

9.0 NOISE & VIBRATION

9.1 INTRODUCTION

As detailed in Chapter 1 Introduction, this EIA Report has been prepared to accompany an application for a data storage facility and associated ancillary development at a site north east of the junction of the M18 and the R352 (Tulla Road), Ennis, Co. Clare. The Proposed Development site is illustrated in Figure 9.1 below.

Residential noise sensitive locations are located along a section of the southern boundary of the site where two private residential locations on the north side of the R352 are located. A number of other detached private residences are located opposite the extent of the southern boundary of the site on the opposite side of the R352. To the east of the site the closest noise sensitive residential location is some 250 m from the red line boundary. The nearest noise sensitive locations to the north consist of a number of private residential properties located along a local road at some 430 m from the red line boundary.

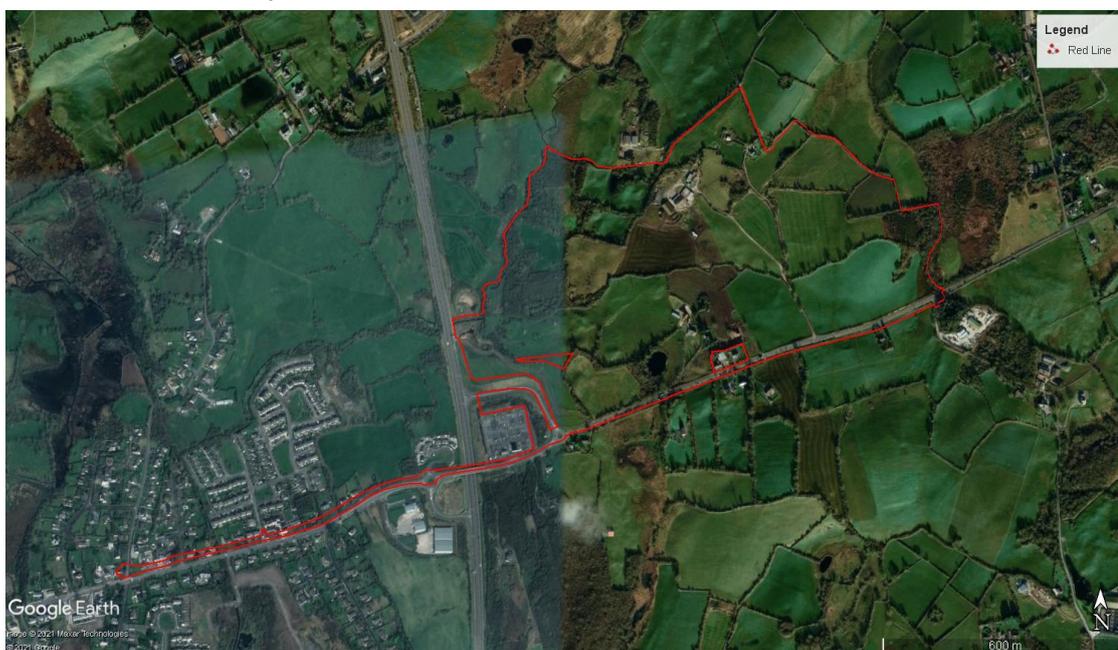


Figure 9.1 Site Location and Context

The Proposed Development will consist of the construction of a six data storage facility and associated elements will include AHU plant (i.e. 48 per data centre), roof plant (i.e. 1 chiller per data centre) and emergency stand-by generators (i.e. 14 per data centre). The Proposed Development will also include an energy centre a substation and a vertical farm building.

This Proposed Development has been assessed and discussed in this assessment in terms of potential noise and vibration impacts on the surrounding environment.

A glossary of the acoustic terminology used in this chapter is presented in Appendix 9.1.

9.2 METHODOLOGY

9.2.1 Proposed Approach

The following methodology has been adopted for this assessment:

- review appropriate guidance, typical local authority planning conditions, etc. in order to identify appropriate noise criteria for the site operations;
- carry out noise monitoring at a number of locations (e.g. in the vicinity of nearest sensitive properties/boundaries) to identify existing levels of noise in the vicinity of the development;
- development of a detailed 3D noise model to consider the Proposed Development; and
- comment on predicted levels against the appropriate criteria and existing noise levels and outline required mitigation measures (if any).

In the first instance it is considered appropriate to review some basic fundamentals of acoustics.

9.2.2 Fundamentals of Acoustics

In order to provide a broader understanding of some of the technical discussion in this report, this section provides a brief overview of the fundamentals of acoustics and the basis for the preparation of this noise assessment.

A sound wave travelling through the air is a regular disturbance of the atmospheric pressure. These pressure fluctuations are detected by the human ear, producing the sensation of hearing. In order to take account of the vast range of pressure levels that can be detected by the ear, it is convenient to measure sound in terms of a logarithmic ratio of sound pressures. These values are expressed as Sound Pressure Levels (SPL) in decibels (dB).

The audible range of sounds expressed in terms of Sound Pressure Levels is 0dB (for the threshold of hearing) to 120dB (for the threshold of pain). In general, a subjective impression of doubling of loudness corresponds to a tenfold increase in sound energy which conveniently equates to a 10dB increase in SPL. It should be noted that a doubling in sound energy (such as may be caused by a doubling of traffic flows) increases the SPL by 3dB.

The frequency of sound is the rate at which a sound wave oscillates and is expressed in Hertz (Hz). The sensitivity of the human ear to different frequencies in the audible range is not uniform. For example, hearing sensitivity decreases markedly as frequency falls below 250Hz. In order to rank the SPL of various noise sources, the measured level has to be adjusted to give comparatively more weight to the frequencies that are readily detected by the human ear. Several weighting mechanisms have been proposed but the 'A-weighting' system has been found to provide one of the best correlations with perceived loudness. SPL's measured using 'A-weighting' are expressed in terms of dB(A). An indication of the level of some common sounds on the dB(A) scale is presented in Figure 9.2.

The 'A' subscript denotes that the sound levels have been A-weighted. The established prediction and measurement techniques for this parameter are well developed and widely applied. For a more detailed introduction to the basic principles of acoustics, reference should be made to an appropriate standard text.

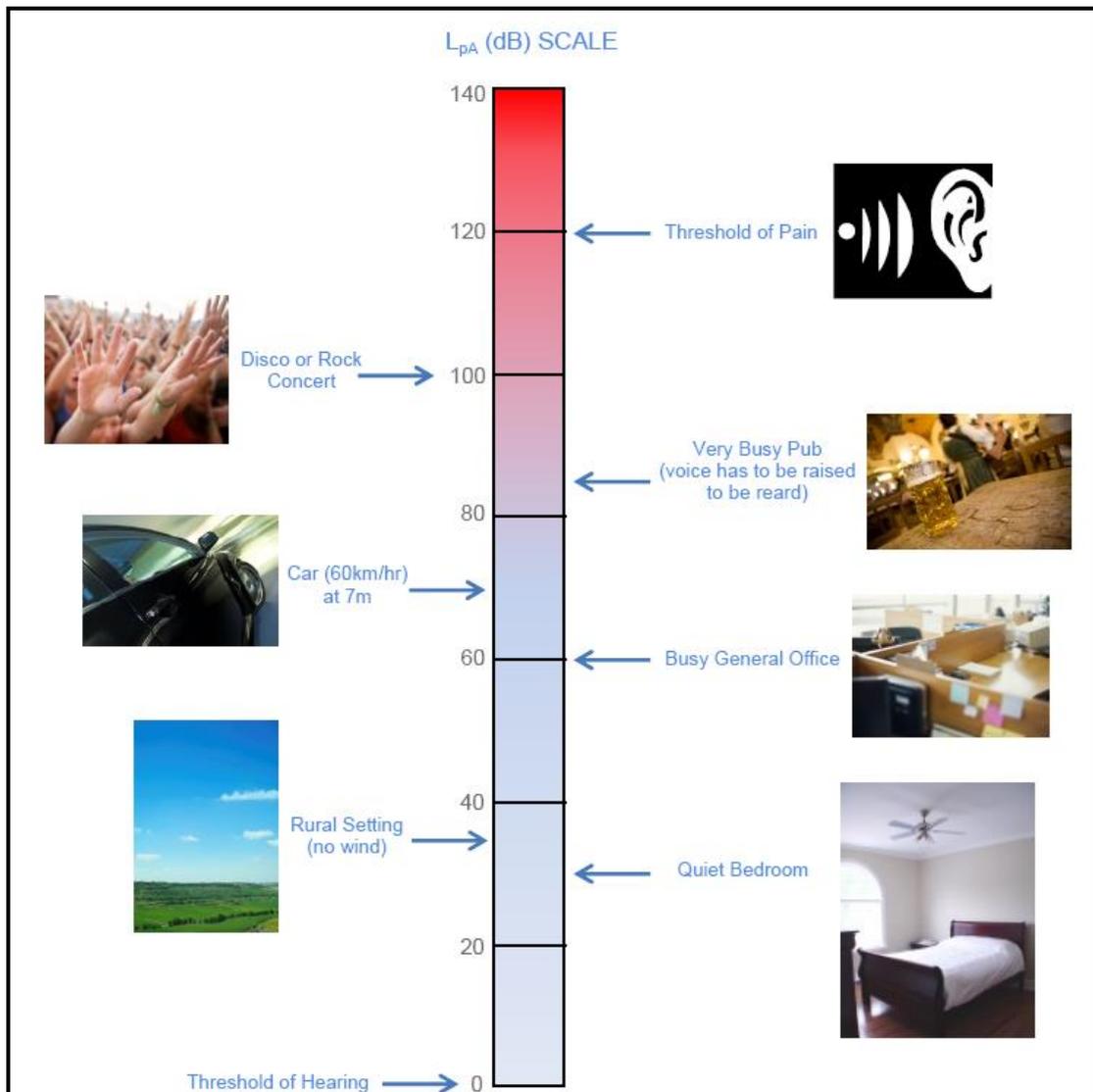


Figure 9.2 dB(A) Scale & Indicative Noise Levels – (EPA: Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4 – 2016))

9.2.3 Significance of Impacts

The significance of noise and vibration impacts has been assessed in accordance with the EPA Draft EIA Report Guidelines 2017 and EPA Draft Advice Notes for EIS 2015 see Tables 9.1 to 9.3 below. As these guidelines do not quantify the impacts in decibel terms, further reference has been made to the draft 'Guidelines for Noise Impact Assessment' produced by the Institute of Acoustics/Institute of Environmental Management and Assessment Working Party.

With regard to the quality of the impact, ratings may have positive, neutral or negative applications where:

Table 9.1 *Quality of Potential Effects*

Quality of Effects	Definition
Negative	A change which reduces the quality of the environment (e.g. by causing a nuisance).
Neutral	No effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error.
Positive	A change that improves the quality of the environment (e.g. by removing a nuisance).

The significance of an effect on the receiving environment are described as follows:

Table 9.2 *Significance of Effects*

Significance of Effects on the Receiving Environment	Description of Potential Effects
Imperceptible	An effect capable of measurement but without significant consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics.

The duration of effects as described in the Draft EPA Guidelines are:

Table 9.3 *Duration of Effects*

Duration of Impact	Definition
Momentary	Effects lasting from seconds to minutes
Brief	Effects lasting less than a day
Temporary	Effects lasting one year or less
Short-term	Effects lasting one to seven years
Medium-term	Effects lasting seven to fifteen years
Long-term	Effects lasting fifteen to sixty years
Permanent	Effects lasting over sixty years
Reversible	Effects that can be undone, for example through remediation or restoration

9.2.4 Construction Phase Guidance

Criteria for Rating Noise Impacts

There is no published statutory Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. Local authorities normally control construction activities by imposing limits on the hours of operation and may consider noise limits at their discretion.

In the absence of specific noise limits, appropriate criteria relating to permissible construction noise levels for a development of this scale may be found in the British Standard BS 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites – Noise*.

The approach adopted here calls for the designation of an NSL into a specific category (A, B or C) based on existing ambient noise levels in the absence of construction noise. A threshold noise value is applied to each category. Exceedances (construction noise only) of the threshold value, at the facade of a sensitive receptor during construction, indicates a potential significant noise impact associated with the construction activities. The threshold values recommended by BS5228-1 are depicted in Table 9.4.

Table 9.4 Example Threshold of Significant Effect at Dwellings

Assessment category and threshold value period (L_{Aeq})	Threshold value, in decibels (dB)		
	Category A Note A	Category B Note B	Category C Note C
Night-time (23:00 to 07:00hrs)	45	50	55
Evenings and weekends ^{Note D}	55	60	65
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75

Note A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.

Note B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.

Note C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.

Note D) 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

It should be noted that this assessment method is only valid for residential properties.

For the appropriate period (e.g. daytime) the ambient noise level is determined and rounded to the nearest 5 dB. Based on review of baseline noise monitoring to hand (see Section 9.3) the relevant BS5228-1 threshold values at the various assessment locations are discussed in the Table 9.5.

Table 9.5 Rounded Baseline Noise Levels and Associated Categories

Period	Baseline Noise Category	Construction Noise Threshold Value $L_{Aeq,1hr}$ (dB)
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	A	65
Evening (19:00 to 23:00hrs)	A	55
Night time (23:00 to 07:00hrs)	A	45

Guidance on the degree of significance is presented the UK document Design Manual for Roads and Bridges (2020) *LA 111 Sustainability & Environmental Appraisal. Noise and Vibration Rev 2*. The approach is as follows:

- to determine the threshold value for construction noise according to the method from BS5228 described above and
- to compare the predicted construction noise level with the existing noise levels and the threshold value according to the criteria in the table below.

Potentially this procedure is to be followed separately for each noise-sensitive location, however in this instance as the existing noise levels at all survey locations correspond in Category A according to table above, all noise-sensitive locations are considered together.

Similarly, for this proposed development the vast majority of construction works will take place within the 'Daytime' period, i.e. 07:00 – 19:00 on Mondays to Fridays and 07:00 – 13:00 on Saturdays.

The magnitude of the construction noise impact according the DMRB is mapped to the EPA significance terms as detailed in Table 9.6:

Table 9.6 Description of the magnitude of impacts. Adapted from DMRB Table 3.16

Predicted Construction Noise Level is	Magnitude of Impact (DMRB)	EPA Significance of Effect
Below or equal Baseline Noise Level	Negligible	Not Significant
Above Baseline and below or equal to threshold	Minor	Slight – Moderate
Above threshold and below or equal to threshold + 5dB	Moderate	Moderate – Significant
Above threshold + 5dB	Major	Significant – Very Significant

This assessment process determines if a significant construction noise impact is likely. Notwithstanding the outcome of this assessment, the overall acceptable levels of construction noise are set out in the Transport Infrastructure Ireland (TII) publication *Guidelines for the Treatment of Noise and Vibration in National Road Schemes*¹, which should not be exceeded at noise sensitive locations during the construction phase of the development. Table 9.7 sets out these levels.

Table 9.7 Maximum Permissible Noise Levels at the Facade of Dwellings during Construction

Days and Times	Noise Levels (dB re. 2×10^{-5} Pa)	
	$L_{Aeq}(1hr)$	L_{Amax}
Monday to Friday 07:00 to 19:00hrs	70	80
Monday to Friday 19:00 to 22:00hrs	60*	65*
Saturdays 08:00 to 16:30hrs	65	75
Sundays & Bank Holidays 08:00 to 16:30hrs	60*	65*

Note * Construction activity at these times, other than that required for emergency works, will normally require the explicit permission of the relevant local authority.

¹ *Guidelines for the Treatment of Noise and Vibration in National Road Schemes, Revision 1, 25 October 2004*, Transport Infrastructure Ireland

In exceptional circumstances there may be a requirement that certain construction works are carried out during night-time periods. In these instances, the relevant evening (60 dB $L_{Aeq,1hr}$) and night-time (50 dB $L_{Aeq,1hr}$) will apply.

Therefore, based on the above the following construction noise criteria are proposed for the site in relation to day to day works during the stated construction hours:

70 dB $L_{Aeq,1hr}$ at noise sensitive location

75 dB $L_{Aeq,1hr}$ at commercial property

Criteria for Rating Vibration Impacts

Vibration standards come in two varieties: those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. In both instances, it is appropriate to consider the magnitude of vibration in terms of Peak Particle Velocity (PPV).

It is acknowledged that humans are particularly sensitive to vibration stimuli and that any perception of vibration may lead to concern. In the case of road traffic, vibration is perceptible at around 0.5 mm/s and may become disturbing or annoying at higher magnitudes. However, higher levels of vibration are typically tolerated for single events or events of short duration. For example, rock breaking and piling, two of the primary sources of vibration during construction, are typically tolerated at vibration levels up to 12 mm/s and 5 mm/s respectively. This guidance is applicable to the daytime only; it is unreasonable to expect people to be tolerant of such activities during the night.

Guidance relevant to acceptable vibration within buildings is contained in the following documents:

- British Standard BS 7385: 1993: *Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration*, and;
- British Standard BS 5228-2: 2009+A1:2014: *Code of practice for noise and vibration control on construction and open sites – Vibration*.

BS 7385 states that there should typically be no cosmetic damage if transient vibration does not exceed 15 mm/s at low frequencies rising to 20 mm/s at 15 Hz and 50 mm/s at 40 Hz and above. These guidelines relate to relatively modern buildings and should be reduced to 50% or less for more critical buildings.

BS 5228 recommends that, for soundly constructed residential property and similar structures that are generally in good repair, a threshold for minor or cosmetic (i.e. non-structural) damage should be taken as a peak component particle velocity (in frequency range of predominant pulse) of 15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz and 50 mm/s at 40 Hz and above. Below these values minor damage is unlikely. Where continuous vibration is such as to give rise to dynamic magnification due to resonance, the guide values may need to be reduced by up to 50%. BS 5288-2 also comments that important buildings which are difficult to repair might require special consideration on a case by case basis.

The TII document *Guidelines for the Treatment of Noise and Vibration in National Road Schemes* also contains information on the permissible construction vibration levels as follows:

Table 9.8 Allowable Vibration during Construction Phase

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of		
Less than 10 Hz	10 to 50 Hz	50 to 100 Hz (and above)
8 mm/s	12.5 mm/s	20 mm/s

9.2.5 Operational Phase – Noise Guidance

The relevant local authority, Clare County Council (CCC), does not have any standard noise conditions listed in the *Noise Action Plan 2018*. Therefore, consideration has been given to the following best practice and national guidance and a review of planning conditions recently applied to similar developments in the area.

In order to establish whether the noise sensitive locations in the vicinity of the site would be considered 'low background noise' areas as defined in the Environmental Protection Agency (EPA) publication *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities* (NG4 2016) guidance, the noise levels measured during the environmental noise survey need to satisfy the following criteria:

- Arithmetic Average of L_{A90} During Daytime Period $\leq 40\text{dB } L_{A90}$, and;
- Arithmetic Average of L_{A90} During Evening Period $\leq 35\text{dB } L_{A90}$, and;
- Arithmetic Average of L_{A90} During Night-time Period $\leq 30\text{dB } L_{A90}$.

Determining Appropriate Noise Criteria

Table 9.9 below outlines the noise emission limit criteria detailed in the NG4 document.

Table 9.9 NG4 Approach for Determining Appropriate Noise Criteria

Scenario	Daytime Noise Criterion, dB $L_{Ar,T}$ (07:00 to 19:00hrs)	Evening Noise Criterion, dB $L_{Ar,T}$ (19:00 to 23:00hrs)	Night Noise Criterion, dB L_{Aeq} (23:00 to 07:00hrs)
Areas of Low Background Noise	45dB	40dB	35dB
All Other Areas	55dB	50dB	45dB

The arithmetic average L_{A90} results at each location are compared against the criteria in Table 9.10.

Table 9.10 Comparison of Measurement Results with NG4 Low Background Noise Area Criteria

Location	Period	L _{A90,T} (dB)	NG4 Screening (dB L _{A90,T})	Satisfies All Criteria for Low Background Noise Area?
A	Daytime	35	≤40	Yes
	Evening	30	≤35	
	Night-time	30	≤30	
B	Daytime	40	≤40	Yes
	Evening	35	≤35	
	Night-time	29	≤30	
C	Daytime	37	≤40	Yes
	Evening	35	≤35	
	Night-time	31	≤30	
D	Daytime	43	≤40	No
	Evening	45	≤35	
	Night-time	32	≤30	

Based on a review of the noise data, in the vicinity of the development site obtained during the baseline noise survey, see Section 9.3, a number of the noise sensitive locations in the vicinity of the site are defined as areas of low background noise as per the NG4 guidance. In these instances, a 45 dB L_{Aeq,15min} daytime, 40 dB L_{Aeq,15min} evening and 35dB L_{Aeq,15min} night-time criteria are applied to day to day operations of the site.

Operational plant and equipment will be selected such that there are no audible tonal or impulsive emissions at noise sensitive locations off site.

Assessment of Significance

The 'Guidelines for Environmental Noise Impact Assessment' produced by the Institute of Environmental Management and Assessment (IEMA) (2014) have been referenced in order to categorise the potential effect of changes in the ambient noise levels during the operational phases of the proposed development.

The guidelines state that for any assessment, the potential significance should be determined by the assessor, based upon the specific evidence and likely subjective response to noise. Due to varying factors which effect human response to environmental noise (prevailing environment, noise characteristics, time periods, duration and level etc.) assigning a subjective response must take account of these factors.

The scale adopted in this assessment is shown in Table 9.11 below and is based on an example scale within the IEMA guidelines. The corresponding significance of impact presented in the Draft 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (EPA, 2017) is also presented.

The criteria above reflect the key benchmarks that relate to human perception of sound. A change of 3 dB(A) is generally considered to be the smallest change in environmental noise that is perceptible to the human ear. A 10 dB(A) change in noise represents a doubling or halving of the noise level. The difference between the minimum perceptible change and the doubling or halving of the noise level is split to provide greater definition to the assessment of changes in noise level.

It is considered that the criteria specified in the above table provide a good indication as to the likely significance of changes on noise levels in this case and have been used to assess the impact of operational noise.

Table 9.11 Operational Noise Impact Scale

Noise Level Change dB(A)	Subjective Response	Impact Guidelines for Noise Impact Assessment Significance (Institute of Acoustics)	Impact Guidelines on the Information to be contained in EIA Reports (EPA)
0	No change	None	Imperceptible
0.1 – 2.9	Barely perceptible	Minor	Not Significant
3.0 – 4.9	Noticeable	Moderate	Slight, Moderate
5.0 – 9.9	Up to a doubling or halving of loudness	Substantial	Significant
10.0 or more	More than a doubling or halving of loudness	Major	Very Significant, Profound

Emergency Operation

In order to provide continuity of service, a number of back-up emergency generators will be provided as part of the current proposal. These generators will only operate in the event of a loss of power supply i.e. temporary grid blackout, when diesel powered back-up generators will be provided to maintain power supply. It is anticipated, based on the Operator's experience, that back-up generators will rarely be used. They will be tested periodically to maintain operational readiness. Routine testing will be conducted during regular weekday daytime periods only. Section 4.4.1 of the Environmental Protection Agency (EPA) document "*Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities*" (NG4 - 2016) contains the following comments in relation to emergency plant items:

'In some instances, ...sites will have certain items of emergency equipment (e.g. standby generators) that will only operate in urgent situations (e.g. grid power failure). Depending upon the context, it may be deemed permissible for such items of equipment to give rise to exceedances in the noise criteria/limits during limited testing and emergency operation only. If such equipment is in regular use for any purposes other than intermittent testing, it is subject to the standard limit values for the site.'

It is therefore considered that the proposed noise criterion of 55 dB $L_{Aeq,1hr}$ on these emergency units is appropriate. Generators will be designed and mitigated in order to achieve this design goal at nearby residential noise sensitive locations.

Recommended Criteria

Following review of relevant guidance, the following noise criteria are proposed for the development:

Table 9.12 Review of Adopted Noise Limits

Activity	Noise Limit dB L _{Aeq,15min} per Period			Source
	Day 07:00 – 19:00hrs	Evening 19:00 – 23:00hrs	Night 23:00 – 07:00hrs	
Day to Day Operations	45	40	35	EPA NG4
Generator Testing	45 ^{Note A}	--	--	EPA NG4
Emergency Operation (NSL)	55			EPA NG4

Note A Testing of the emergency generators shall take place between the hours of 08:00 and 17:00 Monday to Friday, testing shall not be permitted on Saturdays, Sundays or public holidays.

Note plant noise emissions are to be designed and plant selected such that they do not contain audible tones and do not have impulsive characteristics at the nearest noise sensitive locations.

9.2.6 Operational Phase – Vibration Guidance

Criteria for Rating Vibration Impacts

Guidance as to an acceptable magnitude of vibration during the operational phase of the development is best taken from British Standard *BS 6472 (1992): Guide to Evaluation of human exposure to vibration in buildings (1 Hz to 80 Hz)*. The Standard contains recommendations that continuous vibration in residential buildings should not exceed nominally 0.3 mm/s by daytime and 0.2 mm/s by night-time.

It should be noted that the Proposed Development will not give rise to any significant levels of vibration (i.e. less than 0.5 mm/s) off site and therefore the associated impact is identified as long term not significant.

9.2.7 Forecasting Methods

Construction noise calculations have been conducted generally in accordance with BS 5228: 2009+A1:2014: *Code of practice for noise control on construction and open sites - Noise*.

Prediction calculations for operational building services noise, car park activity and vehicle movements on site have been conducted generally in accordance with ISO 9613 (1996): *Acoustics – Attenuation of sound outdoors – Part 2: General method of calculation*.

Changes in road traffic noise on the local road network have been considered using prediction guidance contained within *Calculation of Road Traffic Noise (CRTN)* issued by the Department of Transport in 1988.

9.3 RECEIVING ENVIRONMENT

A series of noise surveys have been undertaken as part of the EIA Report preparation for the Proposed Development. Table 9.13 reviews the findings of these surveys. Full details of the noise monitoring campaign are presented in Appendix 9.2.

If the development is not progressed the existing noise environment will remain largely unchanged. Traffic noise is currently a significant noise source in the vicinity of road networks in the area. In the absence of the proposed development increases in traffic volumes on the local road network would be expected over time and would likely result in slight increases in the overall ambient and background noise levels in the area.

9.3.1 Comment on Noise Levels

Figure 9.3 illustrates the noise sensitive locations in the vicinity of the site at which noise monitoring was undertaken as part of the current assessment.

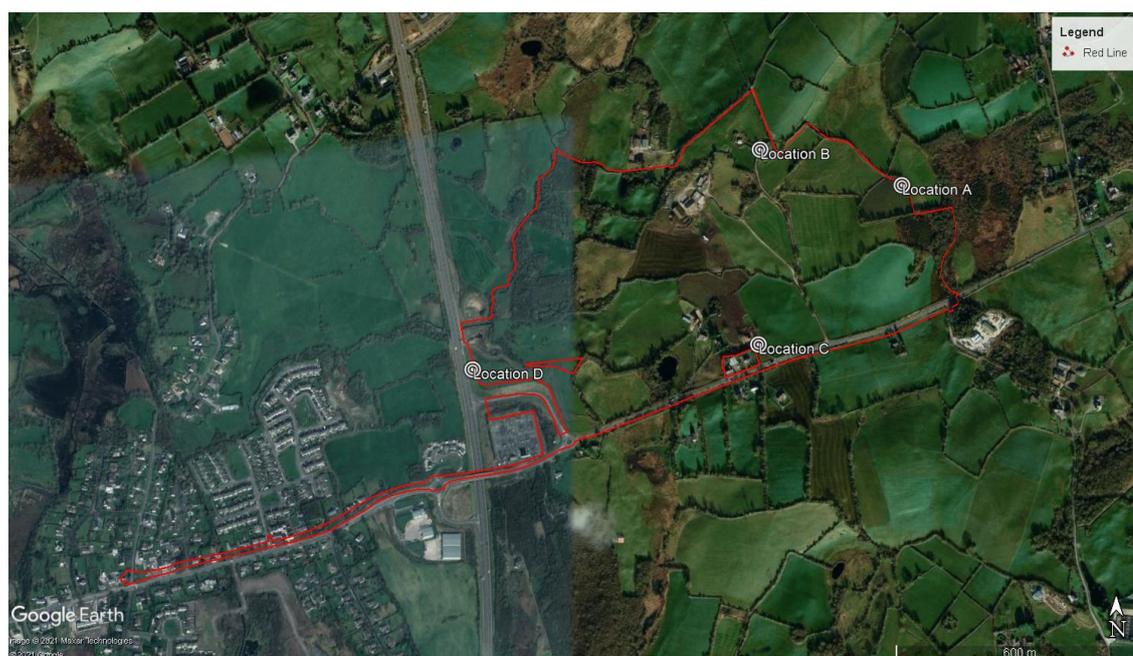


Figure 9.3 Noise Sensitive Locations

Location A Located towards the eastern boundary of the site. This location would be considered to be representative of the noise sensitive residences located to the east of the site.

Location B Located on open ground in the northern section of the site. The location is considered to be representative of noise sensitive locations located to the north along a minor road.

Location C Located to the rear of the closest residential properties located on the southern boundary of the site and off the R352 (Tulla Road). This location would be representative of the various noise sensitive properties located on both sides of the R352 (Tulla Road).

Location D Located to the west of the site. The location would be considered to be representative of noise levels in the vicinity of the Knockaneen halting site.

Road traffic noise, both distant and local was noted as the most significant source of noise and typically dictated ambient noise levels (i.e. $L_{Aeq,T}$) at the nearest noise sensitive locations to the site during daytime and night-time periods.

Background noise levels (e.g. $L_{A90,T}$) at the various locations were typically dictated by local and distant road traffic noise. These levels fell as would be expected into the early hours of the morning when the volume of traffic on the local and wider road network reduced.

Table 9.13 reviews the typical ambient and background noise levels at the sample locations discussed above.

Table 9.13 Review of Typical Noise Levels

Location	Period	Start Time	Sound Pressure Level (dB)	
			$L_{Aeq,15min}$	$L_{AF90,15min}$
A	Day	11:10	49	38
		12:38	44	33
		14:33	38	33
		<i>Average</i>	46	35
	Evening	21:36	36	30
	Night	22:58	39	30
		00:16	34	30
		<i>Average</i>	37	30
B	Day	11:36	45	40
		12:58	45	36
		14:55	49	43
		<i>Average</i>	47	40
	Evening	21:54	42	35
	Night	23:14	42	31
		00:32	37	28
		<i>Average</i>	40	29
C	Day	13:23	53	36
		14:11	51	37
		15:18	50	37
		<i>Average</i>	52	37
	Evening	22:13	53	35
	Night	23:33	50	31
		00:51	32	31
		<i>Average</i>	47	31
D	Day	12:10	63	50
		13:48	64	52
		15:40	65	56
		<i>Average</i>	64	53
	Evening	22:35	63	45
	Night	23:55	54	31
		01:11	45	32
		<i>Average</i>	52	32

These typical noise levels have been considered when discussing appropriate noise criteria in relation to the development as outlined in Table 9.13. Traffic noise from the R352, M18 and other roads in the study area dictated noise levels at all locations during the survey periods in question. It is considered that these conservative assumptions

ensured and will ensure that appropriate noise criteria are applied to Proposed Development.

9.4 CHARACTERISTICS OF THE DEVELOPMENT

The Proposed Development will comprise the construction of the proposed data storage facilities and associated ancillary development over a seven year construction period. The Proposed Development consists of six data storage buildings, an energy centre and associated ancillary development.

When considering a development of this nature, the potential noise and vibration impact on the surroundings must be considered for each of two distinct stages:

- construction phase
- operational phase.

As stated, the construction phase will involve excavation, general site preparation over the development site and the erection of the new buildings over a phased construction period. Comment will also be presented in the following sections in relation to construction traffic on local roads in terms of noise and vibration.

The primary sources of outward noise in the operational context are deemed long term and will involve:

- building services noise;
- emergency site operations, and;
- additional vehicular traffic on public roads.

These issues are discussed in detailed in the following sections.

9.5 POTENTIAL IMPACTS OF THE DEVELOPMENT

9.5.1 Construction Phase

It is predicted that the construction programme will create typical construction activity related noise on site. During the construction phase of the proposed development, a variety of items of plant will be in use, such as excavators, lifting equipment, dumper trucks, compressors and generators.

The proposed general construction hours are 07:00 to 18:00hrs, Monday to Friday and 08:00 to 14:00hrs on Saturdays. Occasional weekday evening works may also be required; however evening activities will be significantly reduced in order to manage any associated noise impacts in an appropriate manner and more stringent construction noise criteria will be applicable during any evening works that may be required. As a result, noise emissions from evening activities are expected to be significantly lower than for other general daytime activities.

Due to the nature of daytime activities undertaken on a construction site there is potential for generation of significant levels of noise. The flow of vehicular traffic to and from a construction site is also a potential source of relatively high noise levels. The potential for vibration at neighbouring sensitive locations during construction is typically limited to excavation works and lorry movements on uneven road surfaces. Due to the proximity of sensitive locations to site works however, there is little likelihood of structural or even cosmetic damage to existing neighbouring dwellings as a result of vibration.

As the construction programme has been established in outline form only, it is difficult to calculate the actual magnitude of noise emissions to the local environment. However, it is possible to predict typical noise levels using guidance set out in BS 5228-1. Table 9.14 outlines typical plant items and associated noise levels that are anticipated for various phases of the construction programme.

For the purposes of the assessment, we have assumed that standard good practice measures for the control of noise from construction sites will be implemented. These issues are commented upon in further detail in the mitigation section of this report.

Table 9.14 Typical Noise Levels associated with Construction Plant Items (BS5228-1)

Phase	Item of Plant (BS 5228-1 Ref.)	Construction Noise Level at 10m Distance (dB L _{Aeq,1hr})
1 – Site Preparation	Pneumatic Breaker (C5.6)	95
	Rock Breaker (C9.12)	85
	Wheeled Loader Lorry (C2 28)	74
	Tracked Semi-Mobile Crusher (C9.14)	90
	Track Excavator (C2 22)	72
	Dozer (C2.13)	78
	Dump Truck (C4.2)	78
2 – Foundations	Large Rotary Bored Piling Rig – Cast In-Situ (C3.14)	83
	Tracked Excavator (C3.24)	74
	Concrete Pump (C3.25)	78
	Compressor (C3 19)	75
	Poker Vibrator (C4 33)	78
3 – Steel Erection	Tower Crane (C4.48)	76
	Sarens SCG 120 Crane	86
	Articulated lorry (C11.10)	77
4 – General Construction	Hand tools	81
	Pneumatic Circular Saw (D7.79)	75
	Internal fit – out	70
5 - Landscaping	Dozer (C2.13)	78
	Dump Truck (C4.2)	78
	Surfacing (D8.25)	68

A number of representative noise sensitive locations have been considered in relation to the Proposed Development as illustrated in Figure 9.4.

Table 9.15 Assessment Locations

ID	Description
NSL01	Single storey residences located to the south west of the development site opposite the junction of the access ramp to the M18.
NSL02	
NSL03	Residence located on the opposite side of the R352 (Tulla Road) set back some 80m from the road edge.
NSL04	Closest residential locations along the R352 (Tulla Road) which share a common boundary of the overall proposed development site.
NSL05	Residence located on the opposite side of the R352 (Tulla Road) set back some 80m from the road edge.
NSL06	
NSL07	Closest residential locations along the R352 (Tulla Road) which share a common boundary of the overall proposed development site.
NSL08	Residence located on the opposite side of the R352 (Tulla Road) set back some 70m from the road edge.
NSL09	Residence located on the opposite side of the R352 (Tulla Road) set back some 25m from the road edge.

ID	Description
NSL10	Closest noise sensitive location to the east of the development site.
NSL11	Closest noise sensitive location to the north of the development site.
NSL12	Noise sensitive location within Knockaneen halting site on the opposite side of the M18 to the west of the development site.

Table 9.16 presents the predicted construction noise levels in the vicinity of the site. Calculations have assumed an on time 66% for each item of plant i.e. 8-hours over a 12 hours assessment period.

For the purposes of the indicative predictions it has been assumed that works are taking place at Locations A, B, C or D on site (see Figure 9.5). The highest predicted construction noise level at a specific assessment for the various construction stages has been detailed in Table 9.16.

Table 9.16 Review of Potential Daytime Construction Noise Impact

Ref.	Baseline Noise Level dB L _{Aeq,1hr}	BS5228-1 Threshold dB L _{Aeq,1hr}	Predicted Construction Noise Level for Various Phases (dB L _{Aeq,1hr})				
			Site Preparation	Foundations	Steel Erection	General Construction	Landscaping
NSL01	60	53	55	48	45	60	53
NSL02	61	55	56	49	46	61	55
NSL03	59	52	54	47	44	59	52
NSL04	60	54	55	49	45	60	54
NSL05	58	52	53	47	45	58	52
NSL06	60	54	56	49	46	60	54
NSL07	63	56	57	51	48	63	56
NSL08	59	53	55	47	44	59	53
NSL09	56	50	53	46	42	56	50
NSL10	43	36	40	32	26	43	36
NSL11	45	39	43	34	32	45	39
NSL12	50	43	46	38	35	50	43

Table 9.16 details the baseline noise level measured at the nearest survey noise monitoring location or based on expected ambient noise levels in the vicinity of the location based on proximity to an existing noise source (e.g. road). If the predicted construction noise level is below this value the associated impact is deemed to be 'Not Significant'.

Where the predicted construction noise level is above the baseline noise level but below the stated BS5228-1 threshold value the associated impact is deemed to be 'Slight' if 5 dB or more below the threshold and 'Moderate' up to the threshold value. If a predicted noise level is below or equal to the BS5228-1 threshold value, the impact is deemed to be 'Not Significant'. Where the predicted construction noise level is 5dB or more higher than the BS5228-1 threshold value the impact is assumed to be 'Moderate' to 'Significant'.

Based on the above rationale, and the predicted noise levels presented the assigned impacts are summarised as follows:

Table 9.17 Review of Potential Daytime Construction Noise Impact

Ref.	Baseline Noise Level dB $L_{Aeq,1hr}$	BS5228-1 Threshold	Construction Phase (dB $L_{Aeq,1hr}$)				
			Site Preparation	Foundations	Steel Erection	General Construction	Landscaping
NSL01	52	65	Moderate	Slight	Slight	Not Significant	Not Significant
NSL02	52	65	Moderate	Slight	Slight	Not Significant	Not Significant
NSL03	52	65	Slight	Not Significant	Slight	Not Significant	Not Significant
NSL04	52	65	Moderate	Not Significant	Slight	Not Significant	Not Significant
NSL05	52	65	Slight	Not Significant	Slight	Not Significant	Not Significant
NSL06	52	65	Moderate	Slight	Slight	Not Significant	Not Significant
NSL07	52	65	Moderate	Slight	Slight	Not Significant	Not Significant
NSL08	52	65	Slight	Slight	Slight	Not Significant	Not Significant
NSL09	52	65	Slight	Not Significant	Slight	Not Significant	Not Significant
NSL10	46	65	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant
NSL11	47	65	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant
NSL12	64	70	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant

There is no item of plant that would be expected to give rise to noise levels that would be considered out of the ordinary or in exceedance of the levels outlined in Table 9.7 or give rise to a significant impact through the process outlined here. In the majority of cases, the construction noise impact is Not Significant; in a number of cases, a Slight to Moderate impact is predicted.

It is anticipated that the construction of the facility will be completed during normal construction hours i.e. 08:00 to 18:00hrs Monday to Friday and 08:00 to 14:00hrs on Saturdays. However, it is possible that the contractor may wish to carry out certain operations outside these hours i.e. evening hours during long summer days etc. Such occurrences will be kept to a minimum and take place over a short timeframe and as such are unlikely to cause excessive disturbance. A more stringent construction noise criteria (as per Table 9.7) will be applicable during any evening works that may be required.



Figure 9.4 Sample Sensitive Locations Considered for Assessment



Figure 9.5 Construction Noise Predictions – Assumed Location of Plant

Construction Traffic

In terms of the additional construction traffic on local roads that will be generated as a result of the Proposed Development the following comment is presented: Considering that in order to increase traffic noise levels by 1dB traffic volumes would need to increase by the order of 25% it is considered that additional traffic introduced onto the local road network due to the construction phase associated with various phases of the development, as outlined in the relevant sections of Chapter 12 will not result in a significant noise impact.

Review of Construction Impacts

In terms of noise associated with these construction activities the associated effect is stated to be:

Quality	Significance	Duration
Negative	Slight to Moderate	Short Term

In terms of vibration due to the distance of activities from the site to the nearest sensitive locations and controlling vibration levels to those detailed in Table 9.7 the associated effect is stated to be

Quality	Significance	Duration
Neutral	Imperceptible	Short Term

9.5.2 Operational Phase

The primary sources of outward noise in the operational context are deemed long term and will involve:

- building services noise;
- emergency site operations; and
- additional vehicular traffic on public roads.

These issues are discussed in detailed in the following sections. See Appendix 9.3 for details of the noise modelling undertaken for this assessment and associated assumptions.

Building Services Noise / Emergency Site Operation

Three scenarios have been developed to consider the noise impact of the proposed operations. These are as follows:

- Scenario A – Proposed Data Storage Facility – Day to Day
- Scenario B – Proposed Data Storage Facility – Emergency
- Scenario C – Proposed Data Storage Facility – Generator Testing

Scenario A would be considered to be the most representative of the day to day operation. Scenario B is representative of emergency situation when a power outage or issue with supply from the national grid has occurred. It should be noted that such an event would be expected to be an extremely rare occurrence.

Scenario C considers the impact associated with the occasional testing of proposed back-up emergency generators on the site. Typically, only two generator units will be

tested at any one time. The assessment presented here assumes the closest generators to existing noise sensitive locations are running when presenting expected noise levels associated with the generator testing.

Figure 9.4 highlights the nearest noise sensitive locations at which predictions have been carried out. Various noise contours are also presented for scenarios A, B and C in order to demonstrate the noise impact of the Proposed Development over a wider area.

The results of the iterations of the noise model are presented in Table 9.18. Note all plant will be selected such that no tonal noise emissions are evident at noise sensitive locations.

Table 9.18 *Predicted Plant Noise Levels for Various Scenarios*

Location	Predicted dB L _{Aeq,T}		
	Scenario A Day to Day	Scenario B Emergency	Scenario C Generator Testing
NSL01	32	41	33
NSL02	32	42	34
NSL03	33	47	35
NSL04	34	53	43
NSL05	33	50	40
NSL06	33	50	39
NSL07	34	54	43
NSL08	35	49	39
NSL09	34	45	38
NSL10	32	36	32
NSL11	29	36	29
NSL12	28	36	29

The above predicted levels are based on a situation where the receiver is downwind of all noise sources. For the purposes of the assessment against the adopted criteria this is a robust worst-case assumption.

Comment on Adopted Noise Criteria Day to Day Operations

The predicted noise levels presented in Table 9.18 have been compared to the relevant daytime, evening and night time noise criteria as adopted for this assessment, presented in Table 9.12. It should be noted that the back-up generator testing shall take place only between 08.00 and 17.00hrs. Residents of the adjacent dwelling houses shall be provided with adequate prior warning of the proposed testing times exceeding 1 hour in duration.

Table 9.19 Comparison of Predicted Noise Levels vs. Adopted Noise Criteria

Location	Period	Scenario A Day to Day			Scenario B Emergency			Scenario C Generator Testing		
		Predicted dB L _{Aeq,T}	Criterion dB L _{Aeq,T}	Complies?	Predicted dB L _{Aeq,T}	Criterion dB L _{Aeq,T}	Complies?	Predicted dB L _{Aeq,T}	Criterion dB L _{Aeq,T}	Complies?
NSL01	Day	32	45	✓	41	55	✓	33	45	✓
	Evening		40	✓				--		
	Night		35	✓				--		
NSL02	Day	32	45	✓	42	55	✓	34	45	✓
	Evening		40	✓				--		
	Night		35	✓				--		
NSL03	Day	33	45	✓	47	55	✓	35	45	✓
	Evening		40	✓				--		
	Night		35	✓				--		
NSL04	Day	34	45	✓	53	55	✓	43	45	✓
	Evening		40	✓				--		
	Night		35	✓				--		
NSL05	Day	33	45	✓	50	55	✓	40	45	✓
	Evening		40	✓				--		
	Night		35	✓				--		
NSL06	Day	33	45	✓	50	55	✓	39	45	✓
	Evening		40	✓				--		
	Night		35	✓				--		
NSL07	Day	34	45	✓	54	55	✓	43	45	✓
	Evening		40	✓				--		
	Night		35	✓				--		
NSL08	Day	35	45	✓	49	55	✓	39	45	✓
	Evening		40	✓				--		
	Night		35	✓				--		
NSL09	Day	34	45	✓	45	55	✓	38	45	✓
	Evening		40	✓				--		
	Night		35	✓				--		

Location	Period	Scenario A Day to Day			Scenario B Emergency			Scenario C Generator Testing		
		Predicted dB L _{Aeq,T}	Criterion dB L _{Aeq,T}	Complies?	Predicted dB L _{Aeq,T}	Criterion dB L _{Aeq,T}	Complies?	Predicted dB L _{Aeq,T}	Criterion dB L _{Aeq,T}	Complies?
NSL10	Day	32	45	✓	36	55	✓	32	45	✓
	Evening		40	✓				--		
	Night		35	✓				--		
NSL11	Day	29	45	✓	36	55	✓	29	45	✓
	Evening		40	✓				--		
	Night		35	✓				--		
NSL11	Day	28	45	✓	36	55	✓	29	55	✓
	Evening		40	✓				--		
	Night		35	✓				--		



Figure 9.6 Scenario A Proposed Data Storage Facility – Day to Day Noise Contour (Extent of 30dB(A))



Figure 9.7 Scenario B Proposed Data Storage Facility (current planning application) – Emergency Noise Contour (Extent of 55dB(A) noise contour)



Figure 9.8 Scenario C Proposed Data Storage Facility (current planning application) – Generator Testing Noise Contour (Extent of 45dB(A) noise contour)

Scenario A All locations are within the relevant adopted daytime, evening and night time limits. All locations comply with the adopted criteria in relation to day to day operations. Figure 9.6 presents a noise contour for Scenario A.

