

SECTION 17: Population and Human Health

17.1 Introduction

The 2014 Environmental Impact Assessment (EIA) Directive (2014/52/EU) has updated the list of topics to be addressed in an Environmental Impact Assessment Report (EIAR) and has replaced 'Human Beings' with 'Population and Human Health'. This Section also meets the requirement for assessment of 'population, human health' as per Schedule 6 of the Planning and Development Regulations 2001-2020.

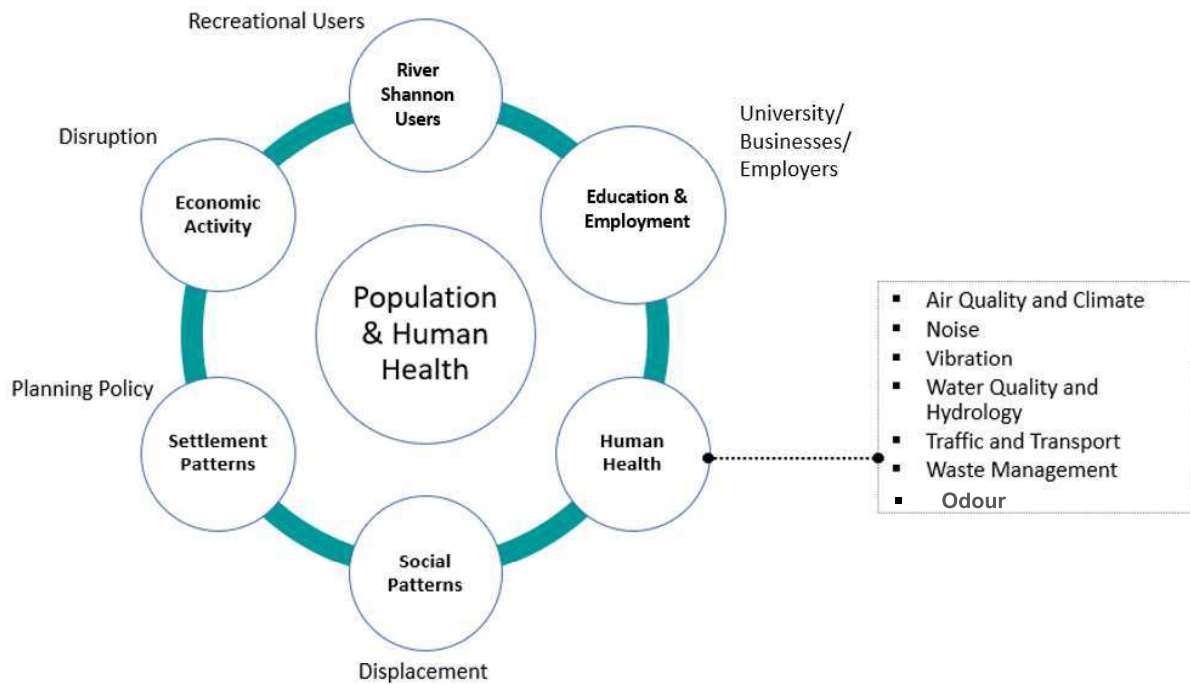


Figure 17-1: Potential Impacts identified in Scoping Document

As noted in Figure 17-1 there are several inter-related environmental topics such as the potential impacts of the Proposed Development on Water Quality and Hydrology, Air Quality and Climate, Noise and Vibration, Traffic and Transportation Waste Management and odour which are of intrinsic direct and indirect consequence to human health. These are addressed in detail in other Sections of this Volume 2 of the EIAR. While the baseline scenario for these environmental topics is not duplicated in this section, the assessment of impacts on population and human health refers to those environmental topics under which human health effects might occur in line with the EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports.

17.2 Assessment Methodology

The European Commission guidance 'Environmental Impact Assessment of Projects, Guidance on the preparation of the Environmental Impact Assessment Report' (European Union, 2017) state the following in respect of "human health":

"Human health is a very broad factor that would be highly Project dependent. The notion of human health should be considered in the context of other factors in Article 3(1) of the EIA Directive and thus environmentally related health issues (such as health effects caused by the release of toxic substances to the environment, health risks arising from major hazards associated with the Project,

effects caused by changes in disease vectors caused by the Project, changes in living conditions, effects on vulnerable groups, exposure to traffic noise or air pollutants) are obvious aspects to study”.

17.2.1 Desktop Study

This section of the EIAR document has been prepared with reference to the Guidelines on the information to be contained in environmental impact assessment reports, published by the EPA in May 2022. A desktop study of the following published policy documents and data was undertaken to appraise the location and likely and significant potential impact upon population and human health receptors and to assess population trends in the subject site and in the wider hinterland:

- Central Statistics Office (CSO) Census 2011 & 2016 data;
- Quarterly Economic Commentary Summer 2021, ESRI;
- AIRO Census mapping;
- Southern Regional Assembly Regional Spatial and Economic Strategy;
- Limerick Development Plan 2022-2026;
- Clare County Development Plan 2017-2023;
- Castletroy Local Area Plan 2019-2025 (lapsed).

This assessment is a study of the potential indirect and direct socio-economic and public health impacts of the construction phase and the operational phases of the development. Effects on receptors were assessed in terms of magnitude, quality, significance and duration.

17.2.2 Assessment Criteria

All impacts or effects are described in following terms as in accordance with the “Description of Effects” outlined in Table 3.3 of the EPA *Guidelines on Information to be Contained in Environmental Impact Assessment Reports 2022*.

Quality: Positive, Neutral, Negative

Significance: Imperceptible, Not Significant, Slight, Moderate, Significant, Very Significant, Profound

Extent and Context: Size of area, population etc.

Probability: Likely, unlikely

Duration: Momentary (seconds to minutes); Brief (less than a day), Temporary <1 yr; Short-term 1-7 yrs, Medium Term 7-15yrs, Long Term 15-60 yrs, Permanent >60 yrs, Reversible (can be undone), Frequency (once, rarely, occasionally, frequently, constantly or hourly, daily, weekly, monthly, annually).

17.3 Baseline Conditions

The following section contains a description of the current state of the environment (baseline scenario) in relation to population and human health and the possible impacts on these arising from the Proposed Development, which are not already covered by other disciplines in this EIAR and include:

- Education and Employment
- Economic Activity;
- Social and Settlement Patterns;
- Human Health, including Health & Safety;
- River Shannon Users – Recreational Population;

The subject site is located in the north-east of the townland of Dromroe, bounded to the north by the Lower River Shannon and adjacent to the boundary with the townland of Sreelane to the east. It falls within the

Electoral Division (ED)¹⁴ of Ballysimon and is situated approximately 3km east of Limerick City. The area is largely urban in nature and has experienced strong population and employment growth over the last 20 years owing to the presence of the University of Limerick Campus, and the 156 hectare National Technology Park at Plassey. This is reflected in the sources of wastewater loading at the plant, which discharges to the Lower River Shannon. The Lower River Shannon is designated both a Special Area of Conservation (Lower River Shannon) and a Special Protected Area (River Shannon and River Fergus estuaries). In addition to its ecological importance, it is a strong the focus for recreational and tourist activity in the area.

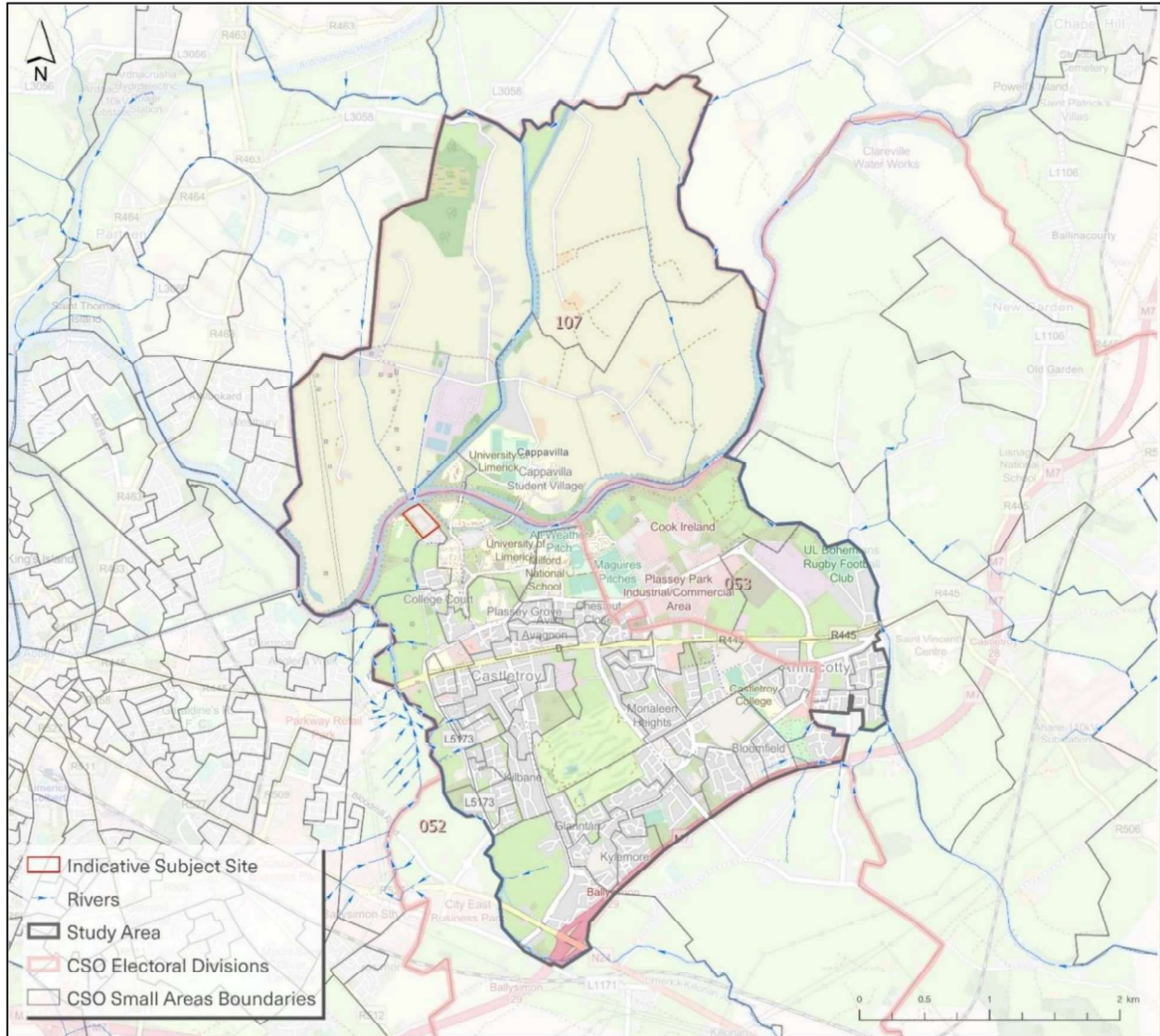


Figure 17-2: Study Area within Wider Hinterland

17.3.1 Need for Scheme

The existing plant is aging, with several items of equipment key to the treatment process in need of refurbishment or replacement. The plant is approaching capacity and does not include storm storage. The WwTP needs to be upgraded to reflect modern requirements and better cater for existing committed and projected growth. If the Proposed Development does not proceed, water quality may be impacted, and future

