

ATTACHMENT – 1-2- NON- TECHNICAL SUMMARY

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1.0 EXECUTIVE SUMMARY

This family pig farm at Ballyfauskeen (also spelt Ballyfaskin), Ballylanders, Co Limerick (V35KV12) has been in operation for over 40 years. The most recent planning application Ref No 19/1135 (accompanied with an EIAR) was granted on 29/01/2021 to increase the pig numbers to 1,000 sows, 166 gilts, 5 boars, 4,000 weaner pig places and 3,957 finisher pig places; in addition to constructing an electrical substation (approx. 22m²). The increase in pig numbers did not require an increase in the area of pig housing, however, refurbishment works on existing pig houses, involving changing in internal partitions, re-wiring, new water and feed fixtures and some internal changes in the slats and floors, will facilitate the increased number of pigs.

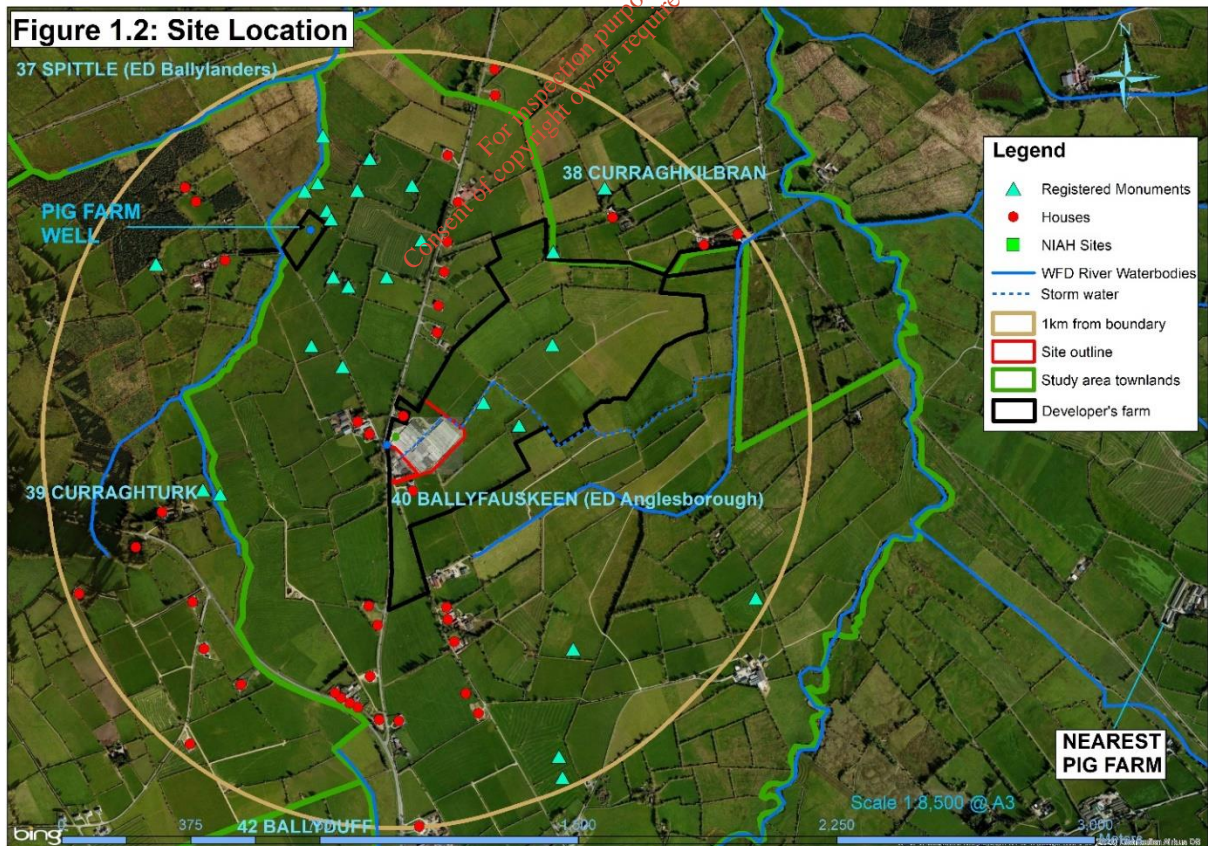
The proposed development will produce similar quantities of ammonia and odour emissions – after mitigation - compared to the licensed herd (see Section 8.0 Air). This can be achieved with the introduction of an adequate power supply the mill enabling specialised low protein diets for the growing pigs. Pig manure production will not change significantly. Traffic on the R662 is projected to increase by two movements per day, with a temporary increase of 6 movements during the 4 month construction period. Noise and visual impacts will not change significantly.

The farm is located in a rural setting which has good ground and surface water quality. This is an indication that the farm has a good environmental track record. It operates an Environmental Management System to insure compliance with the requirements of its EPA license and both the EPA and the Department of Agriculture, Food and The Marine monitor pig manure exports from the farm. The pig manure is land-spread according to a legal framework (SI 605 of 2017 as amended) which governs how pig manure is utilised, and within this legal framework there are adequate protections to insure that pig manure is applied without adverse environmental effects.

2.0 INTRODUCTION

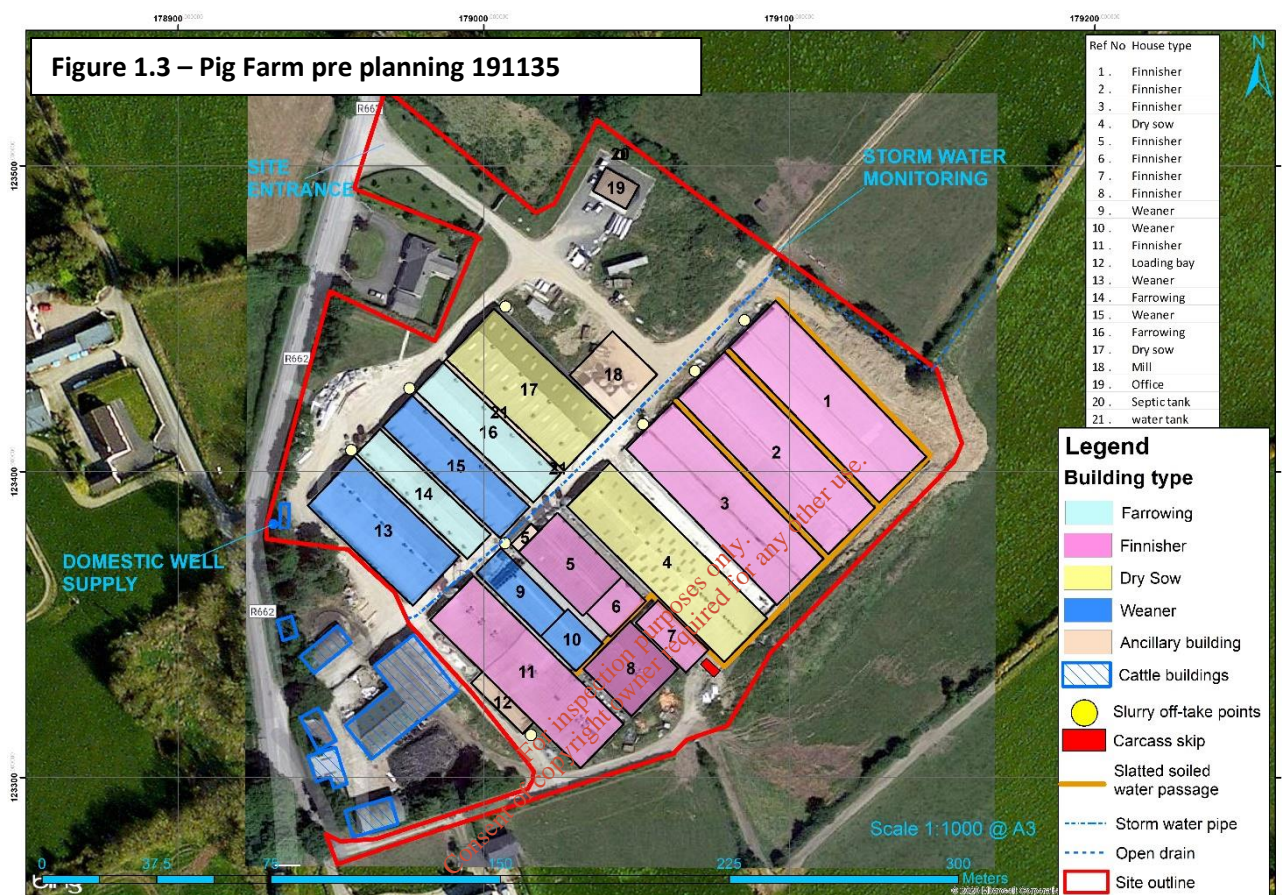
2.1 Description of the Local Area

The existing pig farm is situated on a 2.6ha site located 2.8km south east of Ballylanders, 4.1kms south of Galbally and 2.6kms north west of Anglesborough as illustrated in Figure 1.1. The area is described in the Limerick County Development Plan as the *Ballyhoura/ Slieve Reagh* Landscape area. The storm water from the site drains to the Aherlow River which is 1.4km east of the pig farm. The Galtee Mountains are located 2.5km to the east and south east and eastern fringe of the Ballyhoura Mountains is located approx. 5kms to the west. The surrounding lands are entirely grassland interspersed with once off dwellings, farmsteads, forestry and settlements; typical of rural County Limerick. The site is located on a locally important aquifer and groundwater vulnerability at the site is 'medium'. The pig farm is serviced by a well located in Ballyfauskeen approx. 0.67km north west of the site as shown in Figure 1.2 of Volume 4 and this well has a capacity of 14m³ per hour (336m³ / day). The nearest Natura site is located 3.8 kms east of the site boundary i.e. Galtee Mountains Special Area of Conservation and proposed Natural Heritage Area. The nearest national monument, an enclosure site, is located 100m north east of the site boundary (LI049-198). The nearest dwellings (not including the developer's two family houses) are 60m and 100m to the west, 195m and 270m to the north and 390m and 400m to the south (as illustrated in Figure 1.2).



2.2 Operational details of the 600 sow pig farm (pre planning application 191135)

This pig farm has been operational since the 1970s. Since 2006 there are seven planning applications, including the recent application (19/1135), which are related to this site. Before 19/1135 the pig buildings, mill building, rainwater harvesting tank and office building were constructed following permission granted in 2012 (2012/306) and 2014 (2014/276). The layout of the pre 19/1135 pig farm is illustrated in Figure 1.3



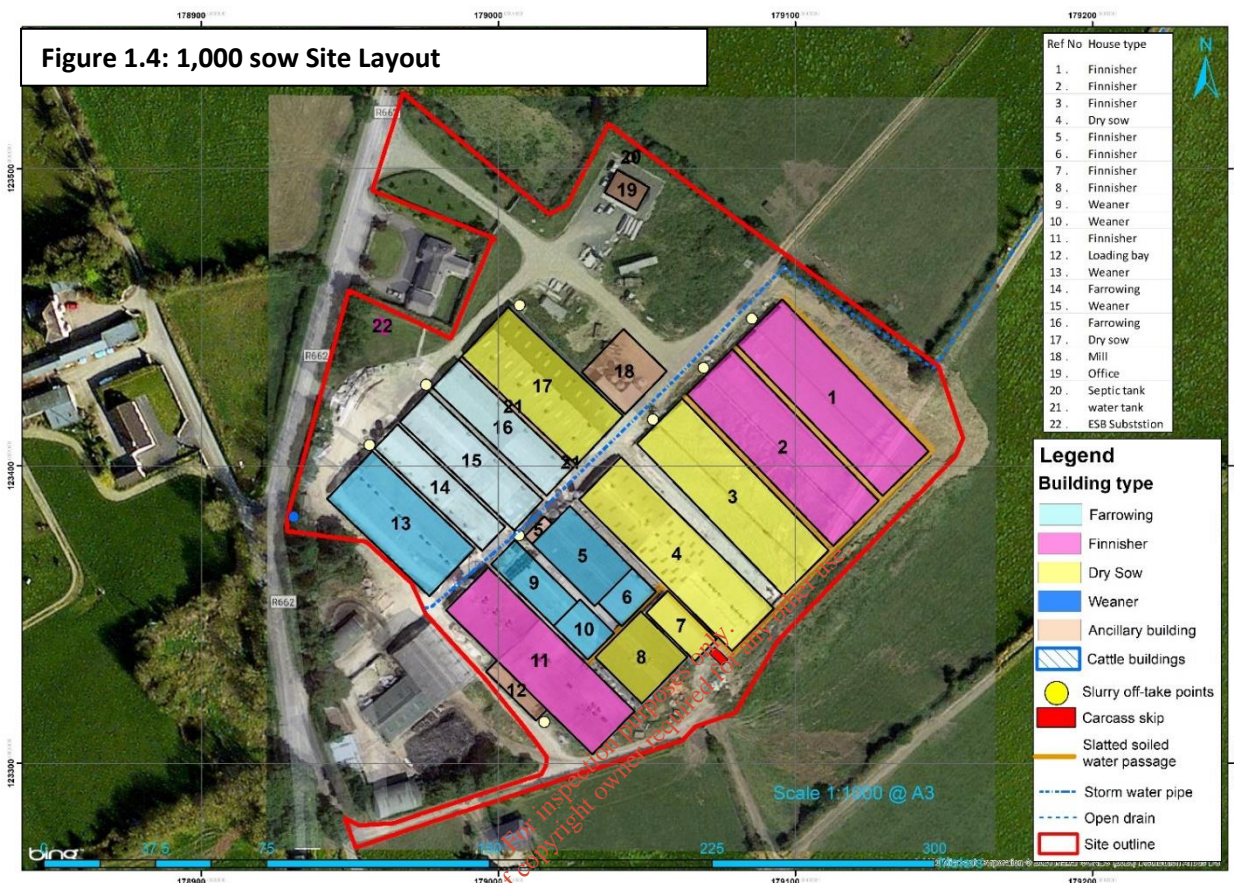
There were 17 pig buildings on site which are up to 70m long and 22.5m wide and generally 5m high or less and these housed the 600 sows and their progeny. The mill building (18) is the tallest on the site at approx. 18m high. There is an office building (19) and a rainwater harvesting tank (21) between houses 16 and 17 – which captures the rain water for power washing the pig houses. All pig passages are slatted and soiled water is collected to slatted slurry tanks. There is at least 50 weeks storage for the approx. 15,681m³ of pig manure.

A traffic count was taken in September 2020 and the average annual daily traffic (AADT) was 923 movements. The existing pig farm contributes 14 movements per day, as follows;

- Employees - 7.4 / day (52 / week);
- Feed lorry – 1.6 / day;
- Pig transport - 0.5 / day;
- Service vans – 0.3 / day
- Slurry tankers - 3.7 / day
- Others - 0.65 / day

Existing noise levels are typical for a pig farm enterprise and are within the limits as set out by the existing EPA license which applies to the pig farm.

2.3 Description of proposed development – 1,000 sows



In planning application 19/1135 the only new building to be constructed was a small electrical sub-station (22) - 22m². The electrical sub-station is to allow the up-grading of the electricity supply to the site to enable the full operation of the feed mill. The 600 sow herd produced pigs for a specialist market in Northern Ireland which required finishing weights of 135kgs. Therefore the application also proposed reconfiguring the pig herd; increasing the sow numbers from 600 to 1,000 and decreasing the number of finishers on-site to accommodate the extra sows. However this market is No longer available. This was to be accomplished by internal refurbishment and not require any new construction. The refurbishment works involves changing in internal partitions, re-wiring, new water and feed fixtures etc. The slats and floors will remain in situ with some minor exceptions. The following changes will occur;

- Houses 3, 7 and 8 will change from finisher to dry sow houses.
- Houses 5 and 6 will change from finisher houses to weaner houses; and
- House 15 will change from weaner house to farrowing house;

When these works are complete the footprint of the proposed development will increase by 22m², the number of sows will increase to 1,000 and the number of finisher places will be 3,957. The slurry production will increase by 1% to 15,805m³.

