RESIDENTIAL DEVELOPMENT CRATLOE ROAD – PROPOSED PHASE 3

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Main Report & Non – Technical Summary

APPLICANT
Riverpoint Construction Limited
April 2023

HRA | PLANNING
chartered town planning consultants

HRA | PLANNING
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In Association With

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Title:	Environmental Impact Assessment Report for Residential Development Cratloe Road – Proposed Phase 3	
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MAIN REPORT **.... PAGE**

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Part A – Non-Technical Summary

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1.0 INTRODUCTION

This Environmental Impact Assessment Report (EIAR) has been prepared on behalf of Riverpoint Construction Limited for a proposed residential development for a residential development on land located between the Old Cratloe Road and Pass (Meelick) Road in the western environs of Limerick City. Planning permission is sought to construct 98 no. residential units on a planning application site of 9.45 hectares and a net residential development area of 2.83 hectares. The full extent of the site is detailed in Figure 1.1.

This EIAR has been prepared in response to a further information request issued under Article 103(1)(b)ii of the Planning and Development Regulations 2001 as amended (the Regulations) by Limerick City & County Council under planning reference 22/959. The further information requested that,

> *"Information as specified in Schedule 7A of the Planning and Development Regulations 2001 for the purposes of EIA Screening determination is required. The information should include the results of the Article 33 request which concerned the potential for cumulative impact considerations having regard to existing and or permitted development".*

A Screening Assessment of the development proposal, including the proposed masterplan was undertaken having regard to the information required under Schedule 7A, taking into account, where relevant, the criteria set out in Schedule 7 of the Regulations. The cumulation of the impact with the impact of other existing development the subject of a consent for proposed development for the purposes of Section 172(1A(b) of the Act was considered and in particular the cumulative impact arising from the overall masterplan proposal which will provide for a total of 448 no. residential units, childcare facility and neighbourhood centre (4 no. commercial units) on an overall site of 22.53 hectares.

The proposed residential development of 98 no. residential units on a site of 9.45 hectares does not exceed the criteria set out for mandatory Environmental Impact Assessment (EIA).

Section 172 of the Planning & Development Act 2000, as amended, does set out the basis for EIA for developments which do not equal or exceed, the relevant quantity, area or other limit specified in Part 2 of Schedule 5, i.e., "sub-threshold development". Cumulatively, when the proposed development is considered in conjunction with previous phases of development (only Phase 1 has been granted permission), the extent of the overall phased masterplan proposal exceeds the mandatory EIA threshold of 10 hectares in a built-up area. Accordingly, it was deemed appropriate to consider the potential for significant effects on the environment and to prepare an EIAR in relation to the subject development, to ensure that the proposed development, in its own right and when considered in conjunction with the overall masterplan, would not negatively impact on the environment.

1.1 Proposed Development

The development as described in the public notices is set out hereunder.

> *Planning permission for the construction of 98 residential units comprising of the following: 44 No. 2 storey, 4 bed, semi-detached units; 44 No. 2 storey, 3 bed, semi-detached units; 6 No. single storey 2 bed, end of terrace units and 4 No. single storey 2 bed, mid terrace units. Installation of all necessary and associated site works to include vehicular and pedestrian connections to public roundabout (currently under construction) on Pass (Meelick) Road, roadways, footpath, green*

spaces, landscaping and boundary treatments, together with all associated drainage connection works and all ancillary site works.

Following a request for further information the mix of units proposed on the site has changed to 10 no. 2 bed units, 42 no. 3 bed units and 46 no. 4 bed units. It is this mix of units which is considered in this EIAR.

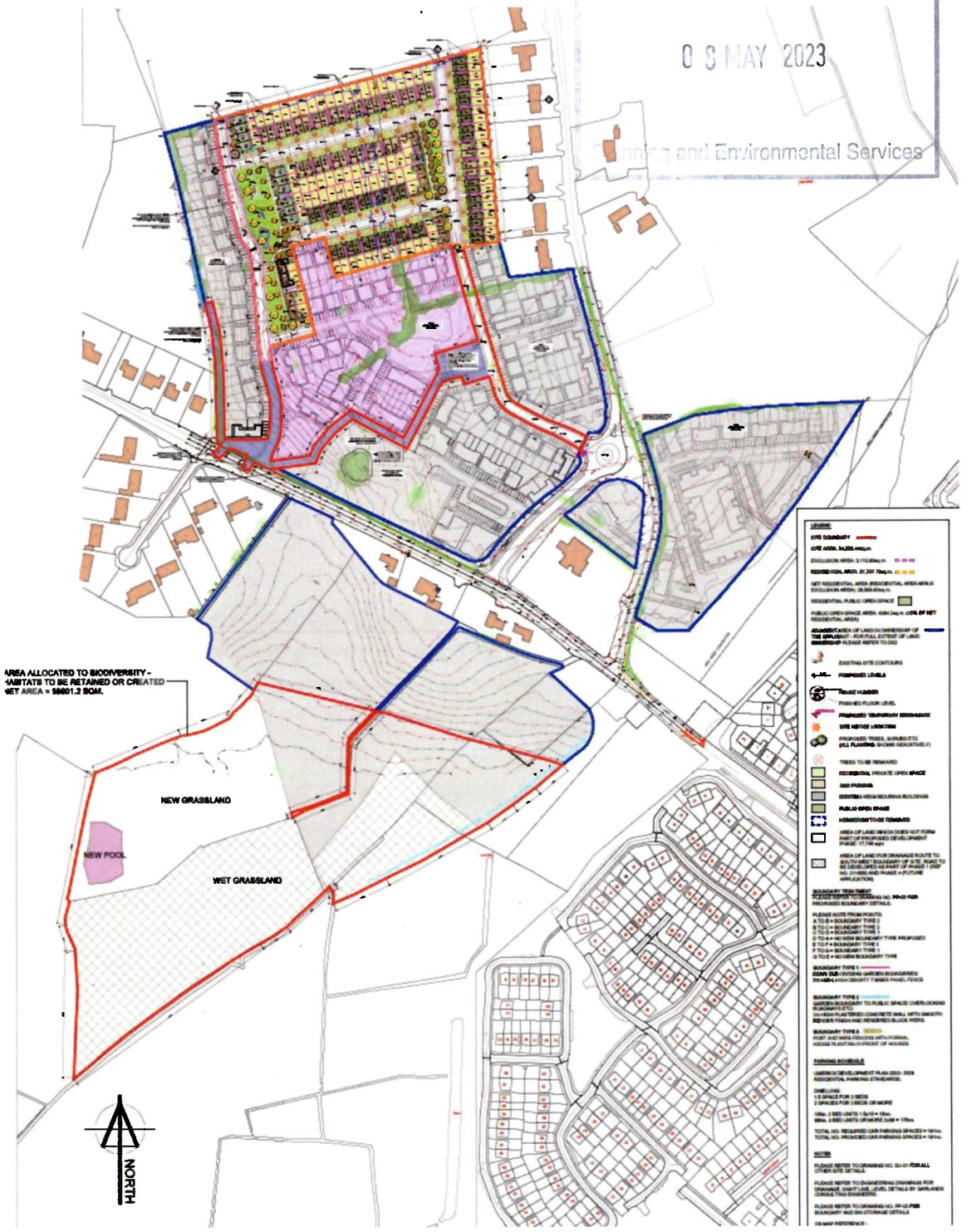

Figure 1.1 Site Extent as Defined in Red in Context of Masterplan Site

1.2 Function of the Environmental Impact Assessment Report

This EIAR is a statement of the potential significant effects that the proposed development may have on the receiving environment. The primary objective of the EIAR is to identify the baseline environmental context of the proposed development, predict potential beneficial and/or adverse effects of the development and propose appropriate mitigation measures where necessary.

The EIAR has been prepared following the logical analysis of the development proposal in relation to the receiving environment. This process of environmental impact 'assessment' and the preparation of this EIAR has been an evolving process which commenced at the project design stage and informed the overall design of the development so that potential adverse effects were omitted, reduced or off-set by design modification.

1.3 The Indicative Masterplan

Whilst the proposed development comprises an application site of 9.45 hectares, the applicant owns and is proposing development on an overall site of 22.53 hectares. A holistic approach to development has been adopted and an overall masterplan has been prepared for 22.53 hectares of land with capacity to deliver circa 448 no. residential units, a childcare facility and neighbourhood centre (4 no. commercial units) as detailed in Figure 1.2. However, this total number is likely to change and can only be finally determined once planning permission has been secured for each phase of development. In terms of infrastructure and planning for future development, the roads and water services have been planned from the outset to ensure adequate capacity to serve the entire masterplan area.

Delivery 1 and Phase 1 of the overall development has been granted planning permission for 99 no. residential units.

Table 1.1 clarifies the intent of the overall development site in terms of a phased approach to development and the delivery of units within each phase of development as detailed in Figure 1.2. This is provided as an indication of future development on site but could be subject to change as each development proposal is advanced and planning permission is sought.

Delivery	Development	Gross Site Area	Status	Plan Ref. No.
Delivery1	Phase 1 - 99 residential units	3.31 ha.	Planning permission granted. On appeal to An Bord Pleanála	P21/1800
Delivery 2	Childcare Facility.	0.43 ha.	Granted Permission	P22/790
Delivery 3	Phase 2 - 86 residential units	219 ha.	Further Information Request	P22/817
Delivery 4	12 residential units & neighbourhood facility	1.40 ha.	Further Information Response Submitted	P22/917
Delivery 5	Phase 3- 98 residential units	9.45 ha.	Subject Development	P22/959
Delivery 6	Phase 4 - 54 residential units	2.55 ha.	Further Information Request	P22/1114
Delivery 7	Phase 5 - 99 residential units	2.87 ha.	Future development	

Table 1.1 Phased Approach within Overall Masterplan

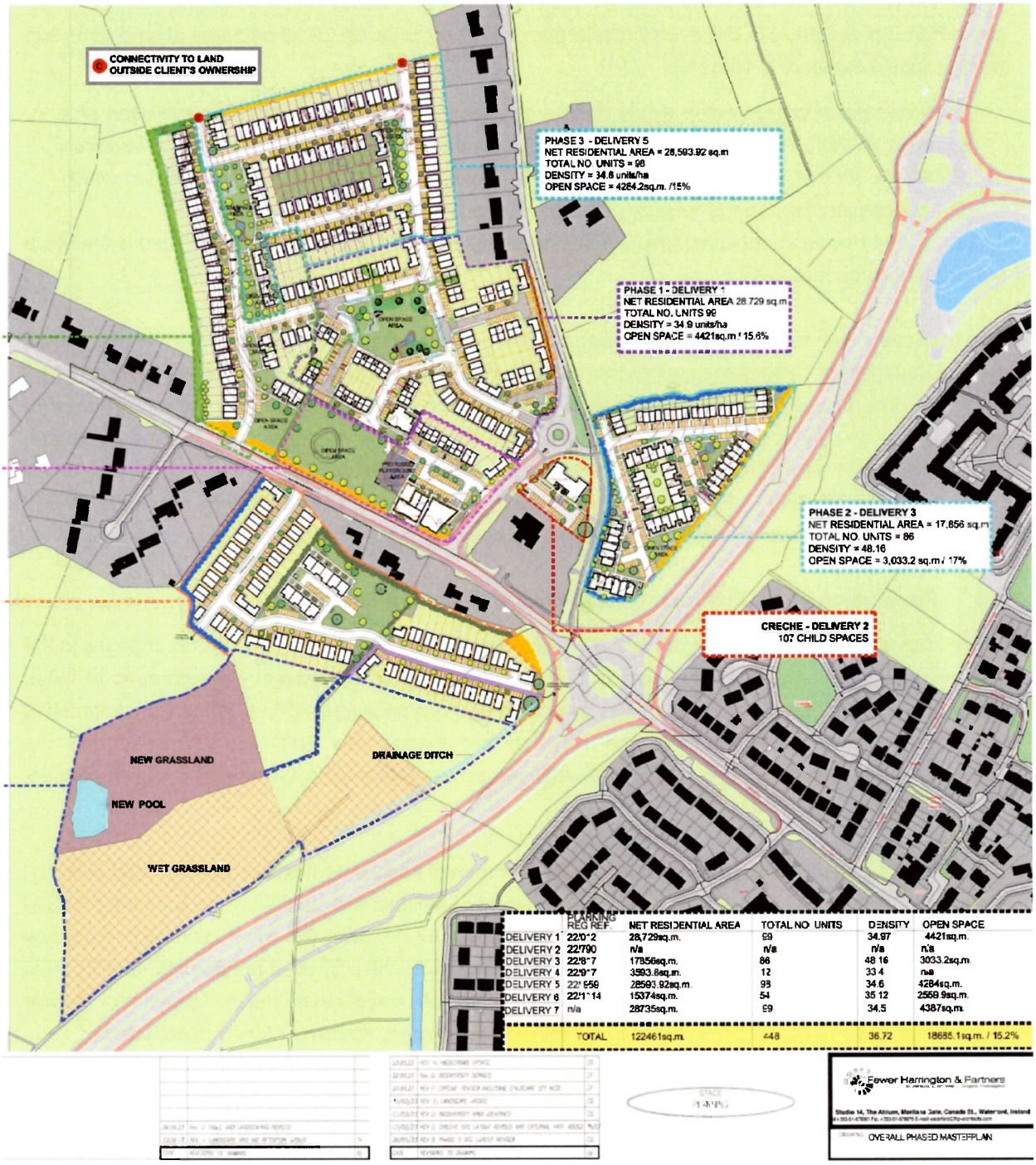

Figure 1.2 Indicative Masterplan Proposal

1.4 Statutory Requirement for Environmental Impact Assessment Report

Proposed development which falls within one of the categories of development specified in Schedule 5 of the Planning and Development Regulations 2001, as amended, which equals or exceeds, a limit, quantity or threshold prescribed for that class of development must be accompanied by an EIAR.

The subject development does not fall within development classes set out in Part 1 of Schedule 5.

Whilst the proposed development of 98 no. units does not in itself fall within a development class set out in Part 2 of Schedule 5, the overall masterplan of 448 no. units on 22.53 hectares of land does and the applicable category is 10(b)(iv).

> *(iv) Urban development which would involve an area greater than 2 hectares in the case of a business district, 10 hectares in the case of other parts of a built-up area and 20 hectares elsewhere. (In this paragraph, "business district" means a district within a city or town in which the predominant land use is retail or commercial use.)*

The proposed development comprises 9.45 hectares (as defined by red line boundary) and is therefore sub-threshold mandatory EIA.

The application site is located within the edge of the built up area of the western environs of Limerick City. A threshold of 10 hectares applies to a built-up area. The overall masterplan site comprises 22.53 hectares. The proposed development, when considered in conjunction with the previous phases of development on a total of 7.33 hectares of land, will cumulatively exceed the 10 hectare threshold. Having regard to development which has already occurred within the masterplan area and future residential development, which is likely to be delivered, a non-mandatory EIAR has been prepared in the interests of the proper planning and sustainable development of the area.

1.5 Preparation of the Environmental Impact Assessment Report

The effects on the receiving environment are measured as the likely natural or physical changes in the environment resulting directly or indirectly from the development processes. Consideration of these effects was undertaken by assessing the proposed development against the defined environmental variables set out in the Planning and Development Regulations 2001, as amended and the Environmental Protection Agency (EPA) 'Guidelines on the Information Contained in Environmental Assessment Reports', 2022

In order to ensure an effective and conclusive environmental assessment consistent with best practice, the assessment of potential effects on the environment examines; the effects arising from the physical characteristics of the proposed residential development of 98 no. units (for which planning permission is sought) and also; the collective cumulative effects of the overall proposed masterplan development if and whenever it is implemented. The examination of the 'all phase' development scenario for the site is consistent with best practice in order to examine a 'worst-case' scenario of the project effects.

1.6 Technical Difficulties or Lack of Data

The compilation of the information necessary for the EIAR did not present any significant difficulties. However, some assumptions and projections were necessary for certain areas of this assessment, particularly the traffic and noise assessments. Survey work has been undertaken to compliment data from official sources in order to provide up-to-date base line information on which to undertake the environmental assessments. This EIAR has been prepared on the best available information and in accordance with current best practice and guidelines published by the Environmental Protection Agency.

1.7 Competencies of the Team

The preparation of this EIAR has been project managed by HRA | PLANNING Chartered Town Planning Consultants. The project management team hold recognised professional qualifications in Town

Planning, Environmental Impact Assessment Management, and in Ecological Assessment. The assessment has been prepared with other specialist professional inputs as specified Table 1.2.

Chapter of EIAR	Author(s)	Company	Subject Area	Qualification
Part A	Mary Hughes	HRA Planning	Non-Technical Summary	BA (Hons) MSc PGDip EIA Mgmt. MIPI Town Planning Consultant
Part B				
Chapter 1	Mary Hughes	HRA Planning	Introduction	BA (Hons) MSc PGDip EIA Mgmt. MIPI
Chapter 2	Mary Hughes	HRA Planning	Project Description	BA (Hons) MSc PGDip EIA Mgmt. MIPI
Chapter 3	Mary Hughes	HRA Planning	Residential Need & Spatial Planning Policy	BA (Hons) MSc PGDip EIA Mgmt. MIPI
Chapter 4	Mary Hughes	HRA Planning	Project Scoping & Consultation	BA (Hons) MSc PGDip EIA Mgmt. MIPI
Chapter 5	Mary Hughes	HRA Planning	Examination of Alternatives	BA (Hons) MSc PGDip EIA Mgmt. MIPI
Chapter 6	Mary Hughes	HRA Planning	Population & Human Health	BA (Hons) MSc PGDip EIA Mgmt. MIPI
Chapter 7	Jane Russell – O'Connor	Russell Environmental	Biodiversity	PhD, P.G.C.E, BSc.
Chapter 8	Brian Lahiff	Garland Engineering	Land & Soils, Geology & Hydrogeology	BE, PGradDip.CEng MIEI
Chapter 9	Brian Lahiff	Garland Engineering	Hydrology – Surface Water & Flooding	BE, PGradDip.CEng MIEI
Chapter 10	Ciara Nolan	AWN Consulting	Air Quality & Climate	BSc. MSc. AMIEnvSc, AMIAQM
Chapter 11	Leo Williams	AWN Consulting	Noise & Vibration	BAI MAI PgDip MIOA
Chapter 12	Brian Coakley	Coakley Consulting Engineers	Material Assets - Traffic & Transport	
Chapter 13	Brian Lahiff Mary Hughes	Garland Engineering CSD Engineers HRA Planning	Material Assets – Built Services	BE, PGradDip.CEng MIEI BA (Hons) MSc PGDip EIA Mgmt. MIPI
Chapter 14	Brian Lahiff Mary Hughes	Garland Engineering HRA Planning	Material Assets – Waste Management	BE, PGradDip.CEng MIEI BA (Hons) MSc PGDip EIA Mgmt. MIPI
Chapter 15	Martin McGonigle & Tony Cummins	John Cronin & Associates	Cultural Heritage - Archaeology	BA Msc BA MA
Chapter 16	Kevin Fitzpatrick	Kevin Fitzpatrick Landscape Architecture	The Landscape – LVIA	
Chapter 17	Mary Hughes	HRA Planning	Interaction with the Foregoing	BA (Hons) MSc PGDip EIA Mgmt. MIPI
Chapter 18	Mary Hughes	HRA Planning	Summary of Mitigation Measures	BA (Hons) MSc PGDip EIA Mgmt. MIPI

Table 1.2 Competent Persons Preparing the EIAR

2.0 PROJECT CHARACTERISTICS

2.1 Site Description

Masterplan Site

The site is located approximately 3.5km from Limerick City centre, in the western environs of the city, adjoining the built-up area and existing residential development. The general area comprising the masterplan site has a rural feel, notwithstanding significant residential and educational developments immediately to the east.

The proposed masterplan site is ideally located and is surrounded by an existing and future road network (currently under construction) with easy access to Limerick city centre, the national road network and the TUS (Technological University Shannon) campus formerly LIT. A well-lit roadside footpath and other pedestrian facilities extends from the site towards the city centre on the Old Cratloe Road. A 6 minute walk from the site to the bus stop provides connectivity across the city via bus route No.302 on the Old Cratloe Road.

The masterplan site is bound by the Old Cratloe Road to the south and the Meelick Road to the east, both of which are being upgraded and realigned as part of the Coonagh–Knockalisheen Distributor Road scheme which is currently on site and expected to be complete by 2025/25. This part of the city is the gateway from the west, containing many housing developments from the 1960s all of which are low rise, in keeping with their surroundings.

The topography of the overall masterplan site is undulating with some localised peaks. The overall site has a high point of +18.00mAOD (Malin Head) in the north east corner. From here the land falls away to the Southeast, South and West. The ground profile falls to a low point of +5.00mAOD (Malin Head) along the southern boundary of the site. The land has typical gradients of 2.3% to the Southeast, 2.9% to the South and 7.7% to the West. Currently, the site comprises a parcel of agricultural land. The area proposed for development is set within a former golf course which was still in use in the 1990s but reverted back to agricultural use by 2000.

The masterplan lands benefits from three different land use zonings, with the primary land use comprising 'New Residential Use'. The objective of this landuse is "to provide for new residential development in tandem with the provision of social and physical infrastructure". The other landuse zonings are positioned fronting onto the Old Cratloe Road, including 'Open Space Use' (surrounding an existing archaeological monument) and a 'Local Centre Use'. Whilst the objective of the open space use is "to protect, provide for and improve open space, active and passive recreational amenities", the objective of local centre use is "to protect and provide local centre facilities to serve the needs of new/existing neighbourhoods and residential areas".

Application Site

The 9.45 hectares application site sits within a wider undeveloped greenfled site for which a masterplan has been prepared. The application site is located wholly on lands zoned for 'New Residential Use'. The purpose of this zoning is intended primarily for new high quality housing development.

The topography of the site is undulating and falls from east to west. Existing site levels within the development lands are between 6.0 m and 18.0 m AOD. There are boundary hedgerows to the north of the site and perpendicular to these is a hedgerow that partially bisects the field. A number of detached, one off houses fronting onto the Meelick Road defines the eastern boundary of the site.

The Zone of Notification (ZoN) for one recorded archaeological site (as recorded by the Archaeological Survey of Ireland (ASI)) is located within the boundary of the proposed development site, Children's burial ground (LI005-007---). Although this archaeological monument is located outside of the defined application site boundary and will be preserved in situ, proposed access roads will encroach slightly into the ZoN surrounding it. Chapter 12.0 of this EIAR deals further with archaeology and cultural heritage.

Based on the OPW CFRAMs Map, the site is located outside Flood Risk Zones A and B and is, therefore located in Flood Risk Zone C. The 1 in 1000 year coastal and fluvial flood levels in this area are at 2.90m and 2.15m respectively. Existing site levels within the development lands are between 6.0 m and 18.0 m AOD more than 3m above the 1 in 100 year flood levels. The issue of flooding is dealt with further in Chapter 9.0.

The site is located within an area of built development and agricultural land, is currently grazed by horses and pomies and so is comprised of low value biodiversity habitats. Biodiversity is dealt with further in Chapter 7.0 of this EIAR.

The land is not located within or adjoining any Natura 2000 designated sites. There is a drainage ditch in the field (outside of the application site) to the west which connects with the Lower River Shannon Special Area of Conservation (SAC) and River Shannon and River Fergus Estuaries Special Protection Area (SPA) some 1.7km distant from the site. Given the local hydrological pathways links between the site and these designated areas to these areas, a Natura Impact Statement (NIS) has been undertaken and accompanies the planning application for development.

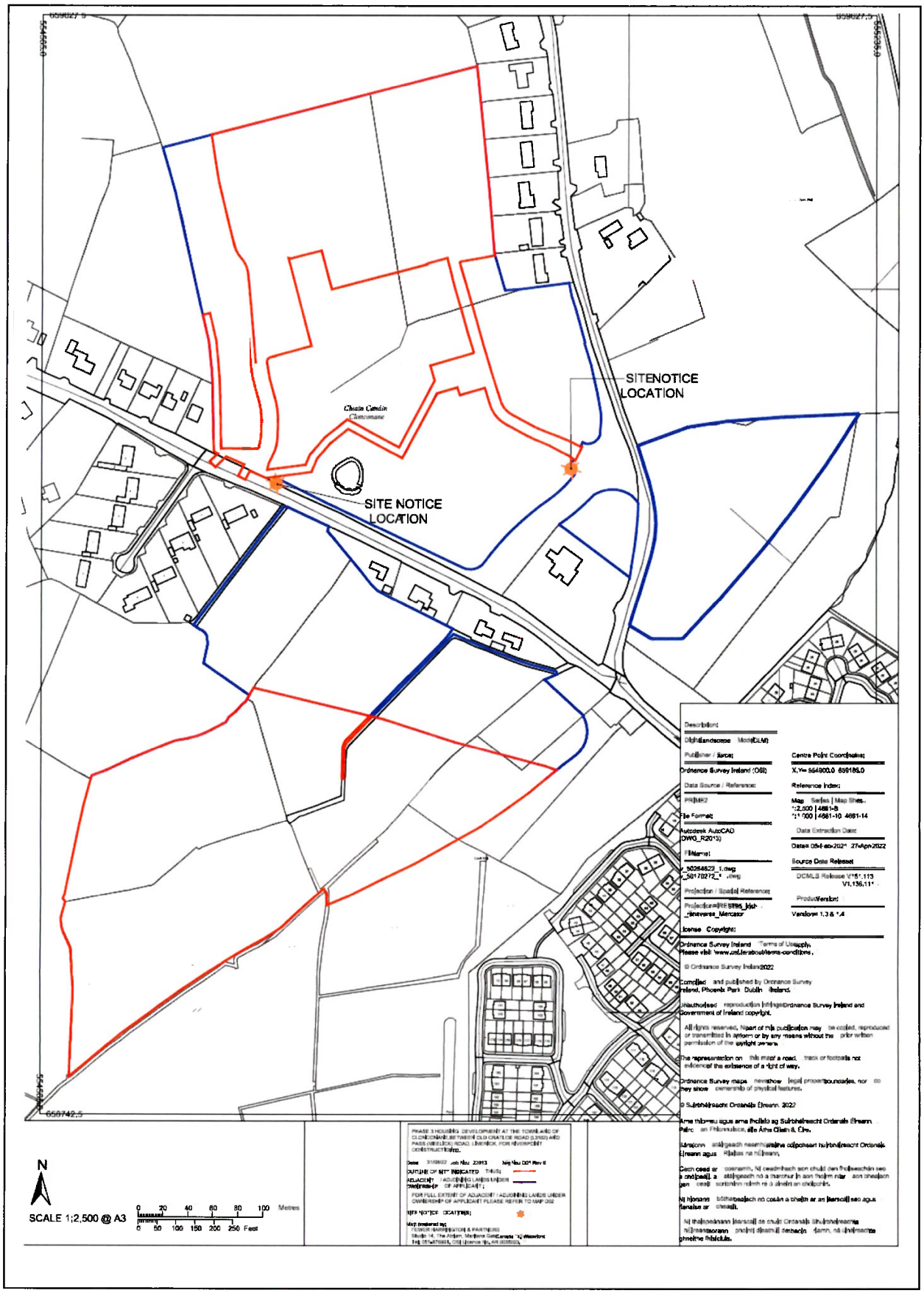

Figure 2.1 Site Location Map – Application Site Defined in Red

2.2 Proposed Development

Based on the key principles set out in the Limerick Development Plan 2022 - 2028, Fewer Harrington Architects have developed a comprehensive design for the overall masterplan site and the planning application site. Full details of the proposed development can be found in the plans and drawings accompanying the planning application. The Site Layout comprising the development proposal is detailed in Figure 2.1 and seeks to achieve a high quality landscaped park style environment, in accordance with the requirements of the Development Plan.

Development Statistics				
	Application Site		**Indicative Masterplan Site**	
No. of Units	98 units		448 units	
Unit Mix	Number	Percentage	Number	Percentage
2 bed house	10	10.1%	81	18%
3 bed house	42	42.9%	150	33.4%
4 bed house	46	47%	118	26.3%
5 bed house	0	0	30	6.6%
1 bed apartment	0	0	26	5.8%
2 bed apartment	0	0	44	9.8%
Site Area Gross	9.45 hectares gross		22.53 hectares	
Site Area Net	2.8 hectares		12.25 hectares	
Density	34.6 units per hectare		37.3 units per hectare	
Gross Floor Area	10,677sqm		TBC	
Building Height	1 & 2 storey		1 & 2 & 3 storey	
Public Open Space	15%		13.6% proposed plus zoned open space area results in total of 17.9%	
Creche	No		Yes – 107 no. children & 8 no. staff capacity	
Local Centre	No		Yes – 2 no. retail units, coffee shop & foodstore	

Table 2.1 Development Statistics

The application site is irregular in shape, purposively designed to accommodate future phases. The entrance to the site will be accessed from the permitted Delivery 1, Phase 1 development and the re-alignment of the Pass (Meelick) Road. This entrance will also give access to the Meelick Road to the north and also to the Old Cratloe Road to the east and west.

The design of the scheme adopts an efficient grid-type urban form with residential buildings arranged around a series of pocket green spaces, generally characterised as tree-lined lawns similar to a village green. The proposed development has been designed to create views throughout the development looking towards the central communal open space for this phase and subsequent phases, thereby accommodating legibility within the site and contributing towards enhanced urban design within the overall scheme.

The blocks of development largely comprise two storey semi-detached units with terraced units bookending the rows of housing, effectively responding to the scale of neighbouring two storey developments. The proposed development is set back into the masterplan site, positioned at a minimum

of 32m distance to the rear of the nearest dwellings, thereby maintaining privacy and protecting existing residential amenity.

A large area of public open space area is positioned on the western site boundary, intended to serve the proposed development. The open space is provided with passive surveillance from the bungalows and semi detached units to the north and east. Additional phases will bring additional passive surveillance to the open space. The development is distinct in character and will use a number of contrasting brick tones and a plastered finish. A consistent built form and design approach through the proposed development and future phases facilitates a sense of identity and place.

To the south of the site, on the southern side of the Cratloe Road, it is proposed to develop and maintain an area of biodiversity. The area primarily comprises wet grassland and it is proposed to develop a new grassland area with a water pool. It is intended that the habitats that will be lost as a result of the overall Masterplan development will be replaced with the proposed habitat area that have the potential to be of higher conservation value and therefore the overall evaluation of the biodiversity will be that of net gain (See Chapter 7.0 for further detail)). The habitat to be created is clearly identified on the Landscaping Plan accompanying the planning application.

3.0 NEED & SPATIAL PLANNING POLICY

This chapter of the EIAR demonstrates that the proposal is in compliance with the provisions of national, regional and local planning policy and that it is consistent with relevant Ministerial Guidelines in relation to the development of apartment units and denser development. The proposed development and wider Masterplan will provide a significant number of housing units on a site which is located in proximity to Moyross, a defined regeneration area, Technology University Shannon and Thomond Park.

The proposed development complies with a number of the NPO's within the ***National Planning Framework*** with particular regard to development within the existing built up footprint of a settlement. Specifically, the NPF notes that Limerick has the potential to generate and be the focus of significant employment and housing growth to 2040. It is necessary for Limerick to further strengthen its position as the principal focus within the Region and to continue to address the legacy of regional growth having occurred outside the City area. This requires growing and diversifying the City's employment base and attracting more people to live in the City, both within the City Centre and in new, accessible green-field development areas. This means improving housing choice, supported by facilities and infrastructure.

The NPF further notes in National Policy Objective 10 "*There will be a presumption in favour of development that encourages more people, jobs and activity within existing urban areas, subject to development meeting appropriate planning standards and achieving targeted growth*".

Rebuilding Ireland – Action Plan for Housing and Homelessness (2016) was launched in 2016 with the aim of addressing ongoing supply issues for residential accommodation in Ireland. The overarching aim of the Action Plan is to increase the delivery of housing from its current undersupply across all tenures and to help individuals and families meet their housing needs. The Action Plan provides a target to double the number of residential dwellings delivered annually by the construction sector and to provide 47,000 social housing units in the period up to 2021.

The ***Sustainable Urban Housing Design Standards for New Apartment (2022)*** provides for an update on guidance on apartment developments in response to the National Planning Framework and Rebuilding Ireland. These Guidelines seek to promote high density apartment development on residentially zoned land in appropriate locations in line with the above referenced NPF overarching policies in relation to encouraging residential development within existing urban settlements.

The Urban Design Manual – A Best Practice Guide (2009) notes 12 no. criteria that should be used to facilitate assessment of planning applications and should, therefore, be used as a guide to steer best design practice for residential proposals. As detailed in the Design Statement prepared by the project architects Fewer Harrington & Partners, the proposed development has been designed taking into account the 12 no. detailed design principles.

Delivering Homes, Sustaining Communities (2007) provides the overarching policy framework for an integrated approach to housing and planning. It notes that demographic factors will continue to underpin strong demand for housing, which in turn will present considerable challenges for the physical planning of new housing and the provision of associated services. Sustainable neighbourhoods are areas where an efficient use of land, high quality design, and effective integration in the provision of where people want to live in.

The ***Sustainable Residential Development in Urban Areas Guidelines 2009*** advocate the use of 'Universal Design', whereby a development is accessible and usable by as many people as possible, regardless of abilities or age. The Guidelines encourage the sustainable and efficient use of land and seek to ensure that sustainable travel patterns are encouraged. A 6 minute walk from the site to the bus stop provides connectivity across the city via bus route No.302 on the Old Cratloe RoaD. It recommends a number of qualitative standards regarding open space provision, design, accessibility, shared use and SUDs. All of these elements have been incorporated into the proposed design approach.

A key objective of the ***Design Manual for Urban Roads and Streets (DMURS)*** is to achieve safe, attractive and vibrant streets by balancing the needs of all users, and prioritising alternatives to car journeys. The manual advocates a design-led approach, which takes account of both the physical and social dimensions of place and movement. Pedestrian and cycling connectivity both within and external to the site have been key design considerations, in particular linkages with the creche and proposed local neighbourhood centre.

The ***Climate Action Plan 2023 (CAP23)*** is the second annual update to Ireland's Climate Action 2019 and is fundamental in implementing the Climate Action and Low Carbon Development (Amendment) Act 2021. Key measures of the plan include ambitious home and business retrofitting and climate-based construction, and 500,000 homes retrofitted to BER B2 by 2030. Energy, sustainability and climate action are key considerations influencing the design of housing on the site. The development is being designed to NZEB (Nearly Zero Energy Buildings) standards. Passive design measures include the use of the building fabric to take advantage of the site constraints/orientation to maximise the daylight factors, natural ventilation and solar benefits. Natural daylight factors in accordance with BRE and CIBSE recommendations have been targeted.

The ***Regional Spatial and Economic Strategy for the Southern Region 2020*** confirms that the city of Limerick is a very important driver of national growth, a key regional centre that requires significant investment and growth. Limerick – Shannon is identified as a Metropolitan Area on the settlement typology. The MASP for Limerick – Shannon highlights the need to increase residential density in Limerick City and Shannon through a range of measures including reductions in vacancy, re-use of existing buildings. A dynamic approach to land-use within the footprint of existing settlements is sought by the RSES in order to maximise the opportunity of urban regeneration and infill sites to contribute to sustainable compact growth and revitalisation of our existing settlements of all scale.

The ***Mid-West Area Strategic Plan (MWASP)*** **proposes** measures to deliver population growth, infrastructure and job creation in specific areas targeted in the RPGs and to achieve balanced regional development to promote sustainable urban and rural development. An objective set out in this strategy is to strengthen the role of Limerick City and its Environs as the core economic driver for the Region.

In the ***Limerick County Development Plan 2022 (CDP)*** the subject land and site is identified as part of Limerick City and Suburbs, identified for significant growth as Level 1 in the Settlement Hierarchy. Located in an area defined as the 'Suburban Edge' in the CDP, the subject land actually adjoins the 'Intermediate Urban Location'. The CDP expects the city and suburbs of Limerick to grow with the provision of 11,054 residential units between 2022 – 2028. The land is located within Urban Character Area O5 (Thomondgate/Moyross/Caherdavin/Ennis Road) where it is a specific objective to promote infill and brownfield development; retain existing green spaces; and to respect and reinforce the landmark status of Thomond Park.

The proposed development has been designed taking the aforementioned objectives into account. Located on primarily residential zoned land, the proposed development in the context of the overall masterplan has been advanced on the basis of higher densities, with an overall density of 37.3 units per hectare across the masterplan site (estimated 448 no. units on 22.53 hectares of land). The proposed application site (Phase 3) has a density of 34.6 units per hectare.

The ***Limerick 2030 Spatial and Economic Plan*** sets a framework for public sector action and private sector investment until 2030. The first element of the 2030 Plan is an Economic Strategy which identifies how Limerick needs to be positioned in order to best take advantage of economic opportunities. The second element is a Spatial Plan focused on revitalising and redeveloping Limerick City Centre. There is little emphasis in the outer lying areas such as Cratloe in this plan. The final element is a Marketing Plan which aims to use Limerick's unique and positive attributes to change perceptions of how Limerick is viewed.

The ***Limerick Shannon Metropolitan Area Transport Strategy (LSMATS)*** has been prepared by the National Transport Authority (NTA), in collaboration with Limerick City and County Council, Clare County Council and Transport Infrastructure Ireland (TII). The strategy provides a framework for the planning and delivery of transport infrastructure and services in the Limerick Shannon Metropolitan Area over the medium to long term. LSMATS provides for the delivery of Bus Connects along the Old Cratloe Road fronting the site, ensuring a bus service and connectivity to the city centre every 10 minutes

4.0 SCOPING

The project was initially scoped with the applicant and within the design team based on the expertise and past experience of the EIAR contributors for similar projects. Existing activities and features on site and similar developments in other locations also informed the process, including previous and current planning applications adjacent to the subject site and within the overall masterplan site.

A total of 15 no. environmental aspects were assessed as part of the scoping process and justification provided on whether the environmental aspect was to be included and considered within the EIAR. Only 2 no. environmental aspects were omitted from consideration including Daylight & Sunlight and Major Accidents & Disasters.

In respect of Daylight & Sunlight it was considered that the scale of the development at only two and three stories is reflective of the scale of development in the general area. Accordingly, it is considered that the scale of the development will not result in adverse impacts from a daylight, sunlight and / or overshadowing perspective. In respect of Major Accidents & Disasters, the subject site is not located within any consultation distances of any Serveso II sites. As a result, there is no expected impact arising from major accidents or disasters in respect of the proposed development.

A pre-planning meeting was held with Limerick City & County Council on the 06th June 2021 and again on the 02nd June 2022 in respect of the proposed development for the entire masterplan site. Representatives from the Planning Department were present. The nature and extent of the proposed development in the context of the overall masterplan was presented at the meeting. A number of issues were raised and discussed with the planning authority in respect of the proposed development which have informed the overall design and have been comprehensively accommodated within the overall masterplan. The design rationale seeks to create a sustainable and successful development, providing a new sense of place with new services and facilities, but all within easy distance of the city centre. The development seeks to make the most efficient use of new road infrastructure in the area which has been delivered to facilitate development and open up lands for development purposes.

5.0 EXAMINATION OF ALTERNATIVES

This chapter provides an outline of the main alternatives examined throughout the design and consultation process. This serves to indicate the main reasons for choosing the development proposed, taking into account and providing a comparison of the environmental effects. In order to meaningfully consider alternatives relating to the proposed development of 99 no. units, consideration must be given to the evolution of the overall masterplan for the site. Once this has been considered then the logic for the development proposal becomes obvious, as it is just part of an overall intended scheme of development.
Prior to the acquisition, the site's ability to satisfy environmental criteria was considered by the applicant and it was found to offer the following attributes;

- The subject site offered the opportunity to bring a vacant greenfield site adjoined by existing residential development and educational uses into productive use, thus promoting the principles of compact growth.

- The site's location within a 6 minute walking distance of a bus stop on bus route No.302 on the Old Cratloe Road, along with its proximity to the Technological University Shannon (TUS) which has the potential to promote a modal shift from the private car to more sustainable forms of transport. This in turn would assist with achieving overarching environmental objectives such as improved air quality (CO2, NO2 and particulate emissions) and a reduction in noise pollution.
- The proximity of the site to significant employment nodes such as TUS, Thomond Park, Coonagh Cross, and Clondrinagh Industrial Estate would facilitate sustainable living in proximity to the workplace.
- The site is not subject to any statutory nature conservation designation and although there is a hydrological pathway via a drainage ditch which feeds into the flow network to a Designated European Site (Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA, any potential impacts can be mitigated through appropriate design measures.
- Given the site is zoned for development, and adjoins existing urban development to the east, including new road infrastructure, its capacity to absorb development without significantly effecting the existing landscape and visual characteristics of the surrounding area is high.
- The site is not located within an area identified as susceptible to flooding.

The key environmental and practical considerations which influenced the design of the proposed development and alternative locations and layouts on the subject lands included the following:

- The need to achieve sustainable densities in accordance with national guidelines Sustainable Residential Development in Urban Areas and the policies of the Limerick Development Plan 2022 - 2028, given the location of the subject site in proximity to services and facilities but also having regard to the existing public transport network on the Old Cratloe Road, which is due for improvement and upgrade under the Limerick Strategic Metropolitan Area Transport Strategy.
- The topography of the subject site and existing site features, including the Children's Burial Ground (archaeological site), significant hedgerows and neighbouring landuses.
- The need to ensure any residential development provides a good mix of housing types which meet current market demands and which are deliverable in the short to medium term.
- The need to provide for high quality open space.
- Protection of existing trees and hedgerows where possible to enhance the amenity and biodiversity of the area.
- The quality of the urban environment to be delivered and the associated impact on human health.
- Access, permeability and connectivity with surrounding areas and land uses.

The subject proposal has evolved during the design phase in response to input from the appointed EIAR team and advice received from Limerick City & County Council at pre-planning stage.. This iterative process inter alia highlighted environmental matters that informed the consideration of alternative layouts and designs including; open space provision, addressing the issues of population and human health in a city environment, biodiversity, and transportation, up to the formalisation of the final scheme which is being submitted to Limerick City & County Council for approval.