Scenario B All locations are within the relevant adopted emergency operation limit in the rare event that a power loss to the site occurs. Figure 9.7 presents a noise contour for Scenario B.

Scenario C All locations are within the relevant adopted daytime limits by a during periods when two generators are undergoing routine testing. Figure 9.8 presents a noise contour for Scenario C.

Review of Changes in Noise Level

Tables 9.20, 9.21 and 9.22 present the predicted changes in existing noise levels associated with the development for Scenario A at the nearest residential noise sensitive locations to the site.

Table 9.20 Review of Predicted Changes in Existing Noise Levels – Day

Ref.	Daytime (07:00 – 19:00 hrs)				EPA Glossary of Impacts
	Predicted dB L _{Aeq,T}	Background Level dB L _{A90,T}	Cumulative Noise Level (dB(A))	Change in Noise Level (dB)	
NSL01	32	37	38.2	+1.2	Not Significant
NSL02	32	37	38.2	+1.2	Not Significant
NSL03	33	37	38.5	+1.5	Not Significant
NSL04	34	37	38.8	+1.8	Not Significant
NSL05	33	37	38.5	+1.5	Not Significant
NSL06	33	37	38.5	+1.5	Not Significant
NSL07	34	37	38.8	+1.8	Not Significant
NSL08	35	37	39.1	+2.1	Not Significant
NSL09	34	37	38.8	+1.8	Not Significant
NSL10	32	35	36.8	1.8	Not Significant
NSL11	29	40	40.3	+0.3	Not Significant
NSL12	28	43	43.1	+0.1	Not Significant

Review of the predicted increases in noise level at the nearest residential noise sensitive locations conclude that the associated impact is 'Not Significant' at all locations for daytime periods.

Table 9.21 Review of Predicted Changes in Existing Noise Levels – Evening

Ref.	Evening (19:00 – 23:00 hrs)				EPA Glossary of Impacts
	Predicted dB L _{Aeq,T}	Background Level dB L _{A90,T}	Cumulative Noise Level (dB(A))	Change in Noise Level (dB)	
NSL01	32	35	36.8	+1.8	Not Significant
NSL02	32	35	36.8	+1.8	Not Significant
NSL03	33	35	37.1	+2.1	Not Significant
NSL04	34	35	37.5	+2.5	Not Significant
NSL05	33	35	37.1	+2.1	Not Significant
NSL06	33	35	37.1	+2.1	Not Significant
NSL07	34	35	37.5	+2.5	Not Significant
NSL08	35	35	38.0	+3.0	Moderate

Ref.	Evening (19:00 – 23:00 hrs)				
	Predicted dB L _{Aeq,T}	Background Level dB L _{A90,T}	Cumulative Noise Level (dB(A))	Change in Noise Level (dB)	EPA Glossary of Impacts
NSL09	34	35	37.5	+2.5	Not Significant
NSL10	32	30	34.1	+4.1	Moderate
NSL11	29	35	36.0	+1.0	Not Significant
NSL12	28	45	45.1	+0.1	Not Significant

Review of the predicted increases in noise level at the nearest residential noise sensitive locations conclude that the associated impact is 'Not Significant' at ten locations for evening periods and 'Moderate' for the remaining locations.

Table 9.22 Review of Predicted Changes in Existing Noise Levels – Night

Ref.	Night (23:00 – 07:00 hrs)				
	Predicted dB L _{Aeq,T}	Background Level dB L _{A90,T}	Cumulative Noise Level (dB(A))	Change in Noise Level (dB)	EPA Glossary of Impacts
NSL01	32	31	34.5	+3.5	Moderate
NSL02	32	31	34.5	+3.5	Moderate
NSL03	33	31	35.1	+4.1	Moderate
NSL04	34	31	35.8	+4.8	Moderate
NSL05	33	31	35.1	+4.1	Moderate
NSL06	33	31	35.1	+4.1	Moderate
NSL07	34	31	35.8	+4.8	Moderate
NSL08	35	31	36.3	+4.9	Moderate
NSL09	34	31	35.8	+4.8	Moderate
NSL10	32	30	34.1	+4.1	Moderate
NSL11	29	29	32.0	+3.0	Moderate
NSL12	28	32	33.5	+1.5	Not Significant

Review of the predicted increases in noise level at the nearest residential noise sensitive locations conclude that the associated impact is 'Moderate' at eleven locations during night-time periods with the predicted impact being 'Not Significant' at one further location.

It is reiterated the predicted noise levels are within the relevant noise criteria considered suitable for the development considering the guidance outlined in EPA: *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4 – 2016)*.

In terms of noise associated with day to day activities the associated effect is stated to be as follows:

Quality	Significance	Duration
Negative	Not Significant to Moderate	Long Term

Additional Vehicular Traffic on Public Roads

In terms of the additional traffic on local roads that will be generated as a result of this development the following comment is presented: Considering that in order to increase traffic noise levels by 1dB traffic volumes would need to increase by the order of 25% it is considered that additional traffic introduced onto the local road network due to this development will not result in a significant noise impact. The resultant noise impact is **neutral, imperceptible** and **long-term**.

Vibration

There is no source of vibration associated with the day to day operation of the development that will give rise to impacts at nearby sensitive locations. In terms of these the operational phase of the development the associated effect is stated to be:

Quality	Significance	Duration
Neutral	Imperceptible	Long Term

9.6 REMEDIAL AND MITIGATION MEASURES

In order to sufficiently ameliorate the likely noise impact, a schedule of noise control measures has been formulated for both construction and operational phases associated with the Proposed Development.

9.6.1 Construction Phase

With regard to construction activities, reference has been made to BS5228 Parts 1 and 2, which offer detailed guidance on the control of noise and vibration from demolition and construction activities. Various mitigation measures will be considered and applied during the construction of the Proposed Development. As an example, the following measures will be implemented on site:

- limiting the hours during which site activities likely to create high levels of noise or vibration are permitted;
- establishing channels of communication between the contractor/developer, Local Authority and residents;
- appointing a site representative responsible for matters relating to noise and vibration;
- monitoring levels of noise and/or vibration during critical periods and at critical sensitive locations; and
- all site access roads will be kept even so as to mitigate the potential for vibration from lorries.

Furthermore, a variety of practicable noise control measures will be employed, such as:

- selection of plant with low inherent potential for generation of noise and/ or vibration;
- erection of barriers as necessary around items such as generators or high duty compressors;
- situate any noisy plant as far away from sensitive properties as permitted by site constraints and the use of vibration isolated support structures where necessary.

We would recommend that vibration from construction activities to off-site residences be limited to the values set out in Table 9.8. It should be noted that these limits are not absolute but provide guidance as to magnitudes of vibration that are very unlikely to cause cosmetic damage. Magnitudes of vibration slightly greater than those in the table are normally unlikely to cause cosmetic damage, but construction work creating such magnitudes should proceed with caution. Where there is existing damage these limits may need to be reduced by up to 50%.

Note Appendix 9.4 presents an recommended construction noise and vibration management plan that will be implemented in terms of the day to day operation of the site. This will focus on opening up and maintaining lines of communication with the local community to address issues in relation to noise and/or vibration and to advise the community of periods where specific activities take place (e.g. rock breaking) that have an increased potential in giving rise to issues off site (Note: no rock breaking is anticipated as part of the Proposed Development).

9.6.2 Operational Phase

Building Services Noise / Emergency Site Operation

Noise from external plant will be minimised by the following measures:

- Purchasing low noise generating equipment, and;
- Incorporating appropriately specified in line attenuators for stacks and exhausts where necessary.

With due consideration as part of the detailed design process, this approach will result in the site operating well within the constraints of the best practice guidance noise limits that have been adopted as part of this detailed assessment.

Additional Vehicular Traffic on Public Roads

The noise impact assessment outlined previously has demonstrated that mitigation measures are not required.

9.7 PREDICTED IMPACTS OF THE DEVELOPMENT

This section summarises the likely noise and vibration impact associated with the Proposed Development, taking into account the mitigation measures.

9.7.1 Construction Phase

During the construction phase of the Proposed Development there will be some impact on nearby noise sensitive properties due to noise emissions from site traffic and other activities. The application of noise limits and hours of operation (i.e. as per Table 9.7 and Section 9.2.4), along with implementation of appropriate noise and vibration control measures (as summarised in Section 9.6.1), will ensure that noise and vibration impact is kept to a minimum. Also, it is reiterated that any construction noise impacts will be **slight to moderate** (dependant on location), **negative** and **short-term** in nature. Also, it is considered that as the Proposed Development progresses from initial ground works that construction noise impacts will reduce from slight to **not significant**.

9.7.2 Operational Phase

Building Services Noise / Emergency Site Operation

Proprietary noise and vibration control measures will be employed in order to ensure that noise emissions from building services plant do not exceed the adopted criterion at the façade of any nearby noise sensitive locations. In addition, noise emissions should be broadband in nature and should not contain any tonal or impulsive elements. The resultant noise impact is **negative, not significant to moderate** (dependant on location) and **long-term**.

It is reiterated the predicted noise levels are within the relevant noise criteria considered suitable for the development considering the guidance outlined in EPA: *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4 – 2016)*.

Additional Vehicular Traffic on Public Roads

Any change in noise levels associated with vehicles at road junctions in the vicinity of the Proposed Development is expected to be **imperceptible**. The resultant noise impact is **neutral, imperceptible** and **long-term**.

9.8 CUMULATIVE IMPACTS

During construction of the Proposed Development it is anticipated that construction work on the Proposed Development site will be an audible noise source for certain periods / activities at certain locations. Any construction being completed at other sites within the study area, whilst potentially significant in their own right, as a matter of good practice, would be expected to control impacts on nearest noise sensitive locations to these sites within appropriate limits. Once the mitigation measures outlined in Section 9.6 of Chapter 9 are implemented there should be no significant cumulative impact with permitted, planned or existing developments (as outlined in Chapter 3 Appendix 3.1) as a result of the Proposed Development. There are no similar construction developments noted as being undertaken at the same time as the Proposed Development.

The environmental noise survey takes account of noise emissions from existing developments. It was noted that the existing ambient noise levels in the area were dominated primarily by road traffic on the surrounding road network. The potential cumulative noise emissions during the operational phase of the entirety of the Proposed Development have been modelled with cumulative predicted noise levels presented in Table 9.18 and Figure 9.6 in Chapter 9. In addition, a cumulative assessment, identifying expected increases in noise level is presented in Tables 9.20, 9.21 and 9.22 of Chapter 9. In terms of noise associated with day to day activities the associated effect is stated to be as follows, **negative, not significant to moderate** (dependent on location) and **long term**.

It is reiterated the predicted noise levels are within the relevant noise criteria considered suitable for the development considering the guidance outlined in EPA: *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4 – 2016)*.

9.9 RESIDUAL IMPACTS

The construction noise assessment has shown that in accordance with the 'significance' thresholds presented in the *British Standard BS 5228 – 1: 2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Noise* there is not a significant impact at residential locations, subject to the implementation of the mitigation measures outlined in Section 9.6.1.

The robust analysis of potential operational phase plant has shown that in accordance with the scale in the EPA Draft EIA Report Guidelines 2017 there will be a **not significant to moderate** (dependant on location), **negative, long term** impact at the closest residences identified on Figure 9.4. Ambient noise (i.e. $L_{Aeq,T}$) levels are, and will continue to be, dictated by road traffic noise in the area while a low level of plant noise is expected to be audible during lulls in other sources (e.g. distant traffic noise). The predicted change in background noise level due to current application is in the range of 2 to 6 dB during night-time periods. It is reiterated the predicted noise levels are within the relevant noise criteria considered suitable for the development considering the guidance outlined in EPA: *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4 – 2016)*.

The operational noise assessment of vehicle movements associated with the site has shown that in accordance with the scale in the EPA Draft EIA Report Guidelines 2017 there will be an **imperceptible, neutral, long-term** impact off site noise sensitive locations considering existing traffic volumes on the local road network.

Interactions are addressed in Chapter 16 of this EIA Report.

9.10 REFERENCES

- EPA Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIA Reports) (2017) and draft revised Guidelines on information to be contained in Environmental Impact Statements; and Advice Notes for preparing EIS (2015).
- Draft '*Guidelines for Noise Impact Assessment*' produced by the Institute of Acoustics/Institute of Environmental Management and Assessment Working Party.
- *British Standard BS 5228 – 1: 2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Noise*.
- Transport Infrastructure Ireland (TII) publication *Guidelines for the Treatment of Noise and Vibration in National Road Schemes*.
- British Standard BS 7385: 1993: *Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration*.
- British Standard BS 5228-2: 2009+A1:2014: *Code of practice for noise and vibration control on construction and open sites – Vibration*.
- BS 8233:2014: *Guidance on sound insulation and noise reduction for buildings*.

- Environmental Protection Agencies *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)* (January 2016).
- ISO 1996-2:2017 *Acoustics - Description, measurement and assessment of environmental noise – Part 2: Determination of environmental noise levels*.
- British Standard *BS 6472 (1992): Guide to Evaluation of human exposure to vibration in buildings (1Hz to 80Hz)*.
- ISO 9613 (1996): *Acoustics – Attenuation of sound outdoors – Part 2: General method of calculation*.
- *Calculation of Road Traffic Noise (CRTN)* issued by the Department of Transport in 1988.
- BS EN 1793-1:1998: Road traffic noise reducing devices – Test method for determining the acoustic performance – Part 1: Intrinsic characteristics of sound absorption
- BS EN 1793-2:1998: *Road traffic noise reducing devices – Test method for determining the acoustic performance – Part 2: Intrinsic characteristics of airborne sound insulation*.
- BS EN 1794-1:2003: Road traffic noise reducing devices. Non-acoustic performance. Mechanical performance and stability requirements
- BS EN 1794-2:2003: Road traffic noise reducing devices. Non-acoustic performance. General safety and environmental requirements.

10.0 LANDSCAPE AND VISUAL IMPACT ASSESSMENT

10.1 INTRODUCTION

Art Data Centres is seeking Planning Permission for a Data Centre, Vertical Farm, and associated infrastructure on a c. 60 ha site at Tulla Road, Spencilhill, to the northeast of Ennis, as described in more detail in Chapter 2. Figure 1 *Site Extents* maps the site location. The site is allocated in the adopted *Clare County Development Plan 2017 - 2023 (As Varied)*. Figure 10.1 illustrates the extents of the site boundary.

This Landscape and Visual Impact Assessment (LVIA) has been prepared to identify potential landscape and visual impacts arising from the development of this site. The assessment of the landscape and visual impact arising from the proposal has taken account of the proposed built form together with the landscaping proposals. The findings of this Assessment will inform Clare County Council (the Council) in determining the Application for the site.

10.2 METHODOLOGY

The methodology of this LVIA follows the Guidelines for Landscape and Visual Impact Assessment (3rd Edition, 2013) (GLVIA) published by the Landscape Institute and the Institute of Environmental Management and Assessment¹.

10.2.1 Study Area

An approximate extent of visibility was initially determined through OS mapping, online mapping, and aerial imagery. The findings of this desktop study were later followed up and confirmed by a field study on 3rd March 2021. As a result of these initial studies a preliminary 10km LVIA Study Area was identified. The 10km distance was based on a combination of the desktop analysis and previous professional experience in relation to the distance within which significant impacts can potentially occur for a proposal of this type.

Zone of Theoretical Visibility (ZTV) mapping has been prepared to aid in the assessment process and to confirm the extent of the study area for the LVIA. The ZTVs have been generated using the digital terrain modelling (DTM) data of the existing landform. DTM data does not take cognisance of the height of intervening built form or vegetative cover and is based purely on a bare ground surface. The ZTV defines the extent from which the proposal will be theoretically visible (the extent of land/sea from which it may be possible to see any part of the proposal). It is correct in so much as it confirms where the proposal will not be visible. As the DTM used was for the existing landform it does not take account of the proposed bunds, which will further reduce actual visibility to some degree. The ZTV is used to gauge the anticipated effects of the proposal upon the wider visual amenity.

A Preliminary ZTV was generated to cover the preliminary 10km LVIA Study Area to confirm the likely extent of visibility as a result of the proposal. A draft layout of the

¹ Landscape Institute and Institute of Environment Management and Assessment, *Guidelines for Landscape and Visual Impact Assessment*, 3rd Edition, 2013

proposals dated 1st March 2021 was used as the basis for the generation of the Preliminary ZTV.

The Preliminary ZTV indicated that the extents of potential visibility beyond 5km from the proposed development were relatively limited and broken. As such actual visibility, given intervening built forms and vegetation, will be very limited. It was therefore decided to reduce the LVIA Study Area to a 5km radius from the Site Boundary in order to ensure a focused LVIA. This LVIA Study Area is illustrated in Figure 10.3.

10.2.2 Planning Context

A review of policy comprising the *Clare County Development Plan 2017 - 2023 (As Varied)* has been carried out. This identifies the policies and designations of relevance to the production of an LVIA. The designations set by the *Landscape Designations* map for the adopted County Development Plan are shown in Figure 10.5.

10.2.3 Establishing the Baseline

The visual character and amenity of the Study Area is assessed to establish the baseline against which landscape and visual effects can be quantified. This process is informed by the ZTV and allows appropriate receptors to be identified. These receptors represent a range of views and viewer types from where the proposed development is likely to be visible. In addition, this process allows specific receptors to be identified that are particularly sensitive and accordingly, require special consideration.

10.2.3.1 Landscape Baseline

The landscape baseline addresses the site within its wider landscape context and describes the landscape character, condition, and value, including any landscape designations or sensitivities within the Study Area.

10.2.3.2 Landscape Fabric

The landscape fabric comprises the separate components that when combined form the overall landscape of the site. These components include:

- Location and Access
- Boundaries
- Landform and Hydrology
- Land Use and Land Cover

The elements that form these components are described in Section 10.4.1 of this report. The main landscape features of the site are illustrated in Figure 10.1.

10.2.3.3 Landscape Character

The *Landscape Character Assessment of County Clare*, carried out in 2004 by ERM Ireland Ltd, is reviewed to identify the baseline character of the site and the wider landscape. The Landscape Character Areas for the site and the Study Area are illustrated in Figure 10.4.

10.2.3.4 Landscape Designations

The review of the relevant planning policy identifies the designations and classifications which should be taken into account in this LVIA. A review of other relevant sources is also carried out to identify any further classifications that may be of relevance. The designations and classifications within the Study Area are mapped in Figure 10.5.

10.2.3.5 Visual Baseline

Visual receptors include users of public footpaths and cycle ways, users of roads and railways and views of or from within valued landscapes. Potential receptors were identified through desk study using OS mapping, aerial imagery and the ZTV. The key routes within the Study Area are mapped in Figure 10.6.

An initial list of representative viewpoint locations was prepared based on a desktop exercise. The selection of the viewpoints was based on the extent of visibility illustrated by the ZTV and the landscape and visual receptors identified within the Study Area. This initial list of viewpoint was then analysed on site to identify if actual views were feasible.

Table 10.1 below sets out the final list of the six LVIA viewpoints. Three visualisations are provided for each viewpoint illustrating the proposed development:

1. Upon completion of Phase 1 (after minimum 1 year establishment of the structure planting)
2. Upon full completion (after minimum 5 years establishment of the structure planting)
3. After minimum 15 years establishment of the structure planting (approx. 10 years after completion of the proposed development).

Table 10.1 Agreed LVIA Viewpoints

No.	Viewpoint Name	Representative of
1	R352 South of Site	Users of the regional road, Residential dwellings, 'Ennis Drumlin Farmland' LCA, 'Working Landscape' designation, Views from the South
2	West of R352-M18 roundabout	Users of the regional road, 'Ennis Drumlin Farmland' LCA, 'Working Landscape' designation, Views from the Southwest
3	M18 (Adjacent service track) West of Site	Users of the motorway, 'Ennis Drumlin Farmland' LCA, 'Working Landscape' designation, Views from the West
4	L4608 North of Site at Cappagh More	Users of the local road, 'Ennis Drumlin Farmland' LCA, 'Working Landscape' designation, Views from the North
5	L4608 at Ballymacahill	Users of the local road, 'Ennis Drumlin Farmland' LCA, 'Working Landscape' designation, Views from the northwest
6	R352 at TII Depot to west of M18	Users of the regional road, Settlement, 'Ennis Drumlin Farmland' LCA, 'Working Landscape' designation, Views from the Southwest

A number of secondary potential viewpoints were identified. However, as potential visibility from these locations is very limited or unlikely, it was decided to include single image views, rather than montages. Two views from the motorway are also included and as these are not safely accessible locations, images from Google Streetview have been included instead. These secondary views help to demonstrate that visibility of the proposed development will be unlikely from these locations. These secondary views are listed in the following table and included in Appendix 10.1.

Table 10.2 Agreed Secondary Viewpoints

No.	Viewpoint Name
A	R352 at Tullyvaghan junction
B	R352, at entrance to Rath Ban Housing Development
C	Junction of L 4608 (Ballymacahill Road) and R352, and opposite side of R352
D	Within Rath Ban Housing Development - centre section, at the eastern extreme of the development
E	Within Rath Ban Housing Development - Northern end section, at the eastern extreme of the development
F	Ballymachill Road
G	Gort Leamhain Housing Development, Eastern extreme of the development
H	Knockanean National School
I	Cappagh Beg
J	M18, at Ballymachill Road Passover
K	M18, at Rail line Passover
L	R469 (Quin Road), at Fergus River
M	N85, at Railway Line

The locations of all the viewpoints are identified on Figure 10.9.

10.2.4 Nature of Receptor

The sensitivity of a receptor is defined by GLVIA3 as the combination of *...judgements of the susceptibility of the receptor to the specific type of change or development proposed and the value related to that receptor*. Susceptibility is defined by GLVIA3 as *...the ability of defined landscape or visual receptor to accommodate the specific proposed development without undue negative consequences*. The baseline analysis considers the existing elements and their character, condition, and value to determine sensitivity.

A breakdown of this analysis is shown in the following table:

Table 10.3: Landscape Sensitivity

Sensitivity	Landscape Effects	Visual Effects
High	Landscape value recognised by existing or proposed designation. Sense of tranquillity or remoteness specifically noted in Landscape Character Assessment. High sensitivity to disturbance specifically noted in Landscape Character Assessment. The qualities for which the landscape is valued are in a good condition, with a clearly apparent distinctive character. This distinctive character is susceptible to relatively small changes.	Viewers' attention very likely to be focused on landscape e.g., users of strategic recreational footpaths and cycle ways, and people experiencing views from important landscape features of physical, cultural, or historic interest, beauty spots and picnic areas. Residents experiencing views from dwellings.
Medium	Landscape value is recognised locally, but not designated; the landscape is relatively intact, with a distinctive character; and the landscape is reasonably tolerant of change.	Viewers' attention may be focused on landscape, such as road or rail users, users of secondary footpaths, and people engaged in outdoor sport or recreation (other than appreciation of the landscape) e.g., fishing, water sports, golf
Low	Landscape value is low (e.g., industrial landscapes) with no designations; landscape integrity is low, with a landscape in poor condition and a degraded character; and the landscape has the capacity to potentially accommodate significant change.	Viewers' attention not focused on landscape e.g., workers or people engaged in outdoor recreation whose attention may be focussed on their activity rather than the landscape. Views from heavily industrialised areas.

10.2.5 Nature of Effects

This relates to the effect of the proposal on each landscape or visual receptor and considers the magnitude of change as a result of the proposal. The effect on each receptor will be assessed in terms of its size and scale, the geographical extent of the area influenced, and its duration and reversibility. Effects can be negative (adverse), positive (beneficial) or neutral in quality. Effects in this Assessment are considered to be negative (adverse) unless otherwise stated. Effects can also vary in duration or even be reversible. Effects in this assessment are considered to be 'long term' unless otherwise stated.

In accordance with GLVIA3, informed professional judgement is made to determine the magnitude of change. In order to maintain a consistency and transparency to the assessment process, the following table provides a guide to the determination levels of magnitude of change.

Table 10.4 Magnitude of Change

Magnitude of Change	Landscape	Visual
High	Total loss or considerable alteration / interruption of key elements, features or characteristics of the landscape character / designation resulting in a fundamental change to baseline conditions.	Dominant / Prominent Highly noticeable change, affecting most key characteristics and dominating the experience of the landscape. The introduction of incongruous development. A large proportion of the view is affected.
Medium	Partial loss or alteration to one or more key elements, features or characteristics of the baseline, resulting in localised change to the landscape character and composition within a broader unaltered context.	Conspicuous Noticeable, partial change to a proportion of the landscape affecting some key characteristics and the experience of the landscape. The introduction of some uncharacteristic elements. Part of the view is affected.
Low	Minor loss or alteration to one or more key elements, features or characteristics of the baseline landscape so that the change arising from the loss / alteration would be discernible, but the underlying landscape character and composition would be similar to baseline.	Apparent Apparent minor change, affecting some characteristics and the experience of the landscape to an extent. The introduction of elements that are not uncharacteristic. A small proportion of the view is affected.
Negligible / No Change	Very limited or imperceptible loss or alteration to one or more key elements, features or characteristics of the baseline. The change will be barely distinguishable. No aspect of the proposed development will be discernible. No aspect of the proposed development will be discernible.	Inconspicuous Little perceptible change. The proposal will result in no appreciable change to the view. May go unnoticed.

10.2.6 Level of Effect and Significance

The likely level of the landscape and visual effects are assessed through a combination of the sensitivity to change and the magnitude of change. The diagram below defines categories for likely levels of effect. However, formulaic conclusions cannot be drawn directly from the categories for the levels of effect of effect and the

significance. Conclusions are therefore qualified by the professional judgement of the landscape architect.

Table 10.5: Level of Effect

Significance of Effect	Magnitude of change			
	High	Medium	Low	Negligible / No Change
Sensitivity				
High	Major			
Medium	Moderate		Minor	
Low			Negligible / No Change	

In line with the recommendations in GLVIA3 the above matrix is not used as a prescriptive tool or arithmetically, and the methodology and analysis of potential effects at any particular location must allow for the exercise of professional judgement. Descriptions of effects, especially those considered significant in EIA terms, are described in narrative text.

In accordance with the EPA guidelines the Significance is determined as per Table 10.6 below.

Table 10.6 Level of Significance

Term	Description
Imperceptible	An effect capable of measurement but without noticeable consequences
Not significant	An effect which causes noticeable changes in the character of the environment but without noticeable consequences
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
Moderate	An effect that alters the character of the environment in a manner consistent with existing and emerging trends
Significant	An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the environment.
Profound	An impact which obliterates sensitive characteristics

10.2.7 Methodology for the Photomontages

The photomontages model representations of the proposal. The digital modelling used for the photomontages is verifiable. The photomontages for this assessment were prepared by Innovision, Sligo Airport Business Park, Strandhill, Co. Sligo. Where applicable, Innovision adheres to the guidelines as set out by the British Landscape Institute Technical Guidance Note 06/19 - “*Visual Representation of Development Proposals*”. Using professional cameras and tripod set-up, and with a selection of lenses, Innovision will carry out the field work at the best available weather opportunity. All necessary additional information is captured on-site including camera position, date and time, as well as locations of any key objects which can aid

accurate placement of the proposal. The above information is recorded using mapping-grade professional GPS equipment.

Once the field work has been carried out and photography processed, the proposed development will be “placed” into the existing photography using professional GIS and 3D modelling software. Once placement has been achieved, a photo-realistic render is output depicting what the proposed development will look like if built. At this point, any landscape mitigation can be added to the image if necessary. The resulting output is a highly accurate, verifiable photomontage. This methodology and modelling process renders an accurate representation of the proposal.

10.2.8 Approach to Mitigation

Mitigation measures are designed to avoid, reduce, or offset adverse effects arising from the proposal. By taking a flexible approach to design and building a degree of mitigation into the design through an iterative process from the outset, the overall scale of adverse effects can be reduced, and optimum environmental fit of the proposal can be achieved.

Mitigation falls into two main categories: primary and secondary.

Primary mitigation is comprised of fundamental measures undertaken as part of the iterative design process. This includes aspects such as the spatial organisation of the site, used to avoid or reduce adverse effects on either the landscape or visual resource. These are based on principles of good design and also emerge in response to technical assessment. This is part of an iterative design process and seeks to develop the site in the most effective way possible, taking account of all relevant considerations. Section 3.6.3 *Alternative Layouts/Designs* of Chapter 3 sets out the alternative building layouts that were considered and the reasons for the selection of the chosen option.

Secondary mitigation measures are designed to address any remaining adverse effects of the final development proposals following primary mitigation. These could include mounding or planted buffer zones for screening effect. However, there may also be no requirement for secondary mitigation measures if both the design approach and primary mitigation measures have already removed any significant adverse effects and the optimal environmental fit has been achieved.

Residual effects are those remaining following primary and secondary mitigation.

Screening of a development is not always the best or most appropriate option. In many circumstances it is better to provide a framework and principles to create an appropriate balance of built development and open space. This improved balance helps integrate with existing patterns of development within the surrounding context. The proposal can therefore contribute positively to the landscape and visual character of the area.

For the purposes of this project, mitigation was embedded in the design of the proposal. As such there is no pre-mitigation scenario to assess. Therefore, as the mitigations measures were inherent to the design of the proposal, and not part of a separate design process, the LVIA assess the residual effects directly.

10.3 PLANNING CONTEXT

10.3.1 Introduction

The site is zoned and designated for the use and development of data centres and power generating infrastructure in the *Variation No.1* to the Clare County Development Plan 2017-2023. This variation to the Development Plan was adopted on 11th March 2019.

The variation provides the following summary of the changes:

(1) Volume 1 - Written Statement of the Clare County Development Plan 2017-2023:

- *To incorporate the use and development of data centres and power generating infrastructure into the enterprise zoning definition, the following additional text has been added into the zoning objective for enterprise as set out in Chapter 19*

Lands zoned for 'enterprise' shall be taken to include the use and development of land for high end research and development, business science and technology-based industry, financial services, call centres/telemarketing, software development, data centres, enterprise and incubator units, small/medium manufacturing or corporate office in high quality campus/park type development.

It is intended that such developments will have high quality architectural design and landscaping. This zoning allows for 'walk to' support facilities such as canteen, restaurant or crèche services which are integrated into employment units and are of a nature and scale to serve the needs of employees on the campus.

This zoning also allows for associated power generating infrastructure as well as transportation infrastructure such as car and bicycle parking and bus stop shelters. This zoning excludes general retail, retail park outlets, motor sales/servicing activities and heavy industrial undertakings.

Lands zoned for 'enterprise' in large villages and small villages shall be taken to include the use and development of land for small-scale business and enterprise development such as incubator units, craft centres/workshops, small-scale manufacturing, local digital/technology business etc. Retail use on these sites shall only be considered where it is ancillary to the main activity taking place.

Enterprise developments in large villages and small villages must have a high standard of architecture and landscaping and must be relative and appropriate to their scale, size and character.

10.3.2 Planning Policy

10.3.2.1 Variation No.1 to the Clare County Development Plan 2017-2023

The variation sets out the following in relation to planning policy for the zoned lands:

Site ENT3 Toureen

Project Ireland 2040 - National Planning Framework sets out the strategic importance of data centres in Ireland's Enterprise Strategy. Having regard to the Government Statement on The Role of Data Centres in Ireland, which in particular recommends having a plan-led approach to data centres, this 55ha site has been identified and zoned as Enterprise (45ha) and Buffer (10ha) with a specific use for a Data Centre Campus due to; its proximity to the electricity sub-station; its proximity to the M18 motorway and adjoining regional road network; the location of the site relative to the Gas Pipeline; the availability of Dark Fibre and the proximity of the site to Shannon International Airport and Ennis Town.

This site is zoned to accommodate a Data Centre campus which consists of one or more than one structure, used primarily for the storage, management and dissemination of data and the provision of associated power electricity connections and energy generating infrastructure. Development proposals for this site shall include the following;

- *A Traffic Management Plan for the construction and operation phase of development.*
- *Any proposed development shall adopt sustainable practice in terms of building design, materials, construction and operation.*
- *A Hydrological Assessment to determine the effects of the development on groundwaters and groundwater quality shall be submitted with development proposals for the site.*
- *At the southern boundary of the site is a mesotrophic lake, which will require protection through the provision of a buffer incorporating the dense clump of trees to the west of the lake and shall be included in an overall Landscape Management Plan for the site.*
- *A Construction and Environmental Management Plan shall be submitted as part of development proposals on site. This shall include a Flood Risk Assessment, a Surface Water Management Plan for the construction and operation phase of the development, a Pollution Prevention Plan and shall incorporate principles of Sustainable Urban Drainage Systems. During the construction phase of developments on site where applicable all relevant best practice guidelines shall be adhered to.*
- *An Air Quality Impact Assessment with reference to potential impacts on European Sites and the surrounding area within the zone of influence of the proposed development shall be submitted, this shall inform an Appropriate Assessment Screening report and/or Natura Impact Report.*
- *The hedgerows and scrub area on this site provide a potential foraging and commuting area for wildlife including Lesser Horseshoe bats. Future development proposals must be informed by a series of bat surveys to record the known usage of the site by in particular Lesser Horseshoe bats and ensure that there is no net loss of supporting habitat. The surveys must include a full light spill modelling study. Any habitat loss must be offset by additional landscape planting to ensure connectivity across the landscape.*
- *Impacts of development of the site on conservation interest bird species of surrounding SPAs and breeding birds should be avoided, through protection and retention of breeding bird habitat in accordance with the Wildlife Acts. Development proposals for the site shall be accompanied by bird surveys (to include a winter bird survey) to assess the use of the site by bird species and where disturbance and/or displacement are predicted appropriate mitigation measures shall be identified. Hedgerow and treeline pruning or removal shall be conducted outside the breeding bird season (March 01st through August 31st).*
- *An Ecological Impact Assessment (designed by an appropriately qualified landscape architect and ecologist) and a Habitat Survey shall form part of development proposals for the site.*
- *A Landscape and Biodiversity Management plan shall be submitted to provide landscape, visual and environmental screening and enhancement measures through planting and design.*
- *An Invasive Species Survey and Management plan (if required) shall accompany development proposals for the site.*

- *Development proposals shall also include an Otter Use Survey of the site, and where disturbance and/or displacement are predicted appropriate mitigation measures shall be identified.*
- *A buffer will be required to be provided with regard to the location of a National Monument (CL-034-007) on site.*
- *Adequate wastewater treatment and disposal measures shall accompany development proposals for this site to ensure that there is no impact to water quality in the area.*

Of particular note to the preparation of this LVIA are the following elements:

- Provision of a buffer around the mesotrophic lake at the southern boundary of the site;
- Provision of a Landscape and Biodiversity Management plan to provide landscape, visual and environmental screening and enhancement measures through planting and design; and
- Provision of a buffer to the Recorded Monument (CL-034-007) (This is mistakenly referred to as a 'National Monument' in the Variation).

10.3.2.2 Clare County Development Plan 2017 - 2023 (As Varied)

There are a range of development management policies that are of relevance in the determination of a planning application for the proposal. These include Development Plan Objectives, setting out design requirements, and those policies related to safeguarding and improving the environment.

The following *Development Plan Objectives* are most relevant to the appraisal of landscape and visual effects:

CDP13.3 Development Plan Objective: Western Corridor Working Landscape

The Development Plan designates the landscape within which the site is located as a *Working Landscape*. These are ...*areas within Settled Landscapes that contain pockets of concentrated development or a unique natural resource*. The following *Development Plan Objective* is of relevance to development within the area of this landscape designation:

It is an objective of the Development Plan:

- A. To permit development in these areas that will sustain economic activity, and enhance social well-being and quality of life - subject to conformity with all other relevant provisions of the Plan and the availability and protection of resources;*
- B. That selection of appropriate sites in the first instance within this landscape, together with consideration of the details of siting and design, are directed towards minimising visual impact;*
- C. That particular regard should be given to avoiding intrusions on scenic routes and on ridges or shorelines. Developments in these areas will be required to demonstrate:*
 - i. That the site has been selected to avoid visually prominent locations;*

- ii. *That site layouts avail of existing topography and vegetation to reduce visibility from scenic routes, walking trails, public amenities and roads;*
- iii. *That design for buildings and structures reduce visual impact through careful choice of form, finishes and colours and that any site works seek to reduce visual impact of the development.*

CDP14.17 Development Plan Objective: Woodlands, Trees and Hedgerows

It is an objective of Clare County Council:

- A. *To preserve and conserve individual or groups of trees identified in Volume 2 of this Plan as ‘Trees for Preservation’ which will enhance the character and appearance of an area;*
- B. *To carry out tree survey work during the lifetime of this Plan to identify future trees of importance in the County and facilitate their future protection;*
- C. *To protect individual or groups of trees within the Plan area which are important for environmental, recreational, historical, biodiversity and/or aesthetic reasons or by reason of contribution to sense of place, including groups of trees which correspond with protected habitats, or which support protected species, under the Habitats Directive;*
- D. *To work with landowners, local communities and other relevant groups to promote the retention and conservation of existing trees and hedgerows and encourage development proposals that enhance the landscape through positive management and additional planting/ sensitive replanting of native tree species;*
- E. *To protect woodlands and hedgerows from damage and/or degradation and to prevent disruption of the connectivity of woodlands and hedgerows of the County;*
- F. *To ensure, where required, applications for development include proposals for planting / leave a suitable ecological buffer zone, between the development works and areas/ features of ecological importance;*
- G. *Where hedgerows are required to be removed in the interests of traffic safety or where breaches to hedgerows occur due to river drainage/maintenance works and flood repair, to require the applicant/developer to replace the hedgerows with suitable native species to the satisfaction of the Council;*
- H. *To require each large green space in new residential developments to have at least one native oak tree, or other naturalised tree species of similar stature and lifespan, integrated into the agreed planting/ landscaping scheme;*
- I. *To require, where possible, that all trees felled as a result of development proposals be replaced at a minimum ratio of 10 new native species per 1 tree felled.*

CDP14.27 Development Plan Objective: Green Infrastructure

It is an objective of Clare County Council:

- A. *To create an integrated and coherent green infrastructure network to enhance biodiversity and quality of life, provide sustainable water management and a green setting for urban areas;*

- B. To facilitate the on-going development and improvement of green infrastructure in the Plan area, including green networks, green amenities and linked green corridors which ensure the provision of recreational amenities, natural areas for the growth of wildlife and biodiversity, and a network of infrastructure which results in a better quality of life for visitors and inhabitants alike;*
- C. To implement the adopted green infrastructure plan for Shannon town and its environs;*
- D. To prepare green infrastructure plans for Ennis and Kilrush during the lifetime of this Plan;*
- E. To work with community groups to access funding for appropriate and beneficial green infrastructure projects including parks, woodlands, sports facilities, green areas, playground/play facilities, river corridors, walkways, cemeteries, churchyards, paths, seating and amenities;*
- F. To require the preparation and assessment of all planning applications associated with amenity and/or recreational uses under the heading of green infrastructure to have regard to the information, data and requirements of the Natura Impact Report, SEA Environmental Report and Strategic Flood Risk Assessment Report contained in Volume 10 of this Development Plan;*
- G. To require projects to be fully informed by ecological and environmental constraints at the earliest stage of project planning and any necessary assessment to be undertaken, including assessments of disturbance to species, where required;*
- H. To ensure compliance with all relevant legislation as outlined in Objective CDP2.1.*

10.3.3 Planning Context Summary

Compliance with the above policies needs to be assessed at the time of determination of the Application. However, the development principles and criteria within these policies, are of relevance in assessing the landscape and visual impact of the proposal.

The level of design detail presented in this Application reflects the status of the proposal. It is adequate to assess the landscape and visual impacts arising from the proposal.

The development process, particularly in relation to greenfield development, will inevitably result in a change to the site resulting from the transformation in land use, with a consequential alteration to the character of the site.

Evaluating the proposal in terms of how well green infrastructure and green networks are incorporated, allows an assessment to be made of how appropriate the proposed design solution is within its landscape and visual context.

The consideration of green infrastructure considers the key elements of landscape setting; habitat and biodiversity; flooding and drainage; and contribution to the existing green network.

10.4 LANDSCAPE BASELINE

10.4.1 Landscape Fabric of the Site

The landscape fabric comprises the physical elements which make up the landscape, such as location, landform, and land cover. These physical elements are described below. The existing landscape context of the site is shown in Figure 10.1.

10.4.1.1 Location

The site is located to the northeast of the settlement of Ennis, on the opposite side of the M18 motorway. The R352, Tulla Road abounds the southern boundary of the site. An electricity substation is located to the southwest of the site, at the junction between the M18 and the R352 (M18, Junction 13). Pastoral farmland generally abounds the boundary to the north, with woodland to the east.

The main existing access to the site is a track the enters the site off the R352 Tulla Road along the eastern section of the southern boundary. This track provides access to a couple of houses and a farmyard within the site as well as a second farmyard beyond the site to the north.

A second access is located off the R352 to the south of Tooreen Lough. This entrance provides access to two further houses and associated farmyards. A further third access is located in the southwest of the site and provides access to the more southern of the two motorway SuDS ponds.

10.4.1.2 Landform and Hydrology

The landform is undulating in nature as a result of the drumlins that cover the site. Over and above the drumlins the landform is generally falls from the east to the west. The most elevated location is the summit of a larger hill in the southeast of the site, at an elevation of approximately 47.5m AOD. The lowest point, in the west of the site, is adjacent to the motorway SuDS ponds at an elevation of approximately 7m AOD.

A number of small seasonal waterbodies are located towards the northern and eastern boundaries with the larger permanent mesotrophic lake of Tooreen Lough located towards the southern boundary. A development exclusion buffer is required around Tooreen Lough incorporating the dense clump of trees to the west of the lake.

A small watercourse runs along the northern half of the western site boundary before heading westwards through a culvert under the M18 motorway. The watercourse passes between two motorway SuDS ponds before passing under the motorway. These SuDS ponds feed into the watercourse. The southern of the two SuDS ponds is located within the site boundary.

10.4.1.3 Land Use and Land Cover

The existing land use of the site essentially comprises average quality drumlin farmland, characterised by the undulating landform associated with the drumlins. This rolling landform has also resulted in an irregular agricultural field pattern defined by mature hedgerows. As this is a farming landscape, the well-defined hedgerow system is one of its main characteristics.

To the east and west, larger blocks of woodland form bookends to the site. The western woodland and surrounding area extending to 10ha has been zoned as Buffer Space by the Council in the Variation.

The landscape structure within the site is complemented by a wooded ring fort in the north of the site which is recorded as a Recorded Monument (CL-034-007). A development exclusion buffer of 30m is required by the Council from the outer edge of the ringfort.

Several buildings are located within the site, including three houses and associated farmyards and farm buildings as well as fourth house with an associated large shed. A further farmyard, and associated buildings, is located just outside the site to the north. Access to this farmyard is through the site, using the access road to the house with the shed. Beyond the house the access road continues outside the site following the site boundary along the northern edge for a stretch before reaching the farm buildings.

The wider landscape adjoining the site to the north, east and south is namely pastoral farmland with some blocks of woodland and forestry. The R352 Tulla Road also passes along the southern boundary. To the west the site is cut off from the surrounding landscape by the M18 motorway and the associated landforms. Beyond the motorway is some pastoral farmland before transitioning into the built forms of the settlement of Ennis that extends out along the northern side of the Tulla Road.

A number of three cable electricity lines pass through the site, mounted on both large twin wood poles and lattice work pylons.

The following factors have been taken into determination in considering the sensitivity to change of the landscape fabric of the site:

- The well-established hedgerow network, the large woodland areas, and the waterbodies such as Tooreen Lough,
- The presence of the Recorded Monument within the site,
- The generally pastoral grassland nature of the remainder of the site,
- The four houses and three farmyards located within the site,
- The presence of electrical infrastructure passing through the site, and
- The undulating nature of the site.

The sensitivity to change of the landscape fabric of the site is therefore considered to be **Medium**, as the landscape is relatively intact with a distinct character. There are high quality parts of the landscape within the site, but there are also areas of existing development and high voltage electricity lines crossing the site.