Table 1: Number of pigs in 600 sow and 1000 sow herds and slurry produced

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Type of pig	600 sow unit	Proposed 1,000 sow unit
sows	600	1,000
Gilts	150	166
Boars	10	5
Weaners	3,450	5,357
Finisher places	3,750	3,957
Breeding unit manure production (m ³ / sow / week)	0.174	0.174
Finishing pig production (m ³ / finisher / week)	0.034	0.034
Total manure produced from breeding unit (m ³)	5,429	5,762
Total manure produced from finisher unit (m ³)	9,257	9,048
Total (m³) =>	14,686	14,810
Soiled water (m ³)	995	995
Total including soiled water (m³) =>	15,681	15,805



Plate No 1: Example of single mv electrical substation

Other changes which will occur are;

- Ammonia emissions will increase by 0 - 4% after mitigation measures are employed (see Section 8.0 Air);
- Odour emissions will remain unchanged after mitigation measures are employed (see Section 8.0 Air);
- Water consumption will increase from 43m³/day to 48m³/day;
- Traffic will increase from 14 to 16 movements per day;
- Noise emissions will not significantly impact sensitive receptors and remain within EPA limits for this facility;
- Sharps waste will increase by 5-6kgs per annum. Municipal waste will not change significantly;
- Carcass waste will increase by 21% (but collection traffic will remain once per fortnight);
- Labour will increase by one person;
- Power usage will increase by approx. 26%; and
- Methane and Nitrous output (as calculated using EPA Intensive Agriculture Emissions Spreadsheet) will increase by approx. 25 - 30% (see Sections 8 & 9).

It is predicted that construction traffic will increase movements by approx. 6 movements per day due to construction over a 4 month period with peaks of approx. 13 movements per day.

It is estimated that approx. 10 tons of construction and demolition waste will be produced during the proposed construction of the electrical substation and the refurbishment of the pig houses.

2.4 Need

The proposed electrical substation is required to upgrade the electricity supply to the mill. By having an adequate power supply the mill the farm can produce bespoke diets to reduce protein levels and lower emissions of ammonia and odour. The increased sow numbers is in response to a marketplace change. The market for heavier pigs (135 kgs) produced by the 600 sow herd was specialized and is no longer available thereby requiring the production of lighter pigs (100 – 105 kgs). If the sow herd size remained unchanged at 600 sows then a substantial percentage of the existing housing would remain empty and consequently the business would be unviable.

The importance of agriculture to the rural economy is immense and the industry has to sustain itself with continued investment. Pig meat is 4 times more carbon efficient than beef or sheep and therefore from a climate change perspective it is essential to increase the proportion of pig and / or poultry meat in the supply chain.

2.5 Risks from Major Accidents and Natural Disasters

There is no risk from flooding, subsidence, earthquakes or other natural disasters. The construction materials of the building will conform to national standards to withstand the strongest winds and the tanks will be leak-proof. Continuous checking of equipment and electrical installations will take place to insure the risk from fire is minimized. Fire extinguishers are installed in the pig houses and regularly maintained. There will be procedures in place to contact the emergency services if there is a fire and to remove staff and other personnel from the site. Environmental incidents, accidents and natural disasters (fire) are rare on pig farms.

2.6 Photos of the Pig Farm



Plate 2: Entrance to 'Ballyfaskin Pig Farm' (mill House in background)



Plate 3: Site of proposed electrical substation



Plate 4: Looking south east with house 13 of left-hand-side



Plate 5: Covered slatted pig-walk passage.



Plate 6: Un-covered slatted pig-walk passage



Plate 7: View from R662



Plate 8: Building No 11 on Left-hand-side and looking SE onto loading bay



Plate 9: Buildings 3-11 on left-hand-side and mill and buildings 13-15 on right-hand-side

3.0 ALTERNATIVES CONSIDERED

3.1 Do Nothing

The 'do-nothing alternative' has been considered. However, the vast majority of the housing infrastructure is in place. The 'do-nothing' alternative does not respond to the change in the market place which has switched from the specialized market for heavier pigs (135 kgs) towards mid-sized finisher weights (100 – 105 kgs). Therefore, in this scenario, the sow herd size remains unchanged at 600 sows and a substantial percentage of the existing housing remains empty and consequently the business becomes unviable.

The 'do-nothing' alternative has to be considered in the context that pork is 4 times more carbon efficient than beef or lamb. The density of pigs in Ireland is low compared to other European countries and pig numbers have been relatively static over the past 10+ years. Failing to maintain the viability of the existing pig farm would result in negative economic spin-offs in the wider regional economy e.g. the current pig farm maintains 30 – 35 jobs in the agri sector and produces equivalent to €140,000 of fertiliser which replaces expensive imported non-renewable chemical fertiliser.

3.2 Do Something

The 'do-something' alternative will result in the optimum enterprise mix, increasing the viability of the enterprise, it will allow the specialization required in the milling operation for the formulation of low protein diets and resulting reduction in emissions of ammonia and odour, and, it will minimise impact on traffic due to feed deliveries in larger loads. It will secure employment on and off the farm and minimise the import of chemical fertiliser.

3.3 Alternative sites and Layouts

Alternative sites and Layouts have been considered and are not be as suitable as the existing site because of the history of pig production at this site since the 1970's. This site has enough space to facilitate the proposed development, there is enough slurry storage on site and the existing layout minimises the movement of pigs, minimises visual impact and maximises the efficiency of operation.

3.4 Alternative house designs

Alternative house designs have been considered such as housing systems with under-slat scraping systems, under-slat flushing systems combined with manure gutters and vacuumed piped systems. Slurry cooling systems were considered. Exhaust air treatment systems were examined. Retrofitting to incorporate these features would be prohibitively expensive, cause major disturbance to the existing enterprise and these alternatives are considered uneconomic.

The existing design has incorporated underground slurry tanks with additional slurry storage to minimise risk of spillage and facilitate improved management of pig manure. All pig walk-ways are slated to minimise soiled water. Storm water is harvested and re used to power wash the pig houses. There is a wet feeding system which minimises dust emissions and noise. The houses use timer switches to minimise energy usage.

3.5 Alternative processes

Systems such as outdoor pig production were considered but this does not suit the soils or climate in Ireland.

3.6 Alternative emission mitigation measures

3.6.1 Alternative emission abatement techniques

As discussed alternative housing systems were considered by this would require significant retrofitting which is not economically feasible. Air treatment systems are similarly expensive and not viable.

3.6.2 Pig diet

Low protein diets are considered and will be used to reduce odour and ammonia emissions.

3.6.3 Land-spreading

Upward splash-plate and rain gun spreading is ruled out due to prevailing regulations in Ireland. Many farmers use downward splash-plate spreaders but there is a move to band-spreading and trailing shoe spreading which can reduce emissions by 35%. Also a move towards spreading in the early season reduces emissions. Alternatives such as anaerobic digestion (AD), aeration, slurry additives, scrubbing and slurry odour masking agents were considered. AD is a proven technology but requires additional state incentives to make it viable. Slurry additives are a developing technology which may offer options in the future. The pig farm will, where possible, hire only contractors that use low emission spreading equipment. The pig farm will adopt low protein diets to reduce ammonia emissions and odour.

3.7 Conclusions

Having examined the available alternatives and having considered the existing infrastructure is largely in place it is concluded that the best alternatives is to introduce low protein diets to reduce ammonia and odour emissions and where possible, use only contractors who use low emission spreading equipment.

4.0 HUMAN POPULATION AND HUMAN HEALTH

4.1 Existing Human Environment

There is a weak upward trend in the rural population (1.6% growth from 2011 – 2016) in Co Limerick. There are 40 dwellings within 1 km of the pig farm site boundary with an estimated population of 112 persons. There are approx. 30 inhabitants per sq. km of countryside around the pig farm. There are commercial and non-commercial premises such as churches, schools, banks, credit unions, manufacturing businesses, bars, community halls, guest houses, shops, post office, schools, playing/GAA pitches, pharmacies, restaurants, garage/car sales, Garda barracks and veterinary businesses. In the environs of the pig farm there are furniture manufacturing businesses in Ballylanders, a metal fabricator between Ballylanders and Spittle and two rurally based bakeries located 1.5km south and 2km south east from the site. The local environs are predominantly

agricultural with one-off houses and farms that benefit from the availability of pig manure. Local tourist services include the Galtee and Ballyhoura Mountains, the Ballyhoura Way 2.2km north of the site, guest houses near Anglesborough approx. 2.5km south of the site and there is a scenic route on the R513 as far as its junction with the R662 (0.75km south of site). There are 15 public water sources within 500m of lands used for landspreading – the closest of these being the Ballylanders ground water supplies which are 1.1km and 1.6km west of the site. The Aherlow River (1.4km east of the pig farm) is an important local fishery and other rivers such as the Arra River, Camogue River, River Funchion, Mulkear River and Morningstar Rivers are important local amenities. The area used for land-spreading is rich in Cultural heritage sites – the closest is the site of an enclosure which is 100m from the site boundary. The area used for land-spreading is well serviced by public roads.

4.2 Potential impacts

The farming community benefit to the degree of approx. €140,000 each year from the approx. 15,800m³ of pig manure produced by the 'Ballyfaskin' Pig Farm. This is an organic renewable fertiliser source which replaces imported non-renewable chemical fertiliser. Employment on the site is projected to increase from 5 persons to 6. Local commercial businesses will generally benefit from increased economic activity and increased employment. The traffic to and from the 'Ballyfaskin' site is projected to increase from 14 to 16, increasing the average daily trips on the R662 from 923 to 925. During the 4 month construction period there will be a temporary increase of approx. 6 movements per day due to construction traffic. Without mitigation there are no significant impacts on farms, commerce, tourism or traffic.

Odour impacts from land-spreading will be typical of normal agricultural practices in the rural study area and will not have a significant impact on local communities, businesses or tourism. There is the potential for periodic odours in the vicinity of the pig farm. There are no pre-mitigation human health impacts on local residents from ammonia, methane, nitrous oxide, dust and other gases associated with the storage and land-spreading of pig manure. There are potential pre mitigation health effects on workers with in the pig confinement buildings. The mill is 150m from nearest dwellings and at this separation distance noise impacts will not be significant pre-mitigation. The noise from the pig houses will not change significantly and is predicted to be within the EPA license limits for this facility. Only workers and visitors operating inside the boundary of the pig farm may be exposed to construction noises which could exceed Health and Safety Authority guidelines which, without mitigation, could result in a slight adverse impact on human health.

The Aherlow River in the vicinity of the pig farm is good quality and not at risk of deterioration. Throughout the study area the water quality is relatively stable and is classified as mostly 'moderate – good'. Other sensitive ecosystem services such as forests, woodlands are not directly affected due to separation distance from the pig farm and will not be significantly affected by land-spreading before mitigation. Fifteen public ground water supply sources have been identified within or adjacent to the area used for land-spreading and these are very high sensitive receptors. In addition there are many private wells attached to dwellings which have not been identified. While the land spreading of organic manures is common place in rural Ireland and in the surrounding area, without good practice there is a potential slight adverse impact on human population due to potential impacts on water supplies.

Without mitigation there is the potential to damage an unknown archaeology at the site of the proposed development, leading to a slight – moderate adverse effect on the Cultural Heritage environment.

4.3 Mitigation

The pig farm, or its contractors, will be required to provide health and safety training and have a safety statement/plan. To mitigate potential impacts it is proposed to control dust and noise during construction and provide workers with personal protection safety devices. The construction hours will be restricted to 8am to 6pm Monday to Saturday. Contractors will employ measures to protect watercourses from sediment run-off and will insure soil is not transported out on to the public road by having wheel wash facilities. The pig farm management will notify adjoining land owners in advance of commencement of sudden loud construction works in case there are any sensitive livestock nearby (e.g. horses or cows at the point of calving)

During the operational phase there will be health and safety training to minimise and manage risks to farm worker's health from noise and dust within the pig houses. The pig house ventilation system will remove harmful concentrations of dust, particulate matter and toxic gases. A Noise Management Programme will be in place to monitor and manage noise emissions. During the operational phase the regulations pertaining to land-spreading as set out in Si 605 of 2017 (Nitrates Regulations) (as amended) will be adhered to, which requires setback distances of 200m, 25m and 5m from public and private water sources and watercourses respectively. A setback distance of 50m will be recommended by the pig farm around rural dwellings and any source protection zones for public water sources will be avoided. There is 50 weeks of slurry storage on site which insures that the pig manure can be spread in suitable conditions. Odour will be mitigated by use of low protein diets, implementing an Odour Management Plan (Attachment 7-1-3) and maintaining a high degree of cleanliness on-site. The pig farm will monitor complaints and advise caution when spreading manure at these locations (e.g. adjoining settlements). The pig farm will, where possible, hire contractors that use low emission slurry spreading equipment. A rodent and pest control programme will be implemented to minimise nuisance from pests.

4.4 Residual and Cumulative Impacts

The proposed development will not significantly impact on population growth within the study area. The residual impact on local business is not significant – although there may be beneficial spin offs due to increased construction activity. The residual impact on farms due to land-spreading is positive but not significant. There will be no residual impact on tourism from the proposed development due to adequate separation distance, and land-spreading pig manure will not add significantly to the existing baseline land-spreading of agricultural manures. The proposed operational pig farm will be approximately 1.5% of the traffic on the local road, with a 0.5% increase in construction traffic, and therefore residual impacts on local traffic are not significant.

After mitigation (low protein diets) the odour emissions will not change significantly compared to the licenced pig farm (see Section 8.0 Air).

The statutory regulations governing the application of organic manures contain mandatory mitigation measures which protect water sources. The pig manure will be applied in accordance to these regulations and therefore residual impacts on water sources is not significant.

Cumulative impacts from the pig farm located in Inchacomb (2 km south east of the ‘Ballyfaskin’ site) and from two licensed facilities in the Glen of Aherlow 13km north west of the ‘Ballyfaskin’ pig farm have been considered and are not significant. The land-spreading of cattle manure in the study area is considered part of the baseline environment and with standard mitigation the potential cumulative nuisance and water quality effects are not significant.

The interaction between Human Population and Human Health with the Risk of Major Accidents or Incidents will not give rise to significant change in the assessed impacts.

5.0 BIODIVERSITY

5.1 Existing Biodiversity

Ash Ecology & Environmental Ltd carried out a survey at the site on 28th of July 2020 and a visual assessment of the study area was conducted when study area was classified according to Fossitt (2000).

The locations of designated sites within 15km of the pig farm are illustrated in Table 2 and in Figures 1.5 and 1.6. There are five designated Special Areas of Conservation within 15km of the pig farm (plus 3 proposed Natural Heritage Areas (pNHA));

1. 000646 Galtee Mountains SAC (and pNHA) (3.9km E, SE from site);
2. 002137 Lower River Suir SAC(8.9km NE from site);
3. 002257 Moanmour Mountain SAC (7.6km NE from site boundary);
4. 002037 Carrigeenamronety Hill SAC (and pNHA) (10.8km SW from site boundary); and,
5. 002036 Ballyhoura Mountains SAC (and pNHA) (12.7km SW from site boundary)

There are 6 additional pNHA sites – (002035) Glenacurrane River Valley pNHA, (002087) Ballynacourty Wood pNHA, (002089) Ballyroe Hill & Mortlestown Hill, (002090) Castleoliver Woods pNHA, (000899) Ballindangan Marsh pNHA and (000651) Mitchelstown Caves pNHA – within 5.7km SE, 9.3km SW, 10.3km SW, 11.7km SW, 14.2km S and 14.9km SE respectively from the pig farm. There are no designated sites in the study area.

