

EPA Envision Online Mapping, Available at: http://gis.epa.ie/Envision/

EPA Catchment Information Mapping, Available at: https://www.catchments.ie/maps/

EPA (2018) *WFD Cycle 2 – Lower Shannon – Sub Catchment Shannon [Lower]-SC-40 Assessment Report*, Available at: https://www.catchments.ie/wp-content/files/subcatchmentassessments/25B_1%20Shannon[Lower]_SC_040%20Subcatchment%20Assessment%20WFD%20Cycle%202.pdf

ESBI & Aquatic Services Unit (2018) *West Offaly Power Thermal Discharge Synthesis Report*, Available at: https://westoffalypower.ie/documents/Environmental_Docs_Vol_3_EIAR_Appendices/Appendix%206.2%20WOP%20Synthesis%20Report.pdf

ESB (2013), *Fisheries Conservation Annual Report 2013*, Accessed at: https://www.esb.ie/docs/default-source/investor-relations-documents/esb-annual-report-2013

European Communities Environmental Objectives (Surface Waters) Regulations (S.I. No. 272 of 2009).

European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009 (S.I. 296 of 2009)

European Communities (Quality of Salmonid Waters) Regulations (S.I. No. 293 of 1988).

European Communities (Quality of Surface Water Intended For The Abstraction of Drinking Water) Regulations (S.I. No. 294 of 1989).

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

Hellawell, J.M. 1986. Biological indicators of freshwater pollution and environmental management. (Pollution monitoring Series, K. Mellanby (ed.)). Elsevier Applied, Science, London. 546 p

Inland Fisheries Ireland (2016). *Guidelines on Protection of Fisheries During Construction Works in and adjacent to Waters.*

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

Koivunen, J., Siitonen, A. and Heinonen-Tanski, H. (2003). Elimination of enteric bacteria in biological-chemical wastewater treatment and tertiary filtration units. *Water Research*, 37, pp. 690-698.

Midland Regional Authority (2010) *Regional Planning Guidelines for the Midland Region 2010 – 2022*.

Mittal, G.S. (2004). Characterization of the Effluent Wastewater from Abattoirs for Land Application. *Food Reviews International*, 20(3), pp. 229-256.

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

NPWS (2018). *Conservation Objectives: River Shannon Callows SAC 000216.*

NPWS (2013). *Site Synopsis: River Shannon Callows SAC 000216.*

NPWS & Browne Dunne Roche (2002). *A Preliminary Study of the Upper Shannon Floodplain*. Unpublished Report, National Parks and Wildlife Services, Department of Arts, Heritage and the Gaeltacht

NPWS (2013a) *The Status of Protected EU Habitats and Species in Ireland*. Volume 1. Unpublished Report, National Parks and Wildlife Services, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013b) *The Status of EU Protected Habitats and Species in Ireland.* Habitats Assessments Volume 2. Version 1.0. Unpublished report. National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin.

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

National Parks & Wildlife Service, Available at: http://www.npws.ie/protected-sites

Offaly County Council (2014) *Offaly County Development Plan 2014 – 2020*. Available at: https://www.offaly.ie/eng/Services/Planning/Development-Plans/County-Development-Plan-2014-2020/

Rajala, R.L., Pulkkanen, M.P, Pessi, M. and Heinonen-Tanski, H. (2003). Removal of microbes from municipal wastewater effluent by rapid sand filtration and subsequent UV irradiation. *Water Science & Technology*, 47(3), pp. 157-162.

Reynolds, J.D. (1998) Conservation management of the white-clawed crayfish, Austropotamobius pallipes. Part 1. *Irish Wildlife Manuals*, No. 1. National Parks and Wildlife Service.

Russo, R.C., Smith, C.E. and Thurston, R.V. 1974. Acute toxicity of nitrite to rainbow trout (Salmo gairdneri). J. Fish. Res. Board Can. 31: 1653-1655.

Russo, R.C. and Thurston, R.V. 1991. Toxicity of ammonia, nitrite and nitrate to fishes, pp 58-89. In, Brune, D.E. and Tomasso, J.R. (editors), Aquaculture and Water Quality. The World Aquaculture Society, Baton Rouge, Los Angeles. 606 p.

Solbé, J.F. de L.G. and Shurben, D.G. 1989. Toxicity of ammonia to early life stages of rainbow trout (Salmo gairdneri). Wat. Res. 23: 127-129.

Stickney, R.R. 1991. Salmonid life histories. In, Stickney, R.R. (editor), Culture of Salmonid Fishes. CRC Press, Inc. Boca Raton. pp 1 - 20.

USEPA (2004). *Technical Development Document for the Final Effluent Limitations – Guidelines and Standards for the Meat and Poultry Products Point Source Category*.

Wcislo, R. and Chróst, R.J. (2000). Survival of Escherichia coli in Freshwater. *Polish Journal of Environmental Studies*, 9(3), pp. 215-222.

World Health Organisation, (2002). *Managing Water in the Home: Accelerated Health Gains from Improved Water Supply*.

WSTG (2011). *Guidance, Procedures and Training on the Licensing of Discharges to Surface Waters, Groundwater and to Sewer for Local Authorities: Volume 1 – Technical Guidance Manual.* Water Services Training Group, Monastery Road, Roscrea, Co. Tipperary.

11.0 LAND – SOILS, GEOLOGY AND HYDROGEOLOGY

11.1 INTRODUCTION

This section describes the existing land, soils and water environment in terms of the baseline environment underlying the proposed extension to an existing abattoir and the surrounding area. Based on this information, the potential impacts of the proposed extension are identified, as are the measures required to mitigate any identified negative impacts on the land, soils and water environment.

11.2 METHODOLOGY

This chapter has been prepared in accordance with the following guidelines from the Environmental Protection Agency (EPA) and the Institute of Geologists of Ireland (IGI):

- Environmental Protection Agency (EPA). *Guidelines on Information to be contained in Environmental Impact Statements* (EPA, 2002).
- EPA (2017). *Guidelines on the Information to be contained in Environmental Impact Assessment Reports, Draft 2017*.
- IGI (2013). *Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements*. Institute of Geologists of Ireland.

The potential impact of the proposed extension to the existing abattoir on the land, soils and water has been assessed by classifying the importance of the relevant attributes and quantifying the likely magnitude of any impact on these attributes.

This impact assessment methodology is in accordance with the guidance outlined in *Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements* published by the Institute of Geologists of Ireland in 2013.

For the purpose of this assessment the impacts of the proposed extension to the existing abattoir on the surrounding environment, the wider study area includes up to a 2km radius from the site. The extent of the wider study area was based on the IGI (Institute of Geologists of Ireland) guideline which recommends a minimum distance of 2km. Where necessary, the study was extended beyond the 2 km limit, following the precautionary principle. The IGI's and EPA's recommended methodology for assessing impacts was used. Each potential impact was described in terms of its Type, Quality, Significance and Duration.

11.3 INFORMATION SOURCES

Data used in the baseline assessment was collected from the following available sources:

- Historical and recent mapping from Ordnance Survey Ireland (OSI).
- Aerial Imagery from Google Maps and Bing Maps.
- Teagasc Subsoil Mapping.

- Geological Survey of Ireland (GSI).
- Environmental Protection Agency (EPA).
- EPA Catchments Website.
- National Parks & Wildlife Service (NPWS).
- National Flood Hazard Mapping (Office of Public Works, OPW).
- Mét Eireann.

The following surveys/reports were commissioned in relation to the site and their findings fed into the preparation of this chapter:

- *Geophysical Survey. Boheradurrow, Banagher, Co. Offaly*. MGX Project No. 6415, MGX File Ref.: 6415d-005. Minerex Geophysics, 25th February 2019.
- *Site Specific Flood Risk Assessment. Banagher Chilling Ltd. Banagher, Co. Offaly*. IE Consulting, IE1796-3149. April 2019.
- *Effluent Process Description. Banagher Chilling Ltd. Banagher, Co. Offaly*. Panther Environmental Solutions Ltd, PES_ETP_19_9201, 15th March 2019.
- *Integrated Constructed Wetlands. Banagher Chilling Ltd*. Planning Report, Boheradurrow and Meenwaun, Banagher, Co. Offaly. VESI Environmental Ltd. April 2019.

11.4 DESCRIPTION OF EXISTING SITE

The existing facility at Meenwaun was originally developed as an abattoir by the Lynch family in the 1990s and was acquired by Banagher Chilling Limited in 2018. The abattoir facility is located in the town land of Meenwaun, while the proposed extension and associated development will be located within the town land of Boheradurrow, Co. Offaly, as shown in Figure 11.1.

Within the landholding, there is an established farmyard complex of buildings and an existing permitted abattoir extending to approximately 748 m^2.

The existing abattoir facility was managed by Ossory Meats, and has ceased operation circa November 2016. At the time of their operation, Ossory Meats were slaughtering 100 cattle per week, and for a period, the site was also slaughtering horses under their licence.

The existing abattoir development is comprised of the following:

- Main building housing the slaughter hall, boning hall, cold room, loading area and amenities (including offices, locker rooms, kitchen and toilets);
- Lairage and holding pen areas;
- Offal skip shed;
- Septic tank and percolation area servicing staff facilities;

- Surface water tank;
- Wastewater treatment system, comprising of inlet sump and storage sump;
- Lorry-wash.

The existing abattoir and proposed extension are detailed in *Attachment 2.3 / Drawing Ref. 1806-06-5*.

11.5 LAND & SOIL BASELINE ENVIRONMENT

This section describes the existing baseline land & soils environment in terms of the land and soils underlying proposed extension to the existing abattoir and the surrounding area.

11.5.1 SITE SETTING & TOPOGRAPHY

The site is located at Boheradurrow, approximately 3.5 km south east of Banagher, Co. Offaly. The site is located on the L3010, 0.25 km off the R438 from a junction known as the '*Five Cross Roads'*. The national secondary road, the N62 is located approximately 7 km to the east. The location and site are outlined on Drawing No. *IE1746-001-Site location & boundary*, in Attachment 11.1. A slaughter house, lairage, office and associated facilities are located onsite; along with a farm yard comprising several cattle sheds. Overall, the site is dominated by large, open green field areas.

The site is relatively flat, with Ordnance Survey Mapping indicating it slopes gently from east (60 mOD) to west (50 mOD), as shown in Figure 11.1. Mullaghakaruan Bog is located along the northern boundary of the site. This bog has been extensively worked and in parts is covered with dense gorse. The bog contains a narrow-gauge rail network which was constructed to transport harvested peat to the now decommissioned Lumcloon Power Station, 12 km North West of the site.

To the south, an area of managed forestry is present. Farm land bounds the site to the South East, while the R438 bounds the site to the West. The River Shannon flows in a South Westerly direction and is located approximately 4.5 km North West of the site. The River Brosna, a tributary of the Shannon flows North Westwards approximately 5 km South of Boheradurrow. The Meenwaun Wind Farm is located to the east of the site.

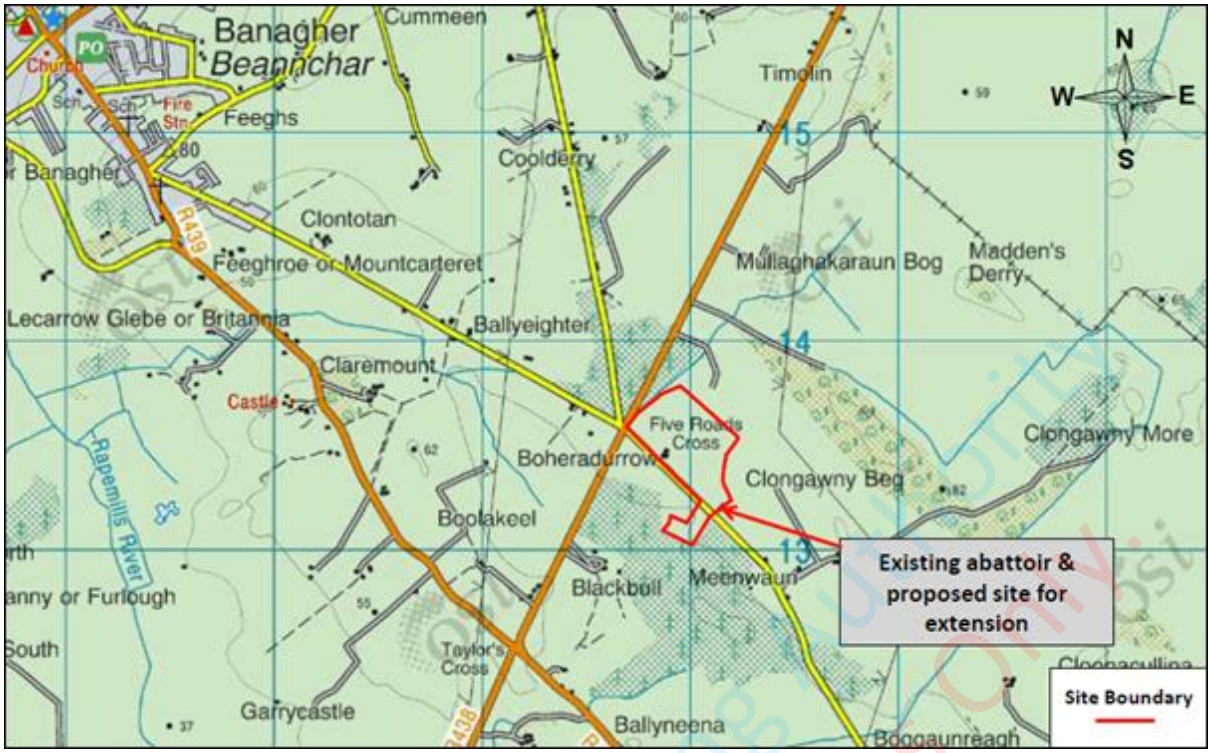

Figure 11.1: Site Location

11.5.2 HISTORIC LANDUSE

Historical mapping and aerial imagery from Ordnance Survey Geohive suggests the site has been in agricultural use throughout history, with a farm yard/buildings present onsite where the current farm yard/sheds are located, since 1837, as shown in Drawing No. *IE1746-003-Historic Map 6 inch Black & White (1837-1842*), in Attachment 11.1. OSI Aerial imagery from 1995 shows the current abattoir facility in the south east of the site.

11.5.3 REGIONAL SOILS & SUBSOILS

Soil is the top layer of the earth's crust which supports the growth of crops, plants and many microorganisms. The formation of soil is dependent upon geology, climate, vegetation, altitude, landform shape and finally management over time. Soil landscapes found in Ireland are a consequence of the changing climatic conditions over the last 100,000 years (with periods of glaciation, the last of which was c.12, 000 years ago) and the management of land by farmers.

Soils can be subdivided into topsoil and subsoil. Topsoil is the active layer at ground level where living organisms occur. In soil science this is referred to as the 'A' and 'B' horizons. Subsoil is the loose uncemented (unlithified) sediments present between the soil 'B' horizon and bedrock. In soils science this is termed the 'C' horizon.

Reference to GSI (Geological Survey Ireland) and Teagasc soil mapping indicates the soils throughout the region are dominated by **raised peat**, and **poorly drained basic mineral soils**. The Regional Soils are outlined in Drawing No. *IE1746-004-Regional Soil Mapping*, in Attachment 11.1.

Regional subsoils consist of **till derived from limestone** and **cut over raised peat**. Gravels derived from limestones are also mapped in the wider region. The regional sub-soils are outlined in Drawing No. IE1746-005-*Regional Subsoil Mapping*, in Attachment 11.1.

11.5.4 SITE SPECIFIC SOILS & SUBSOILS

The soils mapped across the site are dominated by **peat** along the North of the site with the remained of the site covered in a **'fine loamy' drift with limestone clasts** (a poorly drained basic soil).

The sub-soils underlying the soil are mapped as **till derived from limestones** with **peat** present in the North West and along the Northern boundary of the site.

A geophysical survey was completed across the site to investigate the ground conditions, identify areas of soft ground and determine the depth to rock. During the geophysics survey, the surveyors noted that the soils in the North West of the site were peat rich and very soft. The results of the geophysical survey suggest the soils and sub-soils throughout the site are loose to mildly stiff.

The topographic high points were found to contain sand and gravels. Overall, the depth of the soils/sub-soils does not vary greatly throughout the site (between 4 to 8.5 mbgl). The South West and West of the site were identified as having the shallowest bedrock. The subsoils overlay an upper bedrock zone which is highly weathered. Seismic refraction surveying suggests that these soils and sub-soils are extractable by digging. The geophysical report is contained in Attachment 11.3.

Further investigation of the soils/subsoils by intrusive investigation (trial pits/boreholes) will be undertaken to inform engineering design of the complex.

11.5.5 REGIONAL BEDROCK & STRUCTURAL GEOLOGY

The GSI Online bedrock mapping indicates the site, including the region around the site is underlain by the **Waulsortian Limestone Formation**. Waulsortian Limestone is described as dominantly pale-grey, crudely bedded or massively bedded limestone. Waulsortian Limestone is common throughout the central plain of Ireland.

The **Lucan Formation** is mapped in the South East of the site, in contact with the Waulsortian Limestone Formation. The Lucan Formation is also known as '*Calp*' and consists of dark-grey to black, fine-grained, occasionally cherty, micritic limestone that weathers to a pale grey colour. The Lucan Formation overlies the Waulsortian Formation.

There is evidence of limited karstification in the Lucan Formation, which may occur in the slightly more pure limestone zones. There is likely an epikarstic layer of 1-2 m at the top of the pure Waulsortian Limestone. The Ballysteen Formation is mapped 2 km to the west. This Formation consists of irregularly bedded and nodular bedded argillaceous bioclastic limestones (wackestones and packstones), interbedded with fossiliferous calcareous shale.

Regionally the structural geology consists of a series of major North East – South West striking normal faults, with a series of minor North West – South East striking, younger faults. The closest mapped, most probable location of a fault is 1.10 km south the proposed

extension to the existing abattoir, which strikes North West – South East. The Regional Bedrock and Structural geology is presented in Drawing No. IE1746-007-*Regional Bedrock & Structural Geology*, in Attachment 11.1.

The GSI Borehole Database indicates that there are no boreholes on site. The closest borehole is 2.5 km to the North East, located in the town land of Clongawny More (GSI ID: 1071). This borehole encountered bedrock at a depth of <1m; and no other information is available for this borehole.

11.5.6 SITE SPECIFIC BEDROCK & STRUCTURAL GEOLOGY

According to the GSI Bedrock Map, the Lucan Formation underlies the south east of the site, while the Waulsortian Limestone Formation underlies the remainder of the area. The Lucan Formation overlies the Waulsortian Formation. A geological contact between the Lucan and Waulsortian Formation is mapped in the South East of the site, as indicated on the GSI Bedrock Map. This is outlined in Drawing No. IE1746-007-*Regional Bedrock & Structural Geology*, in Attachment 11.1.

A geophysical survey was completed across the site to investigate for the ground conditions; determine the depth to rock; estimate the rock quality; establish the presence of fractures/faults; investigate the presence of karst; and identify potential locations for trial well drilling to develop a water supply on site.

The electrical resistivity data identified the presence of a geological contact or gradational zone whereby the bedrock changes composition from a strong clean limestone (Waulsortian Formation) to a muddier softer form of limestone (Lucan Formation) in the North West of the site.

This corridor where the bedrock transitions from the Waulsortian to the Lucan Formation is a zone of weakness, which is susceptible to karstification.

An extensive zone of karst was identified in the Northwest of the site, which correlates to the gradational boundary between the Lucan and Waulsortian Formations.

A linear karst feature has been identified running in a South West – North East direction, immediately south of the abandoned farm yard. Elsewhere, localised karst anomalies were identified in the south of the site, running parallel to the L3010 road.

Section 11.5.9.3 contains further details on the karst geology of the site.

Results of the geophysical survey indicate that the depth to bedrock across the site varies between 4m to 8.5 m below ground level. The South West and West of the site were identified as having the shallowest bedrock. The upper zone of bedrock across the site is either weathered or overlain by firm to stiff, dense overburden. Below the weathered zone, the geophysical survey suggests the limestone on site is fresh and strong. The geophysical report is contained in Attachment 11.3.

Further investigation of the bedrock by intrusive investigation (boreholes) will be undertaken as part of detailed design.

11.5.7 GEOLOGICAL HERITAGE

The GSI Heritage Database indicates that there are no geological heritage features on the site or within 2 km of the site. The closest geological heritage feature is located 2.7 km to the south of the proposed extension to the existing abattoir. Kilcormac Esker (Site Code: OY018) is mapped as a County Geological Heritage Site. It is classified under theme 7 – Quaternary. The feature is indicated as being recommended for a National Heritage Area (NHA) status.

The Kilcormac Esker and surrounding sands and gravels include an exceptionally large accumulation of sands and gravels deposited under the ice sheet and at its margin as the ice withdrew westwards across Offaly at the end of the last Ice Age. The esker forms part of the much larger Killimor-Birr-Fivealley-Kilcormac Esker System, which extends across the Midlands for over 70 km in linear extent.

The Crancreagh Mushroom Rock (Site Code: OY011), located approximately 4.5 km North East of the site is designated a County Geological Heritage Site. It is classified under theme 1 – Karst. The feature is essentially an isolated upstanding of rock in a grass field. The feature is indicated as being recommended for NHA status. The Regional Geological Heritage surrounding the site is outlined in Drawing No. *IE1746-008- Geological Heritage*, in Attachment 11.1.

11.5.8 ECONOMIC GEOLOGY

Economic geology is concerned with the Earth's material which can be used for economical/industrial purposes. Following a review of the GSI Online Mapping Viewer peat extraction was identified as an economic deposit within 2 km of the site. Mullaghakaruan Bog has an extensive Industrial Railway Network, which was used to transport harvested peat to the Lumcloon Power Station for electricity generation. Lumcloon Power Station is located approximately 12 km North West of the Proposed Site. Lumcloon Power Station has ceased operations.

11.5.9 GEOHAZARDS

A geohazard is a geological event, which can pose a risk to; or lead to an event which can cause harm or damage to human life and infrastructure. Regional and site specific geohazards are outlined in the Sections below.

11.5.9.1 Landslides

The GSI Landslide Database indicates that there are no recorded landslides on or within the proposed extension to the existing abattoir and surrounding area, or within 2 km of it. The closest landslides recorded are as follows:

- Clonoghil Lower – 10 km South East of the proposed development site, a landslide occurred in an area of cutover blanket bog. The resultant damage a blockage to a road, in 1920. Event ID: GSI_LS03-0054.
- At Derry Bridge (Derrycarney) – 15 km North East of the proposed development site, a landslide occurred along the Grand Canal in 1954, which did not result in any infrastructure damage. Event ID: GSI_LS03-0065.

These landslide locations in relation to the site are outlined in Drawing No. *IE1746-009-Landslides*, in Attachment 11.1.

11.5.9.2 Radon

Radon is a naturally occurring radioactive gas formed in the ground by the radioactive decay of uranium which is present in varying quantities in all rocks and soils. As a known carcinogen, in the same category as tobacco smoke and asbestos it is a cause of lung cancer. The EPA's online Radon Map was consulted. This map shows a prediction of the number of homes in a given grid square that exceed the national Reference Level (200 Bequerel per cubic metre (Bq/m^3)).

The EPA's Radon Map shows that the site is not in a High Radon area (where radon levels in >10% of homes are estimated to be above the reference level). Less than 1% of the homes in this 10km grid square of the proposed extension to the existing abattoir are estimated to be above the Reference Level of 200 Bq/m^3.

11.5.9.3 Karst

The GSI Online Karst Database indicates no karst features mapped on site. However, within the wider region of the proposed extension to the existing abattoir, there are several karst features mapped. These are outlined in Table 11.1. The location of these karst features relative to the proposed extension to the existing abattoir, are presented in Drawing No. IE1746-010-*Regional Karst Features*, in Attachment 11.1.

Table 11.1: Summary of the mapped karst features (GSI, 2019)

GSI ID	NAME	DISTANCE FROM SITE	STRATIGRAPHY	DESCRIPTION
2021SWK001	Milltown Swallow Hole	1.5 km SW	Lucan Fm	Located close to the boundary with the Waulsortian Formation
2021SWK003	All Saints Well	2.2 km SW		Spring discharge at surface
2021SWK003	All Saints Well	2.2 km SW		Spring discharge at surface
2021SWK004	Kilcannin Holy Wells	4.4 km NE	Waulsortian Fm	Spring
No ID available	Crancreagh Mushroom Rocks	4.5 km NE		Superficial solution features in clean limestone; located in the town land of Crancreagh
No ID available	Derrinlough Mushroom Rocks	4.7 km NE		Superficial solution features in clean limestone; located in the town land of Derrinlough
No ID available	Drinagh Mushroom Rocks	6.8 km E		Superficial solution features in clean limestone; located in the town land of Drinagh
2019NWK004	Tobernapoula Spring	6.42 km E		Located in townland of Ballynaguisha

The existence of karst could lead to subsidence under buildings and roads on site, especially if the drainage of the site is altered. The Geophysics Survey completed identified a substantial area of possible **karst along the North West portion of the site**. The electrical resistivity data suggests that this area of karst relates to the change in bedrock composition from a strong clean limestone (Waulsortian Formation) to a muddier, softer form of limestone (Lucan Formation) in the North West of the site.

Localised potential karst zones along the south of the site, parallel to the road at L3010 were identified during the geophysical survey. A linear karst feature has been identified running in a South West – North East direction, immediately south of the abandoned farm yard. Further investigation of these features by intrusive investigation is recommended.

A summary of the geophysical survey results are outlined in Drawing No. IE1746-006-*Summary of Geophysical Survey Results*, in Attachment 11.1. The geophysical report is contained in Attachment 11.3.

11.6 WATER BASELINE ENVIRONMENT

This section describes the existing water environment in terms of hydrology, flooding and hydrogeology in the area and surrounding environment of the proposed extension to the existing abattoir.

11.6.1 HYDROLOGY

11.6.1.1 River Basin & Surface Water Features

The site lies within the Shannon International River Basin District. The Shannon River Basin District is a transnational river basin, covering both the Republic of Ireland and Northern Ireland. Within the Shannon River Basin District, the site lies within the Lower Shannon Catchment (HA: 25B); and locally within the Little Brosna Sub Catchment.

The main surface water bodies within the vicinity of the site are the River Brosna; River Rapemills and Little Cloghan River, all tributaries of the River Shannon. The River Shannon flows southwards, into Lough Derg, which drains through the Shannon Estuary into the Atlantic Ocean at Kilrush, Co. Clare. The Grand Canal, the waterway linking the River Shannon and River Liffey in Dublin, is located north of the site at Shannon Harbour. The Feeghroe stream also referred to as the Mountcarteret in the literature/mapping forms the western boundary of the site.

Table 11.2 outlines the main surface water features within a 5 km radius of the proposed extension to the existing abattoir and they are shown in Drawing No. IE1746-011-*Regional Surface Water Features (Hydrology)*, in Attachment 11.1. The rivers/streams outlined in Table 11. 2, are not indicated as being salmonid according to the EPA GIS Portal. Figure 11.2 shows the streams within the immediate vicinity of the site.

Table 11.2: Surface water features in the region of the proposed extension

WATER BODY	PROXIMITY TO SITE	STREAM ORDER	COMMENTS
Feeghroe or Mountcarteret	<0.05 km W	2nd	Forms western boundary of site, flows SW. Rises in Mullaghakaraun Bog, tributary of Rapemills River
Timolin	<0.8 km N	1st	Within managed area of Mullaghakaraun Bog
Mullaghakaraun Bog	<0.5 km N	1st	Within managed area of Mullaghakaraun Bog; tributary of Rapemills River
Portavolla	2.3 km NW	1st	Tributary of Grants Island
Grants Island	2.7 km NW	1st	Tributary of River Shannon
Madden's Derry	3.3 km N	1st	Rises in Mullaghakaraun Bog
Little Cloghan	4.7 km NE	3rd	Tributary of River Shannon
Five Roads Cross	<0.7 km SW	1st	Tributary of Feeghroe Stream
Milltown	<1.1 km S	1st	Flows South, tributary of Rapemills River
Rapemills	2.5 km S	2nd	Tributary of River Shannon
Little Brosna	5 km S	5th	Tributary of River Shannon
Shannon	3.8 km W	7th	Flows southwards, through Banagher Town
Grand Canal	5.3 km N	n/a	Manmade waterway, joining the River Shannon north of Banagher town

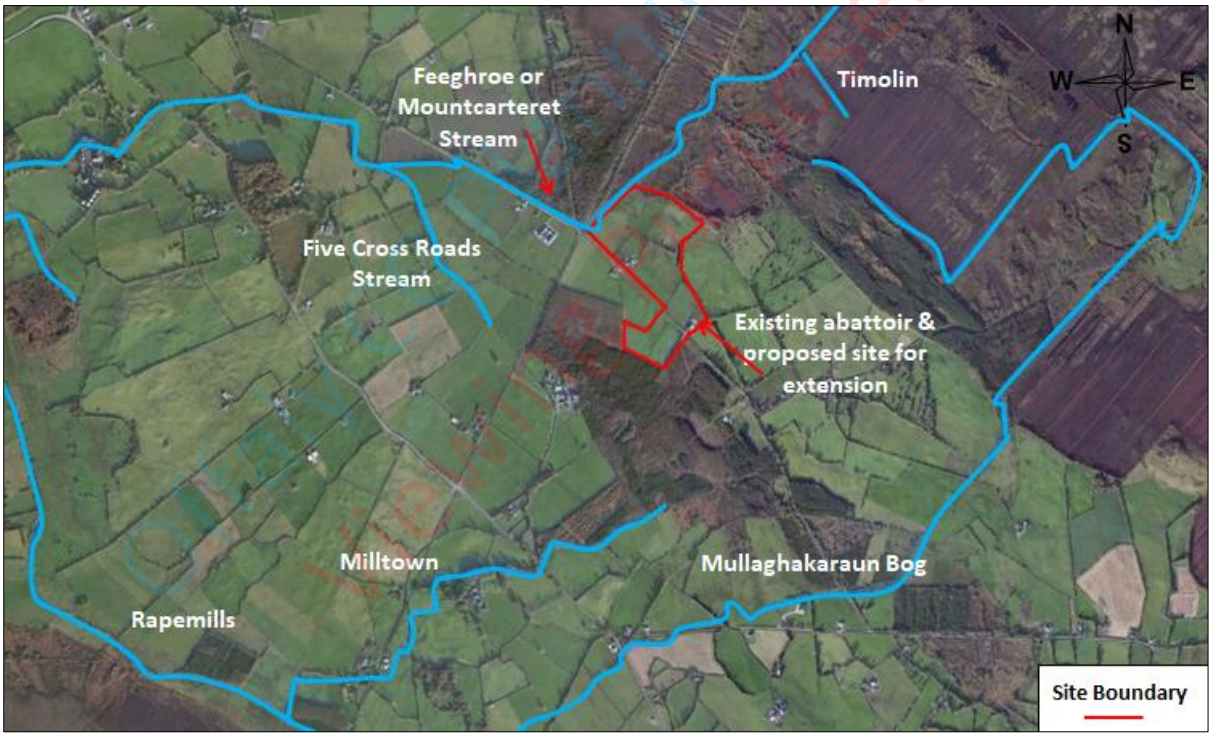

Figure 11.2: Surface water features in the immediate vicinity of the site.

11.6.1.2 Surface Waterbody Status, Pressure & Quality

For the purposes of the Water Framework Directive (WFD) the water quality status of the nearby surface water bodies has been categorised (2010-2015). In addition, the 'risk' of each water body not achieving 'good status' has also been assessed. The status and risk of the nearby surface water features are shown in Table 11.3. Surface Water bodies within the

immediate vicinity of the proposed extension to the existing abattoir were not assigned a status for the 2010-2015 monitoring period; and were all under review as of spring 2019.

The River Shannon, from Banagher Bridge upstream is designated as a Drinking Water River, along with its tributaries. The closest Drinking Water River to the site is the Grants Island Stream, a tributary of the River Shannon, located approximately 2.6 km north of the site. Drinking Water Rivers are outlined in Drawing No. IE1746-013-*Drinking Water Rivers*, in Attachment 11.1.

Drinking Water Rivers are those which are designated under Article 7: Abstraction for Drinking Water, of the WFD. Article 7 requires EU Member States to identify bodies of water for the abstraction of drinking water, and then to protect those water bodies so that the treatment regime will result in drinking water which meets the EU Drinking Water Directive (DWD) requirements. The EU DWD concerns the quality of water intended for human consumption, and its objective is to protect human health from the adverse effects of contamination.

Chapter 10 – Water Quality & Aquatic Biodiversity deals with the impacts of the proposed extension to the existing abattoir on water quality.

Table 11.3: WFD status for surface water features surrounding the site

WATER BODY	TYPE	STATUS 2010-2015	RISK OF NOT ACHIEVING GOOD STATUS
Feeghroe (Mountcarteret)	Stream	Unassigned	Under Review
Timolin	Stream	Unassigned	Under Review
Mullaghakaraun Bog	Stream	Unassigned	Under Review
Portavolla	Stream	Unassigned	Under Review
Grants Island	Stream	Unassigned	Under Review
Madden's Derry	Stream	Moderate	At Risk
Little Cloghan	Stream	Moderate	At Risk
Five Roads Cross	Stream	Unassigned	Under Review
Milltown	Stream	Unassigned	Under Review
Rapemills	River	Upper Catchment – Good; Lower Catchment – Unassigned.	Upper Catchment – Not at risk; Lower Catchment – Under Review.
Little Brosna	River	Upper Catchment – Good; Lower Catchment – Unassigned.	Upper Catchment – Not at risk; Lower Catchment – Under Review.
Shannon	River	Downstream of Banagher Bridge – Good; Upstream of Banagher Bridge – Unassigned.	Downstream of Banagher Bridge – Not at Risk; Upstream of Banagher Bridge – Under Review.

11.6.1.3 Site Hydrology

The site is relatively flat, with Ordnance Survey Mapping indicating it slopes gently from east (60 mOD) to west (50 mOD). Throughout the site there are several drainage channels/ditches. The Feeghroe (also known as the Mountcarteret stream) flows in a North-East to South-West direction adjacent to the western site boundary. The stream then flows in a South-East to North-West direction adjacent to the L3010 road. Throughout the site, there are several culverts to allow livestock/farm machinery pass over the drainage ditches to access each field. The site hydrology is outlined in Figure 11.3.