In light of the foregoing and following consideration of environmental and planning factors at a high level, it is considered that the subject site is an appropriate site for residential development from an environmental perspective.

EFFECTS ON THE ENVIRONMENT

Consideration of environmental impacts in the EIAR were generally restricted to areas that initial scoping had indicated could be impact upon by the proposed development. These included:

- Population & Human Health
- Biodiversity
- Land & Soils, Geology & Hydrogeology
- Hydrology – Surface Water & Flooding
- Air Quality & Climate
- Noise & Vibration
- Material Assets - Traffic & Transport
- Material Assets – Built Services
- Material Assets – Waste Management
- Cultural Heritage - Archaeology
- The Landscape – LVIA

Each of the above was considered in detail, having regard to both the environment as it currently exists prior to development, the likely impacts that a development of this kind would have, and the means of reducing the impacts of the development when it is in operation.

6.0 POPULATION & HUMAN HEALTH

The baseline information was gathered using desk top analysis of available mapping and aerial images; visits to the site and the surrounding area; analysis of census of population data; review of relevant documents; and a review of comments from statutory bodies and the public during the consultation process.

In order to assess the likely significant impacts of the proposed development on population and human health, an analysis of recent Census data was undertaken relating to the economic, demographic and social characteristics of the study area. For the purposes of this demographic analysis, the study area comprises 2 No. distinct enumeration area. These enumeration areas are identified in Figure 6.1 and provide demographic information for the local and regional populations which are likely to be impacted by the subject development. Where relevant, information with relation to the national averages in each demographic area is also provided.
The total population of the study area according to the 2016 census is 19,440. The 15 – 19 age cohort and the 20 – 24 age group comprise 15% of the overall population. The next largest age group at 6% is those that fall within the 55 – 59 year age group. 20% of the overall population falls within the 30 – 44 year age group. This is significant in terms of service provision and has significant implications for housing provision and demand.

The Pobal Deprivation Index is Ireland's most widely used social gradient metric, which scores each small area (50 – 200 households) in terms of affluence or disadvantage. The index uses information

from Ireland's census, such as employment, age profile and educational attainment to calculate this score. Whilst the subject site, located in Limerick North Rural ED is described as being 'marginally below average', the general study area also encompasses a 'very disadvantaged area' (Ballynanty) and also an 'Affluent area' (Farranshone).

Figure 6.1 Extent of CSO enumeration areas utilised in demographic analysis. Subject Site identified by red dot.

Within Limerick City & Suburbs, there has been a forecasted need for 11,054 households between 2022 – 2028, to facilitate a total population of 123,242 in 2028. Accordingly, 259 hectares of land is zoned to accommodate housing growth, including the subject land.

The number of vacant households in the study area stood at 607 no. units in 2016 excluding holiday homes and those that were temporarily absent. This represents 8.5% of the total number of households in the study area. The figure is significantly below that of the State-wide figure, which stood at 10.8% in 2016.

Of the 7,097 households in the study area, 83.7 per cent comprise a house / bungalow with only 13.2 per cent comprising a flat / apartment. This is significant in the context of the proposed development, which seeks to primarily deliver housing in the area thereby satisfying demand, with limited apartment provision throughout the development.

The general area comprising the masterplan site has a rural feel, notwithstanding significant residential and educational developments immediately to the east. The majority of site is surrounded by green fields apart from low density dwellings and Willow Grove development to the north and west, and the county club bar on the Old Cratloe Road - Pass Road junction. Further to the east, developments such

as Thomond Village, Clonile and Shannonvale lie next to the site and mark the edge of the built up area of the Limerick suburbs.

A growing and developing suburban area to the north west of Limerick City, the character of the area is dominated by mid – low density residential development with clusters of commercial development interspersed at nodal locations. The settlement pattern is varied, dominated by individual 'housing estates' with little permeability and connectivity.

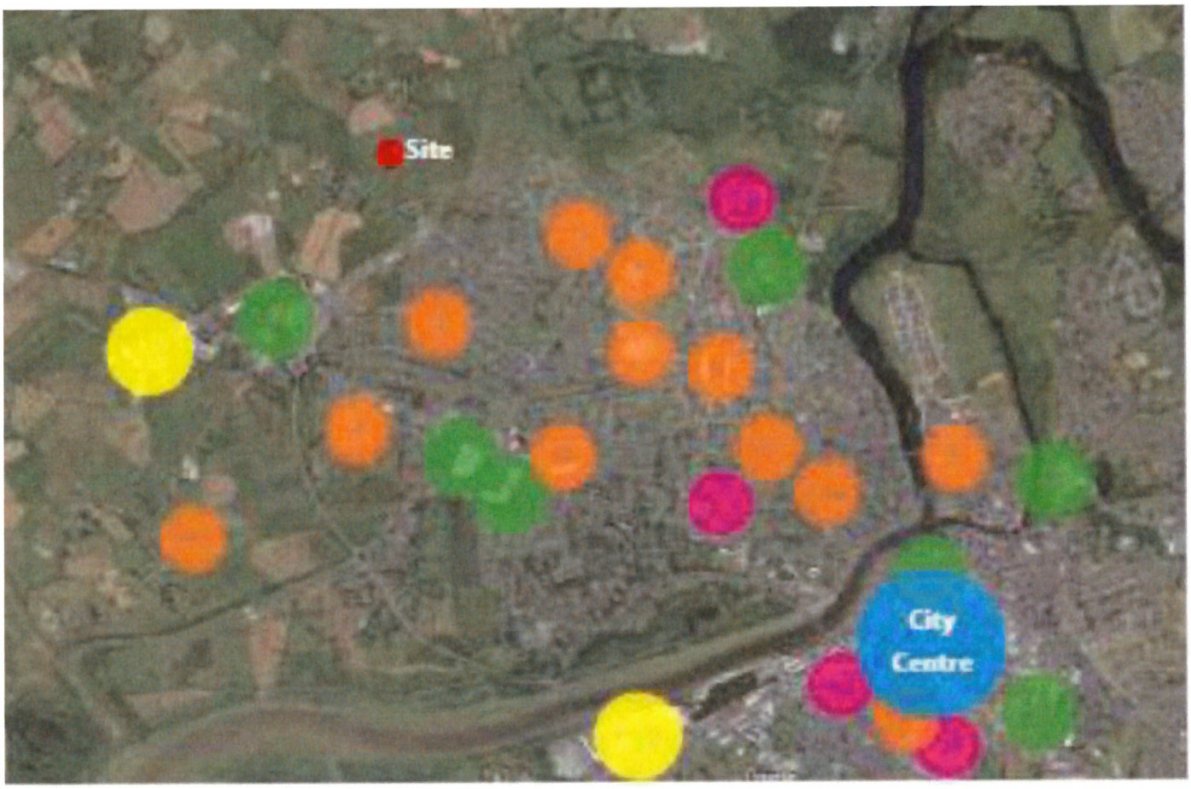

Figure 6.2 Typologies & Landuse

6.1 Operational Impacts

The proposed development will consist of 98 no. residential units/households. Using the average household size of 2.7 the proposed development is likely to result in a projected population of approximately 265 no. persons.

Having regard to the potential of the overall masterplan site to accommodate 448 no. units, including the subject site, the potential is for the masterplan to result in a projected population of approximately 1,210 people. This will result in a sizeable new community within the area. This is considered significant, permanent and positive, particularly in the context of current housing demand, but it will place significant additional strains on existing community facilities and services in the area and in the city. The important consideration is that the potential population generated from the proposed development has already been planned for in the context of the Limerick Development Plan 2022 - 2028 and the projected household growth in Limerick city of an additional 11,054 residential units between 2022 – 2028. The new Limerick Development Plan was adopted in 2022 with adequate planned provision made for supporting services and facilities over the plan period.

The proposed development will result in a generally positive alteration to the existing undeveloped site in terms of the provision of residential units, to serve the growing population of the area in accordance with the objectives of the Limerick Development Plan 2022 – 2028, the associated growing population and the evidential need and demand for housing in the area. The proposed creche facility will complement existing creche operators in the area and the proposed local neighbourhood centre will provide local convenience shopping and other services, not only accommodating the proposed development, but also servicing existing residents in the area.

The Social Infrastructure Audit undertaken for the purpose of the EIAR confirms the proximity of the site to existing community support facilities including local and district shops, health facilities, employment opportunities and schools. These existing facilities within the vicinity of the site have the capacity to be shared and further utilised. They also have the potential to be augmented / expanded with additional facilities and services to serve a growing community.

Enrolment for both primary schools within the area appear to be growing, whilst the last year saw a decline for secondary schools. There are no proposals detailed in the Development Plan to increase primary school capacity in the area, although there are a number of policies which proactively support future growth and expansion.

The subject site is served by public transport with bus links to Limerick City Centre and its range of higher order shops and services. Furthermore, the masterplan site provides for the development of a creche facility and local neighbourhood facilities in advance of the proposed development (Phase 3) thereby ensuring adequate services in the immediate area to serve the development.

6.2 Construction Impacts

Potential construction impacts arise from a range of issues discussed elsewhere in this EIAR: Traffic & Transport (Chapter 12.0); Noise and Vibration (Chapter 11.0); Air Quality and Climate (Chapter 10.0); and Biodiversity (Chapter 7.0). Construction impacts resulting from the delivery of the overall masterplan site are likely to be of medium effect, adverse and temporary in nature.

The construction phase of the proposed development will primarily consist of site clearance, excavation and construction works. Within the overall masterplan site, these works are likely to take place over seven different phases with a potential completion timeframe of five years. Given the extent of the subject site and the phased approach to development works, direct impacts are most likely to be experienced within the masterplan site itself and within those houses that will be occupied upon completion prior to another phase commencing.

Chapter 11.0 of this EIAR sets out a number of noise mitigation measures. Whilst there is potential for temporary noise impacts on nearby noise sensitive properties due to noise emissions from site activities during construction, the application of binding noise limits and 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 as far as practicable. For the duration of the construction period, construction noise impacts will be short-term, negative, slight to significant.

Within the subject site, the works will be undertaken in one phase over a 12 month timeframe. The works will largely be confined to the proposed development site. Notwithstanding the implementation of

remedial and mitigation measures there will be some minor temporary residual impacts on population (human beings) and human health most likely with respect to nuisance caused by construction activities, particularly relating to noise and dust. The houses to be constructed immediately to the south east of the site and those existing one off houses adjoining the site on the Meelick Road, will most likely be impacted. For the duration of the 12 month construction period, construction noise impacts will be short-term, negative, slight to significant.

It is anticipated that subject to the careful implementation of the remedial and mitigation measures proposed throughout this EIAR document any adverse likely and significant environmental impacts will be avoided. Positive impacts are likely to arise due to an increase in employment and economic activity associated with the construction of the proposed development, which is likely to have between 50 – 60 workers on site at any one time. As outlined above, the construction phase will have both direct and secondary positive economic impacts in this regard.

Potential impacts could occur as a result of inadequate site management or accidental spillage during construction, which could enter the local drainage ditches which have a hydrological connection with the a drainage ditch in the field (outside of the application site) to the west which connects with the Lower River Shannon Special Area of Conservation (SAC) and River Shannon and River Fergus Estuaries Special Protection Area (SPA) some 1.7km distant from the site. However, the likelihood of this happening is low given the design measures introduced as part of the development and detailed in Chapter 9.0 of this EIAR.

The visual landscape will change once construction commences and it will take time for the proposed landscaping treatment to mature. These impacts further detailed in Chapter 16.0 Landscape, are likely to be moderate and short term in nature.

The overall predicted likely and significant impact of the construction phase for the application site will be short-term, moderate and likely to be neutral. Although the construction timeframe for the overall masterplan will be longer and more likely to be in the region of five years, the construction will be undertaken on a phased basis such that impacts will continue to be short-term, moderate and neutral in effect.

The EIA Guidelines 2022 state that an EIAR must include the expected effects arising from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project. In this respect, taking cognisance of the other chapters contained within this EIAR document, it is not considered that the proposed development site presents risks of major accidents or disasters, either caused by the scheme itself or from external man made or natural disasters.

7.0 BIODIVERSITY

The ecology and biodiversity assessment has evaluated the importance of the ecological resources present and defined the degree of significance of potential impacts resulting from the MS of the proposed development. The assessment approach has followed the Chartered Institute of Ecology and Environmental Management (CIEEM) (2018) and the EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports (2022) as well as the NRA Guideline for the Assessment of Ecological Impacts of National Road Schemes (2009). The assessment has also taken

into consideration the national planning policy, the EU Habitats and Bird Directives (2000) and protected species legislation in identifying appropriate avoidance, mitigation (including design mitigation) and compensation measures.

Measures to mitigate the potential impacts on defined key ecological receptors are proposed. The assessment involved a desk study and field surveys by suitably qualified ecologists including specialists in botany, breeding birds and mammal ecology.

The Masterplan Site (MS) footprint is predominantly comprised of open grassland with scattered trees and associated hedgerows/treelines. The presence, or potential presence, of species on the MS was identified from the desk study and walkover field surveys.

The main ecological features on the MS are hedgerows/treelines, drainage ditches and wet grassland, that are all of Local Importance (Higher Value) in accordance with the ecological resource valuations presented in the NRA Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA/TII, 2009). The MS is dominated by agricultural fields both grazed by either cattle or horses and ponies and are of Local Importance (Lower Value) and are not considered to be sensitive ecological receptors.

No features of significance for roosting bats are present within the MS, however bat species have been recorded in the vicinity of the site and therefore the lands may be of significance for commuting and foraging bats. The hedgerows/treelines within and around the MS are all of importance for nesting birds. The development at Old Cratloe Road will involve the removal of the agricultural fields, however the majority of the hedgerows/treelines will be retained, therefore reducing the impact at a local level. Furthermore, new native hedgerows will be planted to replace any hedgerows/treelines removed as part of the development. Hence, although the loss of hedgerows/treelines is a significant impact at a local level, the measures to provide native replacement hedgerows that will cover a length greater than those lost, will compensate for the loss of biodiversity and therefore there will be biodiversity net gain for this habitat type.

The two drainage ditches, which are also of Local Importance (Higher Value), will not be directly impacted as a result of the MS development and site specific measures will be implemented to ensure that there is no indirect impact as a result of the construction phase and a surface water and storm water infrastructure has been designed, complete with SuDs measures, to ensure that there is no reduction in biodiversity as a result of the MS development or the hydrologically connected European Sites, during the operation phase.

The remaining Local Importance (Higher Value) habitat is that of wet grassland, which will not be directly involved in the MS development and to compensate for the loss of agricultural grassland an additional area will be left to develop as a wet grassland, together with the creation of a new pool. This is conjunction with an ecological based landscape plan, whereby a number of standard native or pollinator friendly tree species will be planted and green areas will be seeded with native wild flower and grass species mixture overall enhancing the biodiversity of the MS development. In addition bat and insect friendly lighting has been designed to minimise the impact on foraging or commuting species.

With specific reference to Phase 3, one of the habitats that will be lost is one Local Importance (Higher Value) hedgerow/treeline, but the boundary hedgerow adjacent to this phase will be retained allowing for the relocation of wildlife. Local Importance (Lower Value) agricultural grassland and scattered trees will also be lost. Within this phase design there is an open green area that, as mentioned above, will be planted with a native wildflower and grass seed mix as well as standard native or pollinator friendly trees. There is also a bio-retention strip that will provide an additional habitat for wildlife. Therefore, although there will be a loss of habitats, there are measures, once implemented, that will ensure that there is no overall biodiversity net loss for this phase (Phase 3) as the new habitats (although occupying a smaller area) will have the potential for greater biodiversity.

he mitigation measures to protect the drainage ditch will be required for this phase to ensure that there is no pathway to ecological receptors both locally and to the hydrologically connected European Sites during the construction phase. Soakaways have been designed as part of the drainage infrastructure to capture and allow for percolation of the surface water and storm water runoff as well as permeable paving and porous asphalt, in addition to the aforementioned bio-retention strip for the operation phase. The overall ecological assessment has concluded that although a number of a habitats will be directly affected by the proposed masterplan development, compensation measures will be implemented to offset any biodiversity net loss, thus enhancing the overall biodiversity of the MS.

Risks to hydrological receptors will be minimised by construction best practice mitigation measures and site specific mitigation measures. The operation risks will be removed by the implementation of a surface water and storm water infrastructure, including SuDs, to be implemented across the whole Master Plan site (including Phase 3).

The enhancement measures within and adjacent to the proposed masterplan development aim to enhance and improve the habitat quality for nature conservation and will create new opportunities for flora and fauna.

8.0 LAND & SOILS

The Land & Soils assessment involved a desktop study of soils, subsoils, bedrock and groundwater, a review of existing site investigation data and the interpretation and reporting of data.

The lands are highest at the north east corner. The lands generally fall to the Southeast, South and West. The lowest point of the lands is at the Southern Boundary. The ground conditions consist of glacial till derived from limstones on bedrock. A bedrock outcrop is located within the lands and bedrock is shallow. The underlying bedrock of the site is Visean Limestone.

The underlying groundwater body is the Limerick City Northwest groundwater body (GWB). The masterplan lands are located in an aquifer classified as "Lm": (A Locally Important Aquifer which is generally moderately productive) and comprise a moderately permeably subsoil overlain by a well-drained soil. The vulnerability of the aquifer is defined as "High" and "Moderate" across the study lands. The "High" area is located within the northern central lands.

There are no recorded waste disposal or contaminated sites located on or in proximity to the proposed site. The site is not within or directly adjacent to any Natura 2000 area. There are no recorded

geological heritage sites in the close proximity to the study area. There are no quarries in the close vicinity of the study area. There are no regional groundwater supplies or Source Protection Areas (SPA) identified within this area.

There were no detections of contaminated soils or other contaminated material recorded during site investigations to date, the previous use of the lands as a golf course, quarry and possible well may have resulted in some localised filling of the lands with potential for contamination and routes to sensitive receptors.

The identified potential construction and operational stage impacts on sensitive receptors (i.e. site geology, construction operatives, future site users and off-site residents) predominantly relate to ensuring that the land and groundwater is not contaminated which could act as a pathway to downstream sensitive receptors. Mitigation measures proposed to ensure predicted impacts are slight to imperceptible include:

- Minimize excavation and disturbance to soil structure and bedrock to reduce backfill and material removal. Retain topsoil for re-grading. Reuse soils and bedrock on site where possible. Remove excess material to licenses facilities.
- Investigate and plan for the possibility of encountering contaminants during construction.
- Monitor groundwater quality before, during, and after construction to ensure compliance with waste management plans.
- Store waste containers and ancillary equipment in a secondary containment system, and keep spill kits on hand.
- Source imported soils and stones from licensed facilities with documentation confirming their inertness and suitability.
- Implement runoff and sediment control measures to protect subsoils and groundwater aquifers during construction.
- Store waste fuels and materials in designated areas isolated from surface water drains, use fuel interceptor tanks, and avoid storing fueling, lubrication, and site offices within 25m of drainage ditches or open excavations.
- Maintain and check construction vehicles, plant, and machinery to avoid spillages, and use secondary containment, drip trays, and impermeable refuelling areas.
- Store potentially hazardous materials securely on site.
- Install adequate security measures on the construction site, including fencing, site access, plant and equipment security, warning signage, and lighting.
- Monitor the cleanliness and prevention of oil and diesel spillages, runoff control of potential stockpiles, protection of topsoil, and cleanliness of the surrounding road network during construction.
- Assess excavated materials for contamination and treat contaminated material in accordance with waste management regulations, and dispose of excess fill and unacceptable material appropriately.
- Undertake top-soiling and landscaping as soon as finished levels are achieved.
- Provide wheel wash facilities close to the site entrance to reduce the deposition of mud and other substances on the surrounding road network.

Potential risks during the operational phase of development relate to potential impacts from the surface water drainage system in relation to contaminants, and reduced infiltration to the subsurface GWB. The proposed drainage system is designed in accordance with the Greater Dublin Strategic Drainage Study (GDSDS) and the CIRIA SUDS Manual. It will ensure a sufficiently high level of treatment of runoff prior to discharge. These design measures will ensure the residual impact on surface waters during the operational phase will be imperceptible.

9.0 WATER HYDROGEOLOGY HYDROLOGY & FLOOD RISK

The assessment involved a desktop study of sensitive hydrological receptors in the area and the interpretation and reporting of data. It also included flood risk study.

The lands are highest at the north east corner. The lands generally fall to the Southeast, South and West. The lowest point of the lands is at the Southern Boundary. The lands lies within the North Ballycannan sub-basin catchment of the River Shannon and just outside of the Crompaun East sub-basin. Over half of the lands drain to an open watercourses to the West. Lands to the East are drained by a swale recently constructed in connection with the Coonagh to Knockalisheen Distributor Road project. The lands to the South discharge to open drains. All existing swales and drains discharge to OPW maintained channels into the River Crompaun East and ultimately to the River Shannon.

The development lands are located at levels in excess of having a 1 in 1000 change of flooding.

The main risks to surface waters during the construction stage of the proposed development include the storage of fuel on site, the possibility of encountering buried contaminated materials and the subsequent release of contaminants into watercourses and general construction / excavation activities.

Mitigation measures proposed to ensure predicted impacts are imperceptible include:

- Back-up plans to deal with contamination or fuel spills
- Contingency plans for discovery of contaminated waste materials to be developed.
- Waste containers and equipment to be stored within a secondary containment system.
- Chemical analysis to be carried out on fill material to assess risk.
- Imported fill material to be sourced from approved/licensed facilities and confirmed as inert.
- Silt fencing and dams along with an attenuation pond to be installed to prevent silt-laden water leaving the site.
- Drainage ditches to be installed to intercept surface water and pumped water to be treated prior to discharge.
- Monitoring of surface and groundwater quality before, during and post construction works to be undertaken.
- Waste fuels and materials to be stored in designated areas isolated from surface water drains or open waters.
- Wash-out areas to be located greater than 50m from any natural watercourse and properly designed with an impermeable liner.
- All waste material generated to be temporarily stored in secure bunded areas.
- Adequate security measures to be installed on the construction site.

- Construction vehicles, plant and machinery to be maintained and precautions taken to avoid spillages.

Potential risks during the operational phase of development relate to potential impacts from the surface water drainage system in relation to contaminants of surface water bodies. The proposed drainage system is designed in accordance with the Greater Dublin Strategic Drainage Study (GDSDS) and the CIRIA SUDS Manual. It will ensure a sufficiently high level of treatment of runoff prior to discharge. These design measures will ensure the residual impact on surface waters during the operational phase will be imperceptible.

10.0 AIR QUALITY & CLIMATE

In terms of the existing air quality environment, baseline monitoring data available from similar environments indicates that levels of nitrogen dioxide (NO_2), particulate matter less than 10 microns (PM_{10}) and particulate matter less than 2.5 microns ($PM_{2.5}$) are generally well below the National and European Union (EU) ambient air quality standards.

The existing climate baseline can be determined by reference to data from the EPA on Ireland's total greenhouse gas (GHG) emissions and compliance with European Union's Regulation 2018/842. The EPA state that Ireland had total ESR GHG emissions of 46.16 Mt CO_2eq in 2021. This is 2.71 Mt CO_2eq higher than Ireland's annual target for emissions in 2021.

Impacts to air quality and climate can occur during both the construction and operational phases of the proposed development. With regard to the construction stage the greatest potential for air quality impacts is from fugitive dust emissions impacting nearby sensitive receptors. Impacts to climate can occur as a result of vehicle and machinery emissions. In terms of the operational stage air quality and climate impacts will predominantly occur as a result of the change in traffic in the local areas associated with the proposed development.

There are a number of high sensitivity receptors (residential properties) in close proximity to the site at which dust impacts may occur. The area was assessed as having a medium sensitivity to dust soiling impacts and a low sensitivity to dust related human health impacts. There is at most a medium risk of dust soiling impacts associated with the construction stage of the proposed development in the absence of mitigation. Provided the dust mitigation measures outlined in Section 10.6.1 of Chapter 10 are implemented, dust emissions are predicted to be short-term, negative and imperceptible and will not cause a nuisance at nearby sensitive receptors.

The best practice dust mitigation measures that will be put in place during construction of the proposed development will ensure that the impact of the development complies with all EU ambient air quality legislative limit values which are based on the protection of human health. Therefore, the impact of construction of the proposed development will be short-term, localised, negative and imperceptible with respect to human health.

Potential impacts to air quality and climate during the operational phase of the proposed development are as a result of a change in traffic flows and volumes on the local road network. The operational phase air quality and climate modelling assessments determined that there is no potential for significant

impacts as a result of traffic related to the proposed development. It can therefore be determined that the impact to air quality and climate as a result of altered traffic volumes during the operational phase of the proposed development is localised, neutral, imperceptible and long-term in relation to air quality and climate. In addition, the proposed development has been designed to reduce the impact to climate where possible during operation.

As the National and EU standards for air quality are based on the protection of human health, and concentrations of pollutants in the operational stage of the proposed development are predicted to be significantly below these standards, the impact to human health is predicted to be imperceptible, neutral and long term.

No significant impacts to either air quality or climate are predicted during the construction or operational phases of the proposed development.

11.0 NOISE AND VIBRATION

An assessment of noise and vibration impacts on the surrounding environment during the construction and operational phases of the proposed development was undetaken. When considering the potential impacts, the key sources will relate to the short-term phase of construction and the long-term impacts associated with the development as a whole once operational.

The existing and future noise and vibration environments across the development site and in the vicinity of the nearest existing NSLs are dictated by transportation sources in the study area and the surrounding road network including the Old Cratloe Road, Pass Road and the future Coonagh to Knockalisheen Distribution Road.

The construction phase will involve site clearance including rock breaking, building construction works and landscaping, the assessment has determined that there is the potential for moderate to significant short term noise impacts when works are undertaken within close proximity (30 - 40m) of the receptor locations. At distances of 50m and greater there is potential for a negative, moderate impact. However, these occurrences will only be temporary, and the vast majority of the construction works will take place at large distances from the receptors, and therefore no significant impacts are predicted i.e. the construction noise criterion will be complied with. Construction vibration impacts are negative, not significant and temporary.

The use of best practice noise control measures, hours of operation, scheduling of works within appropriate time periods, strict construction noise limits and noise monitoring (where required) during this phase will ensure impacts are controlled to within the adopted criteria. Similarly, vibration impacts during the construction phase will be well controlled through the use of low impact equipment and adherence to strict limit values.

During the operational phase, the predicted change in noise levels associated with additional traffic in the surrounding area required to facilitate the development is predicted to be of negligible impact along the existing road network. In the context of the existing noise environment, the overall contribution of induced traffic is considered to range from imperceptible and long-term to negative, moderate significance and long-term for nearby residential locations.

In addition, the potential for inward noise effect on the proposed development has been assessed. The assessment was carried out with reference to the guidance contained in *Professional Practice Guidance on Planning & Noise* (ProPG), BS 8233:2014 *Guidance on Sound Insulation and Noise Reduction for Buildings* (BSI); and the local and national Noise Action Plans relevant to the area. Due to the noise environment facades are expected to not require enhanced sound insulation specifications for glazing to achieve suitable internal noise levels. Courtyards and other external amenity areas are accessible in the vicinity of the proposed residential buildings within the recommended range of noise levels from *ProPG* between 50 – 55 dB $L_{Aeq,16hr}$. It is considered that the objectives of achieving suitable external noise levels is achieved within the overall site.

Cumulative noise levels associated with the construction phases have been considered and cumulative impacts are likely at the nearest receptors should all sites progress construction works simultaneously, however the various phases of the Masterplan Site are more likely to be sequential and not concurrent. Once cumulative construction impacts are considered and managed during the construction phase potential cumulative impacts on nearby sensitive receptors are expected to be negative, moderate significance and short-term.

At operational stage, cumulative noise impacts associated with the proposed development and other developments in the area are most likely to be associated with increase noise associated with traffic. An increase +3 dB represents a worst case scenario of a doubling in volume of traffic, representing a perceptible change with negative, moderate significance and long-term.

12.0 ARCHAEOLOGY & CULTURAL HERITAGE

This chapter assesses the effects of the proposed development on the cultural heritage resource, including archaeology and architectural heritage. The recorded and potential cultural heritage resource within a study area encompassing the fields within the proposed development boundary and the surrounding lands extending for 1km in all directions, was reviewed in order to compile a comprehensive cultural heritage baseline for the assessment.

The assessment was based on a programme of desktop research, a field inspection and archaeological test trenching and the assessment of impacts was carried out in accordance with current and relevant Environmental Protection Agency guidelines.

A children's burial ground designated as a recorded archaeological site (LI005-007----) is located within the boundary of the Masterplan site (MS) but is located outside of the subject application Phase 3 site. This site is depicted on historic Ordnance Survey (OS) maps and is clearly visible as a sub-circular feature on all reviewed aerial images. In addition, extant remains of this site were noted during field surveys carried out as part of this assessment and it survives as a heavily overgrown enclosed feature that is not accessible to the public.

The Down Survey map depicts a cluster of buildings within the environs of the proposed development and the Archaeological Survey of Ireland have established a Zone of Notification around this settlement cluster (LI005-039----) which extends slightly into the southern end of the proposed development site. There is no evidence of any features associated with this settlement cluster on any of the later OS maps or recent aerial images and much of the location of the settlement cluster is now occupied by modern housing.

There are a total of six other recorded archaeological monuments located within the 1km study area surrounding the Masterplan site and none of these are located within 450m of its boundary. There are also two Protected Structures located within the 1km study area around the proposed development site and neither of these are located within 500m of its boundary.

The review of the historic mapping indicates that the MS has been occupied by farmland since at least the early nineteenth century (and possibly as far back as the seventeenth century) and it has retained it agricultural character with only a slight alteration of field boundaries since the production of the historic OS maps. While the desktop studies and field surveys did not identify other potential archaeological or architectural heritage features within the proposed development site, a number of previously unrecorded archaeological features were identified during recent archaeological site investigations. A programme of archaeological test trenching was undertaken across the Phase 3 area in January 2023 and a small quantity of previously unrecorded features of archaeological potential were uncovered within a discrete portion of the area and these are described in Section 15.3.3.7 of the Chapter.
The children's burial ground (LI005-007---) located within the MS will be preserved *in situ* as an undeveloped greenspace and is outside the Phase 3 area. A 20m buffer from the outer edge of the monument will be established prior to any construction works commencing within the proposed development site. An Archaeological Management Plan for the Phase 1 area (Planning Ref. 21/1800) was submitted to Limerick City and County Council. This included mitigation measures to manage and protect the children's burial ground (LI005-007----) during the operational phase which will also apply for the operational phase of Phase 3 and these measures are described in Section 15.6.2.1 of the Chapter.

Archaeological investigations have identified the existence of previously unrecorded features of potential archaeological origin within the Phase 3 area. As preservation *in situ* of the identified features of archaeological potential is not a viable option within the proposed development, these features will be preserved by record through a programme of archaeological excavation and recording under licence from the National Monuments Service (NMS) in the Department of Housing, Local Government and Heritage.

The proposed Phase 3 development will not result in any predicted significant cumulative effects on the cultural heritage resource.

The mitigation measures presented in Section 15.6 of the Chapter will result in the appropriate recording of the previously unrecorded features of archaeological potential identified during recent site investigations within the Phase 3 area by a full archaeological excavation. This shall result in a high magnitude of impact, albeit ameliorated by the creation of a full and detailed archaeological record, the results of which shall be disseminated. This shall result in a potential moderate range of significance of effect in the context of residual impacts on the these potential archaeological features. In addition, following the implementation of the mitigation measures presented in Section 15.6 of the Chapter, it is predicted that the Phase 3 development will result in a not significant, indirect, permanent, negative, residual impact on the setting the children's burial ground (LI005-007---).

13.0 THE LANDSCAPE

An assessment was undertaken of the likely visual impacts arising from the proposed development on the existing landscape.

Most of the subject lands would be considered to have the character of an 'agricultural field' typified by traditional hedgerow boundaries both around and within the site. The main area of the subject lands has a different character due to the scatted individual and small groups of trees. This is due to the recent history of this area where is was used as a golf course. The subject lands are primarily bounded by robust and healthy field boundary hedgerows, while hedgerows and drainage ditches also traverse the site. Hedgerows along the Old Cratloe Road have been recently removed to facilitate the road upgrades. Subsequently the character of this area has more or a peri-urban feel than the rural feel of other parts of the subject lands. The new road to the east of the site (under construction) will extend the urban landscape of the city to the edge of the subject lands.

Through a comparison of the historical Ordnance Survey maps and aerial photography with the current site and through analysis by site visits it is evident that there has been little change to the study area until recent times. The subject lands were open farmland through both sets of historic maps, 6-inch maps (1837-1842) and 25-inch maps (1888-1913). The field boundaries and patterns in the historic maps are much the same as would have been visible until the most recent road works.

Within the Limerick County Development Plan, the subject lands fall under the Urban Character Area 5, where it is classed as part of the city landscape and the gateway from the west. The land is not located within or adjoining any designated environmental or heritage sites. There are no Tree Preservation Orders, listed views or prospects or any other landscape designation applied to the subject lands or its immediate surrounds. The sensitivity of the landscape to built development is considered as a low to medium level. The lands can accommodate built development with minimal risks to the landscape in terms of character or visual amenity.

The initial construction operations created by the clearance of the site and the construction of the buildings and roads will give rise to temporary or short-term impacts on the landscape character, through the introduction of new structures, machinery etc. and the removal of a small amount of vegetation. The removal of existing vegetation will also cause a negative impact on the landscape character, however a large portion of the existing vegetation on the site is to be retained and incorporated into the landscape design. The negative visual impact on the landscape character during construction would be considered moderate in magnitude and only short-term in duration.

The proposed development will give rise to negative visual impacts for the users of the public realm and the identified residences that may be sensitive to visual impacts (referred to as sensitive visual receptors). The proposed development itself will mostly negatively impact sensitive visual receptors along the Pass Road. The visual impact on one of these receptors is likely to be significant however only short-term in duration. The proposed masterplan development will negatively impact sensitive visual receptors along the Pass Road and the Old Cratloe Road. The visual impact on three of these receptors is likely to be significant however only short-term in duration.

The landscape character of the subject lands will be notably changed from its current largely undeveloped character to that of built environment. The current landscape has the character of a

traditional agricultural landscape that is common in the wider environment and some sections have a peri-urban character. The lands are zoned for the type of development proposed, and therefore, its current state is temporary.

The proposed development and the overall masterplan include a landscape scheme which provides for the retention and enhancement of the hedgerows around the perimeter, and the creation of a network of landscape spaces. This will mitigate the level of impact on the landscape character. The initial change to a new landscape that includes built development may be perceived negatively by some people, however due to the surrounding suburban and peri-urban environment this would be only moderate in significance and long term in duration.

The extent of potential visual impact of the proposed development on the built environment from seven representative view locations around the proposed development is assessed in the chapter. The view locations are representative of locations from which it was suggested by mapping analysis and review in the field, that the proposed development might be visible. Photomontages of the expected proposed view from these locations are submitted as part of the application, as a separate A3 document by Digital Dimensions Ltd.

Design mitigation measures have been incorporated into the design at all stages of the design process. These include the size and finish of buildings, retention of some trees and hedgerows, proposed woodlands blocks, hedgerows, wetlands, and meadows. These mitigation measure reduce the level of predicted negative visual impacts. The assessment concludes that there are no significant negative visual impacts. The highest magnitude of negative impact is the 'moderate' impacts of five of the viewpoints assessed. Moderate impacts are those considered consistent with existing and emerging trends in the area.

14.0 MATERIAL ASSETS - TRAFFIC & TRANSPORT

An assessment of the effects and potential impact of the proposed masterplan development on the surrounding existing and future road network and transport infrastructure was undertaken. The assessment focuses on the effects of increased traffic on the local road network during both the construction and operational periods of the phased development of the overall masterplan lands including the subject Phase 3 proposed development.

The approach to the preparation of this chapter has regard to the requirements of publications by Transport Infrastructure Ireland (TII), National Transport Authority (NTA), Department of Transport (DoT) and other best practice guidance and documents.

The 'Traffic and Transport Assessment Guidelines' published by TII recommend the assessment of the Baseline year, and impact of development traffic in the Opening Year, the Opening Year +5 years and the Opening Year +15 years.

The assessment considers the impact of peak hour traffic from the overall masterplan lands (all development phases) on the baseline and future design year traffic levels which is the cumulative 'worst-case' assessment. If the overall development on the masterplan lands can be shown to be satisfactory,

then individual planning applications, such as this Phase 3, within the development will also be deemed to be satisfactory.

The site is bounded by the Old Cratloe Road to the south and the Pass Road (Meelick Road) to the east, both of which are being upgraded / realigned as part of the Coonagh–Knockalisheen Distributor Road (CKDR) scheme which is currently on site and expected to be complete by 2025/26. The traffic assessment and modelling undertaken as part to the Coonagh–Knockalisheen Distributor Road (CKDR) scheme EIS report concluded that new distributor road would lead to a significant increase in capacity of the local road network and junctions and a significant decrease in traffic flows on the Old Cratloe Road itself.

For this assessment, the key junctions which would be subject to construction and operational traffic were identified below and a traffic survey was undertaken at a key junction. The following roads and junctions were assessed as part of this traffic analysis:

- Junction 1: Standard 'T' junction between the upgraded Old Cratloe Road and the realigned section of Pass Rd (Meelick Rd) constructed as part of the CKDR scheme.
- Junction 2: Roundabout junction between realigned Pass Rd (Meelick Rd), proposed site access junction (s) and old Pass Road (Meelick Rd) constructed as part of the CKDR scheme.
- Junction 3: Proposed development access comprising a standard 'T' junction between the upgraded Old Cratloe Road and development access.
- Junction 4: Proposed development access comprising a standard 'T' junction between the upgraded Old Cratloe Road and development access.
- Junction 5: Roundabout junction between upgraded Old Cratloe Road and CKDR which is currently under construction. Report review only.
- Junction 6: Proposed development access comprising a standard 'T' junction between the realigned section of the Pass Rd (Meelick Rd) and the development access

The impact of estimated peak daily construction traffic flows from each phase including staff, deliveries, material movement and miscellaneous trips were assessed, and construction traffic levels were anticipated to be significantly lower than those estimated and assessed for the operational period. The impact of these construction traffic flows will be temporary to short term and will be replaced by the operational period traffic. A detailed Construction Traffic Management Plan (CTMP) will be produced by the successful Contractor in consultation with Limerick City and County Council prior to the main construction works for each phase.

The operational traffic associated with the respective phases was estimated, combined and assigned to the road network to inform the assessment of the overall masterplan. Junction analysis was then undertaken using industry standard junction modelling software which demonstrated the impact at the key junctions during both the construction and operational phases on the road network.
From the analysis results for the operational phase, it was found that the proposed masterplan development would result in a negligible 'near zero' effect on junction capacity and this would be a long-term effect. Similarly, the increased operational traffic would lead to a very slight increase in queuing and delay at the junctions, but the effect would be imperceptible and long-term in nature.

For the construction phase a number of measures have been presented that could be adopted by the

appointed contractor subject to agreement with Limerick City and County Council. For the operational phase no mitigation or monitoring measures are necessary to accommodate the proposed masterplan development other than the standard 'taking in charge' process with Limerick City and County Council.

15.0 MATERIAL ASSETS – BUILT SERVICES

An assessment of the proposed development was carried out which considered environmental impacts to water and built services including ownership & access, electricity connections; natural gas supply; and telecommunications was undertaken.

Ownership & Access

The applicant owns the Masterplan site, the subject site (Phase 3) and the adjoining land to the south of proposed Phase 5. The applicant acquired the land in April 2021.
The Masterplan lands will be accessed at three separate locations including, the recently constructed roundabout on the realigned Pass /Meelick Road and two separate standard DMURS compliant property 'T' junctions located on the southern and northern side of the upgraded section of the Old Cratloe Road which has been designed as part of the Coonagh – Knockalisheen Distributor Road Scheme which is expected to be completed by 2025 / 26. The upgraded Old Cratloe Road immediately south of the site and the realigned Meelick Road to the east, will comprise a 6.6m carriageway with footpaths and cycle lanes on both sides.

Water Services

The new development will require new connections to all service providers as well as to public water supply and waste water networks, which may result in temporary disruption of existing services in the vicinity of the development in order to facilitate the connection.
The foul sewerage from the overall development is planned to discharge to the foul network to be installed as part of the Old Cratloe Road upgrade works south of the development. A pre-connection enquiry was lodged with Irish Water (Connection Reference No. CDS22003876) for the development outlining the proposed flows and loads which would be generated by the development. This application was undertaken to determine if there is adequate capacity in the existing public foul sewer network to cater for this development. The proposal was accepted as feasible in principle by Irish Water.

The estimated daily demand for the proposed development has been calculated as 39.7 m^3/day. To reduce the water demand on Local Authority water supplies and to reduce the foul discharge from the development, water conservation measures will be incorporated in the sanitary facilities throughout the development, e.g., dual flush toilets, monobloc low volume push taps and waterless urinals.

Surface Water

As part of the proposed development, it is proposed to remove a number of existing drainage channels within the site. These channels have been surveyed and it was determined that they had no contributing catchment upstream of the site, draining the site alone..

A new surface water sewer network shall be provided for the proposed development which will be entirely separate from the foul water sewer network. The design of the storm water network and SUDS allow for 30% climate change and 10% urban creep of the housing area for the developed site.

The storm drainage from the roads and footpaths will be collected in gullies and discharged via a traditional storm pipe network. Given the topography of the site and available green spaces, two networks with separate infiltration and storage areas are proposed in Phase 3. Storage Area 1 infiltrates and attenuates the surface water flow from the entrance road to the development and is oversized to cater for stormwater flows from the wider Masterplan Site. The flow from Area 1 discharges through a pipe network to the Storage Area 2 at the southern boundary at a rate of 1.0l/s. Storage Area 3 infiltrates and attenuates the surface water flow from the majority of the remainder of the development and also discharges via a pipe network to Storage Area 2 but at a rate of 7.12 l/s. Storage Area 2 infiltrates and attenuates the surface water flow from a limited number of housing units and also caters for the restricted from Areas 1 and 3. Area 2 discharges to the existing watercourse at the western boundary at a rate of 9.12l/s.