Table 2 Designated Sites and their Location Relative to the Proposed Site Works

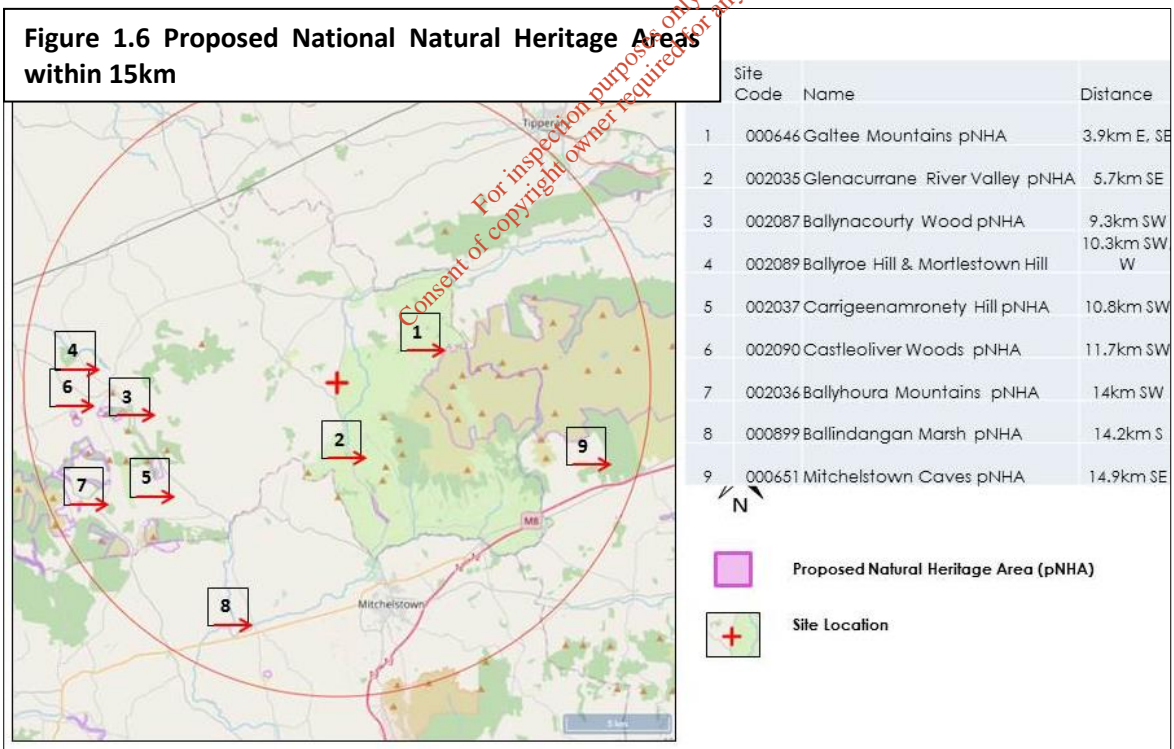
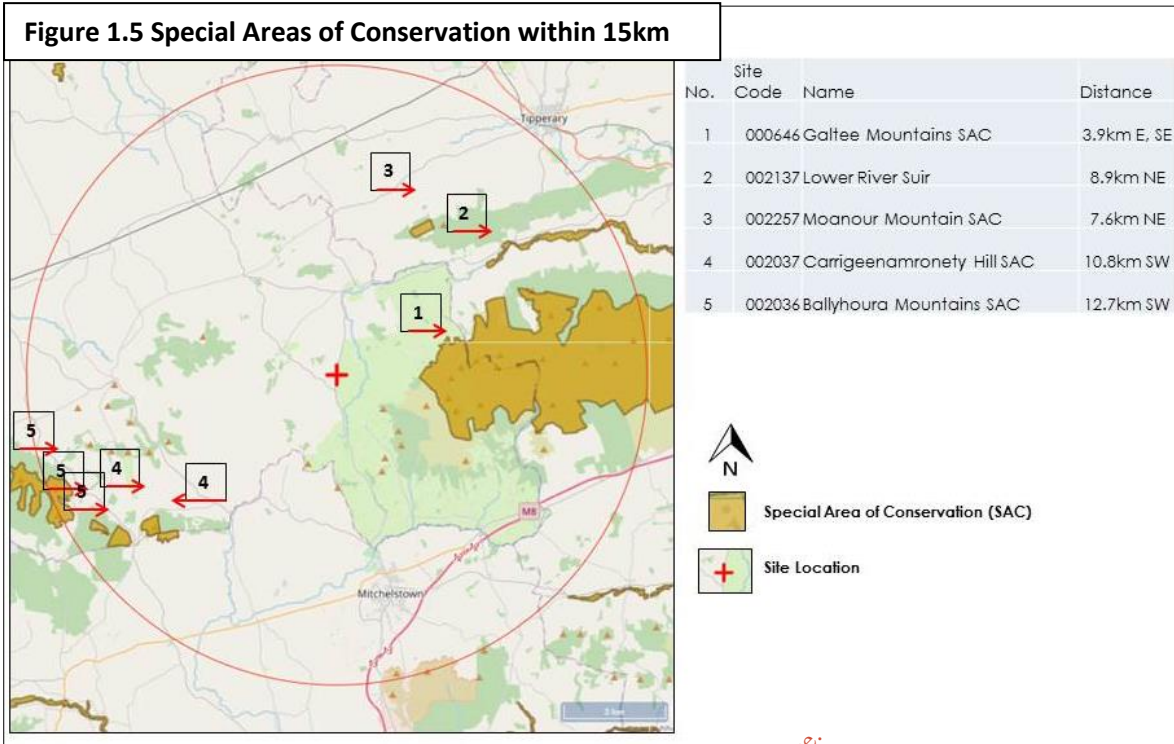
Code	Site	Designation Status	Qualifying Interests	Approx. distance at closest point
000646	Galtee Mountains	SAC/pNHA	Northern Atlantic wet heaths with Erica tetralix [4010] European dry heaths [4030] Alpine and Boreal heaths [4060] Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230] Blanket bogs (* if active bog) [7130] Siliceous scree of the montane to snow levels (Androsacetalia	3.9km E, SE No evidence of pathway from the site of proposed development to the SAC/pNHA given the distance for disturbance and lack of hydrological connection.

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Code	Site	Designation Status	Qualifying Interests	Approx. distance at closest point
			<p>alpinae and Galeopsietalia ladani) [8110]</p> <p>Calcareous rocky slopes with chasmophytic vegetation [8210]</p> <p>Siliceous rocky slopes with chasmophytic vegetation [8220]</p>	
002137	Lower River Suir	SAC	<p>Atlantic salt meadows (Glaucopuccinellietalia maritimae) [1330]</p> <p>Mediterranean salt meadows (Juncetalia maritimi) [1410]</p> <p>Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation [3260]</p> <p>Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]</p> <p>Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]</p> <p>Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0]</p> <p>Taxus baccata woods of the British Isles [91J0]</p> <p>Margaritifera margaritifera (Freshwater Pearl Mussel) [1029]</p> <p>Austropotamobius pallipes (White-clawed Crayfish) [1092]</p> <p>Petromyzon marinus (Sea Lamprey) [1095]</p> <p>Lampetra planeri (Brook Lamprey) [1096]</p> <p>Lampetra fluviatilis (River Lamprey) [1099]</p> <p>Alosa fallax fallax (Twaite Shad) [1103]</p> <p>Salmo salar (Salmon) [1106]</p> <p>Lutra lutra (Otter) [1355]</p>	<p>8.9km NE –</p> <p>A tenuous hydrological connection via site drainage to Lyre Stream, a tributary of the Aherlow River (which becomes part of this SAC). The Aherlow River is directly 1.3km northeast of the site as the crow flies.</p>

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Code	Site	Designation Status	Qualifying Interests	Approx. distance at closest point
002257	Moanour Mountain	SAC	Northern Atlantic wet heaths with Erica tetralix [4010] European dry heaths [4030]	7.6km NE - No evidence of pathway from the site of proposed development to the SAC given the distance for disturbance and lack of hydrological connection
002037	Carrigeen amronety Hill	SAC	European dry heaths [4030] Trichomanes speciosum (Killarney Fern) [1421]	10.8km SW – No evidence of pathway from the site of proposed development to the SAC given the distance for disturbance and lack of hydrological connection
002036	Ballyhoura Mountains	SAC/pNHA	Northern Atlantic wet heaths with Erica tetralix [4010] European dry heaths [4030] Blanket bogs (* if active bog) [7130]	12.7km SW (SAC) and 14km SW (pNHA) – No evidence of pathway from the site of proposed development to the SAC/pNHA given the distance for disturbance and lack of hydrological connection
002035	Glenacurrane River Valley pNHA	pNHA	5.7km SE - No evidence of pathway from the site of proposed development to the pNHA given the distance for disturbance and lack of hydrological connection	
002087	Ballynacourty Wood pNHA	pNHA	9.3km SW - No evidence of pathway from the site of proposed development to the pNHA given the distance for disturbance and lack of hydrological connection	
002089	Ballyroe Hill & Mortlestown Hill	pNHA	10.3km SW, W - No evidence of pathway from the site of proposed development to the pNHA given the distance for disturbance and lack of hydrological connection	
002037	Carrigeen amronety Hill pNHA	pNHA	10.8km SW - No evidence of pathway from the site of proposed development to the pNHA given the distance for disturbance and lack of hydrological connection	
002090	Castleoliver Woods pNHA	pNHA	11.7km SW - No evidence of pathway from the site of proposed development to the pNHA given the distance for disturbance and lack of hydrological connection	
000899	Ballindangan Marsh pNHA	pNHA	14.2km S - No evidence of pathway from the site of proposed development to the pNHA given the distance for disturbance and lack of hydrological connection	
000651	Mitchelstown Caves pNHA	pNHA	14.9km SE - No evidence of pathway from the site of proposed development to the pNHA given the distance for disturbance and lack of hydrological connection	

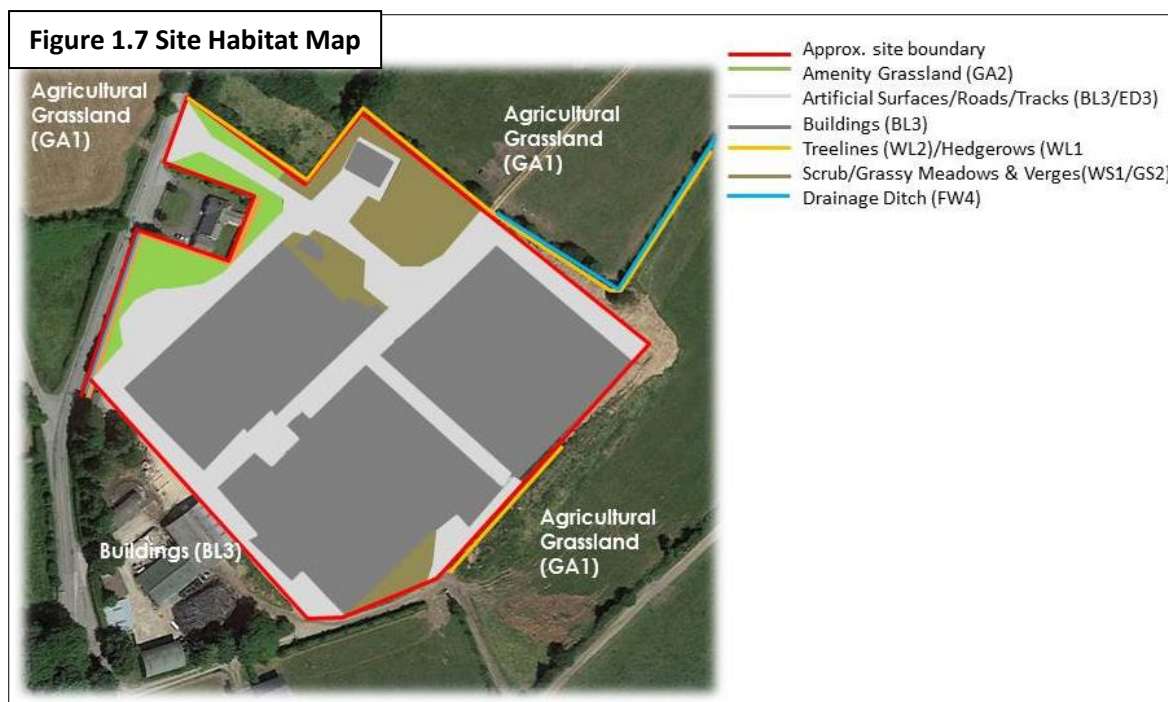


The habitats on the pig farm site are described in Figure 1.7 and Table 3 as buildings and artificial surfaces (BL3), amenity grassland (GA2), improved agricultural grassland (GA1), non-native treelines (WL2), scrub (WS1), grassy verges (WL1), trees (WL2), hedgerows (WL1) and Drainage Ditches (FW4). No rare species of flora was recorded or observed at the site. Neither were protected fauna species such as otter, badger, pygmy shrew, red squirrel, fallow deer, Irish hare, pine marten, Irish stoat or hedgehog recorded or observed. A bat survey was deemed unnecessary

as there was no demolition works. No invasive species were recorded. The drainage ditches at the northern boundary of site may contain common frog. Overall, the site of the proposed development is of local value for a range of terrestrial bird species and bats that are relatively common in the Irish countryside.

Table 3 Habitats Present within the proposed ‘Ballyfaskin Pig Farm’ Site and their Relative Value

HABITAT	COMMENTS	ECOLOGICAL VALUE (NRA GUIDELINES)
Buildings and artificial surfaces (BL3)/ Amenity Grassland (GA2)/ Non-Native Treeline (WL2), (southwest corner of site).	The majority of existing site is Buildings and Artificial Surfaces (BL3) made up of hardstanding and existing buildings. There are also some landscaped areas of grass best described as Amenity Grassland (GA2). These habitats are deemed to be of low biodiversity.	Local importance (Lower value)
Scrub and Grassy Verges (WS1/GS2)	Scattered about the edges of site are some areas of scrub (WS1) and grassy Verges. Some wilder areas of flora occur in these sections so can be considered of local importance.	Local importance (Higher value)
Treelines/Hedgerows (WL2/WL1)	Treelines and hedgerows abound much of the site. Treelines and hedgerows can provide important habitats for local wildlife such as birds, insects and possibly bats and also play host to numerous insect species which are prey items for both bird and bat species. Large mature trees within a woodland habitat/treeline are of particular importance as they can provide essential refuge and breeding sites for many species of mammals and birds, as well as for many invertebrates. In general, these habitats are somewhat fragmented from the wider landscape but add to the diversity in a local context.	Local importance (Higher value)
Drainage Ditches (FW4)	A drainage ditch runs along the western (run-off from road) and north-eastern boundary (residual surface water drainage after usage and collection from attenuation tank). No standing water noted.	Local importance (Lower value)



5.2 Potential Impacts

Construction disturbance can cause sensitive species to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, increased mortality. Deterioration in water quality due to storm water discharges and land-spreading could impact on the River SACs. Construction activities could adversely affect the Aherlow River but this has been ruled out. Construction activities could lead to the introduction of non-invasive species.

5.3 Mitigation

The proposed construction phase mitigation includes measures to control water run-off and accidental spills of fuels, oils and greases and operational phase mitigation includes measures to protect groundwater and surface water features. These measures are specifically mentioned Sections 4.6 and 6.6 of Volume 2 of the EIAR. Environmental noise arising from activities on the construction site shall be controlled and minimised in accordance with the specifications of the noise management plan. Wheel wash facilities will be used to insure that vehicles entering and existing the site are clean to prevent ingress of invasive species. In the event of unintended introduction of an invasive species a person with sufficient training, experience and knowledge in the control of non-native invasive species will be employed to assist in the planning and execution of control measures. Pig manure will be handled, stored and spread according to the relevant regulations.

5.4 Residual and Cumulative Impacts

The Natura Impact Statement Report states that following a comprehensive evaluation of the potential direct, indirect and cumulative impacts on the qualifying interests and conservation objectives for Natura 2000 sites, it has been concluded that the proposed works will not have an adverse effect on the integrity of Natura 2000 sites. The habitats within the site boundary are relatively common and no Annex I or rare or uncommon habitats or floral species will be directly

affected by the proposed works. Invasive species were not noted on the site. Prevention of pollution of drainage ditches will insure no effect on the common frog.

A habitat assessment of the complete study area was mainly that of Improved Agricultural Grassland, Arable Cropping and conifer woodland. Small pockets of higher diversity habitat such as treelines, grassy verges beside rivers and watercourses occur away from the more intensive farms and would therefore not be affected by outputs from to the proposed pig farm development

With mitigation any residual impacts on the habitats and species that occur on the site due to the proposed works is considered to be neutral in the long-term and the predicted residual impact on flora and fauna will be insignificant.