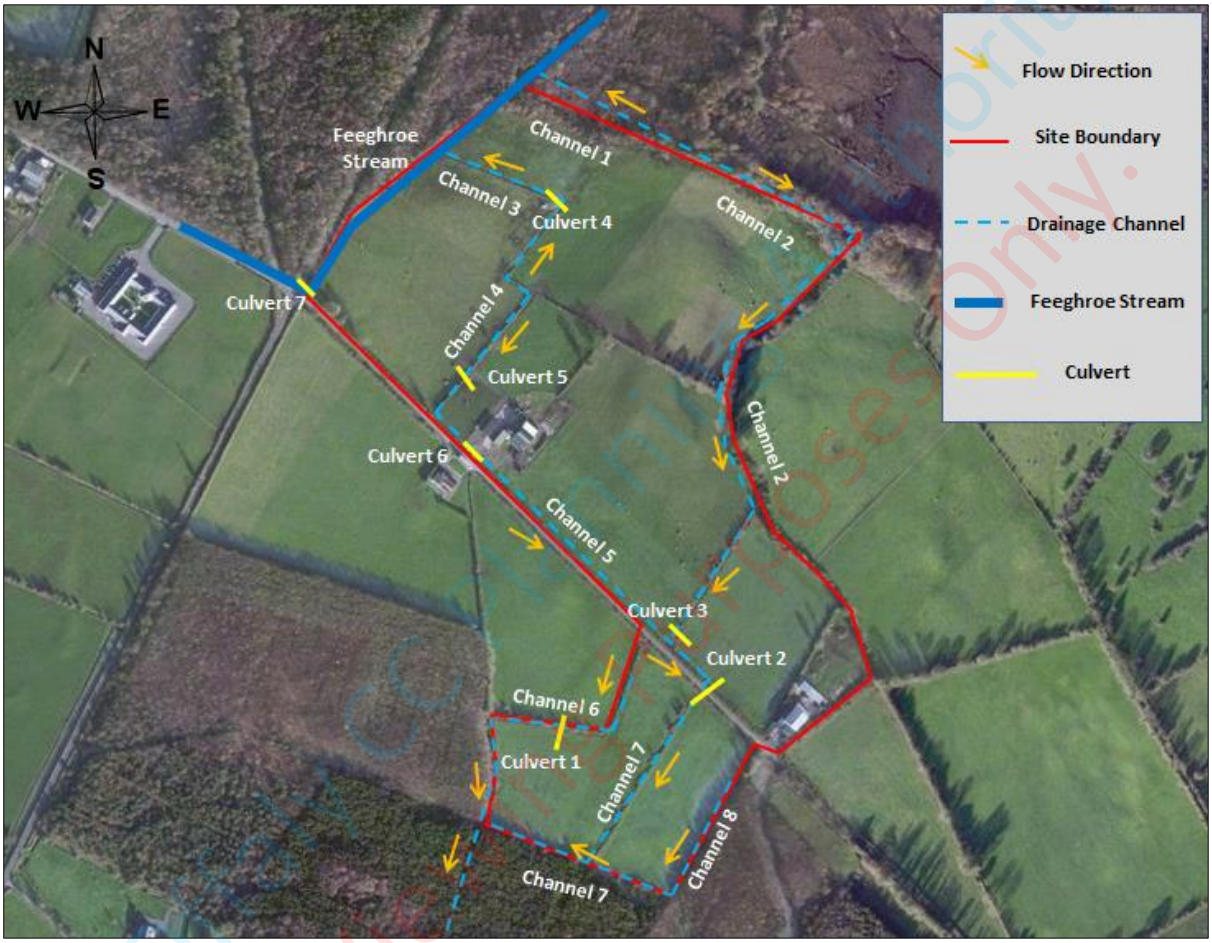

Figure 11.3: Site hydrology showing the drainage channels, culverts, flow directions and Feeghroe Stream.

11.6.1.4 Meteorology & Climatology Data

Monthly rainfall data (Table 11.4) and mean temperature data (Table 11.5) recorded at Gurteen Weather Station is outlined below. Gurteen weather station is located 10 km south of the proposed extension to the abattoir, in Co. Tipperary. The data shows that the rainfall is moderate, in the overall Irish context.

Table 11.4: Rainfall Data

Total Rainfall (mm) – Gurteen, Co. Tipperary													
Parameter	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Year**
2019	46.1	45.9	36.4										
2018	163.1	46.1	96.2	61.2	46.9	22.8	24.1	57.7	72.7	40.2	94.1	122.3	847.4
2017	41.2	62.9	98.7	16.9	81.5	92.5	58.9	95.8	103.7	111.0	95.0	124.4	982.5
2016	98.1	109.8	56.1	51.9	56.6	95.0	49.5	72.3	95.5	36.7	51.5	68.3	841.3
Mean	**96.4**	**66.2**	**74.5**	**59.8**	**68.0**	**71.8**	**66.7**	**84.9**	**74.8**	**103.8**	**89.8**	**91.5**	**948.2**

Table 11.5: Mean Temperature Data

Mean Temperature °C – Gurteen, Co. Tipperary													
Parameter	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Year**
2019	5.6	7.5											
2018	5.5	3.4	4.5	8.5	12.0	15.7	16.9	15.2	11.8	9.3	7.3	7.9	9.9
2017	5.9	6.0	7.8	8.4	12.0	14.3	15.0	14.2	12.4	11.0	6.8	5.4	10.0
2016	5.7	4.6	5.9	6.9	11.9	14.5	15.4	15.3	13.8	10.0	5.1	6.5	9.7
Mean	**5.2**	**5.3**	**6.7**	**8.1**	**10.8**	**13.6**	**15.3**	**14.7**	**12.7**	**9.9**	**7.2**	**5.5**	**9.6**

Long-term climate averages – rainfall and temperature for 1979-2008, at Birr, Co. Offaly, are presented in Table 11.6. Birr is located approximately 12 km south of the proposed extension to the abattoir. January is on average the coldest month, while July is the hottest month on average. October is typically the wettest month on average, while April is the driest month on average.

Table 11.6: Long term climate data for Birr, Co. Offaly

Long Term Climate Averages 1979-2008 - Birr, Co. Offaly													
Parameter	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Year**
Mean Monthly Rainfall Total (mm)	78.8	58.6	67.4	55.0	59.5	66.5	59.4	86.1	66.4	94.2	74.7	83.3	857.7
Mean Temperature °C	5.1	5.3	6.8	8.4	11.0	13.6	15.6	15.3	13.2	10.1	7.2	5.6	9.8

11.6.1.5 Site Specific Flood Risk Assessment

A site specific flood risk was completed for the site of the proposed extension to the existing abattoir facility and all the associated services and facilities. The flood risk assessment has determined that the majority of the proposed development site falls within **Flood Zone 'C' - Low to Negligible Probability of Flooding**. Developments in Flood Zone C are generally not considered at risk of fluvial flooding and would not adversely affect adjacent lands and properties from a flood risk perspective. There are some localised areas where fluvial flooding associated with potential culvert blockage may occur within the site.

The primary flood risk to the proposed development site can be attributed to a flood event in the Feeghroe Stream and a number of drainage channels located in the vicinity of the site.

Hydraulic analysis of the Feeghroe Stream and the drainage channels was carried out within the site.

This assessment has determined that all drainage channels and the Feeghroe Stream have sufficient hydraulic capacity to convey the 1 in 100 year (1% AEP – Annual Exceedance Probability) and 1 in 1000 year (0.1% AEP) flow rates. In consideration of the above analysis, the **fluvial flood risk to the proposed development site is considered to be low**.

The secondary flood risk to the proposed development site can be attributed to a potential pluvial event within the boundary of the site. 2-D surface water modelling was undertaken in consideration of an extreme 1 in 100 year rainfall event for duration of 6 hours including climate change. This assessment has determined that the pluvial flood risk to the site is considered to be low.

Secondary flood risk can also be attributed to a potential surcharge due to a blockage of the culverts located on the Feeghroe stream and drainage channels in the vicinity of the site. This may result in localised areas of flooding within the site. It is recommended that a maintenance programme is put in place to carry out quarterly checks to ensure all existing drainage channels and culverts are free from debris in order to prevent future blockage.

Part of the extension of the existing abattoir facilities requires some alterations to the existing site drainage channels:

- Removal of drainage channel No. 3, which is located within the proposed area of the Integrated Constructed Wetlands. This is a field drain and drains the lands immediately on either side within the boundary of the proposed development. This channel does not have an associated catchment upstream of the site. Therefore, their removal will not have any impact on the hydrological regime of the surrounding area.
- Removal of culvert 3, culvert 4, culvert 5 and culvert 6 which are no longer required for field access within the site.
- Diversion of drainage channel no. 2 and drainage channel no. 4 to accommodate the proposed development. This will require the installation of 2 culverts on the diverted route of channel no. 2 and channel no. 5. The diverted channel and new culverts will be designed to cater for the peak 1 in 1000 (0.1% AEP) flow rates including a 20% increase for climate change.

In consideration of the proposed drainage works and the implementation of a maintenance regime, to include quarterly monitoring of all existing and proposed drainage channels and culverts, the potential residual risk of culvert blockage to the site is considered to be low. Development of the site is not expected to result in an adverse impact to the hydrological regime of the area or increase flood risk elsewhere. Further details are contained in the report by *IE Consulting - IE1796-3149 - Site Specific Flood Risk Assessment - Banagher Chilling Ltd. Banagher, Co. Offaly, April 2019.*

11.6.2 HYDROGEOLOGY

11.6.2.1 Regional Hydrogeology

The GSI operates a classification system for aquifers, based on their hydrogeological characteristics, size and productivity. The have defined three main aquifer types:

- Regionally Important Aquifers.
- Locally Important Aquifers.
- Poor Aquifers.

The Waulsortian and Lucan Formations underlying the site, and the surrounding area are classified as a **Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones**. This is outlined in Drawing No. IE1746-014-*Regional Hydrogeology*, in Attachment 11.1. The proposed extension to the existing abattoir is located within the Banagher Groundwater Body (GWB), ID Code: IE_SH_G_040. The GWB is the management unit under the WFD that is necessary for the subdivision of large geographical areas of aquifer in order for them to be effectively managed.

Generally the Waulsortian and Lucan Formation limestone are unconfined aquifers due to the thin overburden but may be locally confined where the bedrock lies beneath the low permeability bases of raised bogs.

The bedrock aquifer flow paths are generally shallow and short, in the order of 30-300 m long, with groundwater discharging to the streams and rivers that traverse the aquifer. Local groundwater flows are determined by the local topography. There is no regional flow system within the GWB.

The rocks in this GWB are devoid of intergranular permeability. Therefore, groundwater flows occurs in fractures and faults. Zones of enhanced permeability can be encountered in fault zones. Permeability deceases with depth and most flow occurs within the upper 15 m of the bedrock. Significant yields can be achieved where wells intercept a fault zone.

This is demonstrated at the Banagher Water Supply Scheme (WSS), where borehole logs indicate the intersection with a large fault at 30-35 mbgl (meters below ground level). The Banagher WSS abstracts water from the Lucan Formation (Dinantian Upper Impure Limestones). The Waulsortian Limestones may have had their transmissivity enhanced further by dissolution of calcium carbonate along fractures, joints and bedding planes.

According to the Banagher GWB report, water levels are shallow, commonly <3 mbgl. At the Banagher WSS, <0.5 km North West of the proposed extension to the existing abattoir, static water levels vary between 2-5 mgbl.

Surface water bodies crossing the aquifer are generally gaining. Due to the shallow groundwater flow in this aquifer the groundwater and surface waters are closely linked. There are several fens and wetlands in the GWB that are dependent on groundwater.

Diffuse recharge will occur via rainfall percolating through the subsoil. The proportion of the effective rainfall that recharges the aquifer is largely determined by the thickness and permeability of the soil and subsoil, and by the slope. In general, due to the generally low permeability of the aquifers within this GWB, a proportion of the recharge will discharge rapidly to surface watercourses via the upper layers of the aquifer, effectively reducing further the available groundwater resources in the aquifer.

Groundwater discharges to gaining streams and rivers crossing the GWB, and to a few small springs. The specific dry weather flow of the Little Brosna River crossing GWB is very high (6.67 l/s/km^2). This is due to the presence of the overlying Birr Gravel Aquifer, which the river also crosses. The bedrock aquifers have low specific yields and are not capable of sustaining summer base flows.

Groundwater from the GWB has a strong calcium-bicarbonate signature. At the Banagher Water Supply Scheme, which abstracts water from the Lucan Formation (Upper Impure Limestone), groundwater is very hard (>350 mg/l as CaCO3) and has electrical conductivity values of 650-720 µS/cm.

In the Ballytsteen Formation, groundwater is also very hard (typically ranging between 380–450 mg/l), and high electrical conductivities (650–800 µS/cm) are often observed. Alkalinity is also high, but less than total hardness (250-370 mg/l as CaCO3), while pH is generally neutral. These values are typical of groundwater from limestone rocks across Co. Offaly (Cronin, 1999).

In the Lucan Formation, iron and manganese concentrations frequently fluctuate, often reaching problematic levels for drinking water supply. Hydrogen sulphide can often reach unacceptable levels in the Ballysteen Formation. These components come from the muddy parts of these rock units and reflect both the characteristics of the rock-forming materials and the relatively slow speed of groundwater movement through the fractures in the rock allowing low dissolved oxygen conditions to develop (Applin *et al.,* 1989).

11.6.2.2 Groundwater Vulnerability

Aquifer or groundwater vulnerability is a relative measure of the ease with which the groundwater could be contaminated by human activity and depends on the aquifer's intrinsic geological and hydrogeological characteristics. The vulnerability is determined by the permeability of any overlying deposits. For example, bedrock with a thick, low permeability, clay-rich overburden is less vulnerable than bedrock with a thin, high permeability, gravelly overburden.

The GSI uses five groundwater vulnerability categories – Extreme rock at or near surface or karst (X), Extreme (E), High (H), Moderate (M) and Low (L) for mapping purposes and in the assessment of risk to ground waters. The classifications are based on the thickness and permeability of the sub-soils overlying the aquifer. The classification is presented in Figure 11.4.

Depth to rock	Hydrogeological Requirements for Vulnerability Categories				
	Diffuse recharge			Point Recharge	Unsaturated Zone
	high permeability (sand/gravel)	Moderate permeability (sandy subsoil)	low permeability (clayey subsoil, clay, peat)	(swallow holes, losing streams)	(sand & gravel aquifers only)
0–3 m	Extreme	Extreme	Extreme	Extreme (30 m radius)	Extreme
3–5 m	High	High	High	N/A	High
5–10 m	High	High	Moderate	N/A	High
>10 m	High	Moderate	Low	N/A	High

i NA = not applicable.
ii Release point of contaminants is assumed to be 1–2 m below ground surface.
iii Permeability classifications relate to the engineering behaviour as described by BS 5930.
iv Outcrop and shallow subsoil (i.e. generally <1.0 m) areas are shown as a sub-category of extreme vulnerability.

(amended from Deakin and Daly (1999) and DELG/EPA/GSI (1999))

Figure 11.4: Groundwater vulnerability classification (GSI, 2019)

The vulnerability across the site is mapped as **Moderate (M) with localised zone of Low (L) vulnerability** mapped in the north west of the site. Groundwater vulnerability for the site is shown in Drawing No. IE1746-015-*Groundwater Vulnerability*, in Attachment 11.1.

Groundwater vulnerability correlates with the findings of the geophysics survey. The relatively thick, impermeable deposits of glacial till correlate with low groundwater vulnerability. The topographical high points which comprise sands and gravel are permeable, and are deemed to be of moderate vulnerability. This is not indicated on the GSI groundwater vulnerability mapping; however site specific information does allow modification of this.

11.6.2.3 Recharge

Recharge is the amount of rainfall that replenishes the aquifer. It is a function of the effective rainfall, the permeability and thickness of the subsoil and the aquifer characteristics. Effective rainfall is the amount of rainfall available as either recharge to groundwater or run-off to surface water after evaporation or take up by plants.

According to GSI the National Recharge Map, the recharge coefficient for the area of the proposed extension to the existing abattoir is 4%, which suggests that 96% of effective rainfall is available for runoff (480 mm), from the proposed site. Thus, the aquifer has a low recharge acceptance.

11.6.2.4 Site Specific Hydrogeology

The Waulsortian and Lucan Formations underlying the site, and the surrounding area are classified as a **Locally Important Aquifer (LI) - Bedrock which is Moderately Productive only in Local Zones**. A Locally Important Aquifer is defined as an aquifer unit capable of supplying locally important abstractions (e.g. smaller public water supplies, group schemes), or supplying 'good' yields (100-400 m3/d).

It is assumed that groundwater flow is towards the River, Shannon and the Feeghroe Stream, i.e. to the South West - West. No site specific information was available on the quality of the groundwater onsite. In the wider region, and which is common in limestone bedrock, the water is reported to have a strong calcium-bicarbonate signature with high electrical conductivities (650–800 µS/cm). Alkalinity is also high, but less than total hardness (250-370

mg/l as CaCO3), while pH is generally neutral. These values are typical of groundwater from limestone rocks across Co. Offaly (Cronin, 1999).

It is the intention of Banagher Chilling Ltd to develop a groundwater supply onsite to serve the existing and proposed extension to the abattoir. Two potential targets have been identified for trial well drilling following completion of the geophysical survey. The locations identified for potential trial well drilling are indicated in Drawing No. IE1746-020-*Potential Trial Well Locations - Identified by Geophysics*, in Attachment 11.1.

The expected water demand is 150-200 m^3/d and given the aquifer classification and the presence of viable targets, it is expected that the demand can be met from site. Following drilling, pump testing will be undertaken to establish the hydrodynamics of the aquifer and to explore its interaction with other water features. It is expected that the water quality will be similar to other areas in the same aquifer type, with high hardness, and the possibility of iron or manganese as well. Appropriate treatment processes will be designed and implemented to address these issues if they arise.

11.6.2.5 WFD Groundwater Body Status & Groundwater Quality

Under the requirements of the Water Framework Directive (WFD), the Banagher GWB was classified as having an overall Good Status for the 2010-2015 monitoring period. It was classified as 'not at risk' of achieving at least good ecological or chemical status in the next monitoring period.

11.6.2.6 Groundwater Dependent Features

This Section outlines those features which are groundwater dependent, and establishes their baseline for impact assessment within the context of this Section. These include Special Areas of Conservation (SAC); Special Protection Areas (SPA); Proposed Natural Heritage Areas (pNHA) and Natural Heritage Areas (NHA). A full review of ecological features and designated ecological sites in the study area are detailed in Chapter 9 – Terrestrial Biodiversity and Chapter 10 – Water Quality & Aquatic Biodiversity.

GWD Surface Water Features

The GWB has several streams which are fed by groundwater (GSI, 2003). Groundwater fed streams, also known as 'gaining streams' develop where the elevation of the stream is lower than that of the surrounding water table. Therefore, the head difference will cause groundwater to flow towards the lower head, thus into the Feeghroe Stream.

The closest major surface water feature, the Little River Brosna (5 km south of proposed extension to the existing abattoir) has been identified as a gaining stream. This is due to the presence of the overlying Birr Gravel Aquifer, which the river also cross cuts.

The Rapemills Stream is 2.5 km south of proposed extension to the existing abattoir and also crosses the Birr Gravel Aquifer. These features are within the Banagher GWB, and therefore require an impact assessment.

GWD Habitats

Habitats dependent on hydrogeological characteristics include Groundwater Dependant Terrestrial Ecosystems (GWDTE) and receptors that are dependent on groundwater flows or chemistries. The screening of all GWDTE sites within 6 km of the proposed extension to the existing abattoir is outlined in Table 11.7. The GWDTEs are outlined in Drawing No. IE1746-016-*Groundwater Dependant Terrestrial Ecosystems*, in Attachment 11.1.

Table 11.7: Groundwater dependent terrestrial ecosystems in the vicinity of the proposed site for the extension.

NAME	PROXIMITY	SCREENING	RESULT
All Saints Bog SPA (004103); All Saints Bog & Esker SAC (000566); NHA.	2.4 km SW	SAC south of the development; and within GWB.	Include in Impact Assessment to follow precautionary principle
Middle Shannon Callows SPA (004096) – part of River Shannon Callows (000216); pNHA.	3.47 km W	Within GWB	No impact assessment required due the distance from the existing abattoir and proposed extension.
River Little Brosna Callows SPA (004086); NHA.	3.5 km S		
Dovegrove Callows SPA (004137); pNHA.	5.6 km SE		
Redwood Bog SAC (002353); pNHA; Nature Reserve	8.5 km SW	Not classified as GWDTE	
Ridge Road SAC (000919); pNHA	4.3 km S		

According to the EPA GIS Portal, the proposed extension to the existing abattoir is mapped as a Groundwater in SAC Habitats as listed on the WFD Register of Protected Areas. These areas contain groundwater bodies which intersect with Designated Special Areas of Conservation (SAC).

Groundwater in SAC Habitats mapping for the region is shown in Drawing No. IE1746-017-*Groundwater in SAC Habitats*, in Attachment 11.1. A full review of ecological features and designated ecological sites in the study area are detailed in Chapter 9 – Terrestrial Biodiversity and Chapter 10 – Water Quality & Aquatic Biodiversity.

11.6.2.7 Groundwater Abstractions & Water Supply Schemes

The GSI Drinking Water and Wells Database were consulted. However, it is not a requirement for all wells to be registered with the GSI/EPA and it is not a complete inventory. The site of the proposed extension to the existing abattoir is mapped as a Drinking Groundwater Body, according to the EPA GIS Portal. No abstractions were recorded on the register on the site.

Banagher Water Supply Scheme

The Banagher - Clontotan Water Supply Scheme (WSS) boreholes are located <1 km North West of the proposed extension to the existing abattoir. Groundwater abstractions used for public supply have Source Protection Plans prepared by the GSI and EPA to define the groundwater Zone of Contribution (ZOC) for large public water supplies. The Source Protection Zone is divided as follows:

- **Inner Protection Area (SI).** This is designed to protect the groundwater source from microbial contamination and is defined by a 100-meter day time of travel from any point below the water table to the groundwater source.
- **Outer Protection Area (SO).** This comprises of the remainder of the zone of contribution to the groundwater source. The SO of the Banagher WSS is located <0.5 km from the western boundary of the proposed development site.

The Banagher WSS consists of a groundwater and surface water input (from the Shannon). Groundwater provides about 60% of the total demand through two boreholes, drilled in 1986 in the town land of Boheradurrow (EPA, 2011). The boreholes are alongside each other, each in their own separate concrete lined chamber with a padlocked galvanised cover.

The water is chlorinated at the pump house on site, and pumped to a reservoir at Mullaghakaraun. The reservoir has a storage capacity of 4000 m^3 (approximately 2 days) (Kelly, 2004). Details of the wells are outlined in Table 11.8. The location of the Banagher WSS in relation to the proposed extension of the existing abattoir in the regional geological setting is shown on Figure 11.5 below.

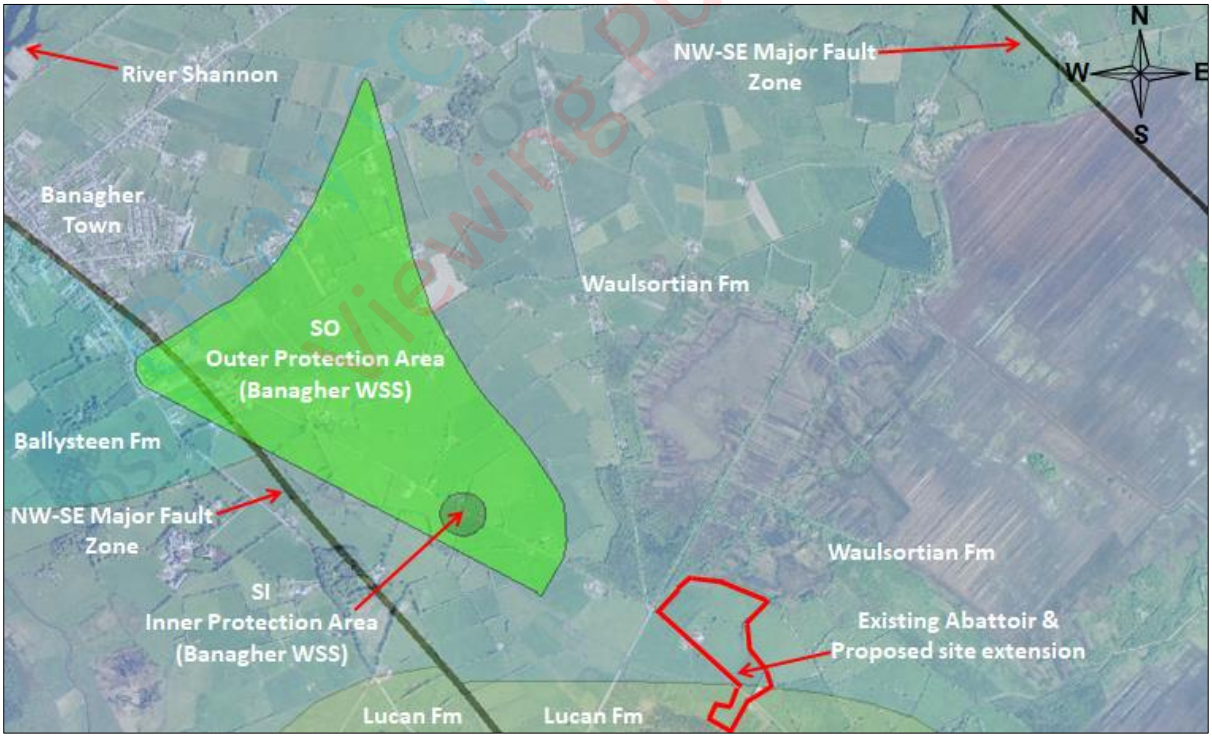

Figure 11.5: Banagher WSS SPZ and the regional bedrock/structural geology in relation to the existing abattoir and proposed site extension

The surface bedrock geological mapping indicates that the Banagher WSS site is underlain by the Waulsortian Formation (Dinantian Pure Unbedded Limestones). Kelly, 2004 has shown that the water bearing strata beneath the Banagher WSS belongs to the **Lucan Formation (Dinantian Upper Impure Bedded Limestones)** – based on information from the well logs, rock samples and the examination of outcrops in the nearby town land of Garrycastle.

A large NW-SE trending fault is mapped approximately 0.2 km south of the boreholes. According to the borehole logs, this is located between 30-35 mbgl. The borehole logs indicate that the vertical thickness of the fault zone ranges from approximately 2.5 m in PW1 to approximately 12 m in the trial borehole, indicating that it is a major fault. During pumping, groundwater is expected to be pulled toward the boreholes along the fault zone. The yield depends primarily on the available storage in the main fault network (Kelly, 2004). Thus, the Lucan Formation and major fault zones are key targets for groundwater exploration in the area. Details of the wells are outlined in Table 11.8.

Apart from the recorded water levels in the Public supply boreholes, there are no other water level data for the area. The streams in the area are assumed to represent the discharge level of shallow groundwater.

It is generally assumed that the water table is a subdued reflection of the topography, and that the groundwater flow direction will be perpendicular to the contour lines. At a local scale, in the vicinity of the wells, it is assumed that the higher ground to the north of the supply boreholes will be the recharge area, therefore water is expected to flow in a southerly direction toward the bog and a westerly direction toward the stream flowing past the boreholes. At a regional scale, it is expected that the regional groundwater and surface water flow direction is northwest toward the river Shannon.

The groundwater gradients are expected to be quite steep, because of the impure bedrock and the relatively steep topography; and, a value of 0.01 is assumed (Kelly, 2004).

Table 11.8: Well details for the Banagher WSS.

BANAGHER WSS – GROUNDWATER COMPONENT			
GSI No.	2021SWW002	2021SWW022	2021SWW008
Well Type	Borehole		
Well Name	Trial Well	PW-1	PW-2
Depth	48.8 m	61 m	59 m
Static Water Level	n/a	2-5 mbgl	2-5 mbgl
Pumping Water Level		Approx. 9 mbgl	Approx. 9 mbgl
Depth to Rock	8 m	9 m	14 m
Status	Disused	Alternates Pumping with PW2	Alternates Pumping with PW1
Pump Level	n/a	Approx. 44 mbgl	Approx. 46 mbgl
Normal Abstraction	n/a	400-420 m^3/d	
Maximum Abstraction	n/a	717 m^3/d (30/10/2002)	
Maximum Yield	654 m^3/d	916 m^3/d	870 m^3/d

BANAGHER WSS – GROUNDWATER COMPONENT			
	(72 hr test 1981)	(72 hr test 1986)	(72 hr test 1986)
Max Drawdown	11.43 m	36.7 m	40.97 m
Hours Pumping	n/a	20-21 hours/day	

According to the GSI classification of well yields, **the boreholes are "excellent" yielding wells, capable of 1000 m^3/d** (Kelly, 2004). However, this **yield is not sustainable**, and the abstraction quantities are only maintained:

- If one borehole is pumping at any one time (wells fail if both are pumping simultaneously).
- If the water level in either of the boreholes does not drop below the level of the fractures, which is possible during dry weather periods (Cullen, 1981).

Estimated aquifer properties in the vicinity of the fault zone are outlined in Table 11.9; according to Kelly, 2004.

Table 11.9: Estimate aquifer properties for the Banagher WSS groundwater component.

PARAMETER	RANGE/VALUE	SOURCE OF DATA
Transmissivity (m^2/d)	45-70	Local
Specific Capacity (Cullen, 1981)	35-55	Local
Permeability (m/d)	0.9-1.4	Local
Porosity	0.015	Assumed

Overall, **groundwater quality is reported as generally good**, but occasionally there are slightly elevated chloride and potassium levels suggesting that there is some human impact, probably contamination from organic waste. Agricultural activities and septic tanks are the principal hazards to the water quality in the area. The main potential sources of pollution within the ZOC are farmyards, septic tank systems, and land spreading of organic and inorganic fertilisers (Kelly, 2004). The Banagher WSS water quality is monitored as part of the EPA/Local Authority National Monitoring System.

Group Water Schemes

The National Federation of Group Water Schemes Database was consulted. There are no Group Water Schemes within 2 km of the existing abattoir/proposed extension area. There is one located 5.2 km west of the site, on the western bank of the River Shannon at Esker. This is not considered further, given its distance from the site.

Local Abstractions

The GSI Well & Spring Database was consulted. There are several wells/springs located within 7 km of the proposed site, which are outlined in Table 11.10. Overall, the main abstraction use is domestic and agricultural, with yields <100 m^3/d. There is one large industrial abstraction recorded at Midland Maltings Distillery.

Table 11.10: Local wells within the vicinity of the proposed extension

GSI Reference No.	Location Easting, Northing	Well Type	Distance/ Direction from site (km)	Drill Date	Depth (mbgl)	Depth to Rock (mbgl)	Yield (m^3/d)	Use	Abstraction (m^3/d)
2021SWW011	206,140 211,240	Dug Well	3.29 km E	1962	9.9	In drift	Poor	Domestic	-
2021SWW010	209,250 210,800		6.1 km E	1970	n/a	n/a	27	Domestic	Poor
2019NWW101	200,950 208,440	Borehole	5.9 km S	1899	20.7	n/a	21.8	n/a	Poor
1719NEW049	199,200 209,020		6.45 km S	1899	51.8	n/a	54.6	n/a	Moderate
1721SEW001	198,350 213,200		5.46 km SW	1899	27.4	n/a	n/a	n/a	n/a
1721SEW002	197,380 213,920		6.41 km SW	1998	30.5	2.1	87.3	Agri & domestic	Moderate
1721SEW003	196,240 214,270		7.6 km SW	2000	48	24.4	32.7	Agri & domestic	Poor
2021SWW001*	201,520 213,780		2.6 km W	1899	-	-	-	Industrial	-

*****GSI Well Reference No. 2021SWW001 refers to Midland Malting's (Distillery) at Montcarteret, near Banagher, Co. Offaly. According to the GWB Description, 2003, the yield is reported as 1000 m^3/d, as referenced from the EPA Database. This is located close to the North East – South West trending fault, on which the Banagher WSS is located. There are four bored wells on site (GSI Ref.: 2021SWW018; 2021SWW019; 2021SWW020; 2021SWW021), all drilled in 2003. The closest Midland Malting's well is within 1.2 km of the proposed extension to the existing abattoir. It is understood that Midland Malting's (Distillery) no longer operates. No information was available on the current status of the boreholes and if they are still in production by an alternative consumer.

Groundwater abstractions are shown in Drawing No. IE1746-019-*Groundwater Abstractions*, in Attachment 11.1.

11.6.2.8 Classification of Geological Environment

The generic type of geological/hydrogeological environment of the Proposed Development can be determined based on the IGI guidelines. In summary, the baseline information suggests that this is a **Type D – Sensitive geological/hydrogeological environment** e.g. potentially unstable hydrogeological environments with groundwater source protection zones and karst.

11.6.2.9 Conceptual Site Model

A conceptual site model was compiled, showing the subsurface strata and hydrogeological characteristics. This conceptual model is presented in Attachment 11.2.

- The site is located at Boheradurrow, approximately 3.5 km south east of Banagher, Co. Offaly. The site is relatively flat, with Ordnance Survey mapping indicating it

slopes gently from east (60 mOD) to west (50 mOD). Mullaghakaruan Bog is located along the northern boundary of the site. To the west, the town of Banagher is present, and the River Shannon, which flows in a south westerly direction.

- An existing slaughter house, lairage, office and associated facilities are located onsite; along with a farm yard comprising several cattle sheds. Overall, the site is dominated by large, open green fields which were used for pastoral farming.
- The top soils mapped across the site are dominated by peat along the north of the site with the remainder of the site covered in a 'fine loamy' drift with limestone clasts (drained basic soil).
- The subsoils underlying the soil are mapped as Till derived from limestones with peat present in the North West and along the northern boundary of the site. The topographic high points contain sand and gravels.
- The depth of the soils/sub soils does not vary greatly throughout the site and ranges between 4 to 8.5 mbgl. The South West and West of the site were identified as having the shallowest bedrock. This has been estimated, based on the geophysical survey completed across the site. It is understood that an intrusive site investigation would completed to ground truth the findings of the geophysical survey.
- The groundwater vulnerability across the site is mapped as Moderate (M) with localised zone of Low (L) vulnerability mapped in the north west of the site. The low vulnerability can be attributed to relatively thick, impermeable deposits of clay across the site. Moderate vulnerability can be attributed to the topographical high points consisting of relatively permeable sands and gravels.
- The Lucan Formation (dark-grey to black, fine-grained, micritic limestone) underlies the south east of the site, while the Waulsortian Limestone Formation underlies the remainder of the area. A geological contact between the Lucan and Waulsortian Formation is mapped in the South East of the site on the GSI Bedrock Geology Map. The Lucan Formation overlies the Waulsortian Formation.
- The geophysical survey identified the true location of the contact between the Lucan and Waulsortian Formations is located in the North West of the site, not in the South East of the site, as mapped by the GSI. The contact is gradational between the formations and correlates to an extensive zone of karst which was identified by the geophysical survey.
- An extensive zone of karst is present in the Northwest of the site. A linear karst feature has been identified running in a South West – North East direction, immediately south of the abandoned farm yard. Elsewhere, localised karst anomalies were identified in the south of the site, running parallel to the L3010 road.
- The upper zone of bedrock across the site is highly weathered, or overlain by firm to stiff clay. Below the weathered upper zone of bedrock, the limestone is strong and fresh.
- Regionally the structural geology consists of a series of major North East – South West striking normal faults, with a series of minor North West – South East striking, younger faults. The closest mapped, most probable location of a fault is 1.10 km south the proposed extension to the existing abattoir, which strikes North West – South East.

- It is understood that an intrusive site investigation (boreholes) would be completed to gain further information on the bedrock underlying the site.
- The Feeghroe stream also referred to as the Mountcarteret in the literature/mapping forms the western boundary of the site. The flood risk assessment has determined that the majority of the proposed development site falls within Flood Zone 'C' - Low to Negligible Probability of Flooding.
- The Waulsortian and Lucan Formations underlying the site, and the surrounding area are classified as a Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones. The proposed extension to the existing abattoir is located within the Banagher Groundwater Body.
- According to GSI the National Recharge Map, the recharge coefficient for the area of the proposed extension to the existing abattoir is 4%, which suggests that 96% of effective rainfall is available for runoff (480 mm). Thus, the aquifer has a low recharge acceptance.
- The Banagher - Clontotan Water Supply Scheme (WSS) boreholes ZOC Outer Protection Area is located <0.5 km West of the proposed extension to the existing abattoir with groundwater flow generally from North to South within the ZOC. The proposed development site is mapped outside the Outer Protection Area of the ZOC.
- Aquifer properties within the vicinity of the WSS are estimated follows: transmissivity 45-70 m2/d; permeability 0.9-1.4 m/d; specific capacity 35-55; and porosity 0.015.
- There are several springs/wells located within 7 km of the site, which are used for domestic and agricultural purposes. The yields are <100 m3/d, with the exception of Midland Malting's (Distillery) at Montcarteret (<1.2 km away from the proposed extension) where the yield is reported at 1000 m3/d. It is understood that Midland Malting's (Distillery) no longer operates. No information was available on the current status of the Midland Malting's (Distillery) boreholes and if they are still in production for an alternative consumer.
- The environment surrounding the proposed extension is classified as a sensitive geological/hydrogeological environment according to the IGI guidelines.

11.7 WATER SUPPLY & MANAGEMENT

The water supply for the proposed extension and the existing abattoir is planned to be sourced from a well, drilled onsite. A geophysical survey has identified two potential locations for trial well drilling. The locations identified for potential trial well drilling are indicated in Drawing No. IE1746-020-*Potential Trial Well Locations - Identified by Geophysics*, in Attachment 11.1.