Gas & Electricity

Gas Networks Ireland has a capped 125mm PE 80 4 Bar gas supply in the area which will serve the proposed site. ESB have low voltage (LV) lines traversing the site and medium voltage (MV) lines in close proximity which will be used to facilitate several cabinet Kiosk type MV/LV substations. The LV network will be distributed via underground ducting and ESB Mini pillars.
The existence of the proposed development will result in an increase in the demand on all required services. Having regard to the potential of the overall masterplan site to accommodate 448 no. units, including the subject site, the potential is for the masterplan to result in a projected population of approximately 1,210 people. This will result in a sizeable new community within the area. This is considered significant, permanent and positive, particularly in the context of current housing demand, but it will place significant additional strains on existing services in the area.

It is not envisaged that the proposed development will result in any significant long-term effects on the environment due to the built services associated with the proposed development. There is however likely to be some minor impact experienced, by way of temporary disruption, during the construction phase of this development. Residual impacts on the built services during the construction and operational phase are considered to be temporary and occasional in nature and not significant, where service is unavoidably disrupted to facilitate the construction phase.

16.0 MATERIAL ASSETS – RESOURCES & WASTE MANAGEMENT

An assessment of the potential impacts associated with waste management during the construction and operational phases of the proposed development was undertaken. The receiving environment is largely defined by Limerick City and County Council as the local authority responsible for setting and administering waste management activities in the area through regional and development zone specific policies and regulations.

During the construction phase, typical construction and demolition (C&D) waste materials will be generated which will be segregated on-site into appropriate skips/containers and removed from site by suitably permitted waste contractors to authorised waste facilities. Where possible, materials will be reused on-site to minimise raw material consumption. Source segregation of waste materials will improve the re-use opportunities of recyclable materials off-site.

The project engineers have estimated the quantity of excavated material that will be generated to be circa 10,500m3 of topsoil, circa 25,000m3 of clay/gravel and circa 4,400m3 of bedrock. It is currently

envisaged that all the excavated bedrock, circa 4,000m3 of topsoil and circa 6,000m3 of the clay/gravel will retained and reused on site. The remainder of the topsoil (circa 6,500m3), and clay/gravel excavated (circa 19,000m3), will be reused on site where possible but it is currently anticipated that it will require removal offsite for reuse, recovery and/or disposal. If material is removed off-site, it could be reused as a by-product (and not as a waste). If this is done, it will be done in accordance with Regulation 15 (By-products) (Previously Article 27 and referred to as Article 27 in this report) of European Union (Waste Directive) Regulations 2011-2020, which requires that certain conditions are met and that by-product notifications are made to the EPA via their online notification form. Excavated material will not be removed from site until approval from the EPA has been received. The potential to reuse material as a by-product will be confirmed during the course of the excavation works, with the objective of eliminating any unnecessary disposal of material. It is envisaged that c 20,000m3 of selected imported fill as hardocre will be required for under building ground floor slabs, roads, paths and services excavations as well as for use within the attenuation storage and infiltration areas.

A carefully planned approach to waste management during the construction phase will ensure that the effect on the environment will be short-term, neutral and imperceptible.
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 that is not suitable for recycling is can be 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).

17.0 INTERACTION BETWEEN ENVIRONMENTAL FACTORS

All environmental factors are inter-related to some extent and this chapter cross references the individual environmental assessments undertaken, including the proposed mitigation measures, having regard to current knowledge and methods of assessment.

The primary interactions can be summarised as follows:

- Architectural design, landscape design, and road and services design and archaeology;
- Landscape design and engineering services with biodiversity and archaeology;
- Stormwater attenuation design with biodiversity and soil & geology;
- Visual impact with biodiversity and archaeology;
- Biodiversity with water and soils;
- Architectural and landscape design with noise;
- Noise and vibration and population and human health;
- Air quality and climate and population and human health; and
- Material Assets with population and human health, water, noise and vibration, air quality and climate

An indication is also given of the cumulative effects of the proposed residential development, with local neighbourhood centre services and facilities. The overall cumulative impact of the proposed development will result in:

- An increase in population n the north western extremity of Limerick city, proximate to the Moyross Regeneration area, making efficient use of new transport infrastructure in the area and developing synergies with the surrounding population, which will result in social benefits to the population of the area;
- An increase in demand or services and facilities in the area in the short term pending delivery of the creche and local neighbourhood centre;
- An increase in economic activity in the local area are due to construction;
- A slight increase in traffic on the local road network which can be adequately managed;
- No significant environmental nuisance from an air quality perspective subject to implementation of the mitigation measures and adherence to good working practices; and
- No significant landscape visual effects due to the nature of the existing, surrounding built environment and the planting of trees.

18.0 SUMMARY OF MITIGATION MEASURES

A summary of mitigation measures is proposed as detailed in Chapters 6.0 to 16.0. The appointed contractor will be required to adhere to the mitigation contained in the EIAR for the protection of the environment and to ensure sustainable development.

A number of mitigation measures have been incorporated into the design proposal, following an iterative assessment during the design stage. In some instances, these mitigatory measures have shaped the design of the scheme, the juxtaposition of the buildings and the mix of uses proposed.
The design rationale and detail employed seeks to mitigate potential negative effects on a series of environmental factors and considerations.

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Part B – Main Report

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CHAPTER ONE INTRODUCTION

1.1 INTRODUCTION

This Environmental Impact Assessment Report (EIAR) has been prepared on behalf of Riverpoint Construction Limited for a proposed residential development for a residential development on land located between the Old Cratloe Road and Pass (Meelick) Road in the western environs of Limerick City. Planning permission is sought to construct 98 no. residential units on a planning application site of 9.45 hectares and a net residential development area of 2.83 hectares. The full extent of the site is detailed in Figure 1.1.

This EIAR has been prepared in response to a further information request issued under Article 103(1)(b)ii of the Planning and Development Regulations 2001 as amended (the Regulations) by Limerick City & County Council under planning reference 22/959. The further information requested that,

> *"Information as specified in Schedule 7A of the Planning and Development Regulations 2001 for the purposes of EIA Screening determination is required. The information should include the results of the Article 33 request which concerned the potential for cumulative impact considerations having regard to existing and or permitted development".*

A Screening Assessment of the development proposal, including the proposed masterplan was undertaken having regard to the information required under Schedule 7A, taking into account, where relevant, the criteria set out in Schedule 7 of the Regulations. The cumulation of the impact with the impact of other existing development the subject of a consent for proposed development for the purposes of Section 172(1A(b) of the Act was considered and in particular the cumulative impact arising from the overall masterplan proposal which will provide for a total of 448 no. residential units, childcare facility and neighbourhood centre (4 no. commercial units) on an overall site of 22.53 hectares.

The proposed residential development of 98 no. residential units on a site of 9.45 hectares does not exceed the criteria set out for mandatory Environmental Impact Assessment (EIA).

Section 172 of the Planning & Development Act 2000, as amended, does set out the basis for EIA for developments which do not equal or exceed, the relevant quantity, area or other limit specified in Part 2 of Schedule 5, i.e., "sub-threshold development". Cumulatively, when the proposed development is considered in conjunction with previous phases of development (only Phase 1 has been granted permission), the extent of the overall phased masterplan proposal exceeds the mandatory EIA threshold of 10 hectares in a built-up area. Accordingly, it was deemed appropriate to consider the potential for significant effects on the environment and to prepare an EIAR in relation to the subject development, to ensure that the proposed development, in its own right and when considered in conjunction with the overall masterplan, would not negatively impact on the environment.

1.2 PURPOSE OF THE ENVIRONMENTAL IMPACT ASSESSMENT

Environmental Impact Assessment (EIA) is a procedure under the terms of European Directives[1] for the assessment of the effects of development projects on the environment. An Environmental Impact Assessment Report (EIAR) is a statement prepared by the developer, providing information on the significant effects on the environment based on current knowledge and methods of assessment. It is carried out by competent experts, with appropriate expertise to provide informed assessment on their discipline.

The primary objective of the EIAR is to identify the baseline environmental context of the proposed development, predict potential beneficial and/or adverse effects of the development and propose appropriate mitigation measures where necessary. In preparing the EIAR the following regulations and guidelines were considered:

- The requirements of EC Directives and Irish Regulations regarding Environmental Impact Assessment;
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Environmental Protection Agency, 2022);
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment August 2018, Department of Housing Planning & Local Government; and
- In addition, specialist disciplines have had regard to other relevant guidelines, as noted in the specific chapters of the EIAR.

1.3 FUNCTION OF THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT

This EIAR is a statement of the effects, if any, which the proposed development, if carried out, would have on the environment. It consists of a systematic analysis and assessment of the potential effects of a proposed project on the receiving environment. The function of the EIAR is to:

- Establish the existing environmental characteristics of the proposed site;
- Provide details of the proposed development and associated secondary developments;
- Predict the likely significant effects of the development on the environment;
- Outline the measures considered necessary to avoid, reduce or mitigate the negative impacts identified both individually and cumulatively to an acceptable degree;
- Identify areas requiring reinstatement and on-going monitoring.

The EIAR has been prepared following the logical analysis of the development proposal in relation to the receiving environment. This process of environmental impact 'assessment' and the preparation of this report has been an evolving iterative process. In order to avoid, reduce or negate potential adverse environmental effects, and to ensure holistic consideration of all environmental issues, the EIAR for this project has been cognisant of baseline environmental conditions established and assessed within the wider masterplan site, including all areas proposed for development under Phases 1 – 7 as detailed on Drawing MP-01.

[1] *EU Directive 85/337/EEC as amended by Directives 2011/92/EU and DIRECTIVE 2014/52/EU*

For the avoidance of doubt, all necessary technical information required for the purpose of the EIAR is enclosed within this report. Consideration of this EIAR is not reliant upon consideration of any data contained in any other separate assessment.

Prior to lodging this application, the required information has been issued for the Department of Housing, Planning and Local Government's EIA Portal. The purpose of this tool is to inform the public, in a timely manner, of applications that are accompanied by an EIAR. The portal provides a URL link.

1.4 TECHNICAL DIFFICULTIES or LACK OF DATA

The compilation of the information necessary for the EIAR did not present any significant difficulties. However, some assumptions and projections were necessary for certain areas of this assessment, particularly the traffic and noise assessments.

Although preliminary and national data has been published from the Census of Population 2022, at the time of writing there is no Small Area Population (SAP0 figures available. Accordingly, this EIAR continues to use SAP figures sourced from the Census of Population 2016. Accordingly, data relating to the economic, demographic and social characteristics of the surrounding area have been primarily sourced from 2016 Census of Population.

In respect of traffic and transport, the modelling for the proposed development as detailed in Chapter 12.0, uses traffic count surveys undertaken during the ongoing Covid-19 pandemic in 2021. However, there were no formal travel restrictions in place at the time and schools were open, so it is not considered that counts have been distorted.

Survey work has been undertaken to complement data from official sources in order to provide up-to-date base line information on which to undertake the environmental assessments. This EIAR has been prepared on the best available information and in accordance with current best practice and guidelines published by the Environmental Protection Agency.

1.5 THE APPLICANT

The Riverpoint Construction Limited registered office is 12th Floor, Riverpoint, Lower Mallow Street Limerick.

1.6 THE DEVELOPMENT

1.6.1 Site Context

The site is located approximately 3.5km from Limerick City centre, in the western environs of the city, adjoining the built-up area and existing residential development. The general area comprising the masterplan site has a rural feel, notwithstanding significant residential and educational developments immediately to the east. The site is within close walking proximity to the Technological University of the Shannon (TUS) and Thomond Park. A 10 minute walk from the site provides connectivity across the city via bus route No.302 on the Old Cratloe Road.

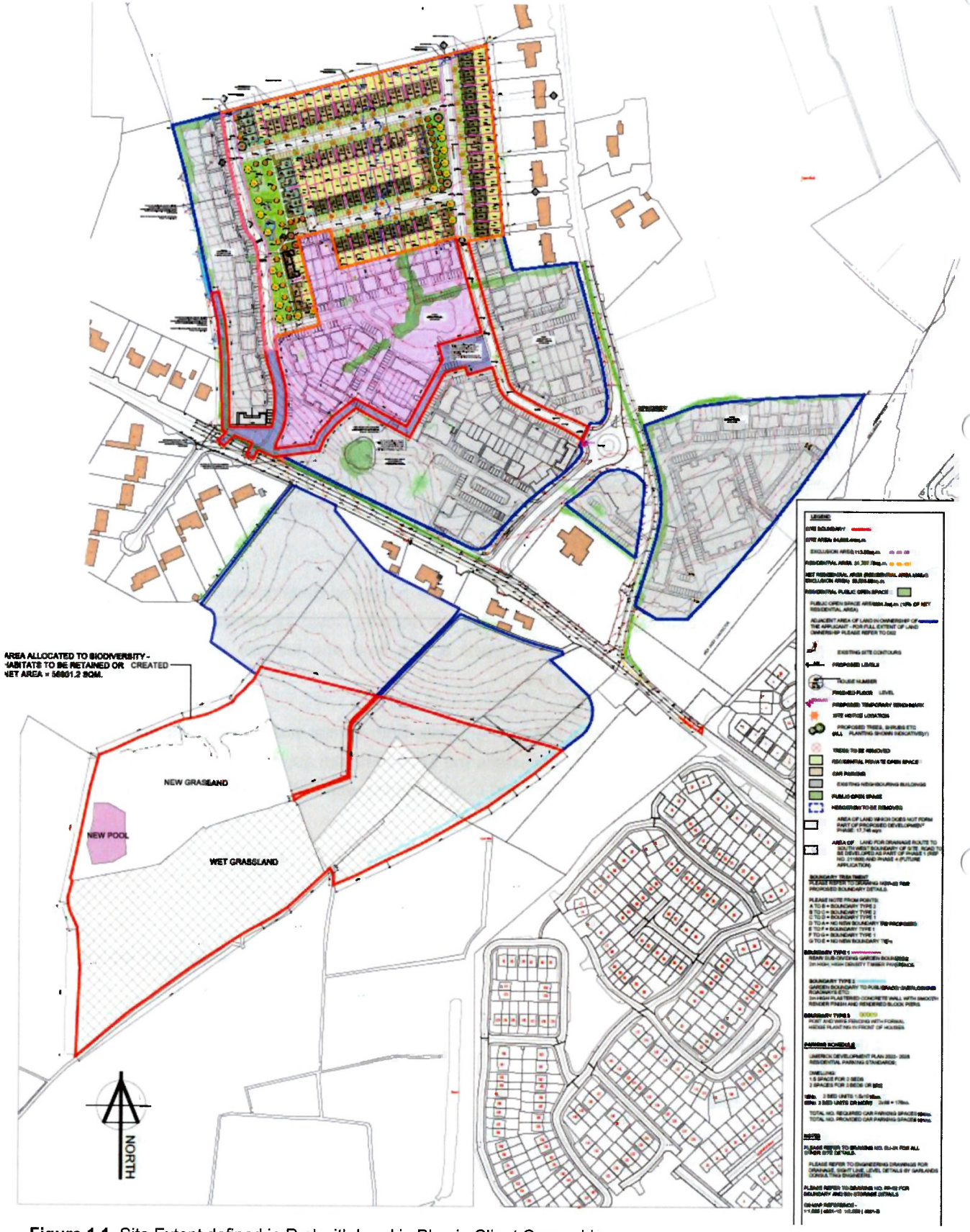


Figure 1.1 Site Extent defined in Red with Land in Blue in Client Ownership

The subject application comprises Phase 3 as identified in red in Figure 1.0. Specifically, the application site is bounded to the east by existing housing developments, by a mature hedge and undeveloped zoned land to the north and west and to the south by the Cratloe Road. The site is irregular in shape, duly designed to accommodate future phases of development.

The masterplan site is bound by the Old Cratloe Road to the south and the Meelick Road to the east, both of which are being upgraded and realigned as part of the Coonagh–Knockalisheen Distributor Road scheme which is currently on site and expected to be complete by 2025/25. Currently, the site comprises a parcel of agricultural land. The area proposed for development is set within a former golf course which was still in use in the 1990s but reverted back to agricultural use by 2000. There are remnants of the landscape characteristics of the golf course evident within the site, with a pond located on the western boundary which appears to dry up in Summer months.

1.6.2 The Proposed Development

The development as described in the public notices is set out hereunder

Planning permission for the construction of 98 residential units comprising of the following: 44 No. 2 storey, 4 bed, semi-detached units; 44 No. 2 storey, 3 bed, semi-detached units; 6 No. single storey 2 bed, end of terrace units and 4 No. single storey 2 bed, mid terrace units. Installation of all necessary and associated site works to include vehicular and pedestrian connections to public roundabout (currently under construction) on Pass (Meelick) Road, roadways, footpath, green spaces, landscaping and boundary treatments, together with all associated drainage connection works and all ancillary site works.

Following a request for further information the mix of units proposed on the site has changed to 10 no. 2 bed units, 42 no. 3 bed units and 46 no. 4 bed units. It is this mix of units which is considered in this EIAR.

It is important to note that this application seeks permission for an overall site as defined in red of 9.45 hectares but with a net residential developable area of 2.83 hectares. The net residential developable area represents that land which shall be developed and excludes an area of land for a drainage route to the south west boundary and which is to be developed as part of Phase 1 (planning reference 21/1800) and the proposed Biodiversity area located south of the Cratloe Road.

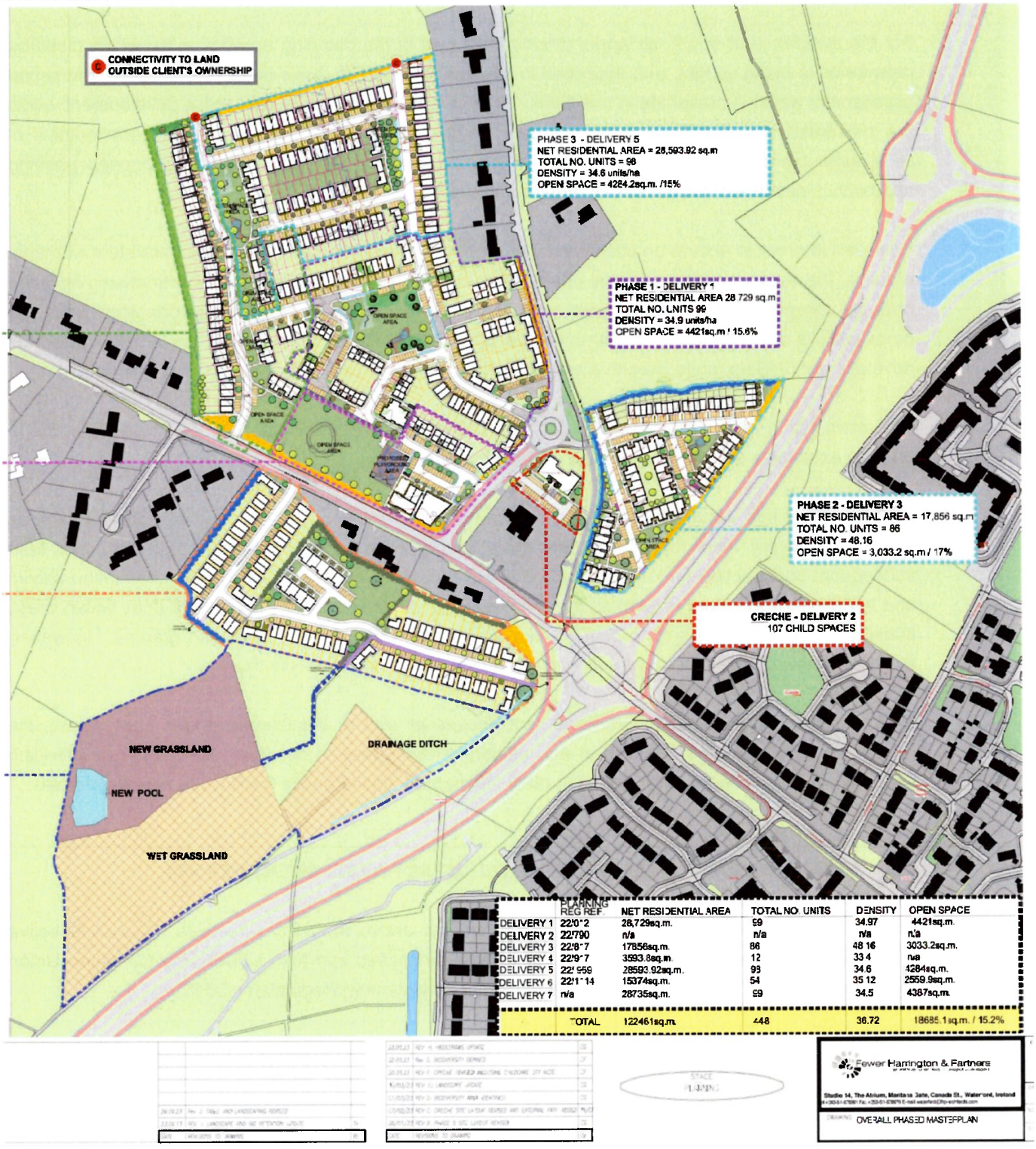
1.6.3 The Masterplan

Whilst the proposed development comprises an application site of 9.45 hectares, the applicant owns and is proposing development on an overall site of 22.53 hectares. A holistic approach to development has been adopted and an overall masterplan has been prepared for 22.53 hectares of land with capacity to deliver circa 448 no. residential units, a childcare facility and neighbourhood centre (4 no. commercial units) and a significant Biodiversity area as detailed in Figure 1.2. However, this total number is likely to change and can only be finally determined once planning permission has been secured for each phase of development. In terms of infrastructure and planning for future development, the roads and water services have been planned from the outset to ensure adequate capacity to serve the entire masterplan area.

Delivery 1 and Phase 1 of the overall development was granted planning permission by the planning authority for 99 no. residential units but is currently on appeal to An Bord Pleanála. Table 1.1 clarifies the intent of the overall development site in terms of a phased approach to development and the delivery of units within each phase of development as detailed in Figure 1.2. This is provided as an indication of future development on site but could be subject to change as each proposal advances.

Delivery	**Development**	**Gross S iteArea defined by red line boundary**	**Status**	**Plan Ref. No.**
Delivery 1	Phase 1- 99 residential units	3.4 ha.	Planning permission granted On appeal to An Bord Pleanála	P21/1800
Delivery 2	Childcare Facility.	0.43 ha.	Granted Permission	P22/790
Delivery 3	Phase 2 - 86 residential units	2.19 ha.	Further Information Request	P22/817
Delivery 4	12 residential units & neighbourhood facility	1.49 ha.	Further Information Response Submitted	P22/917
Delivery 5	Phase 3 - 98 residential units	9.45 ha.	Su bject Development	P22/959
Delivery 6	Phase 4 - 54 residential units	2.55 ha.	Further Information Request	P22/1114
Delivery 7	Phase 5 - 99 residential units	3.02 ha	Future development	

Table 1.1 Phased Approach within Overall Masterplan



	PLANNING REG REF	NET RESIDENTIAL AREA	TOTAL NO. UNITS	DENSITY	OPEN SPACE
DELIVERY 1	22/0*2	28,729sq.m.	99	34.97	4421sq.m.
DELIVERY 2	22/790	n/a	n/a	n/a	n/a
DELIVERY 3	22/8*7	17856sq.m.	86	48.16	3033.2sq.m.
DELIVERY 4	22/9*7	3593.8sq.m.	12	33.4	n/a
DELIVERY 5	22/ 959	28593.92sq.m.	99	34.6	4284sq.m.
DELIVERY 6	22/1*14	15374sq.m.	54	35.12	2559.9sq.m.
DELIVERY 7	n/a	28735sq.m.	99	34.5	4387sq.m.
	TOTAL	122461sq.m.	448	36.72	18685.1sq.m. / 15.2%

Figure 1.2 Indicative Masterplan Proposal

1.7 PLANNING APPLICATION AND ENVIRONMENTAL ASSESSMENT – CLARIFICATION

For the avoidance of doubt, all works proposed as part of the planning application for which planning permission is being sought, and described in the statutory notices, have been subject to environmental assessment which is presented in this EIAR. The 'physical characteristics' of these development works are presented and described in further detail in the following chapters. These characteristics of development present a phased approach to development on the lands and the proposed phasing approach is described and assessed as part of this EIAR.

However, in order to ensure an effective and conclusive environmental assessment consistent with best practice, the assessment of potential effects on the environment examines; the effects arising from the physical characteristics of the proposed residential development of 98 no. units (for which planning permission is sought) and also; the collective cumulative effects of the overall proposed masterplan development (448 no. units, creche & neighbourhood centre) if and whenever it is implemented.

The examination of the 'all phase' development scenario for the site is consistent with best practice in order to examine a 'worst-case' scenario of the project effects.

Examination of this 'worst-case' scenario is based on the likely effects of the proposed development as Phase 5 (Delivery 7) of the overall development and the anticipated activities that will occur from subsequent construction and operational stages of remaining phases based on the information known and available at this time in respect to those subsequent phases. The number of units within these subsequent phases are likely to change as planning permissions are sought and granted. However, the overall environment impacts if any and effects should not substantially change.

Despite the consideration of all development phases as part of this environmental assessment, the residential development as set out in the masterplan is subject to necessary and separate planning consent. This approach is applied in the relevant chapters that examine the environmental variables.

1.8 REQUIREMENT FOR ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Environmental Impact Assessment (EIA) requirements derive from EU Directives. Council Directive 2014/52/EU amended Directive 2011/92/EU and is transposed into Irish Law by the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018.

Proposed development which falls within one of the categories of development specified in Schedule 5 of the Planning and Development Regulations 2001, as amended, which equals or exceeds, a limit, quantity or threshold prescribed for that class of development must be accompanied by an EIAR.

The subject development does not fall within development classes set out in Part 1 of Schedule 5.

Whilst the proposed development of 98 no. units does not of itself fall within a development class set out in Part 2 of Schedule 5, the overall masterplan of 448 no. units on 22.53 hectares of land does and the applicable category is 10(b)(iv).

(iv) Urban development which would involve an area greater than 2 hectares in the case of a business district, 10 hectares in the case of other parts of a built-up area and 20 hectares elsewhere. (In this paragraph, "business district" means a district within a city or town in which the predominant land use is retail or commercial use.)

The proposed development comprises 9.45 hectares (as defined by red line boundary inclusive of the biodiversity area) and is therefore sub-threshold mandatory EIA.

The application site is located within the edge of the built up area of the western environs of Limerick City. A threshold of 10 hectares applies to a built-up area. The overall masterplan site comprises 22.53 hectares. The proposed development, when considered in conjunction with the previous phases of development, will cumulatively exceed the 10 hectares threshold. Having regard to development which has already occurred within the masterplan area and future residential development, which is likely to be delivered, a non-mandatory EIAR has been prepared in the interests of the proper planning and sustainable development of the area.

1.9 STRUCUTRE OF THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT

1.9.1 Layout of the EIAR

The EIAR comprises five parts which include:

(A) Non – Technical Summary;
(B) Introduction and Overview;
(C) Project Characteristics likely to have significant Effects on the Environment;
(D) Examination of the Effects on the Environment, and;
(E) Interaction of the Foregoing

The *'Non-Technical Summary'* presents a synopsis of the specialist technical reports, and commentary on the significant direct and indirect effects on the environment. It omits technical terms and abbreviations but does not understate any issues of significance that may arise from the project. The *'Introduction and Overview'* provides details on how the EIAR is structured, presents the project characteristics, the need for the development and the planning context, and details a number of alternatives that were considered in preparing the proposal. The section *'Project Characteristics likely to have Significant Effects on the Environment'* details the project phase by phase from construction through to the operational phase. The effects of the project on identified environment variables are then undertaken whilst the final section of the EIAR examines the interaction between the examined variables.

1.9.2 Assessment Criteria

The EIAR includes a simplistic and systematic methodological assessment of the proposed development under the following sub-headings:

- Introduction
- Assessment Methodology
- Receiving Environment
- Likelihood of Impacts
- Description and Significance of Impacts

- Remedial and Mitigation Measures
- Residual Impacts
- Monitoring
- References

1.9.3 Significance of Environmental Effect

The effects on the receiving environment are measured as the likely natural or physical changes in the environment resulting directly or indirectly from the development processes. Consideration of these effects was undertaken by assessing the proposed development against the defined environmental variables set out in the Planning and Development Regulations 2001, as amended and the recently EPA published Guidelines on the Information to be Contained in Environmental Impact Assessment Reports

Impacts or effects are described in Guidance documents in terms of quality, significance, magnitude, probability, duration, and type. Table 1.2 below presents the description of the significance of effects and Table 1.3 presents the description of the duration of effects as shown in the Guidelines.

"Significance" is a concept that can have different meaning for different topics – in the absence of specific definitions for different topics the following definitions may be useful.	
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 Effects	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
Moderate Effects	An effect that alters the character of the environment in a manner that is consistent with existing and emerging trends.
Significant Effects	An effect which, by its character, magnitude, duration or intensity significantly alters the majority of 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 Effects	An effect which obliterates sensitive characteristics

Table 1.2 Describing the Significance of Effects

'Duration' is a concept that can have different meanings for different topics – in the absence of specific definitions for different topics the following definitions may be useful.	
Momentary Effects	Effects lasting from seconds to minutes.
Brief Effects	Effects lasting less than a day.
Temporary Effects	Effects lasting less than a year.
Short-term Effects	Effects lasting one to seven years.
Medium-term Effects	Effects lasting seven to fifteen years.
Long-term Effects	Effects lasting fifteen to sixty years.
Permanent Effects	Effects lasting over sixty years.

Table 1.3 Describing the Duration of Effects

1.9.4 Environmental Variables

The potential significance of the environmental variables was first identified in the scoping exercise that preceded the preparation of the EIAR. Further details of the scoping approach is detailed in Chapter 4.0. The environmental variables assessed for this project extend to include:

- Population & Human Health
- Biodiversity
- Land & Soils
- Water – Hydrology, Hydrogeology & Flood Risk
- Air Quality
- Noise & Vibration
- Climate
- Material Assets - Traffic & Transport
- Material Assets – Utilities & Waste
- Cultural Heritage - Archaeology
- The Landscape – LVIA

In assessing each of the above variables, examination was undertaken in terms of their context, character, significance and sensitivity in respect to the proposed development and location. The level of detail and information presented and assessed for each of the above variables differs depending on the context, character, significance and sensitivity of each variable within this receiving environment and, the potential effects that the proposed development may have on each variable.

1.10 COMPETENCIES OF TEAM

The preparation of this EIAR has been project managed by HRA | PLANNING Chartered Town Planning consultants. The project management team hold recognised professional qualifications in Town Planning, Environmental Impact Assessment Management, and in Ecological Assessment. The assessment has been prepared with other specialist professional inputs as specified in Table 1.4.

Chapter of EIAR	Author(s)	Company	Subject Area	Qualification
Part A	Mary Hughes	HRA Planning	Non-Technical Summary	BA (Hons) MSc PGDip EIA Mgmt. MIPI Town Planning Consultant
Part B				
Chapter 1	Mary Hughes	HRA Planning	Introduction	BA (Hons) MSc PGDip EIA Mgmt. MIPI
Chapter 2	Mary Hughes	HRA Planning	Project Description	BA (Hons) MSc PGDip EIA Mgmt MIPI
Chapter 3	Mary Hughes	HRA Planning	Residential Need & Spatial Planning Policy	BA (Hons) MSc PGDip EIA Mgmt. MIPI
Chapter 4	Mary Hughes	HRA Planning	Project Scoping & Consultation	BA (Hons) MSc PGDip EIA Mgmt. MIPI
Chapter 5	Mary Hughes	HRA Planning	Examination of Alternatives	BA (Hons) MSc PGDip EIA Mgmt. MIPI
Chapter 6	Mary Hughes	HRA Planning	Population & Human Health	BA (Hons) MSc PGDip EIA Mgmt. MIPI
Chapter 7	Jane Russell – O'Connor	Russell Environmental	Biodiversity	PhD, P.G.C.E, BSc.
Chapter 8	Brian Lahiff	Garland Engineering	Land & Soils, Geology & Hydrogeology	BE, PGradDip.CEng MIEI
Chapter 9	Brian Lahiff	Garland Engineering	Hydrology – Surface Water & Flooding	BE, PGradDip.CEng MIEI
Chapter 10	Ciara Nolan	AWN Consulting	Air Quality & Climate	BSc. MSc. AMIEnvSc, AMIAQM
Chapter 11	Leo Williams	AWN Consulting	Noise & Vibration	BAI MAI PgDip MIOA
Chapter 12	Brian Coakley	Coakley Consulting Engineers	Material Assets - Traffic & Transport	BE MEngSC HDipGIS MIEI
Chapter 13	Brian Lahiff Mary Hughes	Garland Engineering CSD Engineers HRA Planning	Material Assets – Built Services	BE, PGradDip.CEng MIEI BA (Hons) MSc PGDip EIA Mgmt MIPI
Chapter 14	Brian Lahiff Mary Hughes	Garland Engineering HRA Planning	Material Assets – Waste Management	BE, PGradDip.CEng MIEI BA (Hons) MSc PGDip EIA Mgmt MIPI
Chapter 15	Martin McGonigle & Tony Cummins	John Cronin & Associates	Cultural Heritage - Archaeology	BA Msc BA MA
Chapter 16	Kevin Fitzpatrick	Kevin Fitzpatrick Landscape Architecture	The Landscape	BA (Hons) Land Arch, MLA, MILI
Chapter 17	Mary Hughes	HRA Planning	Interaction with the Foregoing	BA (Hons) MSc PGDip EIA Mgmt.MIPI
Chapter 18	Mary Hughes	HRA Planning	Summary of Mitigation Measures	BA (Hons) MSc PGDip EIA Mgmt. MIPI

Table 1.4 Table of Content and Authors

Mary Hughes is a Director of HRA Planning Chartered Town Planning Consultants and Corporate Member of the Irish Planning Institute. She qualified as a Town Planner in 1996 with a Masters of Science Degree from Queens University Belfast and has 23 years' experience in the field of town planning and environmental assessment. She received a Diploma in Environmental Impact Assessment Management from UCD in 1999. She spent her formative years working in local authorities throughout Ireland as a Town Planner before moving to private practice in 2002. Mary has project managed and co-authored many Environmental Impact Statements (EIS) and more recently Environmental Impact Assessment Reports (EIAR) on behalf of private clients and public bodies across a diverse range of project typed and development sectors in Ireland.

Dr. Jane Russell – O'Connor is the managing Director of Russell Environmental and Sustainability Services Limited and has a PhD in Ecology from the University of Wolverhampton. She has worked as a practicing ecologist for 10 years on a variety of different projects for developers, local authorities, the Heritage Council, civil engineers, architects and industrial multinationals within Ireland, as well as working in the Nature Conservation industry as a Ranger and Country Park Manager for over 10 years, in the UK. She featured on Nationwide in May 2020 about biodiversity and for her work in developing and implementing the pollinator plan in Tramore with Tidy Towns. Dr Russell-O'Connor also teaches ecology and environmental science, part –time, at the South East Technological University in the Department of Architecture and has successfully supervised a number of PhD students to completion.

Tony Cummins BA MA is a Senior Archaeologist with John Cronin & Associates since 2009. He holds B.A. and M.A. degrees in archaeology (University College Cork (UCC) 1992 & 1994) and was confirmed as a licence-eligible archaeologist by the National Monuments Service in 1998. Since that time he has directed numerous archaeological excavations throughout Ireland and also has extensive experience in the compilation of cultural heritage impact assessments for a variety of development types, including residential schemes.

Brian Coakley is Managing Director of Coakley Consulting Engineers. He holds a BE in Civil and Environmental Engineering (2001), a MEngSc Master of Engineering Science Degree (2003) and a Higher Diploma in Geographical Information Systems(GIS) in 2010 from University College Cork (UCC). Brian has over 20 years experience in the fields of traffic engineering, transport planning, road safety and design. He has experience throughout Ireland and overseas in all stages of planning including feasibility, master planning, preliminary and detailed design for projects of varying type, scale and complexity. He has provided traffic and transport input for several Environmental Impact Statements (EIS) and more recently Environmental Impact Assessment Reports (EIAR).

Martin McGonigle graduated with a B.A. in Heritage Studies from G.M.I.T in 2001, followed by an MSc in Maritime Archaeology at the University of Ulster, Coleraine in 2002. He is a Senior Archaeologist with John Cronin & Associates (JC&A) and has been a full-time professional archaeologist since 2002, a Licensed Archaeologist in RoI since 2008 & NI since 2009 and is a full member of Institute of Archaeologists of Ireland (MIAI). Since joining JC&A in 2008 Martin has worked as Senior Archaeologist on numerous archaeological schemes and heritage projects, including cultural heritage assessments for environmental impact assessments, archaeological works on large infrastructure projects. He has also published nationally and internationally on a wide range of cultural heritage and archaeological subjects. Martin graduated with an MSc in Applied Landscape Archaeology from the University of Oxford, passing with distinction.

Brian Lahiff is a Chartered Engineer with Garland Engineering and holds a Bachelor of Civil Engineering from National University of Ireland. Brian has also completed a Postgraduate Diploma in Health and Safety in Construction from Trinity College Dublin in 2008 with distinction. He has also gained a Postgraduate Diploma in Project Management from Trinity College Dublin in 2010, again with distinction. As a Chartered Engineer, Brian has Fifteen (15) years' experience in planning, design, project management, co-ordination and supervision of the construction of a range of projects. He has acted on various types and sizes of projects and specialises in the delivery of phased projects in challenging environments especially in healthcare campuses.

Ciara Nolan is a Senior Environmental Consultant in the air quality section of AWN Consulting Ltd. She holds an MSc. (First Class) in Environmental Science from University College Dublin and has also completed a BSc. in Energy Systems Engineering. She is an Associate Member of both the Institute of Air Quality Management (AMIAQM) and the Institution of Environmental Science (AMIEnvSc). She has over 5 years of experience working in environmental consultancy focussing on air quality. She has prepared air quality and climate impact assessments for numerous EIARs for a range of projects including commercial, residential, industrial, pharmaceutical and data centre developments.

Leo Williams is a Senior Acoustic Consultant at AWN Consulting who has 6 years' experience as an environmental consultant specialising in Acoustics and Environmental Impact Assessment. He has authored numerous EIAR chapters in relation to various sectors, including residential, mixed-use, renewable energy developments and industrial developments.

Kevin Fitzpatrick is a Landscape Architect with Kennedy Fitzpatrick Landscape Architecture. Kevin has 23 years of experience in both landscape design, from planning through to construction, and landscape and visual impact assessment. In specific regard to LVIA he has worked across a range of projects including residential developments, industrial developments, data centres and infrastructure projects.

CHAPTER TWO PROJECT DESCRIPTION

2.1 INTRODUCTION

This chapter sets out a description of the proposed development and information on the project site; the design; extent; and other relevant features of the project. In accordance with Article 5(1)(a) of the 2011 Directive as amended by Directive 2014/52/EU the description of the proposal comprises *"...information on the site, design, size and other relevant features of the project"*.

A description of the Masterplan Site and the proposed Phase 3 application site and its surrounding is presented, together with the proposed design parameters. This description sets the basis against which the specialist assessments presented in this EIAR have been undertaken.

The vision for the proposed scheme is to create a new community living environment in an existing urban setting, proximate to established services and facilities, where car travel is minimised, and pedestrian and cyclist movements are prioritised.

It is proposed to deliver the overall community living environment in a series of phases with the proposed development comprising Delivery Stage 5 Phase 3 of an overall development of seven phases. The indicative masterplan for the overall 22.53 hectares site indicates the potential to accommodate circa 448 no. units. However, the proposed development comprises an application for 98 no. units only on a gross site area of 9.45 hectares and a net residential area of 2.85 hectares.

2.2 OVERALL MASTERPLAN

An indicative masterplan has been prepared for the overall 22.53 hectares site in the ownership of the applicant. Subsequent phases of development will be subject to separate applications for permission and are likely to be accompanied by a sub-threshold EIAR based on cumulative development in the area and overall site size. Initial studies suggest that the overall 22.53 hectares site, inclusive of the application site, has the capacity to accommodate circa 448 no. residential units with associated infrastructure.

A Masterplan drawing accompanies this application under separate cover and is detailed in Chapter 1.0 Figure 1.2. It illustrates the indicative design of the combined sites (Delivery 1 - 7) for information purposes.

2.3 THE LOCATION OF THE PROJECT

2.3.1 Site Location and Context

The site is located approximately 3.5km from Limerick City centre, in the western environs of the city, adjoining the built-up area and existing residential development. The general area comprising the masterplan site has a rural feel, notwithstanding significant residential and educational developments immediately to the east. The majority of site is surrounded by green fields apart from one off dwellings

on the Pass Road to the east, the Willow Grove development on the southern side of the Cratloe Road, and the County Club Bar adjoining the site to the east. at the Old Cratloe Road - Pass Road junction. Further to the east, developments such as Thomond Village, Clonile and Shannonvale lie next to the site and mark the edge of the built up area of the Limerick suburbs.

The proposed masterplan site is ideally located and is surrounded by an existing and future road network (currently under construction) with easy access to Limerick city centre, the national road network and the TUS (Technological University Shannon) campus formerly LIT. A well-lit roadside footpath and other pedestrian facilities extends from the site towards the city centre on the Old Cratloe Road. A 10 minute walk from the site to the bus stop provides connectivity across the city via bus route No.302 on the Old Cratloe Road.

The masterplan site is bound by the Old Cratloe Road to the south and the Meelick Road to the east, both of which are being upgraded and realigned as part of the Coonagh–Knockalisheen Distributor Road scheme which is currently on site and expected to be complete by 2025/25. This part of the city is the gateway from the west, containing many housing developments from the 1960s all of which are low rise, in keeping with their surroundings.