¹⁴ Electoral Divisions are the smallest legally defined administrative areas in the State.

working and resident populations will be uncatered for. As such, there are health, economic and social impacts arising from the 'do-nothing' scenario.

17.3.2 Demographics

Population

The Population and Human Health study area, as defined in Figure 17-2, delineates the population catchment that could potentially be impacted by the construction or operational phases of the proposed works. The population catchment focusses on the population in the immediate area who could potentially be impacted by the Proposed Development based on proximity, it does not therefore correspond to the WWTP agglomeration area which can be discontinuous and spatially dispersed across a wide area.

In defining this area, it was noted that the catchment is relatively discrete, with the M7 acting as a natural boundary to the south, while the Mulkear and Groody Rivers delineate the area to the east and west respectively. The area is primarily formed by the aggregation of the townlands of Newcastle, Newtown, Castletroy, Dromroe, Ballysimon, Sreelane and Kilbane. The EDs of Ballysimon and Ballyvarra which cover this area extend south of the M7 and include substantial areas that will not be potentially impacted by the Proposed Development. It was decided therefore to utilise Census Small Areas (SAs) to define the study area. Small Areas are areas of population generally comprising between 80 and 120 dwellings, designed as the lowest level of geography for the compilation of statistics and which nest within ED boundaries. The study area to the south of the Shannon River comprises 52 no. SAs. This area is similar to the recently lapsed Castletroy Local Area Plan (LAP) area, with the exclusion of a number of SAs to the west.

While the Shannon River forms a defined barrier to the north, the Living Bridge, a pedestrian bridge across the Lower River Shannon, links the University of Limerick campus in County Clare to the north with the campus in County Limerick to the south. In view of this connectivity a further 3 no. SAs have been included to incorporate this linked area. Overall, the proposed study area equates to 55 SAs which are indicated in the map in Figure 17-2. and listed in **Appendix 17A**. The 2016 population for the study area was 14,788. The preliminary results of the 2022 Census have yet to be released at a SA scale.

Table 17.1: Electoral Division Population 1996 – 2016 Census

Area	1996	2002	2006	2011	2016	% Change 1996 - 2016	% Change 2011 - 2016
Cappavilla ED, Co Clare (107)	332	372	674	1038	847	155.1%	-18.4%
Ballyvarra ED, Co Limerick, (053)	2928	3740	4110	4269	4295	46.7%	0.6%
Ballysimon ED, Co Limerick (052)	8222	9675	11321	13073	13760	67.4%	5.3%
3 EDs Combined	11482	13787	16105	18380	18902	64.6%	2.8%
County Clare	94006	103277	110950	117196	118817	26.4%	1.4%
County Limerick	165042	175304	184055	191809	194899	18.1%	1.6%
State	3626087	3917203	4239848	4588252	4761865	31.3%	3.8%

As Small Area Statistics have only been captured by the CSO since 2011 it is not possible to determine a long-term trend in the Study Area population. However, the trend for the larger area encompassed in the three EDs that intersect the study area (Cappavilla ED, Ballyvarra ED, Ballysimon ED) indicates that between 1996 and 2016 the population increased by 64.4%, one of the fastest growing residential areas in Munster. This is in notable contrast to the County Clare and County Limerick growth rates in the same period of 26.4% and 18.1%, and even the national growth rate of 31.3%. While continued growth was generally experienced within the study area, in the last intercensal period between 2011 and 2016, a population decline was experienced in Cappavilla ED and only modest growth in Ballyvarra ED. However, Ballysimon ED, to the south, continued to experience exceptional growth, with rates in excess of county and national rates.

The now lapsed Castletroy LAP envisaged a growth of 12,320 persons in the area's population by 2040 (from the 2016 census base year). This equates to 22% of the National Planning Framework population growth target for Limerick City and Environs and represents almost a doubling of the existing population. The current Limerick County Development Plan continues to envisage Castletroy as a focus for strong growth.

Table 17.2: % Students in Population Aged 15 and Over - 2016 Census

Area	Student	Total Population Aged 15 and Over	% Students
Study Area	4138	12183	34%
County Clare	10423	93245	11%
County Limerick	20161	155305	13%
State	427128	3755313	11%

However, it should be noted that the presence of the University of Limerick within the study area, temporarily inflates the resident population for the academic term. With c. 16,500 students attending UL, students account for a substantial element of the study area population, as is evident from Table 17.2 which shows that students represent 34% of the working age population (15 years old and over). This is over three-times the percentage this group represents in County Clare and the State overall (11%), and 2.6 times the percentage across County Limerick.

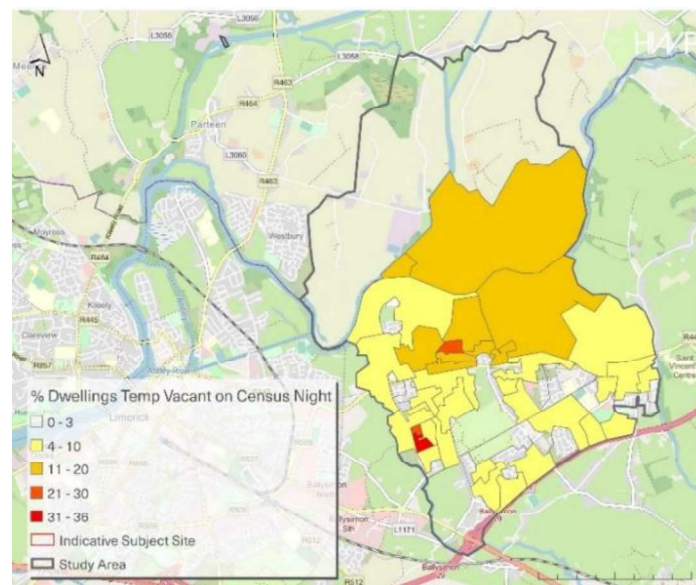


Figure 17-3: % Temp. Unoccupied Dwellings 2016 Census

The relatively large percentage of students living in the study area is also reflected in the number of dwellings which were temporarily vacant on the 2016 Census night (Sunday, the 24th April). At 7% this was considerably higher than national and county figures. In some SAs within the study area this percentage rose to 36%, indicating the presence of dedicated student accommodation (e.g. Brookfield Hall and Plassey Village). Figure 17-3 shows the clustering of SAs with high temporary unoccupancy in the vicinity of the University of Limerick campus.

Table 17.3: % Temp. Unoccupied Dwellings 2016 Census

Dwellings Temporarily Unoccupied on 2016 Census Night			
Study Area	402	5832	7%
County Clare	1,205	55,779	2%
County Limerick	2,434	82,112	3%
State	50,732	2,003,645	3%

The attendance of more than 2,000 international students at UL contributes towards an increased level of diversity in the population of the study area, where 22% of the population is comprised of non- Irish nationals, compared to the national figure of 13%. The presence of the employment hub of the National Technology Park at Plassey is also a contributory factor in this respect.

The large student population is also evident in the overall age profile of the study area, where all the age cohorts are under-represented, in comparison with national figures, with the exception of the 17 – 24-year-old group, which is almost three times the national average. Conversely, the number of children in the area is 5% below the national average, the number of people who are 65 years old and above is 6% below the national average and the number of residents between 25 and 64 years old is 8% below the national average (refer Table 17.4).

However, with 72% of the population in the area aged under 40 compared to 55% in Limerick County and nationally, this young population profile has implications for the provision of housing, education, recreation amenities and health services.