The Waulsortian and Lucan Formations underlying the site, and the surrounding area are classified as a (LI) Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones. A Locally Important Aquifer is defined as an aquifer unit capable of supplying locally important abstractions (e.g. smaller public water supplies, group schemes), or supplying 'good' yields (100-400 m^3/d) (GSI, 2017).

It is proposed to undertake trial well drilling, well development and well testing to confirm the nature of a groundwater supply for the proposed extension and existing abattoir. It is estimated that peak water consumption at the site would be **150-200 m^3/d**. However, this is likely to be an overestimate.

Given the aquifer classification and the presence of viable targets, it is expected that the demand can be met from site.

Following drilling, pump testing will be undertaken to establish the hydrodynamics of the aquifer and to explore its interaction with other water features. It is expected that the water quality will be similar to other areas in the same aquifer type, with high hardness, and the possibility of iron or manganese. Appropriate treatment processes will be designed and implemented to address these issues if they arise.

In conjunction with the development of a sustainable groundwater source onsite, all underground water pipes would be upgraded.

11.7.1 WATER CONSERVATION

Water conservation measures have been included as part of the proposed extensions design. These measures include:

- Rainwater harvesting of all roof water for used in staff sanitary facilities and landscaping.
- The final WWTP (Waste Water Treatment Plant) will include a 20 m3 holding tank for grey water to be used in the lairage and lorry wash-out. It is estimated that 5 m3/d of water will be required for the lorry washout and 5m3/d for the lairage. This practice is currently undertaken at existing abattoirs throughout Ireland.

11.8 WASTEWATER TREATMENT

The existing abattoir waste water treatment system consisted of the following:

- There were no discharged to sewer at the site. Foul water drainage from staff facilities was directed to a septic tank and percolation area.
- Process emissions from the factory, dirty yard drainage and lorry-wash runoff were all directed to a waste water inlet sump and wastewater storage sump. The contents of the waste water storage sump were tankered off-site for either land spreading or for treatment a municipal Waste Water Treatment Plant (WWTP). No treatment of effluent was carried out onsite.
- Storm water from the roof areas was directed to a surface water tank. It is presumed that the contents of this tank were directed to a percolation area.

Effluent generated on the site comprises of wash-down of the production floor, drainage from dirty yard areas, drainage from the floor of chill areas, domestic effluent and centrate return

from fertiliser by-product (belly-grass) dewatering. All process drains, domestic drains and dirty yard surface water drains would be directed to the on-site effluent treatment plant.

The existing septic tank and percolation area will be decommissioned. A Wastewater Treatment Plant (WWTP) will be constructed along with Integrated Constructed Wetlands. The WWTP will be will be designed for a maximum capacity of 15,667 P.E (where 1 P.E. = 64 g BOD / person / day) and 250 m^3/d. It is proposed to discharge the final treated effluent to the Feeghroe Stream, which travels along the western site boundary. The proposed waste water treatment process for the existing abattoir and proposed extension, are shown in Figure 11.6.

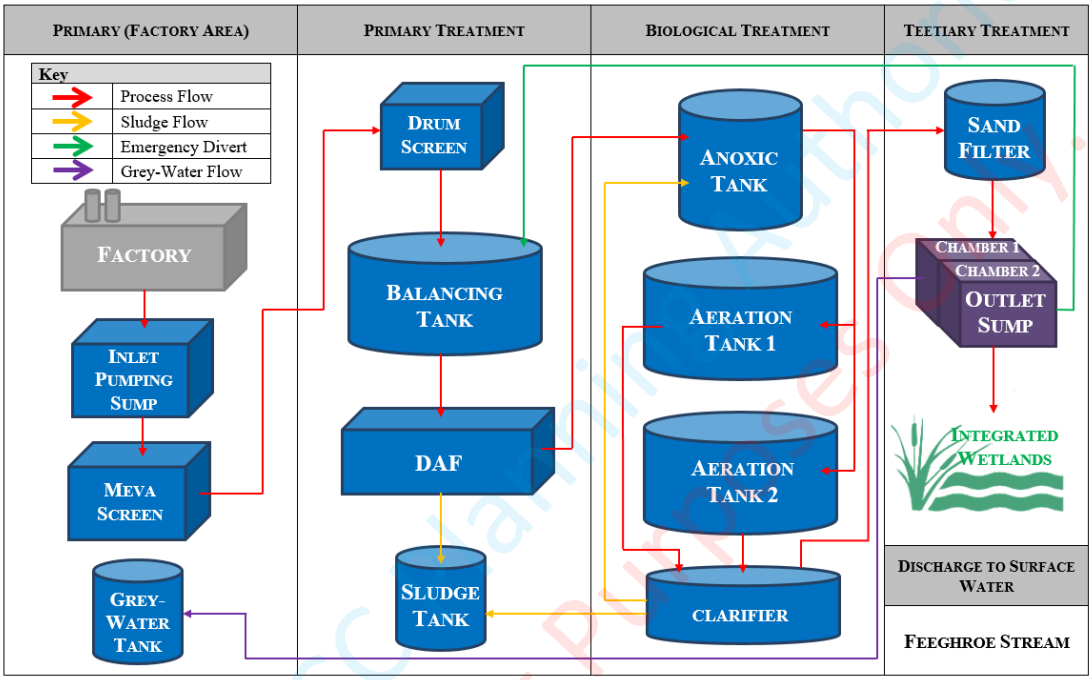

Figure 11.6: WWTP & ICW system for existing and proposed extension to abattoir.

11.8.1 FEEGHROE STREAM – MAX DISCHARGE RATE

The EPA employs a general rule of thumb for effluent discharge to surface waters of 1:20 dilutions. It should be noted that this is dependent on the river being of pristine quality prior to the discharge.

Where an excess of 1:20 dilutions is proposed, a high degree of effluent treatment would generally be required, unless there it can be demonstrated that the river is of very high quality and the discharge would not significantly impact this quality. Table 11.11 provides the Theoretical Maximum Discharge Rates which would be allowed based on the drought / low flow in each watercourse.

Table 11.11: Theoretical maximum discharge rates to the Feeghroe Stream

WATERBODY	LOCATION (ING)	DISTANCE TO SITE BOUNDARY (KM)	WATERCOURSE 95%ILE FLOW (M3/S)	HYDRAULIC DISCHARGE RATE (M3/D)
Feeghroe Stream	202790 213849	0.9	0.009	778

An assimilative capacity assessment was conducted in order to determine the risk of negative impacts upon the Feeghroe stream from a proposed discharge of treated trade effluent from the site. Chapter 10 – Water Quality & Aquatic Biodiversity deals with the impacts of the proposed extension to the existing abattoir on surface water quality. Further details are contained in the *Effluent Process Description Report, PES_ETP_19_9201*.

11.8.2 WASTEWATER TREATMENT PLANT (WWTP)

The proposed WWTP would be operated and managed using the F/M ratio (Food to Mass). This method relies on regulating the rate of growth and metabolism of the microbial population. The F/M ratio is an important control parameter as the quantity of biomass present will influence the removal efficiency. The F/M ratio relates to the biological state of the plant and is independent of the size of the aeration tank. If the operator is aware of the load entering the plant, he/she can ensure that sufficient biomass (micro-organisms) is present in the aeration tank to react with the load.

Where the optimum F/M ratio has been determined, the optimum or desired mass of MLSS (mixed liquor suspended solids) may be calculated. If the actual mass of MLSS is less than the desired mass of MLSS, then the concentration of MLSS must be allowed to increase by reducing the amount of sludge wasted from the system. If the actual mass of MLSS is greater than the desired mass of MLSS, then a proportion of the mixed liquor must be wasted from the system.

The operator and back-up operator of the WWTP would receive extensive training and support when the effluent plant is being commissioned and becomes operational. Training would include the following:

- Discharge licence parameters and conditions – compliance.
- Operating the effluent treatment plant effectively.
- Maintaining an efficient waste water processing environment.
- Receiving, recording and transmitting information.
- Laboratory testing.

The effluent treatment plant will consist of the following stages:

A. Primary Treatment

- Raw inlet sump
- Meva Screen
- Drum Screening

- Balance Tank
- DAF Unit
- Sludge Holding Tank
- Sludge Screw Press
- Grey water tank (final effluent re-use tank)

B. Biological Treatment

- Anoxic Tank
- Aeration Basins x 2
- Clarifier

C. Tertiary Treatment

- Sand Filter

Following treatment at the WWTP plant the effluent will then enter into a system of ICWs, for further tertiary treatment, which is discussed in Section 11.8.3. The proposed waste water treatment process for the existing abattoir and the proposed extension, are shown in Figure 11.6. Further information on the WWTP process can be studied in the *Effluent Process Description Report, PES_ETP_19_9201*. Chapter 10 – Water Quality & Aquatic Biodiversity deals with the impacts of the proposed extension to the existing abattoir on surface water quality.

11.8.3 INTEGRATED CONSTRUCTED WETLANDS (ICW)

Following treatment at the proposed WWTP, treated effluent would be pumped to the proposed ICW system. The ICW configuration for the proposed development site comprises a five-treatment cell system. The system is designed with cascading levels to enable gravity flow across the system, and has been designed to maximise the distance over which the influent must travel for optimum residence time and treatment.

The treated effluent from the WWTP would be pumped to the first ICW cell, and from here would flow sequentially through the remaining cells via interconnecting pipework. The final treated effluent from the ICW would be directed to the Feeghroe Stream, located immediately to the west of the proposed ICW system.

The ICW would serve as a tertiary treatment system, and would treat up to 250m^3 of wastewater a day from the WWTP. The functional wetland treatment area achieved in the proposed design is 40,000m^2, as detailed in Table 11.12.

Table 11.12: ICW treatment cell areas

CELL NO.	CELL AREA (M^2)
Cell 1	7,000
Cell 2	7,935
Cell 3	9,620
Cell 4	7,740
Cell 5	7,705
Total ICW Area	40,000

An ICW treatment area of $150m^2$ per m^3 of influent has been determined to be appropriate to satisfy the required treatment performance and achieve proposed licence limits for discharge to the Feeghroe Stream, as set out in Table 11.13.

Table 11.13: Proposed discharge licence limits for discharge to the Feeghroe Stream

PARAMETER	UNITS	PROPOSED DISCHARGE
Volume Flow	m^3/d	250
pH	pH Units	6-9
BOD	mg/l O2	5
COD	mg/l O2	50
Ortho-phosphate	mg/l PO4-P	0.2
Total Ammonia	mg/l N	0.4
Total Nitrogen	mg/l N	5
Suspended Solids	mg/l SS	20

Each cell would be densely planted with a selection of emergent plant species, including Reed Sweet-grass (*Glyceria maxima*), Common Sedge (*Carex riparia*), Reed Mace (*Typha latifolia*), Lesser Reedmace (*Typha angustafolia*) and Yellow Flag (*Iris pseudacorus*), along with a quantity of other suitable emergent plant species.

The final cell, Cell 5, will be planted with a mixture of deciduous and evergreen tree species on mounds amongst the emergent wetland plants. This arrangement is designed to reduce the overall outflow from the system.

The proposed plants will reduce the through-flowing water of its various potential pollutant contaminants. The vegetation would also play a very important role in reducing the volume of final treated effluent discharging from the ICW to the receiving waters, especially through the process of evapotranspiration.

The operational water depth within each cell would be between 150 mm and 200 mm, with capacity to allow for increased water depth during high rainfall events. The treatment wetland cells would have a minimum embankment height of 1m. The maximum expected discharge flow from the ICW system would be variable due to the open nature of the system.

Chapter 10 – Water Quality & Aquatic Biodiversity deals with the impacts of the proposed extension to the existing abattoir on surface water quality. Further details on the Integrated Constructed Wetlands are outlined in the *VESI Environmental Ltd April 2019* report.

11.9 POTENTIAL IMPACTS OF THE PROPOSED EXTENSION

The following is the wording of the proposed development for which planning permission is being sought:

"We Banagher Chilling Limited intend to apply for permission for development at Boheradurrow and Meenwaun, Banagher, Co. Offaly R42HX24 the development will consist of a single storey extension to existing abattoir of 1061 square meters to include processing rooms, staff changing rooms, offices, increase roof height by 2 meters, extend existing lairage and elevation alterations. In addition the construction of a food processing factory of 4925 square meters with a part first floor of 2299 square meters to include processing rooms, cold store, loading bay, chill rooms, plant rooms, staff changing rooms, staff canteen and administration offices. External works consisting of staff car parking, service yards, new public road entrance, widening of existing public road, effluent treatment compound, water storage tank, gas storage tanks, truck wash bay, integrated constructed wetlands, security hut of 23 square meters, electrical room of 168 square meters, water treatment building of 72 square meters, effluent treatment control house of 30 square meters, all associated siteworks and landscaping works on a site of 19.60 hectares. This application is accompanied by an Environmental Impact Assessment Report (EIAR) and a Natura Impact Statement.

The planning application, EIAR and Natura Impact Statement may be inspected, or purchased at a fee not exceeding the reasonable cost of making a copy, at the offices of the Planning Authority during its public opening hours. A submission or observation in relation to the application may be made in writing to the planning authority on payment of the prescribed fee (€20) within the period of 5 weeks beginning on the date of receipt by the authority of the application."

The proposed upgrade and extension of the existing facility would facilitate a **maximum cattle slaughter rate of 140 per day**. Banagher Chilling Limited intends to provide for the discharge of final treated effluent to the Feeghroe Stream, which passes along the western site boundary. Prior to discharge to this watercourse, the final treated effluent would be directed to new integrated constructed wetlands following treatment in a waste water treatment plant.

The main features uncovered on the site and in the surrounding environment which have the potential of being impacted by the proposed extension to the existing abattoir are summarised in Table 11.14. These features are ranked in terms of importance. The features are divided into four categories: land/soils; surface water; groundwater resources; and ecosystems.

The existing abattoir and proposed extension are detailed in *Attachment 2.3 / Drawing Ref. 1806-06-5.*

Table 11.14: Summary of important features within the project study area

FEATURE	LOCATION RELATIVE TO PROPOSED DEVELOPMENT	IMPORTANCE RANKING	JUSTIFICATION
Land/Soils			
Peat	On site	Low	Peat has low agricultural potential
Fine loamy soils	On site	Low	Limited agricultural potential, poorly drained, shallow depth
Sands/Gravel	On site	Medium	Potential for reuse onsite during construction
Till	On site	Low	Low economic value
Groundwater Resources			
Locally Important Bedrock Aquifer	On site	Medium	Supplies Banagher-Clontontan WSS Supplies domestic/ agricultural dwellings private abstractions
Banagher - Clontotan Water Supply Scheme	Outer Source Protection Zone <0.5 km North West of western boundary	Very High	Groundwater supplies 60% of demand to WSS. Main supply for surrounding region
GSI Well Ref. No. 2021SWW001 *(understood not to be currently in use)*	1.2 km to the west of the proposed extension	High	Commercial Supply to Midland Malting's Distillery
GSI Well Ref. No. 2021SWW011	3.29 km east of the proposed extension	Low	Private supply for domestic/agricultural use
Ecosystems			
All Saints Bog SPA (004103); All Saints Bog & Esker SAC (000566); NHA.	2.4 km South West of site	Extremely High	European Site - SAC, SPA, NHA, Groundwater Dependent Terrestrial Ecosystem

Potential impacts of the proposed extension to the existing abattoir are described below, before mitigation measures are applied. The nature, extent and duration of the impacts are also assessed.

11.9.1 CONSTRUCTION PHASE

During the construction phase, the following activities may pose an impact:

- Excavation and storage of soils and subsoils.
- Contamination of soils during earth moving.
- Contamination of groundwater.
- Contamination of the Feeghroe stream during earth moving.
- Karst activation through collapse.

11.9.1.1 Excavation & Storage of Soils & Subsoils

Removal of soils and subsoils overlying the locally important bedrock aquifer will increase the groundwater vulnerability across the site. This increases the risk of pollution from surface activities, and increases the need for good practices when handling potential contaminants at the surface. This poses a Negative, Moderate and Permanent Effect on the groundwater vulnerability across the site.

Incorrect excavation and storage of peat on site has the potential for collapse in the form of a slump or slide. This may occur if the peat is stacked too steeply. In addition, surrounding water courses, construction machinery/equipment etc. are at risk of damage if a stockpile of peat was to collapse. This poses a Negative, Significant and Short Term Effect to the existing environment.

11.9.1.2 Contamination of Soils During Earth Moving

Soils and subsoils have the potential to become contaminated through leakages, spillages or burst pipes on site. Hydrocarbons, chemical and waste water pose a contamination risk to soils if used or stored incorrectly. This poses a Negative, Significant, and Short Term Effect to the soils/subsoil across the site.

11.9.1.3 Contamination of Groundwater

Hydrocarbons, grease and chemicals used in the construction of the proposed extension have the potential to contaminate groundwater. This may occur through leakages, spillages or incorrect storage practices.

The locally important aquifer underlying the site is karst, and supports the Banagher - Clontotan WSS. The Outer Source Protection Zone is located <0.5 km from the western boundary of the site. Although groundwater originating on the site is unlikely to be drawn into the sources, the risk is not zero. Contamination of the bedrock aquifer underlying the site could lead indirectly to contamination could pose a risk to the domestic abstractions in the vicinity of the site and any downgradient abstractions. Contamination of the bedrock groundwater system represents a Negative, Significant and Long Term Effect on the existing environment.

11.9.1.4 Contamination of the Feeghroe Stream during Earth Moving

Elevated concentrations of suspended sediment, hydrocarbons and other run-off may enter the Feeghroe stream during the construction phase. This may occur due to poorly managed excavation works or the use of fuels/chemical across the site. This has the potential to reduce water quality and harm aquatic life. This poses a Negative, Significant and Short Term Effect to the Feeghroe Stream.

Chapter 10 – Water Quality & Aquatic Biodiversity deals with the impacts of the proposed extension to the existing abattoir on surface water quality.

11.9.1.5 Activation of Karst Through Collapse

Karst has been identified in the North West of the site. This poses a risk of subsidence or collapse to any structures which would be located in this area of the site. This has the potential to damage equipment and cause harm/injury to people working in structures built in karst areas. This poses a Negative and Significant risk to human life and the surrounding environment.

11.9.2 OPERATIONAL PHASE

During the operation phase, the following activities may pose an impact:

- Banagher – Clontotan WSS Impacts.
- Groundwater Dependent Terrestrial Ecosystem Impacts.
- Contamination of Groundwater.
- Culvert Blockages & Drainage Diversions.
- Land Take.

11.9.2.1 Banagher – Clontotan WSS Impacts

The water supply for the proposed extension to the existing abattoir and current abattoir onsite is planned to be sourced from a well drilled onsite. The Banagher-Clontotan WSS Outer Source Protection Zone is located <0.5 km from the western boundary of the proposed development site.

It should be noted that the proposed location of any production well, when chosen, will not be within the ZOC of the public supply, and so is not expected to have any impact on the public supply. It is estimated that water consumption at the proposed development site would be 150-200 m^3/d. However, this is likely to be an overestimate.

Development of a groundwater supply on the proposed development site may interfere with the existing abstractions in the area. In other words, a second large scale abstraction within 1 km of the Banagher WSS may lead to competition for groundwater, and stress the locally important aquifer. This may lead to excessive drawdown, and in times of severe drought, the productivity of the aquifer may be significantly reduced. This has the potential for an effect

on the Banagher WSS, and other commercial abstractions already operating in the vicinity of the site.

11.9.2.2 Groundwater Dependent Terrestrial Ecosystems Impacts

As discussed in Section 11.9.2.1 (above), the development of an additional large scale abstraction in the area has the potential to lower water levels in the surrounding town lands.

The All Saints Bog is a groundwater dependent terrestrial ecosystem, located 2.4 km South West of the proposed site where a large scale groundwater abstraction is planned. Any lowering of regional groundwater levels may stress the sensitive ecology of the All Saints Bog. It is unlikely that any measurable impact will occur to Bogs by virtue of its distance from the proposed extension to the existing abattoir.

11.9.2.3 Contamination of Groundwater

Storage of oil, grease and chemicals has the potential to contaminate the bedrock aquifer underlying the site in the event of a spillage or leak. Contamination of groundwater on site would pose a risk of pollution to the sites proposed water supply. This would have a Negative, Very Significant, Long-Term impact on the groundwater supply for Banagher Chilling Ltd.

11.9.2.4 Culvert Blockages & Drainage Diversions

Secondary flood risk can also be attributed to a potential surcharge due to a blockage of the culverts located on the Feeghroe stream and drainage channels in the vicinity of the site. This may result in localised areas of flooding within the site. This poses a Negative, Significant, Temporary impact on the proposed development and surrounding environment.

Part of the extension of the existing abattoir facilities requires alterations to the existing site drainage channels, as outlined in Section 11.6.1.5. This poses an Adverse, Slight, Long-Term impact on the hydrology of the site.

11.9.2.5 Land Take

Land take is the removal of productive land from potential agricultural or other beneficial uses. The entire site covers an area of approximately 19.6 hectares. Within the landholding, there is an established farmyard complex of buildings and an existing permitted abattoir extending to approximately 748 m^2.

The land across the proposed extension area is used for pastoral farming. However, its productivity is limited by the poor drainage and shallow low fertile soils. Thus, the agricultural potential of the site is low. The area to the North/North West is underlain by peat. The agricultural potential of peat is limited.

Overall, the proposed extension to the existing abattoir will not remove highly productive, fertile agricultural land from the environment. Overall, this can be described as a Negative, Slight, Long term impact.

11.9.3 DO NOTHING SCENARIO

In the absence of the proposed extension to the existing abattoir, the site would remain in a stable condition, as outlined in Section 11.5 the Land & Soil Baseline Environment and Section 11.6 the Water Baseline Environment.

In contrast, the proposed extension to the existing abattoir will enhance the existing Land, Soil and Water environment in the following ways:

- The addition of trees, shrubs and landscaping across the ICW area will benefit the local ecology.
- Redevelopment of the existing abattoir will remove an abandoned visually unpleasant site from the surrounding landscape.

11.9.4 UNPLANNED EVENTS

Under a 'worst case' scenario, the accidental release of fuel, oil, paints or other hazardous material occurs on site during the construction phase or operation phase, through the failure of secondary containment or a materials handling accident on the site. If this were to occur over open ground then these materials could infiltrate through the soil contaminating soil, subsoils and groundwater. Runoff from the site may transport these contaminants into the Feeghroe stream which would degrade water quality and damage the aquatic ecology.

11.10 MITIGATION MEASURES

In this Section, measures are recommended to prevent and/or limit the potential impacts of the Proposed Extension, as outlined in Section 11.9.

11.10.1 CONSTRUCTION PHASE

- Excavation and storage of soils and subsoils.
- Contamination of soils during earth moving.
- Contamination of groundwater.
- Contamination of the Feeghroe stream during earth moving.
- Karst activation through collapse.

11.10.1.1 Excavation & Storage of Soils/Subsoils

The proposed method of excavation is 'cut and fill'. Earthworks operations which involve peat shall be carried out such that surfaces shall be designed with adequate falls, profiling and drainage to promote safe run-off and prevent ponding and collapse following heaving rainfall. Excavations will be minor and not involve substantial excavation depths.

The following procedures will be adhered to when excavating soils/subsoil:

- Stripping of topsoil will be carried out in a controlled and carefully managed way and coordinated with the proposed staging for the development.
- At any given time, the extent of topsoil strip (and consequent exposure of subsoil) will be limited to the immediate vicinity of active work areas.
- Topsoil stockpiles will be protected for the duration of the works and not located in areas where sediment laden runoff may enter watercourses.
- Where feasible, excavated material will be reused as part of the site development works (e.g. for landscaping works and for backfill in trenches under non-trafficked areas).
- Existing topsoil will be retained on site to be used for the proposed development.
- Topsoil will be stored in an appropriate manner on site for the duration of the construction works and protected for re-use on completion of the main site works.
- Top-soiling and landscaping of the works will take place as soon as finished levels are achieved, in order to reduce weathering and erosion and to retain soil properties.
- Stockpiled material will be covered and/or dampened during dry weather to prevent spreading of sediment/dust.
- Specialist machinery such as track machines will be used to minimise compaction of soils.
- Good housekeeping (site clean-ups, use of disposal bins, etc.) on the site project.

11.10.1.2 Contamination of Soils During Earth Moving

During construction all machinery operating onsite will refuel at a designated depot. The fuel tanks will be bunded, and the secondary containment area will be capable of holding 110% of the volume of fuel stored. The depot will contain a hard standing area, where all equipment and mobile machinery will repaired and serviced.

11.10.1.3 Contamination of Groundwater

It is anticipated that the water supply onsite will be one of the first elements of the proposed extension to be developed. To protect the water supply during the construction phase, appropriate fencing, signage and lighting will be installed around the well head. It is anticipated a 15 m radius will be provided around the well to prevent machinery driving close to the well head and damaging the well.

The well will be designed in accordance with all the relevant guidelines issued by the EPA, IGI and Irish Water. Particular attention will be paid to the well head protection to prevent ingress of contamination from the surface water/surface based activities to protection the locally important bedrock aquifer.

11.10.1.4 Contamination of the Feeghroe Stream During Earth Moving

Soil and subsoil stockpiles will be protected for the duration of the works and not located in areas where sediment laden runoff may enter watercourses. The Feeghroe stream will have a

silt fence installed along its bank to protect it from runoff with elevated levels of suspended solids. This will be inspected regularly, and after periods of heavy rainfall.

11.10.1.5 Karst Activation Through Collapse

Mitigation through avoidance was deployed at the planning and design stage to reduce the risks associated with karst. No structures will be built in the areas where karst has been identified.

If karst is found during the excavation phase of the construction on site, a hydrogeologist or engineering geologist will be consulted to inform of the safe way forward. Until the safe way forward is found, the karst feature (e.g. swallow hole, cavity etc.) will be covered over to prevent ingress of surface contamination into the bedrock aquifer. The discovery will be secured with fencing and appropriate signage.

11.10.2 CONSTRUCTION PHASE

- Banagher – Clontotan WSS Impacts.
- Contamination of Groundwater.
- Culvert Blockages & Drainage Diversions.

11.10.2.1 Banagher – Clontotan Impacts

The development of a groundwater supply for the existing abattoir and proposed extension will be undertaken in a risk based manner to ensure there are no impacts on the Banagher WSS boreholes. Following trial well drilling, a step test and pump test will be completed on the well to understand the impact of the well on the surrounding abstractions. A source protection zone will be delineated and a monitoring programme will be implemented to allow for management of the resource. Stakeholder engagement will ensure the sustainable development of the well, in light of existing abstractions.

11.10.2.2 Contamination of Groundwater

All chemicals, fuels, oils, grease and wastes which have the potential to contaminate groundwater will be stored in an area protected by bunds. Each bund surrounding a potential contaminant will be capable of retaining 110% of the volume of material stored on site. In addition, safe handling practices, maintenance and good housekeeping will also limit incidents of spillage and leaks.

The WWTP is designed to be fully contained, and will only discharge to the environment after appropriate treatment. The final sump of the WWTP will have an emergency return connection to the balancing tank, providing storage for emergencies or other such contingency purposes.

The groundwater supply well proposed onsite will be designed in accordance with the best practice guidelines. Appropriate grouting and well head protection will be deployed to ensure the groundwater is abstracted in a safe manner, with the potential for surface contamination to enter the well kept to a minimum.

11.10.2.3 Culvert Blockages & Drainage Diversions

The culverts located on the Feeghroe Stream and Drainage Channels in the vicinity of the site should be inspected on a regular (quarterly) basis to ensure they are free from debris in order to prevent blockage/surcharge which may lead to secondary flooding.

The diverted channel and new culverts will be designed to cater for the peak 1 in 1000 (0.1% AEP) flow rates including a 20% increase for climate change. In consideration of the proposed drainage works and the implementation of a maintenance regime, to include quarterly monitoring of all existing and proposed drainage channels and culverts, the potential residual risk of culvert blockage to the site is considered to be low.

11.11 CUMULATIVE IMPACTS

There is a cumulative impact in relation to the Water component of the proposed extension to the existing abattoir. The safe, secure and sustainable development of a groundwater supply for Banagher Chilling Ltd presents a challenge in itself, given the close proximity to the Banagher WSS well field and other abstractions. Failure to manage the groundwater resource in the region would lead to Negative, Very Significant, Long Term impacts for the many stakeholders and ecosystems which depend on it.

Future expansion of the Banagher Chilling Ltd abattoir may be constrained due to the current capacity constraints on the Irish Water public supply network. The development of additional groundwater supplies for Banagher Chilling Ltd to facilitate expansion of the slaughter rate beyond 140 cattle a day is also limited. This is due to many sensitive groundwater dependent terrestrial ecosystems in the region, along with the existing public, agricultural, commercial and private abstractions operating in the region.

No cumulative impacts are anticipated for the Land/Soils component of the proposed extension to the existing abattoir.

11.12 RESIDUAL IMPACTS

Residual impacts are defined as those impacts that remain following the implementation of the mitigation measures outlined in Section 11.10. A summary of the potential impacts along with the residual impacts are outlined in Table 11.15.

Table 11.15: Summary of impacts and residual impacts

SUMMARY OF IMPACTS & RESIDUAL IMPACTS PROPOSED EXTENSION OF EXISTING ABATTOIR – BANAGHER CHILLING LTD.			
PHASE	**ACTIVITY**	**RECEPTOR**	**IMPACT (QUALITY, SIGNIFICANCE, DURATION)**
Construction Phase	Excavation & Storage of Soils/Subsoils	Soils/Subsoils	Negative, Significant, Short Term Effect
	Contamination of Soils during Earth Moving	Soils	Negative, Significant, Short Term Effect
	Contamination of Groundwater	Locally Import Aquifer/Existing abstractions	Negative, Significant, Long Term Effect
	Contamination of Feeghroe Stream during Earth Moving	Feeghroe Stream	Negative, Significant, Short Term Effect
	Activation of Karst	Structures on Site – subsidence/collapse risk	Negative, Significant, N/A
Operational Phase	Banagher-Clontotan WSS Impacts	Banagher Public WSS	Impact unlikely as site does not encroach on ZOC
	GWDTEs	All Saints Bog/Reduced water table	Impact unlikely due to distance from site
	Contamination of Groundwater	Proposed well onsite to supply Banagher Chilling Ltd.	Negative, Very Significant, Long-Term
	Culvert Blockages	Localised areas susceptible to secondary flood risk	Negative, Significant, Temporary
	Drainage Ditch Diversions & New Culverts	Localised areas susceptible to secondary flood risk	Adverse, Slight, Long-Term
	Land Take	Shallow, low agricultural potential, poorly drained soils across the site	Negative, Slight, Long Term

PHASE	ACTIVITY	MITIGATION	RESIDUAL IMPACT (QUALITY, SIGNIFICANCE, DURATION)
Construction Phase	Excavation & Storage of Soils/Subsoils	Adhere to procedures	Negative, Imperceptible, Temporary
	Contamination of Soils during Earth Moving	Designated refuelling area/machinery repair area	Negative, Imperceptible, Temporary
	Contamination of Groundwater	Fencing around well; design well to guidelines; 15 m radius around well during construction	Negative, Not Significant, Long Term
	Contamination of Feeghroe Stream during Earth Moving	Silt fences; inspect silt fences after periods of heavy rainfall.	Negative, Imperceptible, Short Term
	Activation of Karst	Mitigation through avoidance at design stage	Neutral, N/A, N/A
Operational Phase	Banagher-Clontotan WSS Impacts	Banagher WSS/ implement monitoring programme/ interact with stakeholders	Unlikely as site does not encroach on ZOC
	Contamination of Groundwater	Bunds, safe handling, good housekeeping	Negative, Imperceptible, Long Temporary
	Culvert Blockages	Quarterly Inspections	Neutral, Imperceptible, Temporary
	Drainage Ditch Diversions & New Culverts	Designed to 0.1% AEP flow rates with 20% increase for climate change & maintenance/monitoring	Neutral, Imperceptible, Temporary

11.13 MONITORING

The following monitoring is recommended as part of the proposed extension to the existing abattoir:

- Monitoring of the groundwater to ensure there is no contamination entering the Locally Important bedrock aquifer from onsite activities, storage areas or the integrated constructed wetlands. It is recommended to install monitoring wells across the site (one upgradient; two down gradient) to monitor for potential contaminants and to protect the abstractions in the vicinity of the site (Banagher WSS and the Midland Maltings Distillery).
- Monitoring of groundwater levels and water usage to ensure the safe and sustainable management of the water resources underlying the site, and in the wider area of the proposed extension to the existing abattoir.
- The culverts located on the Feeghroe Stream and Drainage Channels in the vicinity of the site should be inspected on a regular (quarterly) basis to ensure they are free from debris in order to prevent blockage/surcharge which may lead to secondary flooding.
- Monitoring of the influent and effluent at the Integrated Constructed Wetlands, along with monitoring of the vegetation around the cells will be completed. Operational monitoring will be utilised to ensure water levels are being controlled appropriately.

11.14 DIFFICULTIES ENCOUNTERED IN COMPILING INFORMATION

The following minor difficulties were encountered in compiling this Land, Soil and Water EIRA Chapter:

- Lack of site specific information to ground truth the geophysics investigation on the depth to groundwater, groundwater flow direction and groundwater/surface water quality on, and within the immediate vicinity of the site.
- Lack of technical information to fully quantify the risk to the nearby sensitive receptors (Banagher WSS and the All Saints Bog Groundwater Dependent Terrestrial Ecosystem).

11.15 REFERENCES

Applin, K. R. and N. Zhao (1989) The Kinetics of Fe (II) Oxidation and Well Screen Encrustation. Ground Water, Vol. 27, No 2.

Cronin, C., Daly, D. (1999). An Assessment of the Quality of Public and Group Scheme Groundwater Supplies in County Offaly. Geological Survey of Ireland report to Offaly County Council.

EPA, 2011. Water Framework Direction Groundwater Monitoring Programme – Site Information – Banagher Boreholes. Environmental Protection Agency & Offaly County Council.

EPA, 2017. Guidelines on the Information to be contained in Environmental Impact Assessment Reports, Draft 2017. Environmental Protection Agency.

GSI, 2017. A description of Irish Aquifer Categories. Geological Survey, Ireland, Department of Communication, Climate Action and the Environment.

GSI, 2019. Spatial Resources Viewer. Geological Survey, Ireland, Department of Communication, Climate Action and the Environment.

IGI, 2013. Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements. Institute of Geologists of Ireland.

Kelly, 2004. Banagher Water Supply Scheme - Clontotan Boreholes – Groundwater Source Protection Zones. Geological Survey of Ireland & Offaly County Council.

SECTION C – ARCHAEOLOGICAL, ARCHITECTURAL AND CULTURAL HERITAGE

This section of the EIAR examines the impacts of the proposed development, comprising of the refurbishment and extension of the existing abattoir on the site, at Meenwaun/ Boheradurrow, Banagher, Co. Offaly on archaeology, architecture and cultural heritage.

Archeologically important sites, buildings of historic, artistic or architectural interest and sites of cultural heritage form part of the landscape of County Offaly. As part of the scope and examination of alternatives phases of this development, every effort has been made to avoid known Archaeological, Architectural and Cultural Heritage sites.

This section of the Environmental Impact Assessment Report examines the impacts of the development on known sites (which could not be avoided) or potential sites which have come to light during the field survey of the proposed development.

12.0 ARCHAEOLOGICAL, ARCHITECTURAL AND CULTURAL HERITAGE

12.1 INTRODUCTION

This chapter of the Environmental Impact Assessment Report (EIAR) assesses the archaeological, architectural and cultural heritage effects of the proposal to extend an existing abattoir, with associated development, in Meenwaun and Boheradurrow townlands, Banagher, Co. Offaly.

The purpose of the chapter is to provide an archaeological, architectural and cultural heritage assessment of the receiving environment, to identify the likely and significant effects on the receiving environment and to propose ameliorative measures to mitigate these effects.