The topography of the overall masterplan site is undulating with some localised peaks. The overall site has a high point of +18.00mAOD (Malin Head) in the north east corner. From here the land falls away to the Southeast, South and West. The ground profile falls to a low point of +5.00mAOD (Malin Head) along the southern boundary of the site. The land has typical gradients of 2.3% to the Southeast, 2.9% to the South and 7.7% to the West. Currently, the site comprises a parcel of agricultural land. The area proposed for development is set within a former golf course which was still in use in the 1990s but reverted back to agricultural use by 2000.

2.3.2 Landuse Zoning

The masterplan lands benefits from three different land use zonings, with the primary land use comprising 'New Residential Use'. The objective of this landuse is "*to provide for new residential development in tandem with the provision of social and physical infrastructure*". The other landuse zonings are positioned fronting onto the Old Cratloe Road, including 'Open Space Use' (surrounding an existing archaeological monument) and a 'Local Centre Use'. Whilst the objective of the open space use is *"to protect, provide for and improve open space, active and passive recreational amenities"*, the objective of local centre use is "*to protect and provide local centre facilities to serve the needs of new/existing neighbourhoods and residential areas*".

The application site is located wholly on lands zoned for 'New Residential Use'. The purpose of this zoning is intended primarily for new high quality housing development. The quality and mix of residential areas and the servicing of lands is intended as a priority to support balanced communities. It states that new housing and infill developments should include a mix of housing types, sizes and tenures, to cater for all members of society and design should be complimentary to the surroundings and should not adversely impact on the amenity of adjoining residents.

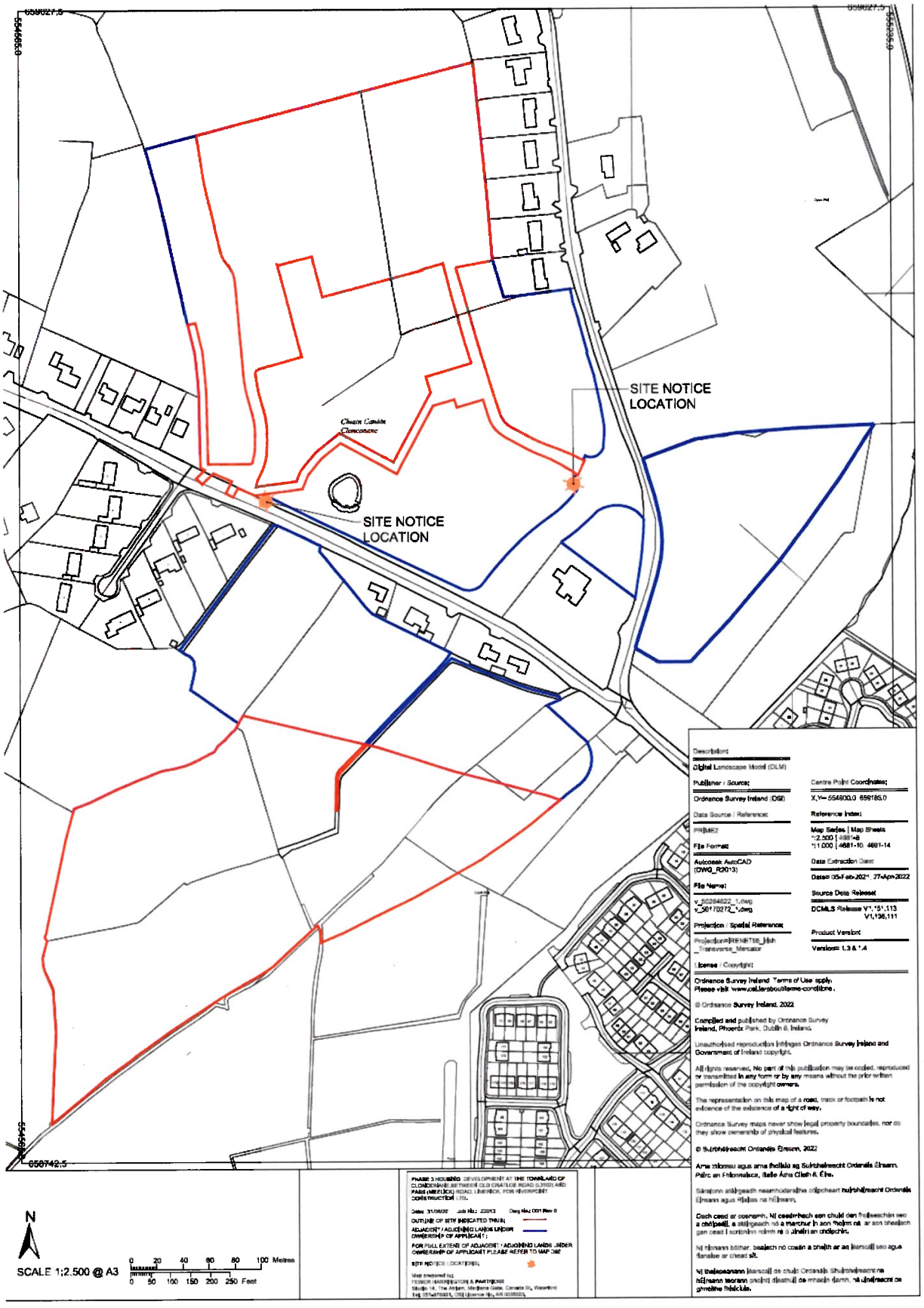


Figure 2.1 Site Location Map with Extent of Site Defined in Red

2.3.3 Planning History

The masterplan site is located within an established urban environment and in particular, is located in an area of the city which is benefitting from significant road infrastructure improvements. The area has been identified for growth, along with the regeneration of the Moyross area, located to the north. Invariably, this means that a number of sites could or will be developed in tandem with the subject proposal.

The only planning permission granted which is of relevance within the masterplan site is planning permission P21/1800. Permission was granted for 99 no. residential units, identified as Phase 1 within the overall masterplan. This is the subject of a third party appeal to An Bord Pleanála. There are four other phases of development at varying stages within the planning application process as detailed in Chapter 1.0 Table 1.1.

There are no other significant planning permissions granted or being assessed, either adjoining or in proximity to the masterplan site.

2.3.4 Application Site

The 9.45 hectares application site sits within a wider undeveloped greenfled site for which a masterplan has been prepared. Figure 2.1 illustrates the location of the site within the context of the overall landholding (masterplan area), defined in blue. This has already been clarified in Chapter 1.0 of this EIAR. The site is irregular in shape, duly designed to accommodate future phases of development.

The topography of the site is undulating and falls from east to west. Existing site levels within the development lands are between 6.0 m and 18.0 m AOD. There are boundary hedgerows to the north of the site and perpendicular to these is a hedgerow that partially bisects the field. A number of detached, one off houses fronting onto the Meelick Road defines the eastern boundary of the site.

The Zone of Notification (ZoN) for one recorded archaeological site (as recorded by the Archaeological Survey of Ireland (ASI)) is located within the boundary of the proposed development site, Children's burial ground (LI005-007---). Although this archaeological monument is located outside of the defined application site boundary and will be preserved in situ, proposed access roads will encroach slightly into the ZoN surrounding it. Chapter 12.0 of this EIAR deals further with archaeology and cultural heritage.

Based on the OPW CFRAMs Map, the site is located outside Flood Risk Zones A and B and is, therefore located in Flood Risk Zone C. The 1 in 1000 year coastal and fluvial flood levels in this area are at 2.90m and 2.15m respectively. Existing site levels within the development lands are between 6.0 m and 18.0 m AOD more than 3m above the 1 in 100 year flood levels. The issue of flooding is dealt with further in Chapter 9.0.

The site is located within an area of built development and agricultural land, is currently grazed by horses and pomies and so is comprised of low value biodiversity habitats. Biodiversity is dealt with further in Chapter 7.0 of this EIAR.

The land is not located within or adjoining any Natura 2000 designated sites. There is a drainage ditch in the field (outside of the application site) to the west which connects with the Lower River Shannon Special Area of Conservation (SAC) and River Shannon and River Fergus Estuaries Special Protection Area (SPA) some 1.7km distant from the site. Given the local hydrological pathways links between the

site and these designated areas to these areas, a Natura Impact Statement (NIS) has been undertaken and accompanies the planning application for development.

2.4 CHARACTERISTICS OF THE PROJECT

2.4.1 Description of the Proposed Development

The description of development as per the public notices state that:

Planning permission for the construction of 98 residential units comprising of the following: 44 No. 2 storey, 4 bed, semi-detached units; 44 No. 2 storey, 3 bed, semi-detached units; 6 No. single storey 2 bed, end of terrace units and 4 No. single storey 2 bed, mid terrace units. Installation of all necessary and associated site works to include vehicular and pedestrian connections to public roundabout (currently under construction) on Pass (Meelick) Road, roadways, footpath, green spaces, landscaping and boundary treatments, together with all associated drainage connection works and all ancillary site works.

Following a request for further information the mix of units proposed on the site has changed to 10 no. 2 bed units, 42 no. 3 bed units and 46 no. 4 bed units. It is this mix of units which is considered in this EIAR.

Based on the key principles set out in the Limerick Development Plan 2022 - 2028, Fewer Harrington Architects have developed a comprehensive design for the overall masterplan site and the planning application site. Full details of the proposed development can be found in the plans and drawings accompanying the planning application. The Site Layout comprising the development proposal is detailed in Figure 2.2 and seeks to achieve a high quality landscaped park style environment, in accordance with the requirements of the Development Plan.

The Phase 3 application site is irregular in shape, purposively designed to accommodate future phases. The entrance to the site will be accessed from the permitted Delivery 1, Phase 1 development and the re-alignment of the Pass (Meelick) Road. This entrance will also give access to the Meelick Road to the north and also to the Old Cratloe Road to the east and west.

The design of the scheme adopts an efficient grid-type urban form with residential buildings arranged around a series of pocket green spaces. The proposed development has been designed to create views throughout the development looking towards the central communal open space for this phase and subsequent phases, thereby accommodating legibility within the site and contributing towards enhanced urban design within the overall scheme.

Development Statistics				
	Application Site		Indicative Masterplan Site	
No. of Units	98 units		448 units	
Unit Mix	Number	Percentage	Number	Percentage
2 bed house	10	10.1%	81	18%
3 bed house	42	42.9%	150	33.4%
4 bed house	46	47%	118	26.3%
5 bed house	0	0	30	6.6%
1 bed apartment	0	0	26	5.8%
2 bed apartment	0	0	44	9.8%
Site Area Gross	9.45 hectares gross		22.53 hectares	
Site Area Net	2.8 hectares		12.25 hectares	
Density	34.6 units per hectare		37.3 units per hectare	
Gross Floor Area	10,677sqm		TBC	
Building Height	1 & 2 storey		1 & 2 & 3 storey	
Public Open Space	15%		13.6% proposed plus zoned open space area results in total of 17.9%	
Creche	No		Yes – 107 no. children & 8 no. staff capacity	
Local Centre	No		Yes – 2 no. retail units, coffee shop & foodstore	

Table 2.1 Development Statistics

The blocks of development largely comprise two storey semi-detached units with terraced units bookending the rows of housing, effectively responding to the scale of neighbouring two storey developments. The proposed development is set back into the masterplan site, positioned at a minimum of 32m distance to the rear of the nearest dwellings, thereby maintaining privacy and protecting existing residential amenity.

A large area of public open space area is positioned on the western site boundary, intended to serve the proposed development. The open space is provided with passive surveillance from the bungalows and semi detached units to the north and east. Additional phases will bring additional passive surveillance to the open space. The development is distinct in character and will use a number of contrasting brick tones and a plastered finish. A consistent built form and design approach through the proposed development and future phases facilitates a sense of identity and place.

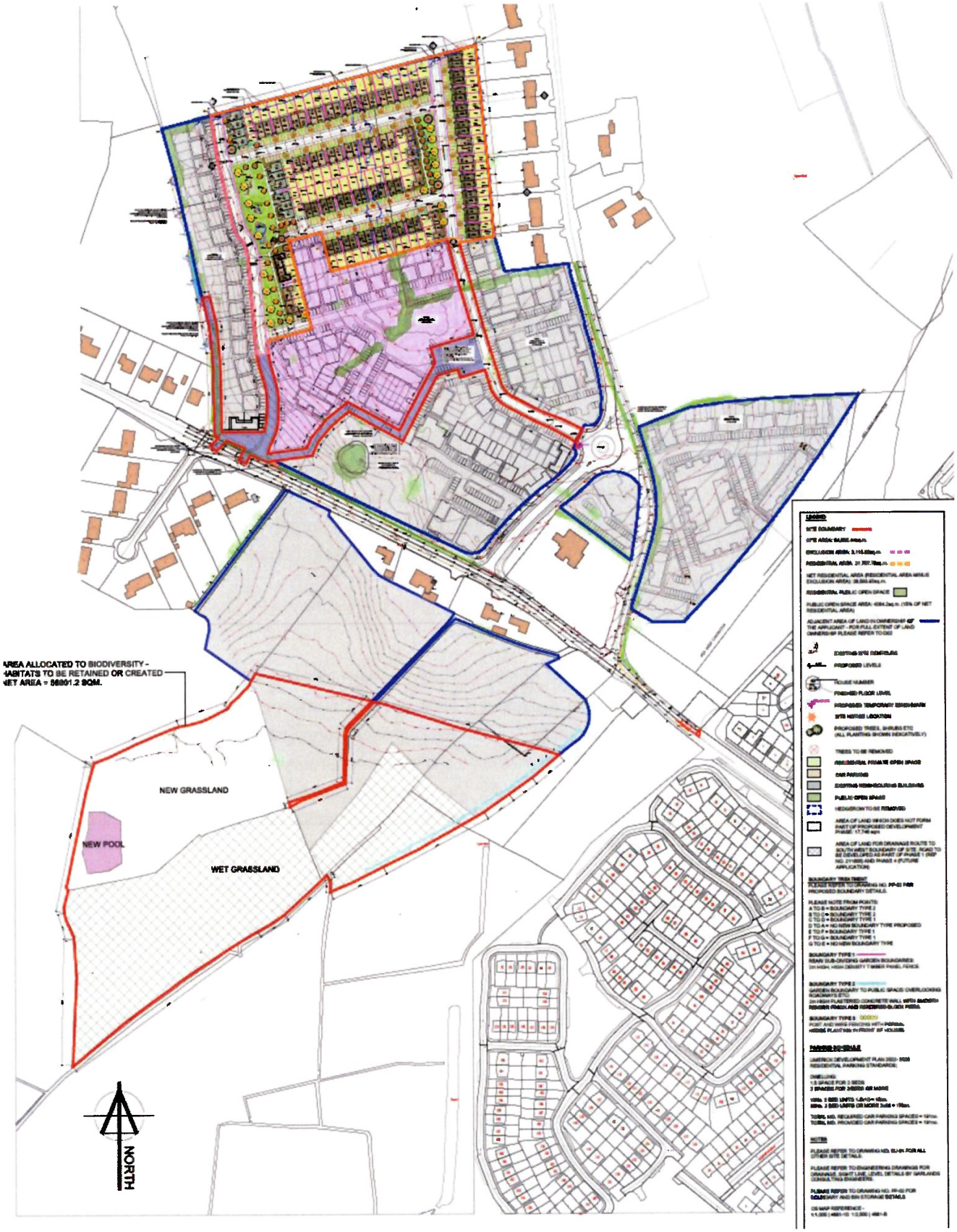


Figure 2.2 Site Layout Plan

To the south of the site, on the southern side of the Cratloe Road, it is proposed to develop and maintain an area of biodiversity of some 5.68 hectares in area.. The area primarily comprises wet grassland and it is proposed to develop a new grassland area with a water pool. It is intended that the habitats that will be lost as a result of the overall Masterplan development will be replaced with the proposed habitat area that have the potential to be of higher conservation value and therefore the overall evaluation of the biodiversity will be that of net gain (See Chapter 7.0 for further detail)). The habitat to be created is clearly identified on the Landscaping Plan accompanying the planning application.

The subject site has been designed in a highly permeable manner with good pedestrian, cyclist and future public transport links. Whilst a mobility management plan will be an important means of managing accessibility to the site, the proposed development has been designed cognisant of future transport proposals within the Limerick Shannon Metropolitan Area Transport Strategy (LSMATS) and Limerick Development Plan 2022 – 2028. To this end the proposed road network will connect with existing footpaths and public lighting on the Cratloe Road.

Existing levels are shown in the topographical survey. The proposed finished floor levels and levels of the roads, car parking and service areas are dictated by existing site levels with every effort made to achieve an overall earthworks balance with minimal cut and fill. Generally, levels rise from west to east across the site. The finished floor levels for the new buildings vary from 17.0m OD at the eastern site boundary to 12.0m OD at the western boundary with the lowest houses located at the north western corner of the site (10.85m OD).

2.4.2 Open Space & Landscaping

The design intent is to create a high quality and appropriate landscape for future residents which will meet their recreational needs and provide an attractive visual setting and associated social amenity spaces. The principles of inclusivity for all age groups, universal accessibility and sustainable development are applied to ensure an inclusive and environmentally responsible design solutions. The main objective of the landscape strategy for the residential area is to place the new residential and community facilities within a cohesive landscape that responds to and integrates the proposed development within the overall site.

The landscape approach seeks to create a permeable network of green infrastructure and open spaces throughout the development and pay attention to future links to the development lands outside this application boundary.

Some 15% of the residential development site is to be developed as public open space. A further area is to be developed as a natural biodiversity area. Key characteristics influencing the landscape design of the proposed site are:

- Landscaped open areas with soft grass and planted zones.
- High quality hard landscaped areas.
- New pedestrian links created between the site and surrounding areas.

Natural Play elements will be incorporated within the open spaces. Natural Play incorporates designed elements that enable play spaces to blend in with their surroundings and encouraging interaction with the natural landscape.

The proposed hard landscaping includes the following materials to the open spaces: compacted gravel paths/ asphalt paths within open spaces, concrete block pavers within specimen seating areas, reinforced grass/ bark within play areas; brushed concrete footpaths and concrete block to entrances/ thresholds.

2.4.3 Access & Layout

Access to the proposed development will be a standard DMURS compliant property 'T' junction located on a realigned section of the Meelick Road which has been designed as part of the Coonagh – Knockalisheen Distributor Road Scheme which is expected to be completed by 2025 / 26. The upgraded Old Cratloe Road immediately south of the site and the realigned Meelick Road to the east, will comprise a 6.6m carriageway with footpaths and cycle lanes on both sides.

The Masterplan lands will be accessed at three separate locations including, the recently constructed roundabout on the realigned Pass /Meelick Road and two separate standard DMURS compliant property 'T' junctions located on the southern and northern side of the upgraded section of the Old Cratloe Road which has been designed as part of the Coonagh – Knockalisheen Distributor Road Scheme which is expected to be completed by 2025 / 26. The upgraded Old Cratloe Road immediately south of the site and the realigned Meelick Road to the east, will comprise a 6.6m carriageway with footpaths and cycle lanes on both sides.

The subject lands comprising Phase 3 will be accessed via the constructed roundabout on the realigned Pass / Meelick Road. It is estimated that 70% of construction traffic (staff/misc. via cars, etc) will arrive/depart via the proposed roundabout junction to the east and 30% of construction traffic (deliveries via HGV) will arrive/depart via a new proposed junction to the west on the Old Cratloe Road.

The development has been designed taking into account DMURS standards and the principles of safety, accessibility and sustainability. The alignment of the internal road layout has been carefully designed to ensure and encourage low vehicle speeds by means of measures such as signage, changes of horizontal alignment, raised table junctions, reduced junction radii and off street parking.

The key aim of the design is to provide a self-regulating traffic environment in the estate through the use of suitable road widths and road curvature, with minimum signage and road markings within the development, other than at junctions. The application site and masterplan layout is orthogonal thereby ensuring permeability and legibility in accordance with the key principles of DMURS

The proposed car parking provision takes into account the Zone 3 parking requirements set out in the Limerick Development Plan 2022 – 2028 as detailed in Table 2.2. Installation of appropriate infrastructure to enable installation of recharging point for EVs will be facilitated within the curtilage of all dwelling houses. In the case of apartment units and the 'local neighbourhood centre' proposed as part of the wider Masterplan development, a minimum of 1 no. EV Charge Point space per five car parking spaces shall be provided and in the case of apartment parking, ducting shall be provided for every parking space.

Car Parking Provision – Proposed Development				
Development Type	Units/GFA	Development Plan Requirement	Required	Provided
House 2bed	10	1.5/unit < 3 bed	15	15
House 3 bed	42	2 /unit >= 3 bed	84	84
House 4 bed	46	2 /unit >= 3 bed	92	92
Total			**191**	**191**

Table 2.2 Car Parking Provision Proposed Development

Bicycle parking shall be accommodated within the curtilage of each proposed residential unit, with 20 no. visitor/ staff spaces associated with the local neighbourhood centre.

The proposed development has taken the provisions of the Limerick Shannon Metropolitan Area Transport Strategy (LSMATS) into consideration. Under the strategy, a bus corridor is to extend along the Old Cratloe Road beyond the application site, effectively providing connectivity between the site and the city centre. Further, cycling infrastructure will be accommodated within and adjoining the proposed development as per the 'Proposed Limerick Cycle Network Map' detailed in LSMATS, in particular the proposed 'Green Route' on the old, realigned section of the Meelick Road as it approaches the Old Cratloe Road.

2.4.4 Drainage Strategy

Foul Water

It is proposed to provide a single gravity foul sewer system to serve the development proposal. The foul sewerage from the overall development is planned to discharge to the foul network to be installed as part of the Old Cratloe Road upgrade works south of the development. The foul sewer network was designed in accordance with Irish Water Code of Practice July 2020 and to IS EN 12056/ IS EN 752, using hydraulic modelling software WinDes, which uses the Colebrook White equation.

A pre-connection enquiry was lodged with Irish Water for the development outlining the proposed flows and loads which would be generated by the development. This application was undertaken to determine if there is adequate capacity in the existing public foul sewer network to cater for this development. The proposal was accepted as feasible in principle by Irish Water.

Surface Water

The design of the storm water network and SUDS were based on a number of permeability factors from the CIRIA SUDS Manual for the developed site, including;

- Roofs; 100% runoff.
- Roads, driveways and footpaths; 100% runoff.
- Green areas; 0% runoff.

The design of the storm water network and SUDS allow for 30% climate change and 10% urban creep of the housing area for the developed site. The storm pipe network has been designed in accordance with IS EN 12056, IS EN752 and the Greater Dublin Strategic Drainage Study.

The storm drainage from the roads and footpaths will be collected in gullies and discharged via a traditional storm pipe network. Given the topography of the site and available green spaces, two

networks with separate infiltration and storage areas are proposed in Phase 3. Storage Area 1 infiltrates and attenuates the surface water flow from the entrance road to the development and is oversized to cater for stormwater flows from the wider Masterplan Site. The flow from Area 1 discharges through a pipe network to the Storage Area 2 at the southern boundary at a rate of 1.0l/s. Storage Area 3 infiltrates and attenuates the surface water flow from the majority of the remainder of the development and also discharges via a pipe network to Storage Area 2 but at a rate of 7.12 l/s. Storage Area 2 infiltrates and attenuates the surface water flow from a limited number of housing units and also caters for the restricted from Areas 1 and 3. Area 2 discharges to the existing watercourse at the western boundary at a rate of 9.12l/s.

A variety of SuDS measures will also be adopted on the site. The SuDS processes decrease the impact of the development on the receiving environment by providing amenity and biodiversity in many cases. The specific measures adopted comprise the following:

1. Permeable Paving to be provided in the private parking areas.
2. Public parking areas will feature porous asphalt.
3. Rainwater harvesting at each individual property.
4. Bioretention Pods and tree planters to be provided in the road verges.

Water Supply

It is proposed to provide watermain around the development to form a fully looped network, ensuring security and quality of supply. Hydrants will be provided in accordance with Building Regulations. The proposed internal water supply network for the development has been designed in accordance with Irish Water Code of Practice July 2020.

It is proposed to connect the development to the 250mm diameter main to be installed as part of the Old Cratloe Road upgrade works south of the development. Individual houses will have their own connections to the distribution main via service connections and boundary boxes.

A pre-connection enquiry was lodged with Irish Water for the development outlining the proposed flows and loads which would be associated with the housing development. This application was undertaken to determine if there is adequate capacity in the existing public watermain network to cater for this development. The proposal was accepted as feasible in principle by Irish Water reference number CDS22003876.

2.4.5 Energy Strategy

The strategy to sustainable design uses robust, passive, cost effective measures to create a more efficient and healthier environment within the planned spaces. The development provides an opportunity to create environmentally sound and energy efficient homes by using an integrated approach to design, planning, construction and operation.

The design strategies employed include a whole life cycle approach to management and planning of the development, energy efficiency with specific focus on reducing the carbon footprint, improving the environmental quality of the building spaces, material selection and use, waste management, water management and conservation and enhancing the ecological value of the site.

The houses have been designed to be simple rectilinear forms. They can be extended to the rear without compromising the style of the house types and the layout of the outdoor space. Additional living accommodation can be easily added if required in the future.

Energy efficient M&E systems and plant- Heating Plant, LED Lighting and Triple E registered products, that minimises the consumption of energy are to be used. An integrated Water Management and Conservation Plan that incorporates the use of low water consumption equipment to ensure the minimal use of potable water, efficient sanitary appliances (e.g. low water WC cisterns & taps).

The development is being designed to NZEB (Nearly Zero Energy Buildings) standards. This standard is the equivalent of a 25% improvement in energy performance on the 2011 Building Regulations. Nearly Zero – Energy Buildings means a building that has a very high energy performance in which the nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on site or nearby. Air to Water Heat Pumps will be used for all housing units. It is envisaged that air to water heat pumps will also be used in the commercial units and creche but with gas fired back-up / assist.

Passive design measures include the use of the building fabric to take advantage of the site constraints/orientation to maximise the daylight factors, natural ventilation and solar benefits. Natural daylight factors in accordance with BRE and CIBSE recommendations have been targeted.

2.4.6 Utilities

Electricity and Gas Infrastructure

ESB has low voltage (LV) lines traversing the site and medium voltage (MV) lines in close proximity which will be used to facilitate several cabinet Kiosk type MV/LV substations. There will be a separate Kiosk substation per 150 units. The LV network will be distributed via underground ducting and ESB Mini pillars.

Gas Networks Ireland has a capped 125mm PE 80 4 Bar gas supply in the area which will serve the proposed site.

Telecommunications

There are currently telecom services in the area, operated by SIRO or Virgin Media and these will be extended into the site to provide telecoms & broadband services to each home user. A full duct infrastructure to facilitate EIR FTTH (Fibre To The Home) 10Gigabit Broadband will be provided so each unit will have access to the national broadband plan. This infrastructure will ensure the provider can provide current and next generation broadband to each home.

2.4.7 Construction Characteristics

Construction Phase

It is anticipated that planning permission for the subject site will be secured in Q2 2023 and that construction will commence on site in Q1 2024 subject to permission and the discharge of any pre-commencement planning conditions. There is an anticipated completion timeframe of 12 months for the proposed 98 no. units the subject of this application.

Taking a holistic view of the entire masterplan site, it is anticipated that circa 100 no. units will be delivered per year dependent on sales and demand and the extent of house type and mix. This means that it could potentially take five years to complete development within the overall masterplan site, but this is dependent on securing relevant planning permissions in a timely manner. Development within the overall masterplan area will be phased as per the phasing plan detailed in Chapter 1.0.

Construction Works & Methods

Site Establishment and Security

The first activity to be carried out at the site will be the establishment of site facilities and security. The site office and welfare facilities (site compound) will be confirmed in advance of the commencement of site works. All the sub-contractors as well as the main contractor and project managers will occupy offices within the construction compound. The site parking for all staff, contractors and visitors will also be located in this area.

Erection of perimeter hoarding will take place at the start of the project alongside the site establishment and security works. The hoarding will be installed around each phase of development, except for dedicated access points. The extent of hoarding will be subject to the detailed phasing of the development and will ensure that areas under construction will be fenced off at all times. Gates will be provided at the access points and will be locked outside of working hours. Hoarding will consist of solid painted plywood on a timber support frame or similar. Hoarding will be properly designed to be secure and durable and will be maintained until it can be dismantled on completion of the development (or phase of the development).

Site Clearance

To facilitate the earthworks operation, site clearance will have to be carried out to remove vegetation. Removal of woody vegetation shall only take place outside the bird breeding season (1st March to 31st August). No removal of habitats or movement of construction machinery will occur outside of the development works area/footprint during the construction phase. Existing trees and hedgerows shall be retained where possible. Temporary surface water management measures will be put in place prior to stripping of topsoil and will remain in place until the completion of the development, or until the completion of each phase.

Topsoil will be stripped from the area to developed and from the area where site won fill is to be excavated to bring the development to the correct level. All excavated topsoil will be stored in dedicated stockpiles with environmental controls in place.

Prior to topsoil clearance, an Invasive Species Management Plan and survey is recommended to ensure areas of invasive plant species (if any) are identified and managed prior to or during site clearance works. There is a responsibility on the Environmental Manager or Ecological Clerk of Works (ECoW) to regularly inspect and supervise maintenance of the environmental controls throughout the process.

Earthworks

Once surface water management measures are in place and topsoil has been stripped, earthworks operations can commence. This will consist of moving fill from the higher ground at the east to the lower ground to the west. Material will be excavated by 360° excavators and transported to the deposition

area by articulated dumpers. The fill will then be placed by dozers and compacted using vibratory rollers. A testing regime will be implemented to ensure the acceptability of the fill and that the degree of compaction is sufficient. Fill will be brought to the required level across the site to allow construction of roads and foundations.

There is a quantity of subsoil 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 8.0 Land & Soils, Geology & Hydrogeology. The project engineers have estimated that circa 33,500m3 of subsoil material will need to be excavated to facilitate the proposed development and that imported fill of 25,500m3 is required. For the Phase 3 subject site it has been determined that circa 14,000m3 of subsoil material will need to be excavated to facilitate the proposed development and that imported fill of 1,200m3 is required. The quantum of fill required will be reduced by reusing bedrock as Class 1 material any other existing site won materials as appropriate thereby reducing cut in the Masterplan Site to 25,125m3 and fill to 17,125m3 and in the Phase 3 development proposal cut will be reduced to 10,500m3 and fill to 900m3.

Top soil stripping will also be necessary resulting in circa 42,000m3 of material in the Masterplan Site being removed, although it is envisaged that circa 15,000m3 of this will be reused. In the case of the subject site, phase 3 will result in circa 10,500m3 of topsoil material being stripped although it is envisaged that circa 4,000m3 of this will be reused.

Construction of Housing, Creche & Neighbourhood Centre

On completion of the bulk earthworks, construction of foundations for housing will commence. The exact construction sequence has not been determined, but it will be similar to what is described below:

- Temporary roads will be constructed to provide access to each row of units. This will include the construction of surface water management and silt control infrastructure, including settlement ponds and silt fencing.
- Construction of foundations. It is envisaged that standard strip foundations will be used on this site. If poor ground conditions are experienced raft foundations may be required in certain locations. The locations of foundations will be set out on the ground. Importation of certified stone fill will be required for the layers under the foundations in compliance with the Building Regulations. Reinforcement will be fixed, formwork installed, and all required ducting placed prior to placement of concrete. Construction of foundations will require concrete deliveries to the site. Controls will be required to prevent any concrete material reaching local watercourses.
- Once foundations have cured, either timber frames will be delivered to site and erected or masonry blockwork will be erected, followed by roofs.
- Windows and doors will be installed, and first fix plumbing and wiring will be completed prior to external and internal rendering.
- On completion of rendering, second fix, plumbing wiring and carpentry will be completed, followed by floors, painting and finishing.
- At this stage, installation of drainage and services is likely to progress and the roads will be completed. Drives, footpaths, boundary walls and lawns will be finished and final road pavements will be installed.

Construction Working Hours & Personnel

The anticipated general construction hours are 07:00 to 18:00hrs, Monday to Friday and 08:00 to 14:00 on Saturdays. In exceptional instances where works are required outside of these hours, bespoke agreement will be sought from Limerick City & County Council prior to any works taking place. The appointed contractor will be required to prepare and adhere to a Site Environmental Policy Plan and any employed subcontractors will be required to buy into this document. Unscheduled deliveries will not be allowed access.

It is anticipated that between 50 – 60 work personnel will be employed on site during peak construction periods. As detailed in Chapter 12.0 Material Assets – Traffic & Transportation construction traffic levels are anticipated to be lower than those tested for the operational state.

Site Access and Egress

Construction site access will be from the Old Cratloe Road and the newly realigned Meelick Road. The road will be raised to the correct alignment using compacted stone fill. At the early stages of construction, the access road may be constructed from unbound stone. The access road will be paved and completed, including street furniture, cycle ways and footpaths, in advance of occupation of the first phase of the development.

The routing will be strictly managed and controlled, and details will be incorporated into a Site-Specific Traffic Management Plan. It should be noted that it is likely that construction traffic accessing and egressing the site will contain soil/stone as a result of the site clearance and construction works.

General Safety & Health Considerations

Health & Safety issues will be the primary concern for the appointed Contractors. This will apply in respect of persons working on the site and in respect of passing pedestrians, motorists or other transport carriers. In this regard the highest possible care will be taken in providing a detailed Construction Stage Health and Safety Plan in advance of works commencing on site.

It is intended to operate a Health, Safety & Environmental Management System in line with ISO 18001 & ISO 14001. This Management System translates the company policy into processes to ensure safety, health and environmental responsibilities and performance can be monitored, reported and improved.

A suitably qualified and competent Project Supervisor Design Process (PSDP) has been appointed and a suitably qualified and competent Project Supervisor Construction Stage (PSCS) will be appointed in line with those requirements laid down in the Safety, Health and Welfare at Work Construction Regulations 2013.

Monitoring During Construction

Appropriate Air Quality and Dust monitoring will be carried out and records will be kept of all such monitoring. Construction works will be carried out in such a way as to limit the emissions to air of pollutants (particularly dust and fine particles (PM10)), employing Best Practicable Means. Air Quality & Climatic issues associated with the propose development are dealt with in detail in Chapter 10 of this EIAR.

Noise monitoring will be carried out in accordance in accordance with Safety, Health and Welfare at Work (Construction) Regulations 2006 – 2012 Safety, Health and Welfare at Work Act 2005, BS 6187:2011 - Code of Practice for Full & Partial Demolition, BS 5228:2009 Code of Practice for Noise & Vibration Control on Construction & Open Sites. Vibration monitoring will be carried out in accordance with BS 5228-1, 2009, Code of Practice for Noise & Vibration Control on Construction & Open Sites. Issues associated with Noise & Vibration are dealt with further in Chapter 11.0.

Construction Waste

Measures shall be undertaken to minimise the quantity of waste produced at the site and to handle the waste in such a manner as to minimise the effects on the environment. A site-specific *Construction Waste Management Plan* (CWMP) shall be prepared and will be employed to ensure sustainable and effective waste management throughout the construction and demolition phases of the project. It will ensure that the management of waste arising is dealt with in compliance with the provisions of the Waste Management Acts 1996 – 2015 and amendments. The waste management hierarchy to be adopted will be as follows:

1. Prevention and Minimisation
2. Reuse of Waste
3. Recycling of Waste:
4. Disposal

Typical waste materials that will be generated from the demolition and construction works will include:

- Soil and stones
- Concrete, bricks, tiles and ceramics
- Wood, glass and plastics
- Metals
- Gypsum-based construction material
- Paper and cardboard
- Mixed C&D waste
- Chemicals (solvents, paints, adhesives, detergents etc.)

The management of all hazardous waste arisings, if they occur, shall be coordinated in liaison with Health and Safety Management. Waste minimisation measures proposed are summarised as follows:

- Materials will be ordered on an 'as needed' basis to prevent over supply.
- Materials will be correctly stored and handled to minimise the generation of damaged materials.
- Materials will be ordered in appropriate sequence to minimise materials stored on site.
- A waste tracking log will be established.
- Sub-contractors will be responsible for similarly managing their wastes.
- All wood waste generated by site works will be inspected and examined and will be segregated as re-useable wood and scrap wood waste.

The main waste storage area will be located in the site compound A dedicated and secure area containing bins, and/or skips, and storage areas, into which all waste materials generated by construction site activities, will be established within the development.

Waste materials generated will be segregated at the site compound, where it is practical to do so. Where the on-site segregation of certain waste types is not practical, offsite segregation will be carried

out. There will be skips and receptacles provided to facilitate segregation at source. All waste receptacles leaving site will be covered or enclosed. The appointed waste contractor will collect and transfer the wastes as receptacles are filled.

The site Construction Manager will ensure that all staff are informed of the requirements for segregation of waste materials by means of clear signage and verbal instruction. Appointed employees will be made responsible for ensuring good site housekeeping.

2.4.8 Operational Characteristics

Pursuant to the EIA Directive an EIAR document is required to set out a description of the project processes, activities, materials and natural resources utilised; and the activities, materials and natural resources and the effects, residues and emissions anticipated by the operation of the project.

The proposed development is a residential development (with a creche and local neighbourhood centre comprising small commercial units), including associated infrastructural works and areas of open space. The primary direct significant environmental effects will arise during the construction stage. As a result, post-construction, the operation of the proposed development is therefore relatively benign and not likely to give rise to any significant additional impacts in terms of activities, materials or natural resources used or effects, residues or emissions which are likely to have a significant impact on population and human health, biodiversity, soils, water, air, or climate.

The primary likely and significant environmental impacts of the operation of the proposed development are fully addressed in this EIAR document; and relate to Population and Human Health, Landscape and Visual Impact and Noise and Air impacts associated with the traffic generated.

The proposed development also has the potential for cumulative, secondary and indirect impacts particularly with respect to such topics as traffic – which in many instances – are often difficult to quantify due to complex inter-relationships. However, all cumulative secondary and indirect impacts are unlikely to be significant; and where appropriate, have been addressed in the content of this EIAR document.

2.4.9 Description of Secondary and Off-Site Developments

The planning application includes details of the necessary road works, which are required to facilitate this development, namely connection of the site into a roundabout which was recently constructed on a realigned part of the Meelick Road.

These works, as detailed in Figure 2.3 comprised part of the proposed Coonagh to Knockalisheen Distributor Project which secured consent from An Bord Pleanála in 2021 and was subject to the preparation of an EIAR and Environmental Impact Assessment.

Whilst the works comprising realignment of the Meelick Road and provision of a roundabout to access the subject lands are now complete, delivery of the main carriageway is currently underway. These works will be considered in cumulation with the development proposal

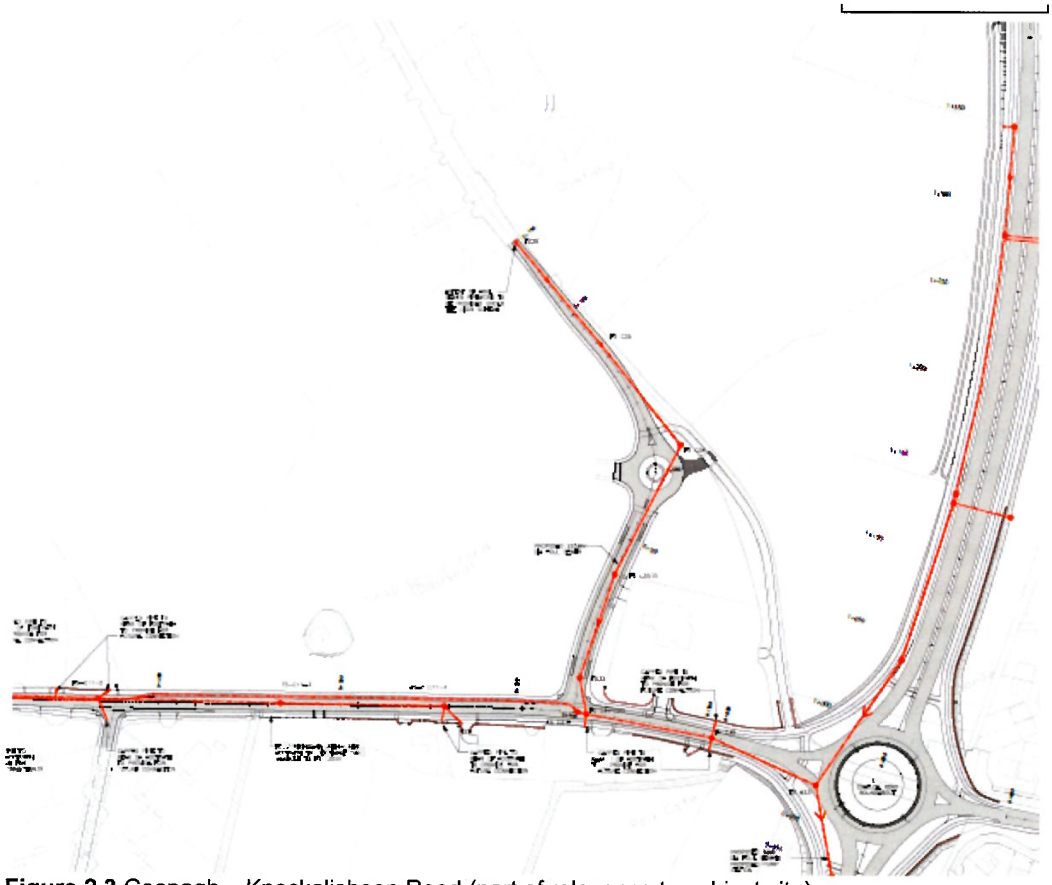


Figure 2.3 Coonagh – Knockalisheen Road (part of relevance to subject site)

2.5 PROJET CHANGES – GROWTH & ALTERATIONS

Very few projects remain unaltered throughout their existence and have the potential to grow or even cease operation. As per the EPA Guidelines and in the interests of proper planning and sustainable development it is important to consider the potential future growth and longer-term expansion of a proposed development in order to ensure that the geographical area in the vicinity of the proposed development has the assimilative carrying capacity to accommodate future development.