Cumulative impacts from the nearest pig farm development located in Inchacomb (2 km south east of 'Ballyfaskin' Pig Farm) are not significant due to the separation distance. The interaction between Biodiversity with other environmental topics will not give rise to significant change in the assessed impacts.

6.0 LAND AND SOILS

6.1 Existing sub-soils and soils

Within the study area there are 36 bedrock formations as illustrated in Figure 1.8 and 1.9. Bedrocks contain aquifers and aquifers are categorised in order of their importance. Firstly, the most important category are *Regionally Important Aquifers*. These bedrocks make up 16.5% of the study area. Secondly, there are *Locally Important Aquifers*. These bedrocks make up 79% of the study area and this is also the aquifer type under the site of the pig farm. Thirdly, and least important, are *Poor Aquifers* which make up 4.5% of the study area.

The bedrock has been weathered over the ages to produce top soils. There are 8 soil groups in the study area as illustrated in Table 4 and Figures 1.10 and 1.11. These include; the principle soil is the *Elton series* (39% of the study area), surface water and groundwater gleys (23% of the study area), acid brown earths (21% of the study), alluvial soils (11.5% of the study area), podzols and brown podzols (5% of the study area) and peaty type soils (1.5% of the study area). With the exception of peats and some poorly drained gleys all these soils with improved grassland are suitable for land-spreading, subject to weather and soil conditions. The main restriction in terms of land-spreading of pig manure on moderately well drained soils is going to be at the shoulders of the season – requiring additional slurry storage to avoid waterlogged soils. An application of pig manure will be equivalent to 1 - 2mm per hectare. The infiltration rates associated with brown earths and *Elton* soils can be assumed to be in excess of 100mm / hr¹. Moderately well drained gleys and podzolics will have mid – lower infiltration rates (30+mm / hr) and poorly drained gleys and peats will have low infiltration rates of 5mm / hr or less.

¹ J.Diamond and T.Shanley, Teagasc: *Infiltration Rate Assessment of some Major Soils*; 1998; Tables 1 and 4.

Figure 1.8 Bedrock Formation and Aquifer Status

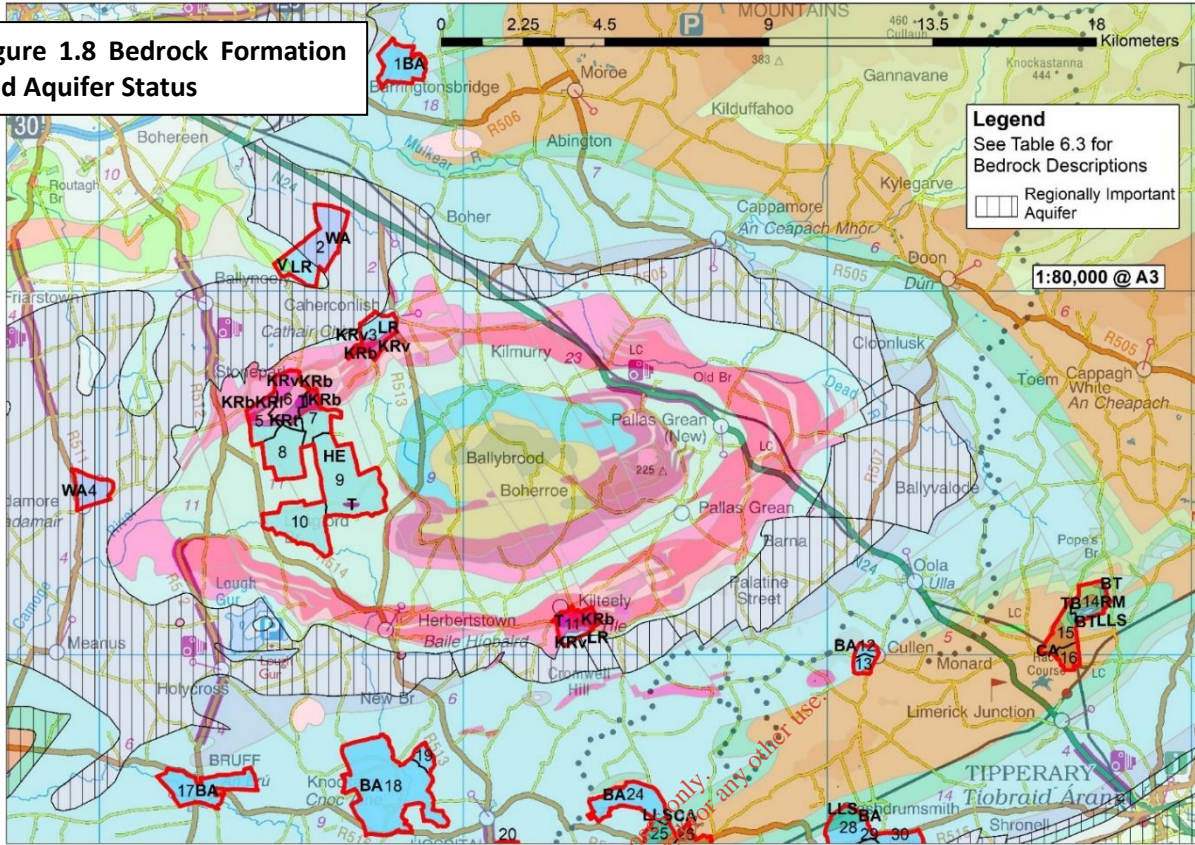
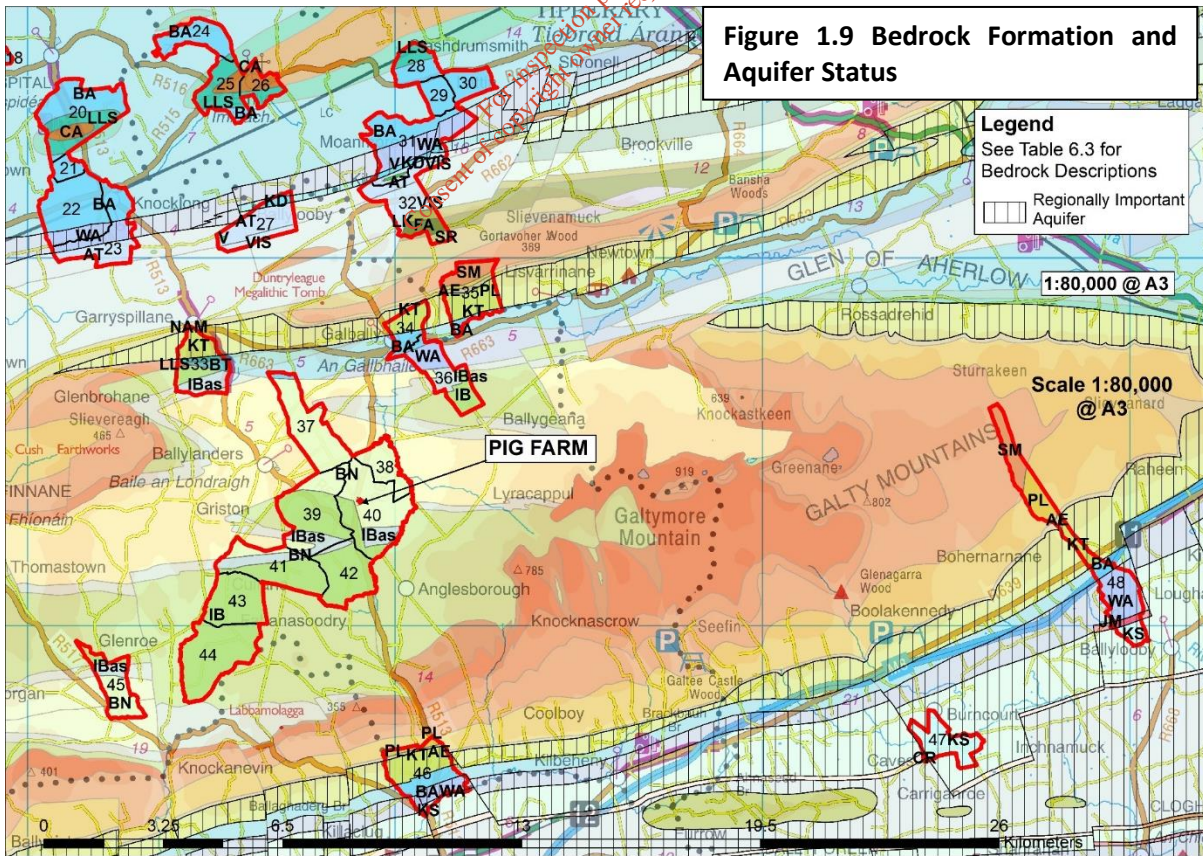


Figure 1.9 Bedrock Formation and Aquifer Status



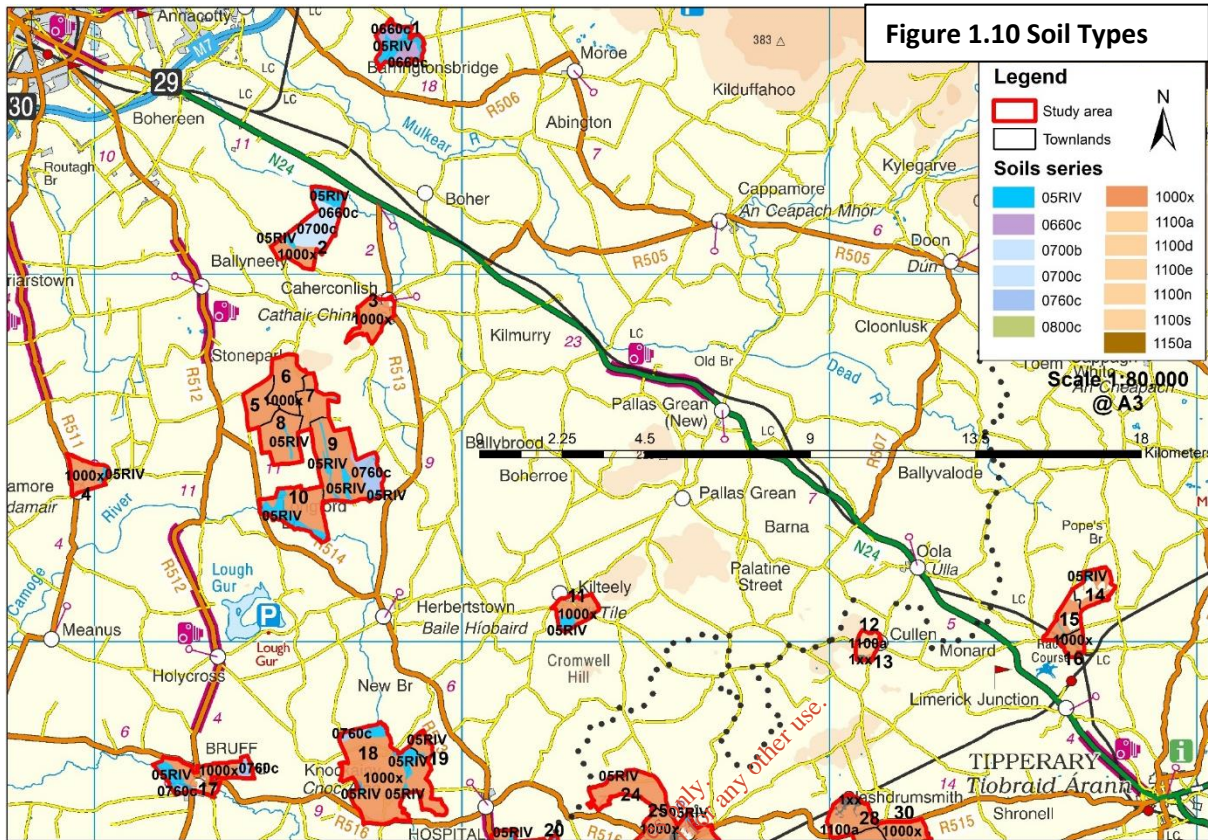
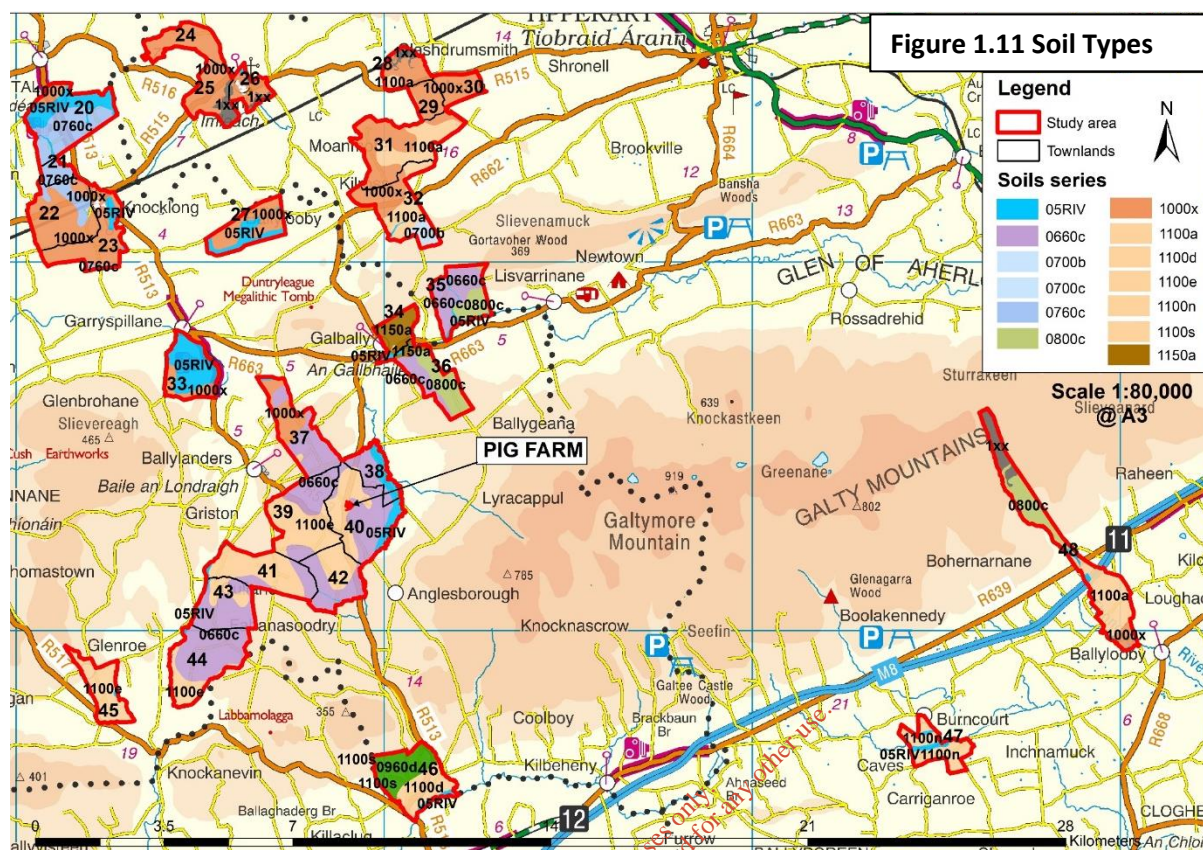


Table 4 Soil Types within the study area

Soil series	Gross Area (ha)	% of study area	Drainage
Peats (1xx)	143	1.5	Poorly drained. Typical summer infiltration rates of less than 5mm / hour.
Alluvial soils (05RIV)	953	11.5	Poor – moderate drainage, depending on location and drainage outlet. Typical summer infiltration rates vary from less than 5mm / hour – 30mm / hour.
Groundwater gleys (0660c)	1,316	16	Moderately - well drained. Typical summer infiltration rates of 30 mm / hour.
Surface water gleys (0700b, 077c)	554	7	Moderately - well drained. Typical summer infiltration rates of 30 mm / hour.
Podzols (0880c)	273	3	Moderately - well drained. Typical summer infiltration rates of 30 – 90mm / hr.
Brown podzols (0900d)	138	2	Moderately - well drained. Typical summer infiltration rates of 30 – 90mm / hr.
Luvissols (1000x)	3,181	39	Generally well drained. Typical summer infiltration rates of 100+mm / hour.
Brown earths (1100a, 1100d, 1100e, 1100n, 1100s, 1150a)	1,698	21	Generally well drained. Typical summer infiltration rates of 100+mm / hour.
Total=>	8,250		



6.2 Nutrient Management

The study area is comprised of approx. 8,250ha. When adjusted for forestry, roads, houses, scrub, farm yards, buffer strips, source protection zones and zones of contribution, the available land with minimal risk to water is 5,543ha. The average phosphorous (P) requirement within the study area, based on Teagasc data for soil samples in Counties Limerick and Tipperary, is approx. 14kg / ha or 77,602kgs (5543 x 14) of P. Taking a more conservative estimate based on assuming P index 3, the P requirement is approx. 55,430kgs. The pig farm will produce approx. 23% (12,644 kgs) of this requirement demonstrating the relatively low contribution that the pig manure is making to the total fertiliser requirement. The chemical nitrogen allowance for the typical receiving farmer is 206 kgs / ha - 1,142 tons of N required within the study area. The pig farm will supply 3% of this requirement.