Table 17.4: Age Profile of Residents 2016 Census

	Study Area - No. Persons	Study Area %	Nationally - No. Persons	Nationally %
Under 17	2854	19%	1129184	24%
17 - 24	4191	28%	453820	10%
25 - 64	6661	45%	2541294	53%
65 plus	1082	7%	637567	13%

The average household size in the study area, at 2.95, is higher than the national average of 2.74, and the county averages for Limerick and Clare of 2.70 and 2.69 respectively. However, at a SA level there is a wide spectrum of average household sizes, ranging from 1.14 persons per unit at SA 127026020/02, where The Park Retirement Village is located, with predominantly 1 and 2 bed units. Similarly, the relatively low average household size of 1.48 occurs in SA 127026011 where Brookfield Hall Student Accommodation is located comprising 2 – 4 bed units. At the other end of the scale is the nearby SA 127026004, which includes Groody Student Park and has an average household size of 4.4 persons per unit, probably accounted for by the 3 – 6 bed units available in the student accommodation. Notwithstanding the above

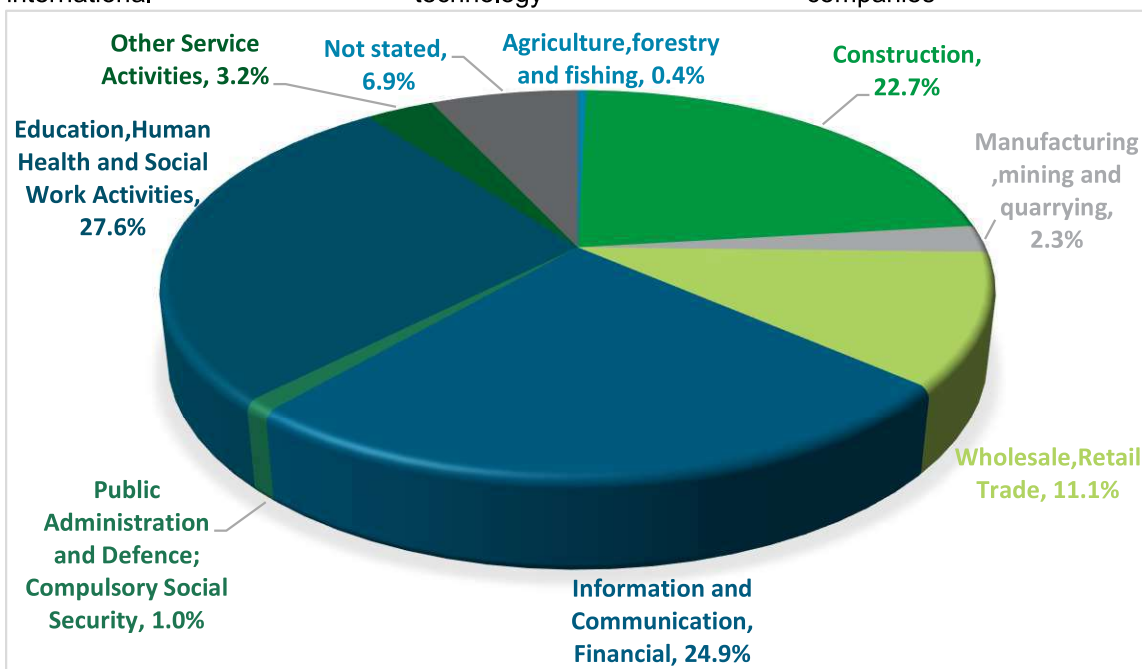
outliers, the average household size in the majority of SAs in the study areas (73%) is in excess of the national average.

Education and Employment

The strategic importance of National Technology Park at Plassey and the University of Limerick, as employment hubs in the study area, is highlighted in the 2016 census workplace zone data which indicates that there were 9,146 jobs in the study area, with a resident worker population of 6,024. This equates to a worker: job ratio of 1.52, which compares very favourably with the ratios of Limerick City and Suburbs at 1.260 and the Southern Regional Assembly at 1.06.

This is also evident in the resident 2016 unemployment rate in the study area of 8.9%, substantially lower than the rate for Limerick City and County of 14.4% and County Clare of 12.4% and 12.9% nationally. It should be noted that the ESRI Quarterly Economic Commentary – Autumn 2022 indicates that as the impact of the Covid-19 pandemic on the national unemployment rate continues to decline, higher participation rates are contributing to a tight labour market. Compared to the peak Covid related unemployment rate of 31.5% (April 2020), the unemployment rate as of August 2022 was 4.3%, below its pre-pandemic rate.

Previous ESRI Quarterly Economic Commentary noted that the impact of Covid-19 had affected younger workers disproportionately. However, the Autumn 2022 Commentary notes that all age groups are experiencing higher participation rates now than prior to the pandemic, this applies in particular to young people. The sectors with the greatest employment growth include Information and communication (+47,400), Health and social work (+44,200); Education (+36,700); and Professional, scientific and technical services (+27,600). It is considered that the employment rate in the study area which is a hub for international technology companies (refer



have benefitted from these increases.

) will

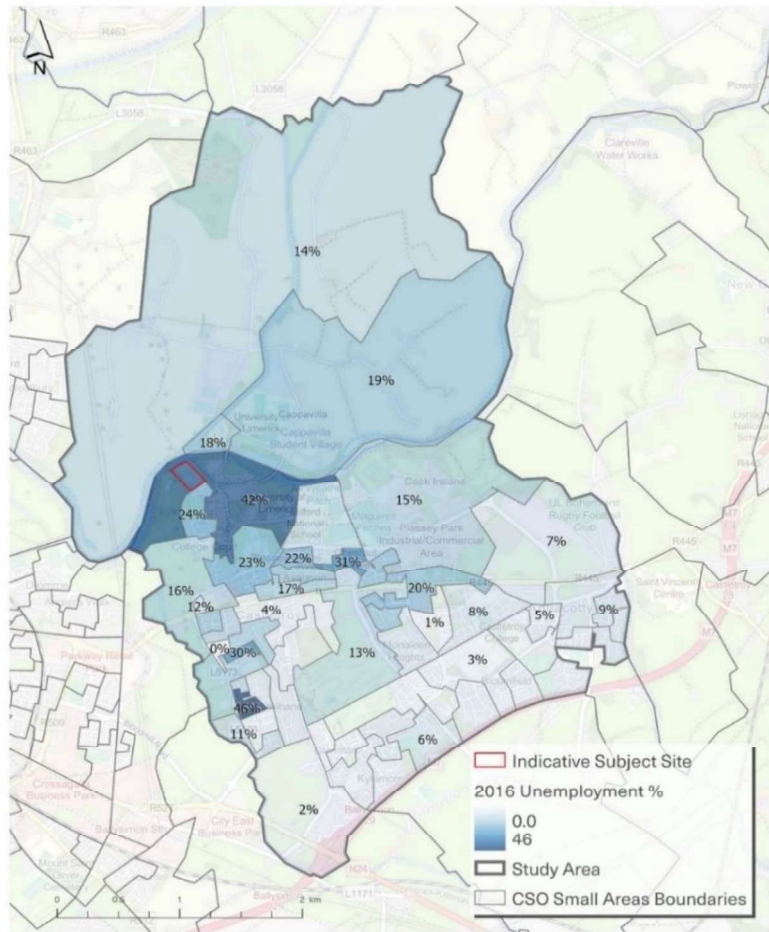


Figure 17-4: Unemployment Rates by Small Areas 2016 Census

While the SA where the subject site is located (127026010) appears to have extremely high unemployment at 42%, as does the SA where Brookfield Hall is located (127026011) at 46%, these figures are misleading as these are predominantly student accommodation areas where the total resident workforce is 7 and 13 persons respectively. A similar situation is evident in the National Technology Park at Plassey, there the unemployment rate of 15% is based on a resident workforce of only 19 persons living in that SA.

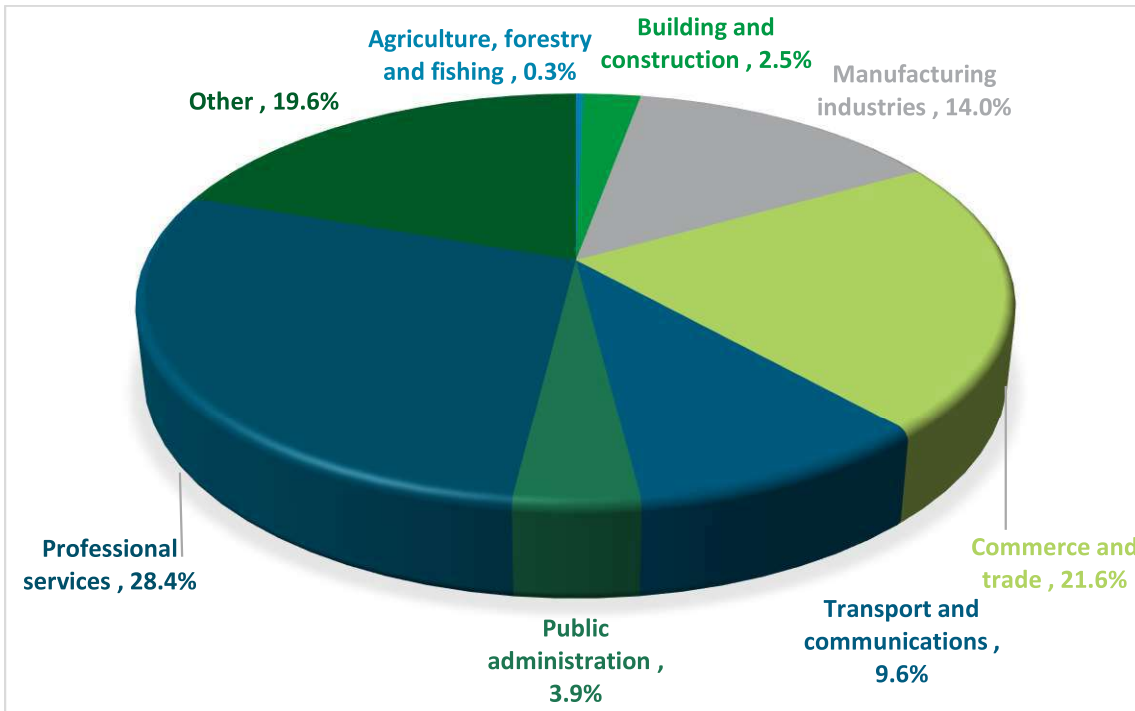
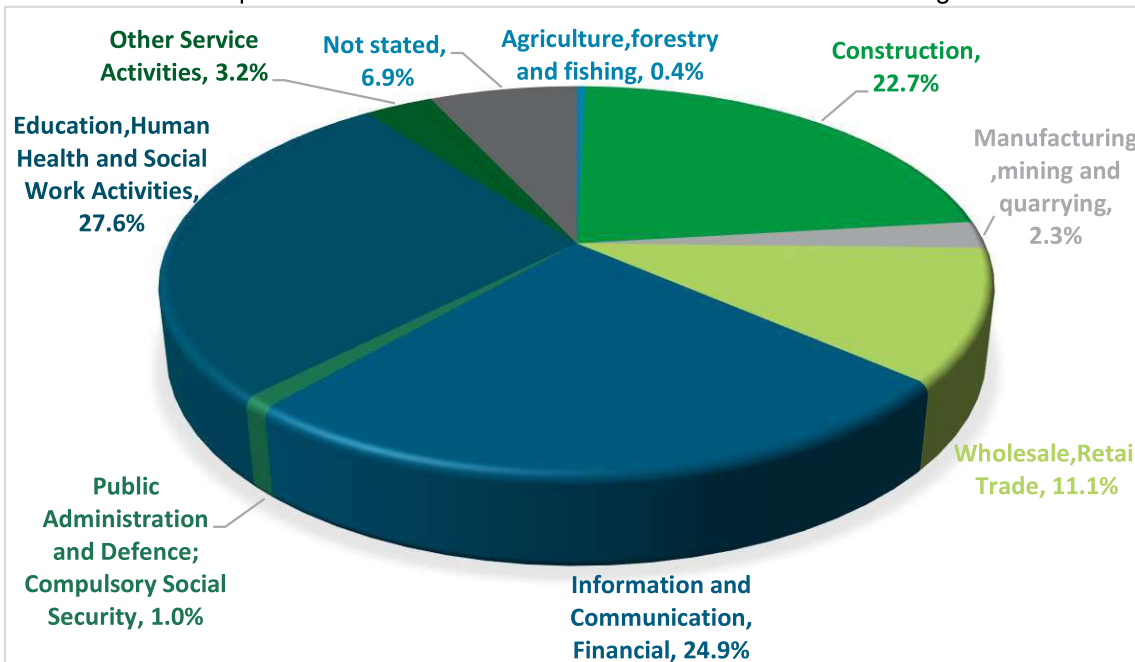