10.4.2 Landscape Character

10.4.2.1 Landscape Character Assessment of County Clare

The *Landscape Character Assessment of County Clare* (Character Assessment) was carried out in 2004 by ERM Ireland Ltd². This Character Assessment identified the area within which the site is located as being located the *Ennis Drumlin Farmland*

² <https://www.clarecoco.ie/services/planning/publications/landscape-character-assessment-of-co-clare-2004-26526.pdf>

Landscape Character Area (LCA). The 5km Study Area is also covered by a number of other LCAs, the locations of which are all visible on Figure 10.4. However, as identified on the ZTVs the Tulla Drumlin Farmland LCA, will experience very little theoretical visibility of the proposed development. As such, this LCA is highly unlikely to experience levels of significance over and above Slight as result of the proposal. Furthermore, the Slieve Aughty Uplands LCA, as identified by the ZTV, will experience very little theoretical visibility at almost 5km away, resulting in a likely level of significance of Not Significant or lower. Therefore, in the interests of providing a focused assessment the Tulla Drumlin Farmland LCA and the Slieve Aughty Uplands LCA are not considered further in this LVIA.

10.4.2.2 Ennis Drumlin Farmland LCA

The *Ennis Drumlin Farmland LCA* radiates out from the settlement of Ennis at its centre. The LCA is composed of numerous drumlins orientated in the direction of the former ice flow. The predominant landcover is agricultural grassland with a number of broadleaf forests and transitional woodland and scrub.

The key characteristics of the *Ennis Drumlin Farmland LCA* are:

- *Settlement of Ennis is the focal point of the area where both historical and modern development is apparent.*
- *Ennis situated within drumlin farmland, drumlins oriented northeast to southwest punctuated by small loughs.*
- *Area can be disorientating due to many small winding roads and limited views.*
- *Communication centre for the region with Ennis as county town, with Fergus River running through the town.*

The condition of this LCA is variable, poor development has degraded landscape quality in some areas. Linear development along the roads near to Ennis frequently detracts from the landscape and reflects the housing pressures within this area. Largescale electrical infrastructure is also visible along the skyline northeast of Ennis. However, the more remote drumlin hinterland, away from the main roads, remains quite rural and intact. The County Development Plan designates the banks of the Fergus as a feature of high amenity.

The sensitivity to change of the Ennis Drumlin Farmland LCA is considered to be **Medium**. This is due to the contrast between the more developed areas and the more intact hinterlands and the presence of a locally designated landscape.

10.4.2.3 Fergus Loughlands LCA

This LCA is highly diverse and rich in terms of ecology with numerous loughs and woodlands.

The key characteristics of the *Fergus Loughlands LCA* are:

- *Undulating lowland mosaic of loughs, farmland and wooded limestone pavements.*
- *Loughs and rivers are oriented predominantly northeast to southwest reflecting historical glacial movements.*
- *Characteristic lowland limestone pavement in parts are vegetated with hazel scrub and is of high ecological value, e.g. Dromore Lough nature reserve.*
- *Important historical features include Dysert O'Dea.*
- *Area is largely rural in character dissected by quiet minor roads.*

- *Scattered settlement aside from the villages of Crusheen and Ruan.*

The Character Assessment describes the *Fergus Loughlands LCA* as a ...*highly attractive and well-maintained landscape. The natural vegetation affords significant screening and can create an intimate landscape in many areas. This contrasts with the more open exposed character around larger loughs and limestone pavement. It is a highly distinctive landscape with the variety of landscape forms, specifically loughs, low drumlins and limestone pavement combining to create an intact landscape area.*

The sensitivity to change of the *Fergus Loughlands LCA* is considered to be **High**. This is due to the high quality of the landscape. The character assessment also describes it as being ...*very sensitive to large scale and unsympathetic development and changes.*

10.4.2.4 Fergus Estuary LCA

This LCA is a low lying, distinctive, estuarine landscape situated on either side of the Fergus Estuary.

The key characteristics of the *Fergus Estuary LCA* are:

- *Flat estuarine farmland divided by drainage ditches, post and wire fences and degraded thorny hedgerows.*
- *Open expansive views are afforded across the estuary to the River Shannon, though these are limited in places due to flood defence embankments.*
- *Settlement is sparse reflecting the areas past tendency to flood, some settlement on higher ground. On eastern boundary, increased settlement due to proximity to Shannon Airport and town.*
- *Scattered holy wells with a number of graveyards and standing stones.*
- *Newmarket-on-Fergus and Killadysert are both designated ACA (Architectural Conservation Area).*

The Character Assessment describes the *Fergus Estuary LCA* as being ...*generally of variable condition. The degradation of hedgerows and low quality barbed wire and post and wire fencing gives the hinterland a slightly degraded quality. Increased residential development on the eastern side can be highly visible and newer houses are not always appropriate to this estuarine setting. On the western side of the estuary, it is generally undeveloped with a strong remote sense. This is punctuated by the villages of Killadysert and Ballynacally.*

The sensitivity to change of the *Fergus Estuary LCA* is considered to be **Medium**. This is due to the variable condition of the landscape as described by the Character Assessment.

10.4.2.5 Local Landscape Character

The undulating drumlin farmland nature of the site and surrounding area is in keeping with the *Ennis Drumlin Farmland LCA* key characteristics for the area.

The local landscape character of the site and surrounding area is influenced by its rural context on the edge of the settlement of Ennis and adjacent to the M18 motorway and a substation. The character is strongly influenced by the industrial infrastructure, such as the pylons, associated with the substation. The motorway

along the western boundary, as well as the road bounding the southern boundary of the site further diminish from the rural character of the area.

Established hedgerows form a well-defined field pattern which is influenced by the rolling landform, whilst blocks of woodland and scrub are interspersed across the landscape. Three farmyards are located within the site area whilst a fourth is located just to the north of the site.

The judgement of sensitivity to change is influenced by the following factors:

- the semi-rural / suburban context,
- the existing water features and the drumlin style landscape,
- the farmyards located within the landscape,
- the manmade infrastructure such as the surrounding road network, the substation, and the pylon lines,
- the hedgerows forming the agricultural field pattern, and
- the large woodlands.

The sensitivity to change of the local landscape character to the type of development proposed is therefore considered to be **Medium**. Although there are elements of the landscape that are of good quality, the proximity to the settlement and key infrastructure take away from this.

10.4.3 Landscape Designations and Classifications

10.4.3.1 Living Landscapes - Working Landscapes' Designation

The Clare County Development Plan states that ... *County Clare comprises a number of areas that have similar characteristics for which similar planning policies are applicable*. As such it divides the county into three different landscape types:

- I. Settled landscapes – areas where people live and work;*
- II. Working Landscapes – intensively settled and developed areas within Settled Landscapes or areas with a unique natural resource;*
- III. Heritage Landscapes – areas where natural and cultural heritage are given priority and where development is not precluded but happens more slowly and carefully.*

The site is located within the Western Corridor Working Landscape designation as illustrated on Figure 10.5. The County Development Plan provides the following description of the Western Corridor Working Landscape:

This part of the County contains the highest concentrations of population and employment and the strongest transport links and connectivity. It includes the Linked Gateway of Shannon and the County Town/Hub Town of Ennis. It is the economic driver of County Clare and an important area of the Mid-West Region.

The County Development Plan Objective CPD13.4, as set out in section 10.3.2.2 of this report, relates to this designation.

The sensitivity to change of the Western Corridor Working Landscape to the type of development proposed is considered to be **Low** due to the nature of this designated area.

10.4.3.2 Buffer Space Woodland

The Clare County Council's Zoning Map PLP-18-0001-2 (12/03/2019) designates two areas of woodland within the site as 'Buffer Space'. The extents of these Buffer Spaces is illustrated in Figure 10.1. These areas have been considered as part of the design and have been kept free of development. As the extents of these Buffer Spaces is not altered the effect upon them is not assessed further.

10.4.3.3 Natural Heritage Areas

There are no *Natural Heritage Areas* (NHA) located within the site or within the 5km LVIA Study Area.

10.4.3.4 Proposed Natural Heritage Areas

There are no *proposed Natural Heritage Areas* (pNHA) located within the site. There are a number of blocks of pNHAs located within the wider Study Area. The proposal will not impact upon these pNHAs due to their distance from the site at over 1km away. Therefore, these are not considered further in this LVIA.

10.4.3.5 Ancient Woodland

There are no areas of Ancient Woodland located within the site or within the 5km LVIA Study Area.

10.4.3.6 Protected Landscapes

There are no other Protected Landscapes of relevance within the LVIA Study Area.

10.5 VISUAL BASELINE

10.5.1 Roads

The M18 motorway passes north to south through the LVIA Study Area. There are also a number of national, regional, and local class roads within the LVIA Study Area. These are shown in Figure 10.6 *Key Routes*.

The sensitivity to change of roads is considered to be **Medium** (in accordance with the methodology set out in Section 10.1).

10.5.2 Railway Lines

The *Limerick to Galway Railway Line* runs roughly south to north through the LVIA Study Area. This is shown on Figure 10.6.

The sensitivity to change of railway lines is considered to be **Medium** (in accordance with the methodology set out in Section 10.2).

10.5.3 Scenic Routes and Protected Views or Prospects

County Clare contains a number of views and prospects, many of which are located along Scenic Routes. These Scenic Routes are designated within the Clare County Development Plan. However, there are no designated scenic routes located within the LVIA Study Area.

10.5.4 Viewpoints

Six representative viewpoints were identified. The locations of the ten representative viewpoints are shown in Figure 10.9 *Zone of Theoretical Visibility with Viewpoint Locations*. The sensitivity to change of each viewpoint is summarised in Table 10.7 *Summary of Viewpoint Sensitivity* below and the existing views are described in Table 10.8 *Representative Viewpoints – Baseline*.

A field survey was carried out on 3rd March 2021 and again on 15th April 2021. The purpose was as follows:

- to walk over and understand the components, characteristics and context of the site;
- appraise the landscape character and visual amenity of the Study Area;
- consider viewpoint locations; and
- to confirm the theoretical visibility and confirm likely actual visibility of the proposal.

The viewpoints are illustrated in Figures 10.11a to 10.16b. Table 10.7 lists the selected representative viewpoints used to inform the assessment of the landscape and visual impacts of the proposal:

Table 10.7 Summary of Viewpoint Sensitivity

VP	Name	Representative of	Sensitivity
1	R352 South of Site	Users of the regional road, Residential dwellings, 'Ennis Drumlin Farmland' LCA, 'Working Landscape' designation, Views from the South	High
2	West of R352-M18 roundabout	Users of the regional road, 'Ennis Drumlin Farmland' LCA, 'Working Landscape' designation, Views from the Southwest	Medium
3	M18 (Adjacent service track) West of Site	Users of the motorway, 'Ennis Drumlin Farmland' LCA, 'Working Landscape' designation, Views from the West	Medium
4	L4608 North of Site at Cappagh More	Users of the local road, Residential dwellings, 'Ennis Drumlin Farmland' LCA, 'Working Landscape' designation, Views from the North	High
5	L4608 at Ballymacahill	Users of the local road, 'Ennis Drumlin Farmland' LCA, 'Working Landscape' designation, Views from the Northwest	High
6	R352 at TII Depot to west of M18	Users of the regional road, Settlement, 'Ennis Drumlin Farmland' LCA, 'Working Landscape' designation, Views from the Southwest	Medium

Table 10.8 describes the context of the existing views and justifies the sensitivity assigned to each of the representative viewpoints.

Table 10.8 Representative Viewpoints – Baseline

Viewpoint	Sensitivity
Viewpoint 1 R352 South of Site (Figure 10.11a)	<p>This view looks northwards across the R352, Tulla Road, towards the site from the entrance to a property on the southern side of the road. The farm buildings located behind the two properties on the other side of the road are visible on the left hand (west) edge of the view. The two properties themselves are just out of view.</p> <p>The western hedgerow of the existing main access to the site is visible in the right-hand edge of the view. The properties this access services are just visible behind intervening vegetation in the middle to far distance.</p> <p>This view helps to demonstrate how the existing hedgerows and rolling landform absorb the existing built elements within the landscape. The farm buildings in the north of the site, like the two properties are just visible behind intervening vegetation. This view also demonstrates how the landscape slopes from the high ground in the right (east) to the lower ground in the left of the view (west).</p> <p>Three separate sets of twin pole electricity lines are visible running across the view at varying distances.</p> <p>The sensitivity to change is considered to be High, as per the methodology, as the view is representative of residents.</p>
Viewpoint 2 West of R352-M18 roundabout (Figure 10.12a)	<p>This view looks northeast across the roundabout for the Junction 13 slip road of the M18 southbound. It is representative of views that would be experienced by road users on the R352, Tulla Road, heading east as they approach the roundabout. The road infrastructure including all the signage makes up much of the foreground of the view.</p> <p>Mature hedgerows beyond the roundabout screen much of the wider landscape from view. With just the hill in the southeast of the site rising up above the vegetation.</p> <p>Pylons and twin wood pole electricity lines are visible scattered across the view as they approach the electricity substation which is just out of view to the left (northwest).</p> <p>The sensitivity to change is considered to be Medium, as per the methodology, as the view is representative of road users.</p>
Viewpoint 3 M18 (Adjacent service track) West of Site (Figure 10.13a)	<p>This view is representative of users of the M18 motorway heading southbound. The view is taken from the service track on the eastern edge of the motorway at a point where it is at a similar elevation to that of the motorway and where views are available through the adjacent hedgerow.</p> <p>The view looks southeast across rolling pastoral farmland. Visible beyond the fields is the woodland in the west of the site, designated 'Buffer Space' on Clare County Council's Zoning Map PLP-18-0001-2 (12/03/2019). The lands of the site are hidden from view behind this block of woodland.</p> <p>Three sets of twin wood pole supports for electricity lines are visible in the centre of the view at varying distances.</p> <p>The sensitivity to change is considered to be Medium, as per the methodology, as the view is representative of road users.</p>
Viewpoint 4 L4608 North of Site at Cappagh More (Figure 10.14a)	<p>This view looks south towards the site from a field gate access on the L4608. It looks out across a rolling landscape covered by a mix of pastoral farmland and woodland. Hedgerows tend to follow the ridgelines shaping the horizon.</p>

	<p>The roof of an existing farm building is just visible in the distance to the left of centre of the view. A twin wood pole electricity line is visible running through the view with poles and pylons of other lines also visible in the distance.</p> <p>The sensitivity to change is considered to be High, as per the methodology, as the view is representative of residents of the properties on the northern side of the L4608.</p>
Viewpoint 5 L4608 at Ballymacahill (Figure 10.15a)	<p>This view looks southeast towards the site from a field gate access on the L4608 at Ballymacahill. The foreground is largely occupied by a pastoral field, whilst woodland occupies much of the far distance.</p> <p>Two twin wood pole electricity lines are visible passing through the view whilst the electricity substation to the southwest of the site is also just visible in the distance above the right-hand wall in the foreground.</p> <p>The sensitivity to change is considered to be High as per the methodology as the view is representative of a residential dwelling as well as users of the L4608. This view was also chosen to demonstrate the type of view from the eastern edge of the settlement of Ennis as there were no reasonably open views available from publicly accessible areas.</p>
Viewpoint 6 R352 at TII Depot to west of M18 (Figure 10.16a)	<p>This view looks eastwards from the R352, close to the entrance to the TII depot, on the eastern edge of the settlement of Ennis. It looks along the road to the roundabout for the Junction 13 slip road of the M18 northbound. The rising form of the road up to the motorway overpass foreshortens the overall view.</p> <p>A mast associated with electricity substation is clearly visible beyond the roundabout whilst the tops of pylons, also associated with the substation, are just visible on the horizon.</p> <p>The sensitivity to change is considered to be Medium, as per the methodology, as the view is representative of users of the R352.</p>

10.6 DESCRIPTION OF PROPOSAL

The proposal is illustrated in Figure 10.7 Proposed Development. It is described in detail in Chapter 2 of this EIAR, and as such the description is not repeated here. In summary the key components of the proposal in relation to the preparation of a Landscape and Visual Impact Assessment are as follows;

- 6 no. two storey data centre buildings, each measuring 86x105m by 18m high, accompanied by 84 no. back-up generators with associated stacks of 8m high;
- An Energy Centre on a plot measuring 110x100m with buildings of 12m high and flues of 25m high;
- An Above Ground Installation (AGI) for a gas supply;
- An Electrical Substation Compound;
- A two storey Vertical Farm Building measuring c. 50x50m by 12m high;
- Undergrounding of two of the existing overhead 110kV circuits; and

- Associated landscaping, including bunds, woodlands, hedgerows and meadows.

The proposed development includes the removal of 30 trees, approximately 2,715 linear metres of hedgerow and approximately 1,525m² of scrub/woodlands. However, the proposed landscape proposals include for the introduction of 57 new specimen trees, approximately 4,860 linear metres of hedgerow and approximately 58,565m² of woodlands. This greatly increases the hedgerow and woodland extents onsite, over and above what will be removed.

This additional structure planting (hedgerows and woodlands) strengthens the landscape framework and habitat connectivity of the site as well as providing an aesthetic setting to the built form and screening it from view from the wider landscape. Approximately 54,810m² of land will also be turned into meadow grasslands, thereby improving the biodiversity of the existing grasslands.

As set out in the Landscape Design Strategy report, accompanying this EIAR as part of the planning application, perimeter vegetation for the most part has been retained. Woodland belts of approximately 30m depth are proposed around the edges of the site where woodlands do not exist. In some sections in the north and south of the site, these woodland belts are located on top of landscape berms, increasing the level of screening provided by the planting. This comprehensive landscaping strategy around the peripheral environs of the site will provide a visual foil for those receptors on close proximity to the site.

The six Data Centre buildings have been located centrally to the site in order to reduce visibility from the Tulla road and the residences located there. As such, the buildings are located in the generally lower elevations of the site. The buildings have been carefully situated to avoid ecological and archaeological buffer zones around the site. This siting also ensures the peripheral vegetation is retained.

The ancillary buildings of the Energy Centre, Substation and Vertical Farm are located in the east of the site at the base of the larger hill, from which the ground level increases significantly. This siting ensures that there will be no potential for views of these buildings from the east and limits the visual impact on views of the horizon from the north and west.

The Data Centre buildings have been orientated so that the mechanical and electrical equipment -such as flue stacks, water and fuel storage, and generators are all located centrally between buildings. This allows building frontages to address key locations such as the roundabout to the southwest of the site, losing the mechanical equipment behind the more aesthetic office elevations.

The building elevational treatments consist of architectural metallic wall panels that graduate from dark blue to light blue as the façade rises. This effect helps to lose the building into the sky, reducing the massing of the building. External mechanical plant areas are treated with louvres which provide required airflow while screening equipment. The office elevation combines the graduated façade with large areas of curtain walling, providing natural daylight and visual relief.

The site will be a dark sky site, with night-time lighting restricted. This ensures that there is no potential for the proposed development to result in a negative visual impact at night.

The following sections assess the potential impacts as a result of these components upon the landscape visual receptors of the 5km LVIA Study Area.

Following the finalisation of the layout, for the proposal, a final ZTV was generated (Figure 10.9). This updated ZTV is a more accurate representation of the extent of theoretical visibility within the Study Area as it is based on the finalised layout. However, as with the Preliminary ZTV, actual visibility of the proposal is still likely to be less than the theoretical visibility illustrated. This is due to the further filtering and screening effects of localised landforms, built form and intervening vegetation such as hedgerows and tree belts, including proposed bunds and vegetation.

10.6.1 Do-Nothing Scenario

The site is currently predominantly greenfield agricultural land. The 'do nothing scenario' would result in the lands continuing to be farmed as they are. Any potential changes to the site would likely be limited to new farm buildings relating to the evolution of the existing farmyards and the continued growth of existing trees and hedgerows. This would result in a likely **Negligible** effect upon the landscape and visual receptors of the LVIA Study Area and an **Imperceptible** level of significance.

However, given the site is located in lands zoned for enterprise with a specific use for a Data Centre Campus, it is likely that the lands would be similarly developed as proposed rather than remaining greenfield. Consequently, given the zoned nature of the lands, the do-nothing scenario would result in a similar level of landscape and visual effect as that resulting from the proposed development.

10.7 ASSESSMENT OF CONSTRUCTION EFFECTS

The proposed development will be constructed in a phased manner over a period of approximately 7 years, and as described in Chapter 3 of this EIAR. Figure 10.8 illustrates the different construction phases of the proposed development.

Potential landscape and visual effects will arise from:

- Site establishment and preparation works;
- Formation of the proposed site access onto the R352;
- Establishment of construction compound and construction staff facilities;
- Erection of site hoarding and permanent security fencing;
- Site clearance;
- Site levelling, and excavation for foundations and underground utilities;
- Formation of landscape berms and attenuation areas;
- Provision of landscaping and planting etc.;
- Access and egress of construction traffic for material import and export;
- Erection and operation of tower cranes;
- Construction traffic movement on site;
- General construction activity, including construction and security personnel, and construction machinery;

- Gradual emergence of the proposed buildings on the site; and
- Completion and commissioning of the development.

It is proposed that the woodland belts, and some hedgerows, will be implemented prior to the construction of the buildings. This will be carried out in two stages as part of pre-construction works and the post cut and fill groundworks. This ensures that the bunds and key structure planting are in place prior to the commencement of any building construction. This will provide early establishment of landscape screening around the site as demonstrated by the Viewpoint photomontages (Figures 10.11a to 10.16b). As such the two elements of the construction that will have the greatest potential for landscape or visual effects are the tower cranes and the gradual emergence of the buildings.

The landscape and visual effect during the initial ground works stage (Pre-Phase 1c) is assessed to be **Moderate, temporary/short term (approx. 1 year)** and the significance is **Moderate**. These works will be readily visible along the R352, and potentially from the L4608 to the north until the bunds area created and as the proposed early landscaping establishes. These works will generally be limited to earth moving and shaping equipment.

The landscape and visual effect during the main remaining phases of the construction (Post-Phase 1b) is generally assessed to be **Minor, short term (approx. 7 years)** and the significance is **Slight** given the current landscape planning context and policy and the screening capability of the existing vegetation and proposed early establishment planting. These elements of vegetation will both combine to screen the majority of construction activity in views from the surrounding landscape, leaving only the cranes and emerging buildings visible above the tops of the vegetation.

Construction works will not have longer-term landscape or visual effects.

10.8 LANDSCAPE ASSESSMENT

10.8.1 Approach

In accordance with the methodology for assessing landscape and visual impacts, this assessment reviews the magnitude of change of the operational proposal against the baseline characteristics to establish the level of the effect and the corresponding significance. Reference is made to viewpoints as required to inform the assessment. As stated previously, the effects are considered to be negative unless stated otherwise.

10.8.2 Potential Effects on the Landscape Fabric of the Site

Development of the site will result in the loss of pastoral agricultural farmland, including hedgerows. This will be replaced with a mix of hard surfaces (roofs, driveways, roads, footways) and greenspace (amenity greenspace, meadow grasslands and SuDS measures).

There will be re-grading of the site to create development platforms for the proposed built forms and suitable gradients for roads, footways, and services. Although large flat platforms will be created for the development these work with the overall slope of the landscape reducing in elevation from east to west. The proposed development is located in the centre of the site with the majority of the existing landscape around the

edges of the site retained. Once completed, there will not be a readily perceivable change in landform across the majority of the site.

The proposal results in the loss of existing pastoral grassland habitat of low ecological value, along with approximately 2,716 linear metres of hedgerow, 1,525m² of scrub/woodland and 30 trees. However, the proposal includes the addition of approximately 4,859 linear metres of new hedgerow, 58,567m² of new woodland and 57 new amenity trees. This not just replaces the extents removed, but considerably increases them. Further to this approximately 54,813m² of meadow grassland is also proposed. These elements provide the opportunity to greatly enhance the diversity and connectivity of the habitats within the site. These habitat improvements will increase and result in a positive improvement to the biodiversity of the overall site as a consequence of the proposed development.

Two of the high voltage power lines crossing the site will be undergrounded as part of the works.

The following key landscape feature within the site will remain unaltered and will be integrated into the new landscape proposals:

- The western block of woodland, designated as 'Buffer Space' on Clare County Council's Zoning Map PLP-18-0001-2 (12/03/2019);
- Tooreen Lough and surrounding planting; and
- The wooded ring fort in the north of the site which is a Recorded Monument (CL-034-007).

All the waterbodies within the site will also be retained.

The magnitude of change to the landscape fabric of the site is assessed to be **Medium** as although the proposed development will alter the landscape fabric, this will be restricted to the centre such that much of the area will appear the same from outside of the site, the key features will remain unaltered and the proposed landscaping will greatly increase the extents of the woodland, hedgerows and meadow grassland on site, thereby improving the habitats and biodiversity of the site.

The effect of the proposal on the landscape fabric of the site is therefore assessed to be **Moderate** and the significance is **Moderate**. Although the proposal will alter a large area of the existing fabric of the site, it will create a greater range of habitats and biodiversity across the site and retains the key landscape features, whilst also being consistent with the land use zoning for the area.

10.8.3 Potential Effects on the Landscape Character

10.8.3.1 Ennis Drumlin Farmland LCA

The ZTV (Figure 10.10) illustrates that the LCA will experience relatively extensive theoretical visibility of the proposed development. However, intervening vegetation, the built form of the settlement of Ennis and the proposed landscaping will greatly reduce the actual extents of visibility as evidenced by the photomontages from the six viewpoints (Figures 10.11a-10.16b).

The proposed development is located in the context of existing development in terms of the adjacent substation and associated infrastructure, the M18 motorway and the nearby settlement of Ennis. Ennis is acknowledged as a focal point of development

within this LCA, so the proposed development's location is in keeping with this characteristic.

Although, the central landform of the site will be platformed for development the drumlin nature to the edges will be retained, whilst the proposed bunding will blend in with this rolling landform character. As such the proposed development will barely alter the drumlin character of the LCA. A large part of the site will also be retained as pastoral farmland in keeping with the farmland nature of this LCA. As demonstrated by the photomontages the visible character of the LCA will largely be retained.

The magnitude of change experienced by the Ennis Drumlin Farmland LCA, as a result of the proposed development is assessed to be **Low** as the proposed development result is largely in keeping with the characteristic of the LCA and will only result in a slight alteration.

The effect of the proposal on the Ennis Drumlin Farmland LCA is therefore assessed to be **Minor** and the significance is **Slight** as the character of the overall LCA will remain largely as it is.

10.8.3.2 Fergus Loughlands LCA

The ZTVs (Figures 10.2 & 10.10) indicate that this LCA will experience broken patches of theoretical visibility at distances of over 3km away. Actual visibility will be further reduced by intervening vegetation, built forms and the proposed landscaping. This is further backed up by Character Assessment for this LCA which states *...the natural vegetation affords significant screening and can create an intimate landscape in many areas.*

The proposed development will not affect any of the key characteristics for this LCA.

The magnitude of change experienced by the Fergus Loughlands LCA, as a result of the proposed development is assessed to be **Negligible** for the following reasons:

- The proposed development will not affect any of the key characteristics of the LCA;
- The distance from the development; and
- The limited potential for actual visibility of the proposed development from within this LCA.

The effect of the proposed development on the Fergus Loughlands LCA is therefore assessed to be **Negligible** and the significance is **Not Significant**.

10.8.3.3 Fergus Estuary LCA

The ZTVs (Figures 10.2 & 10.10) indicate that this LCA will experience larger blocks of theoretical visibility at distances of over 3.5km away. Actual visibility will be further reduced by intervening vegetation, built forms and the proposed landscaping with the motorway located between the site and much of this LCA.

The proposed development will not affect any of the key characteristics of this LCA with the focus of views within the LCA out over the estuary away from the location of the proposed development.

The magnitude of change experienced by the Fergus Estuary LCA, as a result of the proposed development is assessed to be **Negligible** as the proposed development

will not affect any of the key characteristics of the LCA and the distance from the proposed development.

The effect of the proposed development on the Fergus Estuary LCA is therefore assessed to be **Negligible** and the significance is **Not Significant**.

10.8.3.4 Local Landscape Character

The location of the site relates to the infrastructure of the adjacent electricity substation and M18 motorway as well as the nearby built form of the settlement of Ennis. Given this relationship and that the proposed development is set within a landscaped setting it is in keeping with semi-rural / suburban context of the local landscape character.

The proposed landscape planting increases the extent of hedgerows and woodland on the site and introduces new habitats such as permanent meadow grassland.

The undulating landform of the local landscape provides a sense of enclosure to much of the local area, foreshortening views much of the time, with the potential for longer range views limited to the higher elevations of the taller drumlins. Furthermore, the landform generally dips in the centre of the site restricting visibility into the site from the wider landscape. Views into the site from the east are obstructed due to the topography of the larger hill in the east of the site and the area of woodland located below the hill on its eastern side.

The existing woodland in the northwest of the site, combined with the proposed bunds and structural landscaping contribute to reduce views of the proposed development from much of the surrounding landscape to the east and north. Where views are available from wider landscape these are often restricted to glimpse views of parts of the site with visibility of the full site area from one view limited.

Although the landform in the centre of the site will be platformed and altered to suit the building and road layouts, this change will not be noticeable from the surrounding landscape. The appearance of a drumlin landscape is thereby retained from the surrounding context.

This generally restricted visibility of the proposed development is evidenced in the photomontages for the representative viewpoints (Figures 10.11a – 10.16b).

The magnitude of change experienced by the local landscape character, as a result of the proposed development is assessed to be **Low** as the overall local landscape character will remain largely unaltered with the proposed development in keeping with the man-made influence of the surrounding area.

The effect of the proposed development on the local landscape character is therefore assessed to be **Minor** and the significance is **Slight**.

10.8.4 Potential Effects on Landscape Designations and Classifications

10.8.4.1 County Development Plan - Living Landscapes

10.8.4.2 Working Landscapes

The location of the proposed development within this designation is in keeping with the description of this designation as ...*intensively settled and developed areas within Settled Landscapes...* and ...*the highest concentrations of population and employment and the strongest transport links and connectivity*. As such the site being

located within the extents of this designation contributed to the zoning of the site for a Data Centre in *Variation No. 1 to the Clare County Development Plan 2017-2023*.

The Development Plan Objectives for this designation are as follows:

- A. To permit development in these areas that will sustain economic activity, and enhance social well-being and quality of life - subject to conformity with all other relevant provisions of the Plan and the availability and protection of resources;*
- B. That selection of appropriate sites in the first instance within this landscape, together with consideration of the details of siting and design, are directed towards minimising visual impact;*
- C. That particular regard should be given to avoiding intrusions on scenic routes and on ridges or shorelines. Developments in these areas will be required to demonstrate:*
 - iv. That the site has been selected to avoid visually prominent locations;*
 - v. That site layouts avail of existing topography and vegetation to reduce visibility from scenic routes, walking trails, public amenities and roads;*
 - vi. That design for buildings and structures reduce visual impact through careful choice of form, finishes and colours and that any site works seek to reduce visual impact of the development.*

The proposed development will contribute to sustaining economic activity. This LVIA assesses the visual impact arising from the proposed development and demonstrates that the visual impact will be minimal given the scale of the proposed development. The site location does not relate to any scenic routes or shorelines. The site layout makes use of the existing landscape to set the proposed development into the lower central part of the site, whilst relating to the overall east-west slope. This setting combined with the proposed bunds and planting ensure visibility from the wider landscape is minimal. The colour scheme of the data centres has been selected so that where the upper parts of the buildings are visible these will partially blend with sky.

The magnitude of change, experienced by the Working Landscape designation, as a result of the proposal is assessed to be **Negligible** as the proposed development takes account of the Development Plan objectives for the designation and is also in keeping with the overall designation description.

The effect of the proposal on the Working Landscape designation is therefore assessed to be **Negligible** and the significance is **Not Significant**.

10.9 VISUAL ASSESSMENT

This section addresses the likely effects of the proposal on the visual resource of the Study Area. The ZTV (Figures 10.9 and 10.10) has been used to illustrate the parts of the Study Area that have the potential to experience visual effects of the proposal. The potential for visibility has also been verified through field studies and the representative viewpoints.

10.9.1 Roads

The locations of the roads are illustrated in Figure 10.6 Key Routes. The effects and impacts upon all motorways, national roads, and regional roads within the LVIA Study Area have been assessed. However, in order to provide a focussed assessment, in terms of local roads, only those within approximately 1km of the site have been assessed. Local roads are generally lined by mature hedgerows and tree lines which prevent longer distance views. This is evidenced in the assessment of the local roads in the paragraphs below and the viewpoints which demonstrate that views to the site are generally only available from occasional field gates.

10.9.1.1 M18

The ZTV illustrates that users of the M18 will experience theoretical visibility of the proposal mainly for a 5km stretch to the west of the site. There are also some smaller areas further to the south. Actual views from the motorway will be restricted by localised roadside embankments and associated vegetation as well as intervening vegetation and built forms.

The majority of views will be experienced by users heading southbound along the motorway. As such Viewpoint 6 (Figures 10.13a & 10.13b) is representative of views for southbound users of the motorway. This view is taken from the service track adjacent to the motorway where it is at a similar location. It is also located where there is a break in the hedgerow that allows more open views to the site that are not so readily visible elsewhere.

The photomontages for this view demonstrate that visibility of the development will be limited to part of the proposal and will be a glimpse view whilst receptors are travelling at speed along the motorway.

Viewpoints J and K in Appendix 10.1 are also representative from location further northwards of users heading southbound on the motorway. These views demonstrate that the intervening woodland will screen much of the proposed development. Although Viewpoint J is in proximity to Viewpoint 4 (Figures 10.14a & 10.14b), the difference in angle will result in a greater level of screening by both existing and proposed intervening woodlands.

The magnitude of change experienced by users of the M18, as a result of the proposed development is assessed to be **Low to Medium**. Actual visibility will be limited and where views will be experienced these will mostly be partial and glimpsed views in nature due to the speed of travel.

The effect of the proposed development on the M18 is therefore assessed to be **Minor** and the significance is **Slight**.

10.9.1.2 N85

The ZTV illustrates that users of the N85 will experience theoretical visibility of the proposal for two stretches of approximately 3km and 1km at distances of over 3.5km distance from the site. Actual visibility from these stretches is actually unlikely due to the intervening built form of the settlement of Ennis and associated vegetation. Viewpoint M in Appendix 10.1 demonstrates that actual views are generally not feasible.

The magnitude of change experienced by users of the N85, as a result of the proposed development is assessed to be **Negligible**.

The effect of the proposed development on the N85 is therefore assessed to be **Negligible** and the significance is **Not Significant**.

10.9.1.3 R352

The ZTV illustrates that users of the R352 will experience extensive extents of theoretical visibility of the proposed development. However, to the west of the M18 motorway, the intervening built form of the settlement of Ennis and intervening vegetation along with the embankments and associated vegetation of the motorway screen actual views of the proposed development. This is demonstrated by Viewpoint 6 (Figures 10.16a & 10.16b) and in Appendix 1, Viewpoints B & C.

Viewpoint A in Appendix 10.1 demonstrates views from the R352 to the east of the proposed development. This view demonstrates that intervening vegetation and landform largely screen views towards the site. Views may be visible of the southern part of the site. However, there are no proposed buildings in this part of the site.

Viewpoints 1 and 2 in Appendix 10.2 (Figures 10.11a to 10.12b), illustrate the views from along the R352 to the south of the site. Viewpoint 1 demonstrates that due to the placement of the proposed buildings set back over 100m from the road along with the proposed bunds and associated woodland planting only filtered views will be available initially (Figure 10.11b). As the proposed structure planting establishes the proposed development will become completely screened from view as per the montage for the view after 15 years establishment of the structure planting on Figure 10.11a.

The photomontages for Viewpoint 2 show that the part of the proposed development will be clearly visible from this motorway junction roundabout. In discussion with the Council, they requested that the proposed development actually address the motorway junction and that it be visible in order to acknowledge its presence in some form. As such the proposal has been designed so that the front of one of the data halls is visible from the roundabout with other halls either screened behind the front most building or by vegetation to either side of it. The proposed development will also be viewed in the context of existing electricity infrastructure such as a lattice work pylon, with the existing electricity substation visible outside the illustrated views to the left.

The magnitude of change experienced by users of the R352, as a result of the proposed development is assessed to be **Low to Medium**. For the most part the visibility of the proposed development will be filtered or screened for road users. Where readily available views are available these address the road.

The effect of the proposed development on the R352 is therefore assessed to be **Minor** and the significance is **Slight**.

10.9.1.4 R458

The ZTV illustrates that users of the R458 will experience continuous theoretical visibility of the proposal for part of the length in the south of the LVIA Study Area. However, as the road passes through the settlement of Ennis for all of this stretch, actual views of the proposal will be screened by the intervening built form of the settlement. Further north, users of the R458 will only experience small stretches of theoretical visibility with the majority of actuals views highly likely to be completely screened in reality due to intervening vegetation.

The magnitude of change experienced by users of the R458, as a result of the proposed development is assessed to be **Negligible** due to the low potential for actual views of the proposed development.

The effect of the proposed development on the R458 is therefore assessed to be **Negligible** and the significance is **Not Significant**.

10.9.1.5 R469

The ZTV illustrates that to the west of the motorway users of the R469 will experience extensive theoretical visibility of the proposal. To the east of the motorway only small stretches of theoretical visibility will be available and these will largely be limited to potential views of the Energy Centre and/or the Vertical Farm, most likely only the flues of the Energy Centre which extend above the buildings.

Viewpoint L (Appendix 10.1) demonstrates the view experience from along this road and was selected due the absence of roadside vegetation. As can be seen any potential for views towards the site are screened by intervening vegetation beyond the viewpoint location.

The magnitude of change experienced by users of the R469, as a result of the proposed development is assessed to be **Negligible** as the potential for actual views is limited.

The effect of the proposed development on the R469 is therefore assessed to be **Negligible** and the significance is **Not Significant**.

10.9.1.6 R474

The ZTV illustrates that users of the R474 will experience continuous theoretical visibility of the proposal for most of its length within the LVIA Study Area. However, as the road passes through the settlement of Ennis for all of this stretch, actual views of the proposal will be screened by the intervening built form of the settlement. Furthermore, the road, at its closest, is located over 4km for the proposed development.

The magnitude of change experienced by users of the R474, as a result of the proposed development is assessed to be **Negligible** as the potential for actual visibility is very limited.

The effect of the proposed development on the R474 is therefore assessed to be **Negligible** and the significance is **Not Significant**.

10.9.1.7 R475

The ZTV illustrates that users of the R475 will experience theoretical visibility of the proposed development over two stretches for approximately two thirds of its length within the LVIA Study Area. However, as the road passes through the settlement of Ennis for all of this stretch, actual views of the proposal will be screened by the intervening built form of the settlement. Furthermore, the road, at its closest, is located over 4km for the proposed development.

The magnitude of change experienced by users of the R475, as a result of the proposed development is assessed to be **Negligible** as the potential for actual visibility is very limited.

The effect of the proposed development on the R475 is therefore assessed to be **Negligible** and the significance is **Not Significant**.

10.9.1.8 R871

The ZTV illustrates that users of the R871 will experience theoretical visibility of the proposed development for approximately half its length at a distance of almost 3km from the proposed built forms. The road for its length is located within the settlement of Ennis and as such the associated built forms and vegetation will more than likely screen any actual views.

The magnitude of change experienced by users of the R871, as a result of the proposed development is assessed to be **Negligible/None** as the potential for actual views is unlikely.

The effect of the proposed development on the R871 is therefore assessed to be **Negligible/None** and the significance is **Not Significant**.

10.9.1.9 L4076

The ZTV illustrates that users of the L4076 will experience theoretical visibility of the proposed development for much of the route. Viewpoint I in Appendix 10.1 was taken from a location with an open outward view from the road and demonstrates that actual views towards the site are screened by intervening vegetation. For much of the route views outwards are screened by roadside planting or properties located along the road.

The magnitude of change experienced by users of the L4076, as a result of the proposed development is assessed to be **Negligible** as the potential for actual views of the proposed development is limited.

The effect of the proposed development on the L4076 is therefore assessed to be **Negligible** and the significance is **Not Significant**.

10.9.1.10 L4608

The ZTV illustrates that users of the L4608 will experience theoretical visibility of the proposed development for its entire length. Viewpoints 4 and 5 (Figures 10.14a to 10.15b) and Viewpoint F demonstrate the type of views that will actually be experienced along this road. All three viewpoints are taken from field gateways off the road providing open views whereas much of the rest of the route is lined by roadside hedgerows screening views outwards.

As evidenced by Viewpoints 5 and F intervening landform and vegetation will screen much of the proposed development only the upper parts of the proposed data halls likely to be visible on the horizon. The colouring of the buildings will help to blend the buildings with the skyline, and they will also be seen in the context of the electricity substation and associated infrastructure such as pylons and twin wood poles.

Viewpoint 4 is representative of the closest most open views of the proposed development from this road. Although the data halls will be visible, the Vertical Farm, the Energy Centre and the associated new substation will all be screened from view with the exception of the Energy Centre flues following establishment of the structure planting. Although the flues break the horizon they are similar in vertical scale to existing trees on the nearby ridgeline.

Following 15 years establishment of the structure planting (approximately 10 years post completion of the proposed development), visibility of the proposed development will mainly be limited to two data halls with only the top of one of these visible.

The magnitude of change experienced by users of the L4608, as a result of the proposed development is assessed to be **Low to Medium** as actual views of the

proposed development will be relatively limited overall along this route, with more open views only experienced by the stretch closest to the site.

The effect of the proposed development on the L4608 is therefore assessed to be **Minor** and the significance is **Slight**.

10.9.1.11 L4100

The ZTV illustrates that users of the L4100 will experience broken stretches of theoretical visibility of the proposed development along this route. Actual views will be filtered/screened by roadside hedges, and intervening built forms and vegetation, especially the block of woodland on the opposite side of the L4068 road at the southern end of this route. Viewpoint F illustrates a view from the L4608 in proximity to the southern end of the L4100. It demonstrates that intervening vegetation will screen/filter the majority of the proposed development if views are available from the road.

The magnitude of change experienced by users of the L4100, as a result of the proposed development is assessed to be **Negligible** as the potential for actual views is unlikely due to roadside and intervening vegetation.

The effect of the proposed development on the L4100 is therefore assessed to be **Negligible** and the significance is **Not Significant**.

10.9.1.12 L8168 (Kilfielim Road)

The ZTV illustrates that users of the L8168 will experience theoretical visibility of the proposed development along the northern stretch of this road. However due to a combination of roadside vegetation, intervening hedgerows, and the proposed landscaping along the R352 actual visibility of the proposed development is unlikely.

The magnitude of change experienced by users of the L8168, as a result of the proposed development is assessed to be **Negligible** as actual views are unlikely.

The effect of the proposed development on the L8168 is therefore assessed to be **Negligible** and the significance is **Not Significant**.

10.9.1.13 L8172

The ZTV illustrates that users of the L8172 will experience theoretical visibility of the proposed development from much of the route with only a couple of broken stretches along its length. However, roadside hedgerows, the built form of the houses along the eastern side of the northern end of the road and intervening vegetation will likely screen any actual views of the proposed development.

The magnitude of change experienced by users of the L8172, as a result of the proposed development is assessed to be **Negligible** as actual views are unlikely.

The effect of the proposed development on the L8172 is therefore assessed to be **Negligible** and the significance is **Not Significant**.

10.9.1.14 Knockanean Road

The ZTV illustrates that theoretical visibility of the proposed development experienced by users of the Knockanean Road will largely be limited to the stretch of road west of Knockanean National School where Viewpoint H is located. For the stretch on the eastern side of the motorway, mature roadside hedgerows combined

with the woodland block situated between the road and the R352 will screen any actual views of the proposed development. West of the motorway, mature hedgerows combined with the built forms of Knockanean and Ennis, will once again screen any potential views.

The magnitude of change experienced by users of the Knockanean Road, as a result of the proposed development is assessed to be **Negligible** as actual views are unlikely.

The effect of the proposed development on the Knockanean Road is therefore assessed to be **Negligible** and the significance is **Not Significant**.

10.9.2 Rail

The location of the railway line is illustrated in Figure 10.6 Key Routes.

10.9.2.1 Limerick to Galway Railway Line

The ZTV illustrates that users of the Limerick to Galway Railway Line will experience theoretical visibility of the proposed development for two long, largely unbroken stretches, one in the north and one in the south of the LVIA Study Area.

For the stretch in the south, views to the proposed development are likely screened by the large blocks of vegetation located between the railway and the motorway and also in places by the built form of the settlement of Ennis.

In the north, actual views will be screened by localised cuttings through which the railway line passes and intervening vegetation.

Although Viewpoints K and M are located along these two stretches respectively they are raised up on the road over passes and as such the visibility experienced by users of the railway line will be even more restricted than that demonstrated by these two views.

The magnitude of change experienced by users of the Limerick to Galway Railway Line, as a result of the proposed development is assessed to be **Negligible** as actual visibility of the proposed development will be relatively limited and if seen will be likely to appear as part of the settlement of Ennis.

The effect of the proposed development on the Limerick to Galway Railway Line is therefore assessed to be **Negligible** and the significance is **Not Significant**.

10.9.3 Viewpoints

The baseline description and assessment of sensitivity of the viewpoints is presented in Table 10.8. The visual assessment of the viewpoints is described in Table 10.9 below. The viewpoints are illustrated in Figures 10.11a to 10.16b.