The assessment has been carried out by Edel Barry MPhil, Marion Sutton MSc and Seán Shanahan MSc MIAI MIASP, of Shanarc Archaeology Ltd, on behalf of Banagher Chilling Limited and Panther Solutions Ltd., in support of a planning application to Offaly County Council.

12.1.1 DEFINITION OF ARCHAEOLOGICAL, ARCHITECTURAL AND CULTURAL HERITAGE

The term 'cultural heritage' is broadly used to describe any combination of archaeological, architectural and cultural heritage features.

- Archaeological heritage comprises objects, monuments, buildings or landscapes that generally pre-date AD1700.
- Architectural heritage, also referred to as built heritage, comprises structures, buildings, their settings and contents that generally post-date AD1700.
- Cultural heritage also comprises less tangible aspects of heritage such as folklore and cultural associations.

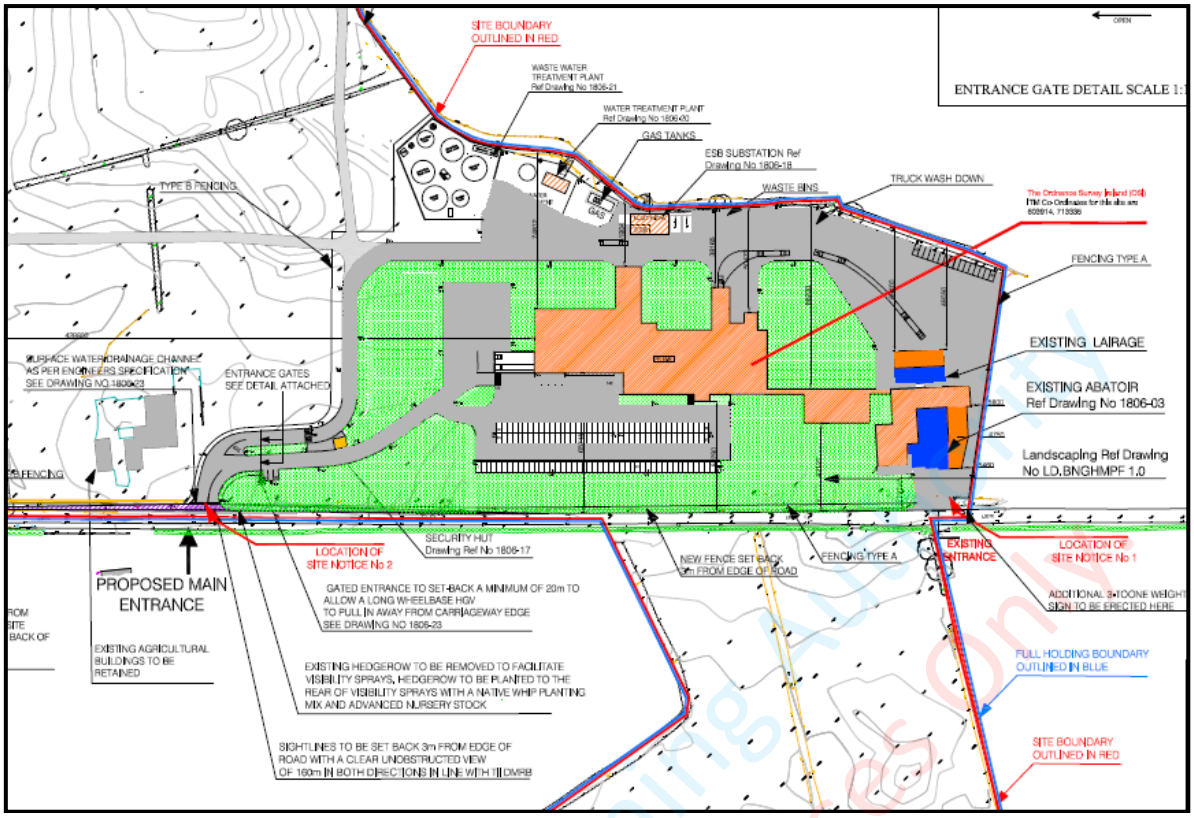

Figure 12.1: Plan of proposed abattoir extension, with associated development

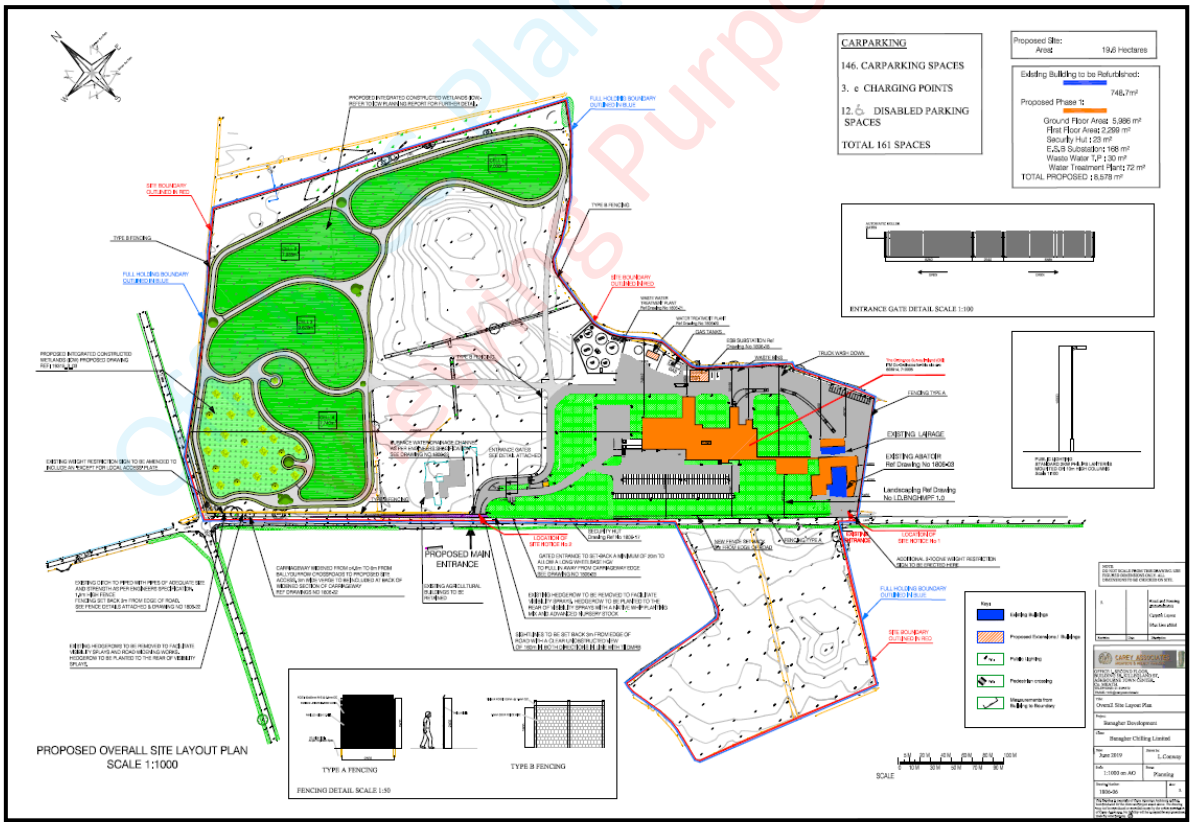

Figure 12.2: Proposed overall site layout plan showing location of abattoir extension relative to integrated constructed wetlands

12.2 LEGISLATIVE FRAMEWORK AND PLANNING POLICY

12.2.1 LEGISLATIVE CONTEXT

Ireland has ratified several international and European conventions on the protection of cultural heritage, principally:

- UNESCO World Heritage Convention 1972;
- Charter for the Conservation and Restoration of Monuments ad Sites (Venice) 1964;
- European Convention on the Protection of the Archaeological Heritage (Valetta Convention) 1992;
- European Convention on the Protection of the Architectural Heritage (Grenada Convention) 1985;
- European Council Directive on Environmental Impact Assessment (85/337/EEC) 1985, amended by Directive (97/11/EC) 1997, Directive (2003/35/EC) 2003, Directive (2011/92/EU) 2011, amended by Directive (2014/52/EU) 2014.

National legislation protecting cultural heritage sites comprises:

- National Monuments Act 1930, amended 1954, 1987, 1994 and 2004;
- Heritage Act 1995;
- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999; and
- Planning and Development Acts 2000 - 2014.

The following standards and guidelines were also consulted as part of this assessment:

- Frameworks and Principles for the Protection of the Archaeological Heritage (1999), Department of Arts, Heritage, Gaeltacht & the Islands;
- Policy and Guidelines on Archaeological Excavation (1999), Department of Arts, Heritage, Gaeltacht & the Islands;
- The Heritage Council, 2000. Archaeology & Development: Guidelines for Good Practice for Developers (2000), The Heritage Council;
- Guidance on the preparation of the EIA Report, 2017, European Commission;
- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018;
- Guidelines on the information to be contained in Environmental Impact Assessment Reports (Draft) (August 2017), Environmental Protection Agency;
- Advice notes on current practice in the preparation of Environmental Impact Statements (2003), Environmental Protection Agency;
- Guidelines for the Assessment of Archaeological Heritage Impacts of National Road Scheme (2005), National Roads Authority; and

- Guidelines for the Assessment of Architectural Heritage Impacts of National Roads Schemes (2005), National Roads Authority.

12.2.2 PLANNING POLICIES

The Offaly County Development Plan 2014-2020 contains a number of policies of relevance to archaeological and architectural heritage. The relevant policies in respect of this assessment are, as follows:

AAHP-04 It is council policy to apply the following principles to the archaeological heritage:

- To facilitate appropriate guidance in relation to the protection of the county's archaeological heritage.
- To promote public awareness of the rich archaeological heritage in this area.
- To protect and enhance archaeological monuments and their settings and Zones of Archaeological potential.

AAHP-07 It is policy of the Council to promote awareness of, and access to, the archaeological inheritance of Offaly.

AAHP-08 It is Council policy to ensure that development in the immediate vicinity of a recorded monument is sensitively sited and designed so that it does not significantly detract from the monument. Where upstanding remains exist, a visual impact assessment may be required.

AAHP-09 It is Council policy to inform and seek guidance from the National Museum of Ireland if an unrecorded archaeological object is discovered, or the National Monuments Service of the Department of Culture, Heritage and the Gaeltacht in the case of the discovery of an unrecorded archaeological site, in accordance with National Monuments legislation.

AAHP-10 It is Council policy to ensure that full consideration is given to the protection of archaeological heritage when undertaking, approving or authorising development in order to avoid unnecessary conflict between development and the protection of the archaeological heritage.

AAHP-11 It is Council policy to ensure that all development proposals affecting sites specified in the Record of Monuments and Places or Zones of Archaeological Potential are referred to in the prescribed bodies (as set out in the Planning and Development Act 2000, as amended) and to have regard to the advice and recommendations of the prescribed bodies in relation to undertaking, approving or authorising development.

AAHP-12 It is Council Policy to ensure that when an unrecorded archaeological object or site is discovered, any works that threaten the object or site are immediately suspended and that the appropriate Government agency is informed.

AAHP-17 It is Council Policy to protect archaeological sites and monuments, underwater archaeology, and archaeological objects, which are listed in the Record of Monuments and Places, and to seek their preservation *in-situ* (or at a minimum, preservation by record) through the planning process. It is Council policy to seek to protect important archaeological landscapes from inappropriate development.

12.3 METHODOLOGY

The assessment of archaeological, architectural, and cultural heritage effects was based on a desk study of relevant archaeological, architectural and cultural heritage sources, supported by a field inspection. The following were the principal desk-based sources consulted:

National Monuments
Under the National Monuments Act 1930 – 2004, archaeological sites in the ownership or guardianship of the State or a local Authority and sites under Preservation Orders are designated as National Monuments. Such sites are offered the highest level of protection under Irish legislation.

Record of Monuments & Places and Sites & Monuments Record
The Record of Monuments and Places (RMP) was established under Section 12 of the 1994 National Monuments (Amendment) Act. The statutory RMP is a list of archaeological monuments known to the National Monuments Service, and is based on the earlier Sites and Monuments Record (SMR) files housed at the National Monuments Service. The record is updated on a constant basis.

Topographical Files
The topographical files of the National Museum of Ireland (NMI) are the national archive of all known antiquities recorded by the NMI. These files relate primarily to artefacts but also include references to monuments and contain a unique archive of records of previous excavations. The NMI's files present a catalogue of objects reported to the institution from 1928-95. The find-spots of artefacts can be an important indication of the archaeological potential of an area.

Archaeological Inventory of County Offaly
The Archaeological Survey of Ireland was initiated after the National Monuments Act 1930 and remains ongoing. The inventory for Co. Offaly was compiled by Caimin O'Brien and P. David Sweetman and was published by the Dublin Stationery Office in 1997.

Offaly County Development Plan 2014-2020
Each City and County Development Plan is compiled in accordance with the requirements of the Planning and Development Act 2000 (as amended) and contains lists of national monuments, recorded monuments, a Record of Protected Structures (a list of buildings which cannot be materially altered or demolished without grant of permission under the Act) and Conservation Areas and Architectural Conservation Areas (to protect and enhance the special character of an area). Local Area Plans (LAPs) compiled under the City/County Development Plan are also consulted.

Offaly Heritage Plan 2017-2021
The fourth Heritage Plan for County Offaly, guiding the work of the Offaly Heritage Forum and Heritage Office, was adopted at the March 2017 meeting for Offaly County Council.

National Inventory of Architectural Heritage
The National Inventory of Architectural Heritage (NIAH) is an ongoing survey within the Department of Culture, Heritage and the Gaeltacht. The work of the NIAH involves identifying and recording the architectural heritage of Ireland, from AD1700 to the present day and includes country houses, churches, mills, bridges and other structures of note. The

NIAH survey of County Offaly was carried out in 2004 and is a representative sample of the post-1700 architectural heritage of the county.

Documentary Sources
Documentary sources are a valuable means of completing the written archaeological, architectural and cultural heritage record of an area, and of gaining insight into the history of the receiving environment. A list of all consulted documentary sources is provided in bibliographic form.

Cartographic Sources
Information gathered from cartographic sources is fundamental to the identification of archaeological and architectural heritage sites and demesne landscapes, which are often now located from cartographic records alone. For example, the earliest Ordnance Survey maps date to the late 1830s and 1840s, but much change has occurred in the use and treatment of the landscape in the intervening years, particularly during the second half of the 20th century.

Toponomy Sources
A townland name may preserve information relating to its archaeology, history, folklore, ownership, topography or land use. Most placenames were anglicised by the Ordnance Survey, which begun in the 1830's. Despite some inaccuracies in translation, the Gaelic, Viking, Anglo-Norman and English origins of placenames are generally recognisable. The Placenames Database of Ireland website (wwww.logainm.ie) hosts online bi-lingual placename research and archival records for townlands.

Previous Archaeological Investigations
The Excavations Bulletin is a published annual directory and an on-line database (www.excavations.ie) that provides summary accounts of all the excavations carried out in Ireland – north and south – from 1969 to 2018. The on-line database has been compiled from the published Excavations Bulletins from the years 1970-2010, with additional online-only material from 2011 onwards. The database provides access to summary descriptions of almost 24,000 reports.

12.4 DESCRIPTION OF EXISTING ENVIRONMENT

12.4.1 SITE DESCRIPTION

The 19.6 hectare site at the centre of this impact assessment is rural and predominantly agricultural in nature, with a large harvested bog to the immediate north and plantation forest to the immediate south. It is located approximately 2.4km southeast of Banagher, and is accessed via the L3010, a local road linking to the R438. The latter connects to the N65 21.5km to the southwest and the N62 7km to the northeast (Figure 12.3). An existing abattoir facility is situated to the southeast corner of the site, in Meenwaun townland, directly east of the townland boundary between Meenwaun and Boheradurrow. An established farmyard complex is situated within the site, to the northwest of the existing abattoir facility. The location of the farmyard has been occupied from at least the early 19th century.

The bulk of the 19.6 hectare site comprises farmed pasture, sited in Boheradurrow townland, bounded to the west by the Feeghroe Stream, and generally by mature hedgerows containing mature native trees on all other sides. The site straddles the L3010 local road, incorporating

two fields on the south side of the road. Hedgerow field boundaries follow approximately straight lines, with the exception of the hedgerow on the northeast boundary, which functions as the townland boundary between Boheradurrow and Clongawny Beg. This boundary has a noticeably tortuous profile.

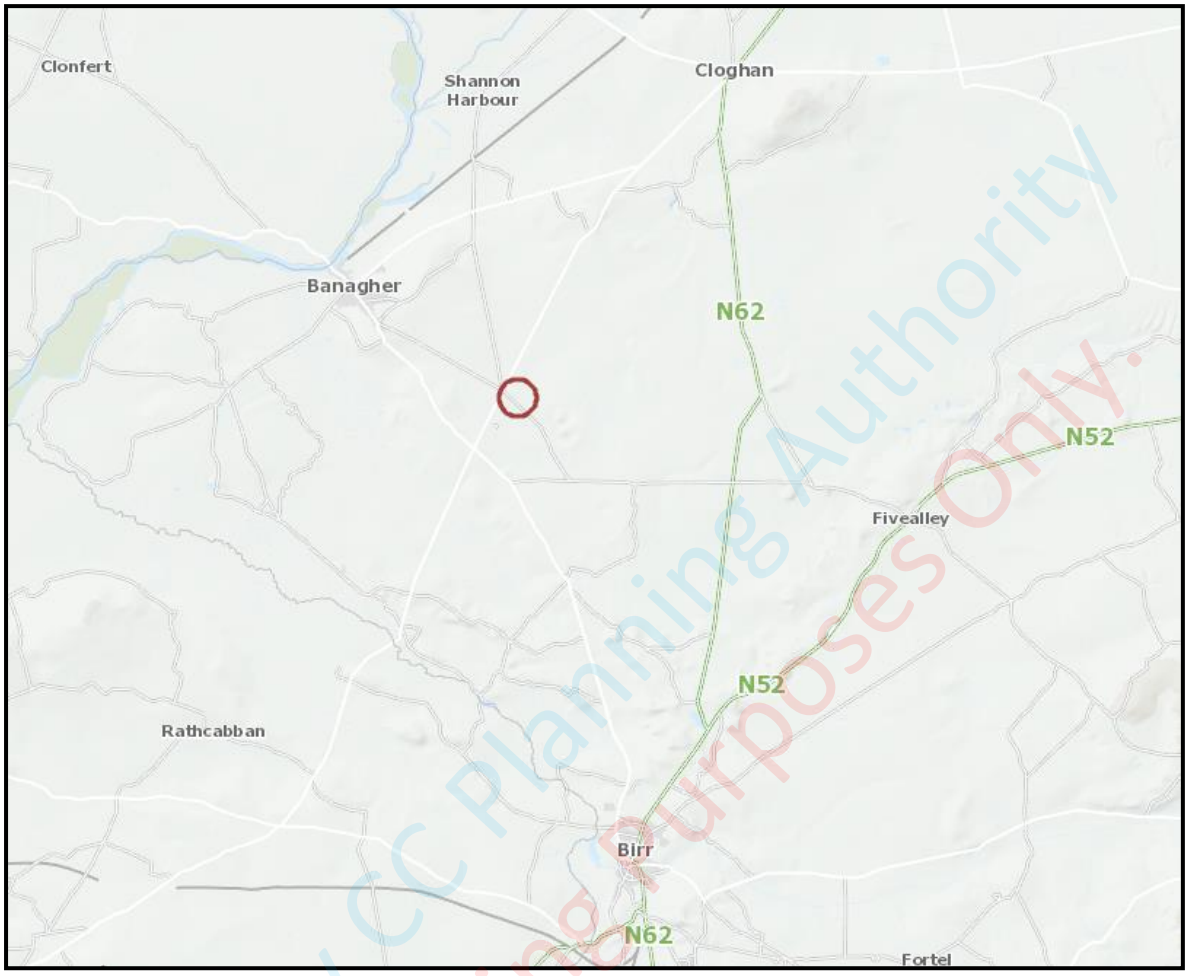

Figure 12.3: Location of site (*circled* red) within wider context (OSI Licence EN 0077919)

12.4.2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

Introduction

Archaeological evidence from the wider vicinity indicates that there has been sporadic settlement activity in this area since the prehistoric period, with continuing intermittent settlement in the early medieval and medieval periods. It is likely that Banagher would have been attractive through time as a fording point on the River Shannon, using the ridge of higher ground to approach from the southeast, but it was not until the 17th century that Banagher became a centre of population.

The River Shannon is the major waterway and artery throughout the centre of Ireland and is used for communication, transport, trade, food, water and defence purposes. There is evidence of man's intervention on the river from the Mesolithic period onwards, with records of the presence of fish traps, fording points and implements from this era.

The ford at Keelogue and Meelick (south of Banagher) was the main passage from County Galway providing access into northern County Clare and counties Tipperary and Offaly. Hence, the ford of Keelogue, which was the shallowest point in the river, was the principal point of communication for territories that aligned the River Shannon. The presence and recovery of prehistoric finds including stone axes, bronze swords and spears indicates that this ford has been in use since the Neolithic period onwards.

Prehistoric Period (7000BC-500AD)

The Mesolithic settlement at Lough Boora lies approximately 13km east-northeast of the proposed development site. One of the earliest known settlements in Ireland, dating from 7000-6500 BC, it was located on the former lake shore at pre-peat levels, and subsequently inundated. The site was discovered when Lough Boora was drained, and it was excavated in 1977 by Michael Ryan, revealing a fossil shore of an early lake, which was bigger than the modern one. A settlement or hunting camp was discovered on what would have been a peninsula jutting out into the earlier lake. Hearths containing animal bone were found, along with a very large quantity of stone tools. Tools were being manufactures at the site from chert, and included a large number of microliths, blades, cores, a small number of poorly made scrapers and ground pebble axes.

A burnt mound (OF029-027) situated in the townland of Kylebeg or Banagher was excavated in 2006 (Licence No. 06E0301). The mound, composed largely of fire-cracked limestone, overlain by a layer of soot and thirteen spreads of ash, was positioned on a steep slope, and covered ten pits or troughs, largely circular in plan and concave in profile. The soot and ash layers were identified as evidence of fires associated with vegetation clearance to facilitate the construction of the road and field boundary which truncate the site.

A number of toghers[1] have been identified to the northeast of the proposed development site (OF030-070 to -079), indicating traffic across the bog. Two of these wooden trackways are of Mid-Bronze Age date (OF030-076: 1734-1440 cal. BC and OF030-079: 1734-1449 cal. BC). The Late Bronze Age Dowris Hoard, an exceptional hoard of bronze objects that gave its name to the final phase of the Late Bronze Age, was recovered from a bog *c.*5km east of the proposed development site. The hoard contained 218 objects, including swords, spearheads, gouges, knives, razors, cauldrons, buckets, horns and crotals. The Banagher Hoard also dates to this period, and is likely to have been found in Meenwaun townland (Fehily Timoney & Co. 2015, 14). The hoard comprised a bronze pennanular bracelet, a gold dress fastner, two solid bronze rings and 125 amber beads. The presence of jewellery in hoards such as these is a good indication of the wealth of the period. The find spot for this was recorded as 'near Banagher, Kings County' in the files of the National Museum, but recent research has shown that it is likely to have come from Meenwaun townland.

Further evidence of prehistoric activity is represented by a ring barrow (OF030-012) and a mound (OF030-014), 3.7km and 3.9km south-southwest respectively, of the proposed development site. An enclosure (OF030-002), identified as a cropmark, approximately 53m east of the proposed development site may also be of prehistoric date. A further seven enclosures located within a 5km radius of the proposed development site may date from the prehistoric period onwards.

[1] Toghers comprise a short stretch of peatland trackway, constructed of wood, up to 15m in length with a discernible orientation, laid down to cross a small area of bog. These may date from the Neolithic (*c.*4000-2400 BC) to the medieval period (5th-16th centuries AD).

Historic Period (500AD onwards)

Early Medieval Period (c.500AD-1100AD)

Much of the archaeological evidence in the wider area dates to the early medieval period. The Barony of Garrycastle is situated in what was the territory of the *Delbna Ethra MacCochláín*, a branch of the *Deabhna* tribe claiming descent from the Dál gCais (Duffy 1997, 31).

Seven ringforts are located in close proximity to the proposed development site, including a possible ringfort (OF030-003) situated approximately 2km to the southeast. Ringforts are the most numerous and widely distributed monuments in the Irish landscape. These enclosed medieval homesteads generally date from *c*.500-1200AD.

The shaft of a high cross of 9th century date (OF021-0030040-) was removed from the grounds of a late medieval church to the southeast of Banagher, and is indicative of the foundation of an Early Christian settlement at the site. A possible holy well (OF021-003005), which later became the town well, was also located on the site. Another ecclesiastical foundation at Garrycastle (OF029-015), a short distance to the southwest, is associated with a holy tree, holy wells, and a former ecclesiastical enclosure. The numerous wells are described on the first edition Ordnance Survey map as 'All Saints' Well', 'Lady's Well' and 'Eye Wells or Tobernasool'. There are the ruins of two buildings at the site thought to date to the 17th/18th century, but there is a suggestion that one of the buildings may be more ancient and it is possible that there may have been an earlier foundation on the site. While it is possible that these churches may be early medieval in date, neither of the sites have an association with a saint's name. However, O'Donovan describes in the Ordnance Survey letters that a patron was held at this church site on SS. Peter and Paul's day, and on the Sunday previous to the 1st of August. This practice was discontinued around 1835.

Approximately 4.16km northeast of the proposed development site is an ecclesiastical complex comprising a church, graveyard, bullaun stone and holy well (OF022-02001, -02002, -021, -022), which may be of early medieval date.

While Mid-Bronze Age dates have been returned for two toghers in the bog to the northeast of the Meenwaun Windfarm, to the east of the proposed development site, it is possible that some of the other toghers identified could date to the early medieval or medieval periods. With two ecclesiastical sites located on the northeast and southwest fringes of the bog it is possible that there could have been routeways across the bog connecting the two sites.

Medieval Period to Late Medieval (c.1100AD-1650AD)

The Anglo-Norman invasion from 1169AD had a huge impact on the landscape of the region. In the following centuries, castles were built at Garrycastle (OF029-006001), located 1.6km to the southwest, and at Streamstown (OF022-019), 2.64km to the northwest. Classified as tower houses, such defended residences of the rural gentry generally date from the fifteenth to seventeenth centuries. They are usually rectangular in plan, several stories in height and contain a number of defensive features, including wall-walks, at floor level, and murder holes.

In the thirteenth century, Richard Tuite is thought to have built an Anglo-Norman castle on what later became the site of Fort Falkland.

Garrycastle tower house (OF029-006001-), from which the barony derives its name, is situated a short distance southwest of the proposed development site. It comprised a roughly coursed limestone rubble four storey tower, of which the north wall and part of the west wall remain, having a bartizan with a Sheela-na-gig (OF029-0060040-), a mural passage at first floor level, a pair of garderobes, and evidence of a destroyed fireplace. A bawn wall (OF029-006002-) is attached to the tower house via a circular tower at the west side, and runs south from the tower. It originally would have returned to rejoin the tower house at the east. A larger bawn that remains extant is part of a building phase that comprised a fortified house in the 16th/17th century.

In the mid-16th century, Banagher (*Beannchor*) was in the possession of the native Irish, and its ownership was contested between the families of the MacCoghlans, the O'Maddens and the O'Carrolls. The MacCoghlans had built numerous castles in what is now west Offaly, due to strategic requirements to protect their large territory (Loeber 2001, 307). The O'Maddens, whose territory included land on both sides of the river and thus required them to secure fording points over the Shannon, built castles at Meelick and Banagher, the strategic importance of which were confirmed by the government later seizing them (*ibid*, 210). The MacCoghlans also built castles at Banagher and Raghra, despite not having territory west of the Shannon (*ibid*). Feilim MacCoghlan was slain in 1540 by the O'Maddens, and Teige Caech O'Carroll rebuilt the castle in 1544 in a bid to claim the settlement (AFM AD 1455, AD1489). There is a 16th century graveslab located inside the church in Banagher (OF021-003003) dedicated to John Coghlan, who died in 1590.

A market was granted to Sir John MacCoghlan, chief of Delvin in 1610.

The construction of Fort Falkland (OF021-003007-) by Sir Arthur Blundell in 1624 marked the commencement of the establishment of a plantation town. The fort may have been built on the site of the 16th century Banagher Castle, and was probably reinforced in the Commonwealth era (Hartnett McEnery 2006, 19). A linear earthwork (OF021-003008-), with a projecting bulwark to the northeast corner was constructed to defend the town on three sides.

By 1628, Banagher had received a charter that established it as a borough town with rights to a weekly market and two annual fairs.

Early Modern Period (c.1650AD-c.1850AD)

The bridge crossing the Shannon (OF021-003009) is recorded by 1690. The site of a 17th century Huguenot glassworks (OF029-024) is recorded in Glaster townland, representing early industry in the wider area of the proposed development site.

A Martello tower located on the Galway side of the River Shannon at Banagher (GA109-010) was strategically sited to protect the river crossing at Banagher and is known as Cromwell's Castle. Built in the mid-17th century, it was later converted for use as a battery and formed part of the late 18th and early 19th century defences to guard against the threat of Napoleonic invasion. There are also two batteries or artillery fortifications dated to the 18th century, one on each side of the River Shannon (OF021-002; GA109-014).

The town of Banagher is associated with Charlotte Bronte, who spent her 1854 honeymoon at Cuba Court (OF021-008--), an early 18th century house then in use as a Royal School, under

the headmastership of Reverend Alan Bell, the uncle of Bronte's husband, Arthur Bell Nicholl. Bell Nicholl returned to live at Banagher following Charlotte's death in 1855. Cuba Court was built to designs by Sir Edward Lovett Pearce.

Garrycastle House (NIAH Ref. 14929004) was built within the bawn of Garrycastle tower house, in c.1740.

Lewis (1837) describes Banagher Bridge as being 'one of the oldest across the Shannon: it consists of several small arches with projecting piers, and is very narrow and inconvenient, but of great strength and solidity'. A canal with a swing-bridge had been constructed on the Galway side of the bridge, as its arches were too small to allow navigation. The streets of the town, he notes, were 'Macadamised'. The present Shannon Bridge dates from the 1840s and was built on the site of its predecessor.

12.4.3 CARTOGRAPHIC ANALYSIS

Analysis of historic mapping shows how landscapes evolve. Comparing successive historic maps can show how archaeological and architectural sites have been created, altered or removed over a period of time. A wide range of historic maps was consulted, a full list of which is provided in the bibliography. Relevant extracts are presented from the following historic maps:

- Down Survey map of Co. Offaly (Kings County), 1656-58 (Figure 12.4);
- Down Survey map of Barony of Garricastle, 1655 (Figure 12.5);
- Taylor & Skinner's Map 87, 1777 (Figure 12.6);
- First edition Ordnance Survey 6" map, 1837-43 (Figure 12.7); and
- Revised Ordnance Survey 25" map, 1912 (Figure 12.8)

Sir William Petty's Down Survey map of County Offaly (then *King's County)* (Figure 12.4) and map of the barony of Garricastle (Figure 12.5) illustrate a settlement at *Bannahar*, the later including a detailed depiction of its fort. *Garrie Caftle* is depicted on the former map, and the townland of *Garricaftle* on the latter map, with a large house likely to correspond with the castle, bawn and fortified house still present on that site (OF029-006). The area containing the proposed development site is situated within land marked '*Red bog belonging to ye forfeited Lands in Garricaffle'. 'Fortefacla'* is marked on the barony map, possibly in reference to Fort Falkland.

Figure 12.4: Down Survey map of County Offaly (King's County)

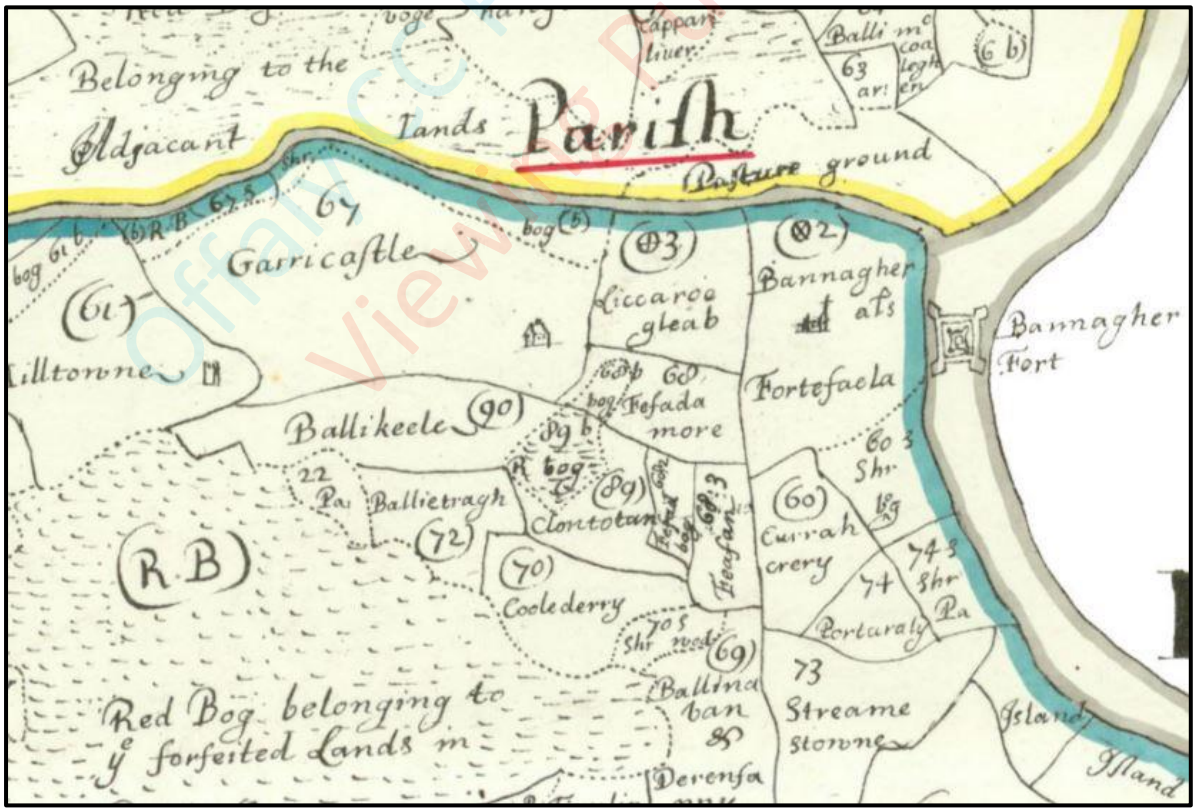

Figure 12.5: Down Survey map of *Barony of Garricastle*

Taylor & Skinner's 1777 Map of the 'Road from Dublin to Galway and Ouchterard by Banagher and from Dublin to Birr by Frankford' depicts a sizeable settlement at Banagher, as well as a number of country seats to the south, including 'Garry' (property of 'McCoglan Esq.') and Cubo (that of 'Fraser Esq.') (Figure 13.6). The area of bogland that lies north of the proposed development site is also shown.