Figure 17-5: Percentage of Resident Workers' Jobs by Sector (2016 Census)

When the jobs of the Study Area resident workers are examined by industry sector however, there does appear to be some discrepancy with the types of jobs that are available within the study area, based on the Census workplaces zones data. As Figure 17-5 and



indicate, the largest mismatch is in the construction/building sector. The rapid growth of the area is reflected in the fact that 22.7% of the jobs based in the locality are in the construction/building sector, however, only 2.5% of the resident workers are engaged in this sector. It can be assumed that there is a major in-flow of construction workers commuting into the study area. The converse is the case in the manufacturing sector, in which 14% of the resident workers are engaged, whereas this sector only accounts for 2.3% of the local jobs. This indicates that a substantial number of resident manufacturing workers commute out of the area for work elsewhere.

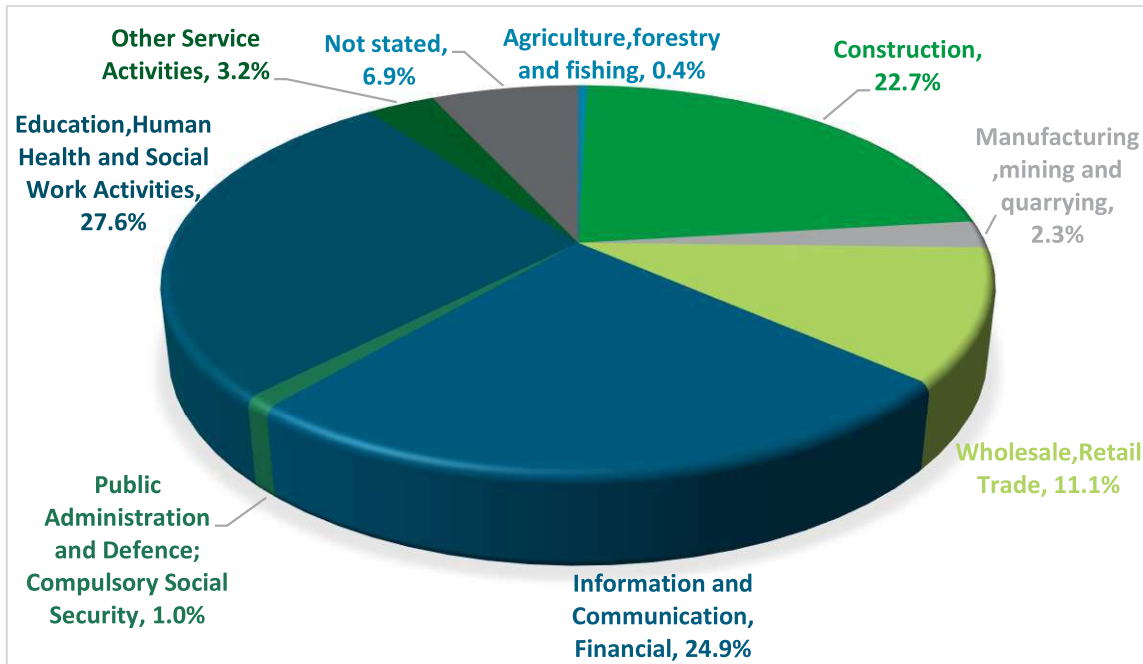


Figure 17-6: Percentage of Local Jobs by Sector (2016 Census)

In the 2016 Census, the CSO SA and workplace zones employment categories did not completely correspond, however, we can assume that ‘Professional Services’ equates to ‘Education, Human Health and Social Work Activities’. This sector represents the largest employment area for resident workers and local jobs. The presence of the University of Limerick campus, which employs c. 1,787 staff within the study area accounts for this predominance, with significant numbers of the university employees living within the study area. Again, we assume ‘commerce and trade’ equates to ‘wholesale retail and trade’. Almost twice the proportion of resident workers are engaged in this sector than locally available jobs, also indicating an outflow of resident workers. The ‘transport and communications’ sector corresponds to some extent with the workplace zone’s ‘information, communication and financial’ sector.

The National Technology Park at Plassey presents a significant focus for this employment type, which represent 24.9% of the local jobs in the area. With only 9.6% of the resident workers employed in this sector, we can assume that workers in this sector predominantly commute into the area from elsewhere. There is c. 4% of the resident workers employed in public administration, which represents only c. 1% of the local jobs.

The impact of the university on the population is not just confined to its role as a strategic employer. As noted previously with 34% of the study area population aged 15 years and older being still in school or college, compared to 14% nationally, the local resident worker figures for this area are not typical. This is exacerbated by students commuting into the area. The overall daytime population figures for the workplace zones, which includes people commuting into the area for education and other non-work related reasons, indicates that the daytime population increases to 24,935 persons, compared to the resident population of 14,788 persons.

The inflow of construction workers and workers at the National Technology Park in conjunction with students and employees commuting to the university results in a predominantly inward commuting flow, offset slightly by resident workers engaged in manufacturing, commerce and trade and public administration commuting out of the area to work.

The commuting patterns of resident workers, students and people working in the locality varies significantly (Table 17.5), only 7.8% of resident working population walk or cycle to work, compared to 49.6% of resident students who use this mode to commute and 23.8% of those whose jobs are in the study area but who aren’t necessarily residents.

The principal mode of travel of the resident working population (74.9%) is by car or van, while 36% of resident students using this commuting option and 62.6% of local jobholders opt to travel by car or van. This preference is evident in the high volumes of traffic in the area, particularly along the R445, where peak time congestion is an issue.

Use of public transport is highest amongst people who work in the area (but are not necessarily residents) at 7.1%, however only 2.8% of resident working population and 5.8% of resident students use this option. All these figures are below the national average of 9% of working commuters using public transport.

Table 17.5: Commuting Mode of Resident Workers, Students and Local Jobholders (aged over 5 years) 2016 Census

Means of Travel	Resident workers	Resident Students	Local Jobholders
On foot	6.9%	44.3%	20.3%
Bicycle	2.9%	5.3%	3.5%
Bus, minibus or coach	2.7%	5.7%	7.1%
Train	0.1%	0.1%	0.3%
Motorcycle or scooter	0.3%	0.1%	0.2%
Car driver	69.2%	8.1%	45.6%
Car passenger	3.5%	27.8%	15.8%
Van	2.2%	0.1%	1.2%
Other (incl. lorry)	0.2%	0.0%	0.9%
Working mainly at home	2.8%	0.1%	(included in 'Other')
Not stated	9.2%	8.4%	5.0%

17.3.3 Economic Activity

Reflecting its status as a District Centre, Castletroy performs an important trade/market and service function for the resident population and for the surrounding hinterland and is well served by retail services. The largest contributor to this being Castletroy Town Centre Shopping Centre, anchored by a convenience unit (Supervalu) with c. 15 smaller retail units and a standalone multiplex and drive-through restaurant. The convenience offer of Castletroy also includes a Centra, Lidl and Spar immediately to the north of the shopping centre, off the Dublin Road. The District Centre caters for the retail needs of the students and staff at UL, the staff at the National Technology Park and the Troy Studios film and television production facility.

In addition, there is a range of retail services available at the nearby local centres: along the Dublin Road, the Castletroy Park Retail Park anchored by a Spar convenience store, the Groody Neighbourhood Centre, the Newtown Centre, with a Centra convenience store anchor and at Annacotty.