Table 10.9 Representative Viewpoints – Assessment

Viewpoint	Viewpoint Assessment
Viewpoint 1 R352 South of Site (Figures 10.11a & 10.11b)	The photomontages demonstrate that even after the completion of Phase 1 (Figure 10.11b), views of the proposed development will be strongly filtered by the proposed woodland planting and associated bund along the roadside. Upon completion of the entire development at Phase 3, the planting will have grown to such a level that the majority of the development will be screened from view, and it will be barely noticeable.

	<p>After 15 years establishment of the structure planting (Figure 10.11a), approximately 10 years after completion of the proposed development (Phase 3), the proposed development will be screened from view, even in the winter months when the trees are bare of leaves.</p> <p>The proposed hedgerow provides an appropriate, aesthetically pleasant boundary between the proposed footpath along the R352 and the site boundary and woodland bund beyond.</p> <p>Magnitude of Change The magnitude of change, as a result of the proposed development, is assessed to be Low for the following reasons:</p> <ul style="list-style-type: none"> • The proposed woodland planting and bund will heavily filter views of the proposed development from the outset; • The hedgerow and woodland planting are in keeping with the existing landscape character of the area and as such are not uncharacteristic elements; and • Although the introduction of the landscaping is a noticeable change to the viewpoint, the actual built forms will not be visible. <p>Effect The effect is therefore assessed to be Minor, and the significance is Slight.</p>
Viewpoint 2 West of R352- M18 roundabout (Figures 10.12a & 10.12b)	<p>The photomontage illustrating the proposed development upon completion of Phase 1 (Figure 10.12b) shows that the proposed development will occupy a small proportion of the view with the lower part of the building screened from view by the existing intervening hedgerow. Upon completion of the entire proposed development (Phase 3), the photomontage (Figure 10.12b) demonstrates that the proposed development will occupy approximately a third of the horizontal extents of view with the existing planting screening the lower parts of the buildings.</p> <p>After 15 years establishment of the structure planting (Figure 10.12a), approximately 10 years after completion of the proposed development (Phase 3), the proposed structure planting will have grown such that it frames the main building in the view on either side and screening the other buildings from view.</p> <p>In all views the frontages of the buildings positively address the view, facing directly onto the receptor. It should be noted that in discussion with the Council during the design phase the Council requested that the proposed development address this motorway junction in some form in order to acknowledge the presence of the Data Centre.</p> <p>Magnitude of Change The magnitude of change, as a result of the proposed development, is assessed to be Medium for the following reasons:</p> <ul style="list-style-type: none"> • The proposed built form will be a noticeable change to the existing view whilst also being an uncharacteristic element in the view; • The proposed buildings will ultimately occupy less than a third of the horizontal extents of view and due to the setback and the intervening hedgerow will not be dominant; and • The proposed buildings positively address the viewpoint. <p>Effect The effect is therefore assessed to be Moderate/Minor and the significance is Moderate. The viewpoint is generally transient in nature and seen in the wider context of the electricity substation and the motorway junction and associated signage. Although there are residences in proximity to the roundabout, their windows are not orientated towards the proposed development.</p>
Viewpoint 3 M18 (Adjacent service track) West of Site (Figures 10.13a & 10.13b)	<p>Upon completion of Phase 1, the photomontage (Figure 10.13b) demonstrates that the proposed development will occupy less than a sixth of the horizontal extents of the view, visible in a dip in the landform and existing vegetation. Two existing twin wood pole electricity structures are removed from the view as a result of the undergrounding of the two high voltage electricity lines within the site.</p>

	<p>Upon completion of the entire proposed development, the photomontage (Figure 10.13b) illustrates that the built forms will have expanded to occupy just under a third of the horizontal view, but still contained to the dip in the landscape.</p> <p>After 15 years establishment of the structure planting (Figure 10.13a), approximately 10 years after completion of the proposed development (Phase 3), the proposed woodland planting will have established to such a point that it will screen/heavily filter the two righthand buildings that were partially visible. As a result, open visibility is restricted to the one more readily visible building. Much of this building that is visible is the frontage of the building, providing a more positive appearance.</p> <p>The proposed development is seen in the portion of the view containing existing electricity infrastructure, containing development to the one part of the view. It should also be noted that this view is representative of users of the motorway consequently travelling at high speeds. As such, given the proposed development occupies a small proportion of the view and is located in a dip in the landscape this will be limited to a glimpsed view.</p> <p>Magnitude of Change The magnitude of change, as a result of the proposed development, is assessed to be Low to Medium for the following reasons:</p> <ul style="list-style-type: none"> • The proposed development occupies a small proportion of the view, visible through a break in the existing hedgerow planting, located in a dip in the landscape and at an oblique angle to the motorway; • Although the proposed buildings, given their scale are uncharacteristic elements within the view, they occupy the same proportion of the view as other man-made electricity infrastructure; and • Given the proportion of the view occupied and the high-speed nature of the receptor, the proposed development will be apparent rather than conspicuous in nature. <p>Effect The effect is therefore assessed to be Minor/Moderate, and the significance is Slight.</p>
<p>Viewpoint 4 L4608 North of Site at Cappagh More (Figures 10.14a & 10.14b)</p>	<p>Upon completion of Phase 1, the photomontage (Figure 10.14b) illustrates that the upper halves of two data halls will be visible with the lower halves screened by a mix of the existing vegetation and the proposed landscaping.</p> <p>The photomontage for the completion of Phase 3 and the entire development (Figure 10.14b) illustrates that although the Vertical Farm, Energy Centre and associated new substation have been constructed, the only elements of these built forms that will be readily visible will be the flues of the Energy Centre. These will be viewed at a similar vertical scale and in the context of existing mature trees on the horizon. A third data hall will now also be visible, with the two previously visible data halls replaced by two new halls which are closer in the view than in the Phase 1 photomontage.</p> <p>The photomontage after 15 years establishment of the structure planting (Figure 10.13a), approximately 10 years after completion of the proposed development (Phase 3), illustrates that the proposed woodland planting will almost completely screen the right-hand data hall from view. The remaining visible data halls will occupy less than a third of the horizontal extents of the view, with the elements visible limited to the frontages and the upper halves of the sides. The proposed landscaping is in keeping with the character of this landscape and easily blends into the view.</p> <p>Despite the addition of large scale, built form, only a proportion of the development will be visible, and the characteristic undulating nature of the drumlin farmland will not be affected.</p> <p>Magnitude of Change The magnitude of change, as a result of the proposed development, is assessed to be Medium for the following reasons:</p>

	<ul style="list-style-type: none"> • The built form will be conspicuous but not dominant, being a partial change to a proportion of the landscape affecting some but not all of the key characteristics of the landscape; • The built forms will be uncharacteristic; and • The key undulating characteristic of this landscape will be retained within the view. <p>Effect The effect is therefore assessed to be Moderate, and the significance is Moderate. Although the proposed development will be noticeable change within the view, a large proportion of the built forms will be screened from view due to the combination of the layout and placement of the buildings and the proposed landscaping. This is despite the viewpoint being located within 500m of the site boundary.</p>
Viewpoint 5 L4608 at Ballymacahill (Figures 10.15a & 10.15b)	<p>The photomontage illustrating the proposed development upon completion of Phase 1 (Figure 10.15b) shows that the very top of one building of the proposed development will be just visible above the horizon. However, the building will be lower in height than the taller elements of the hedgerow running along the horizon. As a result of this minimal visibility and the proposed building colour scheme the proposed development will be a n inconspicuous element within the wider view.</p> <p>Upon completion of the entire development, Phase 3, the photomontage (Figure 10.15b) demonstrates that the tops of four of the proposed buildings will now be visible. However, the heights of these will still be lower than the higher parts of the hedgerow and when combined with the proposed colour scheme helps the proposed development to be absorbed into the landscape.</p> <p>After 15 years establishment of the structure planting (Figure 10.15a), approximately 10 years after completion of the proposed development (Phase 3), the proposed structure planting will have grown to such a point that it will have further screened parts of the proposed development. The proposed planting will blend with the hedgerow along the horizon.</p> <p>Magnitude of Change The magnitude of change, as a result of the proposed development, is assessed to be Low to Negligible for the following reasons:</p> <ul style="list-style-type: none"> • Visibility of the proposed development is limited to just the upper parts of the buildings; • The proposed colour scheme helps to blend the development with the sky, reducing how noticeable the built forms are; and • Consequently, the proposed development, despite being visible, is a barely noticeable element amongst the existing vegetation along the horizon. <p>Effect The effect is therefore assessed to be Negligible, and the significance is Not Significant.</p>
Viewpoint 6 R352 at TII Depot to west of M18 (Figures 10.16a & 10.16b)	<p>All three photomontages for this view illustrate that visibility of the proposed development will be limited to a very small horizontal and vertical proportion of the view farmed between a lamppost, roadside planting, and roadside barrier. The built forms are also viewed behind existing pylons and do not extend vertically above the adjacent existing gateway walls to the Knockanean Halting Site.</p> <p>Magnitude of Change The magnitude of change, as a result of the proposed development, is assessed to be Negligible for the following reasons:</p> <ul style="list-style-type: none"> • The proposed development is barely noticeable, occupying a very small proportion of the view; • The proposed development is seen in the context of the other man-made elements; and • The proposed development does not extend above other built elements in the same proportion of the view. <p>Effect The effect is therefore assessed to be Negligible, and the significance is Not Significant.</p>

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10.10 Cumulative Impact Assessment

In terms of potential cumulative landscape and visual impacts, the only other proposed development with the potential to contribute to cumulative effects is the consented Motorway Service Station at Junction 12, southbound off the M18. The scheme is currently the subject of an appeal to An Bord Pleanála. A list of all cumulative developments considered is contained within Appendices 3.1 and 3.2 of Chapter 3 of the EIAR.

The ZTV for the proposed development (Figure 10.9) shows that there will be some theoretical visibility of the proposed development from the location of the proposed Junction 12 Motorway Services Station. However, actual visibility is highly unlikely due to the combination of the proposed landscaping and intervening vegetation as demonstrated by the Viewpoints in Appendix 10.1 and Annex 10.1 and as assessed in Table 10.9. Furthermore, existing mature hedgerows and woodland to the north of the proposed motorway service station will foreshorten wider visibility of the service station.

The potential for cumulative impacts upon the LVIA Study Area resulting from the proposed development in combination with the proposed service station is therefore limited, given the restriction of actual visibility in the area between the two schemes. Consequently, the cumulative effects are assessed to be **Negligible**, and the significance is **Not Significant**.

10.11 SUMMARY

Table 10.10 summarises the findings of this LVIA.

Table 10.10 Summary Table

Receptor	Sensitivity	Magnitude of Change	Effect	Significance
Construction – Pre-Phase 1c	-	-	Moderate, temporary/ short term (approx. 1 year)	Moderate
Construction – Post-Phase 1b	-	-	Minor, short term (approx. 1 year)	Slight
Landscape Fabric	Medium	Medium	Moderate	Moderate
Ennis Drumlin Farmlands LCA	Medium	Low	Minor	Slight
Fergus Loughlands LCA	High	Negligible	Negligible	Not Significant
Fergus Estuary LCA	Medium	Negligible	Negligible	Not Significant
Local Landscape Character	Medium	Low	Minor	Slight
Working Landscapes	Low	Negligible	Negligible	Not Significant
M18	Medium	Low to Medium	Minor	Slight
N85	Medium	Negligible	Negligible	Not Significant

R352	Medium	Low to Medium	Minor	Slight
R458	Medium	Negligible	Negligible	Not Significant
R469	Medium	Negligible	Negligible	Not Significant
R474	Medium	Negligible	Negligible	Not Significant
R475	Medium	Negligible	Negligible	Not Significant
R871	Medium	Negligible/ None	Negligible/ None	Not Significant
L4076	Medium	Negligible	Negligible	Not Significant
L4608	Medium	Low to Medium	Minor	Slight
L4100	Medium	Negligible	Negligible	Not Significant
L8168 (Kilfielim Road)	Medium	Negligible	Negligible	Not Significant
L8172	Medium	Negligible	Negligible	Not Significant
Knockanean Road	Medium	Negligible	Negligible	Not Significant
Limerick to Galway Railway Line	Medium	Negligible	Negligible	Not Significant
VP1 R352 South of Site	High	Low	Minor	Slight
VP2 West of R352-M18 roundabout	Medium	Medium	Moderate/ Minor	Moderate
VP3 M18 (Adjacent service track) West of Site	Medium	Low to Medium	Minor/ Moderate	Slight
VP4 L4608 North of Site at Cappagh More	High	Medium	Moderate	Moderate
VP5 L4608 at Ballymacahill	High	Low to Negligible	Negligible	Not Significant
VP6 R352 at TII Depot to west of M18	Medium	Negligible	Negligible	Not Significant
Cumulative	-	-	Negligible	Not Significant

It is notable that the LVIA has identified that no landscape or visual receptors will experience levels of significance greater than 'Moderate as a result of the proposed development.

10.11.1 Summary of Residual Impacts

This Landscape and Visual Impact Assessment has been carried out to identify potential landscape and visual impacts arising from the proposed Data Centre development at Tulla Road, Spancilhill. The findings of this LVIA will inform the Council's consideration of the proposed development.

The impact of the proposed development has been considered and presented in this LVIA. A series of design measures, which were inherent to the design of the proposal, have ensured that the proposal fits with the surrounding character and context. The LVIA takes cognisance not only of the proposed built development, but also of the proposed landscaping.

The proposed woodland planting along the boundary to the R352, Tulla Road screens the proposed development from the adjacent properties and the road users. The woodland planting elsewhere across the site also aide in reducing actual visibility of the proposed development and provides an attractive setting to the development. The woodlands also enhance the biodiversity of the site.

The proposed meadow grasslands across the site provide a landscaped area of transition between the proposed building layout and the surrounding countryside and pastoral farmland.

The relationship with the existing landform has been considered. The proposed built forms have been located within the centre of the site where the ground is less elevated. They have also been orientated to correspond with the overall slope of the landform from east to west. This ensures that the key undulating characteristic and overall landform is maintained in views from the wider landscape.

The key features of the site, namely the woodland designated as 'Buffer Space' on Clare County Council's Zoning Map PLP-18-0001-2 (12/03/2019), Tooreen Lough and the ring fort Recorded Monument have been respected and incorporated into the design. All the existing waterbodies have also been retained.

The LVIA, by reference to field surveys and viewpoint analysis, has identified that the site is relatively visually discrete from the wider landscape despite its large scale. Views of the proposed development are not available from the east due to the existing topography. Views of the proposal from the R352 and the wider landscape to the south are contained by a combination of the existing and proposed woodland planting in the south of the site.

Viewpoint A from the east (Appendix 10.1) demonstrates the restricted visibility of the proposal due to the existing topography. Viewpoints 5 and 6 (Annex 10.1, Figures 10.15a to 10.16b), along with Viewpoints C to G (Appendix 10.1), also demonstrate the restricted visibility in views from the west.

To the north, although the built form will be visible, Viewpoint 4 (Annex 10.1, Figures 10.14a & b) demonstrates how the combination of the proposed bunds and woodland planting will reduce the visible extents of the proposed development.

As a result of the landscape and visual impact assessment, it is concluded that the site has the landscape capacity to accommodate the proposed development, taking account of the existing and proposed landscape framework and the following reasons:

- The LVIA has identified that there will be no 'Significant' or higher impacts on the landscape and visual receptors as a result of the proposed development;
- The proposal is in keeping with the zoning and designation in Variation No.1 to the Clare County Development Plan 2017-2023;
- The proposal responds to the existing landscape context and landform, ensuring that the woodland designated as 'Buffer Space' on Clare County Council's Zoning Map PLP-18-0001-2 (12/03/2019), Tooreen Lough and the ring fort Recorded Monument are not altered as part of the development; and
- The proposal improves and increases the habitats and biodiversity through the addition of the bunds, the additional woodland and the new meadow grasslands.

The adoption of the design measures (described in this report, the Landscape Design Strategy report and the Landscape and Biodiversity Management Plan) will integrate the proposal into the surrounding context. This is evidenced by the absence of any significant landscape and visual impacts, the limited extents of potential visibility and the broader findings of the LVIA.

11.0 ARCHAEOLOGICAL, ARCHITECTURAL AND CULTURAL HERITAGE

11.1 INTRODUCTION

11.1.1 General

This chapter assesses the potential impacts, if any, on the archaeological, architectural and cultural heritage resource of a proposed data centre development at Tooreen and Cahernalough, Ennis, County Clare (ITM 537485/679651; Figure 11.1).

This study determines, as far as reasonably possible from existing records, the nature of the archaeological, architectural, and cultural heritage resource in and within the vicinity of the proposed development using appropriate methods of study. Desk-based assessment is defined as a programme of study of the historic environment within a specified area or site that addresses agreed research and/or conservation objectives. It consists of an analysis of existing written, graphic, photographic, and electronic information in order to identify the likely heritage assets, their interests and significance and the character of the study area, including appropriate consideration of the settings of heritage assets (ClfA 2014). This leads to the following:

- determining the presence of known archaeological and architectural assets that may be affected by the proposed development;
- assessment of the likelihood of finding previously unrecorded archaeological and architectural remains during the construction programme;
- determining the impact upon the setting of known cultural heritage sites in the surrounding area; and
- suggested mitigation measures based upon the results of the above research.

The study involved detailed interrogation of the archaeological, architectural and historical background of the proposed development area. This included information from the Record of Monuments and Places of County Clare, the Record of Protected Structures, National Inventory of Architectural Heritage, the Clare County Development Plan (2017-2023), the topographical files of the National Museum of Ireland, and cartographic and documentary records. A field inspection has been carried out in an attempt to identify any known archaeological, architectural and cultural heritage sites and previously unrecorded features, structures, and portable finds within the proposed development area.

An impact assessment and a mitigation strategy have been prepared. The impact assessment is undertaken to outline potential adverse impacts that the proposed development may have on the cultural heritage resource, while the mitigation strategy is designed to avoid, reduce, or offset such adverse impacts.

11.1.2 Legislation and Guidelines

The following legislation, standards and guidelines were consulted as part of the assessment.

- National Monuments Act, 1930 to 2014;
- The Planning and Development Acts, 2000 (as amended) ;
- Heritage Act, 1995, as amended;

- Draft Advice Notes on Current Practice (in the preparation of Environmental Impact Statements), 2015, EPA;
- Draft Guidelines on the Information to be Contained in Environmental Impact Statements. Dublin. Government Publications Office, 2017, EPA;
- Frameworks and Principles for the Protection of the Archaeological Heritage, 1999, (formerly) Department of Arts, Heritage, Gaeltacht, and Islands; and
- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 1999

11.1.3 Consultation

During scoping and research for the assessment and EIAR, a number of statutory and voluntary bodies were consulted to gain further insight into the cultural background of the receiving environment and study area, as follows:

- Department of Housing, Local Government and Heritage – the Heritage Service and Policy Unit, National Monuments and Historic Properties Section: Record of Monuments and Places; Sites and Monuments Record; Monuments in State Care Database; Preservation Orders; Register of Historic Monuments;
- National Museum of Ireland, Irish Antiquities Division: topographical files of Ireland;
- National Inventory of Architectural Heritage: County Clare; and
- Clare County Council: Planning Section.

11.1.4 Definitions

In order to assess, distil and present the findings of this study, the following definitions apply:

‘Cultural Heritage’ where used generically, is an over-arching term applied to describe any combination of archaeological, architectural, and cultural heritage features, where:

- the term ‘archaeological heritage’ is applied to objects, monuments, buildings or landscapes of an (assumed) age typically older than AD 1700 (and recorded as archaeological sites within the Record of Monuments and Places);
- the term ‘architectural heritage’ is applied to structures, buildings, their contents and settings of an (assumed) age typically younger than AD 1700; and
- the term ‘cultural heritage’, where used specifically, is applied to other (often less tangible) aspects of the landscape such as historical events, folklore memories and cultural associations.

The quality, magnitude and duration of potential effects are defined in accordance with the criteria provided in the EPA Draft ‘*Guidelines on the information to be contained in Environmental Impact Assessment Reports*’ (2017) as outlined in Table 1.2 of Chapter 1 (introduction).

11.2 METHODOLOGY

Research for this report was undertaken in two phases. The first phase comprised a paper survey of all available archaeological, architectural, historical, and cartographic sources. The second phase involved a field inspection of the site.

11.2.1 Paper Survey

This is a document search. The following sources were examined and a list of areas of archaeological, architectural and cultural heritage potential was compiled:

- Record of Monuments and Places for County Clare;
- Sites and Monuments Record for County Clare;
- National Monuments in State Care Database;
- Preservation Orders List;
- Register of Historic Monuments;
- Topographical files of the National Museum of Ireland;
- Cartographic and written sources relating to the study area;
- Clare County Development Plan, 2017-2023;
- Aerial photographs;
- Excavations Bulletin (1970–2019);
- Place Names; and
- National Inventory of Architectural Heritage.

Record of Monuments and Places (RMP) is a list of archaeological sites known to the National Monuments Section, which are afforded legal protection under Section 12 of the 1994 National Monuments Act and are published as a record.

Sites and Monuments Record (SMR) holds documentary evidence and field inspections of all known archaeological sites and monuments. Some information is also held about archaeological sites and monuments whose precise location is not known e.g. only a site type and townland are recorded. These are known to the National Monuments Section as 'un-located sites' and cannot be afforded legal protection due to lack of locational information. As a result, these are omitted from the Record of Monuments and Places. SMR sites are also listed on a website maintained by the Department of Housing, Local Government, and Heritage (DoHLGH) – www.archaeology.ie.

National Monuments in State Care Database is a list of all the National Monuments in State guardianship or ownership. Each is assigned a National Monument number whether in guardianship or ownership and has a brief description of the remains of each Monument.

The Minister for the DoHLGH may acquire national monuments by agreement or by compulsory order. The state or local authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments (other than dwellings) may also appoint the Minister or the local authority as guardian of that monument if the state or local authority agrees. Once the site is in ownership or guardianship of the state, it may not be interfered with without the written consent of the Minister.

Preservation Orders List contains information on Preservation Orders and/or Temporary Preservation Orders, which have been assigned to a site or sites. Sites deemed to be in danger of injury or destruction can be allocated Preservation Orders under the 1930 Act. Preservation Orders make any interference with the site illegal. Temporary Preservation Orders can be attached under the 1954 Act. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent, and at the discretion, of the Minister.

Register of Historic Monuments was established under Section 5 of the 1987 National Monuments Act, which requires the Minister to establish and maintain such a record. Historic monuments and archaeological areas present on the register are afforded statutory protection under the 1987 Act. All registered monuments are included in the Record of Monuments and Places.

The topographical files of the National Museum of Ireland are the national archive of all known finds recorded by the National Museum. This archive relates primarily to artefacts but also includes references to monuments and unique records of previous excavations. The find spots of artefacts are important sources of information on the discovery of sites of archaeological significance.

Cartographic sources are important in tracing land use development within the development area as well as providing important topographical information on areas of archaeological potential and the development of buildings. Cartographic analysis of all relevant maps has been made to identify any topographical anomalies or structures that no longer remain within the landscape.

- William Petty, Down Survey, Barony of Bunratty, c. 1655;
- Henry Pelham, The County of Clare, 1787; and
- Ordnance Survey maps of County Clare, 1840-2, 1893-1907 and 1913-8.

Documentary sources were consulted to gain background information on the archaeological, architectural and cultural heritage landscape of the proposed development area.

Development Plans contain a catalogue of all the Protected Structures and archaeological sites within the county. The Clare County Development Plan (2017–2023) was consulted to obtain information on cultural heritage sites in and within the immediate vicinity of the proposed development area.

Aerial photographic coverage is an important source of information regarding the precise location of sites and their extent. It also provides initial information on the terrain and its likely potential for archaeology. A number of sources were consulted including aerial photographs held by the Ordnance Survey, Google Earth and Bing Maps.

Excavations Bulletin is a summary publication that has been produced every year since 1970. This summarises every archaeological excavation that has taken place in Ireland during that year up until 2010 and since 1987 has been edited by Isabel Bennett. This information is vital when examining the archaeological content of any area, which may not have been recorded under the SMR and RMP files. This information is also available online (www.excavations.ie) from 1970–2020.

Place Names are an important part in understanding both the archaeology, history, and cultural heritage of an area. Place names can be used for generations and in some cases have been found to have their root deep in the historical past. The main references used for the place name analysis is *Irish Local Names Explained* by P.W Joyce (1870) and the Place Names Database of Ireland.

The National Inventory of Architectural Heritage (NIAH) is a state initiative established under the provisions of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999 tasked with making a nationwide record of significant local, regional, national and international structures, which in turn provides county councils with a guide as to what structures to list within the Record of

Protected Structures. The NIAH have also carried out a nationwide desk-based survey of historic gardens, including demesnes that surround large houses.

11.2.2 Field Inspection

Field inspection is necessary to determine the extent and nature of archaeological, architectural, and historical remains and can also lead to the identification of previously unrecorded or suspected sites and portable finds through topographical observation and local information.

The archaeological and architectural field inspection entailed:

- Walking the proposed development and its immediate environs;
- Noting and recording the terrain type and land usage;
- Noting and recording the presence of features of archaeological or historical significance;
- Verifying the extent and condition of any recorded sites; and
- Visually investigating any suspect landscape anomalies to determine the possibility of their being anthropogenic in origin.

During the baseline analysis and field inspection, a number of sites of heritage merit have been identified, which do not have statutory protection, but represent sites that require assessment as part of the overall cultural heritage resource. Cultural Heritage (CH) has been applied to sites or structures that possess archaeological and/or architectural heritage significance. Area of Archaeological Potential (AAP) has been applied to areas of the landscape, such as loughs or watercourses, that whilst are not specifically archaeological in nature, are landscape features that have proven throughout the prehistoric and historic period to attract human habitation and settlement.

11.3 RECEIVING ENVIRONMENT

11.3.1 Archaeological and Historical Background

The proposed development area is situated within a number of open fields primarily in the townlands of Cahernalough and Tooreen with small sections extending west into the townlands of Ballymacahill and Knockanean, which are located in the parishes of Kilraghtis and Doora and barony of Bunratty Upper, County Clare. The landscape is currently under agricultural use, which would likely continue without the proposed development. The site is bordered to the south by the R352 and to the west by the M18. There is one recorded monument within the northern half of the proposed development, a cashel (RMP CL034-007) with a further six recorded sites located within the study area (250m) (Figure 11.1). There are no protected structures or structures listed in the NIAH located within the study area of the proposed development.

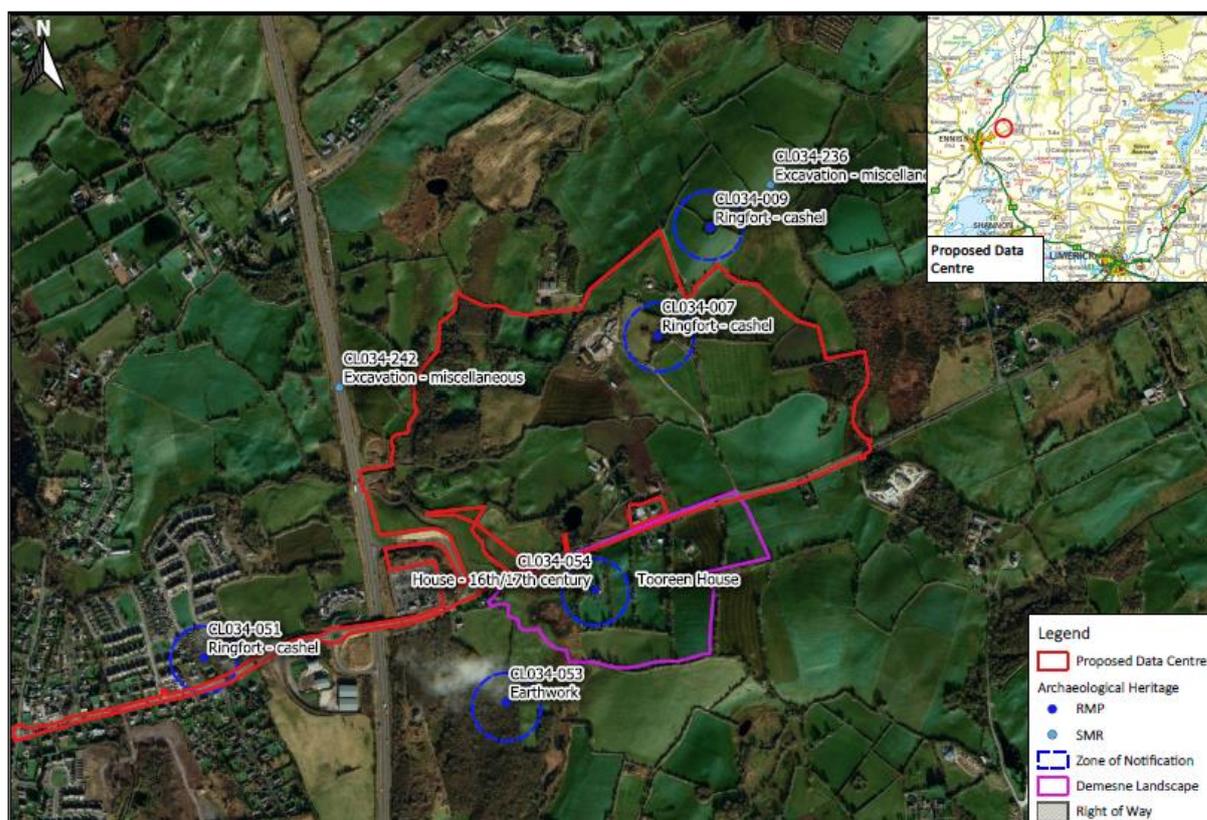


Figure 11.1 Location of proposed development and surrounding recorded monuments and demesne landscapes

11.3.1.1 Prehistoric Period

Mesolithic Period (6000-4000 BC)

Although very recent discoveries may push back the date of human activity by a number of millennia (Dowd and Carden 2016), the Mesolithic period is the earliest time for which there is clear evidence for prehistoric activity in Ireland. During this period people hunted, foraged, and gathered food and appear to have had a mobile lifestyle. The most common evidence found to show the presence of Mesolithic communities at a site consists of scatters of worked flint material, a by-product from the production of flint implements. There are no known Mesolithic sites located within the vicinity of the proposed development; however, the River Fergus, with its range of materials and resources, c. 2.4km to the west-southwest, would have been an attractive location for early hunter gatherers, providing access to the Shannon estuary to the south and deep into the Irish Midlands.

Neolithic Period (4000-2500 BC)

In the Neolithic period communities became less mobile and their economy became based on the rearing of stock and cereal cultivation. The transition to the Neolithic was marked by major social change. Communities had expanded and moved further inland to more permanent settlements. This afforded the development of agriculture which demanded an altering of the physical landscape. Forests were rapidly cleared, and field boundaries constructed. Pottery was also being produced, possibly for the first time.

While recent years have seen a large increase in the number of identified Neolithic settlement and habitation sites, the period is most commonly characterised by its impressive megalithic tombs. There are four types of tomb; court cairn, portal, passage, and wedge. The court, portal, and passage style tombs are of pure Neolithic date, while the wedge tomb straddles the Neolithic to Bronze Age transition. Evidence of Neolithic activity in the county is represented by the presence of court tombs and portal tombs in the Burren and stray artefacts typical of this period. A wedge tomb (RMP CL026-091) is recorded c. 2.1km to the northeast of the proposed data centre.

Bronze Age (2500-800 BC)

During the Bronze Age settlement within the wider landscape continued and intensified and there is a range of evidence for activity in the surrounding wetlands and drylands of the Shannon estuary and Fergus valley (O' Sullivan 2001). Evidence for a possible late Bronze Age wooden trackway crossing the upper Fergus estuary, providing access between dryland islands, was recorded c. 8km south-southwest of the site (O' Sullivan 2001, 109; RMP CL042-149). This has been interpreted as evidence for the herding of cattle or sheep on the saltmarshes by the local farming community (ibid. 261).

The Bronze Age was marked by the widespread use of metal for the first time in Ireland. As with the transition from Mesolithic to Neolithic, the transition into the early Bronze Age was accompanied by changes in society. The construction of megalithic tombs went into decline and the burial of the individual became typical. Cremated or inhumed bodies were often placed in a cist, which is a stone-lined grave, usually built of slabs set upright to form a box-like construction and capped by a large slab or several smaller lintels (Buckley and Sweetman 1991). Barrows and pit burials are also funerary monuments associated with this period. A Bronze Age palstave was recovered during testing for the Ennis Bypass, c. 910m to the north-northwest (Licence 03E1293).

Another site type thought to reveal a glimpse of domestic life at this time is the burnt mound and fulacht fiadh. A common site within the archaeological record, they are normally interpreted as temporary cooking sites but may have been used for other industrial or even recreational functions. They survive as low mounds of charcoal-enriched soil mixed with an abundance of heat-shattered stones. They are usually horseshoe shaped and located in low-lying areas near a water source and are often found in clusters. Even when levelled by an activity such as ploughing, they are identifiable as burnt spreads in the landscape (Brindley and Lanting 1990).

Iron Age (800 BC-AD 500)

The Iron Age was traditionally seen as a period for which there was little evidence in comparison to the preceding Bronze Age and the succeeding early medieval period. However, development-led excavation in recent decades and projects such as the 'Late Iron Age and Roman Project' have added significantly to our knowledge of the Irish Iron Age. In Europe, there are two stages to the Iron Age, the earlier Hallstatt and followed by the La Tene phase. It is clear there was significant contact and interaction between the Continental Europe, Britain and Ireland at this time. There are no recorded sites of Iron Age date in the vicinity of the proposed development area.

11.3.1.2 Early Medieval Period (AD 500–1100)

County Clare formed from a very early period as a native principality, designated *Tuath Mumhan* (North Munster), or Thomond and contained the six cantrels of *Hy Lochlean*, *Corcumruadh*, *Ibh Caisin*, *Hy Garman*, *Clan Cuilean* and *Dal Gaes*. Archaeological

evidence for settlement at this time is characterised in the landscape by ringforts, cashels, souterrains and early ecclesiastical sites.

The early medieval period is depicted in the surviving sources as largely rural characterised by the basic territorial unit known as *túath*. Byrne (2001) estimates that there were likely to have been at least 150 kings in Ireland at any given time during this period, each ruling over his own *túath*. Enclosures comprise the greatest number of sites recorded in the County Clare Sites and Monuments Record (SMR). Cashels are the stone equivalent of ringforts and are normally found in the west of the country. These together with the ringfort or rath are considered to be the most common indicator of settlement during the early medieval period. Ringforts were often constructed to protect rural farmsteads and are usually defined as a broadly circular enclosure. One of the most recent studies of the ringfort (Stout 2017) has suggested that there is a total of 47,000 potential ringforts or enclosure sites throughout Ireland. They are typically enclosed by an earthen bank and exterior ditch and range from 25m to 50m in diameter. Ringforts can be divided into three broad categories – univallate sites, with one bank or ditch; multivallate sites with as many as four levels of enclosing features and platform or raised ringforts, where the interior of the ringfort has been built up. These enclosed farmsteads were intimately connected to the division of land and the status of the occupant. There is one ringfort recorded within the site containing the proposed data centre (CL034-007), where the enclosure is defined as a cashel. There is a further two ringforts located within 250m of the site (CL034-051, 009).

11.3.1.3 Medieval Period (AD 1100–1600)

It was shortly after the arrival of the Anglo-Normans that Donncadh Cairbreach O' Brien, King of Thomond, moved the O' Brien royal residence from Limerick City to the newly constructed earthen fort at *Clonroad or Cluain Ráda*, c. 2.7km to the southwest of the development area (Ó' Dálaigh 2012, 1; RMP CL033-085005). The new stronghold was located at a fording point on the River Fergus in the northeast of modern Ennis town. Following his death, his son and successor Conor Ruadh, transferred the stronghold and settlement from the northern banks of the River Fergus to the southern bank (RMP CL033-085006).

A Franciscan Abbey (RMP CL033-082001) was founded, by King *Donncadh Cairbreach O' Brien* in the 1240s at a place known as *Inish Mac nInil*, c. 3.4km to the southwest of the development area. The friary was suppressed in 1543 and was leased to James Naylande in 1569 after which it became an effective centre for English government in Thomond. Courts were held in the abbey – possibly in the sacristy. At the time of dissolution the friary property included a church, belfry, graveyard, a mill on the Fergus, an eel weir, two messuages with stone walls and twelve houses in the town of *Innishe* (Ó' Dálaigh 2012, 3). In 1589 the friary was leased to *Donnchad O' Brien* 4th Earl of Thomond who was credited with ensuring the preservation of the building. The monastery was the principal burial place of the Kings (and later Earls) of Thomond. The remaining ruins comprise of a church and parts of a cloister.

In 1543, the last recognised King of Thomond, Murrough the Tanist, travelled to London to become the first Earl of Thomond as part of the Surrender and Regrant scheme (Ó' Dálaigh 2012, 17). The account of a raid on Clonroad in 1553 indicates that a substantial settlement was associated with the castle and in 1581 Clonroad was superseded by Bunratty as the Earls' principal residence. The volume of commercial traffic on the River Fergus in the late 1500s appears to have been considerable and the town traded corn, furs, hides, and wool for manufactured goods such as cloth, iron, salt and wine.

The Annals of the Four Masters record that in 1559 a battle was fought at Spencil Hill (RMP CL034-017/20) between the forces of the Earl of Desmond and the joint forces of the Earl of Thomond and the Earl of Clanrickard, c. 1.1-1.5km to the east-northeast of the proposed development. The battle was the culmination of a cross-country skirmish extending over 6km before the forces of the Earl of Desmond gained the summit of the hill and routed the army of the Earl of Thomond and the Earl of Clanrickard.

In 1565 Connaught was divided into six counties by Sir Henry Sidney (the lord-deputy). Thomond, which was sometimes called O' Brien's country, was made shire ground and called Clare, after its chief town and its Anglo-Norman possessors. In accordance with its natural position, the county was subsequently re-annexed to Munster in 1602, on petition of the Earl of Thomond. The medieval town of Ennis had developed at the convergence of three route ways leading to Limerick, Galway, and the Burren (Spellissy 2003, 40). The town was granted a market in 1609 and in 1613 Ennis was incorporated and the abbey was adopted as a parish church for Doora and Dromcliff.

11.3.1.4 Post-Medieval Period (AD 1600–1900)

In 1641 Barnabas O'Brien, Earl of Thomond owned a large portion of the lands in the Baronies of Islands and Bunratty. Following the rebellion of the same year many of the English families were forced out of Ennis and Clare (now Clarecastle); however it was at this time that a number of displaced wealthy Catholic merchant families settled here.

In the late 17th century Ennis is thought to have contained c. 120 houses and 12 English families. The 18th century saw an increase in leases taken and the town sprawled south and north of the river. In 1741 the O'Brien estates passed to Percy Wyndham and the markets and tolls expanded in the following decades. In 1733 the main trade road to Limerick was made a tolled turnpike (Ó' Dálaigh 2012, 6). By the late 18th century the market at Ennis had grown to the point where the market square failed to provide sufficient space. As such the sale of 'milk, potatoes and other gross goods' was moved to Cloghaneagour (*Clochán na nGabhal* or Stepping stones of the forked stream) at the western end of town (Spellissy 2003, 42). By the 19th century, encouraged by trade and commerce, the town had expanded well into Lifford, north of the river.

The 18th century witnessed a more pacified Ireland and the political climate settled; this saw a dramatic rise in the establishment of large residential houses around the country. This was largely due to the fact that after the turbulence of the preceding centuries, the success of the Protestant cause and effective removal of any political opposition, the country was at peace. The large country house was only a small part of the overall estate of a large landowner and provided a base to manage often large areas of land that could be dispersed nationally. During the latter part of the 18th century, the establishment of a parkland context (or demesnes) for large houses was the fashion. Although the creation of a parkland landscape involved working with nature, rather than against it, considerable construction effort went into their creation. Major topographical features like rivers and mountains were desirable features for inclusion into, and as a setting, for the large house and parkland. The demesne of Toureen House, was established to the immediate south of the proposed data centre; however, by the late 19th century the house and demesne had fallen into ruin.

Toureen House itself is a recorded monument (CL034-054), located c. 76m south-southeast of the proposed development area. Today the house has been restored and renovated and comprises a three-bay, three-storey, over basement house dating to

the 17th century. Prior to renovation the structure was completely ruinous and had lost its roof and internal floors.

Vernacular architecture is defined in James Steven Curl's Encyclopedia of Architectural Terms as 'a term used to describe the local regional traditional building forms and types using indigenous materials, and without grand architectural pretensions', i.e. the homes and workplaces of the ordinary people built by local people using local materials. This is in contrast to formal architecture, such as the grand estate houses of the gentry, churches, and public buildings, which were often designed by architects or engineers. The majority of vernacular buildings are domestic dwellings. Examples of other structures that may fall into this category include shops, outbuildings, mills, lime kilns, farmsteads, forges, gates and gate piers.

The ruins of a vernacular farmstead are located within the proposed development area, which are marked on the first edition OS map (CH 1). A later 19th century modified cottage, which is now derelict, is also located within the site (CH 2) (Figure 11.2). The first edition OS map also marks the site of a lime kiln within the site (CH 3) and the further site of a structure is also recorded, as marked on the first edition OS map (CH 4).

11.3.2 Summary of Previous Archaeological Fieldwork

A review of the Excavations Bulletin (1970–2020) revealed that no previous archaeological investigations have been carried out within the confines of the proposed data centre; however, there have been four investigations carried out within the study area, which are summarised below.

A single oval pit, measuring 1.9m by 1.4m and 0.28m deep, was excavated in advance of a gas pipeline c. 223m to the northeast (Licence 02E1187, Bennett 2002:0113). The single fill of the pit was a fine silt that darkened from a mid-brown at the surface to black at the base. The lowest 0.08m of the deposit was pure charcoal, suggesting in situ burning. The site has since been added to the SMR as CL034-236.

Testing for the northern section of the N18 Ennis Bypass identified one site of archaeological interest within the study area of the proposed development in Ballymacahill. This comprised three small fire pits, potentially of modern date that were identified at the base of a natural slope, c. 170m to the west (Licence 04E0054, Bennett 2004:0135). This site has since been added to the SMR as CL034-242.

A programme of investigation was carried out c. 200m to the west (Licence 02E1495, Bennett 2002:0091), but nothing of significance was identified. Similarly, all renovations associated with works at Toureen House (CL034-054), were archaeologically monitored c. 76m to the south-southeast, but nothing of significance was identified (Licence 00E0753, Bennett 2001:102).



Figure 11.2 Location of proposed development showing townland boundaries, CH sites, AAPs and field numbers

11.3.3 Cartographic Analysis

William Petty, Down Survey, Barony of Bunratty, c. 1655

The Down Survey depicts the area of the proposed data centre in the southern limit of the parish of Kilraghtis in the townlands of 'Lehanagh North' and 'South'. No features are depicted within these townlands.

Henry Pelham, The County of Clare, 1787

The route of the modern R352 to the immediate south of the proposed data centre is marked on this map. Tooreen House (CL034-054) is marked to the south of the site and Castletown House and castle are depicted further to the east. This map shows Tooreen Lough within the site with Lough Ardnamurry to the east.

First Edition Ordnance Survey Map, 1840-2, scale 1:10,560

This is the first map to depict the proposed data centre in detail (Figure 11.3). The site consists of a number of open fields and the two loughs. A small number of houses are marked along a trackway extending north-northwest from the road to the south (CH 1). A circular feature marks the location of the recorded ringfort (CL034-007) on the west side of the trackway in the north of the site. A lime kiln is also marked in the eastern part of the site (CH 3). A watercourse, a tributary of the River Fergus, is depicted along the western limit of the site. The demesne of Tooreen House is depicted to the south and the small demesne of Castletown House is depicted to the east.

Ordnance Survey Map, 1893-1907, scale 1:2,500

There have been some minor changes to the layout of the fields by the time of this OS map and some alterations are shown to the vernacular structures depicted within the north of the site along the trackway (CH 1) (Figure 11.4). A footpath is marked extending south-southwest from these structures to the road to the south. Lough Ardnamurry is depicted as covered in furze to the east of the site. Tooreen House (CL034-007) is marked in ruins to the south and its demesne has fallen into disrepair. The lime kiln (CH 3) is no longer depicted.

Third Edition Ordnance Survey Map, 1913-8, scale 1:10,560

The only major change to note within this is that a small house is now shown at the location of CH 2 within the northern part of the development area.