6.3 Mitigation

There is a legal framework (SI 605 of 2017 as amended) which governs how pig manure is land-spread, and within this legal framework there are adequate protections to insure that pig manure is applied without adverse environmental effects. To minimise the risks from spreading on heavy moderately drained soils in the shoulders of the spreading season the pig farm has sufficiently extra storage so that pig manure exports are not necessary during these high risk periods, The pig farm maintains a pig manure export register for inspection by the EPA as required by the existing EPA license and gives a record of slurry movements to the Department of Agriculture, Food and the Marine (DAFM) each year so that slurry movements can be monitored. DAFM inspect approx. 5% of farmers each year for cross compliance with the relevant regulations.

6.4 Residual and cumulative impacts

The loss of approximately 0.1 hectares of agricultural grassland at the 'Ballyfaskin' site for the electrical substation development is not a significant residual impact. By adhering to the regulations chemical fertiliser requirement is replaced with pig manure and therefore nutrient over loading is avoided. Pig manure will supply a relatively small proportion of the P requirement of the study area. The pig manure will add organic matter to the receiving soils – which is beneficial.

Cumulative impacts with the nearest pig farm development in Inchacomb, which is 2km south east of the 'Ballyfaskin' site, are assessed. The Inchacomb pig farm delivers pig manure to some of the townlands within the study area and therefore there is a potential cumulative impact on soil nutrients. However the pig manure is applied according to the relevant regulations and therefore the nutrient requirement of the receiving environment is taken into account, thus insuring that adverse effects are avoided. The total contribution of pig manure to County Limerick organic manure levels is approx. 2%. Therefore the cumulative impact of pig farms in County Limerick is not significant.

Land and Soils has the potential for significant interactions with Human Population, Human Health, Water, Air, Climate and Material Assets, however, having considered these interactions, there is no significant change in the assessed impacts.

7.0 WATER

The water quality has been assessed by referring to Geological Survey of Ireland (GSI) data, EPA data, County Council data, Water Framework Data and water analysis results from groundwater at the pig farm. A field assessment of the study area carried out by Ash Ecology and Environmental (AAE). AAE took 30 Q-samples throughout the study area to supplement the EPA surface water data.

7.1 Groundwater

7.1.1 Receiving groundwater environment

The site overlies a Locally Important Aquifer and the groundwater vulnerability (i.e. the ease with which groundwater can be contaminated) is categorised as medium. This represents a relatively low risk to groundwater at the site. <2% the study area is categorised as extreme vulnerable land over regionally important aquifers. Extreme vulnerability represents a high risk to groundwater, however, the low percentage of the study area represents a low risk overall. See Table 5 and shown in Figures 1.12 and 1.13

Table 5 : Groundwater Vulnerability and Aquifer Status within the Study Area

Groundwater Vulnerability	% of the Study area (Gross Area)	% of the study area (Gross Area)		
		Regionally Important Aquifer	Locally Important Aquifer	Poor Aquifers
Extreme	10	1.3	8.5	0.1
High	31	7.3	23.8	0.04
Medium	38	1.2	6.8	1.9
Low	10	6.3	28.8	2.5

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Groundwater Vulnerability	% of the Study area (Gross Area)	% of the study area (Gross Area)		
		Regionally Important Aquifer	Locally Important Aquifer	Poor Aquifers
Rock	11	0.6	10.9	0.3
Total	100	16.6%	78.6%	4.8%

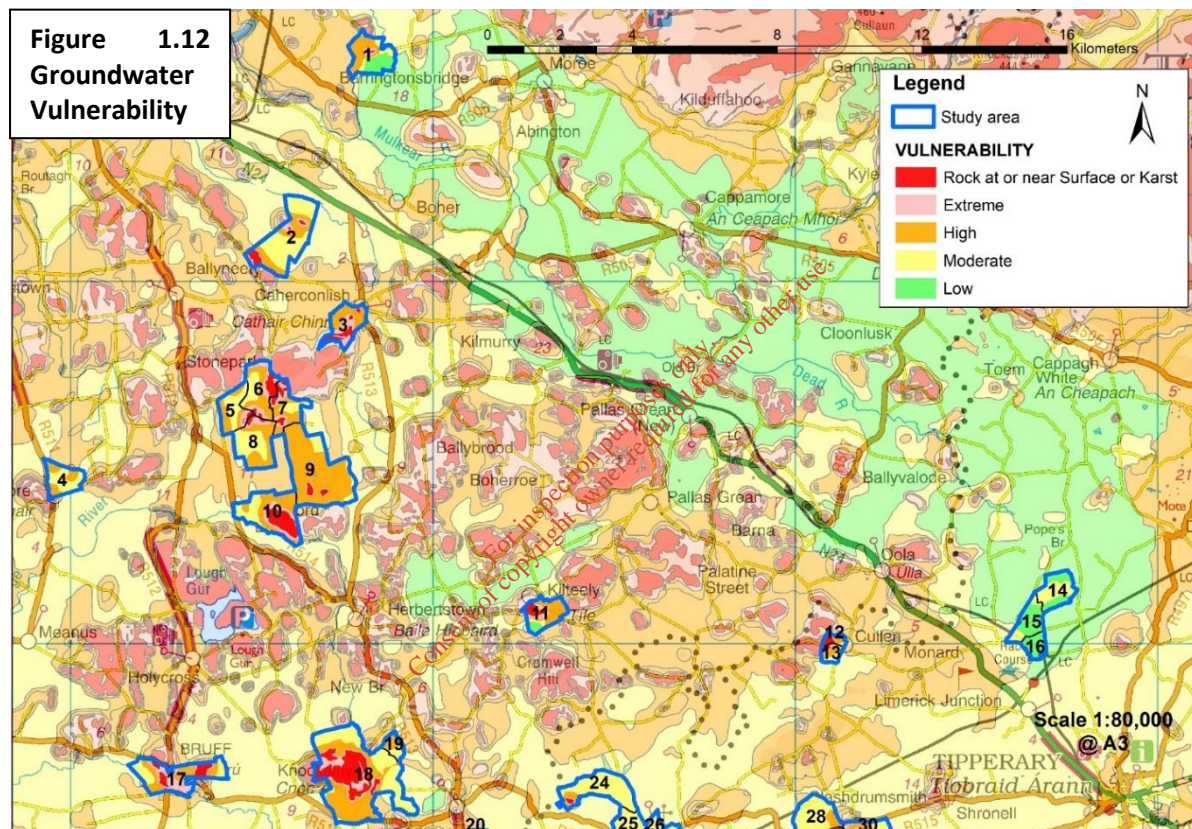
The ground water quality was assessed by examining EPA data (<https://gis.epa.ie/EPAMaps/>) on ground waterbodies, the water analysis results from 22 out of 36 groundwater sources in the vicinity of the study area (<https://waterquality.limerick.ie>) and the water analysis results of the pig farm well.

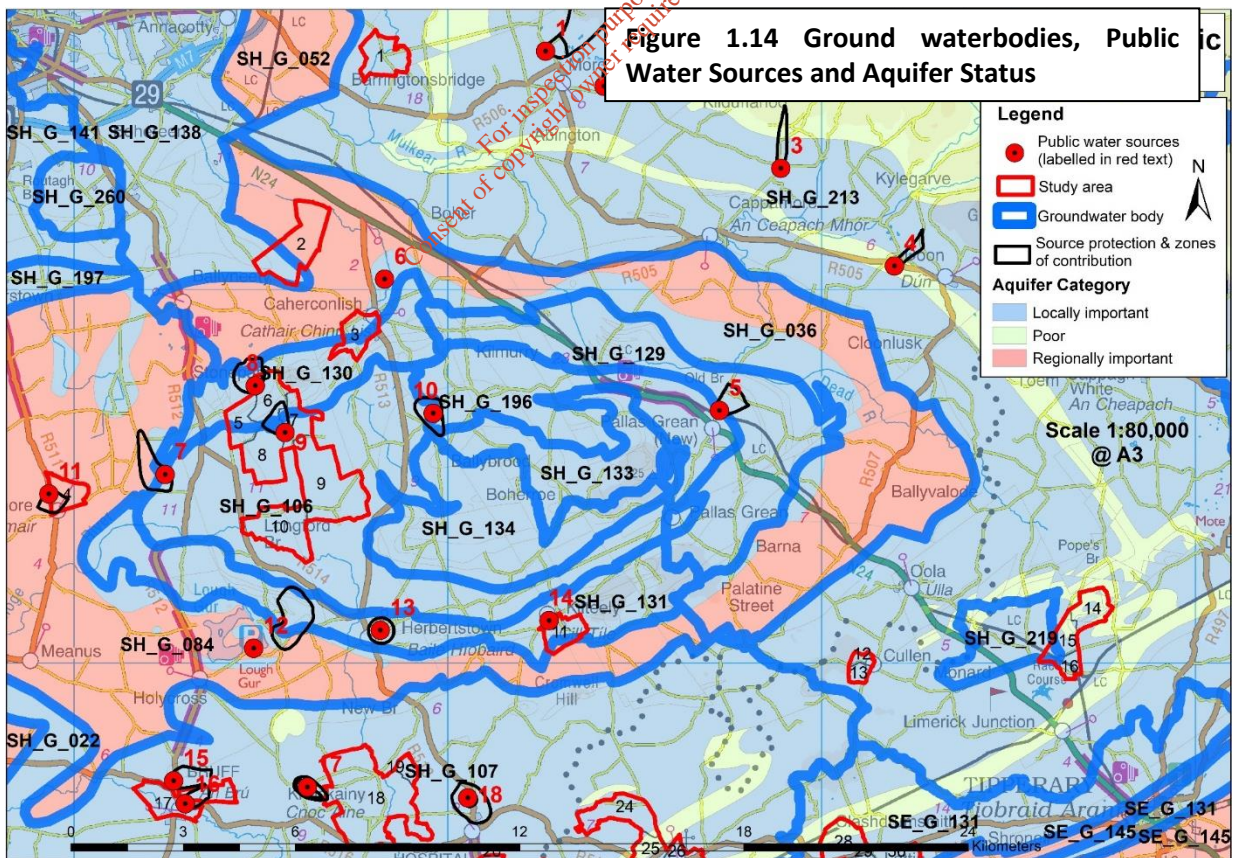
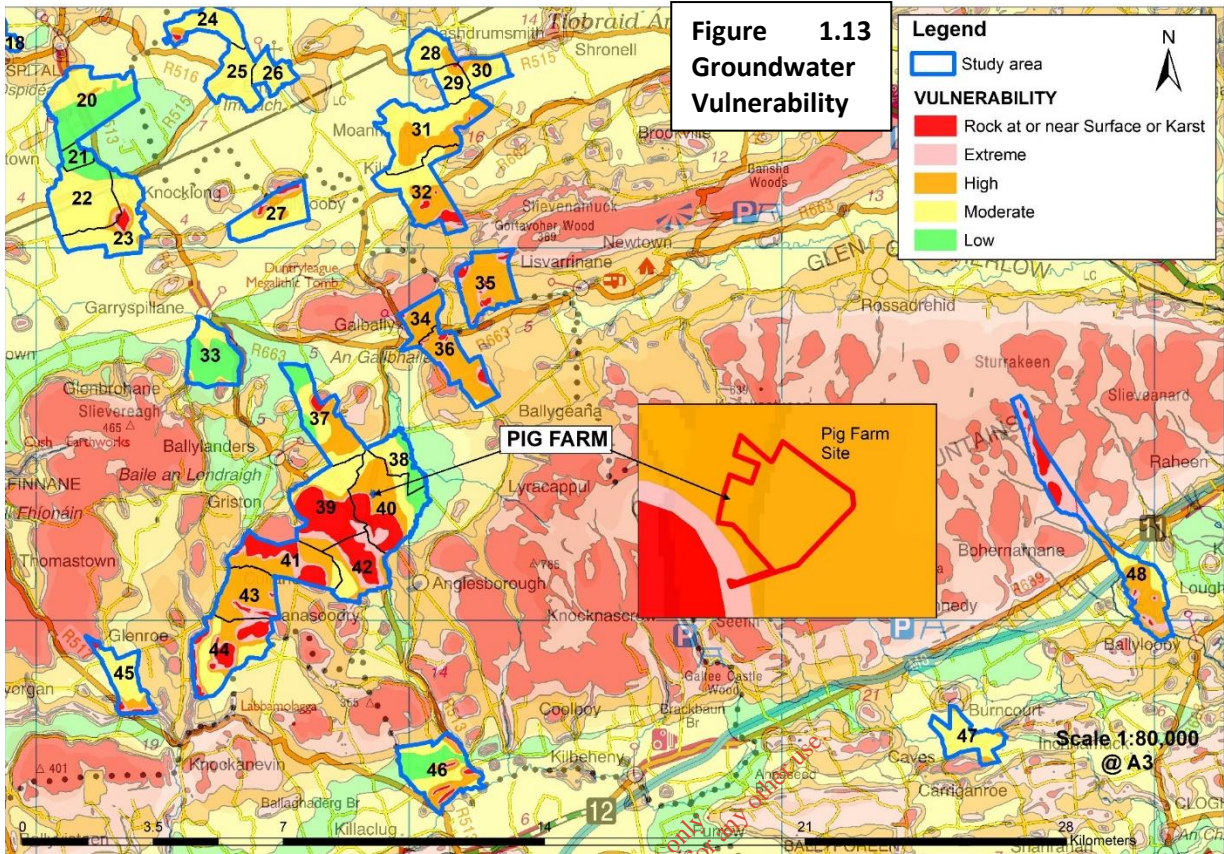
The EPA data shows that there are 21 ground waterbodies throughout the study area (as listed in Table 6 and shown in Figures 1.14 and 1.15).