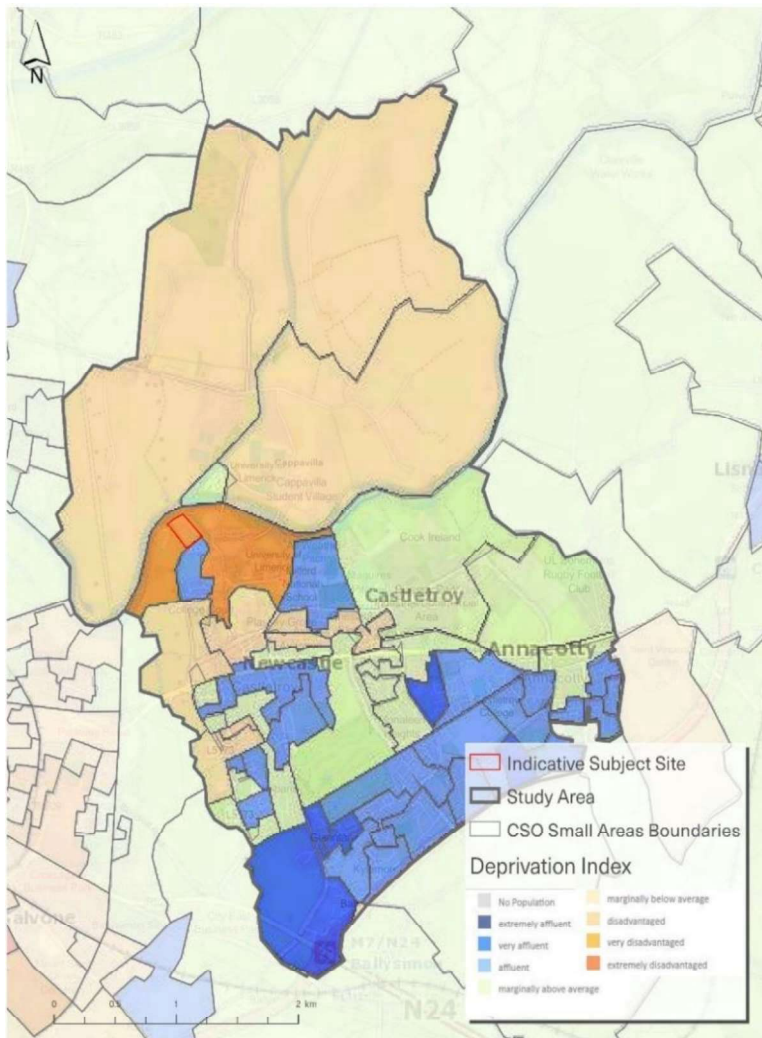
Immediately beyond the western boundary of the study area is the Parkway Shopping Centre, anchored by Dunnes Stores, with 30 stores, providing additional regional level shopping within close proximity to Castletroy residents.

As previously noted, the National Technology Park, home to 80 organisations employing more than 4,000 staff, is located within the study area. This 156-hectare business and technology park with links to UL has become a nucleus of high-technology and knowledge-based companies including Cook Medical, Vistakon, Gilt and IDA's Mid-West Regional Office.

The UL campus is 148.5 hectares in size, of which 46.9 hectares is in County Clare. In 2022 it had close to 16,500 students enrolled, with c. 1,787 staff employed at UL. The campus includes cafes, restaurants, and a range of on-campus facilities.

17.3.4 Social and Settlement Patterns

Social Patterns and Infrastructure



The Pobal Deprivation Index shows the level of overall affluence and deprivation at the scale of CSO Small Areas in 2016 based on a number of census indicators. As highlighted in Figure 17.7 there is a clear north-south divide in the study area, with all of the County Clare areas to the north and most of the County Limerick areas to the north-east considered 'marginally below average' in terms of affluence.

SA 127026010, which largely comprises the university campus, is an outlier in the study areas and is identified as 'very disadvantaged', it is considered however, that this may represent an anomaly in the census returns, as 97% of the population in this SA are recorded as students and the principal dwelling type in this area is student accommodation. Alongside this the SAs immediately to the south are identified as affluent. The SAs to the south-east of the study area are generally recorded as 'marginally above average' affluence, however, this area is predominantly non-residential, mainly comprised of commercial development such as the National Technology Park and the Troy Studios.

Figure 17-7: Pobal Deprivation Index (2016 Census)

However, it does include student accommodation (Kilmurry Student Village, Elm Park Students) and a traveller halting site at Kilmurry View. A band along the south of the study area, comprising Ballysimon, Newtown, Newcastle and the south of Annacotty are recorded as 'affluent' or 'very affluent', representing established and emerging suburban residential areas.

The area is supported by a diverse range of services and social infrastructure including medical and dental practices, pharmacies and retirement homes. It is also well provided for in terms of education facilities by the presence of three primary schools, a secondary school and seven childcare facilities. It benefits from extensive sporting and amenity facilities, in particular along the Shannon and Groody Rivers and the University complex, Castletroy Park, the Groody Valley. The area is also well served with hotels, and a large number of restaurants/food outlets and public houses.

Settlement Pattern

Figure 17-8 demonstrates that population density varies widely across the study area. North of the Shannon, in the predominantly farmland area of County Clare there is uniformly low-density residential development, with the exception of Thomond Village and Cappavilla Village, student accommodation. There is a correlation between areas of higher density development and student accommodation. However, the principal form of residential development in the area is two-storey detached and semi-detached houses. These are the predominant form of dwelling in the south of the study area.

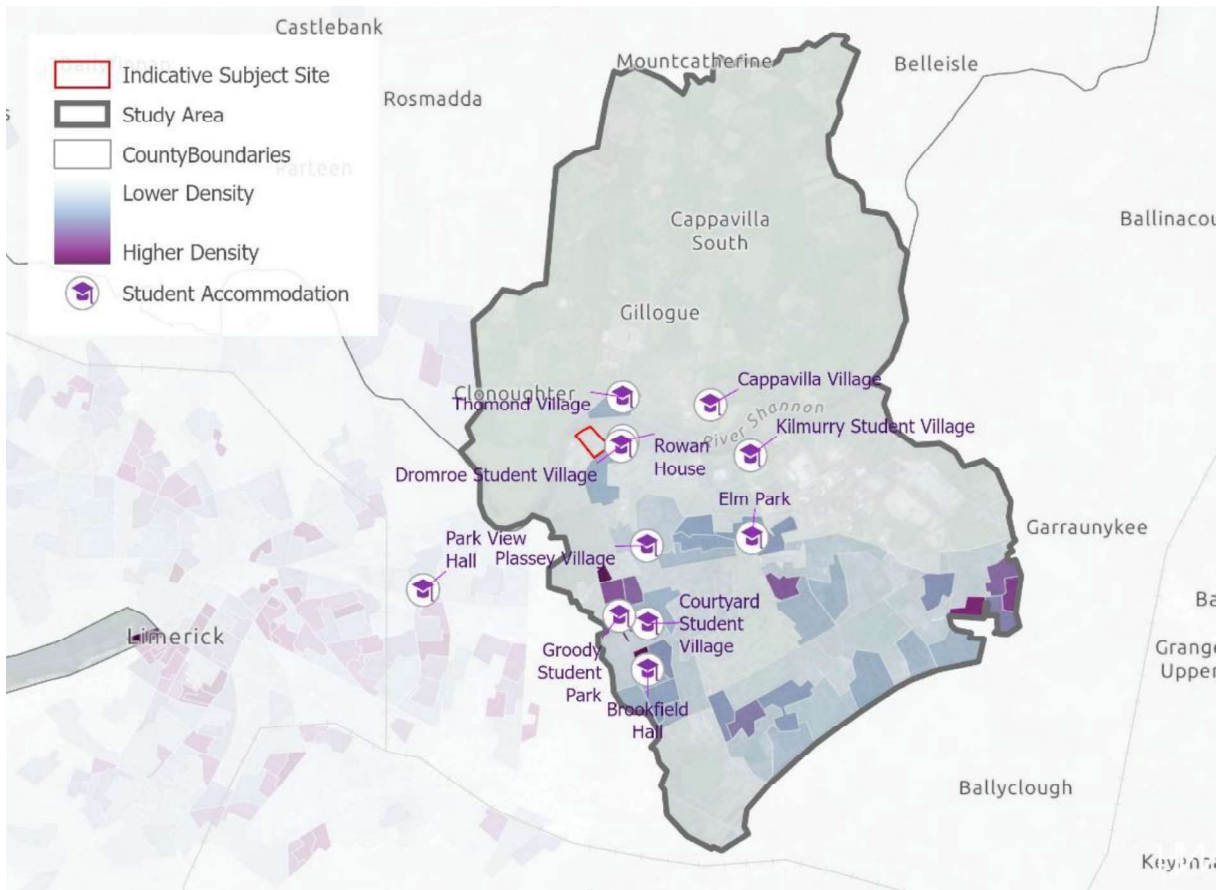


Figure 17-8: Population Density by Small Areas (2016 Census)

The Limerick Development Plan 2022 (LDP) Core Strategy identifies a population growth target of 34,692 in Limerick City and Suburbs (in Limerick), Mungret and Annacotty to the target date of 2028. Castletroy is listed in Section 2.4 of the Core Strategy Statement as one of the districts within the city and suburbs which provides important opportunities for sustainable development of residential, educational, recreation and amenity, employment and commercial uses. It is included in Urban Character Area 3 – Castletroy/Plassey/Annacotty in Table 3.2 of the LDP with specific objectives which state that infill and brownfield development patterns are to be favoured and modest height increases at key locations may be required.

Figure 17-9 indicates that the existing land use pattern and future zoning concentrates educational, and employment uses and in centre of the subject site, with residential use focussed to the south. The LDP (Map 4 Volume 2) emphasises the need for a minimum density of 45 units per hectare in future development in lands to the south-east of the subject site and a minimum of 35 units per hectare in lands immediately to the west.