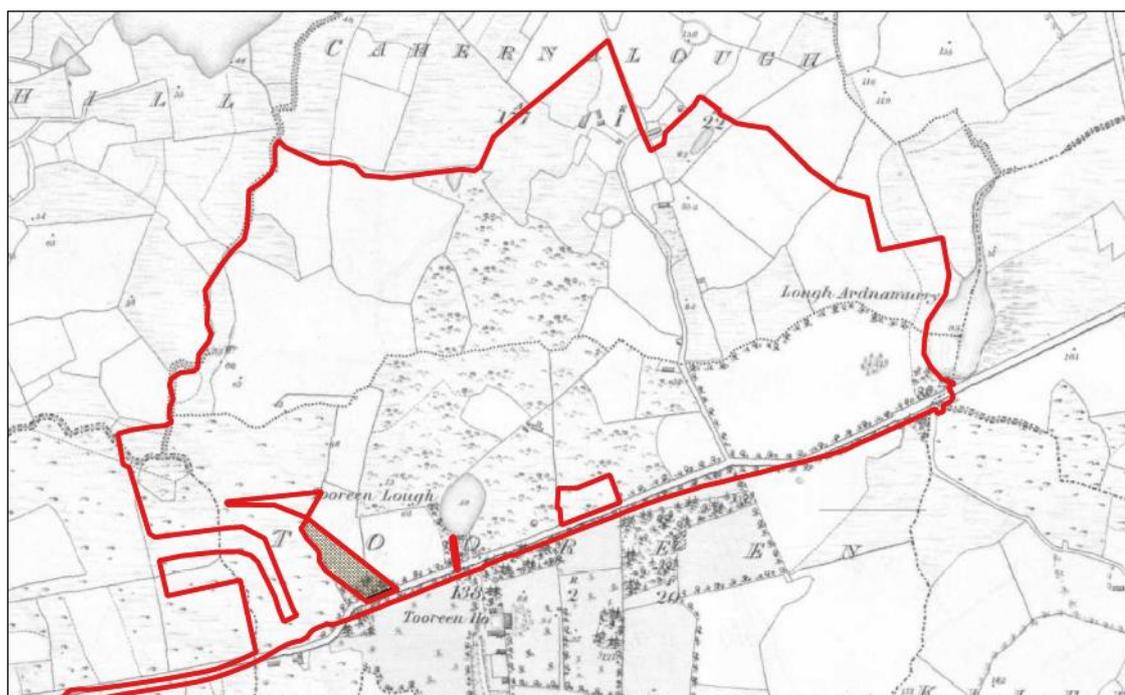


Figure 11.3 Extract from the 1840-2 OS map showing the site location

11.3.4 Clare County Development Plan, 2017-2023

11.3.4.1 Record of Monuments and Places

The Clare County Development Plan, 2017-2023 recognises the statutory protection afforded to all Record of Monuments and Places (RMP) sites under the National Monuments Legislation (1930–2014). The development plan lists a number of aims and objectives in relation to archaeological heritage (Appendix 11.1). It is an objective of the plan to secure the preservation of all archaeological monuments included in the Record of Monuments and Places as established under Section 12 of the National Monuments (Amendment) Act, 1994, and of sites, features and objects of archaeological and historical interest generally, with the preference to preserve in situ and only in exceptional cases preserve by record.

There are seven recorded archaeological sites within 250m of the proposed development, one of which, a cashel (RMP CL034-007) is situated within the northern

portion of the site (Table 11.1; Figure 11.1). Of the seven sites, five represent recorded monuments, whereas two are included in the SMR only as records of previous archaeological investigations. SMRs are not subject to statutory protection.

None of the archaeological sites are further protected as National Monuments, or are subject to Preservation Orders.

Table 11.1 Recorded Archaeological Sites

SMR No.	Location	Classification	Distance to Site	Statutory Protection
CL034-007	Cahernalough	Ringfort - cashel	0m	Yes
CL034-051	Knockanean	Ringfort - cashel	c. 56m north	Yes
CL034-009	Cahernalough	Ringfort - cashel	c. 71m north	Yes
CL034-054	Tooreen	House - 16th/17th century	c. 76m south	Yes
CL034-242	Ballymacahill	Excavation - miscellaneous	c. 170m west	No
CL034-236	Cahernalough	Excavation - miscellaneous	c. 223m north-northeast	No
CL034-053	Knockanean	Earthwork	c. 250m south-southeast	Yes

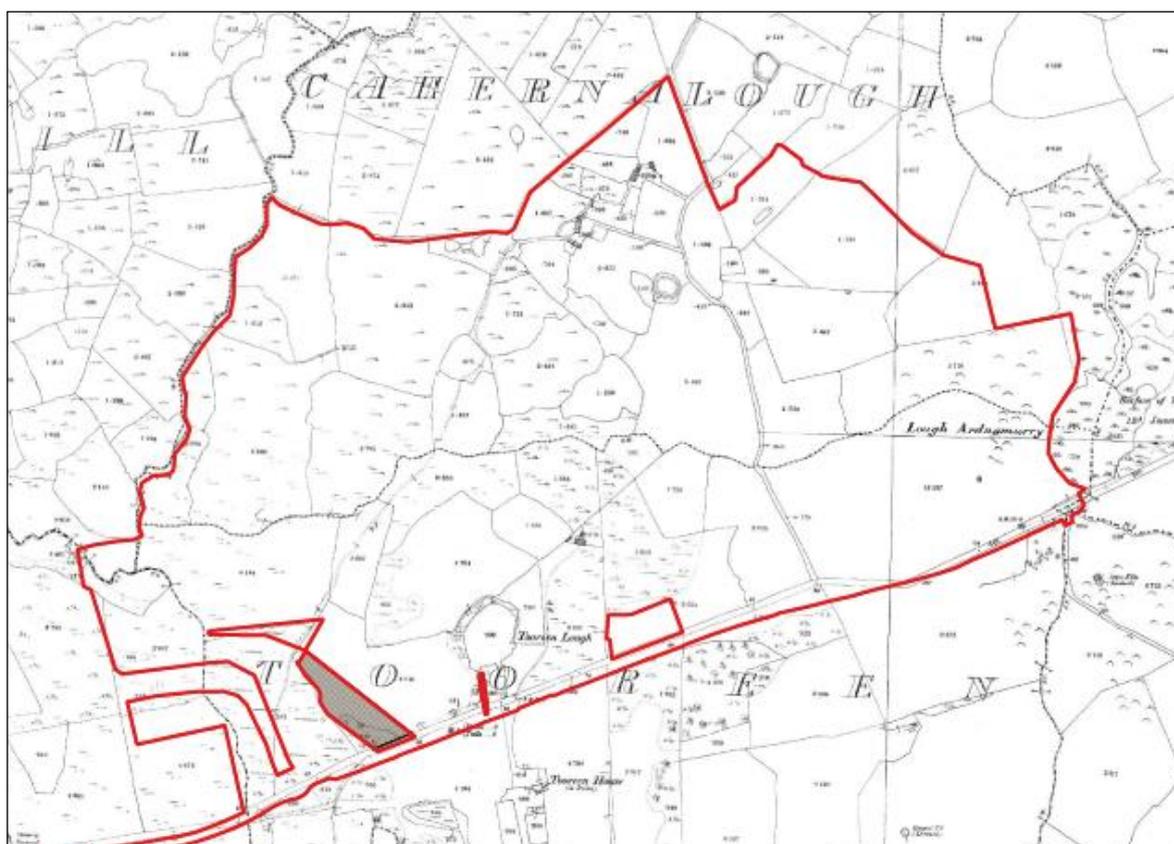


Figure 11.4 Extract from the 1893-1907 OS map showing the site location

11.3.4.2 Record of Protected Structures

The Clare County Development Plan, 2017-2023 recognises the value of the built heritage to the county and is committed to the protection and enhancement of this heritage by providing measures for the protection of architectural heritage. These include the establishment of a Record of Protected Structures (RPS) and the designation of Architectural Conservation Areas (ACAs).

There are no structures included on the RPS within 250m of the proposed development. The nearest protected structure comprises Castletown tower house (RPS 266), situated c. 765m to the east in the townland of Muckinish. The tower house is also included on the Record of Monuments and Places (RMP CL034-014002).

11.3.4.3 ACAs

There are 35 ACAs designated within the Clare County Development Plan, 2017-2023, none of which are situated within the proposed development. The nearest ACA is Our lady's Hospital Complex, Gort Road, which is situated c. 2.6km to the west.

11.3.5 National Inventory of Architectural Heritage

11.3.5.1 Building Survey

The National Inventory of Architectural Heritage survey of Clare was published in 2009. A review of the architectural survey was undertaken as part of this assessment and included buildings within 250m of the study area. There are no structures listed on the NIAH building survey within the study area, the nearest comprises Knockanoura Castle (NIAH 20003065), c. 2.2km to the west-southwest in the townland of Knockanoura.

11.3.5.2 Garden Survey

The National Inventory of Architectural Heritage has also carried out a garden survey of the demesne landscapes in County Clare. The first edition Ordnance Survey map of County Clare (1840-2) shows the extent of demesne landscapes as shaded portions of land within the study area. These were established as a naturalised landscaped setting for the large houses of the landed gentry.

There are no demesnes within the study area listed on the NIAH Garden Survey; however, there is one demesne depicted on the first edition OS map within the study area, which comprises Tooreen House, located to the immediate south of the road that borders the development area to the south (Figure 11.1).

The demesne of Tooreen House is depicted to the immediate south of the development area on the first edition OS map. By the time of the 1893-1907 OS map the principal structure (RMP CL034-054) is annotated 'in ruins' and the demesne is denuded. Today elements of the demesne's footprint are still visible and the main house has been restored with a modern annex constructed to the east.

11.3.6 Cultural Heritage

The term 'cultural heritage' can be used as an over-arching term that can be applied to both archaeology and architectural. However, it also refers to more ephemeral aspects of the environment, which are often recorded in folk law or tradition or possibly date to a more recent period. Cultural Heritage sites can also include elements of the

landscape, such as placenames or townlands (and their associated boundaries). Sites and areas identified as possessing cultural heritage significance are included below.

11.3.6.1 Townlands

The townland is an Irish land unit of considerable longevity as many of the units are likely to represent much earlier land divisions. However, the term townland was not used to denote a unit of land until the Civil Survey of 1654. It bears no relation to the modern word 'town' but like the Irish word *baile* refers to a place. It is possible that the word is derived from the Old English *tun land* and meant 'the land forming an estate or manor' (Culleton 1999, 174).

Gaelic land ownership required a clear definition of the territories held by each sept and a need for strong, permanent fences around their territories. It is possible that boundaries following ridge tops, streams or bog are more likely to be older in date than those composed of straight lines (*ibid.* 179).

The vast majority of townlands are referred to in the 17th century, when land documentation records begin. Many of the townlands are mapped within the Down Survey of the 1650s, so called as all measurements were carefully 'laid downe' on paper at a scale of forty perches to one inch. Therefore, most are in the context of pre-17th century landscape organisation (McErlean 1983, 315).

In the 19th century, some demesnes, deer parks or large farms were given townland status during the Ordnance Survey and some imprecise townland boundaries in areas such as bogs or lakes, were given more precise definition (*ibid.*). Larger tracks of land were divided into a number of townlands, and named Upper, Middle or Lower, as well as Beg and More (small and large) and north, east, south, and west (Culleton 1999, 179). By the time the first Ordnance Survey had been completed a total of 62,000 townlands were recorded in Ireland.

The majority of the proposed development area is located within the townlands of Cahernalough and Tooreen with small sections extending west into the townlands of Ballymacahill and Knockanean. The surrounding townlands consist of Cappagh More, Muckinish, Kilfeilim, Tullyvaghan, Creggaun, and Drumdoolaghty. These are townlands are located within the parishes of Kilraghtis, Clooney, and Doora, within the Barony of Bunratty Upper, County Clare.

There are eight townland boundaries and two parish boundaries within and bordering the proposed development. The townland boundary between Cahernalough and Tooreen winds east-west through the centre of the proposed data centre. Much of this boundary is formed by a mature hedge line. The western section contains a small stream, where it runs through a valley.

11.3.6.2 Place name Analysis

Townland and topographic names are an invaluable source of information on topography, land ownership and land use within the landscape. They also provide information on history; archaeological monuments and folklore of an area. A place name may refer to a long-forgotten site and may indicate the possibility that the remains of certain sites may still survive below the ground surface. The Ordnance Survey surveyors wrote down townland names in the 1830's and 1840's, when the entire country was mapped for the first time. Some of the townland names in the study area are of Irish origin and through time have been anglicised. The main references used for the place name analysis are *Irish Local Names Explained* by P.W Joyce

(1870) and logainm.ie. A description and possible explanation of each townland name in the environs of the proposed development is provided in the below table.

Table 11.2 Place names

Name	Derivation	Possible Meaning
Tooreen	<i>An Tuairín</i>	Little bleach green/ little paddock/ little (cultivated) field/ little pasture
Cahernalough	<i>Cathair na lough</i>	Caher (circular stone fort) of the lake
Ballymacahill	<i>Baile Mhic Cathail</i>	Town/place of Mhic Cathail
Knockanean	<i>Cnoc an Éin</i>	Bird hill
Cappagh More	<i>An Cheapach Mhór</i>	Great tillage-plot
Muckinish	<i>Mucrois</i>	Pig island
Kilfeilim	<i>Cill Feidhlime</i>	Church of Feidhlim
Tullyvaghan	<i>Tulach Uí Bhuacháin</i>	Hillock of Ó Buacháin
Creggaun	<i>An Creagán</i>	Little rock/ rocky ground
Drumdoolaghty	<i>Drom Dubhlachna</i>	Ridge of the black duck
Kilraghtis	<i>Cill Reachtais</i>	Church of Reachtais
Clooney	<i>Cluaine</i>	Meadow land
Doora	<i>Dubh dúire</i>	Black oak-wood
Bunratty Upper	<i>Bun Raite Uachtarach</i>	The mouth of the River Ratty, now called the Owen O'Garney
Clare	<i>Clar</i>	A level piece of land

11.3.6.3 Cultural Heritage sites

Four cultural heritage sites have been identified during the course of this study. CH 1 relates to the site of a ruined vernacular farmstead, located in the northern part of the proposed development area, which is marked on the first edition OS map. CH 2 consists of a late 19th century modified vernacular cottage (now derelict), also located in the northern part of the site. CH 3 represents the site of a lime kiln, located in the eastern part of the site, which is marked on the first edition OS map. CH 4 consists of the site of a probably vernacular building located to the southeast of CH 1. The sites are shown on Figure 11.2.

11.3.7 Stray Finds within the Surrounding Area

Information on artefact finds from the study area in County Clare has been recorded by the National Museum of Ireland since the late 18th century. Location information relating to these finds is important in establishing prehistoric and historic activity in the study area.

A review of the topographical files revealed that no stray finds have been recovered from in or within the study area of the proposed development.

11.3.8 Aerial Photographic Analysis

Inspection of the aerial photographic coverage of the proposed development area held by the Ordnance Survey (1995-2013), Google Earth (2009-2020) and Bing Maps

(2020) revealed that the M18 to the west of the proposed data centre was built between 2005 and 2009 resulting in landscaping in the western corner of the site. The remainder of the site has remained as open pasture fields and no previously unrecorded sites of archaeological potential were noted within the proposed development area.

11.3.9 Field Inspection

The field inspection sought to assess the site, its previous and current land use, the topography, and any additional information relevant to the report. During the course of the field investigation the proposed data centre and its immediate surrounding environs were inspected. The 23 fields that form the development area are described below and marked on Figure 11.2.

Field 1

Sub-rectangular in plan, this field of pasture is located in the southeast corner of the development area and is bounded by the R352 to the south; Lough Ardnamurry to the east; an access lane to the west and the townland boundary between Toureen and Cahernalough to the north (Plate 11.1). Lough Ardnamurry, and its immediate environs, are considered to be of archaeological potential (AAP 1) due to the fact that water bodies were often utilised during prehistoric and historic periods for ritual and settlement (Plate 11.2). The eastern part of the field contains a drumlin that slopes on all sides, with a plateau in the field to the north (Field 2). The eastern side of the slope slopes steeply down towards the lough and contains possible evidence of localised quarrying, although this section is heavily overgrown. The western part of the field is relatively level. The townland boundary that runs through the development area is primarily formed by a denuded stone wall of rough masonry with mature trees (Plate 11.3). Only the very western and south-western portion of the field will be affected by the proposed development.



Plate 11.1: Field 1, facing northeast



Plate 11.2: Lough Ardnamurry (AAP 1), facing east



Plate 11.3: Townland boundary, facing southwest

Field 2

This is a sub-rectangular field of pasture, located to the north of Field 1 and south of Fields 3 and 4. The field is bordered to the south by the townland boundary between Toureen and Cahernalough; by Lough Ardnamurry to the east; an access lane to the west and mature field boundaries to the north. The centre of the field is formed by the plateau of a drumlin that slopes in a western direction through much of field (Plate 11.4). The ground level slopes steeply down towards to the lough to the east, and this portion of the field is planted with trees. Only the western section of this field will be affected by the proposed development.



Plate 11.4: Field 2, facing east

Field 3

This field of pasture is roughly triangular in plan and is located to the north of Field 2 and southeast of Field 4. It is bounded on all sides by mature field boundaries and slopes to the north and northwest away from the drumlin plateau in Field 2. This field will remain unaffected by the proposed development.

Field 4

An irregular field in plan, this field of pasture is located to the north of Field 2 and 3 and is east of Field 5. It is bounded on all sides by mature field boundaries. The field slopes to the west and northwest. The proposed development will be located in the western part of this field.

Field 5

This is a small sub-rectangular field with Fields 6, 7 and 8 to the north, west and south and Fields 4 and 2 to the east and southeast. The field contains a large pond, which is also marked on the historic mapping and has been designated as AAP 2. The first edition OS map shows that a building formerly occupied the southeast corner of the field (CH 4). No remains associated with the structure were noted during the inspection. The field is relatively level, with a modern residence to the northwest and access lane running along the western boundary (Plate 11.5). The proposed development will not extend into this field.



Plate 11.5: Field 5, facing northeast

Field 6

This field is located in the northern most point of the proposed development area, with a modern farmyard complex and Field 7 to the south and a modern residence and Field 5 to the southeast. The field contains natural undulations and slopes gently to the south and southwest (Plates 11.6). A modern shed is located in the field, with the ruins of a vernacular farmstead to the immediate west, which is marked within the historic OS mapping (CH 1). The ruins are heavily denuded and represent the remains of single storey vernacular structures with walls of roughly coursed masonry (Plate 11.7). This field will remain unaffected by the proposed development.

Field 7

This field is located to the south of Field 6 and is bounded to the east and south by Fields 5, 8 and 9. A modern farmyard is located to the immediate west. The field is under pasture and contains natural undulations and a gentle westerly slope. A recorded ringfort (CL034-007), in the form of an overgrown cashel, is located in the southeast corner of the field (Plate 11.8). The site is heavily overgrown (Plate 11.9) and barely accessible, although the denuded cashel wall was visible along the southeastern side with an apparent width of c. 5m. No features potentially associated with the ringfort were noted within any of the surrounding fields. Very little development will occur within this field, with a potential attenuation pond proposed in part of the western section of the field. The ringfort will be preserved in-situ with only minor intrusions into the zone of archaeological potential, associated with the proposed development road layout.



Plate 11.6: Northern part of Field 6, facing southwest



Plate 11.7: Remains of vernacular farmstead (CH 1), facing east-northeast



Plate 11.8: Ringfort (CL034-007), within Field 7, facing east



Plate 11.9: Interior of ringfort (CL034-007)

Modern Farmyard

The modern farmyard comprises a roughly oval area of modern agricultural sheds and areas of disturbance, which is bordered to the north and east by Fields 6, 7 and 9 and to the west and south by Fields 12 and 11. The extent of the disturbance is visible in the aerial photographic coverage of the landscape. The only feature of merit is a semi-derelict single storey cottage with dormer level located to the immediate northeast of the farmyard (CH 2). This structure (Plate 11.10) has been modified in the past and dates to the late 19th century. It possess three bays, with an entrance porch on the main east facing elevation. The door and window fittings have been replaced and the structure has been rendered. The structure will be located to the immediate west of a proposed attenuation pond and northeast of the main distribution road network.



Plate 11.10: Vernacular cottage (CH 2), facing north

Field 8

This field is roughly triangular in plan and comprises level pasture with occasional undulations, located to the immediate southeast of the recorded ringfort (CL034-007) (Plate 11.11). The field is bordered to the east by an access lane and to the southwest by a more recent drive accessing the modern farmyard. In the very southern tip of the field is the site of a lime kiln (CH 3), which is marked on the first edition OS map. No evidence of this site remains today and it may have been affected by the installation of the more recent access track (Plate 11.12). Whilst much of this field will remain unaffected by the proposed development, the site of the lime kiln will be impacted by the distribution network.



Plate 11.11: Field 8, facing south



Plate 11.12: Site of lime kiln (CH 3), facing northwest

Field 9

This field is located at the centre of the proposed development area and comprises a level field of pasture with Fields 7 and 8 to the east and Fields 10, 18 and 11 to the south and southwest. The modern farmyard is located to the immediate northwest. The modern access track to the farm forms the eastern boundary of the field and the

townland boundary between Toureen and Cathernalough forms the southern boundary. The field will be included in the main layout of the data centre development.

Field 10

This is another field of level pasture, which is sub-rectangular in plan (Plate 11.13). The R352 forms the southern boundary, with recent scattered residential development to the west; Fields 18 and 9 to the north and Field 1 and the access lane to the east. The northern boundary is formed by the townland boundary between Toureen and Cathernalough. This portion of the site will contain a portion of the proposed data centre, a realigned access road and some attenuation ponds.



Plate 11.13: Field 10, facing west

Field 11

This field is located to the immediate south of the modern farmyard and bounded to the south by Fields 17 and 18, along with the townland boundary between Toureen and Cathernalough. Field 9 is located to the east and Field 13 and 16 to the west. The field is formed by level pasture with some natural shallow undulations (Plate 11.14). The majority of this field will be affected by the development that is proposed.



Plate 11.14: Field 11, facing east

Field 12

This area comprises an area of pasture containing small drumlins, which are present within this north-western corner of the development area (Fields 12-16) (Plate 11.15). The northern part of the field is heavily overgrown and slopes sharply to the north, where a large pond is present (Plate 11.16). This water body is marked on the historic OS map and has been designated as AAP 3. A modern farm and pasture is located to the north, whereas Field 14 is located to the west and Field 13 to the south. The modern farmyard is located to the immediate east. At the time of the inspection, there was evidence of flooding in the western part of the field. A portion of this field will be used as attenuation for the proposed development.



Plate 11.15: Field 12, facing southwest



Plate 11.16: Pond (AAP 3), facing north

Field 13

This field consists of a rectangular area of pasture containing natural drumlins. The field is bounded to the north and east by Fields 12 and 11 and to the west and south by Fields 14, 15 and 16. Much of the field will be occupied by the proposed data centre and associated attenuation.

Fields 14 and 15

These fields form the northwest portion of the proposed development area and will not be affected by the proposed development. They comprise a mixture of small drumlins under rough pasture, boggy areas of ground and heavily planted area, such as the southern parts of Field 14 and Field 15.

Field 16

This is a roughly triangular field of rough pasture containing small drumlins and undulations. It is bounded by Fields 15, 13, 11 and 17. The southern part of the field slopes steeply down towards a stream that runs along the path of the townland boundary, separating Toureen from Cahernalough (Plate 11.17). The stream is only evident in this part of the site, and it remains unclear where the watercourse commences. This section of the stream to the south of Field 16 (and 17 to the west) is heavily overgrown and has been designated as AAP 4. Only a small section of the eastern part of the field will be affected by the development. The stream does not follow the townland boundary along the southern side of Field 11 and as such it will not be affected by the development.



Plate 11.17: Stream (AAP 4), facing southwest

Field 17

This is a large field in the south-western part of the proposed development area. It comprises a field of pasture that is irregular in plan and bounded to the north by the townland boundary between Toureen and Cathernalough. As described in Field 16, a portion of this boundary is formed by a stream. Fields 20-23 are located to the south, with Field 18 to the east and Fields 16, 16 and 11 to the north. The field is characterised

by small drumlins, similar in form to those located in the north-western part of the site. The eastern part of this field only will be affected by the proposed development.

Field 18

This is an irregular field of rough pasture located in between Field 17 to the west and Field 10 to the east. The field is relatively level and the southern section of the field contains a number of modern houses and outbuildings. Only the northern section of the field will be affected by the proposed development.

Field 19

This is a small area of level pasture surrounding some modern houses (outside the development area) fronting onto the R352. This area will not be affected by the proposed development.

Field 20

This is an irregular field of pasture located in the southwest section of the proposed development area. It is bounded to the south by the R352, with Fields 17, 23 and 19 to the north and east and Field 21 to the west. A small drumlin occupies the western part of the field, which slopes gently to the east (Plate 11.18). The eastern part of the field will be affected by the construction of an access road.



Plate 11.18: Field 20, facing northeast

Fields 21 and 22

These are two small fields of pasture located to the east and north of a link road onto the M18. There is a modern attenuation pond located to the immediate north of Field 22. A modern access track runs through both of the fields, which provides access to the ponds. Both areas appear to have been disturbed due to the presence of the M18 and the construction of the access track.

Field 23

This area consists of a small rectangular field of rough pasture, which is also the grounds of a modern house, located at the eastern end of the field. Toureen Lough is

located within this field and has been designated as AAP 5. This field will remain undisturbed by the proposed development.

With the exception of AAPs 1-5 and CH 1-4, no other previously unrecorded sites of archaeological, architectural or cultural heritage significance were noted during the course of the field inspection.

11.3.10 Summary of Receiving Environment

The proposed data centre is located within 23 fields bordered to the west by the M18 and to the south by the R352. The site is situated within the townlands of Cahernalough, Tooreen, Ballymacahill and Knockanean in the parishes of Kilraghtis and Doora and barony of Bunratty Upper, County Clare. There are seven recorded archaeological sites within 250m of the proposed development, one of which, a cashel (RMP CL034-007) is situated within the northern portion of the site. Of the seven sites, five represent recorded monuments, whereas two are included in the SMR only as records of previous archaeological investigations. SMRs are not subject to statutory protection.

There are no buildings included on the Record of Protected Structures for Clare or the NIAH Building Survey in or within 250m of the proposed development area. Similarly, no Architectural Conservation Areas are located within the study area. One demesne landscape has been identified within the study area, which comprises Tooreen House, located to the immediate south.

A review of the Excavations Bulletin (1970–2020) revealed that no previous archaeological investigations have been carried out within the confines of the proposed data centre; although four investigations have been undertaken within the study area. Two of the sites revealed archaeological remains of minor significance, whereas the remaining two failed to identify any features of significance.

A review of the aerial photographic coverage and historic mapping, along with the field inspection, has resulted in the identification of a number of Cultural Heritage Sites and Areas of Archaeological Potential. CH 1-4 comprise the site of vernacular structures and the site of a lime kiln, all of which are marked within the historic mapping. Today only CH 1 and 2 possess upstanding remains. AAPs 1-5 relate to small loughs/ponds within the area (which are a characteristic of drumlin landscapes) along with a stream in the western part of the site, which follows the path of the townland boundary between Toureen and Cathernalough. A large portion of this townland boundary is located within the proposed development area, but much of it is defined by a denuded stone wall and mature trees. No other features or structures of archaeological, architectural or cultural heritage significance were identified.

11.4 CHARACTERISTICS OF THE DEVELOPMENT

11.4.1 Construction Phase

The proposed development will comprise construction of a six data storage facilities, a gas powered energy centre and associated ancillary development. The key civil engineering works which will have a potential impact on archaeology during construction are summarised below:

- Significant cut and fill will be required for site levelling, construction of roads, car parking areas, foundations, installation of drainage services and ancillary infrastructure;
- Piling for foundations (where required)

11.4.2 Operational Phase

During operation there will be no ground disturbance required.

11.5 POTENTIAL IMPACTS OF THE DEVELOPMENT

11.5.1 Construction Phase

Ringfort CL034-007 will be preserved in-situ as part of the development with any potential direct impacts screened out as part of the design process. Works associated with the access roads will impinge within c. 27m of the ringfort, but the site will not be directly impacted by construction activities.

AAPs 1-5 will not be affected by the construction of the proposed development. Similarly CH 1, 2 and 4 remain outside of the footprint of the proposed works. CH 3 (site of lime kiln) will be subject to a direct, negative impact. Assuming buried remains survive beneath the current ground level, the impact (prior to mitigation) may be significant in nature.

Although no other previously unrecorded sites of archaeological, architectural and cultural heritage significance were identified during the assessment, it remains possible that previously unrecorded archaeological remains survive beneath the current ground level with no surface expression. Prior to the application of mitigation, it is possible that construction activities may result in a direct negative impact on same. Impacts may vary in scale from moderate to profound.

The construction of the proposed development will result in the removal of a section of townland boundary in between Toureen and Catheraboy. Prior to the application of mitigation, this represents a direct negative moderate impact upon the cultural heritage resource.

11.5.2 Operational Phase

Whilst the recorded ringfort (CL034-007) will be preserved in-situ, the operation of the proposed development will result in an indirect negative impact on the setting of the monument, due to the proximity of the data centre and distribution roads. The impact is moderate negative.

No other impacts have been identified during the operation of the proposed development, which relate to the archaeological, architectural or cultural heritage resource.

11.6 REMEDIAL AND MITIGATION MEASURES

11.6.1 Construction Phase

A full geophysical survey and programme of archaeological testing will be carried out prior to the commencement of construction. The works will be carried out under licence to the DoHLGH. This work will be carried out in order to identify any remains associated

with CH 3, along with any buried archaeological remains within the landscape that may be affected by the proposed development. Further mitigation may be required, dependant on the results of the assessment, such as preservation in-situ/by record and/or archaeological monitoring. Any further mitigation will require the approval of the National Monuments Service of the DoHLGH.

A full written and photographic record will be made of the section of townland boundary to be impacted upon by the development. This will be carried out at the same time as the archaeological testing assessment.

11.6.2 Operational Phase

A full photographic record of the landscape setting of ringfort CL043-007 will be made prior to the commencement of construction.

11.7 PREDICTED IMPACTS OF THE DEVELOPMENT

11.7.1 Construction Phase

Following the completion of mitigation measures detailed in section 11.6.1, there will be no predicted impacts on the archaeological, architectural and cultural heritage resource as a result of the construction of the development.

11.7.2 Operational Phase

Following the completion of mitigation measures detailed in section 11.6.2, there will be a slight negative indirect impact on ringfort CL034-007, due to the proximity of the operating development.

11.8 CUMULATIVE IMPACTS

No other existing or approved developments have been identified that would give rise to any cumulative impacts upon the archaeological, architectural and cultural heritage resource.

11.9 RESIDUAL IMPACTS

Following the completion of the mitigation measures described in this chapter, there will be no significant negative residual impacts upon the archaeological, architectural or cultural heritage resource. A slight negative indirect impact on ringfort CL034-007, will remain due to the proximity of the operating development.

11.10 INTERACTIONS

Potential impacts detailed in Chapter 10 Landscape and Visual have been reviewed as part of this assessment.

11.11 REFERENCES

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12.0 TRAFFIC AND TRANSPORTATION

12.1 INTRODUCTION

12.1.1 Purpose of section

The purpose of this section is to assess the traffic impacts of the additional traffic movements that will be generated during the construction, operational and decommissioning phases of a proposed Art Data Centre, Substation and Grid Connection project, proposed in the townland of Tooreen and Cahernalough. The proposed development, referred to as the Art Data Centre – Ennis Campus, County Clare, is located on the northern side of the R352 Tulla Road approximately 1 km to the east of the M18 Motorway, which bypasses the Town of Ennis to the east.

The magnitude of the increase in traffic volumes experienced on the surrounding network and the forecast effects are identified during the construction, operational and decommissioning stages of the Proposed Development.

12.2 METHODOLOGY

The report adopts the guidance for such assessments set out by Transport Infrastructure Ireland (TII), in the document PE-PDV=02045-01 '*Traffic and Transport Assessment Guidelines, May 2014*' and also makes reference to the following;

- Rural Road Link Design, DN-GEO-03031, TII Publications, June 2017,
- Project Appraisal Guidelines for National Roads (Unit 5.3), PE-PAG-02017, TII Publications, May 2019,
- County Clare Development Plan 2017 to 2023 (as varied),
- Design Manual for Urban Roads and Streets, DoTTS, May 2019,
- National Cycle Manual, National Transport Authority, June 2011

The Traffic and Transport Section of this report is set out as follows:

- A review of the existing transport infrastructure in the vicinity of the proposed Art Data Centre, including existing and forecast traffic flows (Section 12.3 - Receiving Environment),
- A description of the nature of the proposed Art Data Centre and the traffic volumes that will be generated during the construction stage and when it is operational (Section 12.4 – Characteristics of Development),
- An assessment of the impacts of traffic generated by the proposed Art Data Centre on the surrounding road network (Section 12.5 –Potential Impacts of Development),
- Proposed mitigation measures (Section 12.6 – Remedial and Mitigation Measures),
- An assessment of the likely impacts of the Proposed Development (Section 12.7 – Predicted Impacts of the Proposed Development),
- An assessment of potential cumulative impacts with neighbouring developments (Section 12.8 – Cumulative Impacts), and,
- An assessment of residual impacts of traffic generated by the proposed Art Data Centre (Section 12.9 – Residual Impacts).

12.3 RECEIVING ENVIRONMENT

12.3.1 Site location and network summary

The location of the proposed Art Data Centre is located in the townland of Tooreen and Cahernalough, County Clare, and is shown in the context of the local road network in Figure 12.1 at the end of this chapter.

The site is located approximately 4.5 kms to the east of Ennis Town Centre and is accessed from the Regional R352 Tulla Road, which is a key commuter route, radiating from the town.

Adjacent to the site the R352 Tulla Road is a Type 2 single carriageway with a width of 7.0m and has a designated speed limit of 80 km/h.

Bordering the site to the west is the M18 motorway, which travels north to south and underpasses the R352 Tulla Road. Roundabout junctions are located either side of the M18 motorway. Access is provided to / from the M18 southbound lanes via the eastern roundabout (East Clare Roundabout) and to /from the M18 northbound lanes via the roundabout to the west (Tulla Road West Roundabout).

Travelling west of the Motorway in the direction of Ennis the R352 Tulla Road is accessed by residential development, both single accesses and estates, and by various other uses including retail, a service station and childcare facilities.

12.3.2 Base year traffic flows – years 2015 and 2019

Due to travel restrictions in place for the Covid-19 virus during the preparation of this EIAR, the collection of current year 2021 traffic counts was not possible. For this reason the following historic traffic count data was used as the base year 2015 traffic data set for the purpose of the traffic assessment;

Year 2015 data

- Classified turning count surveys undertaken at the East Clare Roundabout and the Tulla Road West Roundabout – These surveys were undertaken by ABACUS Ltd for the purpose of preliminary assessment of the subject site, and were collated for the AM (07:00 – 10:00) and PM (16:00 – 19:00) peak periods on a typical weekday in the month of July (Tuesday 21st July, 2015).
- Automatic Traffic Count Data (ATC) from the M18 between Junction 13 Tulla Road and Junction 14 Barefield Road – This data site is maintained by Transport Infrastructure Ireland (TII) with traffic count data available from 2015 to the present.

The classified turning count data provided all link flows and turning movements observed in the year 2015 at the 2 roundabouts during the AM and PM peak hours. A full listing of the traffic count for the roundabouts is included as Appendix 12.1.

Year 2015 to 2019

The M18 ATC data was used to;

- Provide link flows on the M18 main carriageway,
- To provide an indication of seasonal variation in traffic flows on the local road network. The observed counts were undertaken in the month of July, which

was recorded to be the second busiest month of the year. It was therefore determined that no seasonal adjustment of the observed counts was required.

- To determine a factor to convert the observed AM and PM peak hour traffic count data available from the 2015 surveys to all day traffic flows.
- To provide an indication of traffic growth between the observed survey year of 2015 and 2019, the year prior to the introduction of Covid-19 travel restrictions. From 2019 onward traffic growth rates issued by TII were used, as discussed subsequently in this report.

The M18 ATC Data referred to is included as Appendix 12.2.

The link count locations refer to in the assessment are shown in Figure 12.2 at the end of this chapter and are the following;

- Link 1 – The R352 Tulla Road to the east of the proposed Art Data Centre access junction
- Link 2 – The R352 Tulla Road to the west of the proposed Art Data Centre access junction
- Link 3 – The access road serving the proposed Art Data Centre
- Link 4 – The R352 Tulla Road between the M18 slip roundabouts
- Link 5 – The M18 slip road linking into the East Clare Roundabout
- Link 6 – The R352 Ennis Road
- Link 7 – Local access road from the Knockanean halting site linking into the Tulla Road West Roundabout
- Link 8 – The M18 slip road linking into the Tulla Road West Roundabout
- Link 9 – The M18 northbound carriageway to the north of the R352 Tulla Road
- Link 10 – The M18 southbound carriageway to the north of the R352 Tulla Road
- Link 11 – The M18 northbound carriageway to the south of the R352 Tulla Road
- Link 12 – The M18 southbound carriageway to the south of the R352 Tulla Road

The observed AM and PM peak turning counts for the year 2015 are shown by vehicle category in Figures A12.3.1 to A12.3.3 of Appendix 12.3. It should be noted that all turning count figures referred to in Section 12 of this EIAR are provided in Appendix 12.3.

Observed link flows are shown by time period for the observed year 2015 in Table 12.1, with the following key points to note:

- The AM and PM peak hours on the R352 Tulla Road and the M18 slip roads linking into both the East Clare and Tulla Road West Roundabouts were observed to be 08:00 to 09:00 and 17:00 to 18:00 respectively.
- From the M18 ATC data it was determined that all day traffic flows may be estimated from the following expression;

All day = 6.15 x (AM peak hour 08:00 – 09:00 flow + PM peak hour 17:00 – 18:00).

- On the R352 Tulla Road adjacent to the proposed Art Data Centre access junction (Link 1) 2-way traffic flows were observed to be relatively light during all periods, with flows observed as follows: AM peak hour = 272 vehicles, PM peak hour = 441 vehicles and All day = 4,385 vehicles.

- Traffic flows on the R352 Tulla Road increase significantly as the road approaches Ennis to the west of the M18 roundabouts with 2-way traffic flows at this location (Link 6) observed to be: AM peak hour = 623 vehicles, PM peak hour = 808 vehicles and All day = 8,801 vehicles.
- Of the 2 slip roads providing access to and from the M18 motorway, the one providing for southbound traffic movements linking into the East Clare Roundabout (Link 5) was observed to be the busier during the AM peak hour, providing for a 2-way flow of 352 vehicles, while the arm providing for northbound traffic linking into the Tulla Road West Roundabout (Link 8), was observed to be the busier during the PM peak hour, providing for a 2-way flow of 397 vehicles.
- The M18 just to the north of the R352 Tulla Road was recorded to have a daily 2-way traffic flow of 11,759 vehicles. It is noted that this is a relatively low volume of traffic for a motorway with a 2-way link capacity of 52,000 vehicles per day¹.

¹ Rural Road Link Design, DN-GEO-03031, June 2017, TII Publications

Table 12.1 *Observed link flows, by time period and vehicle type, year 2015 (2-way flows)*

Time period	Link	Observed Year 2015				
		cars / lgvs	HGVs	All vehs	% HGVs	PCUs
AM peak hour	1 Tulla Road east of site access	254	18	272	6.6%	282
	2 Tulla Road west of site access	254	18	272	6.6%	282
	3 Ste access	0	0	0	NA	0
	4 Tulla Road between roundabouts	515	19	534	3.6%	550
	5 M18 slip at East Clare roundabout	343	9	352	2.6%	362
	6 Ennis Road	601	22	623	3.5%	639
	7 Local access road	0	0	0	NA	0
	8 M18 slip at Tulla Road West roundabout	160	13	173	7.5%	185
	9 M18 motorway north of Tulla Road - n/b	334	20	354	5.6%	382
	10 M18 motorway north of Tulla Road - s/b	443	26	469	5.6%	506
	11 M18 motorway south of Tulla Road - n/b	334	20	354	5.6%	382
	12 M18 motorway south of Tulla Road - s/b	443	26	469	5.6%	506
PM peak hour	1 Tulla Road east of site access	422	19	441	4.3%	455
	2 Tulla Road west of site access	422	19	441	4.3%	455
	3 Ste access	0	0	0	NA	0
	4 Tulla Road between roundabouts	531	17	548	3.1%	562
	5 M18 slip at East Clare roundabout	197	8	205	3.9%	211
	6 Ennis Road	784	24	808	3.0%	825
	7 Local access road	7	0	7	0.0%	7
	8 M18 slip at Tulla Road West roundabout	386	11	397	2.8%	405
	9 M18 motorway north of Tulla Road - n/b	561	33	594	5.6%	641
	10 M18 motorway north of Tulla Road - s/b	467	28	495	5.6%	534
	11 M18 motorway south of Tulla Road - n/b	561	33	594	5.6%	641
	12 M18 motorway south of Tulla Road - s/b	467	28	495	5.6%	534
All Day	1 Tulla Road east of site access	4,157	228	4,385	5.2%	4,533
	2 Tulla Road west of site access	4,157	228	4,385	5.2%	4,533
	3 Ste access	0	0	0	NA	0
	4 Tulla Road between roundabouts	6,433	221	6,654	3.3%	6,839
	5 M18 slip at East Clare roundabout	3,321	105	3,426	3.1%	3,524
	6 Ennis Road	8,518	283	8,801	3.2%	9,004
	7 Local access road	43	0	43	0.0%	43
	8 M18 slip at Tulla Road West roundabout	3,358	148	3,506	4.2%	3,629
	9 M18 motorway north of Tulla Road - n/b	5,504	326	5,830	5.6%	6,287
	10 M18 motorway north of Tulla Road - s/b	5,597	332	5,929	5.6%	6,393
	11 M18 motorway south of Tulla Road - n/b	5,504	326	5,830	5.6%	6,287
	12 M18 motorway south of Tulla Road - s/b	5,597	332	5,929	5.6%	6,393

12.3.3 Future year traffic volumes – years 2027, 2029 and 2044

The key study years with respect to traffic impacts of the proposed Art Data Centre are as follows;

- Year 2027 – During construction and part operational. It is during this year that construction and operation traffic levels peak to generate the most traffic by the Art Data Centres during the lifetime of the proposed development.
- Year 2029 – First year fully operational, and,
- Year 2044 – First year operational + 15 years design year.

In order to produce forecast background traffic flows for these years from the observed 2015 traffic counts the following steps were undertaken.

Year 2015 to year 2019

Annual Average Daily Traffic (AADT) volumes on the M18 are available from the Automatic Traffic Count site maintained by TII located just to the north of the R352 Tulla Road. With AADTs of 9,802 and 13,215 recorded for the years 2015 and 2019, it may be derived that traffic growth during the interim was 34.8%. Year 2019 traffic flows were therefore determined by factoring 2015 traffic flows by 1.348.

As discussed previously, data from this count site will not be representative beyond 2019 due to Government travel restrictions in place for the Covid-19 pandemic.

Years 2019 +

For years of interest beyond the year 2019 traffic forecast produced by TII were referenced. Revised guidelines for forecasting annual growth in traffic volumes were produced by TII in May 2019². The annual growth rates for light vehicles for County Clare, and factors for the years relevant to this study, are shown in Tables 12.2 and Table 12.3. The figures show that traffic volumes are forecast to increase during the period from 2019 to 2027 by 13.2%, from 2019 to 2029 by 16.7% and by 23.0% during the period from 2019 to 2044, based on a medium growth scenario.

Similarly, the cumulative growth rates from the observed year 2015 to the years of interest are shown in Table 12.4 taking account of the observed growth up to 2019, and the TII growth forecasts thereafter. Total medium growth rates from the survey year of 2015 are forecast to be as follows: 2027 = 52.6%, 2029 = 57.4% and 2044 = 65.8%.

Background traffic flows are included for assessment years 2027, 2029 and 2044 in Tables 12.14 to 12.17 included as Appendix 12.4.

It should be noted that while the assumed peak construction year of 2027 may vary slightly, this will not alter the forecast outcomes and effects presented in this section of the EIAR. This is due to the annual growth rate for background traffic being just 1.56% (as shown in Table 12.2) and that traffic volumes generated by the Art Data Centre will remain unchanged regardless of construction year and opening year, as presented subsequently in Section 12.4.

² Project Appraisal Guidelines for National Roads (Unit 5.3), PE-PAG-02017, May 2019, TII Publications

The forecast AM and PM peak hour counts for the years 2019, 2027, 2029 and 2044 are shown in Figures A12.3.4 to A12.3.7 included as Appendix 12.3.