The indicative masterplan accompanying the proposed development demonstrates that the proposed residential development has the future capacity to grow and expand such that in total, circa 448 no. residential units, a creche and local neighbourhood centre could be accommodated within the masterplan site. This growth is indicative only and is dependent on securing planning permission and market demand. Regard has been made to this future growth potential in various chapters of this EIAR in so far as possible. Whilst all baseline information relates to the masterplan site, the impacts are generally limited to those of the proposed development. Drainage infrastructure and traffic generation impacts has been assessed having regard to the entire masterplan area, given the importance to future proof key infrastructure provision within the site to accommodate future growth.

The parameters for the future development of the area in the vicinity of the subject site are governed by the Limerick Development Plan 2022 – 2028 which has zoned the subject site and the wider masterplan site for new residential development, open space and local centre use. Any adjacent undeveloped lands, will be the subject of separate planning applications in the future, where they are identified as

being suitable for development, and where the provision of the requisite physical and other infrastructure is available.

2.6 DESCRIPTION OF THE RISK OF ACCIDENTS – HAVING REGARD TO SUBSTANCES OR TECHNOLOGIES USED

The risk of accidents can arise during construction and operation phases as part of normal construction measures and day to day living and activities. The risk of accidents and mitigation measures considered necessary to address same, has been considered and are presented under an assessment of each environmental variable assessed in this EIAR, where relevant.

Operation of the proposed development as a new residential neighbourhood is relatively benign and not likely to give rise to any significant impacts.

2.7 OTHER RELATED PROJECTS AND POTENTIAL FOR EX-SITU EFFECTS

The proposed development within the application site is reliant on the delivery of service infrastructure across the masterplan site including the surface and foul water network and road transport infrastructure.

Further, the development is reliant on the delivery of community infrastructure proposed under separate planning applications as separate phases of development. Importantly these services and facilities are located within the wider masterplan area, are under the control of the applicant in terms of delivery and are already the subject of two different planning applications (P22/790 & P22/917).

Regard is had to the overall masterplan proposal for the site where relevant and necessary, although it is important to note that the true impacts of development can only be established from what is actually proposed as part of the planning application. All other works are 'potential' future works.

These works, as detailed in Figure 2.3 comprised part of the proposed Coonagh to Knockalisheen Distributor Project which secured consent from An Bord Pleanála in 2021 and was subject to the preparation of an EIAR and Environmental Impact Assessment. Whilst the works comprising realignment of the Meelick Road and provision of a roundabout to access the subject lands are now complete, delivery of the main carriageway is currently underway. These works will be considered in cumulation with the development proposal.

This project does not involve or rely on any other related projects or give rise to significant ex-situ effects that should be considered as part of this EIAR. The applicant is satisfied that all projects are contained within the confines of the masterplan boundary as presented and assessed in this EIAR.

CHAPTER THREE RESIDENTIAL NEED & SPATIAL PLANNING POLICY

3.1 INTRODUCTION

There is significant policy at national, regional and local level which supports the development of a medium-high density residential scheme at this location. The proposed development has been carefully considered and designed in the context of such policy.

This chapter of the EIAR provides an overview of the policy which is supportive of the proposed development and demonstrates a plan – led approach to development. It rationalises the overall approach to development on the site and will assist in consideration of a balanced approach to development and environmental factors on the site.

3.2 STRATEGIC PLANNING POLICY

3.2.1 National Planning Framework – Project Ireland 2040

The *National Planning Framework* (NPF) published in February 2018 sets out a strategic development strategy for the country up to 2040. Amongst its key messages is the need to provide the highest possible quality of life for people and communities via well designed and managed built and natural environments. It provides for a number of National Policy Objectives (NPO) which must be adhered to in the advancement of development throughout the State. The NPF seeks to *"deliver at least 40% of all new homes nationally, within the built-up footprint of existing settlements"* (NPO 3a) and seeks to *"deliver at least half (50%) of all new homes that are targeted in the five Cities and suburbs of Dublin, Cork, Limerick, Galway and Waterford, within their existing built-up footprints"* (NPO 3b).

A recurring theme in the Framework is the requirement to facilitate balanced development throughout all regions of Ireland, and particularly, to accommodate significant growth in Ireland's cities other than Dublin. The NPO's promoting consolidation are further supported by NPO 11 which states that "*in meeting urban development requirements, there will be a presumption in favour of development that can encourage more people and generate more jobs and activity within existing cities, towns and villages, subject to development meeting appropriate planning standards and achieving targeted growth".*

Specifically, the NPF notes that Limerick has the potential to generate and be the focus of significant employment and housing growth to 2040. It is necessary for Limerick to further strengthen its position as the principal focus within the Region and to continue to address the legacy of regional growth having occurred outside the City area. This requires growing and diversifying the City's employment base and attracting more people to live in the City, both within the City Centre and in new, accessible green-field development areas. This means improving housing choice, supported by facilities and infrastructure.

The NPF further notes in National Policy Objective 10 "*There will be a presumption in favour of development that encourages more people, jobs and activity within existing urban areas, subject to development meeting appropriate planning standards and achieving targeted growth".*

The proposed development at this location complies with the overarching themes of the NPF. It proposes a well-designed sustainable form of mixed-use and residential development on an existing, underutilised site located on the edge of Limerick city in an area identified for significant regeneration and where significant new road infrastructure is proposed to open land for development purposes.

The NPF provides a detailed narration on the Government's aspirations for Limerick and the Mid-West Region. The NPF states: "*As a well-located regional centre situated mid-way between Cork and Galway on Ireland's Atlantic Economic Corridor and with good connectivity to Dublin, Limerick has the potential to generate and be the focus of significant employment and housing growth. It is necessary for Limerick to further strengthen its position as the principal focus within the Region and to continue to address the legacy of regional growth having occurred outside the City area*".

National Policy Objective 10 states that *"There will be a presumption in favour of development that encourages more people, jobs and activity within existing urban areas, subject to development meeting appropriate planning standards and achieving targeted growth".* It states that the key test is meeting appropriate planning standards, which should be performance-based to ensure well-designed, high quality outcomes, rather than absolute in all cases. Although sometimes necessary to safeguard against poor quality design, the NPF notes that planning standards should be flexibly applied in response to well-designed development proposals that can achieve urban infill and brownfield development objectives in settlements of all sizes.

The proposed development supports a number of the NPF objectives in delivering housing on appropriately zoned residential land adjoining Limerick city centre, with good connectivity to the city centre and in proximity to areas of the city identified for social and physical regeneration.

3.2.2 Rebuilding Ireland – Action Plan for Housing and Homelessness (2016)

Rebuilding Ireland was launched in 2016 with the aim of addressing ongoing supply issues for residential accommodation in Ireland. The overarching aim of the Action Plan is to increase the delivery of housing from its current undersupply across all tenures and to help individuals and families meet their housing needs. The Action Plan provides a target to double the number of residential dwellings delivered annually by the construction sector and to provide 47,000 social housing units in the period up to 2021

3.2.3 Sustainable Residential Development in Urban Areas Guidelines 2009

The *Sustainable Residential Development in Urban Areas Guidelines 2009* advocate the use of 'Universal Design', whereby a development is accessible and usable by as many people as possible, regardless of abilities or age. National policy makes it clear that sustainability is not confined to the physical environment. Sustainable neighbourhoods require a range of community facilities, and each district / neighbourhood will need to be considered within its own wider locality.

In this regard, a Sustainable Social Infrastructure Audit as required under the Limerick County Development Plan 2022 – 2028 has been completed and is detailed in Chapter 6.0 Population & Human Health. Further the proposed development is supported by ancillary facilities proposed under previous planning applications on the wider site including a creche and local neighbourhood centre.

The Guidelines encourage the sustainable and efficient use of land and seek to ensure that sustainable travel patterns are encouraged. A 10 minute walk from the site to the bus stop provides connectivity across the city via bus route No.302 on the Old Cratloe Road.

It recommends a number of qualitative standards regarding open space provision, design, accessibility, shared use and SUDs. All of these elements have been incorporated into the proposed design approach. Whilst some 15% of the site has been allocated to open space, it is the quality of that open space which is considered to be most important. In this regard an overall integrated approach to open space provision on the proposed site and wider masterplan area is proposed.

3.2.4 Sustainable Urban Housing: Design Standard for New Apartments: Guidelines for Planning Authorities (2022)

The Sustainable Urban Housing Design Standards for New Apartment (2022) provides for an update on guidance on apartment developments in response to the National Planning Framework and Rebuilding Ireland. These Guidelines seek to promote high density apartment development on residentially zoned land in appropriate locations in line with the above referenced NPF overarching policies in relation to encouraging residential development within existing urban settlements.

3.2.5 Urban Design Manual – A Best Practice Guide (2009)

The Urban Design Manual – A Best Practice Guide (2009) notes 12 no. criteria that should be used to facilitate assessment of planning applications and should, therefore, be used as a guide to steer best design practice for residential proposals.

As detailed in the Design Statement prepared by the project architects Fewer Harrington & Partners, the proposed development has been designed taking into account the 12 no. detailed design principles.

3.2.6 Delivering Homes, Sustaining Communities (2007)

This document provides the overarching policy framework for an integrated approach to housing and planning. It notes that demographic factors will continue to underpin strong demand for housing, which in turn will present considerable challenges for the physical planning of new housing and the provision of associated services. Sustainable neighbourhoods are areas where an efficient use of land, high quality design, and effective integration in the provision of where people want to live in.

3.2.7 Childcare Facilities – Guidelines for Planning Authorities (2001)

The Childcare Guidelines (2001) generally recommend the provision of childcare facilities for residential development with 75 no. units or more, albeit having regard to the existing geographical distribution of such facilities in the area and the emerging demographic profile of the area.

The masterplan layout provides for a creche facility with capacity for 107 no. children and 8 no. staff, in full compliance with the Childcare Guidelines. This planning application was recently permitted by Limerick City & County Council (P22/790).

3.2.8 Design Manual for Urban Roads and Streets (DMURS) (2013)

A key objective of DMURS is to achieve safe, attractive and vibrant streets by balancing the needs of all users, and prioritising alternatives to car journeys. The manual advocates a design-led approach, which takes account of both the physical and social dimensions of place and movement.

Pedestrian and cycling connectivity both within and external to the site have been key design considerations, in particular linkages with the creche and proposed local neighbourhood centre.

3.2.9 Climate Action Plan, 2023

The Climate Action Plan 2023 (CAP23) is the second annual update to Ireland's Climate Action 2019 and is fundamental in implementing the Climate Action and Low Carbon Development (Amendment) Act 2021.

The plan implements the carbon budgets and sectoral emissions ceilings and sets out a roadmap for taking decisive action to halve our emissions by 2030 and reach net zero no later than 2050, as committed to in the Programme for Government. Key measures of the plan include ambitious home and business retrofitting and climate-based construction, and 500,000 homes retrofitted to BER B2 by 2030.

Energy, sustainability and climate action are key considerations influencing the design of housing on the site. The development is being designed to NZEB (Nearly Zero Energy Buildings) standards. Passive design measures include the use of the building fabric to take advantage of the site constraints/orientation to maximise the daylight factors, natural ventilation and solar benefits. Natural daylight factors in accordance with BRE and CIBSE recommendations have been targeted.

3.3 REGIONAL PLANNING POLICY

3.3.1 Regional Spatial and Economic Strategy for the Southern Region 2020

The *Regional Spatial and Economic Strategy for the Southern Region (RSES)* sets out a twelve year strategic development framework for the Southern Region. It establishes a broad framework for development and the way in which society, environment, economy and the use of land should evolve and works towards a broad vision of the Region's future, identifying key priorities for investment.

The city of Limerick is identified as a very important driver of national growth, a key regional centre that requires significant investment and growth. Limerick – Shannon is identified as a Metropolitan Area on the settlement typology. The MASP for Limerick – Shannon highlights the need to increase residential density in Limerick City and Shannon through a range of measures including reductions in vacancy, re-use of existing buildings. A dynamic approach to land-use within the footprint of existing settlements is sought by the RSES in order to maximise the opportunity of urban regeneration and infill sites to contribute to sustainable compact growth and revitalisation of our existing settlements of all scale.

The RSES supports infill development and the regeneration of key sites with higher densities through the provision of a number of key objectives including

- Objective RPO10 which seeks, *"the prioritisation of housing and employment development in locations within and contiguous to existing city footprints where it can be served by public transport, walking and cycling";* and
- Objective RPO165 which seeks to ensure that *"local authorities, through appropriate Development Plan policies shall ensure the consolidation of development at higher densities within existing urban centres, with a focus on locations where it can be demonstrated that such development supports the use of walking, cycling and public transport".*
- Objective RPO176 promotes a "10-minute" city and town concept which "*aims to attain sustainable compact settlements whereby, a range of community facilities and services are accessible in short walking and cycle timeframes from homes or are accessible by high quality public transport services by connecting people to larger scaled settlements delivering services".*

A Metropolitan Area Strategic Plan (MASP) has been prepared for the Limerick – Shannon Metropolitan Area. MASP Policy Objective 10a refers to 'Housing and Regeneration' and states the following: *"It is an objective to support the environmentally sustainable densification of Limerick City Centre, the assembly of brownfield sites for development and the regeneration and redevelopment of Limerick City and Suburbs to accommodate residential use. The MASP recognises that initiatives such as the Living City and Living Georgian City initiatives and other interventions by agencies such as the Land Development Agency (and any environmental mitigation arising from the environmental assessment of such strategies) are essential to facilitate compact growth and increased residential density in the City Centre".*

Further to this, RPO 10 of the RSES supports 'Compact Growth in Metropolitan Areas'.

3.3.3 Mid West Area Strategic Plan

The *Mid-West Area Strategic Plan (MWASP)* proposes that in order for the region to develop its economic strength, it needs to generate export-led growth in goods and services, promote innovation through research and development and secure long-term sustainability and growth. An objective set out in this strategy is to strengthen the role of Limerick City and its Environs as the core economic driver for the Region. The strategy has 5 focus points:

1. The revitalisation of Limerick City and its Environs;
2. Measures to deliver population growth, infrastructure and job creation in specific areas targeted in the RPGs;
3. Balanced regional development to promote sustainable urban and rural development;
4. Development of enterprise and employment; and
5. The identification and re-mediation of infrastructural deficits

3.4 LOCAL PLANNING POLICY

3.4.1 Limerick County Development Plan 2022 - 2028

In the Limerick County Development Plan 2022 (CDP) the subject land and site is identified as part of Limerick City and Suburbs, identified for significant growth as Level 1 in the Settlement Hierarchy. Located in an area defined as the 'Suburban Edge' in the CDP, the subject land actually adjoins the

'Intermediate Urban Location'. The CDP expects the city and suburbs of Limerick to grow with the provision of 11,054 residential units between 2022 – 2028. The land is located within Urban Character Area O5 (Thomondgate/Moyross/Caherdavin/Ennis Road) where it is a specific objective to promote infill and brownfield development; retain existing green spaces; and to respect and reinforce the landmark status of Thomond Park.

The land lies in proximity to Moyross Regeneration Area, where it is an objective of the Council to support and facilitate the physical, economic and social framework strategies for the Regeneration Areas (Objective RA 01) and to integrate Regeneration Areas and communities into the mainstream social, economic and community life of the City.

Chapter 4.0 of the CDP promotes housing. Objective HO 02 promotes density in accordance with the 'Sustainable Residential Development in Urban Areas – Guidelines for Planning Authorities' and the accompanying 'Urban Design Manual', DEHLG, May 2009; and encourages increased densities that contribute to the enhancement of a town or village. Objective HO 01 prioritises social integration by providing a mix of house types and sizes to meet the demand throughout the period of the Plan.

The proposed development has been designed taking the aforementioned objectives into account. Located on primarily residential zoned land, the proposed development in the context of the overall masterplan has been advanced on the basis of higher densities, with an overall density of 37.3 units per hectare across the masterplan site (estimated 448 no. units on 22.53 hectares of land). The proposed application site (Phase 3) has a density of 34.6 units per hectare.

3.4.2 Limerick 2030 Spatial and Economic Plan

The *Limerick 2030 Spatial and Economic Plan* sets a framework for public sector action and private sector investment until 2030. The first element of the 2030 Plan is an Economic Strategy which identifies how Limerick needs to be positioned in order to best take advantage of economic opportunities in order to build a stronger local economy through the creation of employment and the attraction of investment.

The second element is a Spatial Plan focused on revitalising and redeveloping Limerick City Centre. There is little emphasis in the outer lying areas such as Cratloe in this plan. The final element is a Marketing Plan which aims to use Limerick's unique and positive attributes to change perceptions of how Limerick is viewed.

3.4.3 Limerick Shannon Metropolitan Area Transport Strategy (LSMATS)

The Limerick Shannon Metropolitan Area Transport Strategy (LSMATS) has been prepared by the National Transport Authority (NTA), in collaboration with Limerick City and County Council, Clare County Council and Transport Infrastructure Ireland (TII). The strategy provides a framework for the planning and delivery of transport infrastructure and services in the Limerick Shannon Metropolitan Area over the medium to long term. The Strategy will deliver a high-quality, accessible, integrated and more sustainable transport network that supports the role of the Limerick Shannon Metropolitan Area as the major growth engine of the Mid-West Region.

LSMATS provides for the delivery of Bus Connects along the Old Cratloe Road fronting the site, ensuring a bus service and connectivity to the city centre every 10 minutes

3.5 POLICY SUMMARY

Residential development on the subject site has significant support at national, regional and local level, appropriately zoned for residential development, adjoining new road infrastructure currently under construction and in proximity to established residential development. Within the Regional Spatial and Economic Strategy for the Southern Region, the MASP for Limerick – Shannon seeks to progress Limerick city and its suburbs as sustainable development areas for housing.

At a local level, the Limerick County Development Plan 2022 - 2028 identifies the subject lands as a future development area in the core strategy settlement structure. The CDP states that there is potential for an additional 11,054 residential units in the city having regard to the extent of land that is zoned and puts in place the necessary design and delivery parameters to guide such development.

This chapter of the EIAR has demonstrated that the proposal is in compliance with the provisions of national, regional and local planning policy and that it is consistent with relevant Ministerial Guidelines in relation to the development of apartment units and denser development. The proposed development and wider Masterplan area will provide a significant number of housing units on a site which is located in proximity to Moyross, a defined regeneration area, Technology University Shannon and Thomond Park.

The proposed development seeks to deliver residential units on an appropriately zoned residential site, in accordance with the principles of proper planning and sustainable development.

3.6 REFERENCES

Department of Housing Planning Community & Local Government, National Planning Framework 2018

Department of Public Expenditure & Reform, National Development Plan 2018

Sustainable Urban Housing: Design Standards for New Apartments 2022

Sustainable Residential Development in Urban Areas Guidelines 2009

Urban Development and Building Heights – Guidelines for Planning Authorities 2018

Regional Spatial and Economic Strategy for the Southern Region

Limerick County Development Plan 2022 – 2028 (as extended)

CHAPTER FOUR PROJECT SCOPING & CONSULTATION

4.1 INTRODUCTION

The EPA Guidelines state that 'Scoping' is a process of deciding what information should be contained in an EIAR and what methods should be used to gather and assess that information. It is defined in the EC (2001) guidance as: '*determining the content and extent of the matters which should be covered in the environmental information to be submitted in the EIAR*'.

The EIAR will be prepared to address those aspects identified in Article 5 and Annex IV of the EIA Directive and Schedule 6 of the Regulations. The EIAR will also be prepared in the context of Section 4 of the Draft Guidelines on the Information to be Contained in the Environmental Impact Assessment Reports, prepared by EPA (2017).

4.2 SCOPING

4.2.1 Scoping Approach

Mandatory scoping is not a requirement under the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018, although provision is made for formal scoping with the planning authority under S.173(2) of the Planning & Development Act 2000 – 2018. Formal scoping with the planning authority under S.173(2) of the Act was not undertaken, given the nature of the development.

The project was initially scoped with the applicant and within the design team based on the expertise and past experience of the EIAR contributors for similar projects. Existing activities and features on site and similar developments in other locations also informed the process, including previous and current planning applications adjacent to the subject site and within the overall masterplan site.

The scope of the EIAR, conducted in respect of the proposed development, has had regard to the following statutory and guidance documents:

- Statutory requirements of the Planning and Development Act 2000, as amended and the Planning and Development Regulations 2001 - 2022;
- Environmental Impact Assessment of Projects: Guidance on Scoping, European Commission, 2017
- Guidelines on the Information to be contained in Environmental Impact Statements and Advice Notes on Current Practice in the Preparation of an EIS both published by the Environmental Protection Agency 2003;
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, August 2022;
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment August 2018, Department of Housing Planning & Local Government
- The requirements of Limerick City & County Council as detailed in the Limerick Development Plan 2022 – 2028; and
- The likely concerns of third parties.

4.2.2 Scoping Findings

Table 4.1 below documents the scoping exercise undertaken in respect of this EIAR

Environmental Aspect	Detailed Assessment	Justification
Population & Human Health	Yes	The proposed development has the potential to impact on population and human health, employment, local community and amenity uses, during the construction and operational phases.
Biodiversity	Yes	The subject lands are not located within any Natura 2000 or nationally designated conservation sites but is located within 15km of anumber of designated sites. There are a number of habitats that have been recorded on site. The proposed development therefore has potential to im pact on biodiversi ty
Land & Soils, Geology & Hydrogeology	Yes	Theproposed development includes a cut and fill exercise that involves the movement and deposition of soil. The impacts on geology and hydrogeology should therefore be assessed in terms of the groundworks, construction and operational phase of the proposed development.
Hydrology – Surface Water & Flooding	Yes	Theproposed development does have the potential to impact on water (including flood risk, hydrology and drainage) as there will be ground disturbance associated with the proposed develo pment.
Air Quality & Climate	Yes	Construction and operational phases will have thepotential to give rise to air quality impacts, principally relating to traffic associated with the proposed develo pment.
Noise & Vibration	Yes	Construction and operational phases will have the potential to give rise to impacts relating to noiseand vibration. A baseline noise survey hasbeen undertaken to determine the prevailing noise level representative of the site and nearest noise sensitive locations.
Material Assets - Traffic & Transport	Yes	The transportation chapter of the EIAR is required to present an assessment of the potential traffic and transport impacts of the proposed development. The assessment will be influenced by the requirements set out within Traffic and Transport Assessment Guidelines TII,2017.
Material Assets – Built Services	Yes	The Material Assets section of the EIAR will examine the likely significant effects of the construction and operation of the proposed development on intrinsic and valuable assets of material value.
Material Assets – Waste Management	Yes	Theproposed development may generate waste arisings that will require management duri ngconstruction and o peraton.
Cultural Heritage - Archaeology	Yes	The masterplan site is The Zone of Notification (ZoN) for one recorded archaeological site (as recorded by the Archaeological Survey of Ireland (ASI))is located within the masterplan

		site - Children's burial ground. Further, given the largely undeveloped nature of the lands, an assessment is considered necessary.
The Landscape – LVIA	Yes	Given the scale of the buildings proposed when compared to the existing undeveloped nature of the subject lands, the LVIA will consider effects on the landscape character of the existing setting (i.e. as a result of the construction and existence of the proposed development) and visual impacts (i.e. the extent to which the proposed development when built will affect the landscape)
Daylight and Sunlight	No	The scale of the development at only two and three stories is reflective of the scale of development in the general area. Accordingly, it is considered that the scale of the development will not result in adverse impacts from a daylight, sunlight and / or overshadowing perspective.
Major Accidents and Disasters	No	The subject site is not located within any consultation distances of any Serveso II sites. As a result, there is no expected impact arising from major accidents or disasters in respect of the proposed development.
Interactions	Yes	There is the potential for multiple direct or indirect effects (from various environmental aspects) to result in an accumulation or magnified effects from the proposed development.
Cumulative Impacts	Yes	The proposed development will be in proximity to other permitted and proposed development and thus has the potential to exacerbate or create larger, more significant effects

Scoping is considered to be an iterative process and is ongoing throughout the development and preparation of the EIAR. In practice, it was undertaken on a continuous basis upon review of draft EIAR chapters and at fortnightly design team meetings.

4.3 CONSULTATION

Prior to lodging this application, the required information has been issued for the Department of Housing, Planning and Local Government's EIA Portal. The purpose of this tool is to inform the public, in a timely manner, of applications that are accompanied by an EIAR. The portal provides a URL link.

4.4 PRE – PLANNING MEETING

A pre-planning meeting was held with Limerick City & County Council on the 06th June 2021 and again on the 02nd June 2022 in respect of the proposed development for the entire masterplan site. Representatives from the Planning Department were present. The nature and extent of the proposed development in the context of the overall masterplan was presented at the meeting.

A number of issues were raised and discussed with the planning authority in respect of the proposed development. In summary the points discussed were as follows:

- Adjoining residential development needs to be considered and their amenities respected;
- The different phases of development need to be connected, visually and physically;
- Need for a greater mix of housing types;
- Delivery of services including the creche and local centre to be considered at an early stage, in tandem with the delivery of housing units;
- The design is to take into account DMURS standards and is to take account of the principles of safety, accessibility and sustainability; and
- Access to the development is to be designed around the proposed Coonagh – Knockalisheen Distributor Road network, including the section of the existing local road network which is currently being upgraded.

The issues raised by Limerick City & County Council have informed the overall design and have been comprehensively accommodated within the overall masterplan. The design rationale seeks to create a sustainable and successful development, providing a new sense of place with new services and facilities, but all within easy distance of the city centre. The development seeks to make the most efficient use of new road infrastructure in the area which has been delivered to facilitate development and open up lands for development purposes.

CHAPTER FIVE EXAMINATION OF ALTERNATIVES

5.1 INTRODUCTION

The presentation and consideration of various alternatives investigated by the project design team is an important requirement of the EIA process. This section of the EIAR document provides an outline of the main alternatives examined throughout the design and consultation process. This serves to indicate the main reasons for choosing the development proposed, taking into account and providing a comparison of the environmental effects.

This chapter should be read in conjunction with Chapter 3.0 'Spatial Planning Policy' as this provides the statutory and non-statutory support for residential development on the subject site, having regard to national, regional and local policy and objectives.

The Environmental Protection Agency's Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) and, the Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022) suggests that 'alternatives' to the main reasons for choosing the proposed development, may be described at a number of levels including inter-alia; alternative locations, design/layout, processes and mitigation. The EPA Guidelines states:

"The objective is for the developer to present a representative range of the practicable alternatives considered. The alternatives should be described with 'an indication of the main reasons for selecting the chosen option'. It is generally sufficient to provide a broad description of each main alternative and the key issues associated with each, showing how environmental considerations were taken into account is deciding on the selected option. A detailed assessment (or 'mini-EIA') of each alternative is not required."

5.2 RATIONALE FOR THE PROPOSED DEVELOPMENT

The proposed development of 98 no. units is a logical extension to an area of the site which was recently granted planning permission for 99 no. residential units under P21/1800. This decision is currently on appeal to An Bord Pleanála by a third party. The rationale for the proposed development is to provide a residential development with ancillary facilities in a landscaped setting, in proximity to services and facilities in the western environs of Limerick City. The proposal is predicated on the zoning of the site as a residential development area in the Limerick Development Plan 2022 – 2028 whereby new residential development is envisaged. It is within this statutory planning policy context that all alternatives have been considered.

In order to meaningfully consider alternatives relating to the proposed development of 98 no. units, consideration must be given to the evolution of the overall masterplan for the site. Once this has been considered then the logic for the development proposal becomes obvious, as it is just part of an overall intended scheme of development.

The key environmental and practical considerations which influenced the design of the proposed development and alternative locations and layouts on the subject lands included the following:

- The need to achieve sustainable densities in accordance with national guidelines Sustainable Residential Development in Urban Areas and the policies of the Limerick Development Plan 2022 - 2028, given the location of the subject site in proximity to services and facilities but also having regard to the existing public transport network on the Old Cratloe Road, which is due for improvement and upgrade under the Limerick Strategic Metropolitan Area Transport Strategy.
- The topography of the subject site and existing site features, including the Children's Burial Ground (archaeological site), significant hedgerows and neighbouring landuses.
- The need to ensure any residential development provides a good mix of housing types which meet current market demands and which are deliverable in the short to medium term.
- The need to provide for high quality open space.
- Protection of existing trees and hedgerows where possible to enhance the amenity and biodiversity of the area.
- The quality of the urban environment to be delivered and the associated impact on human health.
- Access, permeability and connectivity with surrounding areas and land uses.
- The need for an overall balance in biodiversity such that there is no net loss and a net gain where possible on the site.

Notwithstanding the above, pursuant to Section 3.4.1 of the EPA Guidelines, the consideration of alternatives also needs to be cognisant of the fact that "*in some instances some of the alternatives described below will not be applicable – e.g. there may be no relevant 'alternative location'...*" The Guidelines are also instructive in stating: "*Analysis of high level or sectoral strategic alternatives cannot reasonably be expected within a project level EIAR... It should be borne in mind that the amended Directive refers to 'reasonable alternatives... which are relevant to the proposed project and its specific characteristics*".

5.3 ALTERNATIVE LOCATIONS

Riverpoint Construction Limited (the 'Applicant') acquired the site due to its established and long-term residential zoning under the Limerick City Development Plan 2010-2016. The zoning was recently carried forward into the newly adopted Limerick Development Plan 2022 - 2028 which was itself subject to the Strategic Environmental Assessment (SEA) process.

The Applicant considered the subject land to represent a suitable site for development, being primarily zoned for 'new residential' use. It is an objective of the Development Plan to provide for new residential development and other services associated with residential development. While housing is the primary use in this zone, recreation, education, crèche/playschool, sheltered housing and small corner shops are also envisaged, subject to the preservation of neighbouring residential amenity.

Prior to the acquisition, the site's ability to satisfy environmental criteria was considered by the applicant and it was found to offer the following attributes;

- The subject site offered the opportunity to bring a vacant greenfield site adjoined by existing residential development and educational uses into productive use, thus promoting the principles of compact growth.
- The site's location within a 6 minute walking distance of a bus stop on bus route No.302 on the Old Cratloe Road, along with its proximity to the Technological University Shannon (TUS) which has the potential to promote a modal shift from the private car to more sustainable forms of transport. This in turn would assist with achieving overarching environmental objectives such as improved air quality (CO2, NO2 and particulate emissions) and a reduction in noise pollution.
- The proximity of the site to significant employment nodes such as TUS, Thomond Park, Coonagh Cross, and Clondrinagh Industrial Estate would facilitate sustainable living in proximity to the workplace.
- The site is not subject to any statutory nature conservation designation and although there is a hydrological pathway via a drainage ditch which feeds into the flow network to a Designated European Site (Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA, any potential impacts can be mitigated through appropriate design measures.
- Given the site is zoned for development, and adjoins existing urban development to the east, including new road infrastructure, its capacity to absorb development without significantly effecting the existing landscape and visual characteristics of the surrounding area is high.
- The site is not located within an area identified as susceptible to flooding.

In light of the foregoing and following consideration of environmental and planning factors at a high level, it is considered that the masterplan site and proposed development is an appropriate location for residential development from an environmental perspective. The proposal adopts a plan led approach to development and seeks to deliver much needed housing in accordance with national, regional and local policy and guidance documents.

5.4 "DO NOTHING" ALTERNATIVE

In the event of the 'do-nothing' scenario, the current use of the site is likely to continue, whereby the majority of the lands would remain in agricultural use.

Having regard to the quantity of residential units proposed on the overall masterplan site and within the proposed development, with particular regard to the quantity and location of other zoned land in Limerick City, it is likely that in the event of a 'do-nothing' scenario, the core strategy and the requirement for an additional 11,054 households over the plan period would not be satisfied. This would likely have significant implications from a population and human health perspective.

The additional pedestrian and vehicular traffic movement that would be generated by the proposed project would not require to be catered for on the local network in a 'do nothing scenario'. Similarly, the additional demand / support for local infrastructure, services, and businesses would not be generated by any new population on site; nor would local housing demand be catered for.

A 'do-nothing' scenario was considered to represent an inappropriate, unsustainable and inefficient use of these strategically located residential zoned lands; particularly having regard to the opportunity to provide much needed housing in Limerick City.

As a result of the zoning of the lands and the specific reference to the strategic importance of the site from a residential capacity perspective contained within the Development Plan, together with consideration of the proximity of the lands and accessibility to Limerick City, the 'do-nothing scenario' was discounted.

5.5 ALTERNATIVE DESIGNS

5.5.1 Masterplan Approach

The design approach for the proposed development is presented in the Architectural Design Statement prepared by the project architects, Fewer Harrington Architects and it should be read in conjunction with this chapter of the EIAR.

In summary, the proposed masterplan layout is designed to function as a sustainable and successful residential neighbourhood and accommodate a thriving sustainable community. The design of the scheme adopts an urban form with residential buildings arranged around a series of pocket green spaces, generally characterised as tree-lined lawns similar to a village green. The proposed development has sufficient variety in scale and form to respond to the scale of neighbouring two and three storey developments. In this regard the proposed development generally maintains the existing building scale.

A pre-planning meeting was held with Limerick City & County Council on the 06th June 2021 and again on the 02nd June 2022 and a number of matters were raised regarding the overall masterplan layout. Issues highlighted that are relevant to the environmental performance of the scheme are set out in the Table 5.1 below.

Issues Raised	Design Response	Environmental Improvements
Massing and layout of development needed reconsideration as it was based on a low density housing scheme	Increased density in line with national guidelines and enhanced mix of typologies to meet the needs of different demographics and tenure typologies.	**Population & Human Health** The design amendments resulted in; ✓ greater diversity of tenure mix, integrated development and more sustainable compact growth. **Climate Change** ✓ greater density results in greater landuse efficiencies in line with the core strategy and an overall reduction in greenfield landtake.
Redesign of residential blocks to provide for a streetscape along the	Change in design approach to provide a continuous frontage along the central	**Population & Human Health** The design amendments resulted in;

central access road and to address public safety concerns and visual impact considerations	access spine, thereby facilitating a strong urban edge to the public realm, creating more human scale boundary conditions, and active frontage.	✓ increased passive surveillance of the adjacent public roads which in turn creates a sense of security for future occupants and the public. ✓ enhanced quality of place and animation of the public realm and open space. ✓ Natural overlooking of green spaces and public roads thereby creating safe, healthy and useable areas. **Landscape & Visual** The reorientation of buildings contributes to; ✓ a positive streetscape character, with building frontages and entries onto the surrounding road network. ✓ Allows the creation of local green spaces and neighbourhood clusters thereby enhancing the overall visual quality of the scheme.
Reorientation and increased separation distances between blocks to allow for optimum sunlight penetration into communal spaces, particularly within the local neighbourhood centre.	The units are orientated in a manner which provides maximum daylight during the course of the day and reducing the effect of over-shadowing on nearby buildings	**Climate Change** ✓ The incorporated design amendment improves solar gain within the proposed scheme. This in turn improves the energy efficiency of the development thus minimising energy use and in turn decreasing Greenhouse Gas Emissions associated with the combustion of fossil fuels.
Reorientation of the houses on the southern boundary to overlook the Children's Burial Ground and to facilitate linkages.	Amended linkages internally within the development proposal.	**Human Health** ✓ Improved linkages and increased permeability promote walking and cycling. **Climate Change/Air Quality** ✓ Increased connectivity allows for greater access to alternative modes of transport including cycling and walking thus reducing the need for trips by car which in turn reduces emissions and benefits local air quality.
Reconsideration of the street hierarchy and building massing to provide an urban neighbourhood with good legibility	Whilst 6 no. different areas of open space are proposed within the masterplan area, there is a larger area of open space provided centrally	**Population & Human Health** ✓ The inclusion of well considered public open space will contribute to a sense of identity and place in the

	within Phase 1. Larger 4 bed semi-detached units 'book-end' the rows of housing thereby accommodating legibility within the site and contributing towards enhanced urban design within the overall scheme.	proposed scheme thereby enhancing quality of life for future users. ✓ The inclusion of a network of pedestrian routes through the scheme and connecting with the wider area will have direct public health benefits. **Biodiversity** ✓ The inclusion of extensive tree planting within the open space and the retention of hedgerows on the boundary of the masterplan site will provide a habitat for wildlife and will enhance biodiversity within the proposed development.

Table 5.1 Design Amendments & Environmental Improvements

On foot of the pre planning meeting, the masterplan scheme was revised. Further, the masterplan has responded to issues raised in individual planning applications as they have been assessed and developments approved.

In summary, the scheme has evolved from its original form and the consideration of alternative designs has resulted in significant environmental improvements in terms of the landscape and visual contribution that the proposed development will contribute to this area of Castletroy.

The comprehensive landscape plan will contribute to improved biodiversity and mitigates against the effects of climate change. Human health will benefit from the prioritisation of pedestrian and cycle linkages to the wider area and the Urban Greenway and this will in turn promote a modal shift and reduce the need to travel by car.

5.5.2 Proposed Development

The proposed development has evolved from the masterplan concept agreed with the planning authority. The development has been revised on foot of a further information request from the planning authority (P22/959), has been influenced from feedback provided at pre-planning stage.. This iterative process inter alia highlighted environmental matters that informed the consideration of alternative layouts and designs including; open space provision, addressing the issues of population and human health in a city environment, biodiversity, and transportation.

5.6 ALTERNATIVE PROCESSES

This is not considered relevant to this EIAR having regard to the residential nature of the proposed development.

5.7 ALTERNATIVE MITIGATION MEASURES

The mitigation measures outlined in the various chapters are considered appropriate to the location, nature and extent of the project and its potential impacts. As such, no alternative mitigation measures were considered.

5.8 CONCLUSION

Having examined various reasonable alternative designs, it is considered that the proposed design is a preferable option in terms of the sustainable development of the subject site insofar as the overall masterplan achieves circa 448 no. residential units with associated infrastructure. The net residential density achieved within the overall masterplan is 37.3 units per hectare.

The proposed creche and local neighbourhood centre, both the subject of separate planning applications and phases of development (P22/790 & P22/917), will assist in the place-making of the proposal and will contribute to fostering strong connections between the new population on site and the wider community. The current design of the application proposal achieves a strong mix of housing types, sizes, and designs and the introduction of apartment units in Phase 1 addressing the Children's Burial Ground within the overall masterplan development proposal has resolved the difficulty of achieving a critical mass of housing and presents a strong urban form.

5.9 REFERENCES

National Planning Framework

Limerick Development Plan 2022 - 2028

Environmental Protection Agency's Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)

Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022)

CHAPTER SIX POPULATION & HUMAN HEALTH

6.1 INTRODUCTION

There are a wide range of issues which may impact on population and health. The purpose of this assessment is to identify and assess the potential health and wellbeing effects of the proposed development on the surrounding population, and to deliver evidence-based recommendations that maximise health benefits and reduce or remove potentially negative impacts.

The Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022) suggests that; "*the assessment of impacts on population and human health should refer to the assessments of those factors under which human health effects might occur, as addressed elsewhere in this EIAR e.g. under the environmental factors of air, water, soil etc.*"

In the application of this approach, consideration of the potential impacts of the proposed development on population and human health might therefore arise from a number of variables. For example; traffic and transportation, townscape and visual (landscape), water quality and biodiversity. These aspects are dealt with in the specific chapters in this EIAR which are dedicated to those topics. This Chapter refers to the findings of those assessments included elsewhere in this EIAR which human health effects might occur.

In addition to human health considerations, this chapter will assess the impacts the proposed developments will have on; (i) Demographics, (ii) Employment, and (iii) Community, with specific regard to economic activity, social considerations, land-use and health & safety.

The principal receptors that may be impacted by the proposed development include residential receptors; direct and indirect economic receptors; social and community facilities; and the transient population.

6.2 ASSESSMENT METHODOLOGY

The baseline information was gathered using desk top analysis of available mapping and aerial images; visits to the site and the surrounding area; analysis of census of population data; review of relevant documents; and a review of comments from statutory bodies during the scoping process.

A desk top analysis of current census data from the Central Statistics Office (CSO) and other national databases (see Section 6.9 for references) was undertaken including an assessment of demographic and employment figures.

The preparation of this Chapter was also informed by desktop studies of relevant policy documents and data sources including:

- Central Statistics Office (2021) – Census 2016, Census 2011, Census 2006
- Central Statistics Office (2021) – CSO PxStat
- ESRI (2021) - Quarterly Economic Commentary, Winter 2020

- DoHPLG (2017) - Rebuilding Ireland – Action Plan for Housing and Homelessness
- Childcare Act (1991) - (Early Years Services) Regulations 2016
- Tusla Early Years Inspectorate Reports (2021) – Registered Childcare Facilities
- Department of Health (2021) – Health in Ireland, 2019
- Health Safety Authority (2021) – www.hsa.ie
- HSE Service Records (2021) – www.hse.ie
- ECAD (2021) – Eircode Address Database
- Google Maps and Places (2021)

In order to assess the likely significant impacts of the proposed development on population and human health, an analysis of recent Census data was undertaken relating to the economic, demographic and social characteristics of the study area. For the purposes of this demographic analysis, the study area comprises 2 No. distinct enumeration areas identified by the Central Statistics Office (CSO) of relevance to the subject development, as follows:

1. The local Electoral Division (ED) study area to which the subject site belongs, comprised of 10 No. ED's on the northern side of the river including Ballynanty, Kileely A, Kileely B, Castle A, Castle B, Castle C, Castle D, Coolraine, Limerick North Rural and Farranshone; and
2. The larger combined Limerick City and County Local Authority (LA) administrative boundary.

These enumeration areas are identified in Figure 6.1 and provide demographic information for the local and regional populations which are likely to be impacted by the subject development. Where relevant, information with relation to the national averages in each demographic area is also provided.

Figure 6.1 Extent of CSO enumeration areas utilised in demographic analysis. Subject Site identified by red dot.

A land use analysis informed the location of potential receptors, whilst a practical understanding of the design, construction and operation of residential projects by the study team contributed to an understanding of the potential risks associated with the proposed development.

6.3 RECEIVING ENVIRONMENT

This section provides an overview of existing demographics, health status of the area, and the location of potential receptors. It should be noted that the description of the baseline environment of those factors under which human health effects might occur has been addressed elsewhere in this EIAR, under the environmental factors of traffic and transportation, townscape and visual (landscape), water quality and biodiversity.