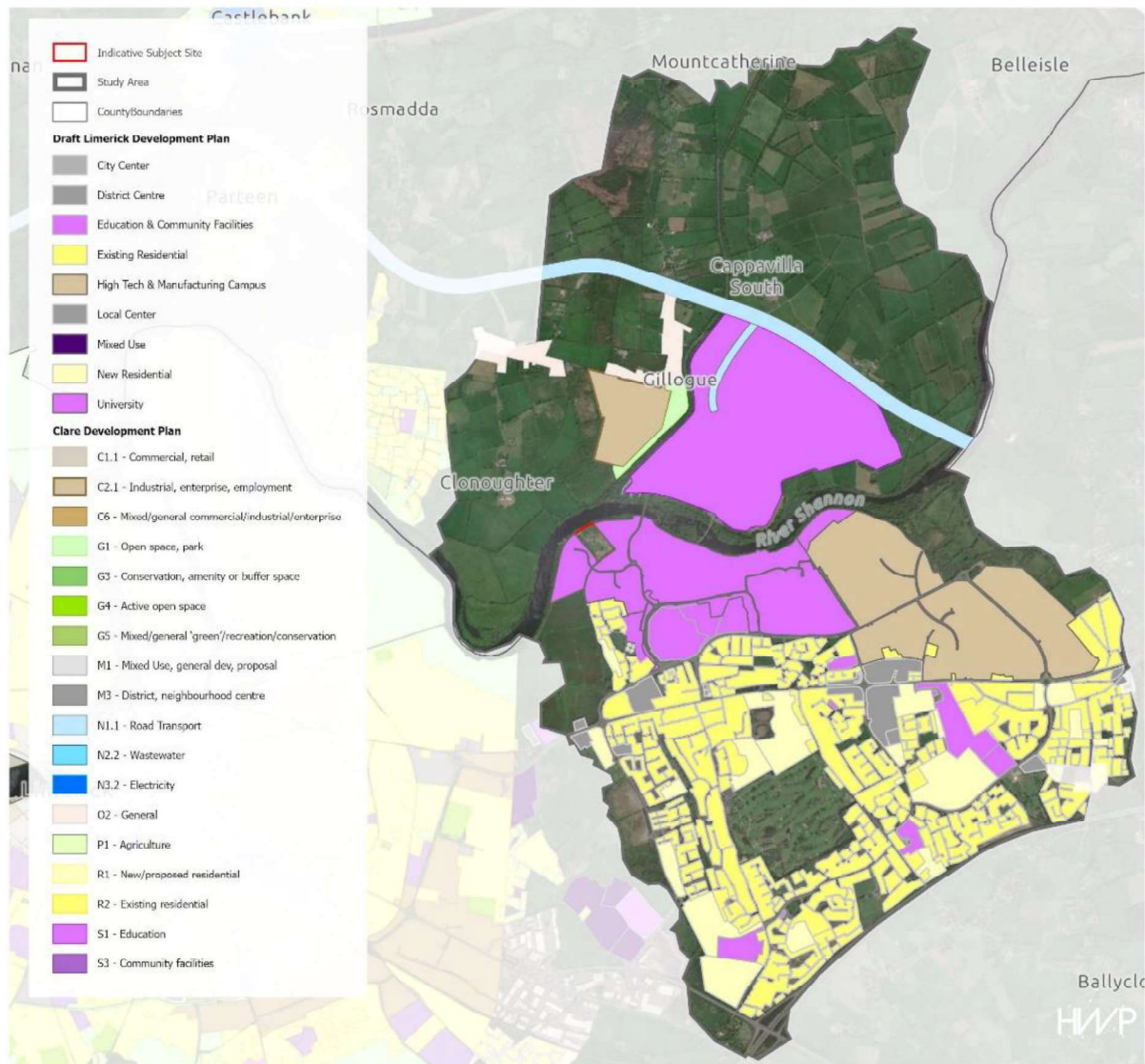


Figure 17-9: Clare County Zoning and Limerick Zoning

17.3.5 Human Health

Health, as defined by the World Health Organization (WHO), is 'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity'. The Healthy Ireland Framework 2013-2025 defines health as 'everyone achieving his or her potential to enjoy complete physical, mental and social wellbeing. Healthy people contribute to the health and quality of the society in which they live, work and play'. This Framework also states that health is much more than an absence of disease or disability, and that individual health, and the health of a country, affects the quality of everyone's living experience. Human health has the potential to be impacted upon by environmental factors such as air, water or soil through which contaminants could accumulate and have potential to cause harm through contact with human beings. Similarly, nuisances such as traffic, noise and vibrations can impact on human health. This section of the EIAR focuses primarily on the potential likely and significant impact on Population and Human Health in relation to health effects/issues and environmental hazards from the other environmental factors and interactions that potentially may occur.

An assessment will be undertaken on potential risks or nuisances that may be caused to human beings during the construction and operational phases. The findings of the aforementioned air quality, water quality, traffic, soil noise, odour and vibration assessments will be reviewed and considered as part of this assessment.

17.3.6 Users of the Lower River Shannon

The Lower River Shannon is designated both a Special Area of Conservation (Lower River Shannon) and a Special Protected Area (River Shannon and River Fergus estuaries). Its waters, adjacent to the WwTP, are the focus of recreational uses including: angling, rowing, canoeing, kayaking, paddle boarding and boating, swimming and other activities, many of which are based out of the University of Limerick Boathouse.

17.4 Likely Significant Impacts

This section provides a description of the specific, direct and indirect, impacts that the Proposed Development may have during both the construction and operational phases focusing on health issues and environmental hazards arising from the other environmental factors.

17.4.1 Do Nothing Scenario

In accordance with EC Guidance and after reviewing the baseline data, the 'do nothing' scenario (i.e. if nothing is done) has the potential to adversely impact water quality in the adjacent River Shannon, with consequent human health, wellbeing and commercial impacts. As noted in the 'Need for the Scheme' the existing plant is aging, with several items of equipment key to the treatment process in need of refurbishment or replacement. The existing plant is overloaded and does not include storm storage. The WwTP needs to be upgraded to reflect modern requirements and better cater for existing committed and future loads.

Section 8 – Odour of this EIAR notes that student accommodation is located downwind in excess of 50% of the year. The odour surveys carried out in relation to Section 8 recorded odours with the potential to give rise to odour nuisance in proximity to the nearest residential properties. In the do-nothing scenario this potential to give risk to an odour nuisance would continue unresolved, with potential to cause annoyance and be considered offensive by the exposed population and impact on the residential amenity in the vicinity of the plant.

Section 10 - Noise and Vibration notes that the existing blowers in the WwTP produce a distinct low frequency tone which is likely responsible for the 'shrill noise' that was noted to be audible off site. In the do-nothing scenario this noise nuisance in the vicinity of the plant would remain with the potential to effect sensitive receptors.

As noted in, **Section 14** – the EPA issued a wastewater discharge licence (WWDL) for the agglomeration of Castletroy and its environs in 2009. While the WwTP is currently treating the wastewater to a good standard, breeches have been noted due to isolated incidences and not ongoing WwTP performance. At present, due to the absence of stormwater storage, storm water overflows (SWOs) are not in compliance with license conditions. In addition, the Annual Environmental Reports indicate that the plant has been non-compliant with its licence conditions in 2018, 2019 and 2021 and there are on average 10 no. EPA reportable incidence yearly at the plant involving spillage and uncontrolled releases due to limitation of the plant storage and equipment. Alongside this **Section 14** notes that a large portion of the WwTP is located within flood risk zone A and B, whereby a flood event could potentially have a negative impact on its operation.

Given the above, if the Proposed Development does not proceed, water quality in the future may be impacted and future working and resident populations will be uncatered for. As such, there are health, economic and social impacts arising from the 'do-nothing' scenario. This situation is likely to exacerbate over time with a potential, in the longer-term, for significant effects on the existing population's health to develop. Similarly, if future planned housing and employment growth in the area is curtailed by the lack of capacity at the WwTP, this is likely to result in a significant effect on the well-being of the population of the area due to lack of housing availability, unemployment, or unsustainable commuting patterns. Recreational use of the Lower River Shannon adjacent to the overloaded WwTP may also potentially be impacted in the 'do-nothing' scenario by consequent water quality issues.

17.4.2 Assessment of Effects during Construction

Population

The construction phase of the Proposed Development should not have a significant direct impact on the population numbers within the study area. It is expected that the construction workforce will travel from existing places of residence to the construction site rather than reside in the immediate environs of the site. Some potential positive benefits for local businesses may arise from the temporary daytime presence of this workforce.

Increased road traffic and the potential for disruption to all modes of travel and access in the vicinity of the works due to closures and diversions could cause disturbance to the residential, working and recreational population of the area. **Section 7** of this EIAR –Traffic and Transport estimates that the Proposed Development will give rise to a worst-case scenario of 39 - 50 HGV trips per day during the excavation and stormwater storage tank construction phases respectively, reducing to 20 HGV trip per day during the remainder of the construction phase. In addition, it is estimated that 40 construction staff will be based on site during construction and it has been conservatively estimated that all staffs will arrive on site in single occupancy vehicles, generating a total worst case estimate of 40 construction worker trips for both AM and PM peak hour trips separately. This construction traffic will all be focussed on Harvard Close and Plassey Park Road, to mitigate any potential impact on the operation of the university. Section 7.5.4 assessed the impact of the construction traffic on the 6 main traffic junctions in the vicinity of the site concluded that in all cases the impact will be minimal.

Similarly, ambient noise and dust emission during construction could also potentially impact on all sectors of the population, in particular the nearest residential areas to the Proposed Development works, including:

- Plassey Water Mill, Blackridge located c. 150m to the north-east,
- Dromroe Student Village located c. 130m to the east,
- Thomond Village (Heron House) approximately 280m to the north-east,
- Stanford Close approximately 275m to the south.

However, **Table 8.17 in Section 8** of this EIAR – Air Quality and Climate, considers the risk to human health arising from construction earthworks to be negligible, and from construction and trackout to be low risk. Similarly, **Table 10.14 of Section 10** – of this EIAR – Noise and Vibration identified 18 sensitive receptor locations in the vicinity of the subject site. It predicts that based on a 'worst-case assessment' of construction noise levels at these locations, there will be no exceedance of the daytime construction noise limit of 65 dB L_{Aeq} at any of these locations. It also concludes that there will be no potential for vibration impacts. In the absence of mitigation there is the potential for a *slight, short-term negative effect in relation to construction noise*.