Table 6 Groundwater bodies within the Study Area and their Quality and Risk Status

ID (Code)	Name of Waterbody	Occurrence within the study area	Description of waterbody	Quality Status (EPA Maps.ie)	Risk Status (EPA Maps.ie)	Agriculture is the significant pressure
SH_G_107	Hospital	20%	PI	Good	Not at Risk	-
SE_G_087	Knockaskallen	17%	PI	Good	Not at Risk	-
SW_G_010	Ballyhoura	10%	PI	Good	Not at Risk	-
SH_G_055	Charleville	9%	PI	Good	At Risk	Yes
SH_G_106	Herbertstown	8%	Rkd	Good	At Risk	-
SE_G_131	Templemore	8%	PI	Good	Review	-
SE_G_040	Clonmel	4%	Karstic	Good	Review	-
SH_G_213	Slieve Phelim	4%	PI	Good	Not at Risk	-
SH_G_130	Knockroe Northwest	3%	PI	Good	Not at Risk	-
SH_G_036	Ballyneety	2%	Karstic	Good	Review	-
SH_G_193	North Kilmallock	2%	Karstic	Good	At Risk	Yes
SE_G_016	Bansha	2%	Rkd	Good	At Risk	-
SE_G_145	Tipperary	2%	Karstic	Good	Review	-
SE_G_091	Lisvarrinane	2%	PI	Good	Review	-
SW_G_082	Mitchelstown	2%	Karstic	Poor	At Risk	Yes
SW_G_011	Ballyhoura Kiltorcan	1%	Rkd	Good	At Risk	Yes
SH_G_084	Fedamore	1%	Karstic	Good	Review	-
SH_G_138	Limerick City East	1%	Rkd	Good	At Risk	Yes
SH_G_131	Knockroe Southwest	1%	PI	Good	Not at Risk	-
SE_G_024	Cahir	0.5%	Rkd	Good	Review	-
SH_G_219	Industrial Facility (P0331-01)	0.2%	PI	Poor	At Risk	-

Approximately 1% of the study area overlies groundwater bodies of poor status. The Mitchelstown (SE_G_082) and Industrial Facility (SE_G_219) waterbodies are poor quality – townlands 14, 15, 16 and 46 are the relevant townlands. Approximately 55% of the study area overlies ground waterbodies that are *not at risk* from deteriorating water quality, 25% of the study area overlies groundwater bodies that are *at risk* due to deteriorating water quality and 20% of the study area overlies groundwater bodies that are *under review* due to increased pressures. This compares favourably with approx. 40%, 37% and 23% of groundwater bodies in County Limerick that are not at risk, under review and at risk. On the EPA mapping system (<https://gis.epa.ie/EPAMaps/Water>) there are five ground waterbodies where agriculture is the significant pressure on groundwater quality – these make up 15% of the study area.





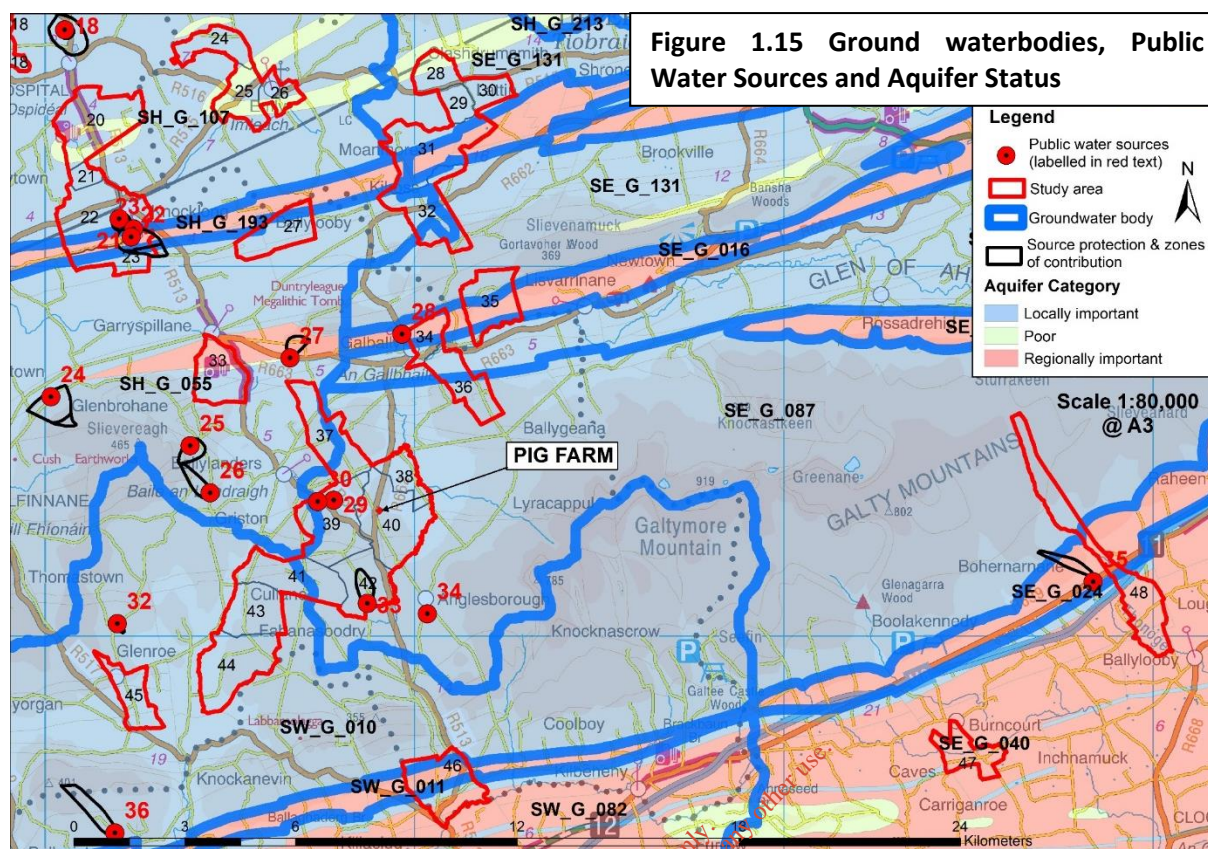


Table 7² shows the average water analysis results for 22 out of 36 public water sources in the vicinity of the study area. Ammonium-N (NH₄-N), Coliforms, E.coli Nitrate-N (NO₃-N) and phosphates can indicate contamination of groundwater from agricultural (and other) sources.

Table 7: Summary of Water analysis for Public Groundwater Supplies in the vicinity of the Study Area

	NH ₄ -N (mg/l)	Coliforms	E.coli	NO ₃ (mg/l)	Ortho P (mg/l)
Threshold values	0.3	0	0	37.5	0.03
Average	0.02	8.14	3.11	15.3	0.03
Maximum	0.03	75	62	24	0.21
Minimum	0.02	0.03	0	2.6	0

Average Ammonium-N levels in the study area are satisfactory and below threshold levels. The presence of Coliform and or E.coli bacteria indicates contamination from agricultural or human excrement. Therefore the threshold for these bacteria is zero. Many of the wells have had one-off spikes in bacterial counts, but generally levels are acceptably low. There is no bacterial contamination at the pig farm well. Nitrate-N levels are generally satisfactory, ranging from 7 to 24 mg / l NO₃ -N and averaging 16.4 mg / l NO₃ -N. There is a weak upward trend in Nitrates in the groundwater bodies in the vicinity of the study area. Ortho - Phosphate levels are generally low with the average increased to threshold levels due to one high Phosphate source in Knocklong (labelled 21, 22 & 23 in Figures 1.14 and 1.15).

² Summarised from Table 6.6 of Volume 2 of the EIAR

Overall, the ground water analysis reflects the EPA ‘good’ status for ground water in the study area.

7.2 Surface water

7.2.1 Receiving surface water environment

River water quality is assessed by taking samples at monitoring points along a river to investigate the presence or absence of macroinvertebrates (tiny animals without backbones e.g. insects, snails and worms). The presence or absence of these macroinvertebrates can be assessed to give a q-rating or value (1/poor – 5/high) at that sampling point – and therefore a q-value for that segment of river body.

The available storm water analysis results (Attachment 7-7-2) indicates that storm water emissions are within the guidelines. The water quality in the vicinity of the pig farm is represented by the Aherlow River quality results downstream from the piggery at *Br SW of Keeloges*. The monitoring results indicate ‘good’ quality and ‘not at risk’ status due historic samples being ‘good’ also.

Table 8: Summary of surface water body quality status & risk categories

Catchment	Number of rivers	2010 – 2015 Status						Risk Category		
		High	Good	Mod	Poor	Bad	Unassigned	Not at risk	Review	At Risk
		Number								
Total for four catchments	469	30 (6%)	190 (41%)	84 (18%)	57 (12%)	0	108 (23%)	202 (43%)	93 (20%)	174 (37%)
Within the Study Area (2013-2018 Data)	30 River Sub-basins	0	14 (47%)	8 (27%)	5 (17%)	0	3 (10%)	16 (53%)	3 (10%)	11 (37%)

The EPA data for the regional is determined by examining the water quality status for the four main relevant catchments (Shannon Estuary South Catchment (HA24), Munster Blackwater (HA18), Suir Catchment (HA16) and Lower Shannon & Mulkear Catchment (HA25D)) that intersect with the study area. These larger catchments are sub divided into sub-basins - each sub-basin represents one river body catchment. The study area is represented by 30 sub-basins (30 river / stream catchments). Table 3 above compares the study area with the wider regional data.

In general the study area reflects both the quality status and the risk status of the wider region. Therefore the baseline surface water quality is mostly ‘Moderate – Good’ and is reflective of the wider surface water quality in County Limerick. Of the 30 sub-basins there are 7 river sub-basins where Agriculture is listed as the main pressure (or partial pressure).

When the water quality of the sub-basins is expressed in relation to the individual townlands within the study area the water quality is as follows;

- 29% of townlands contain river sub-basins classed as ‘Good’
- 17% of townlands contain river sub-basins classed as ‘Moderate’
- 10% of townlands contain river sub-basins classed as ‘Poor’

- 29% of townlands contain river sub-basins classed as ‘Unassigned’

The 29% unassigned represent a gap in the EPA data. Therefore Ash Ecology and Environmental (AAE) took 30 additional Q samples in 2020 to reduce unassigned data. When this exercise was complete there were 45 Q-monitoring points relevant to the study area, 15 EPA points and 30 AAE points. The results for the 45 monitoring points combined were;

5% - High Quality
40% - Good Quality
42% - Moderate Quality
13% - Poor Quality

Again, the results indicate mostly ‘Moderate – Good’ quality status in the study area.

7.3 Potential impacts on groundwater and surface water

The potential effects on groundwater include contamination with pig manure nutrients at the site of the pig farm and throughout the study area. Negative effects on groundwater are only likely where there is poor practise in the storage or application of pig manure. Run-off of nutrients from the site (via storm water) or from land-spreading could result in a slight adverse effect on surface water quality before mitigation. Deposition of NH₃ could affect surface waters.

7.4 Mitigation

A suite of standard construction mitigation measures is proposed, including; controlling silt and sediment runoff, re fuelling in a bunded area on-site, avoiding having machinery that leaks oil or fuel on-site, and removing any contaminated soil to a licensed waste facility using a licensed waste contractor. During the operation phase mitigation measures to protect water quality at the site of the pig farm include on-going monitoring of ground and surface waters, bunding all over ground liquid and slurry storage tanks, monitoring installed leak detection facilities underneath slurry tanks, collecting the run-off from concreted pig manure off-take points, slatted pig walk-ways and carrying out a tank and pipeline assessment every 5 years, as per the EPA license requirements, to insure pig manure storage tanks are leak-proof.

During the operation phase measures to protect water quality during land-spreading include adherence to the regulations (SI 605 of 2017). In addition the pig farm will insure that leaking slurry spreading equipment is not allowed on site. There is 50 weeks of slurry storage on site which insures that slurry can be stored long enough to avoid having to spread in unsuitable conditions and at sensitive times (e.g. at the shoulders of the season). The spreading of pig manure is monitored by DAFM to insure compliance with the regulations. The surface (storm) water quality and groundwater quality will be monitored as required by existing EPA license.

7.5 Residual and cumulative impacts

Pig manure has been spread in the study area for 40 years. Overall the baseline **groundwater** water quality in the study area is good. The water quality in public water supplies in Ballylanders, which is the closest the pig farm, has low NH₄-N (0.02mg/l), low NO₃-N (6mg/l) and E.coli = zero. This confirms EPA ‘good’ status of groundwater in this area. The pig manure replaces chemical fertiliser and therefore with adherence to the regulations there is no significant pre-mitigation

residual impact on baseline ground water quality. The proposed water extraction rate of 48m³ / day will not significantly affect aquifer where local well yields average 62m³ / day and the pig farm well can supply 330m³ / day.

Overall the baseline **surface water quality** is reflective of regional water quality and the operation of the proposed pig farm is not expected to adversely affect the existing water environment. Water quality in the upper Aherlow River is good and the status is not at risk. With the mitigation of adherence to SI 605 of 2017 (as amended), which means that pig manure is used to replace chemical fertiliser, land spreading will not significantly affect the baseline water quality.

The nearest pig farm is located in Inchacomb 2km south east of the 'Ballyfaskin' site. There are potential cumulative effects on surface waters such as the Aherlow River. However the water quality downstream from both of these piggeries is 'good' and the status is 'not at risk'. Therefore there are no significant **cumulative effects**. There are two EPA licensed pig farms in the Glen of Aherlow, further along the Aherlow River. The baseline water quality in the upper Aherlow is good, indicating that the 'Ballyfaskin' farm will not have an in-combination effect with these two piggeries.

Interactions with Water and Biodiversity, Material Assets and Major Accidents and Natural Disasters have been considered and are not significant.

8.0 AIR

8.1 Receiving Air environment

The rural air quality in for the study area is rated as 'good' by the EPA Air Quality Index for Health (<http://www.epa.ie/air/quality/>). The sensitive receptors within the study area are agricultural land holdings, rural dwellings, commercial businesses, tourist services, settlements, public water sources, ecosystems (watercourses, rivers, woodlands/forests, clean air, habitats) and cultural heritage assets.

8.2 Predicted emissions to Air

The main gaseous emissions with potential impacts on receptors are; ammonia (NH₃), methane (CH₄), nitrous oxide (N₂O), dust, particulate matter (PM) and malodour. Other gaseous emissions which are released in very small concentrations include Sulphur Dioxide, Hydrogen Sulphide, Carbon Monoxide and Non-Methane Volatile Fatty Acids. Ammonia, methane, nitrous oxide and malodour are emitted from land-spreading and ammonia, methane, nitrous oxide, dust, PM and malodour are emitted from the pig houses.

8.2.1 Ammonia (NH₃)

The baseline ammonia deposition levels for the study area is approximately 21³ kgs / ha / year of NH₃. Most of this is from agricultural sources. Ammonia is emitted from pig houses and land-spreading. With the proposed increase in sow numbers the total NH₃ levels will increase by approx. 6% before mitigation.

³ Figure 2.3 'N deposition map' in page 6 of EPA Report; Ambient Atmospheric Ammonia in Ireland, 2013-2014. NH₃ = atomic weight 14 for N and 3 for H₃, therefore N makes up 82% of NH₃ => 21 x 0.85 = 17.5kgs N

Table 9: Annual emission figures; NH₃, CH₄ and N₂O for the 600 sow unit and the 1000 sow unit based on AER/PRTR spreadsheet tool

Category of pig	Number	NH ₃ (kgs)
<u>600 sows</u>		
Suckling sow & litter	190	893
Dry sow	410	1312
Boars	10	34
Maiden gilts	150	390
Weaners	3450	3450
Fattening pigs	3750	9750
Total =>		15,829
<u>1000 sows</u>		
Suckling sow & litter	167	785
Dry sow	833	2666
Boars	5	17
Maiden gilts	166	432
Weaners	5357	5357 (*4286)
Fattening pigs	3957	10289 (*8231)
Total =>		19,545 (*16,415)
% change		+ 23% (pre mitigation)
% change		+ 4% (*post mitigation)

Ammonia can have a deleterious effect on human health and the Occupational Safety and Health Administration (OSHA) in the USA (ATSDR, 2004) have an 8 hours exposure concentration limit of 17,000 µg / m³. The ambient air concentration measurements from the UK at sites near pig and poultry farms were 8.68 µg NH₃ / m³. Without mitigation, there are no known significant effects on rural residents, businesses, cultural heritage assets or tourist services at these acceptably low levels. There are no significant effects before mitigation on water sources or ecosystems from land-spreading and no sensitive ecosystems are close enough to the pig buildings to be affected.

8.2.2 Methane and Nitrous Oxide

These greenhouse gases are set to increase by 25 - 30% after mitigation (see Section 9 Climate). These emissions are not at levels directly harmful to human health.

8.2.3 Dust and other gaseous emissions

Most of the construction dust will be generated inside the pig houses, and externally, low levels dust emissions may occur where exposed soil is exposed to drying conditions. Generally without mitigation the impact from construction dust will not be significant. During the operational phase the dust generated within pig buildings may contain many types of particles which can be harmful to human health and contribute to malodour emissions. Along with dust particulate matter PM₁₀ and PM_{2.5} are sometimes found in emissions from pig buildings. However these are expected to dissipate to harmless levels within a few meters of the ventilation outlets.