6.3.1 Economic and Employment Activity

6.3.1.1 National Outlook

The CSO's Quarterly Labour Force Survey (which has now replaced the Quarterly Household Survey) for Q3 2022, indicated that there was an annual increase in full-time employment, bringing total employment in the State to 2,554,300 (50%) an increase on Q3 2021 figures of 3.4%. In December 2022 the seasonally adjusted unemployment rate was 4.3% down from 5.1% in DDecember 2021.

The ESRI Quarterly Economic Commentary for Autumn 2022 states that while the pace of consumption growth is moderating significantly, the domestic economy is still expected to grow robustly this year. Modified domestic demand (MDD) is now forecast to grow by 7.5 per cent in 2022. Furthermore, the unemployment rate is set to fall to 4.1 per cent by the end of the year.

The above sources demonstrate that the national economy and employment levels are expected to sustain growth into 2023. High on the agenda is the supply of residential dwellings to feed the increased need for residential dwellings particularly in urban areas.

6.3.1.2 Local Outlook

To understand employment and economic activity at a local level, reference is made to the Small Area Population (SAPs) figures within the Census of Population 2016 (CSO) encompassing the 10 no. ED's as detailed in Figure 6.1. The ED Study area had a population of 19,440 persons in 2016.

At the local level, some 35.2% of the population was in employment, which is well below the 50% national average, whilst 13% were unemployed or unable to work due to sickness. Some 15% of the population was retired. This local outlook is in significant contrast to the national population and reflects the high levels of unemployment in the area.

Of those that do work a high proportion work within the city of Limerick. This assumption is supported by the travel to work / school / college data by people aged 5 years and over living in the study area. According to the 2016 Census of Population, 32% of the population have a travel time of between 15 – 30 minutes minutes, whilst 18% have a travel time of under 15 minutes, which is significantly below the national average. Overall, it highlights that a significant proportion of people can secure education and

employment within a short commute of where they live and indicates significant provision of employment and services in the area.

There is a strong preference (33%) towards the use of the private car for travel to work, school or college in the area which is followed by travel on foot which stands at a mere 7%. Figures for the rest of Limerick City and County indicated a similar profile of private car users (64%), followed by pedestrians (14%) and bus/coach passengers (7%) respectively.

6.3.2 Health & Social Patterns

6.3.2.1 National Outlook

The Preliminary CSO data illustrates that the population of the Irish State increased between 2016 and 2022 by 7.6%, bringing the total population of the Irish State to 5,123,536 persons. The rate of growth is significant as previous growth rates between 2011 and 2016 stood at 3.8%. The largest single contributor is net migration, although the economy has recovered in recent years with consequent population growth predominantly attributed to natural increase, greater economic activity and increased job opportunities.

The OECD published the Economic Survey of Ireland 2022 and highlights that the health of people in Ireland has improved significantly over the last twenty years with life expectancy now one of the highest in OECD.

6.3.2.2 Local Outlook

The total population of the study area according to the 2016 census is 19,440. The 15 – 19 age cohort and the 20 – 24 age group comprise 15% of the overall population. The next largest age group at 6% is those that fall within the 55 – 59 year age group. 20% of the overall population falls within the 30 – 44 year age group. This is significant in terms of service provision and has significant implications for housing provision and demand.

The Pobal Deprivation Index is Ireland's most widely used social gradient metric, which scores each small area (50 – 200 households) in terms of affluence or disadvantage. The index uses information from Ireland's census, such as employment, age profile and educational attainment to calculate this score. Whilst the subject site, located in Limerick North Rural ED is described as being 'marginally below average', the general study area also encompasses a 'very disadvantaged area' (Ballynanty) and also an 'Affluent area' (Farranshone).

6.3.3 Housing Stock & Structure

6.3.3.1 National Outlook

The National Residential Property Price Index (RPPI) increased by 8.6% in the 12 months to November 2022, with prices in Dublin rising by 7% and prices outside Dublin up by 9.8%. The median price of a dwelling purchased in the twelve months to November 2022 was €300,000.

There were 29,851 new dwelling completions in the whole of 2022, an increase of 45.2% from 2021 and 41.3% up from 2019, pre-pandemic. The average new dwelling size is continuing to gradually fall

year on year. The average new dwelling size index for 2022 is at 75, three-quarters of the 2016 base index of 100.

Across different types of dwelling, the divergence in growth rates between house prices and apartments had somewhat narrowed. The CSO confirms that there was a 29.6% increase in apartments completed in Q4 2022 compared with Q4 2021, up from 2,152 to 2,789. For the whole of 2022, there were 50.8% scheme completions with 30.7% apartments and 18.5% single dwellings.

Housing for All - a New Housing Plan for Ireland' is the government's housing plan to 2030. It is estimated that Ireland will need an average of 33,000 new homes to be provided each year from 2021 to 2030. Housing output in Ireland to date, has not reached the required targets.

6.3.3.2 Local Outlook

Within Limerick City & Suburbs, there has been a forecasted need for 11,054 households between 2022 – 2028, to facilitate a total population of 123,242 in 2028. Accordingly, 259 hectares of land is zoned to accommodate housing growth, including the subject land.

The Limerick City North Electoral Area, in which the subject site is located, had only 102 no. dwelling completions in 2022. This is in contrast to the 246 no. dwelling completions in Limerick City East and the 165 no. in Limerick City West.

Low levels of household growth, coupled with continued population growth has resulted in an increase in the average household size across the State, where growth in average household size has increased from 2.73 persons to 2.75 persons. The average household size in the study area remains at 2.73 persons,

The number of vacant households in the study area stood at 607 no. units in 2016 excluding holiday homes and those that were temporarily absent. This represents 8.5% of the total number of households in the study area. The figure is significantly below that of the State-wide figure, which stood at 10.8% in 2016.

Of the 7,097 households in the study area, 83.7 per cent comprise a house / bungalow with only 13.2 per cent comprising a flat / apartment. This is significant in the context of the proposed development, which seeks to primarily deliver housing in the area thereby satisfying demand, with limited apartment provision throughout the development.

6.3.4 Social Services & Infrastructure

A social infrastructure audit was undertaken for the proposed development site within the study area. The study identified infrastructure facilities in the vicinity of the subject proposal including education and training facilities, childcare services, community and cultural facilities, religious and burial sites, healthcare services, open space and recreation facilities and retail centres.

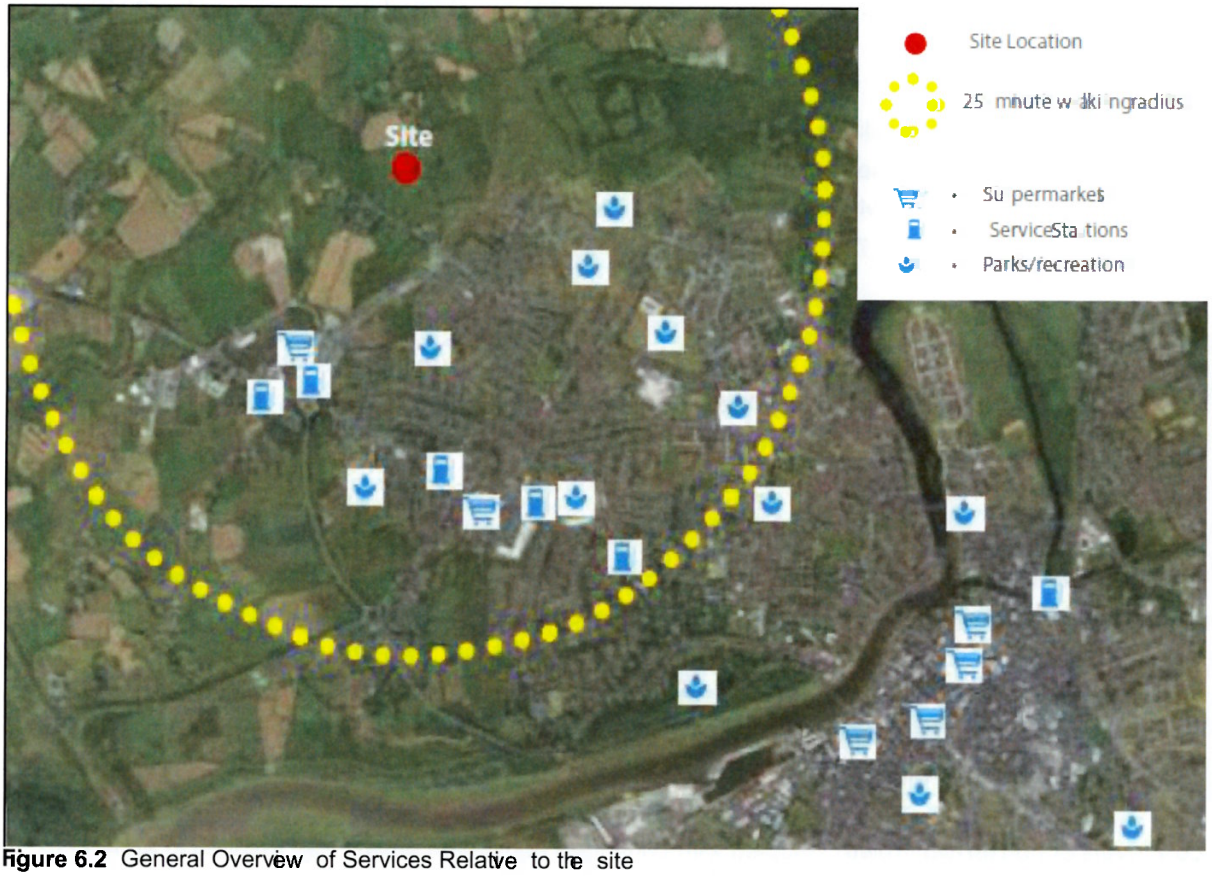


Figure 6.2 General Overview of Services Relative to the site

6.3.4.1 Recreational & Sporting Facilities

In proximity to the subject site there are an array of sports facilities and open space. The TUS University provides extensive sporting facilities and although they primarily service the university itself, they are available to local sporting organisations on a pre-arranged basis. Many clubs have facilities in the area including Thomond Rugby Club, Na Piarsigh GAA club grounds, Shelbourne Football Club and the Limerick Lawn Tennis Club.

There are also many open green areas serving housing developments which can be used on an informal bass for active recreational use. The closest park to the subject site is Shelbourne Park and the Moyross Sports Field. Notwithstanding a lack of parkland in the vicinity of the site, it is noted that significant land has been zoned for open space & recreation purposes, neighbouring the subject land, in the recently adopted Limerick Development Plan 2022 – 2028.

6.3.4.2 Health Facilities

There are five health care / medical centres within the study area (excluding dentists, pharmacies and physiotherapists). These include the Laya Health & Wellbeing Clinic; the Meadow Springs Medical Centre, Treaty Medical Centre, Ennis Road Medical Centre and Ballynanty Medical Centre. The Milford Care Centre on Plassey Park Road offers specialist hospice facilities and a nursing home. There are other family doctor practices at intermittent locations throughout the study area.

Figure 6.3 identifies the general location of 2 no. public hospitals in proximity to the site along with the closest health centre and pharmacy.

Figure 6.3 Healthcare Facilities

6.3.4.3 Childcare Facilities

The subject site is proximate to three existing childcare facilities in the area as detailed in Figure 6.4, including Naionra na nOg (pre school); Learning for Life Limited (montessori & after school) and Kids Inc MQI (after school care). These facilities are within walking distance of the subject site. The Naionara na nOG childcare facility located at the Shannonvale Complex on the Cratloe Road is a substantial facility. At the last Tusla Inspection in 2020, the facility had capacity for 100 no. children in the morning and 55 no. children in the afternoon.

This facility, associated with the other two smaller facilities, provides for childcare capacity services in the area and would be adequate to accommodate some housing (Residential Phase I) within the masterplan site.

Irrespective of existing childcare facilities in the area, the overall masterplan for the site proposes a creche facility with capacity for 107 no. children & 8 no. staff. This facility is proposed as Phase 2 of the overall development as per planning reference P22/790 and will be provided in advance of the proposed development (Phase 3). The creche was recently granted permission by Limerick City & County Council and has been sized to accommodate the totality of housing proposed within the masterplan site. Using the childcare provision guidelines of 20 child places per 75 no. dwellings, a childcare facility with capacity to accommodate 26 no. children is required for the proposed development of 98 no. dwelling units.

Figure 6.4 Location of Surrounding Registered Childcare Facilities. Source Pobal Childcare Services

6.3.4.4 Educational Provision

There are five primary schools, two secondary schools and a University on the northside of Limerick and in proximity to the site. Enrolment figures for 2022/23 indicate that 1,460 no. children attend the five primary schools of Scoil Chriost Ri, John F. Kennedy Memorial School, Thomond National School, Gaelscoil Sairseal and Corpus Christ Catholic School. This represents an increase of 46 no. students on the 1,414 enrolment figure the previous year. See Table 6.1 with breakdown of enrolment figures for 2020/21:

Name	Enrolled 2022/23	Enrolled 2021/22
Scoil Chriost Rí	302	306
John F. Kennedy Memorial School	250	250
Thomond National School	216	215
Gaelscoil Sairseal	309	276
Corpus Christi Catholic School	383	367

Table6.1 Primary Schools and Enrolment Figures (Source: Department of Education & Skills website, 2022/23).

Within the secondary school of Ard Scoil Ris and Thomond Community College, enrolment figures for 2022/2023 indicate that 1,349 students attended both schools, which is a lower figure than the 1,323 pupils that were enrolled in 2021 / 22. This demonstrates some capacity on the system to accommodate additional pupils in the future. However, enrolment numbers in secondary schools are more based on choice than locational circumstances with secondary school student travelling further to avail of a particular school.

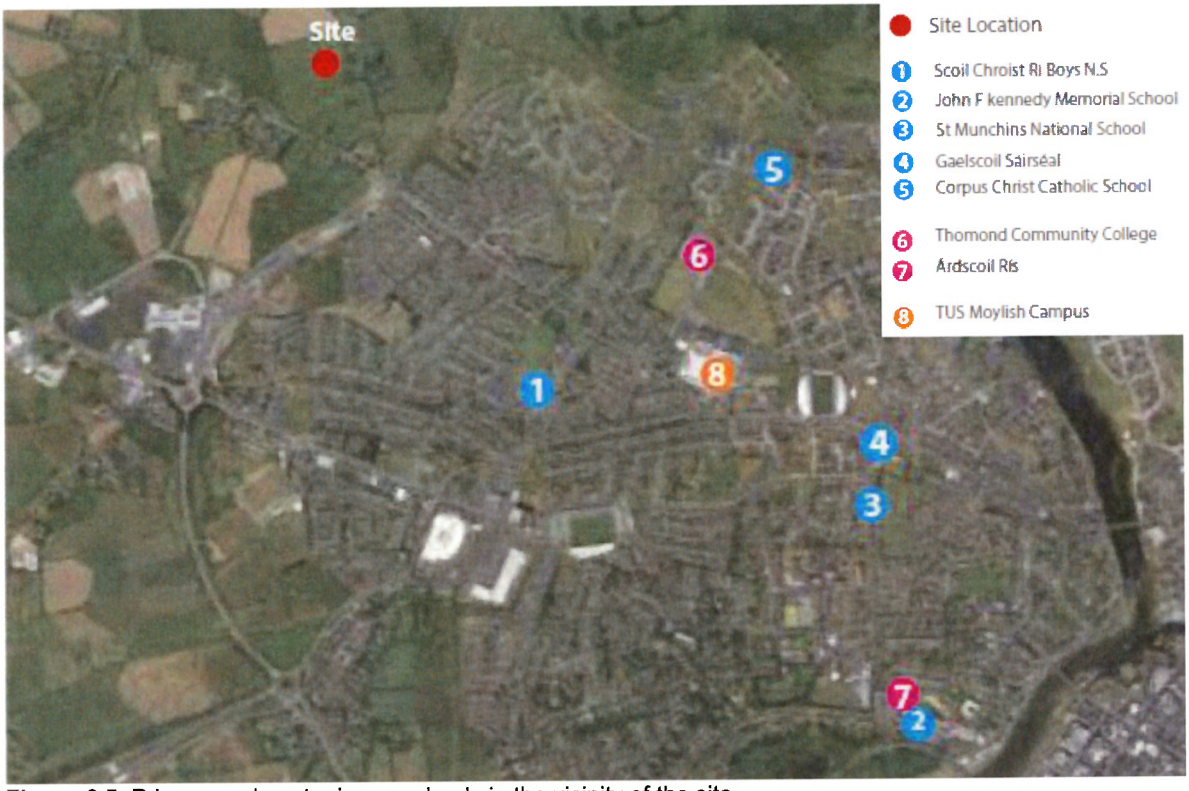


Figure 6.5 Primary and post primary schools in the vicinity of the site

6.3.4.5 Community Services Provision

Caherdavin Community Centre, Moyross Community Centre and St Munchins Community Centre all provide services in the area. Whilst there is no post office in proximity to the site, post offices located at the Jetland Centre in Caherdavin south east of the site and in Ballynanty north east of the site, provide local services.

The closest public library is the city library located in Limerick city centre. However, this facility can be easily accessed by bus from the subject site.

The Limerick Baptist Church off the Old Cratloe Road is closest to the site. Mayorstone Park Garda Station is located in proximity to Thomond Park, an 8 minute walk from the site.

6.3.4.6 Retail & Commercial Services

The Jetland Centre in Caherdavin is accessible from the subject site, whilst a number of smaller facilities operate in proximity to the site on the Cratloe Road including a Spar and a Centra in the Woodview Shopping Centre. The proposed development includes provision for a Neighbourhood Centre (Delivery 4), which is intended to be delivered in advance of the proposed development (Delivery 5). A new Aldi supermarket was recently granted planning permission to the north east of the site on the Knockalisheen Road which will be directly accessible once the new road adjoining the site is constructed.

6.3.4.7 Transport Services

East of the site on the Cratloe Road there is a bus stop which gives access to the city via Bus route no. 302. The proposed development has taken the provisions of the Limerick Shannon Metropolitan Area Transport Strategy (LSMATS) into consideration. Under the strategy, a bus corridor is to extend along the Old Cratloe Road beyond the application site, effectively providing connectivity between the site and the city centre. Further, cycling infrastructure will be accommodated within and adjoining the proposed development as per the 'Proposed Limerick Cycle Network Map' detailed in LSMATS, in particular the proposed 'Green Route' on the old, realigned section of the Meelick Road as it approaches the Old Cratloe Road.

Figure 16.6 Location of Bus Stops in Proximity to the Site

6.3.5 Landuse & Settlement Pattern

6.3.5.1 Settlement Pattern

The general area comprising the masterplan site has a rural feel, notwithstanding significant residential and educational developments immediately to the east. The majority of site is surrounded by green fields apart from low density dwellings and Willow Grove development to the north and west, and the county club bar on the Old Cratloe Road - Pass Road junction. Further to the east, developments such as Thomond Village, Clonile and Shannonvale lie next to the site and mark the edge of the built up area of the Limerick suburbs.

A growing and developing suburban area to the north west of Limerick City, the character of the area is dominated by mid – low density residential development with clusters of commercial development interspersed at nodal locations. The settlement pattern is varied, dominated by individual 'housing estates' with little permeability and connectivity.

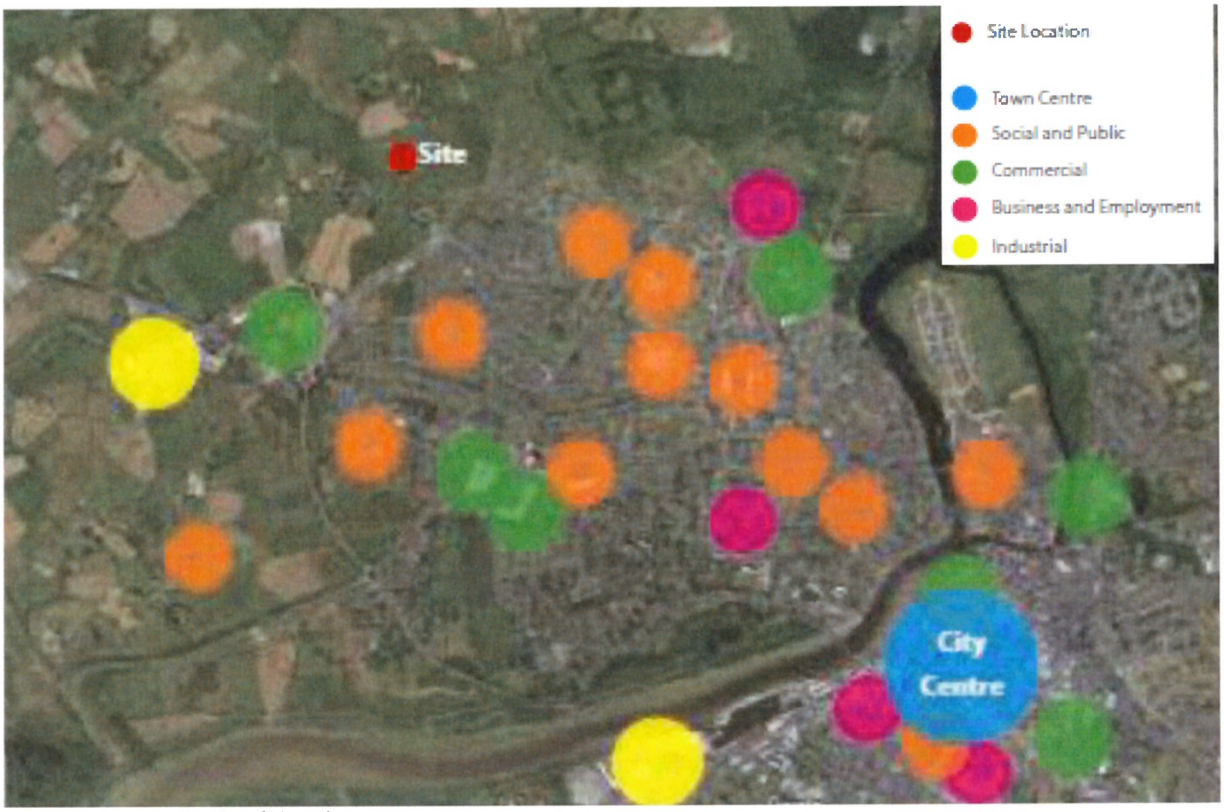


Figure 6.7 Typologies & Landuse

6.3.5.2 Potential Receptors

Key potential receptors, to be assessed in this chapter, include residential, commercial, community and recreational receptors.

Residential Receptors

A row of 11 no. one off dwellings front onto the Meelick Road and adjoin the masterplan site. A total of 6 no. of these dwellings directly back onto the site to the north east. These are likely to be the most directly affected dwellings in the area, as the development extends immediately to their rear.

There are a further 8 no. detached houses located fronting onto the Old Cratloe Road adjoining the masterplan site to the west. Although slightly removed from the site, the houses immediately adjoining the masterplan site will be most directly affected.

There are a number of houses situated opposite the southern side of the Cratloe Road with 3 no. one off houses backing onto the masterplan site and specifically the proposed Phase 5 residential development. To the west, is the Willow Grove residential development, also located on the southern side of the Cratloe Road and slightly removed from the masterplan site and the proposed development.

Further to the east, located closer to TUS University are residential developments including Thomond Village, Clonile and Shannonvale. These mark the edge of the built up area of the Limerick suburbs and are effectively separated from the masterplan site by the proposed Coonagh – Knockalisheen Road which is currently under construction.

Within the masterplan site itself planning permission has already been granted by Limerick City & County Council for Phase 1 residential development (P21/1800) but is currently on appeal to An Bord Pleanála. These 99 no. residential units are planned to be developed and occupied prior to the construction of the proposed development (Phase 3 residential).

Commercial Receptors

The County Club Bar & Lounge is located to the south east of the site, situated in between the realigned Meelick Road to the west, the proposed Phase 2 residential development and old Meelick Road to the east and the proposed creche to the north.

There are no other commercial receptors in the area save for local shops and services, located further removed from the site to the east on the Old Cratloe Road.

A number of indirect economic receptors have also been identified to include suppliers of construction materials required to complete the proposed development. It is not possible to identify these suppliers at planning stage as use of these suppliers will be dependent on detailed construction drawings and requirements.

Community & Recreation Receptors

The closest community & recreation receptor to the site is the TUS University Moylish Campus situated further to the east along the Old Cratloe Road.

Future Receptors

To identify potential future receptors a review was undertaken of permitted development in and around the area over the last five years (including extension of duration of previous permissions). There are no significant planning permissions permitted adjoining or in proximity to the site, which could be affected by the proposed development, save for those phases of development already permitted within the masterplan site as detailed in Table 6.2.

Delivery	Development	Gross Site Area	Status	Plan Ref. No.
Delivery 1	Phase 1- 99 residential units	3.31 ha.	Planning permission granted. Subject to third party appeal	P21/1800
Delivery 2	Childcare Facility.	0.43ha.	Granted	P22/790
Delivery 3	Phase 2- 86 residential units	2.19 ha.	Further Information Response Submitted	P22/817
Delivery 4	12 residential units & neighbourhood facility	1.40 ha.	Further Information Response Submitted	P22/917
Delivery 5	Phase 3- 98 residential units	9.45ha.	Subject Development	P22/959
Delivery 6	Phase 4- 54 residential units	2.55 ha.	Further Information Request	P22/1114
Delivery 7	Phase 5 - 99 residential units	2.87 ha.	Future development	

Figure 62 Developments Permitted within Masterplan Site & at Advanced Stage of Consent Process

6.3.6 Health & Safety

The surrounding context consists of a mix of residential, transport, recreational and amenity related land uses. It does not include any man-made industrial processes (including SEVESO II Directive sites (96/82/EC & 2003/105/EC) which would be likely to result in a risk to human health and safety.

There is little health information available at county level and so there is a reliance on information at national level to inform on the general health of the wider Limerick area.

The Department of Health's report *'Health in Ireland, Key Trends 2019'* (Department of Health, 2019) provides summary statistics on health and health care in Ireland over the past ten years. According to the key trends, in Ireland male life expectancy has increased by 3 years and female life expectancy has increased by 2 years since 2007 and is now above the average for the EU. The greatest gains in life expectancy have been achieved in the older age groups reflecting decreasing mortality rates from major diseases. The proportion of life expectancy at age 65 to be lived in good health is higher for both men and women in Ireland compared with the EU-28 average. In recent decades, Ireland has consistently recorded high rates of self-evaluated good health. Population health at the national level presents a clear picture of rapid decreases in mortality rates accompanied by a rapid rise in life expectancy during the past ten years. This has a knock-on impact on housing demand and need and will influence future housing mix and structures.

At county level, the creation of County Health Profiles is one of the key actions from the Healthy Ireland strategy which is our national framework for action to improve the health and wellbeing of the people of Ireland. The County Health Profile for Limerick City confirms that Limerick City is the most deprived Local Authority in Ireland, with 36.8 per cent of the population either very disadvantaged or disadvantaged. It further states that Limerick City has above average levels of those who stated they had bad or very bad health of (2.6% compared to 1.5% nationally) and those with a disability of 18.2 per cent.

6.3.7 Risk of Major Accidents and Disasters

The EIA Guidelines 2022 state that an EIAR must include the expected effects arising from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project. In this respect, taking cognisance of the other chapters contained within this EIAR document, it is not considered that the proposed development site presents risks of major accidents or disasters, either caused by the scheme itself or from external man made or natural disasters.

6.4 DESCRIPTION OF EFFECTS

This section provides an assessment of all of the potential and predicted impacts of the proposed development on population and human health. As outlined in Section 6.1, in accordance with the EPA Guidelines 2022, the assessment of impacts on population and human health refer to the assessments of those factors under which human health effects might occur, as addressed elsewhere in this EIAR.

A number of the likely impacts have already been 'designed out' of the development proposal. These measures have been dealt with comprehensively in respective chapters including Chapter 7.0 Biodiversity; Chapter 9.0 Water Hydrology – Surface Water & Flooding; Chapter 11.0 Noise & Vibration; Chapter 16.0 The Landscape; and Chapter 12.0 Material Assets: Traffic & Transport.

Seven different 'Delivery Phases' of development, as detailed in Table 6.2, are proposed to effectively deliver the overall indicative masterplan. This application relates to Phase 3 (98 no. units) as detailed in Chapter 1.0 and 2.0 of this EIAR. Whilst seven different phases are proposed at this point in time,

the reality is that some of the phases could be fast-tracked such that two phases advance in construction together. This, however, is very much dependent on market conditions and the specific requirements of contractors. In any case, should different phases cumulatively progress together, the overall impacts are unlikely to be different.

In order to ensure an effective and conclusive environmental assessment consistent with best practise, the assessment of potential effects on the environment also examines the collective cumulative effects of the overall development if all seven development phases, as detailed in Chapter 1.0, were implemented. The examination of the 'all phase' development scenario is consistent with best practice in order to examine a 'worst-case' scenario of the project effects.

6.4.1 'Do-Nothing' Scenario

A *'do nothing'* impact would result in the subject site remaining in a green-field state and substantially undeveloped. Development to facilitate residential use would likely occur on the lands in a piecemeal manner, as planning permission has already been granted for 99 no. residential units as Phase 1. The effect of this development advancing in isolation from the remainder of the landholding would result in adhoc, piecemeal development. Further, it would result in an underutilisation of the site from a sustainable planning and development perspective, particularly considering the location of the lands in proximity to existing services and facilities and the provision of a new distributor road to the east of the site, Coonagh – Knockalisheen Road) which is intended to open up land for development purposes. The status of the environmental receptors described throughout this EIAR document would be likely to remain unchanged. The potential for any likely and significant adverse environmental impacts arising from both the construction and operational phases of the proposed development would not arise.

In terms of the likely evolution without implementation of the project as regards natural changes from the baseline scenario, it is considered there would be limited change from the baseline scenario in relation to population (human beings) and human health.

However, similarly the potential for any likely and significant positive environmental impacts arising from both the construction and operational phases of the proposed development would also not arise. The site is zoned for residential use purposes within the Limerick Development Plan 2022 -2028, with objectives to ensure a wide range of house types. The proposed use of the site is considered to be in accordance with the proper planning and sustainable development of the area.

The partial development of lands, in accordance with the planning consent for Phase 1 issued to date, which effectively subdivides the masterplan area, in isolation of the masterplan lands, would create a gap / infill site in an urban area next to a new road scheme (currently under construction) and good quality pedestrian and cycling infrastructure. Furthermore, without this development it is likely the critical mass and density potential on the northern side of Limerick city would not be realised.

6.4.2 Construction Impacts

Potential construction impacts arise from a range of issues discussed elsewhere in this EIAR: Traffic & Transport (Chapter 12.0); Noise and Vibration (Chapter 11.0); Air Quality and Climate (Chapter 10.0); and Biodiversity (Chapter 7.0). Construction impacts resulting from the delivery of the overall masterplan site are likely to be of medium effect, adverse and temporary in nature.

The construction phase of the proposed development will primarily consist of site clearance, excavation and construction works. Within the overall masterplan site, these works are likely to take place over seven different phases with a potential completion timeframe of five years. Given the extent of the subject site and the phased approach to development works, direct impacts are most likely to be experienced within the masterplan site itself and within those houses that will be occupied upon completion prior to another phase commencing.

Chapter 11.0 of this EIAR sets out a number of noise mitigation measures. Whilst there is potential for temporary noise impacts on nearby noise sensitive properties due to noise emissions from site activities during construction, the application of binding noise limits and 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 as far as practicable. For the duration of the construction period, construction noise impacts will be short-term, negative, slight to significant.

Within the subject site, the works will be undertaken in one phase over a 12 month timeframe. The works will largely be confined to the proposed development site. Notwithstanding the implementation of remedial and mitigation measures there will be some minor temporary residual impacts on population (human beings) and human health most likely with respect to nuisance caused by construction activities, particularly relating to noise and dust. The houses to be constructed immediately to the south east of the site and those existing one off houses adjoining the site on the Meelick Road, will most likely be impacted. For the duration of the 12 month construction period, construction noise impacts will be short-term, negative, slight to significant.

It is anticipated that subject to the careful implementation of the remedial and mitigation measures proposed throughout this EIAR document any adverse likely and significant environmental impacts will be avoided. Positive impacts are likely to arise due to an increase in employment and economic activity associated with the construction of the proposed development, which is likely to have between 50 – 60 workers on site at any one time. As outlined above, the construction phase will have both direct and secondary positive economic impacts in this regard.

Potential impacts could occur as a result of inadequate site management or accidental spillage during construction, which could enter the local drainage ditches which have a hydrological connection with the a drainage ditch in the field (outside of the application site) to the west which connects with the Lower River Shannon Special Area of Conservation (SAC) and River Shannon and River Fergus Estuaries Special Protection Area (SPA) some 1.7km distant from the site. However, the likelihood of this happening is low given the design measures introduced as part of the development and detailed in Chapter 9.0 of this EIAR.

The visual landscape will change once construction commences and it will take time for the proposed landscaping treatment to mature. These impacts further detailed in Chapter 16.0 Landscape, are likely to be moderate and short term in nature.

The overall predicted likely and significant impact of the construction phase for the application site will be short-term, moderate and likely to be neutral. Although the construction timeframe for the overall masterplan will be longer and more likely to be in the region of five years, the construction will be

undertaken on a phased basis such that impacts will continue to be short-term, moderate and neutral in effect.

6.4.3 Operational Impacts

Potential operational impacts arise from a range of issues discussed elsewhere in this EIAR including Landscape & Visual (Chapter 16.0); Traffic & Transport (Chapter 12.0); Noise & Vibration (Chapter 11.0); and Air Quality & Climate (Chapter 10.0).

The proposed development will result in a generally positive alteration to the existing undeveloped site in terms of the provision of residential units, to serve the growing population of the area in accordance with the objectives of the Limerick Development Plan 2022 – 2028, the associated growing population and the evidential need and demand for housing in the area. The proposed creche facility will complement existing creche operators in the area and the proposed local neighbourhood centre will provide local convenience shopping and other services, not only accommodating the proposed development, but also servicing existing residents in the area.

The proposed development will consist of 98 no. residential units/households. Using the average household size of 2.7 the proposed development is likely to result in a projected population of approximately 265 no. persons.

Having regard to the potential of the overall masterplan site to accommodate 448 no. units, including the subject site, the potential is for the masterplan to result in a projected population of approximately 1,210 people. This will result in a sizeable new community within the area. This is considered significant, permanent and positive, particularly in the context of current housing demand, but it will place significant additional strains on existing community facilities and services in the area and in the city. The important consideration is that the potential population generated from the proposed development has already been planned for in the context of the Limerick Development Plan 2022 - 2028 and the projected household growth in Limerick city of an additional 11,054 residential units between 2022 – 2028. The new Limerick Development Plan was adopted in 2022 with adequate planned provision made for supporting services and facilities over the plan period.

Positive impacts on population and human health will include health benefits associated with the provision of a highly permeable layout which encourages walking and cycling, along with amenity and recreational facilities within designated areas of open space.

The implementation of the range of remedial and mitigation measures included throughout this EIAR document is likely to have the impact of limiting any adverse significant and likely environmental impacts of the operational phase of the proposed development on population and human health.

6.4.4 Cumulative Impacts

The potential cumulative impacts of the proposed development on population and human health have been considered in conjunction with the ongoing changes in the surrounding area. A planning history review was undertaken to identify any recently approved or pending developments which may have a cumulative impact with the proposed development. There are no significant developments permitted in

the area, which have not yet been constructed, save for the Masterplan site itself which have been detailed in Table 6.2.

The proposed development does need to be considered in conjunction with the works currently underway, delivering the proposed Coonagh to Knockalisheen Distributor Project. This infrastructure project secured consent from An Bord Pleanála in 2021 and was subject to the preparation of an EIAR and Environmental Impact Assessment. The cumulative impacts associated with noise and dust during construction have been considered in Chapters 10.0 and 11.0 of the EIAR, whilst potential effects arising from increased traffic have also been considered in Chapter 12.0.

With regard to human health, the cumulative impact of the proposed development in conjunction with the proposed new Distributor Road will provide for the introduction of high-quality new neighbourhood in the area with a high level of accessibility and amenity. The overall cumulative impact of the proposed development will therefore be long term and positive with regard to human health.

6.5 LIKELIHOOD OF SIGNIFICANT EFFECTS

6.5.1 Introduction

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 of the proposed development. Additionally, this section addresses the socio-economic and employment impacts of the proposed development. For a more detailed assessment of potential impacts please refer to specific chapters of the EIAR which assess the environmental topics outlined in the EIA Directive.

6.5.2 Water

Construction Phase

Provision of water infrastructure for the proposed development would involve construction activities within the subject lands and on the adjoining public road to facilitate connections with existing infrastructure.

Construction works mainly involving trench excavations conducted in parallel with the other services. The potential impact on the local water services network would be short term and imperceptible. Therefore, the impact on human health and population in this regard is considered to be insignificant.

During the construction phase there is potential for weathering and erosion of the surface soils from precipitation and run-off and surface water runoff may also contain increased silt levels or pollutants from the construction processes. Within the wider masterplan where works are proposed in proximity to the existing drainage ditch within the site, there is potential for discharge of these contaminants to the Lower River Shannon Special Area of Conservation (SAC) and River Shannon and River Fergus Estuaries Special Protection Area (SPA) which has the potential to cause pollution and consequential impacts to human health and population. A berm shall be constructed at the western boundary of the site to prevent any flow of surface water into the drainage ditch during construction. Further mitigation measures are outlined in Chapter 9.0 – Surface Water & Flooding and Chapter 7.0 Biodiversity.

Operational Phase

The impact of the operational phase of the proposed development on the public water supply will increase the demand on the existing supply. A pre-connection enquiry (Connection Reference No CDS22003876) was lodged with Irish Water who has confirmed that there is adequate capacity within the existing public water services network to facilitate the proposed development and wider masterplan development.

It is proposed to provide watermain around the development to form a fully loopednetwork, ensuring security and quality of supply. The proposed internal water supply network for thedevelopment has been designed in accordance with Irish Water Code of Practice July 2020. It is proposed to connect the development to the 250mm diameter main to be installed as part of the Old Cratloe Road upgrade works south of the development. Individual houses will have their own connections to the distribution main via service connections and boundary boxes. As such additional water quantities would need to be treated at the reservoir and supplied through the existing network to the site. This will require extra cost as well as increasing abstraction volumes from the existing source. The impact on human health and population in this regard is considered to be insignificant.

Wastewater will be discharged to the public sewer. Irish Water has confirmed that there is adequate capacity (Connection Reference No. CDS22003876). The impact on human health and population in this regard is considered to be insignificant. It is proposed to provide a single gravity foul sewer system to serve the current proposed development. The foul sewerage from the overall development is planned to discharge to the foul network to be installed as part of the Old Cratloe Road upgrade works south of the development.

Surface water run-off discharge rates from the development sites may be increased because of an increase in impermeable surfaces, shorter flow paths through pipes and reduced roughness co-efficient. However, implementation of SUDs features would aim to maintain runoff rates as close as possible to existing greenfield runoff rates. SUDs will be implemented in accordance with the recommendations of the GDSDS and Limerick County Council requirements. Therefore, the potential impact on population and human health in this regard is considered to be insignificant.

6.5.3 Noise

Construction Phase

During the construction phase there will be extensive site works, involving construction machinery, construction activities on site, and construction traffic, which will all generate noise. The highest noise levels will be generated during the general construction activities. The construction noise levels for this development will occur over an approximate twelve month period for the proposed development while cumulatively it may occur for a five year period having regard to the overall masterplan. Noise levels will only occur during daytime hours which will serve to minimise the noise impacts at local existing receptors over the course of the construction phase.

It is predicted that the construction phases shall result in a short-term increase in noise levels in the area as well as introducing tonal and impulsive noise as a result of construction activities such as pneumatic breaking, cutting, excavating, vehicle movements and general manual construction activities. The predicted noise levels are however expected to occur for only short periods of time at a

limited number of properties, in particular those situate on the Meelick Road and those already constructed within the Masterplan site (Phase 1).

Due to the phased nature of this development (448 units) which will occur over an approximate twelve month period, there will be slight to moderate impacts on existing residents in nearby residential areas and in particular on those residents who will occupy the new units in Phase 1. However, the proposed construction phase noise mitigation measures as detailed in the Noise and Vibration chapter of this EIAR shall ensure that all construction activities are controlled and managed and audited by an independent acoustic consultant to confirm that the mitigation measures are implemented throughout the construction phase.

Operational Phase

The main potential for altering the noise environment once the development is operational, and thus impacting neighbouring residential receptors, is road traffic noise associated with the development.

The UK Design Manual for Roads and Bridges (DMRB, Volume 11, Section 3, Part 7) states that it takes a 25% increase or a 20% decrease in traffic flows in order to get a 1dBA change in traffic noise levels. During the operational phase of the proposed development, there will be an increase in vehicular traffic associated with the site on some surrounding roads but the effect has been determined to be negligible. The traffic figures account for the entire Masterplan of which this development is only a part of, as such it is reasonable to assume that the impact for this development will be even lower. Accordingly, there will be an imperceptible impact on existing ambient noise levels at existing residential development in proximity to the existing roads and junctions within the surrounding area as a result of road traffic alterations associated with the proposed development.

The subject development includes the provision of surface car parking spaces for the residential units. Vehicles using car parking areas generally travel at speeds <20kmph which result in relatively low noise levels. On site car parking within the proposed development will have no impact on adjacent residential developments.

Within the proposed development, sounds generated by everyday domestic activities including waste facilities, pedestrians, children, and use of open spaces, are part of everyday living, and are not considered "noise" in the sense of a potential nuisance. This activity noise would not have any potential for impact beyond the boundaries of the site. In particular, the design of the proposed development has ensured that there will be no impacts on adjacent sensitive receptors.

6.5.4 Air Quality & Climate

Construction Phase

During the construction phase, site clearance and ground excavation works have the potential to generate dust emissions rising from the operation and movement of machinery on site. This has a potential impact on population and human health.