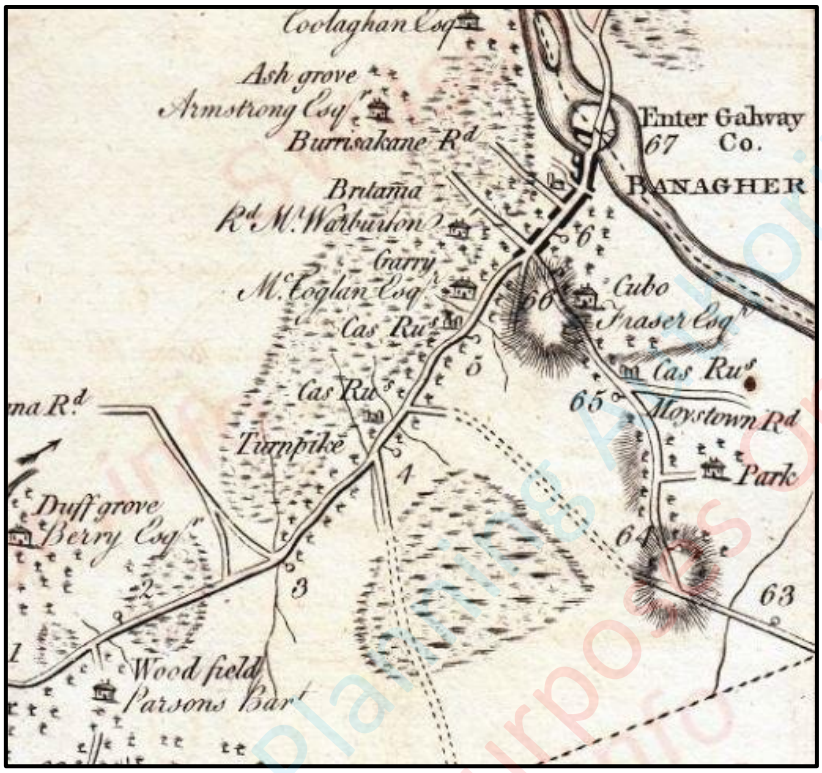

Figure 12.6: Taylor & Skinner's 1777 Map 87

On the first edition 6-inch Ordnance Survey map (1837-43) much of the landscape around the proposed development site is shown divided into small to medium sized fields on the edge of bogland (Figure 12.7). The proposed development site on the north side of the local road is divided into three large fields, on the edge of bogland, with smaller fields to the southeast, straddling Meenwaun and Boheradurrow. On the south side of the local road, one field has been reclaimed from the adjacent bog. Two buildings, with associated yards, small adjacent field and laneway are depicted on the site of the present farmyard in Boheradurrow, within the proposed development site.

The land to the north of the proposed development site, within the townlands of Boheradurrow and the adjacent Ballyeighter, is predominantly bog, traversed by the Feeghroe Stream and several curving drains, including a linear feature marked 'canal', which runs through Boheradurrow in a northwest to southeast direction. Clongawney Beg townland, to the east, is mostly unenclosed.

There is little change to the landscape on the revised 25-inch Ordnance Survey map (Figure 12.8), with the exception of some field boundary and drainage changes, including the subdivision of land around the farm buildings fronting the local road in Boheradurrow. The two buildings at this site remain unaltered, and a well in annotated between the buildings and the road. The road network at the northwestern edge of the proposed development site, meeting on the Feeghroe Stream, is labelled 'Five Roads Cross.

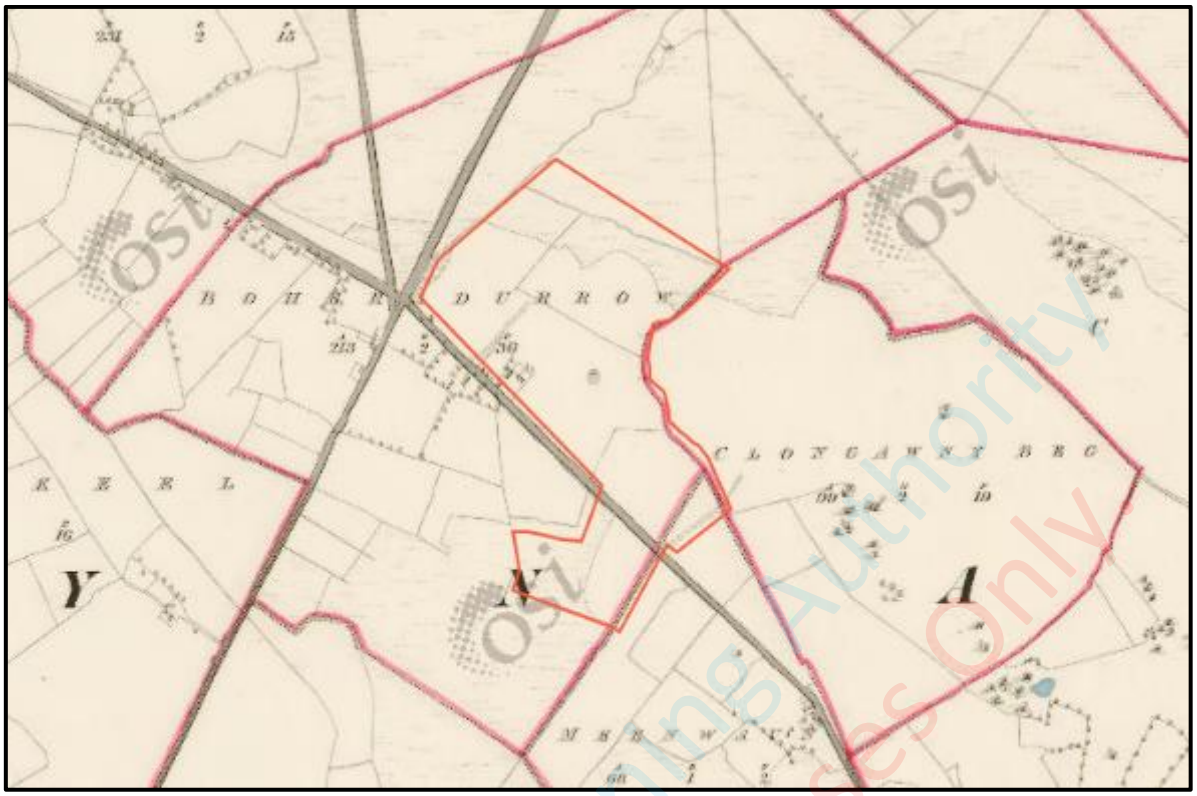

Figure 12.7: First edition 6-inch Ordnance Survey Map of Ireland (OSI Licence EN 0077919)

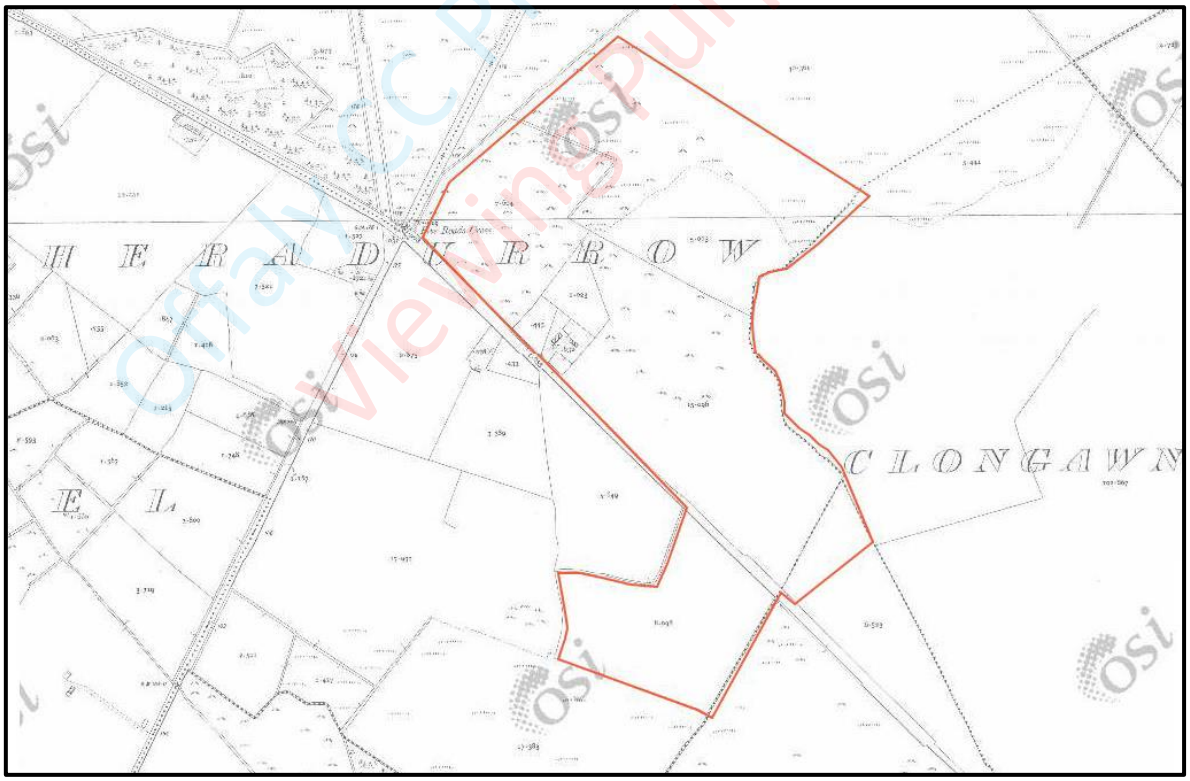

Figure 12.8: Revised 25-inch Ordnance Survey Map of Ireland, 1913 (OSI Licence EN 0077919)

12.4.4 TOPONOMY

The townland name of Boheradurrow derives from *Bóthar an Doire*, the road of the oak-wood. It has been mentioned under a range of spellings, from the first mention of *Bauraderry* in 1738 and *Bauradirra* in 1825, to *Boheradurrow* on the first and revised edition Ordnance Survey maps. It is situated in the civil parish of Reynagh, the Barony of Garrycastle and the county of Offaly (www.logainm.ie/en/41154).

A small area of the proposed development site to the southeast is contained within the townland of Meenwaun. Also situated within the parish of Reynagh and Barony of Garrycastle, this derives from *An Mhóin Bhán*, a white or grassy bogland. The earliest recorded reference to *Monewawn* is in the Registry of Deeds dating to 1805 and *Mín Bhán*, or *Meenwan* is first referenced in 1837 (https://www.logainm.ie/en/41526).

12.4.5 PREVIOUS ARCHAEOLOGICAL INVESTIGATIONS

A search of the online Excavations Bulletin for previous archaeological investigations in the proposed development area produced no results. Several investigations have taken place in the wider vicinity, with those that have been undertaken in the Banagher area summarised in Table 13.1.

Monitoring and testing carried out in advance of construction works at Meenwaun Windfarm (Excavation No. 2017:299, Licence No. 17E0026) to the east uncovered a Neolithic stone axe, two oval pits filled with burnt mound-like material, several stake-holes and spreads of burnt material. A radiocarbon date from one of the pits placed it within an Early Bronze Age context.

Monitoring of topsoil stripping was undertaken as part of ongoing restoration and extension of the Georgian dwelling-house situated inside the late medieval bawn of Garrycastle tower house (Excavation No. 1997:450). Two wall foundations were encountered on the south side of the dwelling-house, attributed to a demolished structure which abutted the south gable of the latter. A brick-arched doorway, now blocked, in the bawn wall immediately southeast of the house provided access to the structure. No deposits or features pre-dating the Georgian house were encountered.

Table 12.1: Previous excavations in the wider vicinity of the proposed development site

LICENCE NO.	EXCAVATION NO.	LOCATION	SITE TYPE	AUTHOR
-	1990:098	'Banagher Fort', Kylebeg or Banagher	Military Fort – post-medieval	Beth Cassidy
03E1538	2003:1524	Banagher, Offaly	No archaeological significance	Brian O
03E1915	2003:1525	Cuba Avenue, Banagher, Offaly	No archaeological significance	Daniel Noonan
03E1541	2003:1526	Shannon Hotel, Banagher	No archaeological significance	Daniel Noonan
04E0854	2004:1379	Church Street, Banagher	Post-medieval pottery kiln	Kieran Campbell
-	1992:156	Harbour Street,	Plantation	Heather A.

LICENCE NO.	EXCAVATION NO.	LOCATION	SITE TYPE	AUTHOR
		Banagher	town/early monastic site	King
05E0282	2005:1290	Kylebeg, Banagher	No archaeological significance	Ellen O'Carroll
05E1212	2005:1291	Main Street, Banagher	Urban post-medieval	Kieran Campbell
05E0559	2005:1292	The Marina, Banagher	Riverbank monitoring	Kieran Campbell
05D032, 05R036	2005:1293	River Shannon, Banagher	Riverine	Rex Bangerter
06E0301	2006:1685	Site 1, Inner Relief Road, Banagher	Burt mound and pits	Paul Stevens
06E0346	2006:1686	Main Street, Banagher	Urban post-medieval	Kieran Campbell
-	1994:195	Banagher	Urban	Heather A. King
07E0853	2007:1440	Banagher	Urban	Tamás Petérváry
07E0196	2007:1441	Harbour Road, Banagher	No archaeological significance	John Purcell
17E0023	2017:299	Meenwaun Windfarm	Early Bronze Age pits and a stone axe	Ros ó Maoldúin
97E0444	1997:441	Banagher	Monitoring of sewerage scheme	Jacinta Kiely
-	1997:450	Garrycastle	Archaeological complex	Dominic Delaney
97E0444 ext	1998:544	Banagher	Urban	Jacinta Kiely
98E0097	1998:545	Kylebeg, Banagher	Seventeenth century and later military fortification	Jim Higgins
98E0301	1998:546	Main Street, Banagher	Urban	Martin Fitzpatrick.
01E0143	2001:1086	Main Street, Banagher	Urban	Billy Quinn
02E1867	2002:1553	Church Street, Banagher	No archaeological significance	Martin E Byrne
02E0250	2002:1552	Banagher	Urban	Stuart Elder

12.4.6 PREVIOUS ARCHAEOLOGICAL FINDS

While the topographical files of the National Museum of Ireland do not contain any records of stray finds for Boheradurrow townland, a number of redundant records in the Record of Monuments and Places indicate finds of worked wood previously recovered from Clongawny More (OF030-072 and OF030-078). Within the wider study area, objects recovered from a bog to the north comprise cut logs and a goblet (NMI 1980:124). A range of wooden objects were found in bogs 4-5km to the east, including the lid of a wooden vessel (NMI 1980:124),

wooden objects (NMI 1977:2178-2181), a wooden stool and wooden beetle (NMI 1988:127-128) and two wooden boards (NMI 1998:128-129).

12.4.7 ARCHAEOLOGICAL HERITAGE

To follow is a schedule of recorded archaeological monuments, national monuments and areas of archaeological potential that were examined for a potential impact.

Record of Monuments and Places (RMP)

The Record of Monuments and Places lists 17 sites within a 2km radius of the proposed abattoir extension developments (Figure 12.9, Table 12.2). None of these monuments are located within the proposed development boundary, and none will be visually impacted by the proposal. One monument, an enclosure in the adjacent townland of Clongawny Beg (OF030-002-), is situated within 1km of the proposed development. This is known from cropmark evidence and is not visible at ground level.

Table 12.2: RMP sites in the wider vicinity of the proposed development site

RMP NO.	SITE TYPE	TOWNLAND	ITM REFERENCE	PROX. (KM)
OF030-002--	Enclosure	Clongawny Beg	604690, 713301	0.53
OF030-070--	Road-class 3 togher	Clongawny	605270, 713860	1.27
OF030-071--	Road-class 3 togher	Clongawny	605239, 713824	1.25
OF030-072--	Redundant record	Clongawny	605158, 713674	1.05
OF030-073--	Road-class 3 togher	Clongawny	605201, 713623	1.09
OF030-074--	Road-class 3 togher	Clongawny	605322, 713663	1.21
OF030-075--	Road-class 3 togher	Clongawny	605332, 713816	1.33
OF030-076--	Road-class 3 togher	Clongawny	605392, 713889	1.31
OF030-077--	Road-class 2 togher	Clongawny	605310, 713900	1.33
OF030-078--	Redundant record	Clongawny	605426, 713978	1.47
OF030-079--	Road-class 3 togher	Clongawny	605329, 713674	1.25
OF029-006004-	Sheela-na-gig	Garrycastle	602055, 713763	1.62
OF029-006001-	Castle-tower House	Garrycastle	602055, 713763	1.62
OF029-006002-	Bawn	Garrycastle	602055, 713763	1.62
OF029-006003-	Fortified House	Garrycastle	602055, 713763	1.62
OF029-015006-	Ritual Site-Holy Well	Garrycastle	602677, 711778	1.92
OF029-015007-	Ritual site–Holy Well	Garrycastle	602677, 711778	1.92

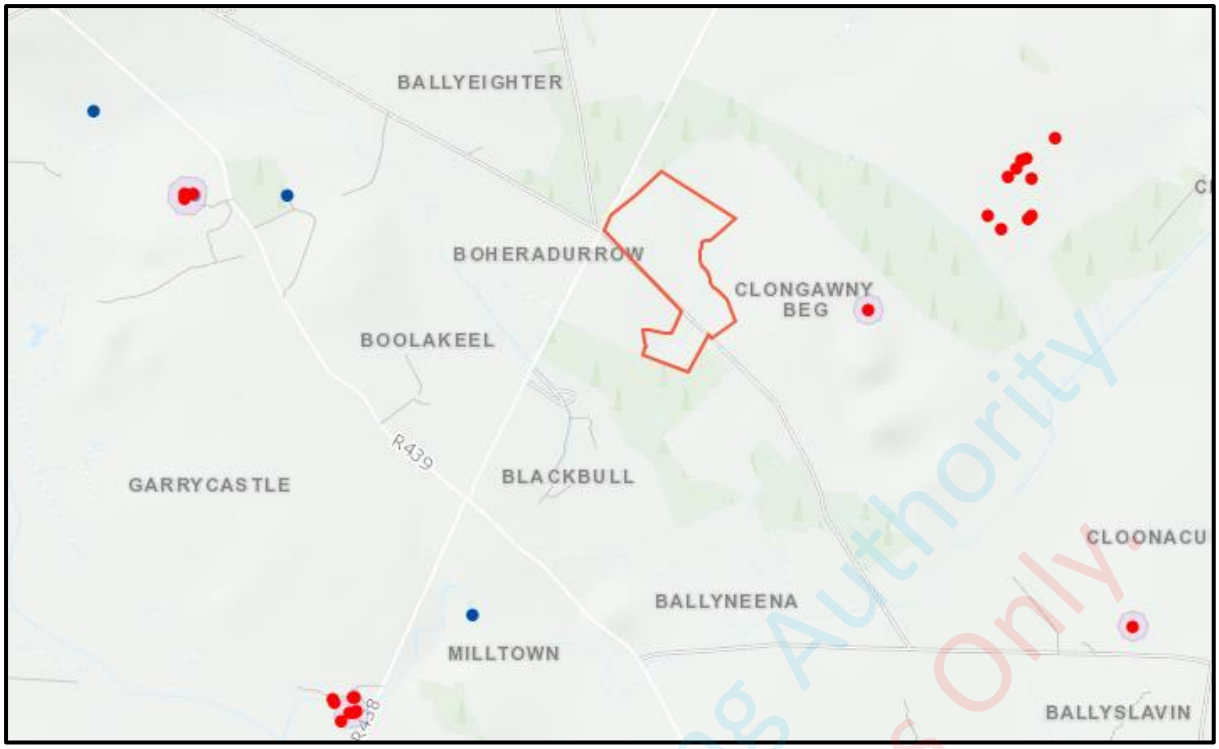

Figure 12.9: RMP sites (*red dots*) and NIAH heritage sites (*blue dots*) in relation to proposed development site (*outlined in red*)

National Monuments

There are no National Monuments in close proximity to the proposed development. The closest National Monument is Gallen Priory (OF014-029, NM 504), located approximately 13km to the northeast, and southeast of Ferbane. The proposal will have no effect on this site.

Areas of Archaeological Potential

The townland boundary between Boheradurrow and Clongawny Beg (to the east) forms the eastern boundary of the proposed development site. Additionally, part of the townland boundary between Boheradurrow and Meenwaun is included within the proposed development area to the southeast, bordering the west boundary of the existing abattoir facility.

An earth-cut ditch was noted marking the boundary between Boheradurrow and Clongawny Beg, while there is no surface trace of the townland boundary on the west of the existing abattoir facility. However, sub-surface traces of an earth-cut ditch, or similar earthwork marking this boundary, may survive. Townland boundaries are considered to be areas of Archaeological Potential (AP), as they may potentially preserve Gaelic *tuath* boundaries. A *tuath* was a basic territorial unit associated with kingship. Their boundaries cannot be related to modern political divisions making the identification of such early boundaries difficult.

12.4.8 ARCHITECTURAL AND CULTURAL HERITAGE

Offaly County Development Plan 2014-2020

The Offaly County Development Plan 2014-2020, which provides a landuse plan and an overall strategy or the development of County Offaly over that period, was adopted on 15 September 2014.

It lists three protected structures within 2km of the proposed abattoir extension developments (Table 12.3):

Table 12.3: RPS sites in the vicinity of the proposed development site

RPS NO.	NAME	ADDRESS	PROXIMITY (KM)
39-39	Claremount House	Banagher, Birr	1.22
39-45	Garrycastle	Banagher, Birr	1.62
39-40	Castle Garden House	Banagher, Birr	2

The proposed abattoir extension developments are not located within an Architectural Conservation Area (ACA).

The Town Plan for Banagher, deemed a Local Service Town, contained within Offaly County Council Development Plan 2014-2020 Volume 2: Settlement Plans was also consulted for the purposes of this report.

It identified three areas of archaeological potential in the town of Banagher and in the immediate vicinity thereof (Figure 12.10). No areas of archaeological potential were identified within or in close proximity to the proposed development site.

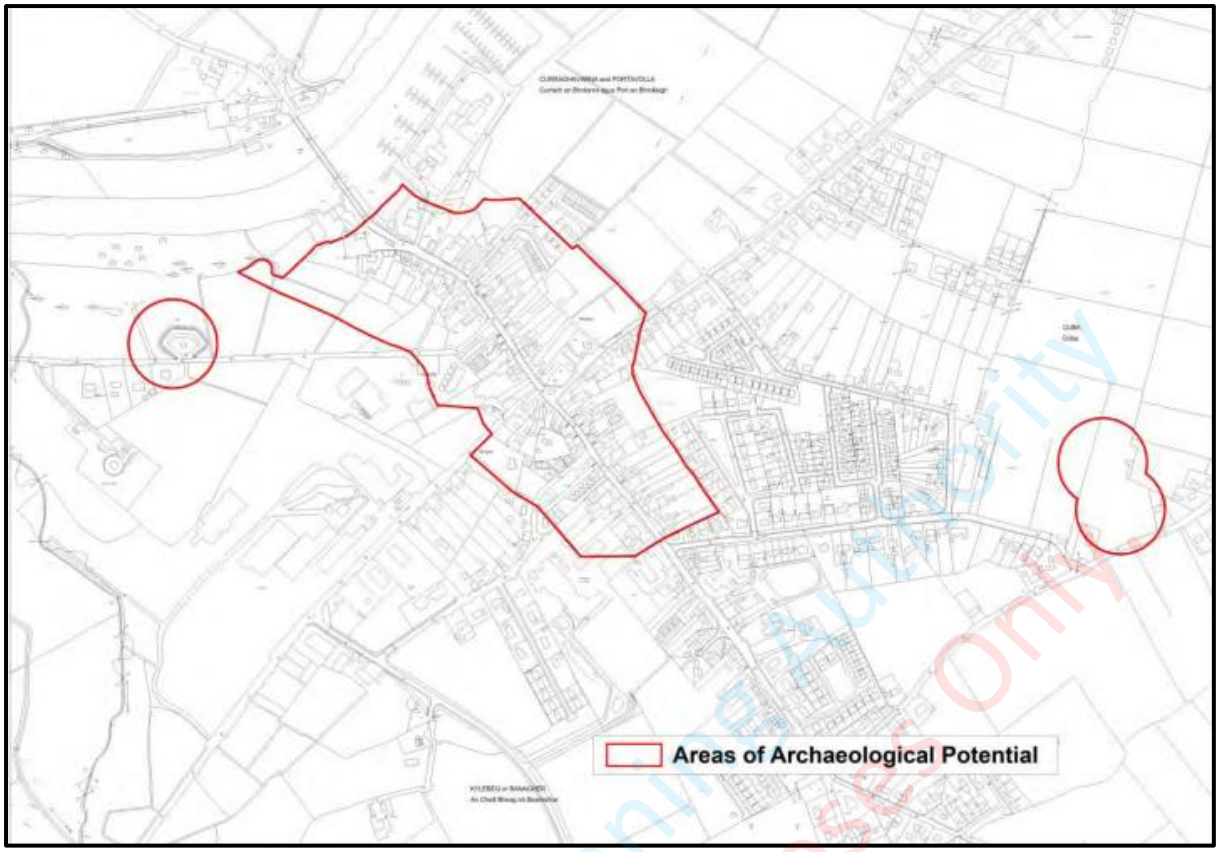

Figure 12.10: Areas of Archaeological Potential in Banagher area (After Banagher Town Plan, Map 8.1)

National Inventory of Architectural Heritage

The Building survey of the NIAH lists four entries within 2km of the proposed abattoir extension developments (Table 12.4), and lists a single entry in the Garden Survey (Table 12.5). The latter is a desk-based assessment of the condition and survival of the listed sites, based on aerial photography, and as such limited details are available.

Table 12.4: NIAH sites in the vicinity of the proposed development site

NIAH REG	NAME	RATING	PROXIMITY (KM)
14929002	Claremont House	Regional	1.22
14930010	Milltown (Ga. By.)	Regional	1.43
14929004	Garrycastle	Regional	1.62
14929003	Castle Garden House	Regional	2

Table 12.5: NIAH Garden Survey sites in the vicinity of the proposed development site

NIAH REG	PROPERTY	SITE CONDITION	PROXIMITY (KM)
OF-53-N-024137	Claremount	Main features substantially present – peripheral features unrecognisable	1.38

The proposed development site is not situated within 500m of any of the above named sites and therefore, will have no direct impact on any Record of Protected Structures (RPS), National Inventory of Architectural Heritage (NIAH) sites or on any Architectural Conservation Areas (ACA). Similarly, no structures of architectural significance were identified during the field inspection or in the documentary, cartographic and aerial photographic sources.

The character of the surrounding built heritage landscape is rural, with fragmented remains of former demesnes surviving in places. Claremount House, which dates from c.1790 and is listed on the NIAH and RPS, is located 1.22km from the proposed development site.

12.4.9 FIELD INSPECTION

A visual inspection of the proposed development site was carried out by Edel Barry of Shanarc Archaeology Ltd. on 22 October 2018. The purpose of the inspection was to assess current and previous land use, access to the site, local topography and any additional environmental information relevant to the site's appraisal. The inspection also sought to identify and assess cultural heritage sites that might be subject to direct or indirect as a result of the proposal. Weather conditions were cool, clear and bright.

The area to the southeast of the proposed development site, upon which the existing abattoir facility is sited, is sub-triangular, fronting onto the L3010 to the southwest, and enclosed by mature hedgerows, as well as concrete post and wire fencing to the northwest boundary. This northwest boundary is the townland boundary between Boheradurrow and Meenwaun. Approximately 40% of the sub-triangular area (to the front) is occupied by concrete block and steel structures that make up the existing abattoir and concrete hardstanding areas. The ground to the rear thereof, is of relatively level topography, but very overgrown and interspersed with piles of demolition debris, predominantly rubble concrete and stone.

Field 1 to the northwest is sub-rectangular and of very gently undulating topography. It has been recently used for pasture and is enclosed by mature hedgerows and native trees. The boundary to the northeast is the townland boundary between Boheradurrow and Clongawny, and comprises a ditch of approximately 1.3m in width and 0.4m in depth, with a gently concave base. This widens to approximately 3m in width and 0.8m-1.10m in depth at the boundary with Field 2, and the boundary turns in a tortuous fashion in a northwesterly direction and then sharply in a northeasterly direction. In the northernmost corner of Field 1, there is a pile of concrete debris. A native hedgerow and a recent ditch form the northwest boundary of Field 1.

Field 2 is of level topography to the northwest and southeast boundaries, but to its centre and north the topography begins to slope upwards, becoming undulating and rising to a gentle

height towards the north. It has also most recently been used as pasture and has a cover of fresh short grass.

Recent or younger hedgerows form field boundaries within the northernmost part of the proposed development site. The topography to the east of this area is undulating, with a long hillock to the northeast. Some bedrock protrudes through the soil incidentally. The soil in this area, in proximity to bog, is black and peaty, and some recent drains have been excavated. The pasture ground to the west of the farmyard fronting the L3010 is of level topography. Cabbages appear to have been sown in a field to the west of the site.

A roughly L-plan parcel of land of approximately 3.3ha to the south of the L3010 also forms part of the proposed development site. The southeastern field boundary thereof, forms the continuation of the townland boundary between Boheradurrow, to the northwest, and Meenwaun, to the southeast. A modern field drain, with native hedgerow, runs parallel to this boundary, down the centre of the field. Some demolition rubble (concrete and stone) is evident at the southwestern extent. This land has been in use as pasture, and is predominantly level, with a gentle rise to the southwest.

No features of archaeological, architectural or cultural heritage interest were noted during the site inspection.

A series of images depicting the application area is presented in Attachment 12.2.

12.5 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

A full description of the proposed abattoir extension, with associated development, is presented in Chapter 2 of this EIAR, and the plans and supporting documents included with the application should be read in conjunction with this chapter.

The proposed development comprises extensions to an existing abattoir facility, sited in Meenwaun townland, and the construction of a new meat processing factory to the west of the existing facility in greenfield, sited in Boheradurrow townland (Figure 12.1; 12.2). The new extensions will extend between the existing abattoir to the southeast and the existing farm buildings to the northwest. The development will include a staff carpark, service yards, new public road entrance, effluent treatment compound, water and gas storage tanks, truck wash bay, integrated constructed wetlands, security hut, water and effluent treatment buildings and all associated site works and landscaping.

It is proposed to widen part of the existing L3010, to construct the integrated wetlands to the northwest of the existing farm buildings, and to discharge final treated effluent to the Feeghroe Stream, on the western boundary of the proposed development site.

12.5.1 INVENTORY OF ARCHAEOLOGICAL SITES AND AREAS OF ARCHAEOLOGICAL POTENTIAL

Figure 12.11: Location of archaeological site (A1, in red) and areas of archaeological potential (AP1, dotted orange line, AP2, dotted green line) in relation to proposed abattoir extension footprint (outlined in red)

The following inventory details all identified sites of heritage significance both within and in direct proximity to the proposed abattoir extension and associated developments. It consists of one archaeological site (A**1**) and two areas of archaeological potential (**AP1 and AP2**). Entries provide location information and a description of each site.

There are no protected structures, recorded in the NIAH, the RPS or otherwise within the proposed development site. Similarly, no structures of architectural or industrial heritage significance will be directly impacted, and no additional features of merits were identified during the field inspection or in the documentary or cartographic sources.

A1	**Figures 12.9, 12.11**
TOWNLAND	Clongawny Beg
COUNTY	Offaly
GRID REFERENCE	604690,713301
IDENTIFICATION	Aerial Photography
SITE TYPE	Enclosure
SITE NAME	-
RMP Ref. NO.	OF030-002--
REFERENCES	Archaeological Inventory of County Offaly' (Dublin: Stationery Office, 1997)
PROXIMITY	0.53km
DESCRIPTION: Not visible at ground level. Aerial photographs (GSI, N 163/4) show a cropmark of a possible circular enclosure. This limited description is derived from the published 'Archaeological Inventory of County Offaly' (Dublin: Stationery Office, 1997).	

AP1	**Figures 12.7, 12.8, 12.11**
TOWNLAND	Boheradurrow, Clongawny Beg
COUNTY	Offaly
GRID REFERENCE	604022, 713556
IDENTIFICATION	Cartography, field inspection
SITE TYPE	Townland Boundary
SITE NAME	-
RMP Ref. NO.	-
REFERENCES	-
PROXIMITY	Within
DESCRIPTION: The townland boundary between Boheradurrow and Clongawny Beg (both in the Civil Parish of Reynagh) runs along the northeast boundary of the site: it runs in a northwesterly direction before turning in a tortuous fashion first towards the north and then in a northeasterly direction.	

AP2	**Figures 12.7, 12.8, 12.11**
TOWNLAND	Boheradurrow, Meenwaun
COUNTY	Offaly
GRID REFERENCE	604055, 713237
IDENTIFICATION	Cartography, field inspection
SITE TYPE	Townland Boundary
SITE NAME	-
RMP Ref. NO.	-
REFERENCES	-
PROXIMITY	Within
DESCRIPTION: The townland boundary between Boheradurrow and Meenwaun (both in the Civil Parish of Reynagh) runs southwest-northeast, dividing the site between the area currently occupied by the abattoir buildings to the southeast (in the townland of Meenwaun) and the farmland to be developed to the northwest (in the townland of Boheradurrow). There are no extant remains of a ditch or other boundary, with the division now partially marked by a recent concrete post and wire fence and partly by a hedgerow.	

12.6 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

12.6.1 CONSTRUCTION PHASE

12.6.1.1 Potential Direct Impacts

Following an assessment of readily available archaeological and architectural records, cartographic and documentary sources, and a visual inspection of the site, it is concluded that the proposed development will not directly impact any known Recorded Monuments, National Monuments, Protected Structures, or NIAH heritage sites.

The construction phase of the proposed development will have a likely direct and negative impact on two townland boundaries (AP1 and AP2), that between Boheradurrow and Clongawny Beg, and that between Boheradurrow and Meenwaun, which may preserve Gaelic *tuath* boundaries.

12.6.1.2 Potential Indirect Impacts

During construction, there are no anticipated potential indirect impacts on any architectural or cultural heritage features.

There is a potential indirect impact on a recorded monument (**A1**), a cropmark of a possible circular enclosure, which is situated 0.53km northeast of the proposed development site. This monument has not been investigated but there is a potential for hitherto unknown sub-surface remains to exist in the vicinity thereof, which would be negatively impacted by the excavation and construction work associated with the proposed abattoir extension.

12.6.2 OPERATIONAL PHASE

12.6.2.1 Potential Direct Impacts

It is anticipated that all archaeological heritage issues will be resolved to the satisfaction of the Department of Culture, Heritage and the Gaeltacht at the pre-construction phase of development and therefore, there will be no potential direct impacts at the operation stage of the development.

12.6.2.2 Potential Indirect Impacts

Potential indirect impacts in relation to the proposed development relate to its setting in the immediate and wider cultural and historic environment. Potential indirect impacts include an impact upon the setting of a monument or architectural structure or an impact that may detract from how the monument is appreciated and viewed within a given landscape. These impacts will exist for the lifetime of the development and will not cease after decommissioning, unless the buildings are demolished at that point. They are considered to be long-term but non-permanent in duration. The landscape and visual impacts associated with the proposed development are examined in the Chapter 7 Landscape and Visual, and should be read in conjunction with this chapter.

12.6.3 CUMULATIVE IMPACT

The current assessment assesses the impact to archaeological, architectural and cultural heritage arising from the proposed development as a whole. No future phases are currently proposed and consequently it is not considered that any additional mitigation measures above those already provided are required.

12.6.4 "DO-NOTHING" IMPACT

There will be no adverse impact on archaeological, architectural and cultural heritage if the site is not developed. If the current buildings were to be reoccupied, there would be no change.

Table 12.6: Summary of Impacts

IMPACT PHASE	FEATURE/SITE/ STRUCTURE	LIKELIHOOD	IMPACT	QUALITY	SIGNIFICANCE	EXTENT	DURATION	MITIGATION	RESIDUAL IMPACT*
Construction	**A1** Enclosure	Low Likelihood	Indirect (sub-surface remains)	Negative	Potentially significant	Local	Permanent	Pre-construction test trenching and construction phase monitoring	Significance of impact reduced to imperceptible
	AP1 Possible townland boundary marker	High likelihood	Direct	Negative	Potentially significant	Local	Permanent	Pre-construction test trenching and construction phase monitoring	Significance of impact reduced to imperceptible
	AP2 Possible townland boundary marker	Low likelihood (due to no visible extant remains)	Direct	Negative	Moderate	Local	Permanent	Pre-construction test trenching and construction phase monitoring	Significance of impact reduced to imperceptible
Operation	**A1** Enclosure	Unlikely	Direct	Neutral	Imperceptible	Local	-	None proposed	No impact
	AP1-2	Unlikely	Direct	Neutral	Imperceptible	Local	-	None proposed	No impact

12.7 MITIGATION MEASURES

Mitigation measures, both at pre-construction, construction and operation phases, are required to be undertaken in compliance with national policy guidelines and statutory provisions for the protection of archaeological and architectural heritage, including the National Monuments Acts 1930-2004, the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999 and the Planning and Development Acts 2000 (as amended).