Other gaseous emissions such as Sulphur Dioxide, Hydrogen Sulphide, Carbon Monoxide and Non-Methane Volatile Fatty Acids are released in very small concentrations from the surface of slurry. Outside of the pig confinement buildings the concentrations of these gases is miniscule.

8.2.4 Odour

Table 10: Annual odour emission figures for the 600 sow unit and the 1000 sow (based on Table 5 of Odournet UK Report⁴)

Category of pig	Number	Odour emissions / animal (o.u.)	Total Odour emissions (o.u.)
600 sows			
Suckling sow & litter	190	18	3420
Dry sow	410	19	7790
Boars	10	20	200
Maiden gilts	150	20	3000
Weaners	3450	6	20700
Fattening pigs	3750	22.5	84375
Total =>			119,485
1000 sows			
Suckling sow & litter	167	18	3006
Dry sow	833	19	15827
Boars	5	20	100
Maiden gilts	166	20	3320
Weaners	4000	6	32143 (*25714)
Fattening pigs	3957	22.5	89036 (*71229)
Total =>			143,432 (*119,193)
% change		-	+ 20% (pre mitigation)
% change		-	0% (*post mitigation)

Malodour substances are released from pig houses and at land-spreading. Odour nuisance from land-spreading is generally related to weather conditions, rates of application and proximity to sensitive receptors. Effects from land-spreading are generally dissipated within a few hours, are temporary and do not result in significant impacts.

The main source of odour at the pig farm is from the finisher pigs (22 odour units per pig) compared to the sows (19 odour units per pig). Therefore as illustrated in Table 10 the proposed development will increase odour units by 20% – before mitigation – above the current licensed emissions.

8.3 Mitigation

⁴ Odour Impacts and Odour Emission Control Measures for Intensive Agriculture

To mitigate emissions at land-spreading the pig farm will encourage spreading of pig manure early in the season and where possible will employ contractors who use band spreaders and / or trailing shoes. Through its discussions with customer farmers the pig farm will collaborate with them to insure that the requirements as specified in SI 605 of 2017 (as amended) are adhered to and setback distances around rural dwellings are also adhered to. Applying pig manure in adherence to the regulations means that chemical nitrogen will be replaced thus off-setting NH₃ and N₂O emissions from chemical fertiliser. The Department of Agriculture, Food and the Marine will monitor records of pig manure exports from pig farms and inspect farmers who use it to ensure that the land spreading of pig manure is in compliance with the Regulations. These records will also be available for inspection by the EPA who monitor operation of this facility.

The low protein diet (2% reduction in protein) will reduce ammonia and odour emissions by 20% from the weaner and finisher pigs. These pigs account for approx. 80% of NH₃ emissions on the farm and therefore the overall reduction is 16% of the before mitigated total. The result is that the 1,000 sow unit will have similar odour emissions to the to 600 sow unit farm; and ammonia will be 0 – 4% higher .

During the operational phase dust in the pig confinement buildings will be mitigated by using an automatic sealed wet feed system, which takes feed from sealed containers (silos) and distributes it via sealed pipes/augers to ad-lib feeders in the rooms, as per pig's natural requirements, reducing the dust levels and thereby also mitigating odour. The feed silos and augers are completely housed in the new mill building, thus confining dust. Pig houses will be adequately ventilated. The health and safety of workers is addressed in the safety statement of the pig farm which includes administrative controls to minimise the amount of time workers are exposed to dust, NH₃ and particulate matter and insures adequate cleaning of pig houses, safety and awareness training and the provision of personal protection equipment i.e. dust masks and eye and ear protection. Training will provide awareness of the dangers associated with agitation of slurry and particularly in relation to hydrogen sulphide and carbon monoxide gases. The ventilation system will efficiently ventilate the pig houses removing harmful concentrations of dust, particulate matter and toxic gases.

The pig farm commits to adhere to the current draft of the '*Code of Good Agricultural Practise for reducing Ammonia Emissions from Agriculture*' (November 2019) as published by DAFM (and contained in Appendix 3 of Volume 3).

Table 11: Summary of existing and proposed pre and post mitigation gaseous emission from 'Ballyfaskin Pig Farm'

Gaseous emission	Licenced	Proposed	
		Pre-mitigation	Post-mitigation
NH ₃ (tons)	15.8 (100%)	19.5 (123%)	16.4 (104%)
Odour (odour units)	119,485 (100%)	143,428 (120%)	119,196 (100%)
Dust & PM	Not significant	Not significant	Not significant
Other ⁵	Not significant	Not significant	Not significant

⁵ SO₂, H₂S, CO, Non-methane Volatile Fatty Acids

8.4 Residual and cumulative impacts

The residual impacts from ammonia emissions will not be significant. Odour will reduce significantly due to the proposed mitigation. The adverse effects from other gaseous emissions such as dust, particulate matter and other toxic slurry gases will be imperceptible outside of the pig houses. With adequate training and personal protection equipment the residual effects within the pig houses is not significant. There are no significant cumulative effects from other pig farms due to separation distance of 2km.

9.0 CLIMATE

Chapter 8 of the EIAR assesses the impacts from the proposed emissions on Climate and Air Quality. Ireland's climate obligations and Nation Policy on Climate Action in relation to carbon dioxide emissions, and Clean Air commitments (relating mainly to ammonia limits) are considered.

9.1 National Commitments

Ireland's Greenhouse Gas (GHG) emission reduction targets are a 20% reduction on 2005 levels for in 2020 and 30% below the 2005 levels by 2030. In order to achieve these binding targets the Government published the 'Climate Action Plan' in June 2019. The 2019 report recognises that there are no zero emissions options for agriculture and sets a target of 10 - 15% reduction in CO₂ emissions for agriculture in page 101 of the plan.

The National Emissions Ceilings (NEC) Directive entered into force on 31/12/2016. In Ireland the national ceiling for ammonia is 116 kilo tons. Under the NEC Directive Ireland has to adopt and implement a 'Code of Good Agricultural Practice for reducing Ammonia Emissions from Agriculture' – the current EU approved code of practice is available on the DAFM website (a copy of which is contained in Appendix 3 of Volume 3).

9.2 Proposed emissions

The emissions of greenhouse gases (GHG) (methane and nitrous oxide) will increase by approx. 20 -30% above licenced levels for the pig farm. Ammonia emissions will increase by approx. 4%.

Table 12: Summary of existing and proposed pre and post mitigation gaseous emission from 'Ballyfaskin Pig Farm'

Gaseous emission	Licenced	Proposed	
		Pre-mitigation	Post-mitigation
NH ₃ (tons)	15.8 (100%)	19.6 (123%)	16.4 (89%)
CH ₄ (tons)	95.6 (100%)	124,3 (130%)	124.3 (130%)
N ₂ O (kgs)	92 (100%)	116 (127%)	116 (127%)

9.3 Mitigation measures

The most recent EPA Report (July 2020): *Ireland's Greenhouse Gas Emissions Projections; 2019 – 2040* predicts that Ireland can and will meet its 2030 commitments by early adoption of a 'with

additional measures scenario and a reduction of 12% in agricultural GHGs. The pig sector is responsible for approx. 2% of agricultural GHG emissions. Achieving the 12% reduction in agricultural emissions requires a focus on the main sectors responsible for GHG emissions, i.e. beef, dairy and sheep. The additional measures mentioned in Section 3.3 of the July 2020 report in relation to agriculture are;

- *nitrogen use efficiency*; This measure applies mainly to grass based agricultural enterprises and is not relevant to pig farming;
- *use of protected urea products*; This measure applies mainly to grass based agricultural enterprises and is not relevant to pig farming – however pig manure replaces and therefore reduces nitrogen usage;
- *improved animal health*; This is very relevant to the pig farm. As verified by the recent EU 2020 Grand Prix award in relation to Health Management and the use of Slaughter Data Dashboard System to improve Pig Herd Health; this farm complies with the ‘improved animal health’ measure. Also, genetic improvements in the Irish sow herd since 2011⁶ has seen the quantity of pig meat produced per sow has increase by 21% - this genetic improvement also leads to a reduction in greenhouse gases
- *extended grazing*; This measure applies mainly to grass based agricultural enterprises and is not relevant to pig farming;
- *reducing crude protein in pigs*: The pig farm commits to reduce the protein in the growing pig diet by 2%, thus complying with the additional measures targets;
- *low emission slurry spreading*; The pig farm commits to using only contractors who have low emission slurry spreading, where possible and
- *inclusion of clover in pasture swards*; This measure applies mainly to grass based agricultural enterprises and is not relevant to pig farming;

Mitigation measures to reduce GHG emissions during the operational phase involve implementing an Energy Management System and carrying out regular energy audits, turning off machinery and motors when not in use, using thermostatic controls on all heating and lighting systems, using automatic controls on the ventilation system to insure optimum efficiency, using night rate electricity where possible, using high U-value insulation materials, using low energy equipment and lighting (LED lights) with timers and continued investment in advanced genetics and improved management systems to achieve improvements in feed efficiency with resulting reductions of inputs and emissions.

Good operational practise such as cleanliness and dryness will mitigate impacts from ammonia, dust and particulate matter emissions. Using an automatic wet feed system, which takes feed from sealed containers and distributes through sealed pipes/augers to the feeders in the rooms, reduces the dust and particulate matter levels. The pig farm will commit to adhering to *Code of Good Agricultural Practise for reducing Ammonia Emissions from Agriculture* as published by the Department of Agriculture, Food and the Marine in November 2019.

9.4 Residual and cumulative impacts

Supplying the increasing demand for meat protein with pork produces 4 times less CO₂ emissions compared to beef or lamb – therefore the proposed development is in line with the overall objectives of the national climate plan. The proposed CO₂ emissions represents <0.02% of the total national agricultural GHG emissions and therefore the residual impact is not significant.

⁶ Teagasc National Pig Herd Performance Report 2017

Furthermore, the most recent EPA greenhouse gas publication (July 2020): *Ireland's Greenhouse Gas Emissions Projections; 2019 – 2040* predicts that Ireland can and will meet its 2030 commitments by early adoption of a 'with additional measures scenario'. These additional measures focuses on the main GHG emitting sectors (dairy, beef, sheep) which is logical since the pig sector produces on 2% of the national agricultural GHGs. These additional measures specifically mention low protein diets for the pig sector, adoption of low emission slurry spreading, improved nitrogen use efficiency and improved herd health. The proposed development is compliant with all these measures and therefore in line with policy that will allow Ireland to meet its 2030 GHG commitments.

Beyond 2030 commitments that it is possible to mitigate a further 19% of the annual CO₂ produced using alternative technologies such as solar panel energy, however, these mitigation options will require State incentives before they are viable.

Post mitigation total emissions of NH₃ can be reduced by reducing protein in the diet by a further 1%.

The cumulative Climate impacts of the nearest pig farm at Inchacomb, which is 2 km south east of the 'Ballyfaskin' site, along with two EPA licensed pig farms in the Glen of Aherlow located 13km from the 'Ballyfaskin Pig Farm' site, are part of the national pig sector which contributes 2% of the national agricultural CO₂ emissions. Therefore cumulative impacts are considered not significant. Cattle GHGs emissions are considered and assessed as part of the baseline and therefore not considered a cumulative effect.

Agriculture contributes less than 1% to national SO₂ emissions, less than 2% carbon monoxide (CO), approx. 41% of the national non-methane volatile organic compounds (NMVOCs) emissions, 32% of the national PM₁₀ production and 9% of the national PM_{2.5} production in 2017. The pig sector is responsible for a tiny proportion of the total agricultural sector. Ireland is generally well below EU thresholds for these emissions. The existing air quality is rated as good by the EPA. Therefore residual impacts from these gaseous emissions is not significant.

GHG emissions to air has the potential for significant interactions with Human Population and Human Health and Biodiversity, however, having considered these interactions, there is no significant change in the assessed impacts.

10.0 MATERIAL ASSETS

10.1 Existing material assets

The material assets identified in the vicinity of the study area are roads, public utilities and services (fifteen groundwater sources), 13 settlements, rural dwellings, commercial premises, farms, commercial forestry & woodland, tourism services, national monuments, structures listed on the National Inventory of Architectural Heritage and waste facilities.

The townlands within the study area are linked with a network of 125km of regional roads and approx. 250km of local roads. The study area is linked to Limerick City and Tipperary Town via the N24 and the M8 and N73 into Mitchelstown provide connections from the south. The traffic on the R662 at the pig farm entrance is approx. 923 movements per day. The existing pig farm contributes

14 movements and will increase to 16 during operational phase of the proposed development and an additional 6 movements during the 4 month construction phase.

Public utilities include two overhead transmission lines (110 kV and 220 kV) which cross the study area from the Mitchelstown area to Limerick City. There is a gas pipeline within 150m of the pig farm. There is a small windfarm 3.5km west of the pig farm. There are at least 15 public ground water sources located within the study area (Figures 1.14 and 1.15). There are waste water treatment facilities in Bruff, Caherconlish, Emly and Knocklong, Hospital, Oola and Limerick junction. There is a range of small business within the 13 settlements and the rural areas in the vicinity of the study area. These include furniture manufacturing businesses in Ballylanders, a metal fabricator between Ballylanders and Spittle and two rurally based bakeries located 1.5km south and 2km south east from the pig farm. The Ballyhoura way passes within 2.2 kms of the pig farm (to the north) and there are guest houses within 2kms to the south.

The study area is rich in architectural and archaeological heritage with one national monument within 100m of the pig farm and 12 bridges within the study area listed on the National Inventory of Architectural Heritage.

Outside the study area there are potential impacts on waste facilities due to construction waste material produced during the construction phase and waste materials produced during the operational phase.

10.2 Potential impacts

The average daily traffic on the R662 road at the pig farm entrance will increase from 923 to 925 due to the proposed development. There will be a temporary increase of 6 movements per day experienced during the construction period which will last 4 months. Regional roads (125 km in total) and local roads (250 km in total) within the study area are in good condition and suitable for both agricultural traffic (tractors and slurry tankers) and heavy goods vehicles and the impact is not significant before mitigation.

The pre-mitigation impact on water material assets is not significant – slight adverse where pig manure is not land-spread according to the relevant regulations.

Impacts on water services, transport/road services, gas lines, power services or nuisance from odour could potentially affect settlements, rural dwellings and businesses. The nearest settlement to the pig farm is Ballylanders, which although outside the study area, is approx. 2.8km north west of the pig farm. At this separation distance there is no impact from the pig houses and the potential pre mitigation impact from land spreading is not significant. There may be positive spin-offs from the capital investment involved in the development. Rural dwellers who share the road network with tractors and slurry tankers may be affected by this traffic. Without mitigation, there will be no significant impact on the road network either during construction or during the operational phase of the proposed development because the site is serviced by a regional road (R662) which has the capacity to accommodate the existing and proposed traffic. Rural dwellers may be affected by odour emissions from the pig farm. Without mitigation there will be no significant effect on the potential to develop private property in the study area as a result of the proposed development. The land around the pig farm is entirely in agricultural use without significant development potential. The proposed development will not involve the demolition of property. There will be no effect on tourist services such as guest houses, Ballyhoura Way or the scenic routes on the R513 or

R663. The proposed development will have a positive effect on the agricultural material assets through the provision of an organic renewable fertiliser to replace chemical fertiliser. There will be no effect on the forestry, woodlands or cultural heritage sites. The increased quantities of construction waste and operational waste (carcass wastes and sharps & veterinary waste) are considered to be not significant in the context of the capacity of receiving waste facilities to take this waste from the pig farm.