Employment and Economic Activity

The construction phase of the Proposed Development is envisaged to commence in 2024, with all works completed in 2026 and will generate construction employment directly on-site, amounting to some 40 persons at any one period during this phase. It will also benefit support industries such as building supply services, professional and technical professions etc. There will also be some potential for positive indirect benefits for local businesses catering for the needs of the construction workforce. These beneficial impacts on economic activity will be largely temporary and confined to the construction period. *This is considered to be a moderate, short-term positive effect.*

Conversely there is potential for temporary disruptions to the operation of University of Limerick and businesses in the vicinity. In the absence of mitigation, the Proposed Development could have an impact on the economic activity of the surrounding area during the construction phase due to the associated nuisance of increased traffic and the potential for disruption to all modes of travel and access in the vicinity of the works due to temporary road, footpath, cycle lane closures and diversions. However as

noted in **Section 7 – Traffic and Transport**, as the construction traffic will be largely focussed on Harvard Close and Plassey Park Road, any potential impact on the operation of the university will be minimal. Similarly, **Section 7.5.4** assessed the impact of the construction traffic on the surrounding local road network as minimal. Alongside this there is potential for impacts from construction dust and noise. These issues are examined with associated mitigations outlined in detail in **Volume 2, Sections 7, 8, 9, 10 and 15** of the EIAR. *In the absence of mitigation there is the potential for a slight, short-term negative effect.*

Social and Settlement Patterns

As referred to previously, there are significant social and recreational uses associated with the Shannon River in this area. However, as the proposed works are confined to within the site boundary, there is no potential for recreational and sport-related water-users (many of whom are based out of the University of Limerick Boat House), or users of the riverside walk to be impacted during the construction phase by temporary access restrictions. There is however potential for indirect impacts on these user groups arising from negative impacts on water quality from construction run-off, accidental spillage or fugitive emissions. *In the absence of mitigation there is the potential for a temporary negative indirect effect.*

Due to the increase in activity at the site, the presence of construction plant and the erection of temporary hoardings around the site there is potential for visual impacts arising from the construction phase on local residents, recreational users of the Boathouse and riverside public footpaths, students and employees in the vicinity. However, **Section 13 – Landscape and Visual** notes that due to the existing mature vegetation that screens the site, the proposed works will be filtered to a large degree. Section 13 concludes that the effect on the landscape character during the construction phase will be *moderate, temporary and negative within 0.5km of the site, reducing at distances beyond this to slight and imperceptible.*

Settlement patterns are unlikely to be impacted by the relatively short-term duration of the construction phase. *This is considered to be a negligible, short-term neutral effect.*

Human Health

The potential risks or nuisances that may be caused to human beings during the construction phase have been assessed in other sections of this report along with corresponding mitigation measures considering air quality, water quality, traffic, noise, and vibration. These are summarised below and also Table 17.6:

- Potential negative impacts on human health could primarily occur as a result of construction dust through the release of PM10 and PM2.5 emissions. **Section 9 – Air Quality and Climate** concludes that in terms of dust related human health impacts, in the absence of mitigation there is the potential for negligible to slight ('low-risk'), negative, short-term impacts to human health as a result of the Proposed Development.
- **Section 8** concludes that the construction phase will not give rise to any significant odour impacts. If any such impacts do occur these will be a short duration and temporary.
- There is also the potential for traffic emissions, primarily in the form of NO₂, to impact air quality in the short-term over the construction phase, particularly due to the increase in HGVs accessing the site. However, **Section 9** concludes that the Proposed Development will have no construction traffic impact on the local air quality. The construction phase Green-house Gas (GHG) emissions are estimated to be miniscule in terms of national targets and considered not significant.
- **Section 10 – Noise and Vibration** notes that the construction phase will include a wide range of activities and noise sources, including consideration of construction traffic, from which there is potential for noise impacts to occur in relation to noise sensitive receptors in the vicinity, such as residents, users of the nearby carpark and workers at the Nexus Innovation Centre. However, the 'worst-case' assessment indicates that there will be no exceedance of the construction noise levels limit of 65 dB LAeq, at any of the nearest noise sensitive locations. The Construction Phase noise impact is therefore predicted to be a Negative, Slight, Short-Term impact. Vibration levels associated with construction activity at the nearest dwellings are considered to be negligible.

- **Section 7 - Traffic and Transport** considers that the construction traffic generated by the Proposed Development will have a minimal impact on the six nearest road junctions. It concludes that the construction stage traffic has the potential for a slight, negative, short-term impact.
- In terms of peak construction traffic **Section 7** concludes that as construction traffic will be largely focussed on Harvard Close and Plassey Park Road there will be a negligible increase in traffic volumes in the surrounding local road network. It is not anticipated that there will be any significant interaction with population and human health.
- Alongside this road safety issues arising from increased traffic on the access road and through the university campus, particularly with regard to cyclists and pedestrians need to be considered. This is included in the construction risk register in **Section 18**. A Traffic Management Plan will be prepared by the design team to addresses this item. It will propose signage and manning the hazard spots during busy periods. The contractor will be made aware of any existing health and safety issues and will be advised to liaise with UL where necessary.
- Similarly, the potential for disruption to access in the vicinity of the works due to closures and diversions must also be considered. However, as above, **Section 7** does not anticipate that there will be any significant interaction with population and human health in this context.
- **Section 14** notes that during the construction phase there is potential for impacts on the water quality in the Shannon River through resuspension of particles, contaminated runoff, accidental spillages, or fugitive emissions. This is included in the construction risk register in **Section 18**. In the absence of mitigation this has the potential to have a short-term significant indirect impact, to varying degrees, on the recreational and sports users, primarily based in the University of Limerick Boathouse and users of the riverside walkways. With appropriate mitigation, **Section 14** concludes that there is the potential for slight, short-term, negative effects.
- The construction risk register in **Section 18** includes flooding of the WwTP site during the construction phase, considering potential for extreme weather events. This has the potential to impact on human health as a consequence of contamination of the Shannon River. **Section 18** considers any local effects will be of short duration and will not unduly impact on the functioning of the Castletroy community or the University of Limerick campus.

Table 17.6: Summary of Construction Impacts

Human Health	Impacts Without Mitigation
Air Quality – dust emissions	negative, imperceptible to slight, short-term
Air Quality – traffic emissions	negative, imperceptible, short-term
Odour	negative, not significant, short-term
Climate	neutral, imperceptible, short-term
Noise – construction including construction traffic	negative, slight, short-term
Vibration	No impact
Traffic	negative, slight, short-term
Road Safety	negative, slight, short-term
Water Quality	negative, slight, short-term
Employment	positive, moderate, short-term

Landscape and Visual	At < 0.5km negative, moderate, temporary
Material Assets	No significant impacts predicted
Major Accidents & Disasters	negative, slight, short-term

17.4.3 Assessment of Effects during Operation

Population

Section 14 – Water, considers that while there is currently no observable negative impact from the WwTP on water quality in the Shannon, the plant has been non-compliant with its licence conditions on several occasions due to isolated spillage and uncontrolled releases related to aging plant and lack of stormwater storage. These water quality issues will be resolved in the operational phase of the upgraded facility, with knock-on impacts on human health and wellbeing. While the increase in final effluent flow arising from the increase in wastewater volumes will result in a *long-term imperceptible/neutral effect on the water quality of the Shannon River*, the proposed stormwater management improvement will result in a *‘long term, significant, positive impact on receiving water quality*.

The Castletroy LAP, which is now lapsed, envisaged growth of 12,320 persons in the area’s population by 2040 (from the 2016 census base year) which represents almost a doubling of the existing population. The current LDP continues to view Castletroy as one of the districts within the city and suburbs where the 2028 growth target of 34,692 in Limerick City and Suburbs, Mungret and Annacotty should be focussed.

The capacity of the plant, currently at 39,000 PE, includes loading from residential and employment uses in the catchment. It is considered to be overloaded and cannot accommodate this planned growth. The operational phase of the Proposed Development will result in an increase to PE of 77,500, which will readily accommodate future residential and employment growth. This growth will have direct positive impacts on the population of the study area, in terms of population numbers but also in terms of health and wellbeing. *The Proposed Development will therefore result in a long-term significant positive effect on the population of the area.*

Employment and Economic Activity

During the operational phase, the improvement in wastewater capacity from the current 39,000 PE to the proposed 77,500 PE, will also directly support future employment growth in the area particularly in facilitating further growth in the National Technology Park at Plassey and the University of Limerick, employment hubs in the study area. In addition, the current vulnerability of the WwTP, located in a flood risk zone will be addressed, safeguarding the uninterrupted functioning of the plant and regulating the outflow rates during heavy rains to minimise the risk of flooding. Both of which underpin the stability of the local economy. *The Proposed Development will therefore result in a long-term significant positive effect on the employment and economic activity of the area.*

Social and Settlement Patterns

Settlement patterns are likely to be positively impacted for the area by the ability to implement the planned housing growth outlined in Limerick Development Plan, Castletroy Local Area Plan, support strategies, policies, and initiatives. It is also likely that increased local employment and university expansion may result in a greater demand for housing and visitor accommodation in the area, which is in line with national, regional and local policies in relation to sustainable compact and consolidated growth and the co-location of housing with employment hubs. It is envisaged that the Proposed Development will potentially result in a *moderate, long-term positive effect*.

Social patterns are also likely to be positively impacted by the project as intermittent water quality issues, while not currently observable, if unresolved over the long-term will impact on the recreational development

of the area. Their removal will permit the continued successful operation and future expansion of water sports and riverside recreational uses. It is envisaged that the Proposed Development will potentially result in a *moderate, long-term positive effect*.

Section 13 – Landscape and Visual considers that the Proposed Development is of a similar form, scale and layout to the existing WwTP, will be screened by the existing vegetation and will not change the fabric of the existing landscape. Within a 0.5km proximity, the Proposed Development will be prominent and increase the visual clutter, resulting in a *permanent, slight, negative effect, which will reduce to imperceptible with distance*.