Table 12.2 *TII traffic growth rates, light vehicles, County Clare*

Year	Lights - Annual factor			Lights - Cumulative index		
	low	Medium	High	low	Medium	High
2019	1.0139	1.0156	1.0191	1.000	1.000	1.000
2020	1.0139	1.0156	1.0191	1.014	1.016	1.019
2021	1.0139	1.0156	1.0191	1.028	1.031	1.039
2022	1.0139	1.0156	1.0191	1.042	1.048	1.058
2023	1.0139	1.0156	1.0191	1.057	1.064	1.079
2024	1.0139	1.0156	1.0191	1.071	1.080	1.099
2025	1.0139	1.0156	1.0191	1.086	1.097	1.120
2026	1.0139	1.0156	1.0191	1.101	1.114	1.142
2027	1.0139	1.0156	1.0191	1.117	1.132	1.163
2028	1.0139	1.0156	1.0191	1.132	1.149	1.186
2029	1.0139	1.0156	1.0191	1.148	1.167	1.208
2030	1.0019	1.0038	1.0075	1.150	1.172	1.217
2031	1.0019	1.0038	1.0075	1.152	1.176	1.226
2032	1.0019	1.0038	1.0075	1.155	1.181	1.236
2033	1.0019	1.0038	1.0075	1.157	1.185	1.245
2034	1.0019	1.0038	1.0075	1.159	1.190	1.254
2035	1.0019	1.0038	1.0075	1.161	1.194	1.264
2036	1.0019	1.0038	1.0075	1.163	1.199	1.273
2037	1.0019	1.0038	1.0075	1.166	1.203	1.283
2038	1.0019	1.0038	1.0075	1.168	1.208	1.292
2039	1.0019	1.0038	1.0075	1.170	1.213	1.302
2040	1.0011	1.0029	1.0105	1.171	1.216	1.316
2041	1.0011	1.0029	1.0105	1.173	1.220	1.330
2042	1.0011	1.0029	1.0105	1.174	1.223	1.343
2043	1.0011	1.0029	1.0105	1.175	1.227	1.358
2044	1.0011	1.0029	1.0105	1.176	1.230	1.372

Table 12.3 *TII derived traffic growth rates from 2019*

Period	Cumulative index		
	low	Medium	High
2019 to 2027	1.117	1.132	1.163
2019 to 2029	1.148	1.167	1.208
2019 to 2044	1.176	1.230	1.372

Table 12.4 *Combined traffic growth rates from 2015*

Period	Cumulative index		
	low	Medium	High
2015 to 2027	1.505	1.526	1.568
2019 to 2029	1.548	1.574	1.629
2019 to 2044	1.586	1.658	1.849

12.3.4 Future environment

A review of the TII and Clare County Council web sites suggests that there are no existing highway proposals that would significantly alter traffic patterns in the proximity of the Proposed Development site located on the R352 Tulla Road just to the east of the M18 motorway.

12.4 CHARACTERISTICS OF THE DEVELOPMENT

12.4.1 Development content

The proposed Art Data Centre comprises of 6 data centres, an energy centre, associated fibre and grid connection and associated site infrastructure. A full description of the proposed development is provided in Section 2.3 with the site layout shown in Figure 2.1.

12.4.2 Construction phases

It is estimated that the Art Data Centre will be constructed over a 6.5 year period (80 months), commencing in December 2022, with construction forecast to be complete in July 2029. Construction will be undertaken in 3 overlapping phases, with the start and completion dates, together with the forecast duration of each phase, shown in Table 12.5. The time line of the construction phases are shown in the summary chart included as Appendix 12.5.

Table 12.5 Summary information for Art Data Centre by construction phase

	Pre-start	Phase 1	Phase 2	Phase 3
Start date	Dec-22	Jun-23	Sep-25	Jun-27
End date	Mar-23	Sep-25	Jul-29	Jul-29
Phase duration	4 months	2 years, 4 months	3 years, 11 months	2 years, 2 months
Elements constructed during phase	Site preparation	Primary infrastructure Substation 1 2 x Data Centres (Nos 2 & 3)	Energy Centre Vertical Farm 2 x Data Centres (Nos 4 & 5)	2 x Energy Centre 2 x Data Centres (Nos 1 & 6)

12.4.3 Traffic generation during construction

The estimation of the volumes of traffic movements generated by deliveries to and from the site were provided by the study team. The estimates were calculated based on the preliminary estimates of materials that will be delivered to and from the site by month for the duration of the construction period.

The estimation of the volumes of traffic movements generated by construction staff to and from the proposed development site was estimated based on trip generation estimates for a similar scale development with a similar construction methodology.

The daily trip generations during each month of the 6.5 year construction period are set out in the chart included as Appendix 12.5 with the following key observations made from previous similar developments and applied to the proposed Art Data Centre as follows;

Construction Staff Trips

- For the peak construction month, which is forecast to occur in month 61 at the end of Year 2027 it is estimated that a maximum 1,200 construction staff will be on site each day. While in practice a significant percentage of the daily workforce will travel to the site by buses organised by the contractor, in order to test the worst case scenario it is assumed that all will travel by car. Based on a modest estimate that the average car occupancy will be 1.5, this will result in a maximum number of 800 cars to and from the site generated by construction staff on site on one day.
- For each of the 3 phases it is determined that there will be a maximum of 474 staff car trips to / from the site per day, as shown in Table 12.6.
- For construction staff it is estimated that 40% and 5% of the daily total will arrive at, and leave from the site during the AM peak hour from 08:00 to 09:00, with the reverse applying to the PM peak hour from 17:00 to 18:00.

Construction HGV Trips

- HGV deliveries will be concentrated at the beginning of the construction phase with a maximum of 115 trips to / from the site during Phase 1, reducing to a maximum of 46 HGVs during Phase 2 and 39 HGVs during Phase 3. The forecast daily average for each phase is 46 trips per day for Phase 1, 13 trips for Phase 2 and 23 trips for Phase 3, as set out in Table 12.6.
- It is estimated that a total of 23,279 HGV trips to and from the site will be generated during Phase 1, with 13,217 during Phase 2 and 12,603 during Phase 3. Including a further 200 deliveries to and from the site during the site preparation stage, it is estimated that a total of 53,396 HGV movements to and from the site will be generated during the construction of the Art Data Centre within the 6.5 year construction period.

Table 12.6 Summary of Art Data Centre trip generation during construction, by phase and vehicle type (trips to and from site)

Trip category		Pre-start (4 months)	Phase 1 (2 years, 4 months)	Phase 2 (3 years, 11 months)	Phase 3 (2 years, 2 months)	Total
Staff car trips	Maximum / day	50	474	474	474	NA
	Average / day	50	340	276	352	NA
HGV trips	Maximum / day	3	115	46	39	NA
	Average / day	2	46	13	23	NA
	Total HGV trips in Phase	200	27,376	13,217	12,603	53,396

12.4.4 Traffic generation during operation

Estimates of the number of employees that will be employed on the completion of each of the 3 individual phases, together with an estimate of the number of staff employed when the proposed Art Data Centre (6 Data Centres plus Vertical Farm) is fully operational, is set out in Table 12.7. It is estimated that a total of 151 staff will be employed on site on the completion of each phase, with an additional 40 staff included for phase 2 which includes the vertical farm. It is estimated that a total of 493 staff will be employed on site on the completion of the Art Data Centre.

The number of daily staff trips estimated to be generated to and from the site on the completion of each phase are shown distributed throughout the day in Tables 12.8 and 12.9.

For Phases 1 and 3 (Table 12.8) it is estimated that 50 staff will arrive at the Proposed Development and 11 will leave during the AM peak hour from 08:00 to 09:00. For the same phases it is estimated that 11 staff will both arrive at and leave the site during the PM peak hour between 17:00 to 18:00. For Phase 2 (Table 12.9), which includes the Vertical Farm, it is estimated that an additional 40 staff will travel to the site during the AM peak hour and from the site during the PM peak hour.

The total number of staff trips that are estimated to be generated traveling to and from the site during the peak hours and on a daily basis on the completion of the proposed Art Data Centre are shown in Table 12.10. During the AM peak hour it is estimated that a total of 190 staff members will arrive at the site, with 33 exiting the site. During the PM peak hour it is forecast that 33 staff will access the site with 73 exiting. It is forecast that a total of 493 staff members will travel to / from the site each day when the Art Data Centre is fully operational.

A Travel Plan will be implemented at the Art Data Centre when operational aimed at promoting sustainable modes of travel and car sharing for staff in preference to single occupancy car trips. In order to assess the worst case scenario, however, for the purpose of the traffic impact assessment presented in Section 12.5 of this EIAR, it is assumed that all staff trips will be made by cars with single occupancy vehicles.

It is noted that an Outline Travel Plan for the Proposed Art Data Centre is included as Appendix 12.6.

Table 12.7 Trip generation for Art Data Centre during operation, number of staff per day

No of Data Centre Buildings	Purpose	Day shift	Night shift	Total
Phase 1	Security staff	11	11	22
	General staff	82	8	90
	Maintenance staff and visitors	39	0	39
	Total	132	19	151
Phase 2 (includes Vertical Farm)	Security staff	11	11	22
	General staff	122	8	130
	Maintenance staff and visitors	39	0	39
	Total	172	19	191
Phase 3	Security staff	11	11	22
	General staff	82	8	90
	Maintenance staff and visitors	39	0	39
	Total	132	19	151
All phases	Security staff	33	33	66
	General staff	286	24	310
	Maintenance staff and visitors	117	0	117
	Total	436	57	493

Table 12.8 *Trip generation during operation for Art Data Centre Phase 1 and Phase 3, by time of arrival and departure, numbers of staff*

Hour commencing	Security staff		General staff		Maintenance staff + visitors		All person trips	
	In	Out	In	Out	In	Out	In	Out
7:00	0	0	41	8	0	0	41	8
8:00	11	11	0	0	39	0	50	11
9:00	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0
15:00	0	0	41	41	0	39	41	80
16:00	0	0	0	0	0	0	0	0
17:00	11	11	0	0	0	0	11	11
18:00	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0
23:00	0	0	8	41	0	0	8	41
0:00	0	0	0	0	0	0	0	0
Total	22	22	90	90	39	39	151	151

Table 12.9 *Trip generation during operation for Art Data Centre Phase 2, by time of arrival and departure, number of staff*

Hour commencing	Security staff		General staff		Maintenance staff + visitors		All person trips	
	In	Out	In	Out	In	Out	In	Out
7:00	0	0	41	8	0	0	41	8
8:00	11	11	40	0	39	0	90	11
9:00	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0
15:00	0	0	41	41	0	39	41	80
16:00	0	0	0	0	0	0	0	0
17:00	11	11	0	40	0	0	11	51
18:00	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0
23:00	0	0	8	41	0	0	8	41
0:00	0	0	0	0	0	0	0	0
Total	22	22	130	130	39	39	191	191

Table 12.10 *Summary of trip generation during operation for all Art Data Centre, AM and PM peak hours and all day, numbers of staff*

Hour commencing	All operational staff	
	In	Out
08:00	190	33
17:00	33	73
All day	493	493

Once operational it is estimated that each of 6 data centres will generate 5 HGV trips to and from the site with 2 HGV trips generated to and from the site by the vertical farm resulting in 32 HGV trips to and from the site per day. Of the 32 HGV trips 7 were allocated to each of the AM and PM peak hours.

12.4.5 Art Data Centre test scenarios

The points in the construction and operational life of the proposed Art Data Centre that are critical in terms of traffic generation, and are therefore selected for the traffic impact element of the assessment, are as follows;

- **Art Data Centre Peak Construction Month - Year 2027** - This is forecast to be the worst case scenario in terms of total traffic generated during the entire construction and operational life of the proposed development. For this scenario Phase 1 is constructed and operational, while Phases 2 and 3 are during the peak construction period. This is forecast to be month 61 of the 80 month construction period as shown in the chart included as Appendix 12.5.
- **Art Data Centre Peak HGV delivery days - Year 2027** - This is forecast to be the worst case scenario in terms of the numbers of HGV trips travelling to and from the site. It is forecast that a maximum of 115 HGVs will travel to and from the site in one day. This is forecast to occur in month 14 of the 80 month construction period as shown in the chart included as Appendix 12.5.
- **Art Data Centre Average Construction Month - Year 2027** - This represents the average month of the construction period with daily trip generation determined to be 59% of the traffic volumes generated during the peak construction month.
- **Art Data Centre Fully Operational - Year 2029** – By September 2029 it is forecast that construction of Phases 1, 2 and 3 will be complete and the proposed Art Data Centre will be fully operational.
- **Art Data Centre Fully Operational – Opening year + 15 - Year 2044** – The year 2044 is tested as the opening year + 15 time horizon in accordance with TII guidelines.

The daily number of trips that are determined to be generated for each of the above scenarios are shown by test scenario, vehicle type and year in Table 12.11, with these trips translated to time period during the day in Table 12.12. Note that the figures shown in Table 12.11 are extracted from the resource chart included as Appendix 12.5.

A summary of the information provided in Table 12.12 is provided in Table 12.13 with the following points to note;

- For the peak construction days the majority of traffic is generated by construction and Phase 1 operational staff cars, with 951 cars traveling to and from the site per day. During the days it is estimated that 39 HGVs will travel to and from the site. On these days it is estimated that 2,089 2-way pcus will be generated by the site per day.
- For the busiest days in terms of HGV, it is estimated that 474 staff cars and 115 HGVs will travel to and from the site per day, totalling 1,500 2-way pcus per day,
- Once operational it is estimated that 493 staff cars and 32 HGVs will travel to and from the site per day, with a total of 1,140 2-way pcus per day,

Table 12.11 Traffic generation by test scenario, trip purpose and vehicle type

Traffic category	Phase	Vehicle type	Development scenario			
			Peak construction day (2027 month 61)	Peak construction for HGV trips (2024 month 14)	Fully operational	
					Year 2029	2044
Construction Traffic	Phase 1	HGV trips (to / from)	0	115	0	0
		HGV pcus (to / from)	0	276	0	0
		Cars/lgvs (to / from)	0	474	0	0
		Total 2-way pcus	0	1500	0	0
	Phase 2	HGV trips (to / from)	1	0	0	0
		HGV pcus (to / from)	2	0	0	0
		Cars/lgvs (to / from)	326	0	0	0
		Total 2-way pcus	657	0	0	0
	Phase 3	HGV trips (to / from)	28	0	0	0
		HGV pcus (to / from)	67	0	0	0
		Cars/lgvs (to / from)	474	0	0	0
		Total 2-way pcus	1082	0	0	0
	All construction traffic	HGV trips (to / from)	29	115	0	0
		HGV pcus (to / from)	70	276	0	0
		Cars/lgvs (to / from)	800	474	0	0
		Total 2-way pcus	1739	1500	0	0
Operational Traffic	Phase 1	HGV trips (to / from)	10	0	10	10
		HGV pcus (to / from)	24	0	24	24
		Cars/lgvs (to / from)	151	0	151	151
		Total 2-way pcus	350	0	350	350
	Phase 2	HGV trips (to / from)	0	0	12	12
		HGV pcus (to / from)	0	0	29	29
		Cars/lgvs (to / from)	0	0	191	191
		Total 2-way pcus	0	0	440	440
	Phase 3	HGV trips (to / from)	0	0	10	10
		HGV pcus (to / from)	0	0	24	24
		Cars/lgvs (to / from)	0	0	151	151
		Total 2-way pcus	0	0	350	350
	All operational traffic	HGV trips (to / from)	10	0	32	32
		HGV pcus (to / from)	24	0	77	77
		Cars/lgvs (to / from)	151	0	493	493
		Total 2-way pcus	350	0	1140	1140
All traffic	All traffic	HGV trips (to / from)	39	115	32	32
		HGV pcus (to / from)	94	276	77	77
		Cars/lgvs (to / from)	951	474	493	493
		Total 2-way pcus	2089	1500	1140	1140

Note: The figures in Table 12.11 are extracted from the chart included as Appendix 12.3

Table 12.12 Traffic generation by test scenario, trip purpose, time period and vehicle type

Scenario	Trip category	All day		AM peak hour		PM peak hour	
		In	Out	In	Out	In	Out
Peak construction day Tested for year 2027	Construction HGVs	29	29	3	1	1	3
	Construction cars	800	800	320	40	40	320
	Operational HGVs	10	10	2	2	2	2
	Operational cars	151	151	50	11	11	11
	All HGVs	39	39	5	3	3	5
	All HGV pcus	94	94	12	8	8	12
	All cars	951	951	370	51	51	331
	All pcus	1,045	1,045	382	59	59	343
	All 2-way pcus	2,089		441		402	
Average construction day Tested for year 2027	Construction HGVs	17	17	2	1	1	2
	Construction cars	464	464	189	24	24	189
	Operational HGVs	6	6	1	1	1	1
	Operational cars	88	88	29	6	6	6
	All HGVs	23	23	3	2	2	3
	All HGV pcus	54	54	7	5	5	7
	All cars	552	552	215	30	30	192
	All pcus	606	606	221	34	34	199
	All 2-way pcus	1,212		256		233	
Worst case construction day for HGVs Tested for year 2027 (15% of HGVs in Peak hours)	Construction HGVs	115	115	17	17	17	17
	Construction cars	474	474	190	24	24	190
	Operational HGVs	0	0	0	0	0	0
	Operational cars	0	0	50	11	11	11
	All HGVs	115	115	17	17	17	17
	All HGV pcus	276	276	41	41	41	41
	All cars	474	474	240	35	35	201
	All pcus	750	750	281	76	76	242
	All 2-way pcus	1,500		357		318	
Year 2029 & 2044 Phase 1 - Operational Phase 2 - Operational Phase 3 - Operational	Construction HGVs	0	0	0	0	0	0
	Construction cars	0	0	0	0	0	0
	Operational HGVs	32	32	6	6	6	6
	Operational cars	463	463	161	42	42	42
	All HGVs	32	32	6	6	6	6
	All HGV pcus	77	77	15	15	15	15
	All cars	493	493	190	33	33	73
	All pcus	570	570	205	48	48	88
	All 2-way pcus	1,140		254		137	

Note: The All-day figures in Table 12.12 are extracted from the chart included as Appendix 12.5

Table 12.13 Summary of traffic generation by test scenario, time period and vehicle type

Scenario	Vehicle type	All day			AM peak hour			PM peak hour		
		In	Out	2-way	In	Out	2-way	In	Out	2-way
Peak construction day	All HGVs	39	39	78	5	3	8	3	5	8
	All cars	951	951	1,902	370	51	421	51	331	382
	All pcus	1,045	1,045	2,089	382	59	441	59	343	402
Average construction day	All HGVs	23	23	45	3	2	5	2	3	5
	All cars	552	552	1,103	215	30	244	30	192	222
	All pcus	606	606	1,212	221	34	256	34	199	233
Worst case for HGV deliveries	All HGVs	115	115	230	17	17	35	17	17	35
	All cars	474	474	948	240	35	274	35	201	235
	All pcus	750	750	1,500	281	76	357	76	242	318
Year 2029 & 2044 Phase 1, 2 & 3 operational	All HGVs	32	32	64	6	6	13	6	6	13
	All cars	493	493	986	190	33	223	33	73	106
	All pcus	570	570	1,140	205	48	254	48	88	137

12.4.6 Art Data Centre traffic distribution

The distribution of traffic generated by the proposed Art Data Centre was estimated separately for staff trips and for deliveries of materials to the site.

Distribution of generated staff trips

It is considered that the optimum source of information to determine likely travel patterns for staff trips to and from the proposed Art Data Centre is the existing traffic patterns travelling into and out of the local road network via the R352 Tulla Road (to and from the directions of Ennis and Tulla) and via the M18 southbound and northbound slip lanes, to and from the M18 motorway. The traffic flows travelling on these links during peak hours reflect existing traffic patterns through the local network, and will include a significant number of vehicles traveling for the purpose of work. Using this information, the results would also appear to be logical with almost half (47%) of staff travelling to the Art Data Centre forecast to travel to / from Ennis.

Traffic flows for 2019 are shown for these links by direction in Table 12.14, together with the estimated percentage distribution of staff trips through the local road network. Based on these flows it is estimated that during the AM peak hour 47% of all staff trips will originate from the direction of Ennis, 28% from the direction of Tulla, with the remaining 25% arriving via the M18 slip roads. For corresponding traffic leaving the Art Data Centre during the PM peak hour it is estimated that the same 47% will travel in the direction towards Ennis, 28% towards Tulla with the remaining 25% accessing the M18 motorway.

Table 12.14 Trip distribution for staff / visitor trips based on 2019 link flows

Arm	AM peak hour				PM peak hour				All Day	
	From		To		From		To			
	Flow	%	Flow	%	Flow	%	Flow	%	% from	% to
R352 Tulla	276	28%	104	11%	255	20%	359	28%	24%	19%
M18 s/b	104	11%	384	39%	112	9%	173	14%	10%	26%
M18 n/b	140	14%	109	11%	400	31%	146	11%	23%	11%
R352 Ennis	469	47%	392	40%	510	40%	603	47%	44%	43%
Total	989	100%	989	100%	1277	100%	1281	100%	100%	100%

Distribution of generated HGV trips

While the location of the potential quarries that will supply materials during the construction phase are known (as will be discussed in Section 12.7.2), the quantities that each will supply is not known at this stage. The location of the providers of all other materials required to construct the Art Data Centre is also not known. For the purpose of this assessment the distribution of HGV trips during both the construction and operational stages of the development were assumed to be as follows;

- To / from M18 north – 40%
- To / from M18 south – 40%
- To / from R352 east – 20%.

While the above could vary significantly in practice, it is considered that it represents a realistic trip distribution for HGV traffic based on the location of quarries that could potentially provide materials during the construction of the proposed development, as discussed in Section 12.6.2, and the potential for other deliveries to be made via the M18 from the north and the south. It is also considered to be a worst case scenario as it concentrates HGV movements on the M18 / R352 Tulla Road roundabouts, which are critical junctions on the local network.

The forecast AM and PM peak trip distributions and trip generations are shown by vehicle type in Figures A12.3.8 to A12.3.18 included in Appendix 12.3.

12.4.7 Walking and cycling

While there is an existing footpath on the southern side of the R352 Tulla Road, there is currently no footpath on the northern side adjacent to the proposed development. As part of the Art Data Centre development it is proposed to provide a shared footpath and cycle lane on the northern side of the road from the proposed Art Data Centre access junction, westwards to the Clare East Clare Roundabout. It is also proposed to upgrade the existing footpath on the southern side of the road to a share footpath and cycle lane. An informal uncontrolled pedestrian crossing facility, comprising dropped kerbs and tactile paving is proposed across the R352 Tulla Road, in order to provide a continuous pedestrian link between the Art Data Centre and Ennis Town Centre.

Distances from the proposed Art Data Centre are shown at 0.5km intervals in Figure 12.3 at the end of this chapter in order to provide an indication of walk distances and between Art Data Centre and various locations in Ennis. Based on a conservative walk speed of 7 minutes per km (or 8.64 km per hour, which equates to 2.4m per second as is adopted in the design of pedestrian crossing) the estimated walk times to a few locations in Ennis are listed in Table 12.21. The figures show that it is estimated that the “Woodside” and “The Lane” residential estates are within 14 and 21 minutes’ walk respectively, with Ennis Town centre, which is located approximately 4.5 kms from the Art Data Centre, just over half an hour walk away (31.5 minutes).

The same information is shown in Table 12.15 for cycle trips. Based on a modest cycle speed of 30 km/h the residential estates would be within a 4 minute (Woodside) and 6 minute (The Lane) cycle, while it is estimated that it will take 9 minutes to cycle between the Art Data Centre and Ennis Town Centre.

Pedestrian access into the site is provided by a footpath adjacent to the main proposed vehicle access junction, with continuous footpaths provided within the campus to element comprising the Art Data Centre. Dropped kerbs and tactile paving are provided at all crossing points.

Table 12.15 *Estimated walk and cycle times from the Art Data Centre*

Location	Distance from Art Data Centre (kms)	Walk time (minutes)	Cycle time (minutes)
Woodside Estate	2	14	4
The Lane Estate	3	21	6
Ennis Town Centre	4.5	31.5	9

Covered cycle parking is distributed at various locations throughout the site with a total number of 126 spaces provided. This equates to 1 cycle parking space for every 2 employees that may be on site at any one time (it is estimated that 256 of the total 493 employees may be on site at any particular time of the day due to shifts), which is in excess of the 1 space per 10% of employees as suggested in the NTA Cycle manual.

12.4.8 Public transport

There are currently no local bus services in Ennis so at present bus would not be a mode of transport available for staff or visitors to the proposed site. It is, however, noted that the provision of local bus services on key routes in Ennis is fundamental to the National Transport Authorities Smarter Travel program, which requires the availability and the promotion of sustainable alternative modes of travel to the private car, as adopted in the current Clare Development Plan 2017 to 2023. While the assessment of the viability of a local Ennis bus route on the R352 Tulla Road is outside the remit of this assessment, given the quantum of residential and other development along the route, it is considered that the Tulla Road route would be an ideal location to pilot a local bus service. Given the relatively high numbers of staff that will be expected to travel to the Art Data Centre from Ennis, the proposed development would serve to enhance the viability of such a service. The Applicant would fully support the introduction of a local bus service on the R352 Tulla Road and would also consider the potential for the future bus route to terminate at the Art Data Centre campus. An area for a future bus terminus is included in the campus layout.

12.5 POTENTIAL IMPACTS OF THE DEVELOPMENT

12.5.1 Impact on link flows

The impact that the proposed Art Data Centre is forecast to have on link flows on the local road network during the construction period and when fully operational was assessed during the AM peak and PM peak hours, and during the course of one day. The results are set out in Tables 12.16 to 12.20, which are included as Appendix 12.4, for the following scenarios;

- Background traffic compared to with Art Data Centre peak construction traffic, year 2027 (Table 12.16),
- Background traffic compared to with Art Data Centre peak construction HGV deliveries, year 2027 (Table 12.17),
- Background traffic compared to with Art Data Centre average construction traffic, year 2027 (Table 12.18),
- Background traffic compared to with Art Data Centre fully operational traffic, year 2029 (Table 12.19), and,
- Background traffic compared to with Art Data Centre fully operational traffic, year 2044 (Table 12.20).

The salient points to note from the tables are as follows (It is noted that all commentary provided in section 12.5.1 refers to 2-way traffic flows, with the exception of references made to the M18 main carriageway, which are one-way flows);

Years 2027 peak construction months

During the peak construction months the maximum increase in 2-way traffic volumes is forecast to be on the R352 Tulla Road just to the west of the proposed Art Data access junction (Link 2). At this location it is forecast that the increase in traffic levels will be +318 vehicles (+77%) during the AM peak hour, +285 vehicles (+42%) during the PM peak hour, with an increase of 23% forecast throughout the day.

Other links forecast to be impacted the greatest during the peak construction phase are;

- The section of the R352 Tulla Road between the roundabouts (Link 4), which is forecast to incur an increase of +255 vehicles (+31%) during the AM peak hour,
- The Tulla Road to the east of the development access (Link 1) forecast to have an increase of 111 vehicles (+27%),
- The M18 Slip onto the Tulla Road West roundabout (Link 8) with an increase of +60 vehicles (+23%), and,
- The R352 leading to Ennis (Link 6) which is forecast to increase by 194 vehicle during the AM peak hour (+20%).

With respect to the impacts on the M18 motorway, the forecast maximum increase during any time period is forecast to be +54 vehicles (+10%), which will occur during the AM peak hour on the northbound carriageway of the motorway to the south of the R352 Tulla Road (Link 11). Over the course of the day the increase on traffic flows on the M18 during the peak construction days is forecast to be between 1% and 3%. It is noted that the M18 has significant spare link capacity on these worst case days, with a maximum daily flow of 18,435 vehicles forecast compared to a link capacity of 52,000 vehicles).

In terms of magnitude the forecast increases in traffic volumes during the PM peak is forecast, in general, to be similar to those during the AM peak hour.

Years 2027 peak HGV delivery months

During the days when the maximum number of HGV deliveries will be made to the site (up to 115 trips to and from the site) the maximum number of additional HGVs that will travel on the network in any one hour will be +27 HGV 2-way movements which will be on the R352 Tulla Road to the west of the proposed access junction (Link 2). During the AM peak hour this will result in a 98% increase in HGVs on this link and a 56% increase in traffic flows,

In terms of the impacts on the M18 slip road approaches to the Tulla Road Roundabouts, it is forecast that they will incur a maximum increase in 2-way HGV movements of 14 HGVs during the AM and PM peak hours.

Years 2027 average construction months

The impacts on average construction days will be significantly less than the peak months with development traffic at 59% of the volumes estimated for the peak months. Some key comparisons are;

- The maximum increase in 2-way traffic volumes on the R352 Tulla Road to the west of the proposed access junction (Link 2) will increase by 45% compared to 77% during the peak construction months,
- The maximum percentage increase on the M18 during the PM peak hour will be +6% compared to +10%

Years 2029 and 2044 fully operational

As the impacts on link flows are similar for both 2029 and 2044 when the Art Data Centre will be fully operational, the following is based on the year 2044 forecasts when overall traffic volumes will be higher.

Once the proposed Data Art Centre is fully operational a maximum increase in 2-way traffic volumes on the R352 Tulla Road just to the west of the proposed access (Link 2) is forecast to be +164 vehicles (+37%) during the AM peak hour, +95 vehicles (+13%) during the PM peak hour, with an increase of 11% forecast throughout the day.

Other links forecast to be impacted the greatest are the section of the R352 Tulla Road between the roundabouts (Link 4) which is forecast to incur an increase of 14% in traffic volume (+126 vehicles) during the AM peak hour, followed by Tulla Road to the east of the development access (Link 1, +53 vehicles), and the M18 Slip onto the Tulla Road West roundabout (Link 8, +33 vehicles), which are both forecast to incur a 12% increase in traffic volumes during the AM peak hour.

It is noted that compared to the AM peak hour forecast impacts are significantly less during the PM peak hour, and for the rest of the day.

With respect to the impacts on the M18 motorway, the forecast maximum increase during any time period is 1% both northbound and southbound once the proposed Art Data Centre is operational.

TII guidelines state that a detailed capacity assessment should be undertaken for junctions where the proposed development is forecast to result in an increase in traffic volumes of +10%, or +5% in instances where the network is already congested. This would suggest that in addition to the proposed access junction, detailed capacity tests should be undertaken for both the East Clare and Tulla Road West roundabouts on the R352 Tulla

Road. Detailed capacity tests as set out in the remainder of this section were therefore undertaken at the following junctions;

- Proposed access junction on the R352 Tulla Road,
- The East Clare Roundabout, and,
- The Tulla Road West Roundabout.

The forecast AM and PM peak turning flows are shown in terms of PCUs for each development scenario in Figures A12.3.19 to A12.3.23 included in Appendix 12.3.

12.5.2 Impacts on junction capacity

Junction capacity assessment method

The traffic impact of the proposed Art Data Centre was assessed at the proposed access junction and on the surrounding network using a combination of the industry recognised junction analysis programmes PICADY for priority junctions, and ARCADY for roundabouts. The capacity for each movement possible at the junction being assessed is determined from geometric data with the output used in the assessment as follows:

- Queue – This is the average queue forecast for each movement and is useful to ensure that queues will not interfere with adjacent junctions.
- Ratio of flow to capacity (RFC) – As suggested, this offers a measure of the amount of available capacity being utilised for each movement. Ideally each movement should operate at a level of no greater than 0.85, or at 85% of capacity.
- Delay – Output in minutes, this gives an indication of the forecast average delay during the time period modelled for each movement.

Scenarios modelled

For the proposed Art Data Centre access junction on the R352 Tulla Road the following scenarios were assessed;

- AM and PM peak hours,
- For development scenarios;
 - Year 2027 Art Data Centre peak construction day,
 - Year 2027 Art Data Centre peak HGV delivery days
 - Year 2027 Art Data Centre average construction day,
 - Year 2029 Art Data Centre fully operational,
 - Year 2044 Art Data Centre fully operational.

For the R352 Tulla Road / M18 slip road roundabouts (East Clare Roundabout and Tulla Road West Roundabout), the same scenarios as above were tested. In addition, year 2027, 2029 and 2044 with no Art Centre Development were also tested in order to determine the actual impact of the introduction of traffic generated by the proposed development.

Junction capacity test results for proposed Art Centre Access junction on the R352 Tulla Road

The results of the capacity test undertaken for the proposed Art Data Centre access junction on the R352 Tulla Road are set out in Table 12.21.

The maximum ratio of flow to capacity (RFC) for the proposed access junction is forecast to apply to traffic turning right out of the site onto the R352 Tulla Road during the PM peak

hour, and is forecast to occur during the peak construction scenario in the year 2027. For this movement the maximum RFC is forecast to be 61.6% (up to 85% is within capacity), with the corresponding maximum queue forecast to be 1.56 PCUs, which will occur on the internal access road, and delay to be 0.35 minutes (21 seconds), which will apply to traffic exiting the site.

For traffic turning right off the R352 Tulla Road into the site the maximum ratio of flow to capacity (RFC) of 19.7 % is forecast, with a corresponding maximum queue in the right turn lane proposed on the R352 Tulla Road forecast to be 0.24 PCUs with an associated delay of 0.13 minutes (8 seconds).

For the days when the peak number of HGV deliveries are made to the site, the only movement that has a higher RFC compared to the equivalent peak construction day discussed above, is the right turn from the development during the AM peak hour, which is forecast to have an RFC of 15%, with a corresponding queue of 0.18 PCUs and delay of 0.15 minutes (9 seconds)

Once fully operational in the future year 2044 the maximum RFC is forecast to apply to traffic turning right out of the development during both the AM (11.6%) and PM peak (11.2%) hours, with the maximum queue forecast to be 0.13 PCUs with corresponding delay of 0.16 minutes (10 seconds).

The result of the capacity tests show that during both peak hours, the proposed access junction is forecast to operate well within capacity without and significant queuing forecast for traffic exiting the site, or for traffic turning right into the site from the R352 Tulla Road.

Junction capacity test results for M18 / R352 Tulla Road East Clare Roundabout

The results of the capacity test undertaken for the East Clare Roundabout are set out in Table 12.22.

The maximum RFC forecast for this roundabout is forecast to occur during the peak construction period in the year 2027 and is forecast to apply to traffic on the R352 Tulla Road heading out of Ennis during the AM peak hour. For this arm a maximum RFC of 29.7% is forecast to apply for the no Art Data Centre development scenario, increasing to 44.3 with the inclusion of the Art Data Centre construction traffic. For the “without development” development scenario a maximum queue of 0.4 PCUs, and delay of 0.05 minutes (or 3 seconds) are forecast. These are forecast to increase marginally for the “with development” scenario with a maximum queue of 0.8 PCUs, and delay of 0.06 (or 4 seconds) are forecast.

It is noted that for the PM peak hour it is the same movement that is forecast to have the highest RFC, with the future year 2044 Art Data Centre fully operational scenario being the worst case. For this movement it is forecast that the RFC will increase from a “without development” level of 36.1%, increasing to 38.6% with the Art Data Centre traffic on the network. For the “without development” scenario, a maximum queue of 0.6 PCU, and delay of 0.05 (or 3 seconds) are forecast, with a negligible impact on these criteria for the “with development” scenario (maximum queue of 0.6 PCU, and delay of 0.06 (or 4 seconds).

It is noted that the maximum impacts that are forecast during the months when the maximum number of deliveries are made to the site will be similar, but marginally less than those set out above for the peak construction months. With respect to the impacts on the M18 slip road approach to the roundabout it is forecast that the worst case will be during the AM peak hour for the peak construction months in 2027, when an RFC of 7.6% for the “without development” scenario will increase to 11.9% with the Art Data Centre traffic introduced on

the network. For all scenarios tested, the maximum queuing for this movement is forecast to be less than 1 PCU. While in reality there will be occasions when minor queuing will occur, the assessment indicates that traffic generated by the proposed Art Data Centre will have a negligible impact on the M18 slip lane approach to the East Clare Roundabout.

The result of the capacity tests for the East Clare Roundabout forecasts that the existing roundabout will operate well within capacity for all scenarios up to and beyond the development future year of 2044.

Junction capacity test results for M18 / R352 Tulla Road West Roundabout

The results of the capacity test undertaken for the Tulla Road West Roundabout are set out in Table 12.23.

The maximum RFC for the Tulla Road West roundabout is forecast to occur during the peak construction period in the year 2027 and is also forecast to apply to traffic on the R352 heading out of Ennis during the AM peak hour. For this arm a maximum RFC of 35.0% is forecast to apply with no Art Data Centre development traffic, increasing to 47.5% with the proposed development construction traffic on the network. For the “without development” scenario a maximum queue of 0.51 PCUs is forecast with a corresponding delay of 0.06 (or 4 seconds) which is forecast to increase marginally to for the “with development” scenario to a maximum queue of 0.9 PCUs with a corresponding delay of 0.07 (or 4 seconds).

During the PM peak hour, it is the same movement that is forecast to have the highest RFC (outbound from Ennis on the R357), with the Art Data Centre fully operational in 2044 being marginally the worst case. For this movement it is forecast that the RFC will increase from a no development level of 42.1%, to 43.7% with the Art Data Centre traffic on the network. For the “without development” scenario, a maximum queue of 0.7 PCUs, and delay of 0.06 (or 4 seconds) are forecast, increasing marginally for the “with development” scenario to a maximum queue of 0.8 PCU, and delay of 0.07 (or 4 seconds).

As for the neighbouring East Clare Roundabout, it is noted that the maximum impacts that are forecast for the Tulla Road East Roundabout during the months when the maximum number of deliveries are made to the site will be similar, but marginally less than those set out above for the peak construction months. At the Tulla Road West roundabout during the critical peak construction months in 2027 it is forecast that the RFC for the M18 slip road approach to the roundabout will increase from a background level of 12.7% to 17.4% with the Art Data Centre traffic during the AM peak hour, and from 35.9% to 40.5% during the PM peak hour. For the worst case PM peak hour it is forecast that for the “without development” scenario there will be a maximum queue of 0.6 PCUs, with a corresponding delay of 0.07 minutes (or 4 seconds). For the “with development” scenario this is forecast to increase to a queue of 0.7 PCUs and delay of 0.08 minutes (5 seconds).

As for the M18 slip on the East Clare Roundabout, while in reality there will be occasions when minor queuing does occur, the assessment confirms that traffic generated by the proposed Art Data Centre will have a minimal impact on the M18 slip lane approach to the Tulla Road West Roundabout.

The result of the capacity tests for the Tulla Road West Roundabout forecasts that the existing roundabout will operate well within capacity for all scenarios up to and beyond the development future year of 2044.

The model output files for each of the 3 junctions are included for the “with Art Data Centre” peak construction, PM peak hour, year 2027, as Appendix 12.7.

Table 12.21 Junction capacity test results – Art Data Centre access junction on the R352 Tulla Road, with development traffic, by year and time period

Year	Arm	AM peak hour			PM peak hour		
		RFC	Q	Delay	RFC	Q	Delay
2027 (Average construction day)	Right turn from development	7.1	0.08	0.13	35.3	0.54	0.21
	Left turn from development	0.7	0.01	0.10	11.9	0.13	0.13
	Right turn into development	11.1	0.12	0.11	1.3	0.01	0.11
2027 (Peak construction day)	Right turn from development	12.4	0.14	0.15	61.6	1.56	0.35
	Left turn from development	1.3	0.01	0.11	24.8	0.33	0.19
	Right turn into development	19.7	0.24	0.13	2.3	0.02	0.11
2027 (Peak HGV delivery day)	Right turn from development	15.0	0.18	0.15	44.0	0.78	0.24
	Left turn from development	2.3	0.02	0.11	14.6	0.17	0.15
	Right turn into development	13.7	0.16	0.11	2.9	0.03	0.11
2029 (Fully operational)	Right turn from development	11.5	0.13	0.14	11.0	0.12	0.15
	Left turn from development	1.5	0.02	0.10	3.0	0.03	0.11
	Right turn into development	8.5	0.09	0.11	2.3	0.02	0.11
2044 (Fully operational)	Right turn from development	11.6	0.13	0.14	11.2	0.13	0.16
	Left turn from development	1.5	0.02	0.10	3.1	0.03	0.12
	Right turn into development	8.5	0.09	0.11	2.3	0.02	0.11

Table 12.22 Junction capacity test results - East Clare Roundabout, without and with development traffic,

by development scenario, year *r* and time period

Year	Arm	AM peak hour						PM peak hour					
		No development			With development			No development			With development		
		RFC	Q	Delay	RFC	Q	Delay	RFC	Q	Delay	RFC	Q	Delay
2027 (Average construction day)	R352 Ennis Road	29.7	0.4	0.05	38.2	0.6	0.05	33.1	0.5	0.05	35.0	0.5	0.05
	M18 slip	7.6	0.1	0.04	10.0	0.1	0.04	9.8	0.1	0.05	10.3	0.1	0.05
	R352 Tulla Road	19.9	0.2	0.04	21.9	0.3	0.04	18.9	0.2	0.04	28.3	0.4	0.05
2027 (Peak construction day)	R352 Ennis Road	29.7	0.4	0.05	44.3	0.8	0.06	33.1	0.5	0.05	36.4	0.6	0.06
	M18 slip	7.6	0.1	0.04	11.9	0.1	0.05	9.8	0.1	0.05	10.5	0.1	0.05
	R352 Tulla Road	19.9	0.2	0.04	23.2	0.3	0.05	18.9	0.2	0.04	35.1	0.5	0.06
2027 (Peak HGV delivery day)	R352 Ennis Road	29.7	0.4	0.05	40.2	0.7	0.06	33.1	0.5	0.05	36.4	0.6	0.06
	M18 slip	7.6	0.1	0.04	11.3	0.1	0.04	9.8	0.1	0.05	11.5	0.1	0.05
	R352 Tulla Road	19.9	0.2	0.04	24.0	0.3	0.05	18.9	0.2	0.04	30.5	0.4	0.05
2029 (Fully operational)	R352 Ennis Road	30.7	0.4	0.05	37.5	0.6	0.05	34.1	0.5	0.05	36.6	0.6	0.06
	M18 slip	8.0	0.1	0.04	10.0	0.1	0.04	10.2	0.1	0.05	11.1	0.1	0.05
	R352 Tulla Road	20.6	0.3	0.04	23.8	0.3	0.05	19.5	0.2	0.04	22.3	0.3	0.05
2044 (Fully operational)	R352 Ennis Road	32.4	0.5	0.05	39.3	0.6	0.06	36.1	0.6	0.05	38.6	0.6	0.06
	M18 slip	8.4	0.1	0.04	10.5	0.1	0.04	10.8	0.1	0.05	11.8	0.1	0.05
	R352 Tulla Road	21.7	0.3	0.04	25.0	0.3	0.05	20.6	0.3	0.05	23.4	0.3	0.05

Table 12.23 Junction capacity test results - Tulla Road West Roundabout, without and with development traffic, by development scenario, year and time period

Year	Arm	AM peak hour						PM peak hour					
		No development			With development			No development			With development		
		RFC	Q	Delay	RFC	Q	Delay	RFC	Q	Delay	RFC	Q	Delay
2027 (Average construction day)	R352 Ennis Road	35.0	0.5	0.06	42.2	0.7	0.06	38.7	0.6	0.06	39.7	0.7	0.06
	Local access	0.0	0.0	0.00	0.0	0.0	0.00	0.7	0.0	0.06	0.7	0.0	0.06
	R352 Tulla Road	22.2	0.3	0.04	23.3	0.3	0.04	21.3	0.3	0.04	28.5	0.4	0.05
	M18 slip	12.7	0.1	0.05	15.4	0.2	0.05	35.9	0.6	0.07	38.6	0.6	0.07
2027 (Peak construction day)	R352 Ennis Road	35.0	0.5	0.06	47.5	0.9	0.07	38.7	0.6	0.06	40.3	0.7	0.06
	Local access	0.0	0.0	0.00	0.0	0.0	0.00	0.7	0.0	0.06	0.7	0.0	0.06
	R352 Tulla Road	22.2	0.3	0.04	23.9	0.3	0.04	21.3	0.3	0.04	33.7	0.5	0.05
	M18 slip	12.7	0.1	0.05	17.4	0.2	0.05	35.9	0.6	0.07	40.5	0.7	0.08
2027 (Peak HGV delivery day)	R352 Ennis Road	35.0	0.5	0.06	43.2	0.8	0.06	38.7	0.6	0.06	40.1	0.7	0.06
	Local access	0.0	0.0	0.00	0.0	0.0	0.00	0.7	0.0	0.06	0.7	0.0	0.06
	R352 Tulla Road	22.2	0.3	0.04	24.3	0.3	0.04	21.3	0.3	0.04	29.6	0.4	0.05
	M18 slip	12.7	0.1	0.05	16.8	0.2	0.05	35.9	0.6	0.07	39.9	0.7	0.08
2029 (Fully operational)	R352 Ennis Road	36.0	0.6	0.06	41.5	0.7	0.06	39.9	0.7	0.06	41.4	0.7	0.06
	Local access	0.0	0.0	0.00	0.0	0.0	0.00	0.7	0.0	0.06	0.7	0.0	0.06
	R352 Tulla Road	22.9	0.3	0.04	24.6	0.3	0.04	22.0	0.3	0.04	23.9	0.3	0.05
	M18 slip	13.1	0.1	0.05	15.5	0.2	0.05	37.3	0.6	0.07	39.2	0.6	0.07
2044 (Fully operational)	R352 Ennis Road	38.0	0.6	0.06	43.5	0.8	0.06	42.1	0.7	0.06	43.7	0.8	0.07
	Local access	0.0	0.0	0.00	0.0	0.0	0.00	0.8	0.0	0.06	0.8	0.0	0.06
	R352 Tulla Road	24.2	0.3	0.04	25.9	0.3	0.05	23.2	0.3	0.05	25.2	0.3	0.05
	M18 slip	13.9	0.2	0.05	16.5	0.2	0.05	39.6	0.7	0.07	41.6	0.7	0.08

12.6 REMEDIAL AND MITIGATION MEASURES

This section summarises the mitigation measures proposed to minimise the effects of the proposed Art Data Centre during both the construction and operational stages.