10.3 Mitigation

To mitigate impacts on material assets construction waste materials will be segregated and recycled where possible. Building materials will be secured and covered on site to prevent weather damage. Haul distances will be minimised by selecting locally sourced materials where possible and materials will be ordered in bulk to minimise deliveries and resulting wear and tear on local road network. On site materials will be recycled where possible. Only licensed waste contractors will be used to remove waste and the pig farm will adopt a policy of waste reduction. Sediment control measures will be implemented to protect surface waters. During the operational phase the impacts on material assets will be minimised by using low energy equipment and lighting with automatic controls and timing switches to reduce consumption of energy. Machinery will be turned off when not in use. In relation to the land-spreading and storage of pig manure there will be adherence to regulations Si 605 of 2017 (as amended) to maintain soil nutrient balance and protect water sources. Water usage will be minimised on the pig farm by maintaining water fixtures in good working order and maintaining a low water to feed ratio, thus minimising volume pig manure production and metering the private water supply. Low protein diets and an odour management plan will be implemented to minimise odour impacts.

10.4 Residual and cumulative impacts

The residual impacts are considered to be not significant with standard mitigation measures. Potential cumulative impacts on traffic, air emissions, noise, ground water sources, tourist services and agricultural land from the next nearest pig farm located in Inchacomb (2km south east of the 'Ballyfaskin' site) are not significant. Cattle organic manures are considered and assessed as part of the baseline and therefore not considered a cumulative effect.

Material assets (particularly generated traffic and construction activity) has the potential for significant interactions with Human Population and Human Health and Cultural Heritage, however, having considered these interactions, there is no significant change in the assessed impacts.

11.0 LANDSCAPE

11.1 Existing landscape

In Section 7.3.4 of the Limerick County Development Plan the landscape around the pig farm is categorised as '*Landscape Area No 2 Ballyhoura / Slieve Reagh*'. The site is located in the lowland component of this landscape area, approx. 1.4km from the eastern boundary with the Galtee Uplands. This area is generally a farmed landscape but a range of hills provides an upland backdrop. The lower reaches of Ballyhoura are pastoral in character but this changes as altitude increases and the vegetation cover changes to commercial forestry interspersed with upland grassland and the remnants of peat bogs. The pig buildings are generally low profile, being less

than 5m high, and clustered into a 2.6ha site. The most prominent feature the site is the mill house which is dark green colour and approx. 18m high.

11.2 Predicted impacts

There will be no impact from the construction of the electrical substation which will be approx. 3m high, 22m² and hidden behind a tall screening hedge. The refurbishment of the pig houses will not create a visual impact. Any potential impact arises from the existing pig houses, and in particular the mill. The following are some general views of the existing pig farm. There are no views of the pig farm from the scenic route on the R513



Plate 10: View at main entrance to pig farm on R662



Plate 11: View from Ballyfauskeen Cross Roads looking north along R662 (Site of substation behind tree line)



Plate 12: View from nearest neighbour west of cross roads



Plate 13: View from the east near Curraghkilbran



Plate 14: Views looking north west towards pig farm from near Paradise Hill



Plate 15: Views from farmyard south east of pig farm in Ballyfauskeen



Plate 16: View of the Galtee Mountains from the back of the pig farm site

11.3 Mitigation

There is natural mitigation due to tree lines around the pig farm. The western half of the site is surrounded by dense hedgerows 4m tall and is also screened by cattle sheds to the west of the site. Similarly hedgerows and tree lines to the north of the site screen the pig buildings. Against these dark green tree lines the dark green colour of the mill effectively mitigates any adverse visual impacts. Tall feed silos can be visually intrusive and containing these within the mill building also reduces visual impact. The design includes native species planting mitigation as specified in the Landscaping Plan in Appendix 8 of Volume 3 of the EIAR. Around the south east boundary of the site there will be screening planting with hedgerow and native and indigenous trees, which will include alder, common birches, common oaks, mountain ash and willow species. Some pines are recommended for screening mill from east and south east views.

11.4 Residual and cumulative impacts

Overall the significance of impact on Landscape is not significant because the landscape has the ability to absorb this development due to natural screening and the dark green colour of the mill. Also, the pig farm does not interfere with views of the Galtees, which are very high sensitivity. The proposed landscaping will further mitigate impacts. Cumulative impacts with a pig farm in Inchacomb 2km south east of the 'Ballfaskin' site is assessed as not significant.

11.0 CULTURAL HERITAGE

From examination of earlier maps it is apparent that there were at least two farms at the cross roads. None of these buildings are likely to predate the 18th or early 19th century. There are no known monuments within the development area, but there are a considerable number of known sites in the vicinity, the nearest of which is 100m east of the site boundary. The National Inventory of Architectural Heritage has no buildings of interest within 1km radius of the site

The likelihood of material of archaeological interest existing in the footprint of the proposed substation is small, but must be considered. Whilst the development will have no impact on known archaeological monuments, there is the small risk of a significant or profound impact on a currently unknown site (within the small footprint of the new building a prehistoric burial could be fully removed by groundworks).

The proposed **mitigation** is monitoring the removal of topsoil in the footprint of the proposed electricity substation by an experienced field archaeologist.

The desktop assessment indicates that the **residual and cumulative impacts** of the proposed works and earlier works on site is unknown but probably not significant.

12. INTERACTIONS, CUMULATIVE EFFECTS AND TRANSBOUNDARY EFFECTS

All environmental factors are inter-related to some extent, and the relationships can range from tenuous to inextricable.

Table 13 Typical Relationships between the Environmental Topics

Typical Inter-Relationship Matrix – Environmental Elements	Human Population, and Human Health	Biodiversity	Land & Soils	Water	Air	Climate	Material Assets	Landscape, Visual	Cultural Heritage, Archaeology	Risk of Major Accident / Natural Disaster
Human Population and Human Health		N	N	N	N	N	N	N	N	CO
Biodiversity	N		N	N	N	N	N	N	N	N
Land & Soils	O	N		O	O	O	O	N	N	N
Water	CO	O	N		N	N	CO	N	N	CO
Air	CO	CO	N	O		O	N	N	N	N
Climate	CO	CO	N	N	N		N	N	N	N
Material Assets	CO	N	N	N	N	N		N	C	N
Landscape, Visual	O	N	N	N	N	N	N		N	N
Cultural Heritage, Archaeology	N	N	N	N	N	N	N	N		N
Risk of Major accident / disaster	CO	CO	N	CO	N	N	CO	N	N	

Table 13 examines the potential for environmental factor interactions. The information in this table can be summarised as follows;

1. There are potential interactions between *Human Population and Human Health and Risk of Major Accident and Natural Disaster* if workers do not adhere to health and safety guidelines;
2. There are potential interactions between *Land and Soils and Human Population and Human Health* due to potential leaching of nutrients to groundwater and or run-off of nutrients and pathogens to surface waters;
3. There are potential interactions between *Land and Soils and Water* due to due to potential leaching of nutrients to groundwater and run-off of nutrients to surface waters;
4. There are potential interactions between *Land and Soils and Air* due to due to emissions at land-spreading and from emissions of malodour, ammonia and nitrous oxide;
5. There are potential interactions between *Land and Soils and Climate* due to due to emissions at land-spreading and from the land of methane, ammonia and nitrous oxide;
6. There are potential interactions between *Land and Soils and Material Assets* due to potential impacts on private and public water sources, impact on agricultural land nutrient status and impacts due to slurry spreading traffic from the proposed development;
7. There are potential interactions between *Water and Human Population and Human Health* due to the potential of the pig farm groundwater and surface water to contaminate other water sources and due to the increased extraction of groundwater;
8. There are potential interactions between *Water and Biodiversity* due to the potential of the pig farm groundwater and surface water to adversely impact on aquatic habitats;
9. There are potential interactions between *Water and Material Assets* due to the potential of the pig farm groundwater and surface water to contaminate water supplies to residences and businesses;
10. There are potential interactions between *Water with Risk of Major Accidents / Natural Disasters* due to the potential for a slurry or fuel spill, a burst tank or contaminated storm water affecting adjoining land or wells;
11. There are potential interactions between *Air with Human Population and Human Health* due to the potential for air emissions (including dust and particulate matter) from land spreading and the pig houses affecting human health;
12. There are potential interactions between *Air with Biodiversity* due to the potential for ammonia or dust deposition to affect biodiversity and aquatic habitats;
13. There are potential interactions between *Air with Water* due to the potential for ammonia or dust deposition to affect water quality;
14. There are potential interactions between *Air with Climate* due to the potential for increasing greenhouse gases and other gaseous emissions to atmosphere such as (ammonia, dust, hydrogen sulphide, carbon monoxide, non-methane volatile fatty acids);
15. There are potential interactions between *Climate with Human Population and Human Health* due to the potential for increasing greenhouse gases and Global Warming;
16. There are potential interactions between *Climate with Biodiversity* due to the potential for increasing greenhouse gases and Global Warming;
17. There are potential Interactions between *Material Assets with Human Population and Human Health* due to the potential for additional construction and operational traffic and noise;
18. There are potential interactions between *Material Assets with Cultural Heritage* due to the potential for construction work and land spreading pig manure to damage archaeology;
19. There are potential interactions between *Landscape with Human Population and Human Health* due to the potential for spoiling views of local residents;

20. There are potential interactions between *Risk of Major Accidents / Natural Disasters* with *Human Population and Human Health* due to the potential impact on health from construction accidents, accidents relating to fumes from slurry, accidents relating to machinery on the pig farm, fires and environmental incidents such as fuel or pig manure spills;
21. There are potential interactions between *Risk of Major Accidents / Natural Disasters* with *Biodiversity* due to the potential for contamination of aquatic habitats as a result of a spill of pig manure or fuel on site;
22. There are potential interactions between *Risk of Major Accidents / Natural Disasters* with *Water* due to the potential for contamination of water as a result of a spill of pig manure or fuel on site; and
23. There are potential interactions *between Risk of Major Accidents / Natural Disasters* with *Material Assets* due to the potential impact on material assets from accidents, fires and environmental incidents such as fuel or pig manure spills.

These interactions have been assessed in the individual chapters of the EIAR and there are no additional impacts or required mitigation as a result of these potential interactions.

Cumulative impacts have been assessed in the individual chapters of the EIAR and there are no additional impacts or required mitigation as a result of the potential cumulative or in-combination impacts from other pig farms in the vicinity of the 'Ballyfaskin' Pig Farm development, such as Inchacomb Pig Farm (2km south east of the proposed development) and two licensed facilities in the Glen of Aherlow. Within County Limerick pig manure organic Nitrogen (N) is 2 – 3% of the total organic N from all livestock, therefore, there are no significant cumulative/in-combination effects from pig and cattle manure.

Given the location of the proposed pig development and the extent of its zone of influence no transboundary impacts will arise.

13.0 SUMMARY OF RESIDUAL IMPACTS AND ENVIRONMENTAL COMMITMENTS (MITIGATION)

13.1 Human Population and Human Health

Before mitigation there are not significant impacts on farms due to the value of pig manure to the receiving farmers or impact of soil nutrients. Before mitigation there are potential slight adverse impacts on human population and health due to potential impacts on ecosystem services and water supplies from poor land-spreading practices. There is a slight to moderate adverse effect before mitigation on the health of farm operatives due to air emissions and potential spread of pathogens within the pig confinement buildings. There will be an economic benefit to the local and wider economy but these impacts are not significant. After standard mitigation these potential adverse impacts are not significant.

To mitigate potential impacts it is proposed to provide health and safety training to construction workers, to control dust and noise during construction and provide workers with personal protection safety devices. Adjoining landowners will be notified in advance of commencement of construction. During the operational phase there will be adherence to the regulations as set out in Si 605 of 2017 (Nitrates Regulations) which will protect water sources. There is 50 weeks of slurry storage on site which insures that the pig manure can be spread in suitable conditions. Odour and ammonia

emissions will be mitigated by the feeding of low protein diets, a high degree of cleanliness and implementing an odour management plan. The pig farm commits to move towards low emission spreading where possible. A rodent and pest control programme will be implemented. A noise management programme will be implemented at the pig farm. There will be health & safety training for workers to show how to minimise and manage risks to their health, how to prevent exposure to slurry gases and minimise effects from dust and particulate matter.

13.2 Water

There are potential slight adverse impacts on surface waters at the site of the pig farm and in the study area which are not significant after standard mitigation.

To mitigate potential impacts on surface water a suite of standard construction and demolition mitigation measures will be implemented including controlling silt and sediment runoff, re fuelling in a bunded area on site, avoiding having machinery that leaks oil or fuel on site, and removing any contaminated soil (e.g. after an accidental fuels spill) to a licensed waste facility using a licensed waste contractor. All construction wastes will be segregated for re-use or re cycling and land-fill. During the operation phase mitigation measures to protect water quality at the site of the pig farm include on-going monitoring of ground and surface waters, bunding all over ground liquid and slurry storage tanks, monitoring existing leak-proof facilities under concrete tanks, collecting the run-off from concreted pig manure off-take points and pig walk-ways to slurry tanks and carrying out a tank and pipeline assessment every 5 years as per the EPA license requirements to insure pig manure storage tanks are leak-proof. During the operation phase there is a legal framework (SI 605 of 2017 as amended), which governs how pig manure is land-spread, and within this legal framework there are adequate protections to insure that pig manure is applied without adverse environmental effects. The waste water treatment system on site will be regularly inspected as per EPA license requirements to show that it is functioning properly. In addition the pig farm will monitor the slurry spreading equipment entering the site to insure it is not leaking. There will be 50 weeks of slurry storage on site which insures that slurry can be stored long enough to avoid having to spread in unsuitable conditions. The exports of pig manure will be monitored by DAFM to insure compliance.

13.3 Air & Climate

Before mitigation there is a slight to moderate adverse impact on workers due to potential health effects from dust and particulate matter. There is the potential for periodic odours in the vicinity of the pig farm.

To mitigate potential impacts during construction a water tanker will be available to douse exposed soil to control dust emissions. Workers will be equipped with the relevant personal protection equipment at all times (eye and ear protection and dust masks). During the operational phase dust and particulate matter will be mitigated by using an automatic sealed wet feed system. Pig houses will be effectively ventilated. The health and safety of workers is addressed by health and safety training, provision of personal protection equipment and administrative controls to minimise the amount of time workers are exposed to dust, ammonia (NH₃) and particulate matter. There will be adequate cleaning of pig houses. The 2% reduction in the growing pig diets will effectively reduce odour levels and NH₃ emissions.

After mitigation the proposed development at Ballyfauskeen will result in an increase in greenhouse gases of 25-30% compared to the existing pig farm. This represents a negative but not significant impact. However, pork is four times more efficient from a carbon emissions point of view (5 kgs CO₂ eq. / kg) than beef or sheep meat. This has to be considered as an underlying cumulative effect and advantage that pork has from a climate change perspective. Also the pig farm by reducing protein in the diets, improving pig health and genetics and using more low emission slurry spreading is achieving the additional measures outlined in Section 3.3 of the July 2020 EPA Report: *Ireland's Greenhouse Gas Emissions Projections; 2019 – 2040*. This report predicts that Ireland can and will meet its 2030 commitments by early adoption of a 'with additional measures scenario' and a reduction of 12% in agricultural GHGs, requiring the pig sector to reduce protein and improve health status. Therefore with mitigation the impacts on Climate are not significant.

13.4 Material Assets

Before mitigation there is a positive but not significant impact on farms due to the value of pig manure to the receiving farmers. There is the potential for pre mitigation slight adverse impacts on public water supplies as a result of poor land spreading practices. After standard mitigation this potential adverse effect is not significant.

To mitigate potential impacts on public water supplies there is a suite of standard construction and operational mitigation measures as discussed under the heading 'Water' above

13.5 Landscape

Before mitigation there is a not significant impact on landscape because of the scale of the electrical substation and the screening effect of existing tree lines and buildings.

The impact on Landscape from the existing pig farm is not significant because the landscape has the ability to absorb the existing development due to natural screening, the dark green colour of the mill and the not significant impact on views of the Galtees. The mill mitigates the visual impact of feed silos by containing the silos within this building. There will be native species planting mitigation as specified in the planning drawings around the boundary of the proposed site and along the entrance road to screen visual effects.

13.6 Cultural Heritage

There are no known monuments on or beside the development site, but there is the possibility of early settlement or burial remains on site. The desktop assessment indicates the residual impact is unlikely to be significant, but archaeological monitoring is proposed to mitigate potential effects.