Human Health

The potential risks or nuisances that may be caused to human beings during the operation phase have been assessed in other sections of this report considering air quality, water quality, traffic, noise, and vibration. These are summarised below and also in Table 17.7:

- **Section 9 – Air Quality and Climate** determines that the operation of both the existing WwTP and the Proposed Development will have no significant impact on local air quality as there are no significant sources of air pollutants involved. As there will be no additional traffic flows to the plant, no operational impact is predicted. In view of the size and scale of the Proposed Development, GHG emission from operational road traffic, space heating of buildings are not considered to be significant.
- **Section 10 – Noise and Vibration** attributes the low frequency tone resulting in an existing ‘shrill noise’ audible off site to the plant blowers. With the fitting of suitable noise attenuation enclosures to the existing and proposed additional blowers, a negligible to minor positive long-term operational impact is anticipated. **Section 9** considers that there will be no impacts on vibrations during the operational phase.
- It is not envisaged that the operational phase of the plant traffic will result in any additional trip per day generation. **Section 7- Traffic and Transport** considers that there will be no significant impacts arising during the operational phase.
- As noted previously, the enhanced water quality and increased WwTP capacity arising from the Proposed Development will facilitate growth in the local residential and employment sector. It will support the delivery of plans for the area within the Limerick Development Plan, support strategies, policies, and initiative. There is a positive correlation between availability of housing and employment and population health and wellbeing. This is considered to be a significant to moderate, long-term positive effect.
- It should be noted however, that accidental discharge, spillage of untreated wastewater into watercourse or groundwater table is included in the operational risk register in **Section 18**, either through accidental spillage, long-term seepage or an extreme flood event. In the absence of mitigation this has the potential to have a short-term significant indirect impact, to varying degrees, on the recreational and sports users, primarily based in the University of Limerick Boathouse and users of the riverside walkways. These risks however, apply to a greater extent to the existing WwTP, with the proposed works minimising the existing risk.
- The introduction of storm storage tanks will regulate the WwTP outflow and reduce the risk of downstream flooding, with a consequent positive impact on human health. This is considered to be a moderate, long-term positive effect.
- However, it should be noted that the risk register in Section 18 includes flooding of parts of the WwTP site during the operational phase, taking into account potential for extreme weather events. This has the potential to impact on human health as a consequence of contamination of the Shannon River. How the proposed Finished Floor Level of > 1% AEP and use of freeboard are designed to address this. **Section 18** considers any local effects will be of short duration and will not unduly impact on the functioning of the Castletroy community or the University of Limerick campus.

- The risk register in **Section 18** includes fire/explosion of the WwTP site due to equipment or electrical fault or human error. In addition, it includes collapse or damage to the structure during the operational phase, due to earthquakes or vehicular collision. These have the potential to impact on the health and safety of WwTP staff and nearby recreational users. **Section 18** considers the likelihood of these risks as extremely unlikely and appropriate management procedures will be put in place to minimise any risk arising from these unlikely events.

Table 17.7: Summary of Operational Impacts

Human Health	Impacts Without Mitigation
Air Quality	imperceptible, long-term
Odour	Positive, slight, long-term
Climate	No impact
Flood mitigation	Positive, moderate, long-term
Noise	Positive, negligible, long-term
Vibration	No Impact
Traffic	neutral, long-term
Water Quality – increased discharge	neutral, imperceptible, long-term on Lower River Shannon
Water Quality – stormwater storage	Positive, significant, long-term on Shannon River
Landscape	Negative, slight to imperceptible, long-term
Population	Positive, significant, long-term on population number
Employment	positive, significant, long-term on employment growth
Settlement Pattern	Positive, moderate, long-term
Recreational Use	Positive, moderate, long-term
Major Accidents & Disasters	negative, low-risk scenarios, short-long-term

17.5 Mitigation Measures and Monitoring

It has been determined that there are likely to be potential impacts on population and human health principally during the construction phase of the scheme. Therefore, these aspects are considered further in the EIAR, and the following mitigation measures have been identified.

17.5.1 Construction Phase

- In terms of management and control of air quality and fugitive dust emissions, Section 9 outlines a suite of mitigation measures. These include a communication strategy, a dust management plan and site management measures. The key identified aspects will be incorporated into the overall Construction Environmental Management Plan (CEMP) prepared in respect of the Proposed Development (**Appendix 5A**).
- Early consultation has been established with local residents and water-based recreational users of the University of Limerick Boat House in the form of a public consultation event on the 13th June 2022.

In addition, the college was informed of proposals and a social media drive and poster, and paper campaign carried out in the area. This is required to minimise any impacts on the Proposed Development on these stakeholders. While it is noted that as all works are confined within the site boundary and envisaged direct impacts on these stakeholders are considered to be minimal, the timeframe of the proposed works in general and specific works impacting indirectly on recreational uses will be communicated to ensure that any impacts from these works are minimised.

- A Traffic Management Plan will be prepared by the design team in consultation with Limerick Council, UL and other stakeholders. This will co-ordinate the management of vehicular, pedestrian and cyclist traffic adjacent to the site including road closures and diversions, to mitigate any traffic congestion or road safety impacts which may arise for road and pavement users. It will propose signage and manning the hazard spots during busy periods with close liaison proposed with UL throughout the construction phase.
- All construction traffic shall use Harvard Close via Junction 1 – Plassey Park Road/ Harvard Close travelling to/from the site, to minimise any potential for temporary disruptions to the operation of University of Limerick and businesses in the vicinity. Passing bays or banksmen will be provided on Harvard Close to ensure smooth traffic movement. Where possible abnormal load movements, on receipt of a permit from the council, will be restricted to off peak times.
- Construction staff parking will not be permitted on the public road network. Restrictions to the movement of tracked vehicles and haul loads shall apply, in conjunction with the use of wheel washers and water bowsers to prevent migration of detritus and dust built-up on public roads.
- **Section 10** includes a comprehensive suite of construction noise mitigation measures with best practice being adopted to monitor and limit the hours when high noise levels are permitted; restrict construction traffic speeds, establish channels of communication with stakeholders; train construction staff in noise minimisation, select and locate plant to minimise noise levels.
- **Section 13** notes that existing mature vegetation critically screens views towards the Proposed Development, this will be protected and enhanced. Temporary hoardings will be put in place should this be deemed necessary to screen glimpses of the construction zone.
- In terms of flood risk **Section 14** notes that all new infrastructure will be constructed within Flood Zone B and C, in the small area where this is not possible, commensurate compensatory storage will be provided. Essential infrastructure will be constructed at an elevation above the 1% Annual Exceedance Probability with the inclusion of freeboard.
- In terms of water quality, during the construction phase best practice will be adopted, to ensure contaminated runoff and stormwater or any resuspended silt particles do not pose a risk to the Lower River Shannon.
- The monitoring measures outlined in **Sections 7, 8, 9, 10, 13 and 15** will be undertaken during the construction phase and will identify any issues arising during this phase of the Proposed Development.

17.5.2 Operational Phase

Overall, it has been determined that it is unlikely that there will be many potential negative impacts on population and human health during the operational phase of the scheme, conversely it is considered it will have significant positive impact on the area and the community. Therefore, mitigation measures have not generally been deemed necessary during the operational phase of the Proposed Development. **Section 10** notes in relation to plant noise that the proposed fitting with suitable noise attenuation enclosures on existing and proposed blowers will reduce existing noise emissions. Section 14 notes that on receipt of planning permission it is expected that a License Review Application will be made to EPA to review the Emission Limit Values (ELV) for the plant.

17.6 Residual Effects

17.6.1 Construction Phase

Once the mitigation measures as proposed are implemented no residual significant impacts are expected to arise as a result of the construction and operation of the Proposed Development. However, the overall Proposed Development will result in a *slight, negative and short-term impact in relation to traffic* and a *temporary, moderate, negative landscape and visual impact within 0.5km* during the construction phase.

17.6.2 Operational Phase

Once the mitigation measures as proposed are implemented, no residual significant negative impacts are expected to arise as a result of the operation of the Proposed Development. **Section 14** states in relation to water that the residual impact will be the maintenance of, and potential to improve, water quality in the Lower River Shannon, whilst supporting domestic and industrial growth the agglomeration. **Section 10** concludes that the Proposed Development will result in a *negligible to minor long-term* noise reduction with the fitting of a suitable noise attenuation enclosure around the existing blowers. In terms of odour, **Section 8** predicts a *'slight, permanent, and positive'* impact on population and human health during the operation phase.

Section 13 notes that the Proposed Development is expected to have a permanent, slight, negative landscape and visual impact within 0.5km during the construction phase, reducing to negligible at distances beyond that. However, it considers that the Proposed Development will also have a positive impact on the landscape character along the Lower River Shannon by improving the quality of the vegetation and provided amenity.

17.7 Cumulative Effects

17.7.1 Construction Phase

The potential environmental effects of the Proposed Development have not been assessed in isolation and a review of other relevant permitted or Proposed Development in the vicinity of the site was undertaken (**Section 20**). Ongoing consultation has been held with UL to ensure the Proposed Development will not impact on any of the university's future development plans. Arising from this we are not aware of any UL proposals located in the vicinity of the proposed works in the short-term. In addition to those permitted residential developments, the following projects were identified as ones which may result in cumulative environmental impacts:

- Kings Flood Relief Scheme,
- Castleconnell Flood Relief Scheme,
- Corbally Baths Project,
- Bunlicky WwTP upgrade.

However, it is considered that this project does not have the potential to result in cumulative impacts with regards to Population and Human Health.

17.7.2 Operational Phase

As above, it is considered that there are no projects or plans identified in proximity that have the potential to result in cumulative impacts with regards to Population and Human Health.

17.8 Difficulties Encountered in Compiling Information

There were no difficulties encountered in compiling the Population and Human Health Impact Assessment.

17.9 References

Central Statistics Office (CSO) Census 2011 & 2016 data;

Quarterly Economic Commentary Summer 2021, ESRI;

AIRO Census mapping;

Southern Regional Assembly Regional Spatial and Economic Strategy;

Limerick Development Plan 2022-2026;

Clare County Development Plan 2017-2023;

Castletroy Local Area Plan 2019-2025 (lapsed).