Construction equipment including generators and compressors will also give rise to some exhaust emissions. However, due to the size and nature of construction activities, exhaust emissions during construction will have a negligible impact on local air quality. CO2 will be released into the atmosphere

as a result of the movement of construction vehicles and use of plant. However, emissions associated with such activities will not be significant.

Construction traffic to and from the site shall result in a short-term increase in the volume of diesel fuelled HGV's along the local road network which will generate additional hydrocarbon and particulate emissions from the vehicle exhausts. However, the activities detailed above will result in an imperceptible impact on local air quality and sensitive receptors.

Mitigation measures are outlined in Chapter 10 – Air Quality and Climate including avoiding unnecessary vehicle movements and manoeuvring and limiting speeds on site so as to minimise the generation of airborne dust and spraying surfaces with water and wetting agents to control dust emissions.

Various elements associated with the construction phase of the proposed development have the potential to impact local ambient air quality, however the potential construction phase impacts shall be mitigated as detailed in Chapter 10.0 to ensure there is a minimal impact on ambient air quality for the duration of all construction phase works. It is predicted that the operational phase of the development will not generate air emissions that would have an adverse impact on local ambient air quality or local human health.

It is predicted that the activities detailed above will result in an imperceptible impact on local air quality and sensitive receptors. Therefore, the potential impact on human health and population in this regard is considered negligible.

Operational Phase

The operational phase of the proposed development will result in a slight impact on local air quality primarily as a result of the requirements of new buildings to be heated and with the increased traffic movements associated with the development.

The proposed landscaping scheme include native trees, grasses and shrubs which will also contribute albeit in a minor way to the adsorption of Carbon Dioxide from the atmosphere and the release of oxygen to the atmosphere.

It is predicted that the operational phase of the development will not generate air emissions that would have an adverse impact on local ambient air quality or local human health, as stated in Chapter 10 – Air Quality and Climate.

6.5.5 Landscape and Visual Impact

Construction Phase

The construction phase will have short term landscape and visual impacts. It is envisaged that construction will occur over a twelve month period and cumulatively on site over a five year period. There will be a perceptual and visual change on the landscape as a result of works. However, the landscape has already been disturbed with construction works associated with the Coonagh – Knockalisheen Road and so the baseline is already that of a landscape in transition. These works are temporary in nature and are not considered significant on population and human health.

However, as already detailed in Chapter 16.0 – Landscape and Visual Impact Assessment, in order to ensure that the visual impacts from construction works, as viewed from neighbouring housing is minimised, effective screening shall be provided around the proposed development on site and each subsequent phase of development. Landscaping on site and within each phase of development shall commence within the first planting season after houses have been constructed on site and prior to completion of development.

Operational Phase

The operational phase of the proposed development has the potential to lead to positive impacts on population and human health. The proposed development will overlook pockets of open space whilst the development proposal will directly link with existing pedestrian footpaths on the Old Cratoe Road thereby encouraging walking.

The proposed development will accommodate a high-quality residential environment located close to existing services and amenities. The landscape design rationale for the masterplan site is based on the provision of a hierarchy of open space and play areas within the development. Accordingly, the proposed development is likely to have a positive impact on human beings.

6.5.6 Economic Activity

Construction Phase

The construction phase of the proposed development is likely to result in a positive net improvement in economic activity in the area of the proposed development site particularly in the construction sector and in associated and secondary building services industries.

It is anticipated that between 50 – 60 work personnel will be employed on site during peak construction periods. A considerable amount of the work will be undertaken by sub-contractors who will also work elsewhere on a phased basis over the construction period.

The construction phase will also have secondary and indirect 'spin-off' impacts on ancillary support services in the area of the site, such as retail services, together with wider benefits in the aggregate extraction (quarry) sector, building supply services, professional and technical professions etc. These beneficial impacts on economic activity will be largely temporary but will contribute to the overall future viability of the construction sector and related services and professions over the phased construction period.

The proposed development could have a slight negative impact on the surrounding area during construction phase due to traffic and associated nuisance, dust and noise. These issues and appropriate mitigation measures are addressed in Chapters 12.0 and 11.0 of the EIAR, in the Material Assets Traffic and Transport Assessment and the Noise and Vibration Assessment which accompany the application.

Operational Phase

The operational phase of the proposed development will result in the provision of 98 no. residential units and associated open space. This will provide accommodation for approximately 265 no. persons, When the housing that could be generated by the overall masterplan is considered, the masterplan area could effectively house 1,210 no persons.

This increase in occupancy in the area will enhance local spending power and will assist with the delivery of a critical mass of population which will support a wide range of additional local businesses, services, transport infrastructure and employment opportunities. Further, provision of a creche and local neighbourhood centre will provide services to not only the proposed residential development but also to residents living in the area, thereby facilitating the development of a sustainable neighbourhood.

6.5.7 Social Patterns

Construction Phase

The construction phase of the proposed development is unlikely to have any significant impact on social patterns within the surrounding area. Some temporary additional local populations may arise out of construction activity. However, these impacts are imperceptible, temporary in nature and therefore not considered significant.

It is acknowledged that the construction phase of the project may have some short-term negative impacts on local residents. Such impacts are likely to be associated with construction traffic and possible nuisances associated with construction access requirements. These impacts are dealt with separately and assessed elsewhere in the EIAR, including Chapter 2 - Project Description; Chapter 10 - Air Quality and Climate; Chapter 11 - Noise and Vibration and Chapter 12 Material Assets - Traffic and Transport.

Such impacts will be short term and in the longer term, the completed scheme will have beneficial impacts for local businesses, residents and the wider community. Any disturbance is predicted to be commensurate with the normal disturbance associated with the construction industry where a site is efficiently, sensitively and properly managed having regard to neighbouring activities. The construction methods employed, and the hours of construction proposed will be designed to minimise potential impacts to nearby residents.

Operational Phase

The addition of circa 265 no. new residents to the area will have a significant, positive and direct impact on the area. Importantly, the predicted increase in population has been planned in a holistic and co-ordinated manner, under the provisions of the Limerick Development Plan 2022 – 2028 and similar to other developments already granted permission in the locality.

The Social Infrastructure Audit undertaken for the purpose of this EIAR (Section 6.3.4) confirms the proximity of the site to existing community support facilities including local and district shops, health facilities, employment opportunities and schools. These existing facilities within the vicinity of the site have the capacity to be shared and further utilised. They also have the potential to be augmented / expanded with additional facilities and services to serve a growing community.

Enrolment for both primary schools within the area appear to be growing, whilst the last year saw a decline for secondary schools. There are no proposals detailed in the Development Plan to increase primary school capacity in the area, although there are a number of policies which proactively support future growth and expansion.

The subject site is served by public transport with bus links to Limerick City Centre and its range of higher order shops and services. Furthermore, the masterplan site provides for the development of a creche facility (granted permission) and local neighbourhood facilities in advance of the proposed development (Phase 3) thereby ensuring adequate services in the immediate area to serve the development.

6.5.8 Land-Use & Settlement Patterns

Construction Phase

The construction phase of the proposed development will primarily consist of site clearing, excavation and construction works. It is acknowledged that the construction phase of the project may have some short-term negative impacts on local residents. Such impacts are likely to be associated with construction traffic and possible nuisances associated with construction methods and activities. These impacts are dealt with separately and assessed elsewhere in the EIAR, including Chapter 2.0 - Project Description; Chapter 10.0 - Air Quality and Climate; Chapter 11.0 - Noise and Vibration and Chapter 12.0 Material Assets - Traffic and Transport. Construction works are likely to take place on a phased basis, which will moderate the potential impacts on adjoining land use.

As detailed in Chapter 16.0 – Landscape and Visual Impact Assessment, in order to ensure that the visual impacts from construction works, as viewed from neighbouring housing is minimised, effective screening shall be provided around the proposed development on site and each subsequent phase of development. Landscaping on site and within each phase of development shall commence within the first planting season after houses have been constructed on site and prior to completion of development.

Secondary land use impacts include off-site quarry activity and appropriate disposal sites for removed spoil. These facilities would already have gone through the planning consent process and any associated environmental impacts assessed accordingly. Whilst traffic to and from these facilities may marginally increase as a result of the development proposal, the impacts are not likely to be significant and shall be temporary in nature. The locations for these specific activities have not yet been identified and will be identified once a contractor has been appointed on site.

The construction phase may result in a marginally increased population in the wider area due to increased construction employment in the area. However, this would be temporary in nature and the impact would be imperceptible.

Operational Phase

The operational phase of the proposed development will result in the introduction of a residential land use to the subject site which will provide much needed housing for the growing population of the Limerick City and County area in general. The proposed use once constructed will function in synergy with adjoining residential development and other commercial uses in the area. The impact of the development on land use and settlement patterns will be positive having regard to its planned implementation as detailed in the Limerick Development Plan 2022-2028.

6.5.9 Health & Safety

Construction Phase

The construction phase of the proposed development may give rise to short-term impacts associated with construction traffic, migration of surface contaminants, dust, noise and littering. Secondary impacts may include resulting increased traffic arising from hauling building materials to and from the proposed development site which are likely to affect population and human health distant from the proposed development site, including adjacent to aggregate sources and landfill sites. Construction impacts are likely to be short term and are dealt with separately in the relevant chapters of this EIAR document.

The proposed development is designed to best industry standards, with emphasis on the health and safety of occupants, local residents and the community at large. A Project Supervisor, Design Process (PSDP), will be appointed at tender stage to coordinate the design effort and to address and minimise construction risks during the detailed design period. Notification of this appointment will be sent to the HSA by means of their Approved Form 1 (AF1).

As design advances and before construction commences, a Preliminary Health and Safety Plan will be drawn up by the PSDP and reviewed by the project team. This ultimately will be passed on to the appointed Project Supervisor Construction Stage (PSCS) to be developed into a Construction Health and Safety Plan, prior to construction commencing. Notification of this appointment and the commencement date of construction will be sent to the HSA by means of their Approved Form 2 (AF2). Construction on site will be managed through a Construction and Environmental Management Plan to be prepared by the appointed contractor. The construction methods employed, and the hours of construction proposed will be designed to minimise potential impacts. The development will comply with all Health & Safety Regulations during the construction of the project. Where possible, potential risks will be omitted from the design so that the impact on the construction phase will be reduced.

Operational Phase

The operational stage of the development is unlikely to precipitate any significant impacts in terms of health and safety. The design of the proposed development has been formulated to provide for a safe environment for future residents and visitors alike. The paths, roadways and public areas have all been designed in accordance with best practice and the applicable guidelines including DMURS. The proposed residential units along with the creche and local neighbourhood centre, which are part of the overall masterplan, accord with the relevant guidelines and will meet all relevant safety and building standards and regulations. This ensures a development which promotes a high standard of health and safety for all occupants and visitors.

The proposed development will not result in any significant impacts on human health and safety once completed and operational. The proposed development therefore is unlikely to result in negative impacts in relation to population and human health in this regard.

6.5.10 Risk of Major Accidents or Disasters

Construction Phase

Having regard to the topography, geology and location of the subject site, and its low risk of flooding due to its elevation which is well above flood risk zones A and B, it is not considered likely that there

will be any impact related to a major accident or disaster during the construction phase of the proposed development, stemming internally from within the development, or externally.

The works proposed in proximity to roadways will be governed by best practice and appropriate safety procedures, ameliorating any risk of a major accident in those contexts.

Operational Stage

The proposed development will be located on land which is not at any significant risk of flooding. The entrance arrangements have been designed so as to avoid any risk of a major accident associated with the surrounding road network. It is considered that there is no significant risk related to major accidents or disasters, external or internal, man-made or natural in respect of the proposed development.

6.6 REMEDIAL AND MITIGATION MEASURES

Avoidance, remedial and mitigation measures describe any corrective or mitigative measures that are either practicable or reasonable, having regard to the potential likely and significant environmental impacts.

6.6.1 Construction Phase

A range of construction related remedial and mitigation measures are proposed throughout this EIAR document with reference to the various environmental topics examined and the inter-relationships between each topic. These remedial and mitigation measures are not likely to result in any significant and likely adverse environmental impacts on population and human health during the construction phases being avoided.

6.6.1.1 Mitigation by Avoidance / Design

No mitigation proposed

6.6.1.2 Mitigation by Prevention

POP & HH CONST 1: In order to protect the amenities enjoyed by nearby residents and the adjoining school, a Construction and Environmental Management Plan (including traffic management) shall be prepared by the contractor and implemented during the construction phase.

POP & HH CONST 2: A berm shall be constructed at the western boundary of the site to prevent any flow of surface water into the drainage ditch during construction.

6.6.1.3 Mitigation by Reduction

No mitigation required

6.6.2 Operational Phase

The operation phase is considered to have likely positive impacts on human beings in relation to the provision of additional residential units and high quality open space and pedestrian/cyclist facilities to cater for the demands of a growing population and encourage active travel modes in accordance with the principles of sustainable development and residential zoning objectives pertaining to the site.

6.7 RESIDUAL EFFECTS

The proposed development will provide an overall positive socio-economic benefit through direct and indirect employment opportunities associated with the predicted growth in trade.

No negative residual impacts have been identified as a result of the proposed development.

6.8 MONITORING

In relation to the impact of the development on population and human health it is considered that the monitoring measures outlined in other chapters and relevant to other environmental topics such as water, air quality and climate and noise are sufficient to adequately address monitoring requirements.

6.9 REFERENCES

Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022)

Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment (European Commission, 2017)

Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2003)

Central Statistics Office (CSO) website www.cso.ie

Limerick Development Plan 2022 – 2028

DoHPLG (2017) – Rebuilding Ireland – Action Plan for Housing and Homelessness

Regional Spatial and Economic Strategy for the Southern Region

OECD Economic Survey of Ireland 2022

ESRI (2022) – Quarterly Economic Commentary, Autumn2022

ESRI (2018) – Ireland's Economic Outlook: Perspectives and Policy Challenges

Childcare Act (1991) – (Early Years Services) Regulations 2016

Health Safety Authority – www.hsa.ie

Department of Education and Skills (DoES) website www.education.ie

CHAPTER SEVEN BIODIVERSITY

7.1 INTRODUCTION

This chapter assesses the potential impacts of the proposed development upon biodiversity. Under the EIA Directive as well as best practice methodology from the EPA, the analysis of impacts to biodiversity is an essential component of the EIA process, and so is a required chapter in any EIAR.

The purpose of this assessment was to:

- Undertake a desktop review of available ecological data for both the receiving environment and greater area, including a review of European sites within 15 km of the project (considered separately as part of the Appropriate Assessment process) and nationally designated sites within 10km;
- Undertake ecological field surveys of the receiving environment;
- Identify flora and fauna present within the footprint of all elements of the project;
- Evaluate the ecological significance of the receiving environment;
- Appraise the potential impacts of the project on the ecology of the receiving environment;
- Consider measures to mitigate the potential negative impact(s) of the project on the ecology of the receiving environment.

7.1.1 Study Area

The proposed development site (Phase 3) is part of a phased development proposal for a large greenfield area or Masterplan Site (MS). This MS is divided into seven different phases of delivery as detailed in Table 1.1 in Chapter 1.0 Introduction. The overall MS layout which illustrates the indicative layout of the subject site and adjoining lands in the ownership of the applicant is displayed on Figure 1.0 in Chapter 1.0 and full details of the proposed development phases are given in Chapter 2.0.

The study area takes a holistic approach and examines the wider MS area whilst focusing on any areas of significance within the proposed development site. The MS is predominantly open farmland and is located approximately 3.5Km from Limerick City centre and is bisected by the L3102, Old Cratloe Road which runs from the Limerick City Centre past Thomond Park Stadium and Limerick Institute of Technology to the north west out of the City towards the N18 road to Ennis. A new road and roundabout have been developed running northeast from the Old Cratloe separating the Neighbourhood Centre, to the west and the Creche to the east.

Whilst the site is rural in character, nearby housing developments and Limerick City are visible. The land slopes from a higher elevation at the east to lower elevations in the west.

The MS area is composed of primarily open grazed farmland. Hedgerows and hedgerow/treeline combinations run along most of the site boundary. However, there is some post and rail fencing in particular where the proposed Neighbourhood Centre section meets the Old Cratloe Road. There are also a number of hedgerows bounding the individual fields within the overall study area.

The majority of the hedgerows are of good quality.

There is a small pool adjacent to a drainage ditch at the western boundary of the site. The drainage channel runs all the way along the western boundary of the site, adjacent to the proposed Phase 4. This drainage ditch flows into the OPW flood relief network which discharges directly into the River Shannon. The portion of the River Shannon where the OPW channels discharge is designated as the Lower River Shannon Special Area of Conservation (SAC) and River Shannon and River Fergus Estuaries Special Protection Area (SPA) (Figure 7.1).

There are also individual mature trees mixed, native and non-native species and in some sections small copses of mature trees.

To the southwest of Old Cratloe Road the fields nearest to the road are relatively dry, but become increasingly wetter to south, outside the overall study area boundary. Adjacent to these fields is a wet grassland habitat.

Running adjacent to the new distributor Coonagh to Knockalisheen road, which is still under construction, is an OPW flood management drainage channel. The flow in this channel is standing water with no flow during dry periods.

The soil type overlying the bedrock geology, is limestone till from the Crosstown Series, which forms well drained grey/brown podzolics and brown earths, both with basic status.

Figure 7.1 Drainage ditch and connection with flow network of European Sites

**Note that a portion of the Lower River Shannon SAC overlaps with the River Shannon and River Fergus Estuaries SPA.*

7.2 ASSESSMENT METHODOLOGY

7.2.1 Relevant Guidance

The methodology for this assessment has been devised in consideration of the following relevant guidance published by the Environmental Protection Agency (EPA) including 'Guidelines on the information to be contained in Environmental Impact Statements (2002), 'Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)' (2003) reference was also made to the draft (2015 and 2017) guidelines and 'Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment' (DoECLG, 2013).

Additional guidance available from the EU such as 'Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment' (2013) has also been considered. The appraisal also takes account of 'Guidelines for Ecological Impact Assessment in the United Kingdom' (2006), CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd edition. Chartered Institute of Ecology and Environmental Management, Winchester both published by the Chartered Institute of Ecology and Environmental Management (CIEEM). The Heritage Council publication 'Best Practice Guidance for Habitat Survey & Mapping' (Smith et al., 2011) is also referenced.

Relevant guidance published by the National Roads Authority (NRA) such as 'Guidelines for Assessment of Ecological Impacts of National Road Schemes' (2009a), and 'Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes' (2008) have also been followed.

Documentation and guidance available from Limerick City and County Council (LC&CC) including the Limerick Development Plan 2022-2028 (LC&CC, 2022) have been referred to. The OPW Flood Risk Management Plan for Shannon Upper & Lower (OPW, 2018) was also reviewed.

Relevant guidance published by the National Roads Authority (NRA), and applicable to assessing watercourses in Ireland, was also followed, including 'Guidelines for the Assessment of Ecological Impacts of National Road Schemes – Revision 2' (NRA 2009a), 'Ecological surveying techniques for protected flora and fauna during the planning of National Road Schemes – Version 2' (NRA 2009b), 'Environmental Impact Assessment of National Road Schemes – A practical guide' (NRA 2008a) and 'Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes' (NRA 2008).

7.2.2 Legislative Context

As the Stage 1 Screening Report for Phase 3 (and previously Phase 1, Phase 2 and the Neighbourhood Centre and Crèche) screened in for Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA a Stage two Appropriate Assessment Natura Impact Statement (NIS) was also prepared as part of the original planning application. Therefore, because of the hydrological connection with these two European Sites and potential impact the EU Habitats Directive and EU Birds Directive are relevant to this Environmental Impact Assessment Report as detailed below:

Article 6(1) and article 6(2) of Council Directive 92/43/EEC of 21st May 1992 on the conservation of natural habitats and of wild fauna and flora aims to promote the maintenance of biodiversity. It forms the cornerstone of Europe's nature conservation policy with the Birds Directive and establishes the EU wide Natura 2000 ecological network of protected areas, safeguarded against potentially damaging developments." (EEC, 1992). Member States are required to establish necessary conservation measures and appropriate statutory measures to ensure the protection of natural habitat types in Annex I and the species in Annex II present on the sites. This includes the avoiding the deterioration of natural habitats as well as the disturbance of any species included in Annex II (EHLG, 2009, p18).

Both the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA sites are European sites and thus Natura 2000 sites (EHLG, 2009, p18).

In addition, flora and fauna, rare at a national level, are protected under the provisions of the Wildlife Act 1976, as amended, and the orders and regulations made thereunder, such as the Flora Protection Order

Section 171 of the Fisheries (Consolidation) Act 1959 creates the offence of throwing, emptying, permitting or causing to fall onto any waters deleterious matter. Deleterious matter is defined as not only as any substance that is liable to injure fish but is also liable to damage their spawning grounds or the food of any fish or to injure fish in their value as human food or to impair the usefulness of the bed and soil of any waters as spawning grounds or other capacity to produce the food of fish.

Under Section 3 of the Local Government (Water Pollution) Act, 1977 (as amended by Sections 3 and 24 of the 1990 Act) it is an offence to cause or permit any polluting matter to enter waters. Suspended solids would be a key parameter here. Likewise, any visual evidence of oil/fuel in water courses would constitute an offence.

The EU Water Framework Directive (2000/60/EC) requires all Member States to protect and improve water quality in all waters so that we achieve good ecological status by 2015 or, at the latest, by 2027. It was given legal effect in Ireland by the European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003). It applies to rivers, lakes, groundwater, and transitional coastal waters. The Directive requires that management plans be prepared on a river basin basis and specifies a structured method for developing these plans.

The river basin for the study area is that of the River Shannon. However, this has a huge catchment area and therefore the waterway corridor as defined for this study is composed of the catchment of streams and OPW channels adjacent to the study area that drain directly into the Shannon River.

7.2.3 Desktop Study

A desk study was carried out to collate and review available information, datasets and documentation sources pertaining to the MS site's natural environment. These sources included:

- OSI Aerial photography and 1:50000 mapping
- National Parks and Wildlife Service (NPWS);
- The Ireland Red List No. 10: Vascular Plants (Wyse et al. 2016);
- Teagasc Soil area maps

- Geological Survey of Ireland
- Bat Conservation Ireland (BCI)
- Geological Survey Ireland (GSI) area maps
- Environmental Protection Agency (EPA) water quality data
- Limerick Development Plan 2022 – 2028
- Limerick Heritage Plan 2017-2030
- Limerick City County Biodiversity Plan
- Limerick Actions for Pollinators

Designated Nature Conservation Sites

Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) within 10km of the proposed site were identified as part of this ecological appraisal using in-house GIS systems to interrogate datasets obtained from the NPWS at www.npws.ie. These designated sites are described in Table 7.2 of this document.

European (Natura 2000) sites within 15 km of this project, such as Special Areas of Conservation (SACs) and Special Protection Areas for birds (SPAs) were also identified as part of this ecological appraisal and detailed in the Stage 1 Screening Report submitted as part of the planning application for Phase 3.

A separate Appropriate Assessment (AA) screening and Natura Impact Statement was carried out in order to appraise the potential impact on European site specifically for Phase 3 and submitted as part of the initial planning application. The designated sites evaluated are also detailed in Table 7.5 of this document.

Flora and Fauna

A desktop study was undertaken to locate any records of rare or protected flora and fauna that have previously been recorded for the site and surrounding area. Records available on the National Biodiversity Data Centre websites were reviewed, and records of obtained by request from the NPWS were reviewed. Botanical species were assessed in accordance with their occurrence on the Flora Protection Order (2015) and The Ireland Red List No. 10: Vascular Plants (Wyse et al. 2016).

7.2.4 Field Survey

An ecological site walkover was carried out over the 15th November 2021 and 15th June 2022 for the whole MS. Particulars are outlined in Table 7.1 below.

Date	Weather Conditions	Surveyor
15/11/2021	Precipitation: None, Cloud: 4/8-8/8, Visibility: Excellent	JROC
15/06/2022	Precipitation: None, Cloud: 2/8-5/8 Visibility: Excellent	JROC and DOC

Table 7.1 Baseline Field Assessment Details

Habitats

The habitats within the site of the proposed development were identified and classified according to 'A Guide to Habitats in Ireland' (Fossitt, 2000) during walkover surveys of the site on the dates indicated above in Table 7.1. The dominant plant species present in each habitat type were recorded.

Habitats were appraised and evaluated according to their occurrence as protected habitats under Annex I of the EU Habitats Directive (92/43/EEC) and for their capacity to support rare, threatened and endangered species. The methodology used in this report to assess the impact on habitats is based on NRA guidelines (2009). The habitat mapping exercise had regard to the 'Best Practice Guidance for Habitat Survey and Mapping' (Smith et al., 2011) published by the Heritage Council. Scientific and common names for plants follow Parnell and Curtis (2012).

In addition to habitat identification, each habitat was assessed for its ecological significance, based on the National Roads Authority (NRA) Site Evaluation Scheme (NRA, 2009).

Mammals

Mammal observations or signs were recorded during site walkovers on the dates indicated above in Table 7.1. Field boundaries and densely vegetated areas were walked to search for potential badger setts. Evidence of bat roosts was searched for and information on all potential roosts was recorded according to roost identification guidelines, but no roosts were found. 'Bat Survey Guidelines: Traditional Farm Buildings Scheme', Aughney, T.,Kelleher, C. & Mullen, D. (2008).

The conservation status of mammals within Ireland and Europe is assessed using one or more of the following documents; Wildlife Acts (1976 - 2010), the Red List of Terrestrial Mammals (Marnell et al., 2009) and NPWS (2013) The Status of EU Protected Habitats and Species in Ireland.

Avifauna

All bird species observed and heard within the study area boundary were noted during the walk over surveys within the site.

Other Fauna

During the course of the walk over surveys at the proposed site, species from other groups of fauna were noted and included in the report.

7.2.5 Evaluation and Impact Assessment

The value of the ecological resources and features or receptors was determined using the ecological evaluation guidance given in the National Roads Authority (NRA) Ecological Assessment Guidelines as outlined in Table 7.2 (NRA, 2009). This evaluation scheme seeks to provide value ratings for ecological receptors, with values ranging from internationally to locally important. Internationally important receptors would include Special Areas of Conservation (SAC) or Special Protected Areas (SPA) while those of national importance would include Natural Heritage Areas (NHA).

This evaluation scheme is aimed at assessing the value of sites (see Table 7.2). It has been adapted here to assess the value of habitats and fauna within one site. The value of habitats is assessed based

on condition, size, rarity, conservation and legal status. The value of fauna is assessed on its biodiversity value, legal status and conservation status. Biodiversity value is based on its national distribution, abundance or rarity, and associated trends.

All Irish bat species are protected under the Wildlife (Amendment) Act 2000 and the EU Habitats Directive. Some of the habitats and species identified were selected as key ecological receptors. The NRA (NRA, 2009) refer to key ecological receptors as those ecological features which are evaluated as Locally Important (higher value) or higher and are likely to be impacted significantly by the proposed development. The features that were evaluated as being of Local Importance (higher value) and higher in this study were selected as key ecological features and the impact significance on each of these features was assessed.

Ecological Resource Evaluation

Ecological resources are evaluated using the criteria outlined in Table 7.2.

Site Rating	Qualifying Criteria
A - International Importance	SAC, SPA or site qualifying as such. Sites containing 'best examples' of Annex I priority habitats (Habitats Directive). Resident or regularly occurring populations of species listed under Annex II (Habitats Directive); Annex I (Birds Directive); the Bonn or Berne Conventions. RAMSAR site; UNESCO biosphere reserve; Designated Salmonid water
B - National Importance	NHA. Statutory Nature Reserves. Refuge for Flora and Fauna. National Park. Resident or regularly occurring populations of species listed in the Wildlife Act or Red Data List 'Viable' examples of habitats listed in Annex I of the Habitats Directive
C - County Importance	Area of Special Amenity, Tree Protection Orders, high amenity (designated under a County Development Plan) Resident or regularly occurring populations (important at a county level, defined as >1% of the county population) of European, Wildlife Act or Red Data Book species Sites containing semi-natural habitat types with high biodiversity in a county context, and a high degree of naturalness, or populations of species that are uncommon in the county
D – Local importance, higher value	Sites containing semi-natural habitat types with high biodiversity in a county context, and a high degree of naturalness, or populations of species that are uncommon in the locality Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.
E - Local importance, lower value	Sites containing small areas of semi-natural habitat that are of some local importance for wildlife; Sites or features containing non-native species that are of some importance in maintaining habitat links.

Table 7.2 Ecological Resource Evaluation Criteria (from NRA, 2009)

Assessing Impact Significance

Once the value of the identified ecological receptors (features and resources) was determined, the next step was to assess the potential effect or impact of the proposed development on the identified key

ecological receptors. This was carried out with regard to the criteria outlined in various impact assessment guidelines (NRA, 2009; CIEEM, 2006, 2016 and 2018). The impacts were assessed under a number of parameters such as magnitude, extent, duration and reversibility.

Where impacts are assessed to be significant, mitigation measures have been incorporated into the project design to remove or reduce these impacts. The residual impacts after mitigation were then assessed.

The cumulative impact of the development was also assessed by discussing the impact of the overall development that have planning permission, that are in the planning process, but not yet received permission or other proposed developments that are in existence in the area.

The cumulative impact of neighbouring developments and agriculture in the greater area are also considered.

7.3 RECEIVING ENVIRONMENT

7.3.1 Field Results

The habitats present within the site were classified based on botanical and physical characteristics according to Fossit's (2000) classification system. Floral and faunal species directly observed were identified, and signs of cryptic and nocturnal mammals and mammal dwellings were searched for. Large mature trees were also assessed in terms of their potential to provide roosting habitat for bats.

The species recorded during field surveys are assessed side by side with those belonging to the same group (i.e. avifauna, mammals) for which records relating to the study area exist.

7.3.2 Desktop Study

As outlined in 7.2.4 above, a desk study was carried out to collate and review available information, datasets and documentation sources pertaining to the MS's natural environment.

Records of invasive plant species, mammals, birds, and other faunal groups, including common, protected, and invasive species within the two 1km grid squares (R54 and R55) overlapping and surrounding the proposed MS were also retrieved from the NBDC website.

These were used both independently, and also in conjunction with field results as described above.

A central element of the desktop study is the collection of data on designated nature conservation sites. Sites of national importance within 10 km of the proposed development site are considered as part of the ecological assessment (within this environmental report). Sites of international importance within 15km of the proposed development site are dealt with separately as part of the Appropriate Assessment (AA) process and discussed in the AA Screening Report and Natura Impact Statement that was submitted as part of the original planning application for Phase 3.

European Sites are included in Table 7.3 and Figure 7.2. Figure 7.3 shows designated nature conservation sites of national importance within 10 km of the proposed development and details of the only Natural Heritage Area within 10km are in Table 7.4.

There were a number of SACs and an SPA within 15km of the proposed development as detailed in Figure 7.2. Natural Heritage (NHA) sites and proposed Natural Heritage Sites (pNHA) sites within a 10Km radius have been identified in Figure 7.3

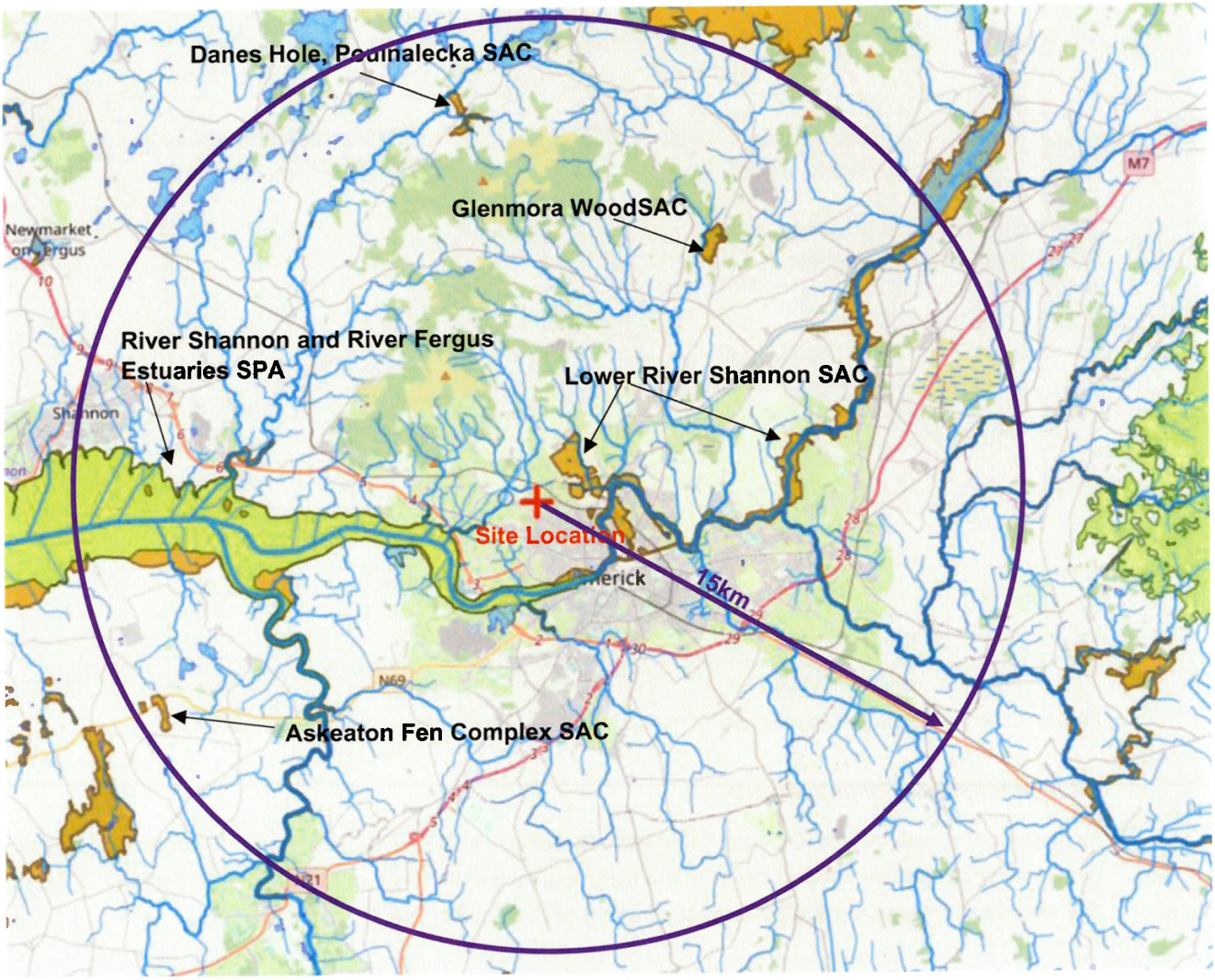


Figure 7.2 Proximity of the development to European Sites within a 15km radius (EPA, 2023).

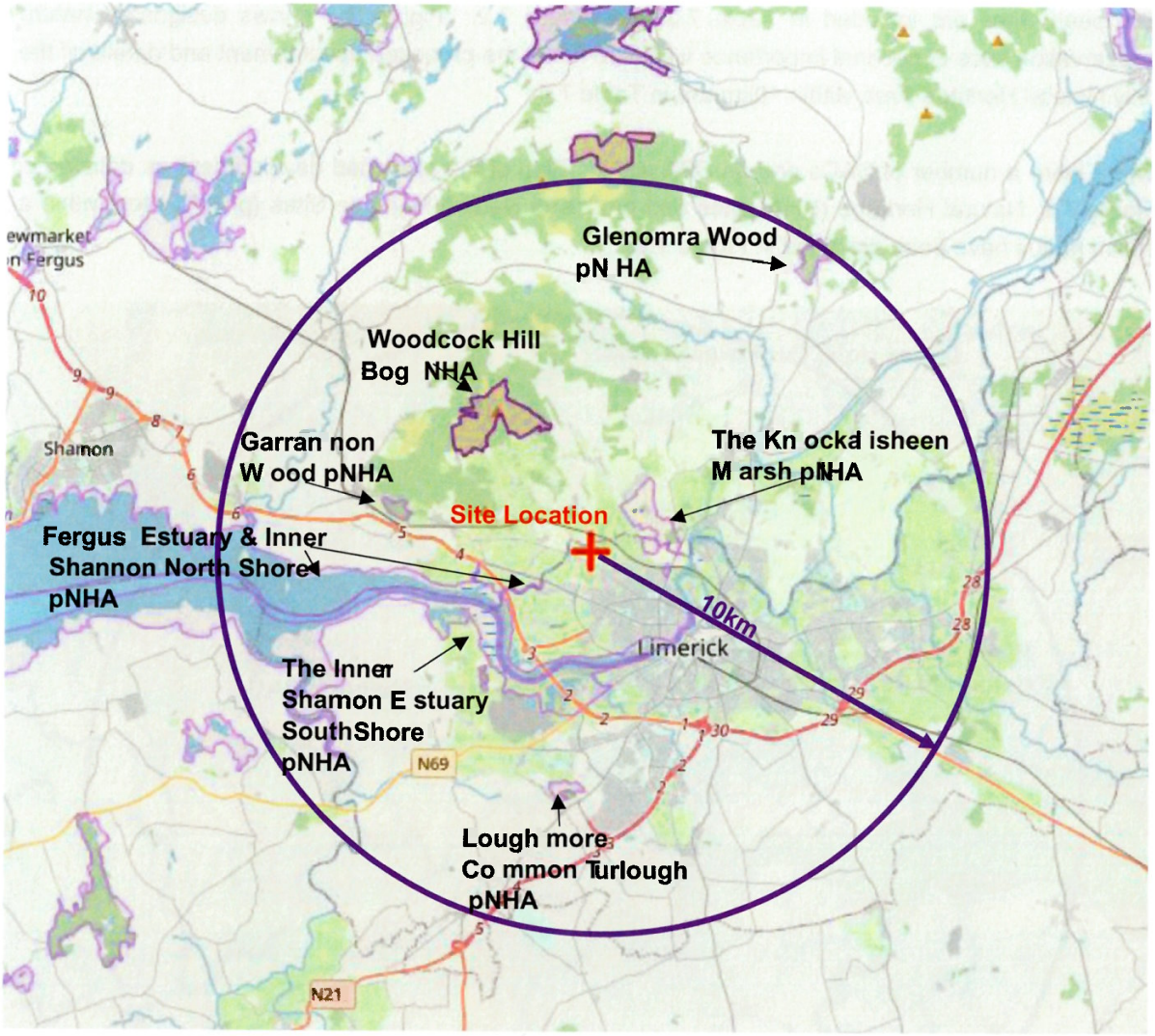


Figure 7.3 Proximity of the development to Natural Heritage Areas within a 10km radius (EPA, 2023)

Sites of International Importance

In accordance with Article 6 of the 'Habitats' Directive (92/43/EEC) the Stage 1 Screening Report evaluated the potential impacts on all of the European Sites identified in Figure 7.2, as detailed in Table 7.3. and was presented for planning for Phase 3 of the development.

The two sites that were screened in were Lower River Shannon SAC 002165 and River Shannon and River Fergus Estuaries SPA 004077.

Name of Site	Site Code	Approximate distance	Direction	Potential Risk
Lower River Shannon SAC	002165	1.14Km and 1.74Km	North, North East and South West respectively	Yes- Potential Hydrological connectivity and therefore potential pathway for impacts
River Shannon and River Fergus Estuaries SPA	004077	1.74Km	South West	Yes - Potential Hydrological connectivity and therefore potential pathway for impacts
Glenomra Wood SAC	001013	9.6km	South west	No, hydrological connectivity and sufficient geographical separation, so no potential pathway for impacts
Askeaton Fen Complex SAC	0002279	13.8km	North east	No, hydrological connectivity and sufficient geographical separation, so no potential pathway for impacts
Danes Hole Poulnalecka SAC	0000030	12.1km	North	No, Sufficient geographical separation, so no potential pathway for impacts

Table 7.3 European Sites within 15km of the proposed development

Sites of National Importance

Sites of National Importance in the Republic of Ireland are termed, Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs). While the Wildlife (Amendment) Act 2000 has been passed into law, pNHAs will not have legal protection until the consultative process with landowners has been completed; this process is currently ongoing. Six pNHAs and one NHAs are present within 10 km of the Study Area (Figure 7.3 and Table 7.4).

Site Name	Site Code	Approximate Distance	Direction	Potential Risk
Woodcock Hill Bog NHA	002402	4.2km	North west	No, hydrological connectivity and sufficient geographical separation, so no potential pathway for impacts
Fergus Estuary & Inner Shannon North Shore pNHA	002048	1.7km	South west	Yes- Potential Hydrological connectivity and therefore potential pathway for impacts
The Inner Shannon Estuary South Shore pNHA	00435	3.4km	South west	Yes- Potential Hydrological connectivity and therefore potential pathway for impacts
Knockalisheen Marsh pNHA	002001	1.4km	North east	No, hydrological connectivity and sufficient geographical separation, so no potential pathway for impacts
Loughmore Common Turlough pNHA	00438	6.5km	South	No, hydrological connectivity and sufficient geographical separation, so no potential pathway for impacts
Glenomra Wood pNHA	001013	9.6km	North, north east	No, hydrological connectivity and sufficient geographical separation, so no potential pathway for impacts

Garrannon Wood pNHA	001012	5.1km	North west	No, hydrological connectivity and sufficient geographical separation, so no potential path wayfor im pacts

Table 7.4 National sites within 10km of t heproposed development

7.3.3 Flora

Protected or Rare Flora

No rare or protected flora species protected under the Flora Protection Order (2015), listed in Annex II and IV of the EU habitats directive (92/43/ECC), or listed in the Irish Red Data were recorded during the surveys of MS.

Invasive Non-Native Flora

No non-native invasive species were recorded on the MS. A search of the NBDC was conducted to identify any invasive species within R54 and R55 grid squares covering and adjacent to the development site (Table 7.5).