12.6.1 Mitigation by design

Mitigation by design measures include the following;

- Selection of the most appropriate delivery routes to transport materials to and from the site, limiting the distance travelled on local and regional roads to a minimum.
- Where possible gravel and stone material will be obtained from borrow pits on site. For all sand, stone and cement required to be delivered to the site all materials will be sourced from suppliers that are both closest to the proposed development site, and also those that will minimise the amount of time / distance travelled by truck on local and regional roads. The quarries considered most suitable on this basis are discussed in Section 12.7.2.
- Construction of a new access junction in the form of a priority junction with right turn and left slip lanes on the R352 Tulla Road to provide access for all construction and operational traffic generated by the proposed Art Data Centre.

12.6.2 Construction Phase

The successful completion of the Art Data Centre will require significant coordination and planning, and a comprehensive set of mitigation measures will be in place before and during the construction stages in order to minimise the effects of the additional traffic generated on the adjacent road network. While a detailed **Traffic Management Plan (TMP)** will be submitted for agreement with the Road Section of Clare County Council well in advance of the construction phase of the proposed Art Data Centre, a preliminary **Outline Traffic Management Plan (OTMP)** incorporating all the likely potential mitigation measures is submitted as part of the CEMP included with the application documentation. The OTMP, and subsequently, the TMP, will be finalised and agreed with Clare County Councils Road Section and An Garda Síochána prior to construction works commencing on site. The TMP will include as a minimum the following:

Traffic Management Coordinator – A competent Traffic Management Co-ordinator will be appointed by the Client / Contractor for the duration of the project. This person will be the main point of contact for the public and public bodies, including Clare County Council and An Garda Síochána, for all matters relating to traffic management during the construction of the proposed Art Data Centre.

Delivery Programme – A programme of deliveries will be submitted to Clare County Council in advance of all deliveries to the Art Data Site, with preliminary daily traffic volumes included by construction month included as Appendix 12.5 of this EIAR. The proposed development will be constructed over a 6.5 year period, commencing in December 2022, with completion forecast in July 2029.

Identification of delivery routes – These routes will be agreed and adhered to by all contractors. As discussed with Clare County Councils Road Section during pre-planning, where possible suppliers will be selected to minimise the amount of distance travelled by truck and HGV movements generated during the construction phase. While the origins of the suppliers of general construction materials and data centre components are not known at this stage, in relation to supply of sand, aggregate, stone and cement, which will comprise a significant proportion of HGV traffic generated during the construction phase, 3 quarries have been identified for consideration, with the locations and routes shown in Figure 12.4 at the end of this chapter, this shows;

- Quarry Option 1 - located in Bunratty the total distance to the Art Data site is 24 kms of which the majority of the route is on the M18 motorway, with only a short section of the L3122 north of Bunratty and the 1km section of the R352 between the M18 and the site access being on non-national roads.
- Quarry Option 2 - located in Toonagh north of Ennis, the total travel distance is just 11 kms of which 4 kms is on the R476, and 1 km on the R352 between the M18 and the site access.
- Quarry Option 3 – This quarry is 17 kms from the site and is located to the east of Tulla with the entire route on the R352 non-national road.

Discussions will be held with the Road Section of Clare County Council to discuss the traffic implications of each quarry location well in advance of the commencement of construction.

Traffic volumes and impacts of traffic during construction – A summary of the traffic volumes and the forecast impacts of additional traffic movements generated during the construction of the Art Data Centre, (as set out in detail in Table 12.9 of the EIAR is as follows;

Staff trips – It is forecast that during the busiest construction month (month 61 in the year 2027) a maximum of 1,200 construction staff will require to travel to and from the site per day. While a detailed travel plan will be prepared by the contractor, which will involve the transportation to and from the site by bus for a significant number of construction staff, the scenario tested in the EIAR assumes that all construction staff will travel by car, with an average of 1.5 staff to each car. For the busiest construction days, this will result in 800 car trips to and from the site per day, with 40% (320 car trips) travelling during the traditional peak hours. It is estimated that site staff will generate 464 cars trips to and from the site on an average day, with 189 travelling to the site during the AM peak hour and from the site during the PM peak hours.

HGV – It is noted that when considering HGV movements only, the busiest period is forecast to be early in Phase 1, when it is estimated that 115 HGV movements will require to travel to / from the site during one day, resulting in 12 trips per hour, or on average 1 load in and out of the site every 5 minutes.

Detailed capacity tests were undertaken at the proposed access junction on the R352 Tulla Road and the 2 roundabouts linking the M18 slip roads to the R352 Tulla Road (East Clare Roundabout and Tulla Road West roundabout, as shown in Figure 12.1 of the EIAR. At this preliminary stage it was assumed that 40% of all HGV trips will travel to/from the site via the M18 from the north, with the same amount to and from the M18 in the south. It was assumed that the remaining 20% would travel to and from the direction of the quarry located close to Tulla. For all cases the proposed access junction and roundabouts are forecast to operate well within capacity (maximum of 48% while up to 85% capacity is considered acceptable) with no queueing forecast for the M18 slip road approaches to the roundabouts (therefore no forecast risk of blocking back to M18 carriageway).

It is acknowledged that the above capacity assessment is based on uniform arrivals / departures to and from the site, and this will require to be co-ordinated between the supplier and site staff during the peak construction months. This will include the presence of construction staff (flagman) located at key junctions during peak delivery days and times who will be in constant 2-way radio contact. Continual monitoring of the M18 slip roads at the East Clare and Tulla Road West roundabouts will be undertaken during busing periods. It is noted that contingency measures are provided in the CEMP in the event that an incident occurs at the M18 slip approach to the Tulla Road West roundabout in order to avoid the build-up of HGVs queuing back to the main M18 carriageway. These measures involve the immediate re-routing of HGV movements off the M18 to temporary detours via the N85 and through Ennis.

Travel plan and parking for construction workers – While the traffic impact assessment included in Section 12.5 of the EIAR assumes the worst case scenario that all construction workers will drive to the site, the construction company will be required to implement a travel plan for construction staff, which will include the provision of buses to / from the site for a significant portion of the workforce.

Based on the worst case it is forecast that up to 800 parking spaces will be required to be available for site staff during the busiest month, reducing to 400 for an average month.

Information to locals – All residents and businesses in the area will be informed of any upcoming traffic related matters. Information will include the contact details of the Contract Project Co-ordinator, who will be the main point of contact for all queries from the public or local authority during normal working hours. An "out of hours" emergency number will also be provided.

A Pre and Post Construction Condition Survey – A pre-condition survey of roads associated with the proposed development will be carried out prior to construction commencement to record the condition of the road. A post construction survey will be carried out after works are completed. Where required the timing of these surveys will be agreed with the local authority. All road surfaces and boundaries will be re-instated to pre-development condition, as agreed with the local authority engineers.

Liaison with the relevant local authority - Liaison with Clare County Councils Road Section and An Garda Síochána during the delivery of any abnormal loads, when an escort may be required.

Temporary traffic signs – As part of the traffic management measures temporary traffic signs will be put in place at all key junctions, including the new junction providing access to the site the R352 Tulla Road. All measures will be in accordance with the “*Traffic Signs Manual, Section 8 – Temporary Traffic Measures and Signs for Road Works*” (DoT now DoTT&S) and “*Guidance for the Control and Management of Traffic at Roadworks*” (DoTT&S). A member of construction staff (flagman) will be present at key junctions during peak delivery days and times. This will include the monitoring of traffic on the M18 slip roads at the East Clare and Tulla Road West roundabouts.

Delivery times of abnormal loads - The management plan will include the option to deliver any abnormal loads at night in order to minimise disruption to general traffic during the construction stage.

Additional measures - Various additional measures will be put in place in order to minimise the effects of the development traffic on the surrounding road network including wheel washing facilities on site and sweeping / cleaning of local roads as required.

Re-instatement works - All road surfaces and boundaries will be re-instated to pre-development condition, as agreed with the Road Section of Clare County Council. The roads conditions survey (and any other analyses required by the Roads Section of the Council) will be undertaken immediately prior to construction commencement of the project to assess the condition of the road network at that time and to agree any required works with the local authority. Such a survey would be repeated immediately after completion of the construction phase of the project in order to ensure that any reinstatement works were carried out to a satisfactory standard as required by the local authority.

Road Opening Licence – Roads works associated with the proposed access junction on the R352 Tulla Road will be undertaken in line with the requirements of a road opening licence as agreed with Clare County Council.

12.6.3 Operational Phase

In addition to the provision of the proposed access junction on the R352 Tulla Road that will provide access to the site for all traffic during the operational stage up to and beyond the test year of 2044, the following measures will be put in place as mitigation measure;

Travel Plan – While an outline Travel Plan is provided as part of the current planning application to Clare County Council (included as Appendix 12.6), a detailed plan will be developed prior to opening. The plan will be updated as each Data Centre is occupied, with the aim to encourage the use of sustainable modes of travel to the Art Data Centre, including walking, cycling, public transport (if an option) and car sharing / pooling.

The provision of a safe environment for all sustainable modes - Including footpaths and crossing facilities and cycle paths throughout the Art Data campus.

The provision of a safe internal road network - Including parking and delivery bays to provide a safe environment for all staff, visitors and deliveries to the site.

12.6.4 Mitigation during decommissioning

In the event that the Art Data Centre is decommissioned after the life of the proposed development a decommissioning plan, including material recycling / disposal and traffic management plan will be prepared for agreement with the local authority. The mitigation measures would be similar to those proposed during the construction phase.

12.7 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

12.7.1 Do Nothing

An alternative scenario to developing the proposed Art Data Centre would be to do nothing and leave the site as it is. For this scenario there will be no additional traffic generated or works carried out on the road network and therefore no effects with respect to traffic.

12.7.2 Construction Phase

Worst case Art Data Centre peak construction scenario - 2027 (as presented in Section 12.5)

Based on the worst case scenario that all construction staff trips are car-based, during the busiest months of the 6.5 year (80 month) construction period, the likely effects on the surrounding road network are forecast to be as follows;

Link flows and delays on R352 Tulla Road – Traffic volumes during peak hours on the R352 Tulla Road are forecast to increase by up to 77% just to the west of the proposed access junction during the AM peak hour, reducing to 23% during the course of the day. The junction capacity tests undertaken for the critical AM and PM peak hours indicate that the forecast increase in traffic flows will translate into relatively small impacts to general traffic flow in terms of delays and queues. It is therefore determined that the effects on traffic on the R352 Tulla Road will be negative, will be slight, and will be short term, lasting for approximately 18 months between the years 2026 to 2028.

Link flows and delays on M18 slip roads and the M18 – During these peak construction months peak hour traffic flows on the M18 slip roads linking into the R352 roundabouts are forecast to increase by between 12% and 23% during the peak hours, and by 7% during the course of the day. On the M18 main carriageway construction traffic during the peak months is forecast to result in between a 1% to 10% increase during peak hour flows, and 1% to 3% during the day. As for the R352 approaches to the roundabouts, the junction capacity tests undertaken for the AM and PM peak hours show that the additional traffic will relatively minor impacts to general traffic flow in terms of delays and queues on the M18 slip road approaches. It is, therefore, also determined that the effects on traffic on the M18 slip roads and on the M18 main carriageway will also be negative, will be slight, and will be short term, lasting for approximately 18 months between the years 2026 to 2028.

Average and lower than average construction scenario between 2023 and 2029

During the remaining 5 years construction period the impacts on the local network as a result of construction traffic will be less than for the peak construction scenario, as set out above. It is therefore determined that the effects on traffic on the R352 Tulla Road and on the M18 slip roads and main M18 carriageway will be negative, will be slight, and will be short term, lasting for approximately 5 year, between the years 2023 to 2029.

12.7.3 Operational Phase

Art Data Centre Fully Operational – 2029 to 2044

Additional traffic volumes that will be generated during the operational stage will be significantly less than an average construction day. It is therefore determined that the effects on traffic on the R352 Tulla Road, the M18 slip roads and the M18 main carriageway during the operational phase will be negative, will be slight, and will be long term, lasting for the life time of the Art Data Centre.

12.7.4 Decommissioning

It is forecast that the traffic related impacts during the decommissioning phase of the Art Data Centre will be similar, but significantly less than those determined for construction phase.

12.8 CUMULATIVE IMPACTS

The one significant pending development that could have the potential for cumulative traffic impacts with the Art Data Centre is the decommissioning of the Roche Pharmaceutical facility located in Clarecastle, County Clare. An assessment of the potential cumulative traffic effects with the proposed Art Data Centre was undertaken based on the following criteria;

- Project status (proposed to operational and the potential for developments periods of activity to overlap),
- Degree of overlap with the Proposed Development delivery highway network (low to high),
- Traffic volumes (low to high).

The construction of the proposed Art Data Centre will take place between the year 2023 to 2029, and will be operational for the foreseeable future. The works associated with the decommissioning of the Roche facility will take place between the years 2021 to 2024. In terms of project scheduling there is therefore an overlap in years 2023 and 2024.

With respect to the area of the road network that is impacted and the traffic volumes generated by both developments, the EIAR prepared for the Roche site identified the area impacted to be roads local to Clarecastle and the R458 between the site and Junction 11 of the M18, beyond which the “impact of traffic generated by the Proposed Development will be below the TII thresholds, therefore, an assessment of the traffic and transportation impacts beyond Junction 11 of the M18 is not required”. As set out in Section 12.5 of this EIAR, it is concluded that the effects of traffic generated by the Art Data Centre will be limited to the R352 Tulla Road and the slip roads of Junction 13 of the M18. It is therefore concluded that the potential for cumulative impacts will be imperceptible.

12.9 RESIDUAL IMPACTS

12.9.1 Construction stage

During the 6.5 year construction stage of the Art Data Centre, it is forecast that the additional traffic that will appear on the delivery routes indicated in Figure 12.1 will have a slight to moderate and temporary impact on existing road users, which will be minimised with the implementation of the mitigation measures included in the proposed traffic management plan.

12.9.2 Operational stage

During operational stage of the Art Data Centre, it is forecast that the effects on existing road users and businesses due to the additional traffic that will travel on the road network will be slight and will be minimised with the implementation of the mitigation measures included in the proposed Travel Plan.

12.9.3 Decommissioning

As stated above, in the event that the proposed Art Data Centre is decommissioned a decommissioning plan will be prepared and implemented in order to minimise the residual impacts during this stage. In the event that decommissioning of the site takes place the residual effects will be similar, but less than for the construction stage, and will have a slight to moderate and temporary impact on existing road users.

13.0 MATERIAL ASSETS

13.1 INTRODUCTION

This chapter prepared evaluates the potential impacts, from the proposed development on Material Assets, as defined in the EPA Guidelines *'Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports* (EPA, 2017), *Advice Notes Draft Advice Notes for Preparing Environmental Impact Statements* (EPA, 2015), and *European Commission Guidance on Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report* (2017).

13.2 METHODOLOGY

The Directive 2011/92/EU defined Material Assets as *'resources that are valued and that are intrinsic to specific places; they may be of either human or natural origin'* : this included architectural and archaeological heritage. The Directive 2014/52/EU included architectural and archaeological heritage as components of cultural heritage; this EIA report has done likewise within in Chapter 12 Archaeological, Architectural and Cultural Heritage.

The EPA Guidelines (2017) state that material assets are taken to mean *"built services and infrastructure, roads and traffic and waste management"*. The EPA Advice Notes (2015) also gives examples of material assets including; assimilative capacity of air and water; ownership and access; and tourism and recreational infrastructure. The European Commission Guidance (2017) refers to a number of examples of material assets including buildings, other structures, mineral resources and water resources.

In this EIA Report, the impacts on some of the material assets described in the above guidance have already been considered in the following chapters and therefore these aspects will not be addressed in specific detail within this chapter.

- Chapter 4, Population and Human Health;
- Chapter 5, Land, Soils, Geology & Hydrogeology;
- Chapter 6, Hydrology;
- Chapter 8, Air Quality & Climate;
- Chapter 11, Cultural Heritage
- Chapter 12, Traffic & Transportation; and
- Chapter 14, Waste Management.
-

This chapter assesses ownership and access, built services and infrastructure, which have not already been addressed elsewhere in this EIA Report. Section 13.3 addresses ownership and access. The subsequent sections address built services and infrastructure. The potential impacts on built services and infrastructure, if any, are assessed in terms of the following:

- Land Use, Property, and Access
- Power, Electrical, and Gas Supply;
- Telecommunications;
- Surface water infrastructure;
- Foul drainage infrastructure; and
- Water supply.

The proposed development will not impact on any other structures or water resources. The associated built services and infrastructure in the vicinity of the site are summarised in the

following sections; further detail is provided within the planning application documentation including details of consultation with utility suppliers.

The assessment of impact on utilities has been undertaken by confirmation of supply with the utility supplier, Clare County Council (CCC), Eirgrid, ESB Networks and Irish Water (IW). Mitigation measures are proposed where required.

13.3 RECEIVING ENVIRONMENT

The associated built services and infrastructure currently in the vicinity of the site are summarised in the following sections.

13.3.1 Land Use, Property, and Access

The proposed development site is under third party ownership. There currently exists an agreement between the Applicant and the owner of the site. A letter of consent, to apply for development on the lands from the site owner, is included with the planning application.

The proposed development footprint is c. 60 hectares (ha) and is located to the east of Ennis in the townland of Tooreen and Cahernalough with small sections extending west into the townlands of Ballymacahill and Knockanean. The lands are bordered to the south by the R352 (Tulla Road) and to the west by the M18. The lands are traversed by a gas pipeline and overhead powerlines connecting to the existing Ennis 110kv Substation that adjoins the western boundary.

The site is currently predominantly in agricultural use and comprises a series of irregularly shaped fields divided by hedgerows and ditches typical of its agricultural setting. The site contains a number of existing dwellings and farm outbuildings.

The land proposed for development have been identified by Clare Co Co (CCC) as zoned as suitable for Enterprise (ENT3) . CCC Variation No.1 to the CCDP 2017-2023 states that “lands zoned *enterprise* shall be taken to include the use and development of land for high end research and development, business science and technology -based industry, financial services, call centres/telemarketing, software development, datacentres, enterprise and incubator units, small/medium manufacturing or corporate office in high quality campus/park type development”. The main existing access to the site is from Tulla Road along the southern boundary.

13.3.2 Power, Electrical, and Gas Supply

The availability of power is a key consideration in site selection. The lands are traversed by a gas pipeline and overhead power lines connecting to the existing Ennis 110kV Substation that adjoins the western boundary. There is a high pressure gas main running north/south to the east side of the site.

13.3.3 Telecommunications

A variety of providers including Aurora, BT, ESB and PiPiper are available in the locality of the site and discussions are ongoing to create at least three fibre entries to provide resilience.

13.3.4 Surface Water Infrastructure

Stormwater currently discharges to ground and the Ballymacahill River which borders the west of the site.

13.3.5 Foul Drainage Infrastructure

There is an existing 225 mm diameter foul drain that forms part of an existing foul drainage network that services the existing Knockanean area southwest of the proposed development along the existing Tulla Road. This existing foul drain discharges to the existing pumping

station at Gort Na mBlath located c. 550 m further west from the proposed development. The wastewater ultimately discharges to Ennis North (Clonroadmore) WWTP Reg D0048.

13.3.6 Water Supply

A 450mm diameter mains runs along Tulla road and has capacity to supply adequate water for the proposed development.

13.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

This section describes the built services and infrastructure for the proposed development during both construction and operation are described below.

13.4.1 Land Use, Property, and Access

The proposed data storage facility and energy centre covers an area of 60 hectares and of the total land area, 10 ha of the lands are retained as buffer zones. The land proposed for development have been identified by Clare Co Co (CCC) as zoned as suitable for Enterprise (ENT3). CCC Variation No.1 to the CCDP 2017-2023 states that “lands zoned *enterprise* shall be taken to include the use and development of land for high end research and development, business science and technology -based industry, financial services, call centres/telemarketing, software development, datacentres, enterprise and incubator units, small/medium manufacturing or corporate office in high quality campus/park type development”.

A number of the existing dwellings and farm outbuildings will be retained and some (one house and eight farm buildings) will be demolished as part of the proposed site redevelopment. Details on demolition are included in the demolition report provided with this planning submission and also addressed in Chapter 13 (Waste) and the Construction Environmental Management Plan (CEMP).

The main access to the proposed development site will be off the Tulla Road along the southern boundary, with a secondary access and egress for emergency use only, off the Tulla road to the west of the main entrance. These entrances will connect to an internal road network that will serve two purposes public 24/7 access to the Vertical Farm, Substations, Energy Centre, and Gas AGI; and to provide a secure private road network circumnavigating the Data Centres for staff access, connection between buildings and for the delivery of equipment and materials. There is good visibility on approach to both access points as detailed in Chapter 12 (Traffic and Transportation).

13.4.2 Power, Electrical, and Gas Supply

During construction, contractors will require power for heating and lighting of the site and their on site construction compound. The power requirements will be relatively minor and will be provided by a temporary power supply.

During operation, the six data storage facilities will require up to 200 MW IT load. The data halls equipment, including servers and the air handling plant require energy to maintain server availability and the necessary environmental conditions. As detailed in Chapter 2 (Description of the Development) it is proposed to construct an energy centre in the east of the site. This energy centre and connection to the electricity grid with an additional onsite substation will service the power needs of the data storage facilities.

It is envisaged that phase 1 (80MW) will be provided by electrical power from the grid. It is proposed to underground two existing overhead 110kV circuits to the Ennis substation as they come onto the site on the east side. A new substation will be created on the east site, partly for extending Eirgrid's substation (the existing has no additional space) and for transforming

to 10kV / 20kV for distribution to the data centres. Dual feeders will be provided to each data centre via a set of underground ducts that will be created in the service roads.

Connecting to the Eirgrid network gives the opportunity to use low carbon energy that is now generated across the island of Ireland through wind generation and photo voltaic solar farms. These renewable sources of energy currently provide up to 40% of the total supply at any one time. This will increase significantly over the next decade or so as more and more renewable capacity is added to the network. The additional phases (120 MW) will be powered by the on-site gas powered energy centre or a combination of both. The Applicant intends to construct the energy centre in order to respond flexibly to the evolving energy market and to ensure the capacity to have future security of supply and also to respond to any future grid capacity constraints.

There is a high pressure gas main running north/south to the east side of the site. In conjunction with Gas Networks Ireland, a pressure reduction station (AGI) will be installed to provide delivery of gas for the generators to be located in the energy centre. The initial provision of generation on site will be based on using Natural Gas from Gas Networks Ireland (GNI). GNI have announced that they are already looking at injecting green or blue hydrogen into their network to improve their carbon impact, as per their Vision 2050. The graph below shows how the use of natural gas will reduce to 0% by 2050. The engines on-site will be specified to work on Natural Gas or Hydrogen or any mix in between in order to future proof the plant and to take the opportunity to reduce the carbon impact.

In the event of a loss of power to the site, diesel-powered back-up generators will be activated to provide power pending restoration of mains power. Based on experience of many other datacentre developments, the back-up generators will rarely be used.

13.4.3 Telecommunications

Telecommunications including fibre required during the construction phase will be provided via a mobile connection or temporary connection to the nearby telephone network.

A variety of providers including Aurora (running long the gas line), BT, ESB and PiPiper are available in the locality of the site and discussions are ongoing to create at least 3 fibre entries to provide resilience.

A fibre optic cable distribution network will be installed with a separate incoming fibre infrastructure and provided to each building via underground fibre ducts. There are existing underground carrier ducts adjacent to the site that will be utilised for the development. The connection into the wider telecommunications network will be undertaken by a statutory telecommunications operator.

The installation of a new fibre optic cable network on the site will be carried out in accordance with best practice standards. Consultation with the providers has confirmed there is sufficient capacity in the network for the proposed development.

13.4.4 Surface Water Infrastructure

During construction run-off into excavations/earthworks cannot be prevented entirely and is largely a function of prevailing weather conditions. Earthwork operations will be carried out such that surfaces, as they are being raised, shall be designed with adequate drainage, falls and profile to control run-off and prevent ponding and flowing along with mitigation measures in place to ensure that any impacts on surface water is minimised at source. Any discharge water will be treated using a silt-buster or similar to removed suspended solids prior to discharge.

The proposed surface water drainage service to the development comprises various drainage components including positive stormwater networks, attenuation systems and several Sustainable Drainage Systems (SuDS) elements. The proposed surface water drainage was designed in accordance with the SuDS Manual 2015.

The developed area of the site is 17.3 ha and attenuation has been designed on site for the 1:100 yr. flood event including consideration of a 20 % allowance for climate change. An overflow subsurface pipeline will discharge at current discharge rates (greenfield) to the Ballymacahill River. Drainage will be from a single lined attenuation pond.

Rainwater run-off from the roofs of the six datacentres will be collected and will feed water harvesting tanks with any excess overflow into the common road drainage network. This water will be available as cooling water. Other SuDS measures will include permeable paving and swales. These drains and swales will discharge to a surface water attenuation pond where the discharge will be controlled using a “Hydrobrake Optimum” vortex flow control device to limit the maximum discharge to 50 l/s during the 1/100 year storm (the calculated Q_{bar} value attributed to the site is 61l/s). The attenuation pond to be constructed to retain a constant volume of water to promote settling and reduce conveyance of suspended solids and other particles to the receiving waters. An attenuation volume of 9293 m³ is designed as part of the proposed development. A Class (I) bypass separator with a suitable capacity will be installed downstream of the proposed hydrobrake. The function of the separator is to intercept pollutants (any petroleum /oil) and prevent their entry to the Ballymacahill River. As such there is no potential for increase or flooding or impact on water quality as a result of the proposed development. Further details are provided in Chapter 7 of the EIAR and within the CSEA engineering report prepared for planning.

13.4.5 Foul Drainage Infrastructure

Welfare facilities will be provided for the contractors via portable sanitary facilities within the construction compound site during the construction works. It is anticipated that initially, waste collected by means of a temporary sealed storage tank, with all wastewater being tankered off-site to an appropriately licensed facility for disposal. The site contractor may wish to establish temporary connections to the existing services established to provide service and utilities subject to relevant applications and approvals.

A temporary trench excavation along the Tulla road will be undertaken to facilitate pipe laying for connection with the existing pumping station of Gort Na mBlath located approximately 550 m west of the main site. The wastewater ultimately discharges to Ennis North (Clonroadmore) WWTP Reg D0048.

There is no trade effluent proposed for this development. Consultation with CCC has confirmed that sufficient wastewater capacity is available and a pre-connection enquiry PCE application form has been submitted to Irish Water (IW). A review of the most recent Annual Environmental Report (2019) for the receiving IW wastewater treatment plant and confirmation with IW and CCC confirms there is no capacity issues.

Table 13.1 2019 AER Confirming available capacity for Receiving WWTP.**2.1.4.2 Treatment Capacity Report Summary - ENNIS NORTH WWTP**

Treatment capacity is an assessment of the hydraulic (flow) and organic (the amount of pollutants) load a treatment plant is designed to treat versus the current loading of that plant.

ENNIS NORTH WWTP	
Peak Hydraulic Capacity (m ³ /day) - As Constructed	16272
DWF to the Treatment Plant (m ³ /day)	6784
Current Hydraulic Loading - annual max (m ³ /day)	20495
Average Hydraulic loading to the Treatment Plant (m ³ /day)	13132
Organic Capacity (PE) - As Constructed	31500
Organic Capacity (PE) - Collected Load (peak week) ^{nom}	23980
Organic Capacity (PE) - Remaining	7520
Will the capacity be exceeded in the next three years? (Yes/No)	No

Nominal design capacities can be based on conservative design principles. In some cases assessment of existing plants has shown organic capacities significantly higher than the nominal design capacity. Accordingly plants that appear to be overloaded when comparing a collected peak load with the nominal design capacity can be fully compliant due to the safety factors in the original design.

The designed Dry Weather Flow DWF of the development is 20.9 m³/day. The proposed foul drainage service will incorporate a foul pumping station and associated rising main which will also include a 24-hour emergency storage tank (in the unlikely event that the proposed foul pump malfunctions).

13.4.6 Water Supply

During construction, a water source will be required for the duration of the works for welfare facilities, dust suppression and general construction activities. Initially, water supply will be provided by tankered water and bottled water to the site. A temporary connection to the existing existing watermain will be established to provide service and utilities subject to relevant applications and approvals. The water demand during the construction phase will not be significant enough to affect existing pressures.

A 450mm diameter mains runs along the Tulla Road and following a proposed upgrade for connection (within the existing road), has capacity to supply adequate water for the proposed development. Peak daily usage will be 48 l/s and average demand 11.2 l/s (Adiabatic Cooling System) during high temperature condition), plus 1.2 l/s for domestic use. On the rare occasions that evaporative cooling is required (temperature of 27°C the requirement is 1,000 m³ /day for the whole site.

13.5 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

13.5.1 Construction Phase

Land Use, Property, and Access

During the construction phase there are potential short-term nuisances such as dust, noise, as well as the potential for pollution of groundwater or the existing drainage ditches associated with demolition, excavations and construction. To minimise nuisance for neighbours, the contractor will be required to operate in compliance with the Construction Environmental Management Plan (CEMP). The potential impact associated with land use and property for the construction phase will be *localised, negative, not significant and short term*.

Power, Electrical, and Gas Supply

During construction, contractors will require power for heating and lighting of the site and their onsite accommodation. In addition, some on site equipment/plant will require power.

A construction compound and temporary power supply will be installed for the construction of the proposed development. The contractor compound and car parking for contractors will move as the development proceeds through the different phases. Planned locations are outlined in the CEMP and drawing ART-ARC-SP-00-DR-A-004. No off site parking is required. The power requirements for the construction phase will be relatively minor and therefore the power demand for the construction phase will have a *short term imperceptible* impact.

Excavations within the vicinity of existing electrical services will be carried out in consultation with EBS Networks to ensure there is no impact on existing users. There are no potential impacts associated with power supply for the proposed development for the construction phase.

Telecommunications

Telecommunications including fibre required during the construction phase will be provided via a mobile connection. There are no potential impacts associated with telecommunications for the proposed development for the construction phase.

Surface Water Infrastructure

The contractor will be required to manage surface water as outlined in the construction surface water management plan included in the Construction Environmental Management Plan (CEMP). The design and control measures will ensure that run-off water containing silt or potential construction contaminants (oil and alkaline water from cement) will be contained on site and treated. Run off will be managed to greenfield run-off rates and as such there is no potential for off-site flooding.

As detailed in Chapter 6, the potential impacts associated with surface water run-off for the proposed development during the construction phase is *short term, neutral and imperceptible*.

Foul Drainage Infrastructure and Water Supply

Welfare facilities (canteens, toilets etc.) will be required for the construction crew. Portable toilets will be provided onsite for construction staff.

There are no potential impacts on the existing infrastructure associated with wastewater management for the proposed development for the construction phase.

Water will be supplied via a connection to the existing mains along the Tulla road, which will serve the construction compound, welfare facilities and any other construction activities for the duration of construction works on the proposed development. Consultation with CCC and IW has been undertaken to confirm availability of supply requirement and a Pre Connection Enquiry (PCE) has been submitted to IW. A copy is included in the engineering report provided with planning documentation.

It is concluded the potential impacts associated with wastewater and water supply for the proposed development for the construction phase are *short-term, neutral and imperceptible*.

13.5.2 Operational Phase

Land Use, Property, and Access

During the operational phase the Proposed Development is not anticipated to generate significant air (including odour), noise or water emissions during normal operating conditions; these have been discussed further in the respective EIAR chapters, Chapter 6 (Hydrology), Chapter 8 (Air Quality & Climate) and Chapter 9 (Noise and Vibration) Chapters.

The proposed development represents a loss of agricultural land however in the overall context of Ireland's available agricultural land the loss is negligible. There is no net loss of soil from the site. Due to the zoning of these lands for development, the overall potential impact associated with land use and property for the operational phase will be a localised *neutral, slight, and long term*.

Power, Electrical, and Gas Supply

A 200 MW IT Load in total will be required for the operation of the 6 no. data storage facilities). The data halls equipment, including servers and the air handling plant require energy to maintain server availability and the necessary environmental conditions. This energy will be provided by electrical power from the grid and onsite gas-powered engines located in the energy centre, or a combination of both.

To facilitate connection with the grid, construction of an additional on-site substation is required. The latter will form part of a separate application to An Bord Pleanála but is assessed within this EIAR.

The data storage facility will also have diesel powered back-up generators, as a contingency power measure in the event of a loss of electrical power/gas supply loss. These diesel generators will be located in three external plant compounds. In addition, a back-up generator will be located in the energy centre building.

The Applicant is within the standard process of consent with EirGrid and Gas Networks Ireland. Based on these discussions with Eirgrid, and Gas Networks Ireland as well as Eirgrid's All-Island Generation Statement 2020-2029, there is a *long-term, neutral, not significant* effect on power and electrical supply during the operational phase of the Proposed Development.

Telecommunications

The proposed development will not make a connection to public network, a dedicated direct connection to services will be provided, and therefore there is no perceptible impact on the existing telecommunications infrastructure.

There is sufficient capacity available within a number of networks to accommodate the development, so there are no potential impacts associated with telecommunications for the Proposed Development for the operation phase.

Surface Water Infrastructure

The operational phase of the development represents an increase in hardstanding area that has the potential to cause an increase in surface water run-off and flooding offsite and downstream of the development site. As the design incorporates management of run-off to greenfield run off rate and in compliance with GSDS requirements there is no perceptible impact on receiving surface water infrastructure. The design incorporates measures for management of hydrocarbons and mitigation for any leaks and spills through interceptors (see Chapter 6 Hydrology).

Foul Drainage and Water Supply Infrastructure

Consultation has been undertaken with CCC with regard to available capacity and required upgrades to sewers. A PCE was submitted to IW which addressed water demand (and wastewater) for the proposed development (ref: Engineering report - CSEA). The overall water demand and wastewater discharge associated with the proposed development is in accordance with the water demand outlined in the PCE.

There is no trade effluent proposed for this development. Consultation with CCC has confirmed that sufficient wastewater capacity is available and a pre-connection enquiry PCE

application form has been submitted to Irish Water (IW). The designed Dry Weather Flow DWF of the development is 20.9 m³/day. The proposed foul drainage service will incorporate a foul pumping station and associated rising main which will also include a 24-hour emergency storage tank (in the unlikely event that the proposed foul pump malfunctions).

A 450mm diameter mains runs along the Tulla Road and following a proposed upgrade for connection (within the existing road), has capacity to supply adequate water for the proposed development. Peak daily usage will be 48 l/s and average demand 11.2l/s (Adiabatic Cooling System) during high temperature condition). plus 1.2 l/s for domestic use. On the rare occasions that evaporative cooling is required (temperature of 27°C the requirement is 1,000 m³ /day for the whole site.

13.6 REMEDIAL AND MITIGATION MEASURES

13.6.1 Construction Phase

Construction of the proposed development will require connections to water supply and drainage infrastructure, power and telecommunications.

Ongoing consultation with CCC, Irish Water, EirGrid, ESB Networks, Gas Networks Ireland and other relevant service providers within the locality and compliance with any requirements or guidelines they may have will ensure a smooth without disruption to local and business community.

The works contractor will be obliged to put best practice measures in place to ensure that there are no interruptions to utilities considered above, unless this has been agreed in advance.

Power and Electricity Supply

The power demand for the construction phase will be relatively minor and the connection works are almost entirely within proposed site boundaries with grid works within the road alignment (Tulla Road), so it is not anticipated that this would have any significant potential offsite impact. As such, no remedial or mitigation measures are required in relation to power supply for the construction phase.

Telecommunications

Telecommunications including fibre required during the construction phase will be provided via a mobile connection prior to connecting to existing networks along existing roads to accommodate the proposed development by the relevant network companies. No remedial or mitigation measures are required in relation to telecommunications.

Surface Water Infrastructure

During the construction phase, surface water management will be in accordance with a specific surface water management plan (SWMP) developed for the site (see CEMP). Any surface water run-off collecting in excavations or from exposed soil will likely contain a high sediment load. This will be diverted for appropriate settlement and will not be allowed to directly discharge directly to the existing lakes/springs or Ballymacahill River. Buffer zones adjacent to open water areas will be applied. The SWMP will incorporate specific measures for managing run-off water quality.

Foul Drainage Infrastructure

Portable toilets will be provided for construction staff. Once operational, the new pumping station to the foul drainage network which runs along the R147 with pipe upgrades in accordance with the requirements of IW and CCC. A temporary connection will be established.

Foul drainage for the proposed development will be in accordance with the Building Regulations Technical Guidance Document H for design and construction.

Strict quality control measures will be undertaken while laying pipes to minimise or eradicate infiltration and ex-filtration.

Water Supply

A connection will be put in place for the construction of the proposed development. This will be fed from the existing 450mm diameter mains along the R147. The works contractor will be obliged to put best practice measures in place to ensure that there are no interruptions to the water supply, unless this has been agreed in advance.

Strict quality control measures will be undertaken while laying pipes to minimise or eradicate infiltration and ex-filtration.

13.6.2 Operational Phase

Power and Electricity Supply

The data halls equipment, including servers and the air handling plant require power to maintain server availability and the necessary environmental conditions. The data halls equipment, including servers and the air handling plant require energy to maintain server availability and the necessary environmental conditions. It is envisaged that this energy will be provided by electrical power from the grid, or onsite gas-powered engines located in the energy centre, or a combination of both. The Applicant intends to construct the energy centre for reasons of commercial need in order to respond flexibly to the evolving energy market and to ensure the capacity to have future security of supply and also to respond to any future grid capacity constraints.

The proposed development includes a number of sustainable measures to minimise energy use on site through building design and use of solar panels and waste heat. These are outlined in Chapter 2 Description of the Proposed Development and the Energy and Sustainability Report provided with the planning application documentation. The waste heat will be used for a vertical farm to be located on site.

No remedial or mitigation measures are required in relation to power and electricity.

Telecommunications

There is sufficient capacity available in the network to accommodate the development, and as such there are no potential impacts associated with telecommunications for the proposed development for the operational phase. No remedial or mitigation measures are required in relation to telecommunications.

Surface Water Infrastructure

The stormwater system has been designed to collect rainwater runoff from the impermeable areas of the site, roofs and road/car park and directed to an appropriate SuDS and attenuation system. The allowable greenfield runoff rate has been established by the project engineers, CSEA, using the methodology set out in the *Engineering Services Report*.

The drainage design for the proposed development includes a Class 1 full retention separators downstream of the fuel unloading areas and a Class 1 bypass interceptor upgradient of the attenuation basin to ensure the quality of surface water discharge is controlled prior to attenuation and discharge offsite. In addition, a hydrodynamic solid separator is provided within the drainage network to screen rubbish, debris and sediment from the surface water runoff before it enters the attenuation basin. A shut off valve is included in the design to ensure that site discharges can be shut off in the event of a fire or other form of significant surface water contamination event. No remedial or mitigation measures are required.

Foul Drainage and Water Supply Infrastructure

IW have agreed in principal that the wastewater requirements for the development can be accommodated, subject to application. The PCE form to IW his included in the engineering report provided with planning. No remedial or mitigation measures are required in relation to foul drainage or water supply infrastructure.

13.7 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

13.7.1 Construction Phase

The works contractor will be obliged to follow best practice measures to ensure that there are no interruptions to service from the existing telecommunications network, watermain, sewer and electrical grid. Any planned interruptions will be agreed in advance with the utilities suppliers. Strict quality control measures will be undertaken while laying pipes to minimise or eradicate infiltration and ex-filtration.

The implementation of mitigation measures within each chapter, and detailed in Section 13.6.1 will ensure that the predicted impacts of the proposed development on material assets will be *neutral, imperceptible, and short -term* for the construction phase.

13.7.2 Operational Phase

The implementation of mitigation measures within each chapter and detailed in Section 13.6.2 will ensure that the predicted impacts on the material assets during the operational phase will be *neutral, not significant and long term*.

13.8 RESIDUAL IMPACTS

The Proposed Development requires electrical power, gas usage, water supply and wastewater treatment. Consultations have been undertaken with CCC, Irish Water, Eirgrid and Gas Networks Ireland, respectively, and confirmed availability of supply. These entities in considering future connection take into consideration the environmental impacts of planned developments within the wider network. The provision of a combined gas and electric power provides additional resilience in the network. As such, there will therefore be no significant impact on material assets to the wider economy or environment. The overall predicted impact of the Proposed Development can be classed as *long-term, neutral and not significant* with respect to material assets.

13.9 CUMULATIVE IMPACT ASSESSMENT

The following considers the cumulative impacts of the proposed development and proposed and permitted and operating facilities in the surrounding area in relation to Material Assets and Waste.

13.9.1 Construction Phase

The construction of the Proposed Development and other surrounding proposed and permitted developments considered, which are identified in Chapter 3 and Appendix 3.1 require site clearance, excavations and levelling which will generate localised requirement for soil removal and/or import, power and water supply and wastewater discharge. However, provided standard mitigation measures set out in the EIA Reports for these developments or where EIA does not apply, provided that planning conditions are implemented, the cumulative impact will be short term negative and imperceptible.

13.9.2 Operational Phase

The Proposed Development and all permitted developments considered, which are identified in Chapter 3 and associated appendices are required to engage with Irish Water, Gas Ireland and Eirgrid to ensure that there is sufficient capacity to cater for the increase in water and wastewater, gas and electricity requirements. Based on known current and known future developments there is adequate capacity of supply available within the local environs. . In developing long term plans for security of supply, these National Authorities for water and energy supply are required to develop resources in compliance with sustainable environmental planning.

The cumulative impacts associated with material assets will be *long-term negative and not significant*.

Interactions are presented in Chapter 15.

14.0 WASTE MANAGEMENT

14.1 INTRODUCTION

This Chapter of the EIAR comprises an assessment of the likely impact of the proposed development from the waste generated from the development as well as identifying proposed mitigation measures to minimise any associated impacts.

A site-specific Construction and Demolition Waste Management Plan (C&D WMP) has been prepared by AWN Consulting Ltd to deal with waste generation during the demolition, excavation and construction phases of the proposed development and has been included as Appendix 14.1. The C&D WMP was prepared in accordance with the 'Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects' document produced by the National Construction and Demolition Waste Council (NCDWC) in conjunction with the Department of the Environment, Heritage and Local Government in July 2006.

The Chapter has been prepared in accordance with EPA Guidelines on the Information to be contained in EIAR (2017, Draft)

These documents will ensure the sustainable management of wastes arising at the Development site in accordance with legislative requirements and best practice standards.

14.2 METHODOLOGY

The assessment of the impacts of the proposed development, arising from the consumption of resources and the generation of waste materials, was carried out taking into account the methodology specified in relevant guidance documents, along with an extensive document review to assist in identifying current and future requirements for waste management; including national and regional waste policy, waste strategies, management plans, legislative requirements and relevant reports. A summary of the documents reviewed, and the relevant legislation is provided in the C&D WMP provided in Appendix 14.1 and in sections 14.2.1 and 14.10 of this chapter.

This Chapter is based on the proposed development, as described in Chapter 2 (Description of the Proposed Development) and considers the following aspects:

- Legislative context;
- Construction phase (including demolition, site preparation and excavation);
- Operational phase; and
- Decommissioning Phase

A desktop study was carried out which included the following:

- Review of applicable policy and legislation which creates the legal framework for resource and waste management in Ireland;
- Description of the typical waste materials that will be generated during the Construction and Operational phases; and
- Identification of mitigation measures to prevent waste generation and promote management of waste in accordance with the waste hierarchy.

Estimates of waste generation during the construction and operational phases of the proposed development have been calculated. The waste types and estimated quantities are based on published data by the EPA in the National Waste Reports and National Waste Statistics, data recorded from similar previous developments, Irish and US EPA waste generation research as well as other available research sources.

Mitigation measures are proposed to minimise the effect of the proposed development on the environment during the construction and operational phases, to promote efficient waste segregation and to reduce the quantity of waste requiring disposal. This information is presented in Section 14.6

A detailed review of the existing ground conditions on a regional, local and site-specific scale are presented in Chapter 6 of this EIAR (Land, Soils, Geology and Hydrogeology).

14.2.1 Legislation and Guidance

Waste management in Ireland is subject to EU, national and regional waste legislation and control, which defines how waste materials must be managed, transported and treated. The overarching EU legislation is the Waste Framework Directive (2008/98/EC) which is transposed into national legislation in Ireland. The cornerstone of Irish waste legislation is the Waste Management Act 1996 (as amended). European and national waste management policy is based on the concept of 'waste hierarchy', which sets out an order of preference for managing waste (prevention > preparing for reuse > recycling > recovery > disposal) (Figure 14.1).

Figure 14.1: Waste Hierarchy (Source: European Commission)



The Irish government issues policy documents which outline measures to improve waste management practices in Ireland and help the country to achieve EU targets in respect of recycling and disposal of waste. The most recent policy document, *Waste Action Plan for a Circular Economy – Waste Management Policy in Ireland*, was published in 2020 and shifts focus away from waste disposal and moves it back up the production chain. The move away from targeting national waste targets is due to the

Irish and international waste context changing in the years since the launch of the previous waste management plan, *A Resource Opportunity*, in 2012. The need to embed climate action in all strands of public policy aligns with the goals of the European Green Deal.