12.7.1 PRE-CONSTRUCTION PHASE

12.7.1.1 Avoidance of Impact

Avoidance of direct and indirect impacts upon all archaeological, architectural and cultural heritage sites is the preferred mitigation option with regards to the proposed abattoir extension and associated developments. As this is not always feasible, pre-construction and construction-phase recommendations are offered to provide ameliorative measures when avoidance and preservation *in situ* are not possible.

12.7.1.2 Archaeological Investigations

Groundworks associated with a development of this kind have the ability to uncover and disturb hitherto unrecorded sub-surface features, deposits, structures and finds of archaeological interest. Besides two historic townland boundaries (AP1 & AP2; Table 13.6), no known archaeologically significant sites or features are located within the proposed development site, and no new features of archaeological potential were noted from a study of cartographic and aerial photographic sources or during an on-site inspection.

However, there remains the possibility that subsurface archaeological features or material may exist within the proposed development area. The townland name, Boheradurrow, suggests the presence of a road, and numerous *togher* are recorded in bogland to the north and east of the proposed development site, including a large number in Clongawny More townland to the northeast. The site incorporates a watercourse, the Feeghroe Stream, and areas of higher ground that would have formerly overlooked bog, a combination of topographical features that may have been attractive to early settlers.

Due to the sub-surface archaeological potential, to the scale of the overall proposed development, and to the proliferation of monuments in the wider vicinity of the site, archaeological investigations in the form of targeted test trenching is recommended to assess the likelihood of archaeological remains at the site.

Archaeological investigations should be carried out under licence in accordance with Section 26 of the National Monuments Acts 1930 – 2014, and with a method statement agreed in advance with the National Monuments Service (Department of Culture, Heritage and the Gaeltacht) and the National Museum of Ireland. The results of this investigation will determine whether

redesign to allow for preservation *in situ*, full archaeological excavation and/or monitoring are required. The investigation report will include mitigation proposals for dealing with the discovery of archaeological deposits and material during development at the site. This work should be conducted by a suitably qualified archaeologist.

It is envisaged that the following will apply:

i. Should investigation yield evidence of archaeologically significant material or structures, preservation *in situ* may be recommended. Strategies for the *in situ* preservation of archaeological remains are conducted in consultation with the statutory authorities, and may include avoidance, if possible, of the remains during construction.

ii. Should investigation yield evidence of archaeologically significant material or structures that cannot be preserved *in situ*, archaeological excavation and recording, to full resolution, is recommended.

iii. Where less substantial archaeology is anticipated, it is proposed that groundworks are monitored by a suitably qualified archaeologist, with the provision for full excavation of any archaeologically significant material uncovered at this time (if an impact cannot be avoided) (see chapter 13.8.2.1 on Archaeological Monitoring below).

iv. Should archaeological features or material be uncovered, adequate funds to cover excavation, fencing (if required), post-excavation analysis and reporting, and conservation work should be made available.

12.7.2 CONSTRUCTION PHASE

12.7.2.1 Archaeological Monitoring

Given the rich archaeological assemblage in the surrounding area, it is recommended that all groundworks for the proposed development be archaeologically monitored with provision made to deal with any archaeological features that may be uncovered. This will ensure the full recognition of, and proper excavation and recording of all archaeological features, finds and deposits that may be disturbed below the ground surface. Archaeological monitoring at the construction phase will be informed by the results of pre-construction archaeological investigations.

It is envisaged that the following will apply:

i. In the event of archaeological features or material being uncovered during the construction phase, it is crucial that machine work cease in the immediate area to allow the archaeologist to assess, excavate and record any such material.

ii. Should archaeological features or material be uncovered during the construction phase, adequate funds to cover excavation, fencing (if required), post-excavation analysis and reporting, and conservation work should be made available.

iii. This work should be done under licence in accordance with Section 26 of the National Monuments Acts 1930 – 2014, and with a method statement agreed in advance with the

National Monuments Service (Department of Arts, Heritage and the Gaeltacht) and the National Museum of Ireland.

The monitoring of groundworks reduces the level or significance of impact on the archaeological heritage within and in close proximity to the site from potentially significant and moderate to imperceptible.

12.7.3 OPERATIONAL PHASE

There are no direct physical archaeological, architectural and cultural heritage impacts to recorded heritage assets to be resolved at the operational phase of the development. Once the development has been completed, including the resolution of any archaeological material that may have been exposed, there is no need for further monitoring of the project.

12.8 RESIDUAL IMPACTS

Residual impacts are the degree of environmental change that will occur after the proposed mitigation measures have taken effect. No residual impacts are envisaged as all archaeological, architectural and cultural heritage issues will be resolved at the pre-construction and construction stages of the proposed development.

12.9 DIFFICULTIES ENCOUNTERED IN COMPILING INFORMATION

No difficulties were encountered in compiling information for this report.

12.10 REFERENCES

Duffy, S. 1997. *Atlas of Irish History*. Gill & Macmillan.

Hartnett McEnery, J. 2006. *Fortress Ireland.* Wordwell.

Loeber, R. 2001. 'An Architectural History of Gaelic Castles and Settlements, 1370-1600' in Duffy, *et al*. (eds.) *Gaelic Ireland: c.1250-c.1650: Land, Lordship & Settlement'* Four Courts Press.

Ó Maoldúin, R. & Danaher, E. 2018. The Biography of an Axe. *Archaeology Ireland*. 31 (1), 17-20.

Eogan, G., 1983. *Hoards of the Irish Later Bronze Age.* UCD, Dublin.

Fehily Timoney & Company, 2015. Environmental Impact Statement for the Proposed Meenwaun Wind Farm, County Offaly. Volume 2 – Main EIS. Chapter 12 – Archaeology, Architecture and Cultural Heritage. February 2015.

Herity, M., 2008. *Ordnance Survey Letters Offaly*. Four Masters Press, Dublin.

Lee, T., 2009. *Offaly Through Time and its Townlands*. Ottait Publishing, Rath, Co. Offaly.

Lewis, S. 1837. *A Topographical Dictionary of Ireland, comprising the several counties, cities, boroughs, corporate, market, and post towns, parishes and villages*. 2 volumes.

Waddel, J., 1998. *The Prehistoric Archaeology of Ireland*. Wordwell, Dublin.

Whitfield, N., 1992. 'Of bees and bracelets from the Banagher area'. *Archaeology Ireland* Vol. 4, No. 4.

Whitfield, N. 1993. 'A Massive Marker for the Banagher Hoard'. *Archaeology Ireland* Vol. 7, 2.

Electronic Sources

www.excavations.ie	Summary of archaeological excavation from
www.archaeology.ie	DoCHG website listing RMP sites
www.logainm.ie	Placenames database
www.downsurvey.tcd.ie	Down Survey *Map of the County of Offaly (Kings County) 1654-6*
	Down Survey *Map of the Barony of Garricastle 1655*
www.buildingsofireland.ie	NIAH website listing recorded architectural sites
digitalcollections.tcd.ie	Taylor and Skinner's maps of the roads of Ireland

Cartographic Sources

Down Survey county, barony and parish maps, 1656-58

Taylor and Skinner's maps of the roads of Ireland, 1777

Ordnance Survey: First edition 6" map

Revised edition 25" map

Other Sources

Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999.

Dept. of Arts, Heritage, Gaeltacht & the Islands, 1999. Frameworks and Principles for the Protection of the Archaeological Heritage, Government Publications, Dublin.

1999. Policy and Guidelines on Archaeological Excavation. Government Publications, Dublin.

Department of the Environment, Heritage and Local Government, 2004. Architectural Heritage Protection Guidelines for Planning Authorities.

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

2015. Advice notes on current practice in the preparation of Environmental Impact Statements.

National Inventory of Architectural Heritage.

National Roads Authority, 2005. Guidelines for the Assessment of Archaeological Heritage Impacts of National Road Scheme.

2005. Guidelines for the Assessment of Architectural Heritage Impacts of National Roads Schemes.

National Monuments Acts 1930-2004.

National Museum of Ireland, Topographical Files, Co. Dublin

Planning and Development Acts 2000 - 2014.

SECTION D - MATERIAL ASSETS

This section of the Environment Impact Assessment Report deals with material assets that would potentially be affected by the proposed development, which comprises of the refurbishment and extension of the existing abattoir on the site, at Meenwaun / Boheradurrow, Banagher, Co. Offaly. The discharge of treated effluent to the Feeghroe, via the proposed WWTP and integrated wetlands, is also included within the scope of this section.

Material assets are grouped into:

Material Assets:	**Agriculture** including all agricultural enterprises.
Material Assets**:**	**Utilities** including electricity, gas, foul sewer and telecommunications.
Material Assets:	**Natural or other resources** including mineral resources, land and energy.
Material Assets:	**Waste Management**, including all potential waste streams during both the construction and operational phases.

Material Assets are generally considered to be the physical resources in the environment which may be either of human or natural origin. The object of the assessment of these resources is to identify the impact of the development on individual enterprises or properties and to ensure that natural resources are used in a sustainable manner in order to ensure availability for future generations.

Agricultural enterprises interact, to a large extent, with the natural environment in terms of climate, aid quality, soil, hydrology and hydrogeology. Some domestic animals, such as horses and milking cows, may be impacted by traffic-generated noise.

Resources required for the proposed development include existing land, fill material which would have to be sourced from quarries and electricity / fuel oil required for the operation of the proposed development.

13.0 MATERIAL ASSETS - AGRICULTURE

13.1 INTRODUCTION

This section outlines the potential agricultural impact with respect to an application for planning permission to Offaly County Council for the upgrade and construction of an extension to an existing beef abattoir plant within the townlands of Boheradurrow and Meenwaun, Banagher, Co. Offaly. The proposed development includes for an onsite waste water treatment plant and integrated constructed wetlands system.

The proposed development is located in a rural, farming area predominately comprised of pastureland, hedgerows and peatland.

The proposed development site comprises of a number of agricultural fields, mainly in use for pasture, an existing abattoir (which ceased operation circa November 2016) and an established farmyard complex of buildings. The proposed development would be situated primarily on grassland and disturbed ground, with the integrated wetlands situated upon areas of grassland and previously tilled ground.

No other agricultural holdings would be directly impacted through the loss of land by the proposed development, as all lands proposed for development are under the ownership of the applicant, Banagher Chilling Limited.

13.2 METHODOLOGY

A field survey and a desktop study were carried out to assess the potential impact of the proposed development on agriculture in the area.

The field survey consisted of a walkover inspection of the proposed development site, which was conducted on Friday 21st September 2018. A photo log is included as Attachment 9.5.

The desktop survey assessed potential impacts using statistical information from the Central Statistics Office (CSO) and mapping data from the 50,000 Discovery Series, 2,500 Ordnance Survey mapping, CORINE land use mapping and myplan.ie.

13.3 DESCRIPTION OF EXISTING ENVIRONMENT

13.3.1 CENSUS OF AGRICULTURE OVERVIEW

The Central Statistics Office (CSO) in Ireland undertakes an agricultural census every ten years, the most recent of which was carried out in 2010. According to the Census of Agriculture (2010), the agricultural area used (excluding commonage), amounted to approximately 4.6 million hectares, while commonage in Ireland amounted to approximately 422,415 hectares. A breakdown of the utilisation of agricultural land in Ireland is provided in Figure 13.1 below.

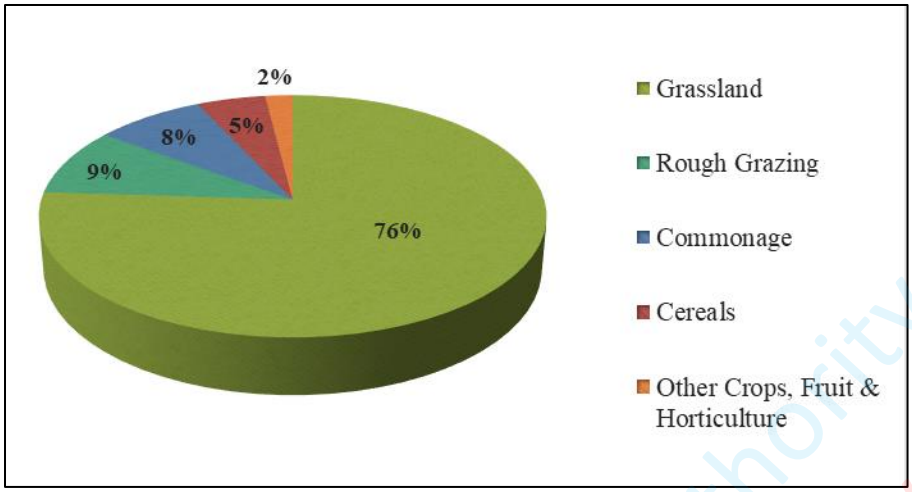

Figure 13.1: Utilisation of agricultural land in Ireland as of 2010

13.3.2 OFFALY

According to the Census of Agriculture (2010), there are 126,483 hectares of agricultural land in County Offaly, 235 hectares of which is in commonage. The average farm size in Offaly is 36.5 hectares, which is above the national average of 32.7 hectares.

There are 3,462 farms in Offaly, the majority (67%) of which are specialist beef production farms, 8% are mixed grazing livestock, 8% are specialist dairying and the remainder are mixed field crops, specialist tillage, mixed crops and livestock, specialist sheep and "other".

13.3.3 BOHERADURROW & MEENWAUN TOWNLANDS, CO. OFFALY

The proposed development would take place within the townlands of Boheradurrow and Meenwaun, Co. Offaly. The proposed development is located within a rural agricultural landscape, dominated by pasture fields of varying sizes, bordered by hedgerows, in addition to peatlands. Arable fields and wooded areas, including bog woodland, can also be found scattered around the landscape. Residential development in the area is predominantly linearly aligned along the existing road network. A number of farmyard complexes are located within the area.

The proposed development site comprises of a number of agricultural fields, mainly in use for pasture, an existing abattoir (which ceased operation circa November 2016) and an established farmyard complex of buildings. Field boundaries comprise of a mixture of hedgerows, treelines and drainage ditches, while the Feeghroe Stream passes along the western site boundary.

The CORINE data series shows that the land of the proposed development and the land within the immediate vicinity of the proposed development is primarily used for pasture. The CORINE data series also shows that a good proportion of the surrounding region is comprised of pastureland, with areas of peat bogs, transitional woodland scrub and mixed forest also present. Other land cover in the general region consists of land principally occupied by agriculture with

areas of natural vegetation, complex cultivation patterns and discontinuous urban fabric and industrial and commercial units associated with Banagher town.

13.3.4 AGRICULTURAL ENTERPRISES

The existing abattoir at the development site was operated by Ossory Meats, and ceased operation circa November 2016. At the time of their operation, Ossory Meats were slaughtering 100 cattle per week, and for a short period, the site was slaughtering horses under licence.

In addition to agricultural farms and holdings, two agricultural enterprises licenced by the Environmental Protection Agency (EPA) for a class of activity defined as "Intensive Agriculture", are located within 15km of the proposed development, as outlined in Table 13.1 below.

Table 13.1: EPA Licenced Agricultural Enterprises within 15km of the Proposed Development

LICENCE NO.	LICENSEE NAME	LICENCE TYPE (FIRST SCHEDULE OF EPA ACT, 1992, AS AMENDED)	APPROXIMATE DISTANCE FROM PROPOSED DEVELOPMENT
P0412-01	Harvest Lodge Pigs Ltd	6.2 (b): Intensive Agriculture	12.8km East
P0437-02	Mr Michael Monagle (Sharragh Pig farms)	6.2 (a): Intensive Agriculture	12.9km South-East

13.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development would comprise of the proposed upgrade and extension of an existing abattoir facility within the townlands of Meenwaun and Boheradurrow, at Banagher, Co. Offaly. The proposed development would also include the construction of stormwater and effluent drainage systems, water treatment plant, electrical sub-station, truck wash, security hut, waste and by-product area and gas compound, site access roads and all ancillary development including internal road surfacing, the provision of outdoor artificial lighting, an extension to the existing lairage facility and site landscaping.

The proposed development would facilitate a maximum slaughter rate of 140 cattle per day. Slaughtering activities at the proposed facility would typically operate Monday to Friday. However, slaughtering may be undertaken at weekends for reasons such as casualty animals and demand.

Should conditions allow, it is proposed that the site's water requirement would be sourced via water abstraction onsite.

New stormwater and effluent drainage systems would be constructed. Stormwater from clean-yard areas and car parking areas would pass through a silt trap and Class 1 By-Pass Separator

before being directed to a modular underground attenuation system. From here, stormwater would be pumped to a manhole prior to discharge to the Feeghroe Stream.

All process drains, domestic drains and dirty yard surface water drains would be directed to the site's new WWTP, which would comprise of an inlet sump, meva screen, drum screen, balancing tank, dissolved air flotation (DAF) unit, sludge tank, anoxic tank, two aeration tanks, clarifier, sand filters and an outlet sump. From here, the treated final effluent would be directed to the proposed integrated constructed wetlands (ICWs), comprising of a five-treatment cell system, prior to discharge to the Feeghroe Stream.

The proposed upgrade and extension of the existing abattoir facility would result in a loss of agricultural grassland, disturbed ground (including a section of previously tilled land), sections of hedgerows and drainage ditches and a limited area of bog woodland.

The expected construction timeframe would be approximately 18 months, with hours of operation from 7am to 7pm Monday to Friday, and 8am to 2pm on Saturdays. A temporary site compound would be established and would house the temporary offices, equipment and materials storage and construction staff welfare facilities. The temporary site compound would also be used for the storage of fuels and oils required for the various construction plant, in addition to housing waste receptacles.

13.5 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

13.5.1 CONSTRUCTION PHASE

There are a number of specific issues that may impact on agriculture during the construction phase of the proposed development. These include:

Noise: Increased noise from construction machinery has the potential to be an issue with certain sensitive livestock such as dairy cows and horses.

Dust: The proliferation of dust during construction has a nuisance value and livestock are at risk to eye irritation from high levels of wind blowing dust particles.

Traffic: There would be construction-related traffic during the construction phase of the proposed development, which could generate noise emissions and potential dust emissions.

The potential impact of land take on agriculture is discussed in Section 13.5.2.

13.5.2 OPERATIONAL PHASE

Should the proposed development be granted planning permission, there would be a loss of agricultural grassland and a limited area of previously tilled land. However, the loss of this agricultural land would not have an adverse impact upon agricultural assets of the area, given that the lands are wholly within the ownership of the applicant, Banagher Chilling Limited, and

given that the proposed development would strengthen the local economy of the agri-food sector by providing employment and by sourcing cattle from farmers and suppliers within the catchment area.

The potential for operational noise associated with the proposed development to cause disturbance to livestock within grassland surrounding the proposed site would be considered low. Animals would quickly become acclimatised to the new noise environment adjacent to the development, as with similar projects such as new roads and motorways.

A transportation assessment has been undertaken as part of the planning application (included as Attachment 8.1 and discussed in Section 8), which notes that the total traffic generated by the development comprises an Annual Average Daily Traffic (AADT) of 283 Passenger Car Units (PCUs, or car equivalents) within a 24 hour period. The report notes that while the local roads within the vicinity of the development are lightly trafficked, the increase in traffic movements due to the development can be considered small.

It is therefore considered that the proposed development would not result in decrease or loss of material assets with regards agriculture.

13.5.3 CUMULATIVE IMPACT

It is not considered that there would be any significant adverse cumulative impacts upon agricultural assets, given that the loss of agricultural land to accommodate the proposed development would benefit the agri-food sector by sourcing cattle from local farmers and suppliers.

13.5.4 "DO-NOTHING"

Should the proposed development not be built, the existing abattoir would continue to become increasingly dilapidated, while the farmland may either be left fallow, or would continue to be used for pasture / tillage purposes. There would be no alterations to landuse in the area.

13.6 MITIGATION MEASURES

13.6.1 CONSTRUCTION PHASE

The construction works contractor, once appointed, would prepare a detailed Construction Environmental Management Plan (CEMP) for all construction activities, in line with the outline CEMP prepared as part of this application. The CEMP would include control measures for noise and dust generation and traffic.

Noise

Noise control measures are outlined in detail in Section 6 and Attachment 6.1, and within Section 5.5 of the Outline CEMP. Measures include the following:

- Cognisance would be taken of the National Roads Authority's "*Guidelines for the Treatment of Noise and Vibration in National Road Schemes*", the British Standard 5228: Part 1 "*Code of practice for Noise Control on Construction and Open Sites*" and the CIRIA 2015 "*Environmental Good Practice on Site*";
- Where required, screens or barriers would be installed to shield particularly noisy activities;
- Care would be taken when unloading vehicles to minimise noise disturbance;
- Regular maintenance would be carried out on all construction equipment, machinery and vehicles;
- Construction plant would be operated in accordance with the operator's instructions;
- Engine and machinery covers would be maintained in good working order and would remain closed whenever machinery is in use;
- Where practicable, all mechanical plant would be fitted with effective exhaust silences and pneumatic tools fitted with mufflers or silencers;
- Any compressors required would be silenced or of sound reduced models fitted with acoustic enclosures;
- Construction plant would be selected, where possible, with low inherent potential for the generation of noise;
- Construction plant would be switched off or throttled back to a minimum when not in use;
- Staff personnel would be instructed to avoid unnecessary revving of machinery.

Dust

Dust control measures are outlined in detail in Section 5 and Attachment 5.1, and within Section 5.1 of the Outline CEMP. Measures include the following:

- Cognisance would be taken of the guidelines published by the Institute of Air Quality Management (IAQM), "*Assessment of dust from demolition and construction 2014*";
- Material handling systems and site stockpiling of materials would be designed and laid out to minimise exposure to wind;
- Prolonged storage of materials onsite would be avoided;
- When transporting materials to and from the site, vehicles would be fitted with covers where possible to prevent material loss;
- Public roads outside the site would be regularly inspected for cleanliness and cleaned as necessary. A road sweeper would be used where required;

- Regular visual inspections would be undertaken around the proposed site boundary to monitor the effectiveness of dust control measures;
- Should additional dust control measures be required, for instance during particularly dry weather, dust suppression measures would be undertaken, such as the use of water misting plant and wheel-wash facilities.

Traffic

The following measures would be undertaken during construction works:

- A 15kph speed limit would be implemented for all traffic onsite to reduce the potential for dust and noise generation;
- Discussions would take place with local landowners to ensure that construction traffic causes minimum interference with movements of stock and does not hinder farm operations;
- Deliveries to the site would be via suitably contained vehicles, with sheeting and covers where required;
- Local roads would be inspected and cleaned as necessary.

13.6.2 OPERATIONAL PHASE

No mitigation measures are required as the development of this land would increase its material value to the landowner and not cause significant impacts upon the agricultural material assets of other parties. Furthermore, the proposed development would have a positive impact upon the area by strengthening the local economy of the agri-food sector, by sourcing cattle from local farmers and suppliers.

13.7 RESIDUAL IMPACTS

There would be no significant residual impacts on agriculture as a result of the construction phase or operational phase of the proposed development.

13.8 DIFFICULTIES ENCOUNTERED IN COMPILING INFORMATION

No difficulties were encountered during the assessment of potential impacts of the proposed development on agriculture.

13.9 REFERENCES

Central Statistics Office (2010). *Census of Agriculture 2010.* Available at: http://www.cso.ie/en/media/csoie/releasespublications/documents/agriculture/2010/full2010.pdf

Environmental Protection Agency (2017) Draft. *Guidelines on the information to be contained in Environmental Impact Assessment Reports*.

Environmental Protection Agency (2015) Draft. *Advice Notes for Preparing Environmental Impact Statements*.

Environmental Protection Agency (2003) *Advice Notes on Current Practice (in the Preparation of Environmental Impact Statements).*

Environmental Protection Agency Licence public access information, Available at: http://www.epa.ie/licensing/iedipcse/

EPA Envision Online Mapping, Available at: http://gis.epa.ie/Envision/

Myplan.ie Viewer. Available at: http://www.myplan.ie/viewer/

Offaly County Council (2014) *Offaly County Development Plan 2014 – 2020*. Available at: https://www.offaly.ie/eng/Services/Planning/Development-Plans/County-Development-Plan-2014-2020/

Teagasc Subsoil Mapping. Available at: http://gis.teagasc.ie/soils/map.php

14.0 MATERIAL ASSETS – UTILITIES

14.1 INTRODUCTION

This section outlines the utilities that would potentially be affected by the proposed development during both the construction and operational phases. Material assets are generally considered to be the physical resources in the environment, which may be either of human or natural origin. The object of the assessment of these resources is to identify the impact of the development on individual enterprises or properties and to ensure that natural resources are used in a sustainable manner in order to ensure availability for future generations.

Economic assets of human origin, i.e. utilities are considered in this section. Economic assets of natural origin are addressed in other sections of this EIAR, namely: *Section 11 Land - Soils, Geology, Hydrology and Hydrogeology; Section 12 – Archaeological, Architectural and Cultural Heritage, Section15 Material Assets – Natural and Other Resources* and *Section 16 Material Assets - Waste Management*. The purpose of this section is to assess the impacts of the proposed development on the existing utility network, which includes the following infrastructure:

- Electricity;
- Water;
- Foul sewer;
- Storm water (surface water) drainage;
- Gas (LPG);
- Telecommunications;
- Utilities owned by other stakeholders.

14.2 METHODOLOGY

A desktop study was undertaken to assess the potential impact of the proposed development on the utilities of the area.

14.3 DESCRIPTION OF EXISTING ENVIRONMENT

Banagher Town and surrounds is served by public water supply scheme, operated by Irish Water, which comprises a groundwater and a surface water input (Shannon). Groundwater is supplied through two adjacent boreholes with an abstraction of 700m³/day. The GSI have published a source protection report for the site.

Groundwater provides about 60% of the total demand through two boreholes, drilled in 1986. The boreholes are alongside each other, each in its own separate concrete lined chamber with a

padlocked galvanised cover. The water is chlorinated at the pump-house (Grid Ref: 202841, 214032, Drinking Water Code: 2500PUB1001), located 930 meter north-west of the site boundary, and pumped to a reservoir at Mullaghakaraun.

Water treatment consists of coagulation, rapid gravity filtration, chlorination and fluoridation. The treatment plant produces approximately 1,195 m^3/day and serves a total population of 3,321 people in the Banagher supply area.

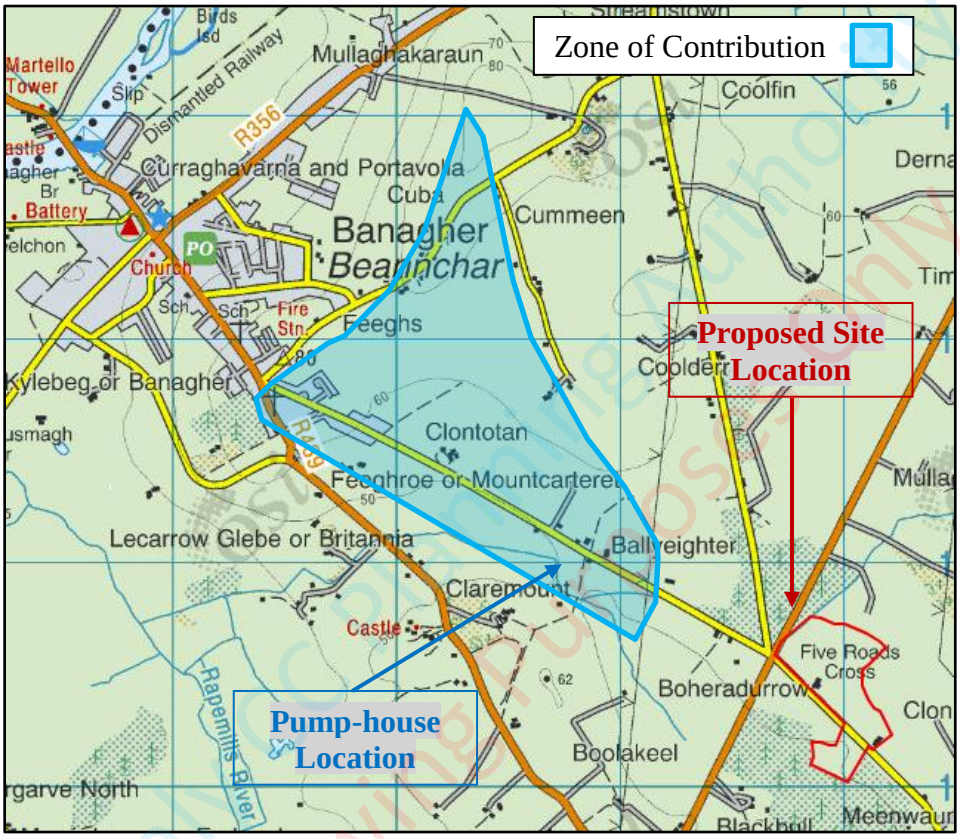

Figure 14.1: Banagher Public Water Supply Scheme

Banagher Waste Water Treatment Plant (WWTP), located 3.9km north-west of the proposed site boundary, is operated by Irish Water and holds a Waste Water Discharge Licence with the EPA (D0141-01). However, the proposed site would not be serviced by this WWTP, as Banagher Chilling Limited intends to treat effluent arising from the development onsite, at a new onsite WWTP, which forms part of the proposed development.

Banagher town has a number of broadband, phone and television channel providers, including Eir, Sky, Pure Telecom and Vodafone.

There are multiple power line systems within the vicinity of Banagher town; a 220 kV line between Shannonbridge and Limerick; a 110 kV line between Shannonbridge, Dallow and Portlaoise; and 110kV line between Shannonbridge and Thurles. A 110kV station is located at

Dallow to the south, and Thermal Generation takes place at Shannonbridge to the north-west of the site.

Meenwaun Wind Farm is located adjacent the proposed development site, comprising of four 2.75MW wind turbines, with a 10MWmaximum export capacity (MEC). The wind farm was energised in December 2017 via the 20kV on-site substation and an underground cable to the ESB's Dallow 110kV substation.

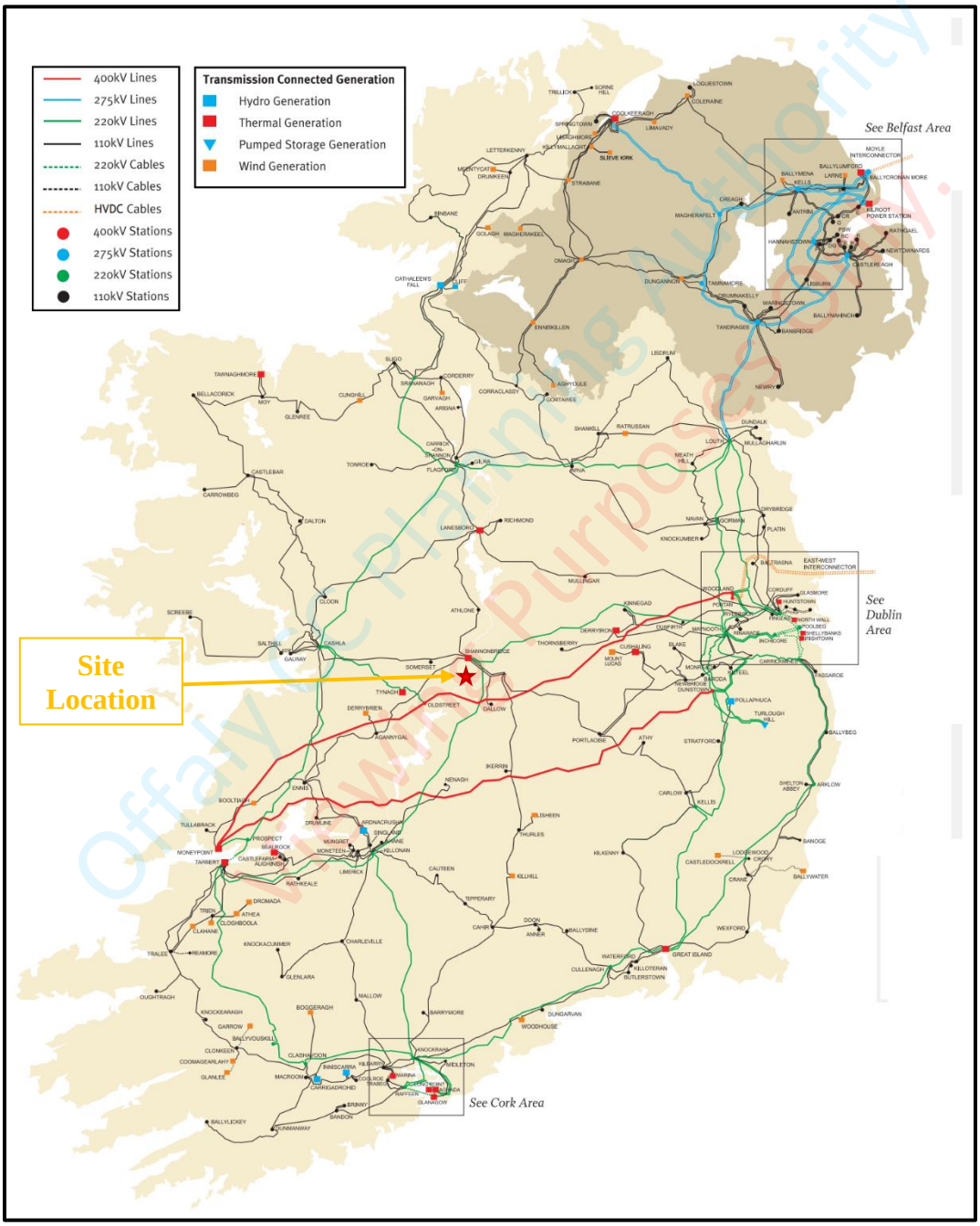

Figure 14.2: Electrical Grid Map Ireland (Source: Eirgrid)

The Banagher area is not currently serviced by a gas network. The nearest gas lines are at Tullamore town, Nenagh town and Portlaoise town, approximately 31.5km, 38km and 45km respectively from the facility.

Figure 14.3: Gas Network Map Ireland (Source: Gas Networks Ireland)

14.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development would comprise of the proposed upgrade and extension of an existing abattoir facility within the townlands of Meenwaun and Boheradurrow, at Banagher, Co. Offaly. The proposed development would also include the construction of stormwater and effluent drainage systems, water treatment plant, electrical sub-station, truck wash, security hut, waste and by-product area and gas compound, site access roads and all ancillary development including internal road surfacing, the provision of outdoor artificial lighting, an extension to the existing lairage facility and site landscaping.

Slaughtering activities at the proposed facility would typically operate Monday to Friday. However, slaughtering may be undertaken at weekends for reasons such as casualty animals and demand. Upon completion of construction works, it is estimated the proposed development would provide employment for 110 personnel, with working hours varying from 7am to 10pm.

Two steam boilers, to be located within the plant room, are proposed as part of the development, each with a capacity of approximately 900kgs per hour.

Should conditions allow, it is proposed that the site's water requirement would be sourced via water abstraction onsite. It is estimated that water consumption at the site would be 150 – 200 m^3/day. Water conservation measures have been included as part of the proposed development design. Rainwater harvesting would be implemented, with all roof water collected for use in staff sanitary facilities and site landscaping. The final WWTP design includes for the capture of treated effluent water in a holding tank (grey water tank) to be used in lairage and lorry wash-out. It is estimated that final treated effluent would be required at a rate of $5m^3$ per day for the lorry-wash and $5m^3$ per day for the lairage.

New stormwater and effluent drainage systems would be constructed. Stormwater from clean-yard areas and car parking areas would pass through a silt trap and Class 1 By-Pass Separator before being directed to a modular underground attenuation system. From here, stormwater would be pumped to a manhole prior to discharge to the Feeghroe Stream. Stormwater from the roof areas would be directed to a rainwater harvesting tank onsite, and stored for use in toilets and site landscaping. This tank would contain an overflow valve, which would be directed to the site's stormwater network.