The strategy for the management of waste from the construction phase is in line with the requirements of the *Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects*, published by the Department of Environment, Heritage and Local Government (DoEHLG) in 2006. The guidance document, *Construction and Demolition Waste Management: A Handbook for Contractors and Site Managers* (FÁS & Construction Industry Federation, 2002), was also consulted in the preparation of this assessment.

There are currently no Irish guidelines on the assessment of operational waste generation, and guidance is taken from industry guidelines, plans and reports including the *Southern Region (SR) Waste Management Plan 2015 – 2021*, *BS 5906:2005 Waste Management in Buildings – Code of Practice*, the Clare County Council (CCC) County Clare Waste Management Bye-Laws 2018, the EPA National Waste Database Reports 1998 – 2018 and the EPA National Waste Statistics Web Resource.

14.2.2 Terminology

Note that the terminology used herein is generally consistent with the definitions set out in Article 3 of the Waste Framework Directive. Key terms are defined as follows:

Waste - Any substance or object which the holder discards or intends or is required to discard.

Prevention - Measures taken before a substance, material or product has become waste, that reduce:

- a) the quantity of waste, including through the re-use of products or the extension of the life span of products;
- b) the adverse impacts of the generated waste on the environment and human health; or
- c) the content of harmful substances in materials and products.

Reuse - Any operation by which products or components that are not waste are used again for the same purpose for which they were conceived.

Preparing for Reuse - Checking, cleaning or repairing recovery operations, by which products or components of products that have become waste are prepared so that they can be re-used without any other pre-processing.

Treatment - Recovery or disposal operations, including preparation prior to recovery or disposal.

Recovery - Any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy. Annex II of the Waste Framework Directive sets out a non-exhaustive list of recovery operations.

Recycling - Any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes

the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations.

Disposal - Any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy. Annex I of the Waste Framework Directive sets out a non-exhaustive list of disposal operations.

14.3 RECEIVING ENVIRONMENT

The proposed development includes six data storage facilities, an energy centre an Above Ground Installation (AGI) building, vertical farm, a substation compound and associated ancillary development on a greenfield site (previously used for agriculture and hosting power transmission infrastructure) in the townlands of Tooreen and Cahernalough, Co Clare.

In terms of waste management, the receiving environment is largely defined by CCC as the local authority responsible for setting and administering waste management activities in the area. This is governed by the requirements set out in the *Southern Region (SR) Waste Management Plan 2015 – 2021*, which sets out the following targets for waste management in the region:

- A 1% reduction per annum in the quantity of household waste generated per capita over the period of the plan;
- Achieve a recycling rate of 50% of managed municipal waste by 2020; and
- Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices.

The Regional Plan sets a specific target for C&D waste of “70% *preparing for reuse, recycling and other recovery of construction and demolition waste*” (excluding natural soils and stones and hazardous wastes) to be achieved by 2020.

The National Waste Statistics update published by the EPA in August 2020 identifies that Ireland’s current progress against this C&D waste target is at 77% and our progress against ‘Preparing for reuse and recycling of 50% by weight of household derived paper, metal, plastic & glass (includes metal and plastic estimates from household WEEE)’ is at 51%. Both of these targets are required to be met by 12 December 2020 in accordance with the requirements of the Waste Framework Directive; however, the EPA are yet to confirm that these were met.

The Clare County Development Plan 2017 – 2023 also sets policies and objectives for the CCC area which reflect those set out in the regional waste management plan.

In terms of physical waste infrastructure, CCC no longer operates any municipal waste landfill in the area. There are a number of waste permitted and licensed facilities located in the Southern Waste Region for management of waste from the construction industry as well as municipal sources. These include soil recovery facilities, inert C&D waste facilities, municipal waste landfills, material recovery facilities and waste transfer stations.

There is a number of licensed, permitted and registered waste facilities in the Clare region and in the surrounding counties. However, these sites may not be available for use when required or may be limited by the waste contractor selected to service the development in the appropriate phase. In addition, there is potential for more suitably

placed waste facilities or recovery facilities to become operational in the future which may be more beneficial from an environmental perspective.

The ultimate selection of waste contractors and waste facilities would be subject to appropriate selection criteria proximity, competency, capacity, serviceability, and cost. Potential waste facilities have been identified in in section 14.3.1 and section 14.3.2.

14.3.1 Current C&D Waste Disposal / Recovery Routes

During the planning phase and prior to the appointment of waste contractors, waste destinations for C&D Waste cannot be supplied. These details are to be finally determined prior to demolition and construction beginning. Waste facilities have capacity and life span limitations that may not be available at the of construction & demolition phases of the development.

As well as EPA licensed facilities, there are currently a number of facilities in Clare and the counties surrounding the proposed Project in possession of a Waste Facility Permit or Certificate of Registration from the applicable County Councils which accept soils and inert waste from construction and demolition works. These facilities are all permitted or certified to operate Class 5, Class 6, and/or Class 7 waste activities as described in the Third Schedule of the Waste Management (Facility Permit and Registration) Regulations 2007 (S.I. No. 821/2007).

The currently licensed or permitted facilities which can operate under these classes of activity and are closest to the proposed development are listed in Table 14.1. There are also registered sites that can receive waste from the development that are not included in the table due to their lower capacity limits, however they can still potentially be used by the yet to be selected waste contractor. All details were collected from the National Waste Collection Permit Office and Environmental Protection Agency websites (July 2021) and a full list of licensed, permitted and register sites can be found on the registers contained on these sites.

Table 14.1: Potential destinations for Construction & Demolition Waste

Facility / Applicant Name	Licence Number & Facility Type	Location
Potential Soil Recovery Facilities		
Tulligmore Quarry Solutions Limited	W0255-02	Tulligmore Quarry Solutions Limited, Tulligmore, Dripsey, Cork.
Lennon Quarries Limited	W0272-02	Lennon Quarries Limited, Tallagh, Belmullet, Mayo.
Mallow Contracts Limited	W0266-01	Mallow Contracts Limited, Lissard & Ballyhillloge, Mourneabbey, Co. Cork, Cork.
Potential Permitted Waste Facilities for Soil		
Cloonaughter Parteen Co Clare	WFP-CE-17-0001-01	Cloonaughter Parteen Co Clare
Clare Waste & Recycling Co. Ltd	WFP-CE-08-0002-03	Raheen Tuamgraney Co. Clare V94 WY67
Jim Bolton Sand and Gravel Ltd	WFP-CE-19-0001-01	Faheyamore O'Briens Bridge Co Clare V94 F635
Kieran Kelly Haulage Ltd	WFP-CE-19-0002-01	Ballynacragga Newmarket-on-Fergus Co Clare
Lymar Contracts Ltd.	WFP-CE-20-0002-01	Caherea Lissycasey Ennis Co Clare
Potential Permitted Waste Facilities for Demolition and Construction Waste		
Clare Waste & Recycling Co. Ltd	WFP-CE-08-0002-03	Raheen Tuamgraney Co. Clare V94 WY67

Facility / Applicant Name	Licence Number & Facility Type	Location
Clean (Irl) Refuse & Recycling Company	WFP-CE-08-0003-03	Smithstown Industrial Estate Shannon Co Clare V14 HP89
Potential Waste Facilities Hazardous Waste		
Enva Ireland Limited	W0145-02	Enva Ireland Limited (Cork), Unit 9, Raffeen Industrial Estate, Raffeen, Monkstown, Cork.

14.3.2 Current Operational Waste Disposal / Recovery Routes

During the planning phase and prior to the appointment of operational phase waste contractors, waste destinations for the Operational Phase Waste cannot be supplied. These details will be finally determined prior to the operational phase beginning. Waste facilities have capacity and life span limitations that may change throughout the life of the operational phase of the development that cannot be controlled. There will be other operational limitations such as cost and serviceability capabilities of provider that will not be known until the waste contractor selection process is undertaken in the detailed design phase or prior to occupation of the development.

As well as EPA licensed facilities, there are currently a number of facilities in Clare and the counties surrounding the development in possession of a Waste Facility Permit or Certificate of Registration from the applicable County Councils which accept the same types commercial and municipal waste.

The currently licensed or permitted facilities which are closest to the proposed development are listed in Table 14.2. There are also registered sites that can receive waste from the development that are not included due to their lower capacities however they can still potentially be used by the waste contractor. All details were collected from the National Waste Collection Permit and Environmental Protection Agency website (July 2021) and a full list of licensed, permitted and register sites can be found on their registers.

Table 14.2: Potential destinations for Operational Waste

Facility / Applicant Name	Licence Number & Facility Type	Location
Potential Waste Facilities (Transfer Stations) for Operational Waste		
Starrus Eco Holdings Limited	W0058-01	Starrus Eco Holdings Limited (Sligo), Deepwater Quay, Sligo, Sligo.
Mr Binman Limited	W0061-01	Mr Binman Ltd, Luddenmore, Grange, Kilmallock, Limerick.
Bruscar Bhearna Teoranta	W0106-02	Bruscar Bhearna Teoranta (Carrowbrowne), Carrowbrowne, Headford Road, Galway, Galway.
The City Bin Co.	W0148-01	City Bin Co Ltd, Townlands of Carrowmoneash, Oranmore, Galway.
Potential Permitted Waste Facilities for Operational Waste		
Clare Waste & Recycling Co. Ltd	WFP-CE-08-0002-03	Raheen Tuamgraney Co. Clare V94 WY67
Clean (Irl) Refuse & Recycling Company	WFP-CE-08-0003-03	Smithstown Industrial Estate Shannon Co Clare V14 HP89

14.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

A full description of the proposed development can be found in Chapter 2 (Description of the Proposed Development). The characteristics of the proposed development that are relevant in terms of waste management are summarised below.

14.4.1 Demolition Phase

There will be waste materials generated from the demolition of the existing residential building, multiple farm buildings and some hardstanding areas on site, as well as from the further excavation of the building foundations.

Further detail on the waste materials likely to be generated during the demolition works are presented in the project-specific C&D WMP in Appendix 14.3. The C&D WMP provides an estimate of the main waste types likely to be generated during the C&D phase of the proposed development. The reuse, recycling / recovery and disposal rates have been estimated using the EPA National Waste Reports and these are summarised in Table 14.3.

Table 14.3 Estimated off-site reuse, recycle and disposal rates for demolition waste.

Waste Type	Tonnes	Reuse		Recycle / Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Glass	32.6	0	0.0	85	27.7	15	4.9
Concrete, Bricks, Tiles, Ceramics	184.7	30	55.4	65	120.0	5	9.2
Plasterboard	14.5	30	4.3	60	8.7	10	1.4
Asphalts	3.6	0	0.0	25	0.9	75	2.7
Metals	79.7	5	4.0	80	63.7	15	11.9
Slate	3.6	0	0.0	85	3.1	15	0.5
Timber	43.5	10	4.3	60	26.1	30	13.0
Asbestos	0.1	0	0.0	0	0.0	100	0.1
Total	362.2		68.1		250.2		43.9

14.4.2 Construction Phase

During the construction phase, waste will be produced from surplus materials such as broken or off-cuts of timber, plasterboard, concrete, tiles, bricks, etc. Waste from packaging (cardboard, plastic, timber) and oversupply of materials may also be generated. The appointed Contractor will be required to ensure that oversupply of materials is kept to a minimum and opportunities for reuse of suitable materials is maximised.

There will also be soil, stones, clay and made ground excavated to facilitate construction of new foundations, underground services, and the installation of the proposed basements. The development engineers (Clifton Scannell Emerson Associates Consulting Engineers) have estimated that c. 111,424 m³ of material will need to be excavated to do so. It is currently envisaged that all of the excavated material will be able to be retained and reused onsite for landscaping and fill. These estimates will be refined prior to commencement of construction.

If the material that requires removal from the site is deemed to be a waste, removal and reuse / recycling / recovery / disposal of the material will be carried out in accordance with the Waste Management Act 1996 (as amended), the Waste Management (Collection Permit) Regulations 2007 (as amended) and the Waste

Management (Facility Permit & Registration) Regulations 2007 (as amended). The volume of waste requiring recovery / disposal will dictate whether a Certificate of Registration (COR), permit or licence is required for the receiving facility. Alternatively, the material may be classed as by-product under Article 27 classification (European Communities (Waste Directive) Regulations 2011, S.I. No. 126 of 2011). For more information in relation to the envisaged management of by-products, refer to the C&D WMP (Appendix 14.1).

In order to establish the appropriate reuse, recovery and / or disposal route for the soils and stones to be removed off-site, it will first need to be classified. Waste material will initially need to be classified as hazardous or non-hazardous in accordance with the EPA publication *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* (2019). Environmental soil analysis will be carried out prior to removal of the material on a number of the soil samples in accordance with the requirements for acceptance of waste at landfills (Council Decision 2003/33/EC Waste Acceptance Criteria). This legislation sets limit values on landfills for acceptance of waste material based on properties of the waste, including potential pollutant concentrations and leachability. It is anticipated that the surplus material will be suitable for acceptance at either inert or non-hazardous soil recovery facilities / landfills in Ireland or, in the unlikely event of hazardous material being encountered, be transported for treatment / recovery or exported abroad for disposal in suitable facilities.

Waste will also be generated from construction phase workers e.g. organic / food waste, dry mixed recyclables (waste paper, newspaper, plastic bottles, packaging, aluminium cans, tins and Tetra Pak cartons), mixed non-recyclables and, potentially, sewage sludge from temporary welfare facilities provided on-site during the Construction phase. Waste printer / toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated in small volumes from site offices.

Further detail on the waste materials likely to be generated during the excavation and construction works are presented in the project-specific C&D WMP (Appendix 14.1). The C&D WMP provides an estimate of the main waste types likely to be generated during the Construction phase of the proposed development . These are summarised in Table 14.4.

Table 14.4: Predicted on and off-site reuse, recycle and disposal rates for construction waste

Waste Type	Tonnes	Reuse		Recycle / Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	310.1	10	31.0	80	248.1	10	31.0
Timber	263.2	40	105.3	55	144.7	5	13.2
Plasterboard	94.0	30	28.2	60	56.4	10	9.4
Metals	75.2	5	3.8	90	67.7	5	3.8
Concrete	56.4	30	16.9	65	36.7	5	2.8
Other	141.0	20	28.2	60	84.6	20	28.2
Total	939.8		213.3		638.1		88.3

14.4.3 Operational Phase

An Operational Waste Management Plan (OWMP) will be developed prior to commencement of operations. The plan will seek to ensure the facility contributes to the targets outlined in the *SR Waste Management Plan 2015 – 2021*. Mitigation measures proposed to manage impacts arising from wastes generated during the operation of the Proposed development are summarised below.

Segregation of Waste Materials Onsite

All waste materials will be segregated into appropriate categories and will be stored in appropriate bins or other suitable receptacles in a designated, easily accessible areas of the site.

Table 14.5 below summarises the anticipated management strategy to be used for typical wastes to be generated at the data storage facilities and the estimated waste to be generated.

Table 14.5 Anticipated Onsite Waste Management and Estimated Average Quantities

Waste Type	Hazard Y/N	On-site Storage/Treatment Method (anticipated)	Method of Treatment or Disposal (offsite)	Waste Volume (kg / week)
Packaging Waste	N	Segregated bins/skips	Recycle	165.0
Office Waste	N	Segregated bins/skips	Recycle	80.0
General Non-Hazardous Waste	N	Segregated bins/skips	Recovery	172.5
Empty Containers	N	Segregated bins/skips	Disposal to landfill	40.0
Canteen/Kitchen Waste	N	Segregated bins for compost, mixed recyclable and general waste	Compost food waste. Recycle mixed dry recyclable waste. Recovery of other general waste	37.5
Non-hazardous WEEE	N	Segregated bins for waste electric and electronic equipment	Recovery	60.0
Landscaping waste	N	Composting bins	Composting	20.0
Vertical Farm	N	Segregated bins/skips	Compost organic waste. Recycle mixed dry recyclable waste. Recovery of other general waste	3,300.0
Waste Oil	Y	Oil drum in external waste storage area	Recovery	5.0
Waste sludge from oil separator	Y	Storage tank connected to oil separator	Recovery or disposal	5.0
(Wet) Batteries	Y	Specialised container in waste storage area	Return to supplier	20.0
(Dry) Batteries	Y	Specialised container in waste storage area	Recovery	20.0

Hazardous Waste

Hazardous waste may be generated from batteries, contaminated chemical drums and other packaging. If the packaging contains residues of or if it is contaminated by dangerous substances, it may be classed as a hazardous waste (depending on the volume and concentration of contaminants). If the drums are found to be unsuitable for re-use, they will be classed as a waste. Any waste classed as hazardous will be stored in a designated area (suitably bunded, where required) and will be removed off site by a licensed hazardous waste contractor(s).

Waste sludge from the petrol interceptors will be pumped out/removed as required by a suitably permitted/licenced contractor.

14.4.4 Decommissioning Phase

The Proposed Development may be decommissioned at some stage in the future. At that time, a demolition or refurbishment plan will be formulated for the decommissioning phase of the Proposed Development to ensure no waste nuisance occurs at nearby sensitive receptors.

14.5 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

This section details the potential waste effects associated with the proposed development .

14.5.1 Construction Phase

The proposed development will generate a range of non-hazardous and hazardous waste materials during site demolition, excavation and construction. General housekeeping and packaging will also generate waste materials, as well as typical municipal wastes generated by construction employees, including food waste. Waste materials will be required to be temporarily stored on-site pending collection by a waste contractor. If waste material is not managed and stored correctly, it is likely to lead to litter or pollution issues at the development site and in adjacent areas. The indirect effect of litter issues is the presence of vermin in areas affected. In the absence of mitigation, the effect on the local and regional environment is likely to be **indirect, short-term, significant** and **negative**.

The use of non-permitted waste contractors or unauthorised waste facilities could give rise to inappropriate management of waste, resulting in indirect negative environmental impacts, including pollution. It is essential that all waste materials are dealt with in accordance with the European Union, regional and national legislation, as outlined previously, and that time and resources are dedicated to ensuring efficient waste management practices. In the absence of mitigation, the effect on the local and regional environment is likely to be **indirect, long-term, significant** and **negative**.

Wastes arising will need to be taken to suitably registered / permitted / licenced waste facilities for processing and segregation, reuse, recycling, recovery, and / or disposal, as appropriate. There are numerous licensed waste facilities in the Southern Region (SR) which can accept hazardous and non-hazardous waste materials, and acceptance of waste from the development site would be in line with daily activities at these facilities. At present, there is sufficient capacity for the acceptance of the likely C&D waste arisings at facilities in the region and within Ireland. The majority of construction materials are either recyclable or recoverable. However, in the absence

of mitigation, the effect on the local and regional environment is likely to be **indirect, short-term, significant** and **negative**.

There is a quantity of excavated material which will need to be excavated to facilitate the proposed development. A detailed review of the existing ground conditions on a regional, local site-specific scale are presented in Chapter 5 (Land, Soils, Geology, and Hydrogeology). It is not anticipated excavated material will need to be removed off-site. Correct classification and segregation of the excavated material is required to ensure that any potentially contaminated materials are identified and handled in a way that will not impact negatively on workers as well as on water and soil environments, both on and off-site. However, in the absence of mitigation, the effect on the local and regional environment is likely to be **indirect, short-term, significant** and **negative**.

14.5.2 Operational Phase

The potential impacts on the environment of improper, or a lack of, waste management during the operational phase would be a diversion from the priorities of the waste hierarchy which would lead to small volumes of waste being sent unnecessarily to landfill. In the absence of mitigation, the effect on the local and regional environment is likely to be **indirect, long-term, significant** and **negative**.

The nature of the development means the generation of waste materials during the operational phase is unavoidable. Networks of waste collection, treatment, recovery and disposal infrastructure are in place in the region to manage waste efficiently from this type of development. Waste which is not suitable for recycling is typically sent for energy recovery. There are also facilities in the region for segregation of municipal recyclables which is typically exported for conversion in recycled products (e.g. paper mills and glass recycling).

If waste material is not managed and stored correctly, it is likely to lead to litter or pollution issues at the development site and in adjacent areas. The knock-on effect of litter issues is the presence of vermin in affected areas. However, in the absence of mitigation, the effect on the local and regional environment is likely to be **indirect, short-term, significant** and **negative**.

Waste contractors will be required to service the proposed development on a regular basis to remove waste. The use of non-permitted waste contractors or unauthorised facilities could give rise to inappropriate management of waste and result in negative environmental impacts or pollution. It is essential that all waste materials are dealt with in accordance with regional and national legislation, as outlined previously, and that time and resources are dedicated to ensuring efficient waste management practices. However, in the absence of mitigation, the effect on the local and regional environment is likely to be **indirect, long-term, significant** and **negative**.

14.5.3 Decommissioning Phase

The greatest potential impact on waste during the decommissioning phase of the Proposed Development would be if the building waste to be demolished or refurbished.

The decommissioning of the proposed development will generate a range of non-hazardous and hazardous waste materials during site demolition / refurbishment. General housekeeping and packaging will also generate waste materials, as well as typical municipal wastes generated by construction employees, including food waste. Waste materials will be required to be temporarily stored on-site pending collection by a waste contractor. If waste material is not managed and stored correctly, it is likely to

lead to litter or pollution issues at the development site and in adjacent areas. The indirect effect of litter issues is the presence of vermin in areas affected. In the absence of mitigation, the effect on the local and regional environment is likely to be **indirect, short-term, significant** and **negative**.

The use of non-permitted waste contractors or unauthorised waste facilities could give rise to inappropriate management of waste, resulting in indirect negative environmental impacts, including pollution. It is essential that all waste materials are dealt with in accordance with the European Union, regional and national legislation, as outlined previously, and that time and resources are dedicated to ensuring efficient waste management practices. In the absence of mitigation, the effect on the local and regional environment is likely to be **indirect, long-term, significant** and **negative**.

Wastes arising will need to be taken to suitably registered / permitted / licenced waste facilities for processing and segregation, reuse, recycling, recovery, and / or disposal, as appropriate. There are numerous licensed waste facilities in the Southern Region (SR) which can accept hazardous and non-hazardous waste materials, and acceptance of waste from the development site would be in line with daily activities at these facilities. At present, there is sufficient capacity for the acceptance of the likely C&D waste arisings at facilities in the region and within Ireland. The majority of construction materials are either recyclable or recoverable. However, in the absence of mitigation, the effect on the local and regional environment is likely to be **indirect, short-term, significant** and **negative**.

14.5.4 Do Nothing Scenario

If the proposed development was not to go ahead (i.e. in the Do-Nothing scenario) there would be no demolition, excavation or construction or operational waste generated at this Site. There would, therefore, be a neutral effect on the environment in terms of waste.

14.6 REMEDIAL AND MITIGATION MEASURES

This section outlines the measures that will be employed in order to reduce the amount of waste produced, manage the wastes generated responsibly and handle the waste in such a manner as to minimise the effects on the environment.

14.6.1 Construction Phase

The following mitigation measures will be implemented during the construction phase of the proposed development :

As previously stated, a project specific C&D WMP has been prepared in line with the requirements of the requirements of the *Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects* (DoEHLG, 2006), and is included as Appendix 14.1. Adherence to the high-level strategy presented in this C&D WMP will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated during the demolition, excavation and construction phases of the proposed development .

- Prior to commencement, the appointed Contractor(s) will be required to refine / update the C&D WMP (Appendix 14.1) in agreement with CCC, or submit an addendum to the C&D WMP to CCC, detailing specific measures to minimise

waste generation and resource consumption, and provide details of the proposed waste contractors and destinations of each waste stream.

- The Contractor will be required to fully implement the C&D WMP throughout the duration of the proposed construction and demolition phases.

A quantity of topsoil, sub soil, clay and made ground will need to be excavated to facilitate the proposed development. Project Engineers have estimated that excavated material will not need to be removed off-site. Correct classification and segregation of the excavated material is required to ensure that any potentially contaminated materials are identified and handled in a way that will not impact negatively on workers as well as on water and soil environments, both on and off-site.

In addition, the following mitigation measures will be implemented:

- Building materials will be chosen to 'design out waste';
- On-site segregation of waste materials will be carried out to increase opportunities for off-site reuse, recycling and recovery. The following waste types, at a minimum, will be segregated:
 - Concrete rubble (including ceramics, tiles and bricks);
 - Plasterboard;
 - Metals;
 - Glass; and
 - Timber.
- Left over materials (e.g. timber off-cuts, broken concrete blocks / bricks) and any suitable construction materials shall be re-used on-site, where possible;
- All waste materials will be stored in skips or other suitable receptacles in designated areas of the site;
- Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required);
- A Waste Manager will be appointed by the main Contractor(s) to ensure effective management of waste during the demolition, excavation and construction works;
- All construction staff will be provided with training regarding the waste management procedures;
- All waste leaving site will be reused, recycled or recovered, where possible, to avoid material designated for disposal;
- All waste leaving the site will be transported by suitably permitted contractors and taken to suitably registered, permitted or licenced facilities; and
- All waste leaving the site will be recorded and copies of relevant documentation maintained.

Nearby sites requiring clean fill material will be contacted to investigate reuse opportunities for clean and inert material, if required. If any of the material is to be reused on another site as by-product (and not as a waste), this will be done in accordance with Article 27 of the EC (Waste Directive) Regulations (2011). EPA approval will be obtained prior to moving material as a by-product. However, it is not currently anticipated that Article 27 will be used.

These mitigation measures will ensure that the waste arising from the construction phase of the proposed development is dealt with in compliance with the provisions of the Waste Management Act 1996, as amended, associated Regulations and the Litter Pollution Act 1997, and the SR Waste Management Plan 2015 – 2021. It will also

ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved and will promote more sustainable consumption of resources.

14.6.2 Operational Phase

All waste materials will be segregated into appropriate categories and will be temporarily stored in appropriate bins, skips or other suitable receptacles in a designated, easily accessible areas of the site.

The Operator / Buildings Manager of the Site during the operational phase will be responsible for ensuring – allocating personnel and resources, as needed – the ongoing implementation of the below mitigation measures, ensuring a high level of recycling, reuse and recovery at the Site of the proposed development.

The following mitigation measures will be implemented:

- The Operator / Buildings Manager will ensure on-Site segregation of all waste materials into appropriate categories, including (but not limited to):
 - Organic waste including Vertical Farm organic waste;
 - Dry Mixed Recyclables;
 - Mixed Non-Recyclable Waste;
 - Glass;
 - Waste Oil;
 - Waste electrical and electronic equipment (WEEE) including computers, printers and other ICT equipment;
 - Batteries (non-hazardous and hazardous);
 - Light bulbs; and
 - Cleaning and Farming chemicals (pesticides, paints, adhesives, resins, detergents, etc.).
- The Operator / Buildings Manager will ensure that all waste materials will be stored in colour coded bins or other suitable receptacles in designated, easily accessible locations. Bins will be clearly identified with the approved waste type to ensure there is no cross contamination of waste materials;
- The Operator / Buildings Manager will ensure that all waste collected from the Site of the proposed development will be reused, recycled or recovered, where possible, with the exception of those waste streams where appropriate facilities are currently not available; and
- The Operator / Buildings Manager will ensure that all waste leaving the Site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities.

These mitigation measures will ensure the waste arising from the proposed development during the operational phase is dealt with in compliance with the provisions of the Waste Management Act 1996, as amended, associated Regulations, *the Litter Pollution Act 1997*, the *SR Waste Management Plan 2015 – 2021* and the CCC Waste Management Bye-Laws 2018. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved.

14.6.3 Decommissioning Phase

The following mitigation measures will be implemented during the decommissioning of the proposed development:

- Prior to commencement, the appointed Contractor(s) will be required to prepare a Demolition or Refurbishment Waste Management Plan (DR WMP) in

agreement with CCC, detailing specific measures to minimise waste generation and resource consumption, and provide details of the proposed waste contractors and destinations of each waste stream.

- The Contractor will be required to fully implement the DR WMP throughout the duration of the decommissioning.

In addition, the following mitigation measures will be implemented:

- On-site segregation of waste materials will be carried out to increase opportunities for off-site reuse, recycling and recovery. The following waste types, at a minimum, will be segregated:
 - Concrete rubble (including ceramics, tiles and bricks);
 - Plasterboard;
 - Metals;
 - Glass; and
 - Timber.
- All waste materials will be stored in skips or other suitable receptacles in designated areas of the site;
- Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required);
- A Waste Manager will be appointed by the main Contractor(s) to ensure effective management of waste during the demolition / refurbishment works;
- All construction staff will be provided with training regarding the waste management procedures;
- All waste leaving site will be reused, recycled or recovered, where possible, to avoid material designated for disposal;
- All waste leaving the site will be transported by suitably permitted contractors and taken to suitably registered, permitted or licenced facilities;
- All waste leaving the site will be recorded and copies of relevant documentation maintained.

14.7 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

14.7.1 Construction Phase

A carefully planned approach to waste management as set out in Section 14.6.1 and adherence to the C&D WMP (Appendix 14.1) during the construction phase will ensure that the predicted effect on the environment will be **short-term, imperceptible and neutral**.

14.7.2 Operational Phase

During the operational phase, a structured approach to waste management as set out in Section 14.6.2 will promote resource efficiency and waste minimisation. Provided the mitigation measures are implemented and a high rate of reuse, recycling and recovery is achieved, the predicted impact of the operational phase on the environment will be **long-term, imperceptible and neutral**.

14.7.3 Decommissioning Phase

A carefully planned approach to waste management as set out in Section 14.6.3 and adherence to a DR WMP during the demolition / refurbishment phase will ensure that

the predicted effect on the environment will be **short-term, imperceptible and neutral**.

14.7.4 Conclusion

Assuming the full and proper implementation of the mitigation measures set out herein and, in the C&D WMP (Appendix 14.1), no likely significant negative effects are predicted to occur as a result of the construction or operational of the proposed development.

14.8 RESIDUAL IMPACTS

The implementation of the mitigation measures outlined in Section 14.6 will ensure that high rates of reuse, recovery and recycling are achieved at the Site of the proposed development during the construction and operational phases. It will also ensure that European, National and Regional legislative waste requirements with regard to waste are met and that associated targets for the management of waste are achieved.

14.9 CUMULATIVE IMPACT ASSESSMENT

The following considers the cumulative impacts of the proposed development along with permitted and operating facilities in the surrounding area in relation to Material Assets Waste Management.

14.9.1 Construction Phase

Multiple permissions remain in place (see Chapter 3 Planning and Alternatives for list) for both residential and commercial developments within the vicinity of the proposed development. In a worst-case scenario, multiple developments in the area could be developed concurrently or overlap in the construction phase. Due to the high number of waste contractors in the Clare region there would be sufficient contractors available to handle waste generated from a large number of these sites simultaneously, if required. Similar waste materials would be generated by all the developments.

Other developments in the area will be required to manage waste in compliance with national and local legislation, policies and plans which will mitigate against any potential cumulative effects associated with waste generation and waste management. As such the effect will be **short-term, not significant** and **neutral**.

14.9.2 Operational Phase

There are existing residential and commercial developments close by, along with the multiple permissions remaining in place and the potential for more future development in the area. All of the current and potential developments will generate similar waste types during their operational phases. Authorised waste contractors will be required to collect waste materials segregated, at a minimum, into recyclables, organic waste and non-recyclables. An increased density of development in the area is likely improve the efficiencies of waste collections in the area.

Other developments in the area will be required to manage waste in compliance with national and local legislation, policies and plans which will minimise/mitigate any potential cumulative impacts associated with waste generation and waste management. As such the effect will be a **long-term, imperceptible** and **neutral**.

14.10 REFERENCES

1. Waste Management Act 1996 (No. 10 of 1996) as amended.
2. Protection of the Environment Act 2003, (No. 27 of 2003) as amended.
3. Litter Pollution Act 1997 (S.I. No. 12 of 1997) as amended
4. Southern Region Waste Management Plan 2015 – 2021 (2015).
5. Department of Environment and Local Government (DoELG) *Waste Management – Changing Our Ways, A Policy Statement* (1998).
6. Forum for the Construction Industry – Recycling of Construction and Demolition Waste.
7. Department of Communications, Climate Action and Environment (DCCAE), Waste Action Plan for the Circular Economy - Ireland's National Waste Policy 2020-2025 (Sept 2020).
8. Department of Environment, Heritage and Local Government, Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects (2006).
9. FÁS and the Construction Industry Federation (CIF), Construction and Demolition Waste Management – a handbook for Contractors and site Managers (2002).
10. Clare County Council (CCC), Clare County Development Plan 2017-2023 (As varied) (2017)
11. CCC, County Clare Waste Management Bye-Laws (2018)
12. BS 5906:2005 Waste Management in Buildings – Code of Practice
13. Planning and Development Act 2000 (No. 30 of 2000) as amended
14. Environmental Protection Agency (EPA), Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous (2015)
15. Council Decision 2003/33/EC, establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC.
16. EPA, *European Waste Catalogue and Hazardous Waste List* (2002)
17. EPA, National Waste Database Reports 1998 – 2018.
18. US EPA, *Characterisation of Building Uses* (1998);
19. EPA and Galway-Mayo Institute of Technology (GMIT), EPA Research Report 146 – A Review of Design and Construction Waste Management Practices in Selected Case Studies – Lessons Learned (2015)

15.0 INTERACTIONS – INTERRELATIONSHIPS BETWEEN THE ASPECTS

15.1 INTRODUCTION

This chapter has been produced following the guidance within the EIA Directive, the *Planning and Development Act 2000* (as amended), the *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (EPA, 2017) and EPA Draft Advice Notes for Preparing Environmental Impact Statements (EPA, 2015).

In accordance with the guidance not only are the individual significant impacts required to be considered when assessing the impact of a development on the environment, but so must the interrelationships between these factors be identified and assessed.

The majority of the EIA Report chapters have already included and described assessments of potential interactions between aspects, considered by the various specialists contributing to this impact assessment. The quality, magnitude and duration of potential impacts are defined in accordance with the criteria provided in the EPA 2017 Guidance as outlined in Chapter 1 (Introduction). This section of the assessment presents a summary and assessment of the identified interactions.

Section 171A of the Planning and Development Act requires that the interactions between the following be assessed:

- Population and human health;
- Land, soil, water, air and climate;
- Biodiversity, with particular attention to species and habitats protected under the Habitats Directive and the Birds Directive; and
- Material assets, cultural heritage, and the landscape;

15.2 DISCUSSION – POSITIVE IMPACTS

The reasoning behind the interactions that are considered to have a positive effect (i.e. a change which improves the quality of the environment) is outlined in this section.

Planning and Alternatives on:

Population and Human Health

The proposed development will create up to 450 full time jobs within the data centre and 40 in the vertical farms during operation with an average of 600 during the construction phase, peaking at 1200, which will have a *long-term, positive* effect on employment.

15.3 DISCUSSION – NEUTRAL IMPACTS

The reasoning behind the interactions that are considered to have a neutral effect (i.e. no effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error) is outlined in this section.

15.3.1 Land, Soils, Geology and Hydrogeology on:

Population and Human Health

There will be a loss of soil available for agricultural use due to the development. However, the area of development is zoned by Clare Co Co (CCC) for development and as such it is not intended that it will be returned to agricultural use. In addition, the employment created by the construction and operation of the proposed development counterbalances this economic loss to some extent and so the impact is *long-term, imperceptible and neutral*.

Hydrology

Levelling and landscaping will have the potential to increase suspended solids within run-off during construction. However, the implementation of a CEMP as detailed Chapter 6 (Hydrology) during construction and design measures (bunding of oil), SUDs measures including attenuation and use of interceptors will ensure the effect will be *short term imperceptible and neutral during construction and long-term, imperceptible and neutral during operation*.

Biodiversity

The change in use of land from agricultural to industrial with result in loss of natural flora and fauna has been removed/displaced. However, the proposed landscaping as outlined in the landscape and biodiversity management plan will result in enhancing local biodiversity by incorporating native species and pollinator planting. The design measures and mitigation measures incorporated in the CEMP (and the surface water management plan) will ensure that there is no change in the overall water regime at water dependent habitats on site. The impact is *short term imperceptible and neutral during construction and long-term, imperceptible and neutral during operation*.

Archaeological, Architectural and Cultural Heritage

Although the archaeological assessment for the proposed development has identified no known features of archaeological interest on the site, aspects of the proposed development have the potential to impact on unidentified archaeological features during construction works. However, mitigation measures detailed in Chapter 11 (Archaeological, Architectural and Cultural Heritage) including a geophysical survey and test trenching and ceasing works if archaeological features or material is uncovered, will ensure that the effect is *short-term, imperceptible and neutral* during construction. Delimiting of the archaeological buffer zone will ensure no impact to any archaeology during operation resulting in a *long-term, imperceptible and neutral impact* during operation.

Waste Management

As detailed in Chapter 14 (Waste Management), c. 107,376m³ of material will be excavated and reused for landscaping and berms. Any spoil which cannot be reused on site will be removed off site for reuse or recovery, where practical, with disposal as last resort. Adherence to the mitigation measures in Chapter 14 and the requirements C&D Waste Management Plan (included as Appendix 14.1), will ensure the effect is *short-term, imperceptible and neutral*.

15.3.2 Hydrology on:

Population and Human Health

The proposed development will generate wastewater emissions (foul water) from the site. This will discharge following an upgrade of the foul sewer on the Tulla road to the Local Authority wastewater treatment plant (WWTP) at Gort Na mBlath located approximately 550 m west of the main site. The wastewater ultimately discharges to Ennis North (Clonroadmore) WWTP Reg D0048 which generally operates in compliance with its EPA licence. Consultation with CCC and IW has shown that there is sufficient capacity for the wastewater discharges from the proposed development. As the WWTP will provide treatment for wastewater emissions, the effect is considered to be *long-term, imperceptible and neutral*.

Land, Soils, Geology and Hydrogeology

Stormwater will be collected for hardstand areas and attenuated to greenfield run-off rates prior to discharge. However, a significant proportion of the site will remain greenfield and as such the impact on the groundwater regime will be *long-term, imperceptible and neutral*.

Biodiversity

The design measures and mitigation measures incorporated in the CEMP (and surface water management plan) will ensure that there is no change in the overall water regime at water dependent habitats on site. The impact is *short term imperceptible and neutral during construction and long-term, imperceptible and neutral* during operation.

Waste Management

Hydrocarbon sludge waste and debris will be generated in the hydrocarbon interceptors which will treat the surface water run-off from the proposed development during the operational phase. This waste stream will be managed in accordance with the relevant legislation identified in Chapter 14 such that the effect of the waste generation will be *long-term, imperceptible and neutral*.

15.3.3 Air Quality and Climate on:

Hydrology

Mitigation measures implemented during the construction phase will ensure that the deposition of dust is minimised and therefore the predicted effect from air (including dust) on the water environment during construction is *short-term, imperceptible and neutral*.

The operational procedures and other general site maintenance regime in accordance with the Environmental Safety and Health Management Procedures for the facilities will ensure that the impact of the facility complies with all ambient air quality legislative limits and therefore the predicted impact from air (including dust) on the water environment is *long term, imperceptible and neutral*.

Biodiversity

Mitigation measures during the construction phase of the proposed development will ensure that dust generation is minimised and the effect on biodiversity will be *short term, imperceptible and neutral*.

Results from the modelling of air emissions including emissions from back-up generators during the operational phase show that the emissions from the facility will comply with the relevant air quality legislative limits and the effect on biodiversity will be *long term, imperceptible and neutral*.

15.3.4 Air Quality and Climate on:

Population and Human Health

The design and mitigation measures set out in Section 8.6 of Chapter 8 (Air Quality and Climate) that will be put in place at the proposed facility will ensure that the impact of the facility complies with all ambient air quality legislative limits and therefore the predicted impact is *long term, imperceptible and neutral*.

15.3.5 Landscape and Visual on:

Biodiversity

The construction of the proposed development will involve the removal of some of the existing natural hedgerows. However, this will be replaced by other suitable landscaping treatments and overall will have a *long-term, imperceptible and neutral* impact.

15.3.6 Material Assets on:

Population and Human Health

The proposed development will have an impact on material assets such as surface water drainage, water supply, wastewater drainage, power supply and road infrastructure. The individual chapters of this EIA Report (Chapter 12 Traffic and Transportation and Chapter 13 Material Assets) have assessed the capacities of the available infrastructure to accommodate the proposed development and the implementation of the mitigation measure proposed in these chapters will ensure there are no residual negative impacts on the local population. The predicted effect is *long term, not significant and neutral*.

Hydrology

The proposed development will result in changes to surface water drainage (as a greenfield site is being developed), water supply and wastewater networks. However, a combination of mitigation measures to be implemented as detailed in Section 7.6 of Chapter 6 (Hydrology), as well as the capacity already built into these networks, will ensure that these changes will result in a *long-term, not significant and neutral* impact.

15.4 DISCUSSION – NEGATIVE IMPACTS

The reasoning behind the interactions that are considered to have a negative effect (i.e. a change which reduces the quality of the environment) is outlined in this section.

15.4.1 Noise on:

Biodiversity

Noise generated during the construction phase of the proposed development will have a *short-term, slight and negative* impact on fauna which are likely to be displaced during construction works. During operation, following additional landscaping to provide suitable habitats, the impacts will be *longterm-term, imperceptible*.

15.4.2 Noise on:

Population and Human Health

The potential impact of noise and vibration on the local population is discussed in Chapter 4 (Population and Human Health) and Chapter 9 (Noise & Vibration). The application of noise limits and limits on the hours of operation, along with implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impact is kept to a minimum. The noise impact is assessed to be *short-term* in duration with a *slight to moderate negative* significance considering the existing background low level of noise in this rural location. As reported, the noise impact will reduce to *slight* as construction moves above ground. Due to the distance between the site and the nearest sensitive locations, vibration impacts generated during construction are expected to be *short term* duration and *imperceptible* significance. Therefore, the noise and vibration impact of the construction phase of the proposed development is negative but not considered significant with respect to human health.

The predicted noise emissions associated with the proposed development of the site during the operational phases are within the relevant noise criteria considered suitable for the development considering the guidance outlined in EPA: *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4 – 2016)*. These guidelines consider impacts on human health. As such the modelling has due consideration to human health, and has shown that although there will be an increase in noise as a result of the operation of the facility, this is not considered to have a significant impact on human health. The proposed development will not generate any perceptible levels of vibration during operation and therefore there will be no impact from vibrations on human health.

15.4.3 Traffic on:

Population and Human Health

The traffic assessment shows that the impacts on the local community resulting from the additional traffic movements associated with the proposed development were found to be *short-term, negative* and *slight* for the construction phase and *long-term, negative* and *slight* for the operational phase. No significant traffic delays are forecast during either the construction or operational phases.

15.4.4 Air Quality on:

Landscape

The proposed development will include industrial type generator stacks which will permanently alter the existing landscape. The generator stacks associated with the Data Centres will not be visible as they will be screened by the Data Centres and the

proposed landscaping measures. The taller 25m stacks associated with the Energy Centre have greater potential for visibility. However, due to the siting of the Energy Centre next to the tall hill on site, views towards the stacks from the east and south will be screened for the most part. In views from the north and west, where the stacks may be visible these will be viewed at a similar vertical scale to existing trees on the horizon. The residual landscape and visual effects are considered to range from *long term negative, moderate significance* down to *not Significant*.

15.4.5 Landscape and Visual on:

Population and Human Health

The predicted impact of the proposed development on the landscape is described in Chapter 10. The proposed development is well-sited and includes architectural and landscape proposals that will ensure the development is integrated into its setting, including the use of landscaped berms and woodland planting which will provide visual screening. Residual impact in terms of landscape amenity will be *long term, negative and moderate significance*.

15.4.6 Land, Soils, Geology and Hydrogeology on:

Noise

Impacts associated with excavation works will be transient in nature and have a temporary to short-term impact on the noise environment, which will be mitigated by the implementation of the measures outlined in Chapter 9. The effect of construction noise impacts will be *slight to moderate (dependant on location), negative and short-term* in nature. Also, it is considered that as the proposed development progresses from initial ground works that construction noise impacts will reduce to slight. There is no longterm interaction.

15.5 SUMMARY

In summary, the interactions between the environmental factors and impacts discussed in this EIA Report have been assessed and the majority of interactions are *short to long-term and neutral*.

15.6 TABLE OF INTERACTIONS

Table 15.1 Summary of interrelationships Between the Aspects

	Planning and Alternatives		Population & Human Health		Land, Soils and Hydrogeology		Hydrology		Biodiversity		Air Quality and Climate		Noise and Vibration		Landscape and Visual Impact		Cultural Heritage		Material Assets, including Transport and Waste		
	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	
Planning and Alternatives			+	+	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Population & Human Health					o	o	o	o	x	x	o	o	-	-	-	-	x	x	o	o/-	
Land, Soils and Hydrogeology							o	o	o	o	-	x	-	x	x	x	o	x	o	o	
Hydrology									o	o	o	o	x	x	x	x	x	x	o	o	
Biodiversity											o	x	-	x	o	o	x	x	x	x	
Air Quality and Climate													x	x	x	-	x	x	x	x	
Noise and Vibration															x	x	x	x	x	x	
Landscape and Visual Impact																	x	x	x	x	
Cultural Heritage																			x	x	
Material Assets, including Transport and Waste																					

Con.	Construction Phase	+	Positive Interaction
Op.	Operational Phase	o	Neutral Interaction
x	No Interaction	-	Negative Interaction