All process drains, domestic drains and dirty yard surface water drains would be directed to the site's new WWTP, which would comprise of an inlet sump, meva screen, drum screen, balancing tank, dissolved air flotation (DAF) unit, sludge tank, anoxic tank, two aeration tanks, clarifier, sand filters and an outlet sump. From here, the treated final effluent would be directed to the proposed integrated constructed wetlands (ICWs), comprising of a five-treatment cell system, prior to discharge to the Feeghroe Stream.

Artificial outdoor lighting would be installed along the internal access network and within the main site yard. The lighting design for the development would be determined at a detailed design stage.

The expected construction timeframe would be approximately 18 months, with hours of operation from 07:00 – 19:00 Monday to Friday, and 08:00 – 14:00 on Saturdays. A temporary site compound would be established and would house the temporary offices, equipment and materials storage and construction staff welfare facilities. The temporary site compound would also be used for the storage of fuels and oils required for the various construction plant, in addition to housing waste receptacles.

14.5 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

14.5.1 CONSTRUCTION PHASE

Power and water would be required during construction activities and for the servicing of the temporary site compound. The development site would be connected to the local electricity grid network system and mains water supply. Given the scale and transient nature of construction works, the power and water demand on the local electricity and mains water systems would not be considered significant and would not be anticipated to impact upon local power or water supply.

Telecommunications requirements during the construction phase would be provided using mobile phones / broadband. There would be no anticipated impacts to the local telecommunications system.

Foul water from staff welfare facilities generated during the construction phase would be collected on-site in designated waste holding containers / port-a-loo units and emptied on a regular basis by a licenced waste contractor.

The construction contractor would liaise with the relevant utilities provider(s) prior to works commencing, with ongoing consultation throughout the proposed development. Where new services would be required, the construction contractor would apply to the relevant utility provider and adhere to the requirements outlined in the connection permit / licence.

14.5.2 OPERATIONAL PHASE

The development would require power during the operational development for normal day-to-day operations. It is anticipated that 922 MWhrs (based upon usage by a similar sized abattoir), would be required by the site annually. However, this figure is indicative only. The estimated power requirement would not be considered significant in the overall context of the proposed development, and would not be anticipated to significantly impact upon the local power supply.

It is estimated that the annual consumption of LPG at the site would be $80m^3$, which would not be considered significant in the overall context of the proposed development.

Given the range of telecommunications providers in the area, the proposed development would not have a significant impact upon local telecommunications.

The proposed development would include for the installation of artificial outdoor lighting along the internal access roadway and carpark, which would be connected to the electricity grid.

The estimated water demand for the proposed development would be between 150 – 200 m^3/day. No significant impact would be anticipated upon the Banagher regional water supply. Should conditions allow, it is hoped that the site's water requirement would be sourced via water abstraction onsite. A geophysics survey has been undertaken of the site, which identified two potential locations for trial wells. Upon approval of planning permission, site investigation works and water well drilling would be undertaken to assess the viability of the trial wells. Further details are discussed in Section 11 of this EIAR.

Water conservation measures have been included as part of the proposed development design. Rainwater harvesting would be implemented, with all roof water collected for use in staff sanitary facilities and site landscaping. The development also proposes to utilise 'grey-water' from the on-site WWTP, to be used in lairage and lorry wash-out.

The estimated final treated effluent discharge for the proposed development would be a maximum of 250 m^3/day. As mentioned in Section 14.3, Banagher WWTP would not receive any wastewater from the proposed development, as Banagher Chilling Limited intends to treat effluent arising from the development at the proposed onsite WWTP and ICW system. Wastewater would be treated on-site before discharge to the Feeghroe Stream.

14.5.3 CUMULATIVE IMPACT

Considering the nature of the proposed development, it is considered that the main potential cumulative impacts would be an increased demand on local utilities, including mains power, water supply and telecommunications, in addition to increased traffic volumes. However, it is considered that utilities in the area have adequate capacity to accommodate the estimated requirements of the proposed development, during both the construction and operational phases, and therefore there would be no significant cumulative impact upon local utilities.

14.5.4 "DO-NOTHING" IMPACT

Should the proposed development not take place, there would be no changes or impacts upon utilities including the national power grid, local water supply and telecommunications.

14.6 MITIGATION MEASURES

14.6.1 CONSTRUCTION PHASE

The construction works contractor would liaise with the relevant utilities provider(s) prior to works commencing, with on-going consultation throughout the proposed development. Where new services would be required, the construction contractor should apply to the relevant utility provider and adhere to the requirements outlined in the connection permit / licence.

The construction works contractor would be obliged to put measures in place to ensure that there are no interruptions to existing services, unless this has been agreed in advance with the relevant service provider.

All works in the vicinity of utilities apparatus would be carried out in ongoing consultation with the relevant utility company or local authority and would be in compliance with any requirements or guidelines they may have.

Where new services or diversions to existing services are proposed, the construction works contractor would apply to the relevant utility company for a connection permit where appropriate, and would adhere to their requirements.

14.6.2 OPERATIONAL PHASE

The proposed development would be serviced by existing utilities, with the capacity to accommodate the proposed development. Therefore, no mitigation measures are necessary. In the event that pipelines for water supply were undersized to deliver estimated volumes, they would be replaced with pipelines of greater diameter.

14.7 RESIDUAL IMPACTS

Given the nature of the proposed development and following the implementation of mitigation measures as outlined in Sections 14.6.1 and 14.6.2, it is considered that residual impacts would be imperceptible.

14.8 DIFFICULTIES ENCOUNTERED IN COMPILING INFORMATION

No difficulties were encountered during the assessment of potential impacts of the proposed development on utilities.

14.9 REFERENCES

Energy Co-Operatives Ireland, available at: http://www.energyco-ops.ie/. [Accessed November 2018].

Environmental Protection Agency (2017) Draft. *Guidelines on the information to be contained in Environmental Impact Assessment Reports*.

Gas Networks Ireland, available at: https://www.gasnetworks.ie/home/. [Accessed November 2018].

Water Framework Directive, Groundwater Monitoring Programme, Banagher BH (August, 2011)

15.0 MATERIAL ASSETS – NATURAL AND OTHER RESOURCES

15.1 INTRODUCTION

This section outlines the potential impacts on natural and other resources of the proposed development at Banagher, Co. Offaly, comprising of an upgrade and construction of an extension to an existing beef abattoir plant, which would include the construction of stormwater and effluent drainage systems, water treatment plant, electrical sub-station, truck wash, security hut, waste and by-product area and gas compound, site access roads and all ancillary development including internal road surfacing, the provision of outdoor artificial lighting, an extension to the existing lairage facility and site landscaping.

15.2 METHODOLOGY

A desktop study was undertaken to assess the potential impact of the proposed development on the natural and other resources of the area. This included a review of available data on the Geological Survey Ireland Spatial Resources, Teagasc Subsoil Mapping and EPA Envision Online Mapping websites.

15.3 DESCRIPTION OF EXISTING RESOURCES

The area in the immediate vicinity of the proposed development is rural in nature, with much of the land in agricultural use. However, a network of utilities associated with residential houses, agricultural and commercial operations are all available in the general hinterland.

15.3.1 LAND USE AND SOIL

The proposed extension to the existing facility, including all ancillary works such as lairage facilities and hardstanding, would cover approximately 46,800 m^2, while the proposed ICW system would cover approximately 55,400m^2.

As discussed in Section 11, the proposed development site is dominated by peat along the north of the site, with the remainder of the site covered in a ‘fine loamy’ drift with limestone clasts (a poorly drained basic soil). The subsoils underlying the site are mapped as till derived from limestones with peat present in the north-west and along the northern boundary of the site. A detailed description of the existing soil environment is provided in Section 11.

15.3.2 TRANSPORT NETWORK

The proposed development would be located within the townlands of Meenwaun and Boheradurrow. The nearest settlement to the existing facility is the town of Banagher, located approximately 2.4km north-west of the site. The towns of Birr and Portumna are located approximately 8km and 20km respectively from the facility. Tullamore is the closest large-size town and is located approximately 31.5km to the north-east of the site.

The site is accessed via the L3010, a local road linking to the R438 road. The R438 road connects to the N62 National Primary Road approximately 7km to the north-east and the N65 National Primary Road some 21.5km to the south-west.

15.3.3 ECONOMIC MINERALS

There are no operational quarries within the immediate vicinity of the site. Five operational quarries are located within 10km of the proposed development site, as detailed in the table below.

Table 15.1: Operational Quarries within 10km of the Proposed Development

QUARRY NAME	QUARRY TYPE	APPROX. DISTANCE FROM PROPOSED DEVELOPMENT
Lusmagh Quarry	Crushed Rock	4.7km South-West
Birr Pit	Sand and Gravel	5km South-East
Boolinarig Pit	Sand and Gravel	5.6km South-East
Ballinaguilsha Quarry	Crushed Rock	6km South-East
Ballywilliam Pit	Sand and Gravel	7.7km South-East

GSI online webmapping indicates the following mineral localities within the vicinity of the proposed development:

- Area of limestone (pale grey compact variegated marble), 5.3km west of the site;
- Area of clay, 5.4km north of the site;
- Area of tufa, 5.6km south of the site;
- Area of dimension stone, 6.6km south-east of the site;
- Area of clay / brick, 6.7km north-west of the site;
- Infilled limestone quarry, 6.7km south-east of the site.

15.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development would comprise of the proposed upgrade and extension of an existing abattoir facility within the townlands of Meenwaun and Boheradurrow, at Banagher, Co. Offaly. The proposed development would also include the construction of stormwater and effluent drainage systems, water treatment plant, electrical sub-station, truck wash, security hut, waste and by-product area and gas compound, site access roads and all ancillary development including internal road surfacing, the provision of outdoor artificial lighting, an extension to the existing lairage facility and site landscaping.

Slaughtering activities at the proposed facility would typically operate Monday to Friday. However, slaughtering may be undertaken at weekends for reasons such as casualty animals and demand.

Two steam boilers, to be located within the plant room, are proposed as part of the development, each with a capacity of approximately 900kgs per hour.

Artificial outdoor lighting would be installed along the internal access network and within the main site yard. The lighting design for the development would be determined at a detailed design stage.

Should conditions allow, it is proposed that the site's water requirement would be sourced via water abstraction onsite. It is estimated that water consumption at the site would be 150 – 200 m^3/day. Water conservation measures have been included as part of the proposed development design. Rainwater harvesting would be implemented, with all roof water collected for use in staff sanitary facilities and site landscaping. The final WWTP design includes for the capture of treated effluent water in a holding tank (grey water tank) to be used in lairage and lorry wash-out.

New stormwater and effluent drainage systems would be constructed. Stormwater from clean-yard areas and car parking areas would pass through a silt trap and Class 1 By-Pass Separator before being directed to a modular underground attenuation system. From here, stormwater would be pumped to a manhole prior to discharge to the Feeghroe Stream.

All process drains, domestic drains and dirty yard surface water drains would be directed to the site's new WWTP, which would comprise of an inlet sump, meva screen, drum screen, balancing tank, dissolved air flotation (DAF) unit, sludge tank, anoxic tank, two aeration tanks, clarifier, sand filters and an outlet sump. From here, the treated final effluent would be directed to the proposed integrated constructed wetlands (ICWs), comprising of a five-treatment cell system, prior to discharge to the Feeghroe Stream.

The proposed upgrade and extension of the existing abattoir facility would result in a loss of agricultural grassland, disturbed ground (including a section of previously tilled land), sections of hedgerows and drainage ditches and a limited area of bog woodland.

The expected construction timeframe would be approximately 18 months, with hours of operation from 7am to 7pm Monday to Friday, and 8am to 2pm on Saturdays. A temporary site compound would be established and would house the temporary offices, equipment and materials storage and construction staff welfare facilities. The temporary site compound would also be used for the storage of fuels and oils required for the various construction plant, in addition to housing waste receptacles.

15.5 POTENTIAL IMPACTS AND MITIGATION MEASURES

15.5.1 LAND USE AND SOIL

In total, the proposed development would occupy a 102,200m^2 (approximate) footprint, which would result in a land take of mainly agricultural grassland, disturbed ground (including a section of previously tilled land), sections of hedgerows and drainage ditches and a small section of bog woodland. All of the land take would take place within the applicant's landholding.

As noted in Section 16.6, it is estimated that 804 tonnes of excavated materials would be generated from the proposed extension to the existing abattoir facility and associated structures, with an estimated 58,000 tonnes of excavated materials generated from the construction of the ICW system. However, as noted in Section 16.6, these figures are estimates only.

Excavated soils would be stockpiled for use in reinstatement and landscaping activities where possible. For the ICW system, excavated soils would be used to construct the enclosing embankments around each pond and for use in cell lining where suitable. Any excess soils remaining following reinstatement and landscaping works would be collected by a licenced waste contractor and either reused for reinstatement / landscaping activities at other sites if suitable or disposed of as appropriate.

Therefore, it is considered that there would be no significant impact on land or soil material assets. Impacts on the agricultural use of land are discussed in Section 13 Material Assets – Agriculture.

15.5.2 TRANSPORT NETWORK

During the construction stage, the presence of HGVs and small commercial vehicles for deliveries of construction materials and transport of construction workers would be noted.

As discussed in Section 8 and Attachment 8.1, during the operational phase of the proposed development, the total traffic generated by the development comprises an AADT of 283 PCUs within a 24 hour period. The Transportation Assessment report notes that while the local roads within the vicinity of the development are lightly trafficked, the increase in traffic movements due to the development can be considered small. The traffic assessment notes that the local road network can easily accommodate the traffic generated, and notes that the access junction and adjacent established road junctions would operate without any issues arising during the selected year of opening and the design year 15 years after opening. The report concludes that there would be no traffic/transportation capacity, traffic safety or operational issues associated with the proposed development.

15.5.3 ECONOMIC MINERALS

It is considered that the proposed development would have no significant impact on mineral resources in the vicinity of the area.

15.5.4 RAW MATERIALS REQUIRED

Construction material, when needed, would be brought in from nearby sources such as local quarries where practical.

15.6 RESIDUAL IMPACTS

No significant residual impacts are predicted.

15.7 DIFFICULTIES ENCOUNTERED IN COMPILING INFORMATION

No difficulties were encountered during the assessment of potential impacts of the proposed development on natural or other resources.

15.8 REFERENCES

Environmental Protection Agency Licence public access information, Available at: http://www.epa.ie/licensing/iedipcse/

EPA Envision Online Mapping, Available at: http://gis.epa.ie/Envision/

Myplan.ie Viewer. Available at: http://www.myplan.ie/viewer/

Teagasc Subsoil Mapping. Available at: http://gis.teagasc.ie/soils/map.php

16.0 MATERIAL ASSETS – WASTE MANAGEMENT

16.1 INTRODUCTION

This section discusses the proposed waste management measures as part of the proposed development at Banagher, Co. Offaly, in addition to assessing the potential impact of waste management upon the surrounding area. Waste management for both the construction and operational phases is addressed.

16.2 METHODOLOGY

A desktop study was undertaken to assess the potential impact of the proposed development on waste management in the area. The desktop study assessed potential impacts using EPA licensing and waste management information, relevant waste plans and strategic documents, and mapping data from EPA Envision and myplan.ie. The assessment of potential impacts arising from waste management at the proposed development has taken cognisance of the relevant legislation policies and plans as outlined in Section 16.3.

16.3 LEGISLATIVE FRAMEWORK AND PLANNING POLICY

16.3.1 LEGISLATIVE CONTEXT

The main legislation pertaining to waste management in Ireland and of potential relevance to the proposed development includes the following:

EU Legislation:

- Council Directive 1999/31/EC on the Landfilling of Waste;
- Waste Framework Directive 2008/98/EC;
- European List of Waste, Commission Decision 2000/532/EC;
- Council Directive 2003/33/EC establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC;
- WEEE Directive 2012/19/EU.

Irish Legislation:

- Waste Management Act 1996 as amended;
- Waste Management (Facility Permit and Registration) Regulations 2007 (S.I. 821 of 2007) and (Amendment) Regulations (S.I. 86 of 2008, S.I. 320 of 2014, S.I. 198 of 2015);
- Waste Management (Licensing) Regulations 2000 (S.I. 185 of 2000) , 2004 (S.I. 395 of 2004), (Amendment) Regulations 2010 (S.I. 350 of 2010);

- Waste Management (Planning) Regulations 1997 (S.I. 137 of 1997);
- Waste Management (Collection Permit) Regulations 2007 (S.I. 820 of 2007) and (Amendment) Regulations 2008 to 2016;
- Waste Management (Hazardous Waste) Regulations 1998 (S.I. 163 of 1998) and Waste Management (Hazardous Waste) (Amendment) Regulations 2000 (S.I. 73 of 2000);
- Waste Management (Food Waste) Regulations 2009 (S.I. 508 of 2009), European Union (Household Food Waste and Bio-waste) Regulations 2013 (S.I. 71 of 2013) and European Union (Household Food Waste and Bio-waste) Regulations 2015 (190 of 2015);
- European Union (Waste Electrical and Electronic Equipment) Regulations 2014 (WEEE) (S.I. 149 of 2014);
- Litter Pollution Act 1997, Litter Pollution Regulations 1999 (S.I. 359 of 1999) and Litter Pollution (Increased Notice Payment) Order 2007 (S.I. 558 of 2007);
- Waste Management (Landfill Levy) Regulations 2015 (S.I. 189 of 2015);
- Waste Management (Prohibition of Waste Disposal by Burning) Regulations 2009 (S.I. 286 of 2009) and (Amendment) Regulations (S.I. 504 of 2013, S.I. 538 of 2015, S.I. 599 of 2017);
- European Communities (Waste Directive) Regulations 2011 (S.I. 126 of 2011), (Amendment) Regulations 2016 (S.I. 315 of 2016), and European Union (Properties of Waste which Render it Hazardous) Regulations 2015 (S.I. 223 of 2015), European Union (Waste Directive) (Recovery Operations) Regulations 2016 (S.I. 372 of 2016);
- Local Government Act and associated regulations.

16.3.2 PLANNING POLICIES, PLANS AND OTHER GUIDANCE

Policies, plans and guidance documents pertaining to waste management and of potential relevance to the proposed development include the following:

- European Waste Catalogue and Hazardous Waste List (2002), Environmental Protection Agency;
- National Waste Prevention Programme Annual Report for 2016, Environmental Protection Agency;
- Eastern Midlands Region Waste Management Plan 2015–2021 and Associated Reports;
- Offaly County Development Plan 2014–2020;
- Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects (2006), Department of Environment, Heritage and Local Government.

Eastern Midlands Region Waste Management Plan 2015–2021

The Eastern-Midlands Region (EMR) Waste Management Plan 2015-2021 provides a framework for the prevention and management of waste in a sustainable manner in 12 local authority areas. The Eastern-Midlands Region comprises Dublin City Council, Dún Laoghaire-Rathdown, Fingal, South Dublin, Kildare, Louth, Laois, Longford, Meath, Offaly, Westmeath and Wicklow County Councils. The three key objectives of the Eastern-Midlands Region Waste Management Plan are:

1. Prevent waste: a reduction of one per cent per annum in the amount of household waste generated over the period of the plan.
2. More recycling: increase the recycle rate of domestic and commercial waste from 40 to 50 per cent by 2020.
3. Further reduce landfill: eliminate all unprocessed waste going to landfill from 2016.

Offaly County Development Plan 2014-2020

The Offaly County Development Plan 2014 – 2020 outlines six waste management and one recycling policies and six waste management objectives for the county, with the relevant objectives to the proposed development outlined in the table below.

Table 16.1: Waste Management Policies Relevant to the Proposed Development

REFERENCE	POLICY
EnvP-08	It is Council policy to ensure the provision of quality cost effective waste infrastructure and services, which reflect and meet the needs of the community and to ensure that the 'polluter pays principle' is observed in all waste management activities.
EnvP-09	It is Council policy to ensure that all permitted development shall be such that the requirements of Waste Management regulations shall be observed. Due regard shall also be given to the requirements of the current Waste Management Plan for the Region.
EnvP-10	It is Council policy to apply and enforce where appropriate, relevant EU and Irish environmental legislation. Permitted developments shall be required to comply with all such legislation.
EnvP-11	It is Council policy to co-operate with the Environmental Protection Agency in regard to licensing arrangements for Scheduled activities in County Offaly in accordance with the provisions of the Environmental Protection Agency Act 1992.
EnvP-12	It is Council policy to ensure that all waste disposal shall be undertaken in compliance with the requirements of the Environmental Protection Agency and relevant Waste Management Legislation.
EnvP-13	It is Council policy to require Waste Management Plans to be prepared for Construction and Demolition Projects of a particular scale in accordance with Best Practice Guidelines issued by the Department of Environment, Heritage and Local Government in July 2006. It is Council policy to require developers of projects with significant potential for the generation of construction and demolition waste to prepare a Project Construction and

REFERENCE	POLICY
	Demolition Waste Management Plan where the project exceeds any of the following thresholds: 1. New residential developments of 10 houses or more. 2. New residential developments other than (1) above, including institutional, educational, health and other public facilities, with an aggregate floor area in excess of 1,250m^2 . 3. Demolition/renovation/refurbishment projects generating in excess of 100m^3 in volume of construction and demolition waste. 4. Civil engineering projects in excess of 500m^3 of waste, excluding waste materials used for development works on the site.

Table 16.2: Waste Management Objectives Relevant to the Proposed Development

REFERENCE	OBJECTIVE
EnvO-13	It is an objective of the Council to implement the provisions of the Waste Management Hierarchy and the current Waste Management Plan for the Region. As a result, developments in the county will be expected to take account of the provisions of the Waste Management Plan for the relevant Region and observe those elements of it that relate to waste prevention and minimisation, waste recycling facilities, and the capacity for source segregation
EnvO-14	It is an objective of the Council to use statutory powers to prohibit the illegal deposit and disposal of waste materials, refuse and litter, and to authorise and regulate, waste disposal within the county in an environmentally sustainable manner.
EnvO-15	It is an objective of the Council that the environment shall be protected against harmful effects of inadequate waste management.
EnvO-16	It is an objective of the Council that the environment be protected against the harmful effects of litter.
EnvO-18	It is an objective of the Council to restore and protect the quality of the environment in the county.

Banagher Community Plan 2018 - 2023

The Banagher Community Plan 2018 – 2023 does not contain specific targets or objectives for waste, nor does it reference waste or recycling in any way.

16.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development would comprise of the proposed upgrade and extension of an existing abattoir facility within the townlands of Meenwaun and Boheradurrow, at Banagher, Co. Offaly. The proposed development would also include the construction of stormwater and effluent drainage systems, water treatment plant, electrical sub-station, truck wash, security hut, waste and by-product area and gas compound, site access roads and all ancillary development including internal road surfacing, the provision of outdoor artificial lighting, an extension to the existing lairage facility and site landscaping.

Slaughtering activities at the proposed facility would typically operate Monday to Friday. However, slaughtering may be undertaken at weekends for reasons such as casualty animals and demand.

New stormwater and effluent drainage systems would be constructed. Stormwater from clean-yard areas and car parking areas would pass through a silt trap and Class 1 By-Pass Separator before being directed to a modular underground attenuation system. From here, stormwater would be pumped to a manhole prior to discharge to the Feeghroe Stream.

All process drains, domestic drains and dirty yard surface water drains would be directed to the site's new WWTP, which would comprise of an inlet sump, meva screen, drum screen, balancing tank, dissolved air flotation (DAF) unit, sludge tank, anoxic tank, two aeration tanks, clarifier, sand filters and an outlet sump. From here, the treated final effluent would be directed to the proposed integrated constructed wetlands (ICWs), comprising of a five-treatment cell system, prior to discharge to the Feeghroe Stream.

The expected construction timeframe would be approximately 18 months, with hours of operation from 7am to 7pm Monday to Friday, and 8am to 2pm on Saturdays. A temporary site compound would be established and would house the temporary offices, equipment and materials storage and construction staff welfare facilities. The temporary site compound would also be used for the storage of fuels and oils required for the various construction plant, in addition to housing waste receptacles.

The proposed development would generate certain waste types during both the construction and operational phases. During construction works, construction and demolition waste would be generated, including masonry rubble, concrete and excavated soils and stones. Waste would be segregated onsite, and would be reused in infilling processes and landscaping where permitted and where possible, with remaining wastes sent for recycling or disposal as appropriate. The operational phase would generate typical industrial-type wastes, such as packing and mixed municipal waste, in addition to animal by-product wastes associated with slaughtering activities. Operational wastes would be collected via licenced waste hauliers and directed for rendering, recycling, incineration or disposal as appropriate at licenced waste facilities.

16.5 DESCRIPTION OF EXISTING ENVIRONMENT

Private waste contractors, regulated by Offaly County Council, undertake the collection of municipal and commercial waste in County Offaly. Waste contractors operating in the Banagher region include AES and Oxigen. According to the EPA's website, there are four facilities licenced for waste activities, as outlined in the table below.

Table 16.3: Waste Licensed Facilities in County Offaly

LICENSE NO.	APPLICANT / FACILITY	FACILITY TYPE
W0029-04	Offaly County Council, Derryclure Landfill	Landfill
W0049-02	Bord Na Mona, Cloncreen Bog, Clonbullogue	Landfill
W0104-03	Advanced Environmental Solutions (Ireland) Limited, Cappincur, Tullamore	Waste Transfer Station
W0113-04	KMK Metals Recycling Limited, Cappincur, Tullamore	Waste Transfer Station (Hazardous & Non-Hazardous)

Derryclure Landfill (W0029-04) was the only municipal landfill facility in the county, however the landfill ceased the acceptance of waste directly after October 2012. A waste and recycling service is still provided at this location. County Offaly has identified historic landfill sites at Birr (Clonrbone, Kilcormac, Scurragh), Edenderry (Cloncannon and the site adjacent Cloncannon), Tullamore (Ballydaly and Ballydrohid) and Ferbane.

Three recycling centres are operated by Offaly Co. Co.: Derryclure; Birr and Edenderry. There are 43 bring banks that accept glass and cans, and in some cases, textiles.

The proposed development site can be described as comprising of a large area of grass-field and two separate made ground areas containing an existing abattoir and a redundant farmyard. In its current condition, the following potential waste types may be present as a result of refurbishment of the existing abattoir:

- Excavated soils and stone;
- Concrete;
- Masonry / Rubble;
- Metal;
- Timber;
- Electrical Wiring;
- Redundant Equipment (WEEE);
- Mixed Municipal;
- Plastic / PVC Plumbing;
- Rubber Hoses and Conveyor Belts;
- Copper Pipe;
- Insulating Materials.

16.6 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

16.6.1 CONSTRUCTION PHASE

During the construction phase of the development, construction and demolition waste (commonly referred to as 'C&D waste') would be generated at the site, with the main likely waste streams outlined in the table below.

Table 16.4: Predicted Main Construction Waste Streams

WASTE TYPE	EWC CODE	ORIGIN
Concrete	17 01 01	Waste concrete may arise due to surplus concrete from pouring activities and washings from ready-mix trucks. Some waste concrete may also arise during limited demolition works at the existing abattoir.
Bricks	17 01 02	Damaged / defected brick waste may arise during construction activities.
Tiles and Ceramics	17 01 03	Waste tiles / ceramics may arise during the construction activities.
Mixture of Concrete, Bricks, Tiles and Ceramics	17 01 07	As detailed in 17 01 01, 17 01 02 and 17 01 03 above.
Wood	17 02 01	Wood waste may arise during construction works, including building and shuttering works, due to damaged / defected wood, off-cuts and surplus wood.
Glass	17 02 02	Glass waste may arise due to damaged / defected glass and accidental breakages.
Plastic	17 02 03	Plastic waste may arise due to damaged / defected products.
Metals (including alloys)	17 04 01 - 07	Waste metal may arise due to damaged / defected metal, off-cuts and surplus metal.
Soils and Stones	17 05 04	During site clearance works and earth-moving activities, moderate amounts of excavated soils and stones waste would arise.
Insulation Materials	17 06 04	Waste may arise due to damaged / defected insulation panels and off-cuts.
Bituminous mixtures, coal tar and tarred products	17 03	Waste may arise due to surplus material from tarring of internal road network.
Biodegradable waste	20 02 01	Green waste would arise during site clearance works, with the removal of existing vegetation at the site.

The temporary site compound, which would house the site offices and staff welfare facilities such as a canteen, would generate limited amounts of waste, including the following:

- Paper and cardboard – EWC 15 01 01 and EWC 20 01 01;
- Biodegradable / food waste – EWC 20 01 08;
- Plastics – EWC 15 01 02 and EWC 20 01 39;
- Metals – 20 01 40;
- Mixed municipal waste – EWC 20 03 01;
- Sanitary waste – EWC 20 03 04.

Other waste materials that may arise during construction works in small volumes include:

- Waste Oils and Liquid Fuels – EWC 13 02 and EWC 13 07;
- Waste from Electrical and Electronic Equipment – EWC 16 02;
- Cables – EWC 17 04 11;
- Paints – EWC 20 01 28;
- Wood Preservatives – EWC 03 02;
- Batteries – EWC 16 06;
- Gypsum – EWC 17 08 02.

Wastes from EWC fractions EWC 13 02, EWC 13 07, EWC 16 02, EWC 03 02 and EWC 16 06 may be hazardous.

It is not anticipated that any asbestos waste would be generated during the construction phase of the development, as this material is not known to be present at the existing abattoir and associated structures onsite.

The BRE Waste Benchmark Data, published in June 2012, provides guidance on the construction waste estimates based on the gross internal floor area. Table 16.5 below details the typical construction industry waste generation per 100m^2 floor area.

Table 16.5: BRE Waste Benchmark

PROJECT TYPE	NUMBER OF PROJECTS DATA RELATES TO	AVERAGE TONNES/100M^2	NUMBER OF PROJECTS DATA RELATES TO
Residential	256	16.8	260
Public Buildings	23	22.4	24
Leisure	21	21.6	20
Industrial Buildings	23	**12.6**	24
Healthcare	22	12.0	22

PROJECT TYPE	NUMBER OF PROJECTS DATA RELATES TO	AVERAGE TONNES/100M^2	NUMBER OF PROJECTS DATA RELATES TO
Education	60	23.3	60
Commercial Other	4	7.0	2
Commercial Offices	14	23.8	11
Commercial Retail	48	27.5	47
Total number of projects	**471**	-	**470**

For a total building area of 8,578m^2 and an average of 12.6 tonnes of waste per 100m^2 of floor area, the construction waste generated translates to approximately 1,081 tonnes. The total building area was calculated using the figures provided in ***Table 2.2****: Proposed Development Infrastructure and Areas*.

Table 16.6 below outlines the typical breakdown of construction and demolition waste type expected to be generated from a typical site such as this, based on the EPA Waste Data, *Construction & Demolition Waste Statistics For Ireland* (March 2018). Table 16.6 also gives an estimate of the construction waste (breakdown) which might be generated based on information currently available.

Table 16.6: Waste Materials Generated and Estimated Construction Water Quantities

WASTE TYPES	PERCENTAGE (EPA FIGURES)	WASTE TONNES ESTIMATE
Metal waste	5.24%	56.64
Glass waste	0.09%	0.97
Paper and cardboard waste	0.01%	0.11
Plastic waste	0.01%	0.11
Wood waste	1.57%	16.97
Waste containing PCBs	0.00%	0.00
Mixed waste	0.08%	0.86
Mineral waste	12.11%	130.91
Asbestos waste	0.19%	2.05
Soil and stones	74.35%	803.72
Residue from treatment of mixed waste	6.35%	68.64
Total	**100**	**1,081**

It should be noted that no asbestos waste would be anticipated to be generated at the site, as this material is not known to be present at the existing abattoir and associated structures onsite. Therefore, the estimated figure of 2.05 tonnes of asbestos waste can be discounted.

While Table 16.6 estimates that 803.72 tonnes of soils and stones would likely be generated, it should be noted that this figure relates to the proposed facility and associated structures only. The construction of the ICW system would also require excavation works. Based upon the indicative size and required depth of the ICW cells, it is estimated that approximately 58,000 tonnes of excavated material (soils and stones) would be generated. However, it should be noted that this figure is indicative only, and does not take into account the topography of the area. Furthermore, the ICW planning document by Vesi Environmental, which accompanies this application, notes that areas where the soil depth is shallow (gravel / rock near the surface) would require unsuitable materials (if encountered) to be excavated, in order to replace with suitable construction material for the ICW cells to ensure that the minimum requirements of at least 750mm of subsoil with the required permeability is achieved. As discussed in Section 16.7.1, excavated soils would be reused in site levelling and landscaping where possible, and as ICW cell lining where suitable.

Waste arising during the construction phase would be managed in accordance with the waste hierarchy, as per Section 21A of the Waste Management Act 1996, as amended. Given that only suitably licenced waste hauliers, contractors and facilities would be used, it is not anticipated that wastes arising from the construction phase of the proposed development would have a significant impact upon the environment.

16.6.2 OPERATIONAL PHASE

During the operational phase of the development, the likely by-products and wastes that would be generated by site are provided in Tables 16.7 and 16.8.

Table 16.7 details the estimated volumes of by-products generated during the operational phase, and includes the proposed storage and disposal methods. Table 16.8 provides estimated volumes of recyclables and waste materials, based upon waste data submitted to the EPA for similarly-sized abattoir facilities.

In addition to the tables below, limited volumes of the following wastes may be generated during the operational phase, all of which would be collected separately and treated appropriately:

- Waste chemicals arising due to onsite WWTP monitoring, for example COD vials;
- Waste organic solvents and refrigerants – EWC 14 06;
- Batteries – EWC 16 06, EWC 20 01 33*/34;
- Waste electrical and electronic equipment – EWC 20 01 35*/36;
- Oil/water separator contents – EWC 13 05;
- Waste engine, gear and lubricating oils – EWC 13 02.

Waste arising during the operational phase would be managed in accordance with the waste hierarchy, as per Section 21A of the Waste Management Act 1996, as amended. Banagher Chilling Limited would appoint waste contractors to undertake the collection and treatment of

the anticipated operational waste streams. Given that only suitably licenced waste hauliers, contractors and facilities would be used, it is not anticipated that wastes arising during the operational phase of the proposed development would have a significant impact upon the environment.

Table 16.7: Estimated By-Product Generation, Collection and Disposal Method

WASTE / BY-PRODUCT	EWC	ESTIMATED ANNUAL TONNAGE	STORAGE METHOD	LIKELY DISPOSAL METHOD
Blood	02 02 99	1,500	Refrigerated Tank	Variable – food industry, rendering, compost
Effluent Sludge	02 02 04	2,000	Sludge Holding Tank	Anaerobic Digestion, Composting or Landspread
Lairage Sludge	02 01 06	800	Lairage Tank	Anaerobic Digestion, Composting or Landspread
CAT 1 Material	02 02 03	1,000	CAT 1 Trailer	Rendering
CAT 3 Material	02 02 02 02 02 03	5,000	CAT 3 Trailer	Rendering
Belly Paunch	02 02 03	1,500	Belly Paunch Trailer	Anaerobic Digestion, Composting or Landspread

Table 16.8: Estimated Waste Generation, Collection and Disposal Method

WASTE	EWC	ESTIMATED ANNUAL TONNAGE	STORAGE METHOD	LIKELY DISPOSAL METHOD
Mixed municipal waste	20 03 01	10 – 50	Designated bin(s), waste storage area	Incineration
Plastics	15 01 02 20 01 39	5 – 50	Designated bin(s), waste storage area	Recycling
Paper and Cardboard	15 01 01 20 01 01	1 – 5	Designated bin(s), waste storage area	Recycling
Metals	15 01 04 20 01 40	0 – 20	Designated bin / skip, waste storage area	Recycling
Wooden Packaging	15 01 03	0 – 5	Designated skip / trailer, waste storage area	Recycling
Food waste	20 01 08	10 – 20	Designated bin(s), waste storage area	Anaerobic Digestion or Composting

16.6.3 CUMULATIVE IMPACT

Considering the nature of the proposed development and nearby residential and commercial properties, there would be a potential cumulative impact upon waste management during both the construction and operational phases, with nearby properties generating similar types of waste as the proposed development.

However, the potential cumulative impacts would not be considered significant, as the area is suitably serviced by licenced waste contractors, and given that good waste management practices would be implemented on-site during construction works as standard practice.

16.6.4 "DO-NOTHING" IMPACT

Should the proposed development not proceed, wastes would not be generated at the site and therefore waste management would not be required.

16.7 MITIGATION MEASURES

16.7.1 CONSTRUCTION PHASE

The Waste Hierarchy

Throughout the construction phase, the construction works contractor would manage the wastes generated in order of priority in accordance with Section 21A of the Waste Management Act 1996, as amended, as per the waste hierarchy below.

Figure 16.1: Waste Hierarchy

Wastes would be segregated as much as possible in order to avoid cross contamination. Where practical, the generation of wastes at source would be reduced through measures such as the efficient ordering and purchasing of materials to reduce surplus materials, the return of

uncured concrete to the batching plant where possible and the re-using of shutters for concrete works. Where it is not possible to avoid the generation of wastes, wastes would be sent for recycling or recovery as a priority. The generation of waste for disposal would be minimised as much as is practical.

Construction Waste Management

Waste materials generated by construction activities would be managed according to the Department of the Environment, Heritage and Local Government's 2006 Publication - Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects.

Construction waste management would be managed in accordance with the Construction and Demolition Waste Management Plan (Document Ref. PES_C&D WMP_19_9201) prepared for the proposed development.

Prior to the commencement of development, the construction works contractor would identify a permitted waste contractor(s) who would be employed to collect and dispose of all wastes arising from the project works. In addition, the construction works contractor would identify all waste licensed/permitted facilities that would accept all expected waste exported off-site and would maintain copies of all relevant Waste Permits/Licences as required. Further details are provided in the sections below.

In order to ensure that waste is minimised and segregated correctly, the construction works contractor would ensure that all staff personnel, sub-contractors and any other relevant personnel are appropriately informed by means of clear signage, verbal instruction and induction training. Waste management training, as part of site induction, would discuss the waste hierarchy and detail the segregation of waste materials at source and storage methods, in addition to including a section on hazardous waste management. Site induction training, verbal instruction and signage would aim to train site personnel so that they are in a position to:

- Distinguish reusable materials from materials suitable for recycling;
- Ensure maximum segregation at source;
- Co-operate with the construction site manager on the best location's for stockpiling reusable materials;
- Separate materials for recovery;
- Identify and liaise with operators of waste collection and waste management operators.

Waste Contractors

The collection of wastes from the site would be undertaken by suitably authorised waste hauliers, and would only be recycled / recovered or disposed of at suitably licenced waste facilities.

The construction works contractor would appoint a waste contractor(s) for the construction phase. The waste contractor(s) appointed for the project would have experience in

construction waste management and would be appropriately licenced, holding the relevant waste collection permit and/or waste licences for the types of waste anticipated to be generated during construction works.

The waste contractor(s) would be appropriately licenced in compliance with the following regulations:

- Waste Management (Collection Permit) Regulations 2007 (S.I. No. 820 of 2007);
- Waste Management (Collection Permit) Amendment Regulations 2008 (S.I. No. 87 of 2008);
- Waste Management (Facility Permit and Registration) Regulations 2007 (S.I. No. 821 of 2007);
- Waste Management (Facility Permit and Regulations) Amendment Regulations 2008 (S.I. No. 86 of 2008).

The construction works contractor would ensure that copies of all waste contractors' collection permits and licences would be available for inspection, as discussed in the "Record Keeping" section below.

Waste Storage Area

The temporary site compound would be the main designated location for waste receptacles onsite. Suitable waste receptacles would be provided by the appointed waste contractor(s) during the construction phase, with skips / bins allocated to specific waste streams to avoid contamination. The number and size of waste receptacles would be determined following the appointment of the waste contractor(s). Waste receptacles would be appropriately labelled.

Where waste fuels and oils are generated, they would be stored within a bunded container in a designated area of the site compound. Any hazardous materials would be stored separately from non-hazardous waste, and would be stored within bunded containers / upon a bund where appropriate.

The removal of waste from the site would be undertaken on a regular basis, preventing large volumes of waste accumulating onsite.

Waste Minimisation

Waste minimisation and prevention would be the responsibilities of the construction works contractor appointed to the proposed development, who would ensure the following:

- The efficient ordering and purchasing of materials to reduce surplus materials;
- Materials would be ordered in appropriate sequence to minimise materials stored on site;
- The correct storage of materials to minimise the generation of damaged materials, for example keeping materials packaged until they are ready to be used and storing materials which are vulnerable to water damage via precipitation under cover and raised above the ground;

- The handling of materials with care, to avoid undue damage;
- The return of uncured concrete to the batching plant where possible;
- The re-use of shutters for concrete works;
- Where practical and where permitted, certain waste streams would be used during infill works;
- Where possible, excavated subsoil and topsoil would be reused for the reinstatement and landscaping of the development site.

The construction works contractor would reuse materials onsite where possible. In particular, inert wastes (such as concrete (EWC 17 01 01), bricks (EWC 17 01 02) and soils and stones (EWC 17 05 04)) would be used for infilling activities where suitable. The inert wastes may be passed through a mobile crusher unit, which would render the backfill material into a uniform shape and size which would allow for improved backfilling and compaction to required engineering standards.

The reuse of materials onsite would reduce the requirement for imported material to the site, which would have the following positive environmental impacts to the construction phase:

- Reduction in imported materials to the site;
- Reduction in the requirement for virgin aggregate materials from quarries;
- Reduction in energy required to extract, process and / or transport virgin materials / aggregates;
- Reduced HGV movements associated with the delivery of imported materials to the site;
- Reduced noise levels associated with reduced HGV movements;
- Reduction in the amount of landfill space required to accept C&D waste.

Management of Waste Streams

As mentioned above, wastes generated would be managed by the construction works contractor in order of priority in accordance with Section 21A of the Waste Management Act 1996, as amended.

Excavated Soils and Stones:
Based on current calculations, it is estimated that approximately 804 tonnes of excavation materials would be generated for the proposed facility footprint, with approximately 58,000 tonnes generated for the ICW system. However, as noted in Section 16.6.1, these figures are estimated.

Soils and stones arising from excavations would be reused in the reinstatement (for example as engineering fill) and landscaping processes where possible. This would be investigated by the construction works contractor and would be subject to appropriate testing to ensure the material is suitable for its proposed end use. With regards the excavated materials for the ICW system, approximately 12,500 tonnes of the 58,000 tonnes excavated would be used to

construct the enclosing cell embankments and access roadways. Excavated materials would also be reused in the lining of the ICW cells, should they be of the required permeability.

Any excess excavated soils would be collected by a licenced waste contractor and either reused for reinstatement / landscaping activities at other sites if suitable or disposed of as appropriate.

In the unlikely event of any evidence of soil contamination being found during work on site, the appropriate remediation measures would be employed. Areas of potentially contaminated soil would be isolated and tested for contamination in accordance with the 2002 Landfill Directive (2003/33/EC). Any work of this nature would be carried out in consultation with, and with the approval of, the EPA and the Environmental Department of Offaly County Council. Pending the results of laboratory testing, this material would be excavated and exported off-site, by an appropriately Permitted Waste Contractor holding an appropriate Waste Collection permit and that this hazardous material, and be sent for appropriate treatment / disposal to an appropriately Permitted / Licenced Waste Facility.

Concrete and Bricks:
Surplus concrete would be returned to the batching plant where possible. An impermeable concrete washout area (separate to vehicle wheel wash) would be installed by the construction works contractor, if required. Excess concrete and washings from ready mix trucks would be deposited in the designated contained area only. The main contractor would arrange for removal from site of concrete at regular intervals. Where concrete, blocks and bricks arise from demolition or construction waste, they would be crushed and used for ground-fill material where deemed suitable. Where these materials cannot be reused onsite, they would be diverted for recycling if possible.

Wood:
Waste wood would be reused for shuttering where suitable. Wood that is uncontaminated (free from preservatives and paints) would be segregated and recycled.

Metal:
Metal is highly recyclable and has a considerable rebate value. Where metal cannot be reused onsite, the majority would be recycled.

Glass:
As glass can contaminate other segregated waste streams, it would be collected separately where possible. The majority of glass would be recycled.

Other Recyclables:
These include plastic, cardboard and office waste such as paper. Where possible, the different recyclables would be segregated onsite and sent for recycling. With regards packaging waste, the construction works contractor would investigate the possibility of returning the packaging to the supplier.

Food Waste:
Food waste on site would arise from any catering and food consumption by construction staff. Suitable food waste bins would be provided by the contractor in the construction compound and the contractor would ensure that these are regularly removed and emptied. Food waste would be sent for composting or anaerobic digestion.

Mixed Municipal Waste and Other Non-Recyclable Waste:
Wastes not suitable for reuse or recycling would be stored in separate waste receptacles. Prior to removal from site, the EHS Officer or delegate would inspect the receptacles to ensure they contain no recyclable material or materials which can be reused.

Green Waste:
Green waste may be sent for composting if not possible to reuse onsite during landscaping / re-instatement activities.

Sanitary Waste:
Sanitary waste from the port-a-loo toilets / holding tanks located within the temporary site compound would be collected by a licenced waste contractor on a regular basis.

Hazardous Materials:
Hazardous waste would be managed in accordance with the Waste Management (Hazardous Waste) Regulations 1998 and 2000. Small quantities of hazardous waste may be generated onsite. Examples of potentially hazardous wastes include fuels and oils, batteries, paints, adhesives and sealants. Hazardous waste would be stored separately from non-hazardous waste, would be appropriately labelled and would be stored upon bunds where appropriate. Where hazardous materials are being specified, alternatives with a lower environmental impact should be sought wherever possible. The construction works contractor would ensure that the appointed waste contractor is licenced to transport / accept hazardous waste prior to the waste leaving the site. Depending on the type of hazardous material, the waste may be recovered, recycled or disposed of appropriately.

Waste Electrical and Electronic Equipment (WEEE):
This waste, if generated, would be stored separately from other waste streams and would be covered pending collection. WEEE can contain hazardous components such as batteries and mercury containing fluorescent tubes. All hazardous wastes would be stored in appropriate secure bunded containers prior to removal from site. Some hazardous wastes may not be stored with other wastes. This would be determined by the contractor and appropriate precautions taken.

Record Keeping

For each waste movement and for each type of waste, the construction works contractor would obtain a signed waste docket from the waste contractor, detailing the weight, type of material, destination of material and whether the material is going for recycling, recovery or disposal. The construction works contractor would retain copies of the waste contractors' relevant waste collection permits and waste licences on file throughout the construction phase.

16.7.2 OPERATIONAL PHASE

The Waste Hierarchy

The proposed facility would manage all wastes generated during the operational phase in order of priority in accordance with Section 21A of the Waste Management Act 1996, as

amended, as per the waste hierarchy in Figure 16.1 above. Wastes would be segregated as much as possible in order to avoid cross contamination. Where practical, the generation of wastes at source would be reduced through measures such as the efficient ordering and purchasing of materials to reduce surplus materials. Where it is not possible to avoid the generation of wastes, wastes would be sent for recycling or recovery as a priority. The generation of waste for disposal would be minimised as much as is practical, with any remaining waste directed to incineration.

Waste Management

As part of the commissioning phase of the proposed development, Banagher Chilling Limited would appoint waste contractors to collect and treat / dispose of all the anticipated waste streams arising during the operational phase. Banagher Chilling Limited would ensure that the appointed waste haulier contractors are suitably licenced to transport the waste streams, and that all waste would be going to facilities which are licenced to accept the waste.

Waste management training, which would discuss the waste hierarchy and the appropriate segregation of waste materials, would be included within the site induction for employees, sub-contractors and relevant visitors. As part of the site's proposed Environmental Management System, site objectives and targets would be set for waste minimisation.

Waste Contractors

The collection of wastes from the site would be undertaken by suitably authorised waste hauliers, and would only be recycled / recovered or disposed of at suitably licenced waste facilities. Banagher Chilling Limited would appoint waste contractors with the relevant experience in waste management. The waste contractors would be appropriately licenced, holding the relevant waste collection permit and/or waste licences for the types of waste anticipated to be generated during the operational phase.

The waste contractor(s) would be appropriately licenced in compliance with the following regulations:

- Waste Management (Collection Permit) Regulations 2007 (S.I. No. 820 of 2007);
- Waste Management (Collection Permit) Amendment Regulations 2008 (S.I. No. 87 of 2008);
- Waste Management (Facility Permit and Registration) Regulations 2007 (S.I. No. 821 of 2007);
- Waste Management (Facility Permit and Regulations) Amendment Regulations 2008 (S.I. No. 86 of 2008).

With regards the collection of organic fertilisers (such as lairage sludge and belly paunch) from the facility, Banagher Chilling Limited would ensure that only hauliers registered on the Department of Agriculture, Food and the Marine (DAFM) Animal By-Products (ABP) Transport Register would be employed.

Banagher Chilling Limited would ensure that copies of all waste contractors' collection permits and licences would be maintained on file, as discussed in the "Record Keeping" section below.

Waste Storage Area

The waste storage area would be located to the rear of the proposed facility, adjacent the north-eastern site boundary. This area would include the associated waste receptacles provided by the appointed waste contractor(s), in addition to designated trailers for Category 1, Category 3 and belly paunch materials. Lairage sludge would be stored within the lairage tank, located underneath the lairage facility, while effluent sludge would be stored within the sludge holding tank at the WWTP compound. Blood would be stored within a refrigerated tank, which would be located adjacent the proposed facility building. All waste receptacles, trailers and tanks would be appropriately labelled.

Any hazardous wastes would be stored separately from non-hazardous waste. Liquid wastes would be stored within bunded containers / upon a bund where appropriate.

The removal of waste from the site would be undertaken on a regular basis, to prevent large volumes of waste accumulating onsite and to prevent the potential for odour nuisance. For example, Category 1 and Category 3 material would be removed off-site on a daily basis, while municipal waste may be collected once per week.

Management of Waste and Animal By-Product Streams

Wastes generated during the operational phase would be managed by Banagher Chilling Limited in order of priority in accordance with Section 21A of the Waste Management Act 1996, as amended.

Wood:
Waste wood, for example wooden pallets, would be directed for recycling.

Metal:
Metal is highly recyclable and has a considerable rebate value. Metal would be directed for recycling.

Other Recyclables:
These include plastic, cardboard and office waste such as paper. The different recyclables would be segregated onsite and sent for recycling. With regards packaging waste, Banagher Chilling Limited would investigate the possibility of returning the packaging to the supplier.

Food Waste:
Food waste on site would arise from the proposed canteen, from any catering and food consumption by operational staff. Suitable food waste bins would be provided within the canteen and any other kitchen area, which would be removed and emptied on a regular basis. Food waste would be sent for composting or anaerobic digestion.

Mixed Municipal Waste and Other Non-Recyclable Waste:
Wastes not suitable for recycling would be stored in designated waste bins. These wastes would be directed for incineration where possible.

Sanitary Waste:
Sanitary waste from staff facilities would be directed for treatment at the proposed onsite Waste Water Treatment Plant.

Hazardous Materials:
Any hazardous waste generated onsite would be managed in accordance with the Waste Management (Hazardous Waste) Regulations 1998 and 2000. Examples of potentially hazardous wastes include fuels and oils, batteries, paints, adhesives, sealants and laboratory wastes from onsite water monitoring. Hazardous waste would be stored separately from non-hazardous waste, would be appropriately labelled and would be stored upon bunds where appropriate. Depending on the type of hazardous material, the waste may be recovered, recycled or disposed of appropriately.

Waste Electrical and Electronic Equipment (WEEE):
This waste, if generated, would be stored separately from other waste streams and would be covered pending collection. WEEE can contain hazardous components such as batteries and mercury containing fluorescent tubes. All hazardous wastes would be stored in appropriate secure bunded containers prior to removal from site.

Blood:
Blood from slaughtering activities would be directed to a designated blood tank, which would be refrigerated and emptied on a regular basis. There are a few recovery / disposal methods for blood, including the use of blood in the food industry, composting or rendering. During the commissioning phase, the facility would determine the preferred disposal method.

Effluent Sludge, Lairage Sludge & Belly Paunch:
Effluent sludge would be stored within the sludge holding tank within the WWTP, while lairage sludge would be stored within the lairage tank. Belly paunch would be stored within a designated trailer. Sludges and belly paunch would be directed for anaerobic digestion, composting or landspreading as appropriate. Should sludges / belly paunch be landspread, the contractor would be required to prepare a Nutrient Management Plan in accordance with the Nitrates Regulations.

Category 1 & Category 3 Material:
These materials must be stored in designated trailers, removed offsite on a daily basis, and must be directed for rendering.

Record Keeping

For each waste movement and for each type of waste, Banagher Chilling Limited would obtain a signed waste docket from the waste contractor, detailing the weight, type of material, destination of material and whether the material is going for recycling, recovery or disposal. The site would also maintain copies of the waste contractors' relevant waste collection permits and waste licences on file.

16.8 RESIDUAL IMPACTS

It is envisaged that the impact of construction phase wastes would be temporary, slight and negative. There are several facilities with the necessary EPA licences and waste facility permits for soils recovery in the region. There is considered to be adequate capacity to receive the wastes likely to be generated by the construction of the proposed development, even in the 'worst-case' scenario, which is where excavated material cannot be reused in the proposed.

Following the implementation of mitigation measures outlined in Sections 16.7, and given that all wastes arising as part of the construction phase would be managed in accordance with the waste hierarchy as outlined in Section 21A of the Waste Management Act 1996, as amended, it is considered that the proposed development would have a short-term and negligible environmental impact.

The operational phase of the proposed development would give rise to a variety of municipal and packaging type wastes. However, waste management would be undertaken by suitably licenced waste contractors. Therefore, it is considered that the operational phase of the proposed development would have a long-term and negligible environmental impact

16.9 MONITORING

16.9.1 CONSTRUCTION PHASE

The construction works contractor would maintain records and documentation of all waste transported off-site, with waste volumes tracked to measure overall environmental performance. The construction works contractor would ensure that copies of all waste contractors' collection permits and licences would be available for inspection.

16.9.2 OPERATIONAL PHASE

The applicant, Banagher Chilling Limited, would maintain records and documentation of all waste transported off-site, with waste volumes tracked to measure overall environmental performance. The applicant would ensure that copies of all waste contractors' collection permits and licences would be available for inspection.

16.10 REINSTATEMENT

In the event of the proposed development being discontinued, the construction works contractor would undertake measures to ensure that wastes at the site would not impact upon the environment, including the following:

- All wastes present throughout the site would be transported to the site compound and segregated appropriately;
- Where possible, surplus building materials would be returned to the supplier, sold or sent for recycling;

- Waste contractors would be contacted to remove the remaining wastes at the site, for recovery/recycling or disposal at licenced waste facilities;
- Stockpiled soil would be used to reinstate areas where possible.

16.11 DIFFICULTIES ENCOUNTERED IN COMPILING INFORMATION

No difficulties were encountered during the assessment of potential impacts of the proposed development on waste management.

16.12 REFERENCES

BRE Waste Benchmark Data (June 2012), Available at: http://www.smartwaste.co.uk/filelibrary/benchmarks%20data/Waste_Benchmarks_for_new_build_projects_by_project_type_31_May_2012.pdf

Eastern Midlands Region Waste Management Plan 2015–2021

Environmental Protection Agency (2017) Draft. *Guidelines on the information to be contained in Environmental Impact Assessment Reports*.

Environmental Protection Agency (2015) Draft. *Advice Notes for Preparing Environmental Impact Statements*.

Environmental Protection Agency (2002) *European Waste Catalogue and Hazardous Waste List*.

EPA Licensing and Permitting Information. Available at: http://www.epa.ie/licensing/

EPA Envision Online Mapping. Available at: http://gis.epa.ie/Envision/

EPA - Construction & Demolition Waste Statistics for Ireland (March, 2018), Available at: http://www.epa.ie/nationalwastestatistics/constructiondemolition/

Offaly County Council (2014) *Offaly County Development Plan 2014 – 2020*.

SECTION E – INTERACTIONS AND INTER-RELATIONSHIPS

In line with requirements of EC Directive 85/337/EC (as amended) and the Planning and Development Regulations 2001, any interactions/inter-relationship between the various environmental factors was also taken into account as part of the EIAR scoping and assessment.

Where a potential exists for interaction between two or more environmental topics, the relevant specialists have taken the potential interactions into account when making their assessment and where possible complementary mitigation measures have been proposed. An overview of these potential interactions is provided in Table 17.1, with the main interactions or inter-relationships discussed in Sections 17.1 to 17.12 below.

17.0 INTERACTIONS AND INTER-RELATIONSHIPS

Table 17.1: Summary of Potential Interactions / Inter-Relationships

Receptor / Source	Human Beings	Air	Climate	Noise	Landscape & Visual	Traffic	Biodiversity	Water	Soils	Cultural Heritage	Material Assets
Human Beings		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Air	✓		✓	*x*	*x*	*x*	✓	*x*	*x*	*x*	✓
Climate	✓	✓		*x*	*x*	*x*	✓	*x*	*x*	*x*	*x*
Noise	✓	*x*	*x*		*x*	*x*	✓	*x*	*x*	*x*	✓
Landscape & Visual	✓	*x*	*x*	*x*		*x*	*x*	*x*	*x*	✓	*x*
Traffic	✓	✓	✓	✓	*x*		✓	*x*	*x*	*x*	✓
Biodiversity	✓	✓	✓	*x*	✓	*x*		✓	✓	*x*	*x*
Water	✓	*x*	*x*	*x*	*x*	*x*	✓		✓	*x*	*x*
Soils	✓	✓	*x*	*x*	✓	*x*	✓	✓		✓	✓
Cultural Heritage	✓	*x*	*x*	*x*	✓	*x*	*x*	*x*	*x*		*x*
Material Assets	✓	✓	✓	*x*	*x*	*x*	✓	✓	✓	*x*	

✓ - Anticipated Interaction
X - No Anticipated Interaction

17.1 AIR AND SOILS

Excavations and earth moving operations during construction works may generate quantities of dust, which have the potential to impact upon air quality in the vicinity of the proposed development. Consequently, an impact upon air quality has the potential to impact upon human health, cause dust nuisance and cause disturbance to fauna (further discussed in Section 17.3).

The extent of dust generation depends on the nature of the construction dust (soils, sands, gravels, silts etc.) and the construction activity. The potential for dust dispersion depends on the local meteorological conditions such as rainfall, wind speed and wind direction.

Mitigation measures to control dust emissions would be implemented, which would include dust suppression where necessary.

17.2 AIR, CLIMATE AND TRAFFIC

The proposed development has the potential to impact upon the air quality and climate of the area through air emissions, including potential greenhouse gases, arising from the proposed boilers, the wastewater treatment process and exhaust fumes from vehicles.

There would be a small increase in traffic during the construction phase, however, this would not be considered significant given the transient nature of works.

A comprehensive greenhouse gas assessment of the operational phase of the proposed development was undertaken by Katestone Environmental Pty Ltd., and is included as Attachment 5.1. The assessment of greenhouse gases generated from operations determined that the impact of the development on climate change would be very low in terms of national emissions.

The Odour, Air Quality and Greenhouse Gas Assessment report, included as Attachment 5.1, also assessed the potential impacts of traffic on air quality and climate. The report concluded that the proposed development's potential impact on roadside local air quality would be negligible. The potential impact of the development on regional air quality was found to be low compared to major regional roads in the vicinity of the proposed development.

17.3 AIR, HUMAN BEINGS AND BIODIVERSITY

An adverse impact on air quality has the potential to impact upon human health, cause dust nuisance and cause disturbance to fauna. However, as discussed in Section 17.2, the risk to air quality as a result of the proposed development would not be considered significant.

During the construction phase of the development, there would be potential for dust emissions, which could impact upon the communities and residents on the roads to the site and fauna in the surrounding area. The potential impact of dust would be temporary, given the transient nature of construction works. Dust control would be an integral part of construction management practices, with mitigation measures implemented where required, including sweeping of roads and hardstand areas, appropriate storage and transport of

material and dust suppression measures where required. Therefore emissions during construction are not likely to adversely affect air quality.

Odour is another aspect of air quality with the potential to impact upon human beings, in the context of nuisance. As detailed in Attachment 5.1, the air quality assessment undertaken for the proposed development predicted that concentrations of odour would be well below the relevant odour criterion at sensitive receptors. Odour controls would be implemented at the proposed development to minimise potential emissions. Such measures would include the capture and abatement of emissions from the balance tank and sludge holding tank at the onsite WWTP.

The air quality assessment (included as Attachment 5.1) found that predicted concentrations of nitrogen dioxide, sulphur dioxide, carbon monoxide, particulate matter (as PM10 and PM2.5) and benzene would be well below the relevant criteria at sensitive receptors. As discussed in Section 17.2 above, the assessment report also assessed the potential impacts of the development upon traffic in the region and concluded that the development's potential impact on roadside local air quality would be negligible.

The air quality assessment also considered the potential effect of the development on Natura 2000 sites. This assessment found that predicted concentrations of ammonia would be well below the relevant criteria at the Natura 2000 sites located near the proposed development.

17.4 NOISE, HUMAN BEINGS AND BIODIVERSITY

Noise generated during the construction and operational phases of the proposed development has the potential to impact upon human beings and fauna within the vicinity of the site.

During the construction phase, noise may be generated due to increased vehicle movements and the operation of construction plant. It is not anticipated that there would be a significant impact on local residences and fauna within the vicinity of the development. Applicable noise limits have been recommended in order to comply with standards for construction noise. Additional noise impact mitigation measures have been recommended in order to promote good practice in relation not noise, and have been included as part of an outline Construction Environmental Management Plan.

The operational phase of the proposed development would have no significant additional impact upon the existing noise environment of the area. The predicted noise levels for operational site equipment and traffic are likely to be below the existing background levels at all survey locations. These would therefore fall into the No Observed Effect Level (NOEL) criteria. Therefore, it is not anticipated that significant noise impact would occur to human beings or bio-diversity.

17.5 MATERIAL ASSETS AND HUMAN BEINGS

The proposed development would not be anticipated to have any significant impact upon the land use of the area, given that the proposed development would be an extension to the existing abattoir facility, and given that the development would be located mainly within agricultural lands, primarily pasture, belonging to the applicant.

It is considered that the proposed development would have a positive impact upon the local economy of the agri-food sector, by providing employment opportunities and by sourcing cattle from local farmers and suppliers.

The proposed development would not have any significant impacts upon utilities, such as disruption to local services, during either the construction or operational phase. During construction works, the demand on the local electricity and mains water systems would not be considered significant given the scale and transient nature of works.

During the operational phase, the annual anticipated electricity consumption (approximately 922 MWhrs) and LPG consumption (80m^3) would not be considered significant in the overall context of the proposed development. With regards water demand for the site (estimated between 150-200 m^3/day), no significant impact would be anticipated upon the Banagher regional water supply. Should conditions allow, the applicant intends to source the site's water requirement via water abstraction onsite. Water conservation measures have been included as part of the proposed development design, which include rainwater harvesting of all roof water for use in staff sanitary facilities and site landscaping, in addition to utilising "grey-water" from the proposed WWTP for use in lairage and lorry-wash out. Wastewater generated by the proposed development would not impact upon Banagher WWTP, as it is proposed to treat wastewater onsite at the new WWTP and ICW system prior to discharge to the Feeghroe Stream.

Should waste be incorrectly handled or stored at the development site, it has the potential to cause an adverse impact upon human beings through nuisance, including visual, odour, pests, and pollution to soils and water.

During the construction phase, wastes would be segregated and stored in suitably contained waste receptacles at the site compound. This would considerably reduce the potential risk of pollution to soils and water. Waste would be removed from the development on a regular basis, to avoid the accumulation of high waste volumes, which could cause nuisance. It should also be noted that given the inert nature of the majority of C&D waste types, it is unlikely that issues regarding odour or pests would arise.

During the operational phase, wastes would be appropriately stored within the waste receptacles provided by the appointed waste contractor(s), with animal by-products stored within designated trailers or tanks. The removal of waste from the site would be undertaken on a regular basis, to prevent large volumes of waste accumulating onsite and to prevent the potential for odour and pest nuisance. For example, Category 1 and Category 3 material would be removed off-site on a daily basis, while municipal waste may be collected once per week.

Any hazardous waste generated during the construction or operational phase would be managed in accordance with the Waste Management (Hazardous Waste) Regulations 1998 and 2000, and would be stored separately from non-hazardous waste, appropriately labelled and stored upon bunds where appropriate.

17.6 MATERIAL ASSETS, BIODIVERSITY, WATER QUALITY AND SOILS

The proposed development would alter flora cover and the species of fauna supported due to land take and soil disturbance works. This impact would be minor, given the low ecological value of agricultural habitats at the site, and given that it is proposed to plant native flora species for the ICWs and site landscaping.

Waste has the potential to impact upon water quality and biodiversity during both the construction phase and operational phase, by causing pollution to soils and water through leaching of materials, and subsequently to aquatic biodiversity, and by potentially attracting pests / vermin to the site. However, as discussed in Section 16, wastes generated during the construction phase would be stored in suitably contained waste receptacles at the site compound, with the majority of the waste inert in nature, reducing the potential of pollution to soils and water.

It is not considered that there would be any significant impact upon soils and water, and thus biodiversity, due to waste management during the operational phase, given that waste would be collected by licenced waste contractors and recovered, recycled or disposed of at appropriately licenced waste facilities, which would have environmental controls in place as standard.

17.7 MATERIAL ASSETS AND NOISE

The proposed development is located in a rural agricultural area, primarily dominated by pastureland. Increased noise emissions during the construction or operational phases would have the potential to impact upon livestock due to disturbance.

The potential for noise during construction works associated with the proposed development on livestock would not be considered significant, given the transient nature of construction activities and given that noise control measures would be implemented by the construction works contractor, as standard practice, and as outlined in the Construction Environmental Management Plan prepared for the development. The potential for operational noise associated with the proposed development to cause disturbance to livestock within the vicinity of the site would be considered low. Animals would quickly become acclimatised to the new noise environment adjacent to the development, as with similar projects such as new roads and motorways.

17.8 MATERIAL ASSETS AND AIR

As noted above, the proposed development is located in a rural agricultural area. The proliferation of dust during construction has a nuisance value and livestock would be at risk to eye irritation from high levels of wind blowing dust particles. Given the proposed mitigation measures for dust control and dust suppression, in addition to the transient nature of construction works, the potential for dust to impact upon livestock would be considered low.

17.9 WATER QUALITY AND SOILS

There would be a potential impact on water quality during the construction phase of the proposed development due to the release of suspended solids during soil disturbance works. Surface water run-off passing over exposed soils has the potential to entrain suspended solids and release them into receiving waters. An increase in suspended solids would reduce water clarity, which could affect light penetration and therefore productivity in the waters. Water quality may also be impacted upon by an increase in nutrients, which are bound to suspended solids. A significant increase in nutrients can result in excessive eutrophication, leading to deoxygenation of waters and subsequent asphyxia of aquatic species.

Appropriate mitigation measures would be implemented during the construction phase including the provision of silt control features and the appropriate storage of spoil.

17.10 WATER QUALITY, HUMAN BEINGS AND BIODIVERSITY

The proposed development and future planned discharge of treated effluent to surface waters would have the potential to cause a deterioration in water quality. A deterioration in water quality would impact upon aquatic flora and fauna, would negatively affect the fishery industry and in severe cases, may impact upon any water-based leisure activities and amenities of the area.

It is unlikely that the proposed development would have the potential to impact upon drinking water quality. The Banagher Water Treatment Works river water abstraction (2500PUB1001) [E 200864, N 216181] is located upstream of the Rapemills-Shannon confluence, and would not be affected by the proposed discharge. Due to the nature of the area hydrology, streams are generally gaining and there is a low risk of impact from the proposed discharge to the Banagher WTW groundwater abstraction, located <0.5km from the boundary of the proposed site. The Portumna Water Treatment Works (1200PUB1042) abstraction point is located approximately 30 km downstream of the Rapemills-Shannon confluence in Lough Derg [E 185210, N 203730].

During construction works, there would be a potential risk to water quality from releases of suspended solids during earth works, uncured concrete and hydrocarbons from the operation of heavy construction plant and associated equipment. Uncured concrete has the potential to alter the pH of waters locally, while hydrocarbons can lead to potentially toxic and / or de-oxygenating conditions within waters.

Suspended solids potentially entrained in surface water run-off during construction works can impact upon aquatic habitats through deposition, reducing clarity and by potentially increasing nutrients which are bound to the suspended solids. An increase in sediments has the potential to impact upon fish by damaging gravel beds required for spawning, smothering fish eggs and in extreme cases, by interfering with the gills of fish. Consequently, an impact on fish would affect fauna, such as the otter (*Lutra lutra*), who prey on fish.

During the construction phase of the proposed development and future planned development, surface water quality would be protected through the implementation of mitigation measures, which include the use of appropriate silt control features, the regular maintenance and inspection of construction plant and the appropriate storage of potentially polluting

substances. An outline Construction Environmental Management Plan (CEMP) has been prepared which included measures for the protection of water quality.

During the operational phase, water quality may be impacted upon due to an increase in nutrients, which may arise from surface water-run off containing nutrients bound to suspended solids or by the discharge of treated effluent emissions, in particular emissions of phosphates and nitrogenous compounds. A significant increase in nutrients can result in excessive eutrophication, leading to deoxygenation of waters and subsequent asphyxia of aquatic species.

Discharges of ammonia can have a direct toxic effect in its unionised form (NH_3) to which fish species, and particularly salmonid species, are susceptible. Uncontrolled emissions of suspended solids and fats, oils and grease can also have a detrimental impact upon habitats and species.

It is not anticipated that the proposed development has the potential to adversely impact upon water quality during the operational phase. Proposed final effluent quality values for discharges to the Feeghroe Stream have been based upon the Feeghroe's assimilative capacity and current water quality. The assimilative capacity assessment concluded that the proposed discharge would not, in and of itself, cause the Feeghroe Stream to fail to achieve good status, or significantly impact the current water quality of the Feeghroe.

17.11 LANDSCAPE AND VISUAL, SOILS AND HUMAN BEINGS

The excavation, temporary storage and movement of soil within the site would affect the appearance of the landscape. This would be temporary as vegetation becomes established and would be necessary as part of the construction.

The proposed development would have the potential to adversely impact upon the visual landscape during the operational phase, thereby reducing the visual amenity for local residents.

In terms of landscape impacts, it is not considered that the site is located within a particularly sensitive setting. The wider context is that of a working rural landscape without particular landscape or visual designations in the Offaly County Development Plan.

As discussed in Section 7, it is considered that the proposed extension, though substantial in scale, is appropriately sited; visually well contained; and, where visible, the design helps it to assimilate with the existing landscape and visual context. The proposed development would result in visual impacts that are very localised and in the lower order of magnitude. Overall, it is considered that such effects are not significant in EIA terms, especially once landscape mitigation proposals, outlined in Section 7.3, have become established.

17.12 CULTURAL HERITAGE, SOILS AND HUMAN BEINGS

Archeologically important sites, buildings of historic, artistic or architectural interest and sites of cultural heritage form part of the landscape of County Offaly. A number of monuments are present within the wider vicinity of the site. These include an enclosure,

located approximately 0.5km to the north-east, and a cluster of toghers, with the nearest togher located approximately 1.1km to the north-east. Furthermore, two townland boundaries are located within the site, the boundary between Boheradurrow and Clongawny, and the boundary between Boheradurrow and Meenwaun.

Potential impacts to archaeological, architectural and cultural sites may occur during topsoil stripping, excavation and soil movements during the construction phase of the development. These works may also impact upon the landscape of the area, particularly if existing archaeological and architectural features are physically affected.

The proposed development would not directly impact upon any known recorded monuments, national monuments, protected structures or NIAH heritage sites. However, the proposed development would likely have a direct impact upon two townland boundaries, that between Boheradurrow and Clongawny Beg, and that between Boheradurrow and Meenwaun.

The proposed development would have a potential indirect impact upon an enclosure located approximately 0.5km from the site. This monument has not been investigated, but there is potential for unknown sub-surface archaeological features or material within the vicinity of the proposed site, which would be negatively impacted by construction works.