Common Name	Scientific Name	Invasive Im pact	GridReference	Reco rd Date
Butterfly-bush	*Buddleja davidii*	Med ium	R559552	15 /07/22
Japanese knotweed	*Fallopia jap onica*	High	R551590 R542594	12/02/2018 05/06/2018
Indian balsam	*Impatiens glandulifera*	High	R541594	23/0 8/200

Table 7.5 Invasive non-native flora records within 2km (Grids R54 and R55) of the site

7.3.4 Habitats

There are no habitats within the study area that conform to those listed under Annex I of the EU Habitats Directive. The dominant habitats within the site boundary are Improved Agricultural Grassland/ Dry Neutral Grassland Mosaic (GA1/GS1), Improved Agricultural Grassland (GA1), and Hedgerows/Treelines (WL1/WL2).

There are also areas of Scrub/Scattered Trees Mosaic (WS1/WD5) as well as Scattered Trees (WD5), a Drainage Ditch (FW4), a Pool (FL5), an area of Wet Grassland (GS4) and Spoil and Bare Ground (ED2).

Figure 7.4 shows the habitats mapped for the MS.

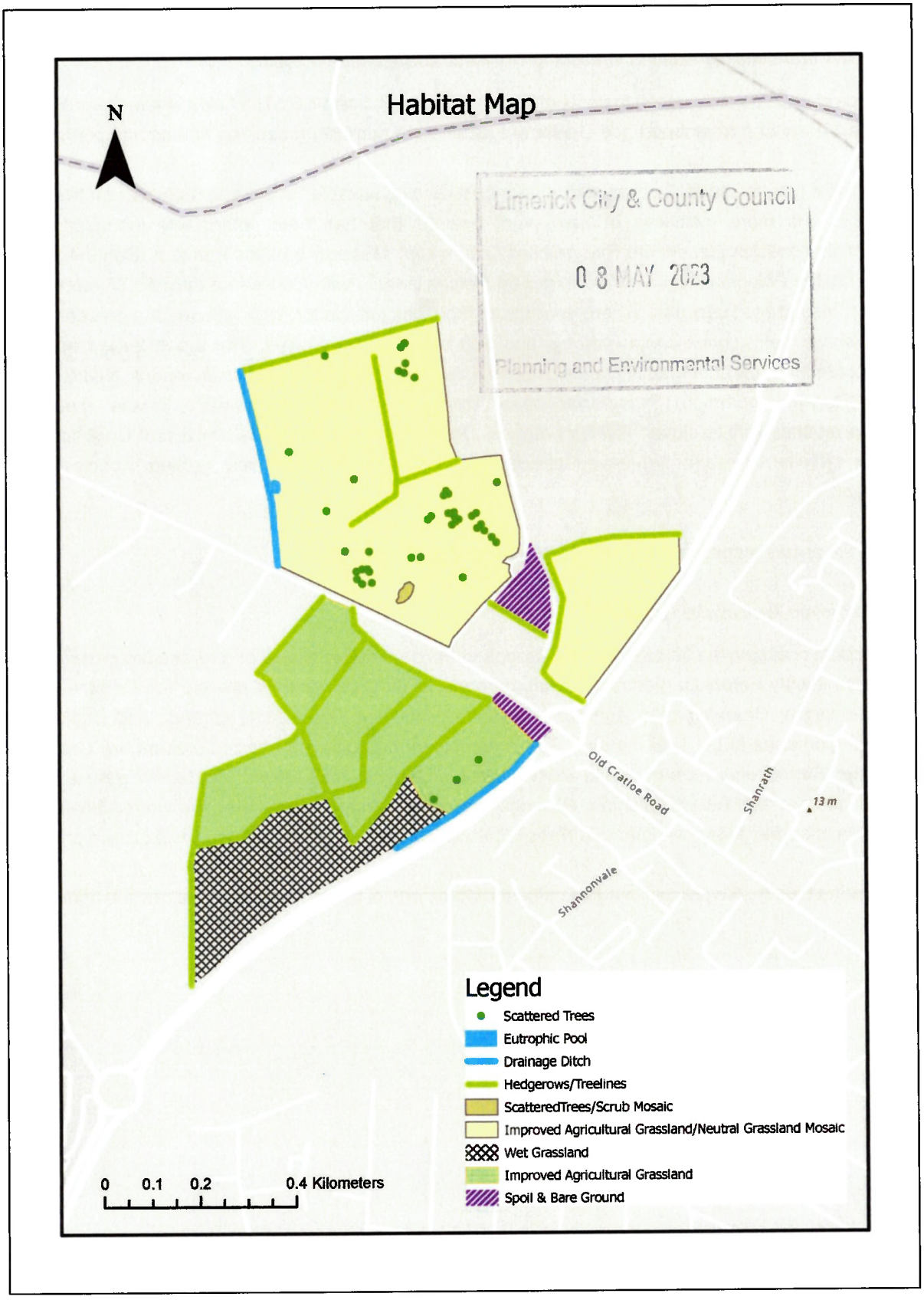


Figure 7.4 Habitat Map of the MS

Habitats within and adjacent to the Proposed Masterplan Site

GA1/ GS1 Improved Agricultural Grassland/Dry Neutral Grassland Mosaic

This type of habitat occupies the majority of the site (Figures 7.5 and 7.6). The fields where the proposed Phases 1-4 and the Neighbourhood Centre are located are currently grazed by horses and ponies.

This habitat type is usually seeded with an agricultural mix, suitable for grazing, however on this site, the fields are more indicative of permanent pasture that has been intensively managed. The predominant species present are Rye-grasses *Lolium spp.,* Meadow-grasses *Poa spp.*, Bents *Agrostis spp.*, Timothy *Phleum pratense*, Yorkshire Fog *Holcus lanatus* with Cocks-foot *Dactylis glomerata*, in uncut or less grazed sections. Where sections of the fields are wetter, rush species are present such as Compact rush *Juncus conglomeratus* and Soft rush *Juncus effuses*. The broad leaved species present are Meadow buttercup *Ranunculus acris,* Creeping buttercup *Ranunculus repens,* Nettle *Urtica dioica,* Ragwort (common) *Senecio jacobaea,* Thistle (marsh) *Cirsium palustre,* Thistle (creeping) *Cirsium arvense,* White clover *Trifolium repens,* Dock (common) *Rumex acetosa* and Dock (curled) *Rumex crispus.* These broad-leaved species are indicative of intensively grazed, species poor grassland.

Figure 7.6 shows a portion of the area to be occupied by Phase 3.

GA1 Improved Agricultural Grassland

This habitat occupies the fields where the proposed Phase 5 and is typical of a re-seeded grass sward of predominantly Perennial rye-grass *Lolium perenne*, other grass species present are Common bent *Agrostis tenuis,* Creeping bent *Agrostis stolonifera,* Yorkshire Fog *Holcus lanatus,* and Cocks-foot *Dactylis glomerata* in the field margins. The predominant broadleaved species present are Creeping buttercup *Ranunculus repens,* White clover *Trifolium repens,* Red clover *Trifolium pratense,* Dock *Rumex acetosa* and Ribwort plantain *Plantago lanceolata.* Where these fields are wetter Silverweed *Potentilla anserine,* Meadow buttercup *Ranunculus acris* and Rush (Hard) *Juncus inlfexus* are present.

This habitat type is also present in adjacent fields to the north of the MS outside of the red line boundary.

Figure 7.5 GA1/GS1 Improved Agricultural Grassland/Dry Neutral Grassland Mosaic

Figure 7.6 GA1/GS1 Improved Agricultural Grassland/Dry Neutral Grassland Mosaic

GS4 Wet Grassland

Adjacent to and south of the area where Phase 5 is located but within the red line boundary of the MS, the fields become increasingly wetter and grade into GS4 Wet Grassland. This habitat is also present in the adjoining OPW channel where there is limited standing water. The predominant species present are Meadow foxtail *Alopecurus pratensis,* False oat-grass *Arrhenatherum elatus,* Cocks-foot *Dactylis glomerata,* Yorkshire Fog *Holcus lanatus,* Sweet vernal grass *Anthoxanthum odoratum,* Common reed *Phragmites australis,* Wood club-rush *Scirpus sylvaticus,* Yellow Flag (Iris) *Iris pseudacorus,* Rush (Hard) *Juncus inlfexus* Greater birds-foot trefoil *Lotus pedunculatus,* March cinquefoil *Comarum palustre,* Marsh bedstraw *Galium palustre,* Silverweed *Potentilla anserine,* Purple-loosestrife *Lythrum salicaria,* Hoary willowherb *Epilobium parviflorum,* Vetch (Bush) *Vicia sepium*, Sorrel *Rumex acetosa,* Meadow sweet *Filipendula ulmaria,* Common valerian *Valariana officinialis,* Clovers (red) *Trifolium pratense,* Creeping buttercup *Ranunculus repens* and Grey willow *Salix cinerea* (Figures 7.7 and 7.8).

ED2 Spoil and Bare Ground

Adjacent to the newly constructed road, there are two areas of spoil and bare ground on either side of the road. In places these have become colonised predominantly with Oil seed rape *Brassica napus* and some Dock *Rumex obtusifolius* (Figure 7.9). In addition, there is an area of spoil where the Crèche is to be located and has been partly colonised with similar species.

FW4 Drainage ditch

There is a drainage ditch on the western boundary of the MS, whilst connected to the flow network of the Lower River Shannon SAC and River Shannon and River Fergus SPA, contained no moving water at the time of surveying. In preceding days there had been moderate rainfall. As this ditch is bounded by a hedge bank containing prolific Bramble *Rubus fruiticosus agg.*, it was difficult to access full, however Yellow Flag (Iris) *Iris pseudacorus* is present in places where water levels are reduced.

The second drainage ditch is an OPW drainage channel (Figure 7.7), which was partially dry and the species indicative of the adjacent GS4 Wet Grassland, where there was standing water. Common Water-starwort *Callitriche stagnalis,* Yellow Flag (Iris) *Iris pseudacorus,* Common reed *Phragmites australis,* Floating sweet-grass *Glyceria fluitans* and Water-cress *Nasturtium officinale* are present.

FL5 Eutrophic (lakes) pond

A small pond is also positioned adjacent to the western boundary of the MS on the edge of the main field where Phase 4 is to be located, that appears to be rainfall fed, rather than from the drainage ditch (Figure 7.9). The horses and ponies evidently use this pond for drinking, due to the numerous hoof prints present. Species present within this habitat are Grey willow Salix cinerea, Yellow Flag (Iris) *Iris pseudacorus*, Purple-loosestrife *Lythrum salicaria*, Bramble *Rubus fruiticosus agg.*, Compact rush *Juncus conglomeratus* and Soft rush *Juncus effuses* at the water's edge, with Duckweed (common) *Lemna minor* in the open water. Whether this pond is artificial or natural is unknown. However, in the north-west corner of the site, there is a former artificial pond that is fed by a clay drainage pipe, which is currently dry and contains no water.

Figure 7.7 GS4 Wet Grassland and FW4 Drainage Ditch (OPW channel)

Figure 7.8 GS4 Wet Grassland

Figure 7.9 ED2 Spoil and Bare Ground

WS1/WD5 Scrub/Scattered Trees Mosaic

Within the open grassland area there is small copse/scrub area, which looks as though it may be a remant of an old hedgerow. The species are a mixture of planted and self-seeded native species, such as Hawthorn *Crataegus monogyna* and Elder *Sambucus nigra,* with planted Black poplar *Populus nigra.* Bramble *Rubus fruiticosus agg.* is the other main species present.

WD5 Scattered Trees

Within the GA1/GS1 Improved Agricultural Grassland/Dry Neutral Grassland Mosaic where Phases 1-4 and the Neighbourhood centre are proposed, there are a number of scattered trees and in places these occur in groups. The species are Alder *Alnus glitinosa,* Horse chestnut *Aesculus hippocastanum,* Black poplar *Populus nigra,* Black maple *Acer* nigrum and Spruce species *Picea spp.* and Grey willow *Salix cinerea.*

WL1/WL2 Hedgerows/Treelines

There are boundary hedgerows to the north of the site and perpendicular to these is a hedgerow that partially bisects the field (Figure 7.11). The predominant species in the hedgerows are Hawthorn *Crataegus monogyna*, Blackthorn *Prunus spinosa*, Ash *Fraxinus excelsior*, Elder *Sambucus nigra* and Crab apple *Malus sylvestris.* Other woody species such as Field rose *Rosa arvensis,* Bramble *Rubus fruiticosus agg.* and Ivy *Hedera helix* are present.

Where Phase 2 is located there is a one hedgerow that is adjacent to the road where the species present are predominantly Hawthorn *Crataegus monogyna*, Blackthorn *Prunus spinosa* and Ash *Fraxinus excelsior* with some Sycamore *Acer pseudoplatanus* and Spindle *Euonymous europeaus.* Other species present are Bramble *Rubus fruiticosus agg.* and Ivy *Hedera helix.* Nettle *Urtica dioica* is abundant indicating nutrient enrichment. There is also a hedge to the north of this portion of the site, which has similar species to that above.

Figure 7.10 FL5 Eutrophic Pool

Figure 7.11 Partial WL1/WL2 Hedgerow/Treeline bisecting the field where the proposed Phase 3 is located.

Habitat	Evaluation	Rationale	Selection as a key ecological receptor
GA1/ GS1 Improved Agricultural Grassland/Dry Neutral Grassland Mosaic	Local Importance (lower value)	Highly modified habitat, but potential for a range of wildlife	Yes
GA1 Improved Agricultural Grassland	Local Importance (lower value)	Highly modified habitat, but potential for a range of wildlife	Yes
GS4 Wet Grassland	Local Importance (higher value)	Semi-natural habitat; potential for a range of wildlife; outside the development footprint, but within the red line boundary	No
ED2 Spoil and Bare Ground	Local Importance (lower value)	Highly modified habitat, but potential for a range of wildlife	Yes
FW4 Drainage ditch FW4 OPW Drainage ditch	Local Importance (higher value) Local importance (lower value)	Semi-natural habitat; potential for a range of wildlife Man-made feature with runoff from road. Outside of MS.	Yes Yes
FL5 Eutrophic (lakes) pond	Local Importance (lower value)	Semi-natural habitat; potential for a range of wildlife. However, nutrient	Yes

		enriched from horse manure.	
WS1/WD5 Scrub/Scattered Trees Mosaic	Local Importance (lower value)	Semi-natural/modified habitat; potential for a range of wildlife, but remnant of earlier hedgerow	Yes
WD5 Scattered Trees (non-native) WD5 Scattered Trees (native)	Local Importance (lower value) Local importance (lower value)	Mixture of native and non-native species, habitat; potential for a range of wildlife	Yes
WL1/WL2 Hedgerows/Treelines	Local Importance (higher value)	Semi-natural habitat; potential for bat roosts in trees with thick growths of ivy; proximity to development footprint;	Yes

Table 7.6 Evaluation of habitats within the study area (NRA, 2009)

7.3.5 Fauna

Birds

During the walkover surveys on the 15th November 2021 and 15th June 2022 a number of bird species were observed or heard as detailed in Table 7.7.

The hedgerows, blocks of woodland, and scrub within and bounding the site are likely to be used by Robin and other species for nesting. Robin and other species are also likely to forage within these areas. Robin may also forage within the fields themselves. Starling may forage within fields within the proposed development site, favouring grassland habitats. They may use crevices and cracks within trees along the field boundaries and woodlands within and bounding the site to breed. Swallow and House Martin may forage on the wing over the open grassland habitats within the proposed development site boundary. However, there is no potential breeding habitat for either of these species within the proposed development site.

No overwintering waterfowl species were identified on the site.

No rare or species of conservation concern were recorded on the site at the time of surveying. (Kingston, 2012).

Common Name	Scientific Name	Status BOCCI
Blackbird	*Tardus merula*	
Blue tit	*Parus caeruleus*	
Bulfinch	*Pyrrhula pyrrhula*	
Carrion crow	*Covus corone corone*	
Chaffinch	*Fringilla coelebs*	
Field fare	*Turdus pilaris*	
Goldfinch	*Carduelis carduelis*	

Great tit	*Parus major*	
House sparrow	*Passer domesticus*	Amber
Robin	*Erithacus rubecula*	
Starling	*Sturnus vulgaris*	Amber
Wren	*Troglodytes troglodytes*	

Table 7.7 Birds identified during the walkover surveys and their status in terms of the Birds of Conservation Concern in Ireland

Mammals

There was evidence of possibly a Fox *Vulpes vulpes* burrow that is not currently in use as well as tracks in various locations within the study area.

There was no evidence of Otter *Lutra lutra* the study area. However, recorded on the NBDC, the most recent records were in Grids R575576 and R575573, which are within a 5km of the study area, recorded as part of the Mammals of Ireland Survey 2016-25 (Biodiversity Ireland, 2023).

No dawn or dusk survey for bats has been completed on the site. However, trees within the copses and hedgerows were checked for likely roosts, and none were identified during the walkover surveys. There were no derelict or unoccupied buildings within the overall study area that would provide suitable bat roosting sites.

A range of bat species records were retrieved from the NBDC within the 2km grid square of the development site as detailed in Table 7.8.

Species Common Name	Scientific Name	Grid	Date
Soprano pipistrelle bat	*Pipistrellus pygmaeus*	R568563 R540560 R568563 R530560	07/06/2007 01/06/2005 07/06/2007 01/06/2005
Daubenton's bat	*Myotis daubentonii*	R540560 R530560 R530550 R540550	01/06/2005 01/06/2005 01/06/2005 01/06/2005

Table 7.8 Bat species recorded within 2km of the development site (Biodiversity Ireland, 2023)

Irish Hare could potentially use the site's hedgerows and would favour grassland habitats, although there are no records in the vicinity of the development site.

While Badger is recorded within the local area (in Grid R545574 in 2010 and Grid R534587 in 2009) and could potentially forage within and commute through the proposed development site, no Badger signs such as snuffles, latrines, or droppings were observed within the site, and no setts were present in densely vegetated areas within and in the vicinity of the site.

Hedgehog could potentially be present within the site; they are known to nest in hedgerows. As such, there is potential for this species to forage, nest and/or hibernate within and in areas bounding the proposed development site.

Irish stoat are known to predate on a variety of prey, including Rabbits, and birds and their eggs, and also to utilise a variety of den sites, including those excavated by other mammal species and accumulations of stones. As such, there is potential for this species to forage and breed within and in areas bounding the proposed development site. However, there are no records for stoat in the vicinity of the development site.

There are also no records of the high-impact invasive mammal species American Mink *Mustela vison* within the two 2km grid square or of Brown Rat *Rattus norvegicus.*

Other Fauna

Common frog *Rana temporaria* were not recorded on site during the walkover surveys and as both the drainage ditches contain standing water, together with the small pool, there is a likelihood that frogs could spawn in these habitats and therefore a further survey should be completed in March prior to construction. According to the NBDC records, Common frog was recorded in Grid 567510 on the 01/03/202. Smooth newt *Lissotriton vulgaris* was recorded in Grid 515545 on 04/04/2020, but not recorded on the site during the walk over surveys. Similarly, these were not done at the optimum time for surveying the aquatic habitats and as for the Common frog, surveys should be completed in March for these species and other amphibians.

Emerald damselfly *Lestes sponsa,* Speckled wood butterfly *Pararge aegeria* and Cabbage white butterfly *Pieris rapae* were recorded on the development site during the walk over survey on 15th June 2021.

7.4 DESCRIPTION OF EFFECTS

7.4.1 'Do-Nothing' Scenario

If the proposed development was not to proceed on the subject site and on the overall Masterplan site, the existing biodiversity would be left undisturbed and no likely effects would occur.

Most of the habitats to be affected have been significantly modified from their natural state by human activity. Formally disturbed areas and areas that have been left unmanaged are being recolonised by vegetation. The general pattern of succession from recolonising bare ground to patches of grassland to woodland would be expected to continue.

In the event that the proposed development does not proceed then the lands will likely continue in agricultural use.

7.4.2 Construction Effects

Of principal concern is the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA and the hydrological connectivity of these habitats with the development site. Also of concern are the Fergus Estuary & Inner Shannon North Shore pNHA and The Inner Shannon Estuary South Shore pNHA, which overlap with the two European Sites. As detailed in the Stage 1 Appropriate Assessment Screening report accompanying the planning application, the potential significant effects on the

Qualifying Interests of the European Sites and thus National Sites, is principally in the form of emissions to surface water during the construction phase.

Within the MS site and the proposed Phase 3 development, the major concern is that of habitat loss. Other concerns on habitats and their species that are being retained within the development site and in the surrounding area, would be pollution, emissions to surface water as well as noise and dust.

7.4.3 Operational Effects

Encroachment by development and increased human disturbance of birds and other wildlife are areas where the potential for impacts exists.

The potential for hydrological impacts resulting from the proposed development can be expected to be as a result of surface water draining and storm water drainage. However, a range of Sustainable Drainage Solutions (SuDs) have been designed to intercept the surface water and storm water to prevent these impacts as follows:

- Permeable paving will be used to construct car parking areas.
- Public road areas to be finished with porous asphalt
- Stone soakaways
- Swales
- Bio-retention strips
- Tree pits
- Swale
- Cubic M3 attenuation system

As such, rainfall and storm water within the proposed development site will be diverted away from the likely path towards the drainage channels with the implementation of the various SuDs measures. The excess flow from the soakaways (i.e. that which does not percolate through the ground) will be discharged to the cubic M3 attenuation tank. The discharge of surface water will be subject to standard environmental mitigation measures including a Class 1 Bypass Separator with an alarm and dial out facility, thereby preventing the discharge of emissions to the drainage ditch. Therefore, there will be no direct emissions of water discharge to the drainage ditch that are within the flow network that connects to the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. Phase 2 surface water and storm water runoff discharges to a swale that runs along the edge of the road and discharges into an OPW channel approximately 500m from the MS.

Foul water from all phases will discharge directly into the foul drainage system for Limerick City.

7.4.4 Cumulative Effects

This proposed development must be seen as part of a wider phased development of the surrounding lands. It is Delivery 5, Phase 3 of an overall planned development of five phases and seven delivery packages comprising as detailed in Chapter 1.0 Table1.1. To date only Phase 1 has been granted permission although it is currently subject to a third party appeal to An Bord Pleanála. See the Masterplan Drawing detailed in Chapter 2.0. Notwithstanding the Masterplan being advanced as separate phases of development, this assessment has regard to Phase 1 which has been granted permission and the other remaining phases as proposed insofar as information is available. A number

of the identified impacts can also act cumulatively with other impacts from similar developments in this area of Limerick. These primarily arise through the additional loading to wastewater treatment plants in Limerick City.

In order to reduce the runoff or rainwater and storm water into the wastewater treatment system, all surface water will be collected and treated separately though SuDs measures or attenuation system, as detailed above, before being discharged to water courses, thus reducing the cumulative impact to of wastewater to some extent.

Based on the information in this report, the proposed Phase 3, will not have a significant adverse effect on the natural environment.

A search was made of Limerick County Council planning website for other developments in the vicinity of the proposed development. The only other significant development in the vicinity of the site was the construction of a new road network (Coonagh to Knockalisheen Distributer Road). However, at the time of surveying the construction of this road development was partially complete and has been halted. Access roads for Phase 3 have been constructed and will provide access to the site for all construction traffic.

7.5 LIKELIHOOD OF SIGNIFICANT EFFECTS

The potential impacts of the proposed development on terrestrial and aquatic biodiversity include:

- Impacts on Habitats
- Impacts from non-native invasive species
- Predicted impacts on water quality and aquatic ecology during construction
- Predicted impacts on water quality and aquatic ecology during operation
- Predicted Impacts on fauna during operation – Air
- Potential impacts on protected mammals – bats and otter during construction and operation
- Potential impacts on birds during construction and operation
- Potential impacts on other fauna during construction and operation.

The potential impacts and likelihood of significant effects are detailed in Table 7.9.

Impact	Residual Effect
Impacts on Habitats	The habitats to be directly affected consist primarily of modified habitats of reasonable ecological value and classified as Local Importance (Lower value). The impact on these habitats will be long term and significant. However measures have been implemented to reduce the impact by creating replacement habitats. The impacts on those habitats that are classed as Local importance (Higher Value) will be short term and imperceptible, provided mitigated measures are employed. The ecological effect from dust generation during construction will be short term and imperceptible.

Impacts from non-native invasive species	Buddleia and this species was recorded outside the proposed development site. There will be no ecological effect from this invasive species. Indian balsam and Japanese knotweed were also recorded in the 2km squares adjacent to the development site. Although not within the site, these species are highly invasive and should they become established during the construction phase then appropriate actions to record and remove them will be required.
Predicted impacts on water quality and aquatic ecology during construction	No watercourses of high sensitivity to pollutants or high conservation value occur in close proximity to the development site. However through the flow network there is connectivity with European Sites and National Sites. Therefore, mitigation measures have been incorporated into the overall development to prevent any residual effects on aquatic habitats in Section 7.6. However, there is low risk of significant effects on water quality due to the distance involved and the dilution provided in the aquatic environment, the impacts on wa ter quality will be imperceptible and the effect on aquatic ecology will be imperceptible.
Predicted impacts on water quality and aquatic ecology during operation	Following implementation of the SuDs measures, the resultant surface water system has sufficient capacity to adequately deal with any surface water arising from the overall site during operation. The proposed development is predicted to have an overall neutral long-term impact on water and hydrology with the development site. There will be no significant residual effect on hydrology, drainage characteristics of the site or water quality during operation. Based on the above it has been concluded that the impact on local water quality, water quality in downstream receptors and aquatic ecology will be imperceptible during operation.
Potential impacts on protected mammals – bats and otter	The impact on bats will be localised and will not significantly impact on overall bat populations as there will no significant loss of critical resources for bats. Overall, the impact on feeding habitat for bats is predicted to be permanent and not significant. Otter could potentially forage in the drainage ditches adjacent to the site boundaries. The proposed works will result in an increase in noise and disturbance. However it will be of limited significance in the context of Otters' largely nocturnal habits, ability to move away from short-term disturbance and the negligible significance of increased noise and disturbance in the context of the levels already generated by the adjoining housing developments. The impact on Otter, if they utilise the site, would be not significant in the short term and imperceptible in the long term.
Potential impacts on birds during construction and operation	Whilst works could potentially disrupt feeding patterns, given the availability of similar habitat in

	the surrounding area and the ability of birds to move away from disturbance, the impact on the feeding behaviour of these species would be not significant during construction. Any impact on these species would not be significant during construction and imperceptible during operation. During the operational phase, the levels of activity will stabilise and birds in the surrounding landscape will be expected to habituate to any increased noise and disturbance levels. The impact on terrestrial birds, in habitats adjoining the proposed development site is therefore predicted to be permanent and imperceptible during operation. During operation, the existing storm water management systems have been designed to ensure that there are no significant effects on surface or ground water quality. The impact on surface water quality and on prey availability for birds feeding in aquatic or estuarine habitats downstream of the facility will be imperceptible during construction and operation.
Potential impacts on other fauna during construction and operation	Mammal species which are protected under the Irish Wildlife Act 1976, as amended, occur or could potentially occur within the proposed development site. No habitats of significant value with regard to amphibians or reptiles will be affected by the proposed works. The work areas are only likely to support common invertebrate species. The effect on these species will be not significant in the short term and imperceptible in the long term.

Table 7.9 Potential impact and residual effects on habitats

7.5.1 Construction Effects

Construction activities are likely to generate some noise and dust emissions. The potential for dust to be emitted depends on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speeds and wind direction. The potential for impact from dust depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these locations.

Given that there are only two High Value habitats in proximity to the development site, dust suppression measures as detailed in Chapter 7.0 shall be employed to reduce impact. However, any impacts from dust generation will be short-term and can be minimised with correct site management procedures.

There will be some rock breaking on the MS and noise disturbance to wildlife can be minimised throughout the construction phase, by operating during day light hours only.

No disturbance to habitats or flora outside the proposed development area will occur. All works and temporary storage of material will be restricted to the immediate footprint of the development, which will be wholly within the development site boundary. Designated access points will be established within the site and all construction traffic will be restricted to these locations.

A Construction Environmental Management Plan shall be prepared by the appointed contractor prior to commencement of development to include a range of standard surface water control measures during construction. However, the following site specific measures shall be implemented to protect existing habitats:

In order to prevent flow into the drainage ditches, silt fencing with geotextile membrane shall be erected around the site to prevent any discharge to water courses. To further protect the drainage ditches identified in Figure 7.1, berms shall be constructed. This is particularly important as the overall MS is at a higher elevation than both of the ditches and the likelihood of discharge from the construction site during periods of rainfall are high.

In addition, a lined attenuation pit shall be constructed at the lowest point to capture any surface water during the construction phase.

The water quality mitigation measures outlined above will ensure otter and aquatic species are not negatively impacted by a decline in water quality.

7.5.2 Operational Effects

Surface Water Drainage Infrastructure.

Due to the inclusion of Sustainable Drainage Solutions (SuDs), soakaways, and attenuation system within the design of the development, the impact on the aquatic habitats, in particular will be removed during the operation of the Masterplan development and the proposed Phase 3.

While the proposed operational phase water management strategies will be specific to the MS development, they will also serve to minimise potential operational phase run-off impacts into the wider environment including the Lower River Shannon SAC and other designated sites even if not primarily designed to address any particular risks to the SAC/other designated sites as such. The retained drainage ditches will be outside of the boundary treatments for the Masterplan development.

Taking the above into consideration, potential operational phase impacts in relation to surface water drainage on designated sites are considered imperceptible and neutral.

Habitats

Impacts on terrestrial habitats are generally restricted to the direct removal of habitats and possible impacts from the spread of invasive species. Based on the criteria outlined by EPA, 2017, as described above, the predicted impacts are detailed in Table 7.10

Habitat	Eva luation	Potential Impact
GA1/ GS1 I mproved Agricultural Grassland/Dry Neutral Grassland Mosaic	Local Importance (Lower Value)	Loss of large areas. Heavily grazed and lower value habitat. Negative. Significant. Perman ent im pact
GA1 Improved Agricultural Grassland	Local Importance (Lower Value)	Loss of large areas. Poor diversity. Negative. Im perceptible. Permanent im pact
GS4 Wet Grassland	Local Importance (Higher Value)	Outside of the development, therefore no loss of habitat. Positive. Imperceptible. Short term im pact.

ED2 Spoil and Bare Ground	Local Importance (Lower Value)	Loss of small areas of low value habitat. Negative. Imperceptible. Long term impact
FW4 Drainage ditch	Local Importance (Higher Value)	No loss of habitat. Neutral. Imperceptible. Short term impact.
FL5 Eutrophic (lakes) pond	Local Importance (Lower Value)	Loss of habitat. Negative. Significant. Permanent impact.
WS1/WD5 Scrub/Scattered Trees Mosaic	Local Importance (Lower Value)	Within exclusion zone where archaeological feature is contained. Positive. Imperceptible. Short term impact
WD5 Scattered Trees (non-native) WD5 Scattered trees (native)	Local Importance (Lower Value) Local impotence (Lower Value)	Loss of non-native trees. Negative. Not significant. Permanent impact. Loss of native trees. Negative. Significant. Permanent impact. Trees where the archaeological feature is present will be retained.
WL1/WL2 Hedgerows/Treelines	Local Importance (Higher Value)	A number of hedgerows will be removed as part of the development. Negative, Significant, Long term impact. However, new native species hedgerows will be planted to replace these (Figure 7.12). The boundary hedgerows of the development site area will be retained and some of the internal hedgerows will be retained where possible. Neutral. Imperceptible. Short term impact

Table 7.10 Evaluation of potential impact of the construction phase on habitats

As detailed above there will be some significant direct loss of habitats as a result of the proposed development. However the habitats that will be lost as a result of the overall Masterplan development will be replaced with habitats that have the potential to be of higher conservation value and therefore the overall evaluation of the biodiversity will be that of net gain. Details of the habitats to be retained and newly created habitats are detailed in Figure 7.12. Details of the habitats to be lost and compensation measures are detailed in Table 7.11.

Habitat to be Removed	Compensation Habitat	Impact Classification	Biodiversity Net Loss/Net Gain
WL1/WL2 Hedgerows/Treelines	Replacement native species hedgerows	Positive	Net gain as more hedgerows will be planted than those removed in the overall MS.
WD5 Scattered trees (native)	Native or pollinator friendly species will be planted in green areas	Positive	Net gain as more trees will be planted than those removed
WD5 Scattered Trees (non-native)	Native or pollinator friendly species will be planted in green areas	Positive	Net gain as more trees will be planted than those removed
FL5 Eutrophic (lakes) pond	Replacement pond	Positive	Net gain as the proposed new pond will be of a larger size and the water quality is likely to be of improved quality as there will be no horse grazing or runoff from farming activities.

GA1/ GS1 Improved Agricultural Grassland/Dry Neutral Grassland Mosaic	Green areas to be planted with native wildflower and grass seed mix and managed with a reduced mowing regime during the summer months to provide a habitat for pollinators. In addition, an area will be retained as a new wet grassland that was formerly Improved Agricultural Grassland.	Neutral	Although the existing area of Improved Agricultural Grassland/Neutral Grassland is larger than the proposed green areas and new wet grassland, both of these measures will have a greater potential for increased biodiversity and therefore there will be no net loss overall.
GA1 Improved Agricultural Grassland	Green areas to be planted with native wildflower and grass seed mix and managed with a reduced mowing regime during the summer months to provide a habitat for pollinators.	Neutral	Although the existing area of Improved Agricultural Grassland is larger than the proposed green areas and new wet grassland, both of these measures will have a greater potential for increased biodiversity and therefore there will be no net loss overall.

Table 7.11 Habitats to be removed and resultant biodiversity net loss/net gain

The impact during operation on the boundary treelines/hedgerows will be minimised with the inclusion of walls around the development and therefore the impact is considered to be imperceptible and neutral.

As the additional native and/or non-native pollinator friendly trees and native hedgerow planting and grassy areas within the MS matures they will enhance the quality of the foraging habitat on the site as well as providing additional cover for fauna while maintaining and/or providing wildlife corridors/green infrastructure across the study site.

As per the construction phase, the Landscape Masterplan associated with the development will also be relevant to other fauna including bats during the operational phase by creating new linear hedgerows hedgerows for bats to use as the vegetation matures while also retaining existing boundary hedgerows and some of the internal hedgerows as detailed in Figure 7.12.

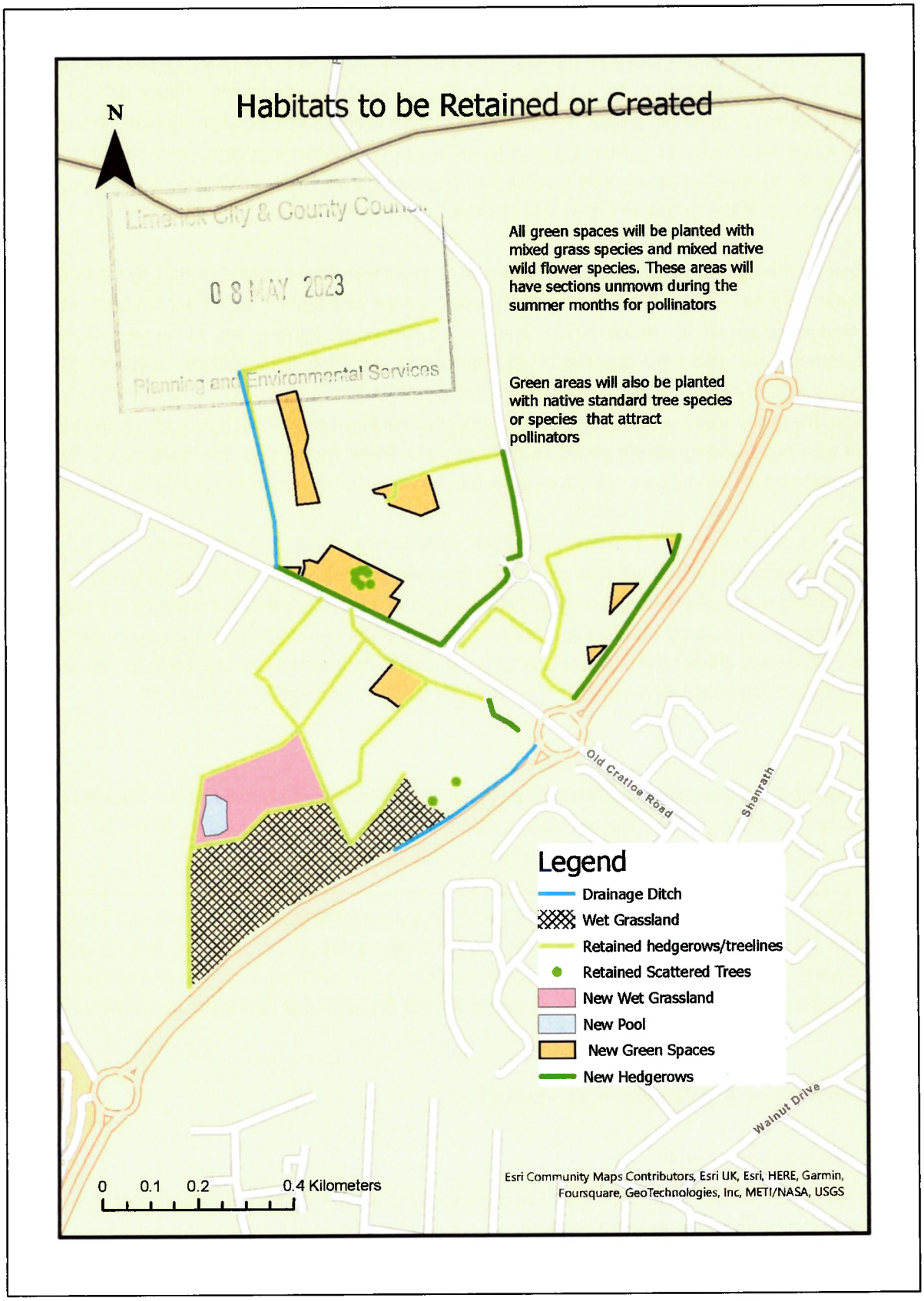


Figure 7.12 Habitats to be retained or created within the MS.

Bats

Although no bat roosts were found on the MS, bats are known to be in the area as detailed in Table 7.8 and may use the development for foraging. Therefore operational stage disturbance effects which includes disturbance of fauna, particularly bats arising from artificial light spillage into the environment from the associated lighting scheme. Lighting types that emit a narrow spectrum with no UV (*e.g.* low pressure sodium) attract relatively less insects than broad spectrum types with high or low UV (*e.g.* high pressure sodium, Metal halide and mercury; see Bat Conservation Ireland 2010, Stone 2013).

Therefore, the narrow spectrum types with no UV have a relatively lower impact on bats by not attracting their insect prey base away from the nearby habitats where bats will be searching for prey (see Bat Conservation Ireland 2010, Stone 2013). The use of directional lighting and luminaire accessories (shield, louvre) are also very successful approaches to reducing light spillage nuisance into the surrounding environment (see Bat Conservation Ireland 2010, Stone 2013, BCT & ILP 2018) in relation to bats. In this case, areas of the MS that are considered sensitive to artificial lighting in relation to bats coincide with new/existing wildlife corridors comprising of linear hedgerows and hedgerows/treelines. This has been taken into account by the proposed public lighting design for the residential scheme.

There will be additional human activity/vehicular disturbance during the operational phase of the proposed development which will lead to a slight increase in noise levels at the site. However, fauna species confirmed present at the site are likely to be already relatively tolerant of noise as the proposed development site is situated on the edge of an urban/suburban environment and as such there is no predicted significant effect on faunal species as a result of disturbance associated with the operational phase of the proposed MS development. Therefore impact is imperceptible and neutral.

Other Impacts

As outlined above, potential operational phase impacts on designated sites via other impacts such as disturbance/displacement on relevant fauna, recreational activity and flooding/floodplain are not relevant here and are therefore considered imperceptible neutral.

The existing eutrophic pool is of poor quality due to the extensive trampling by horses and ponies and deposition of horse manure and thus the level of biodiversity in this pool is very low. The two drainage ditches which are of Higher Value will remain undisturbed and mitigation measures have been suggested in Section 7.5 to ensure that the water quality is not impacted during the construction phase.

7.6 REMEDIAL & MITIGATION MEASURES

7.6.1 Construction Phase

As part of the proposed development the following measures are to be implemented in order to minimise the potential impacts on the existing ecology.

6.6.1.1 Mitigation by Avoidance / Design

No mitigation proposed.

7.6.1.2 Mitigation by Prevention

BIO CONST 1: In order to prevent flow into the drainage ditches, silt fencing with geotextile membrane shall be erected around the site to prevent any discharge to water courses. To further protect the drainage ditches identified in Figure 7.1, berms shall be constructed. This is particularly important as the overall MS is at a higher elevation than both of the ditches and the likelihood of discharge from the construction site during periods of rainfall are high.

BIO CONST 2: A lined attenuation pit shall be constructed at the lowest point to capture any surface water during the construction phase.

BIO CONST 3: The phased ground clearance works for the proposed development that involve the removal/disturbance of any hedgerow, treeline or occasional mature trees, will be undertaken outside of peak bird breeding season (March 1st to August 31st inclusive); if hedgerow clearance cannot be limited to outside this period, a qualified ecologist will be required to oversee clearance operations, with works being halted in the event that nesting birds are observed.

BIO CONST 4: Construction operations shall take place during the hours of daylight to minimise disturbances to roosting birds and to minimise disturbances to faunal species at night. No badger or otter activity was observed during the walk over surveys.

BIO CONST 5: If site lighting is required during construction works it will be placed with consideration of and away from the potential foraging/roosting areas of protected species associated with the wider area such as hedgerows/treelines

BIO CONST 6: A pre-construction mammal survey will be undertaken within the footprint of the development in order to confirm that none of these species have colonised the site following the walkover surveys. In the event that a badger sett or otter spraint or holts should be encountered at any point, the NPWS will be informed and in the case of badger, NRA Guidelines for the Treatment of Badgers Prior To the Construction of National Road Schemes will be followed. Should evidence of Otters be found then a derogation licence will be required.

BIO CONST 7: As part of best practice construction measures a preconstruction bat survey shall be carried out within the site prior to construction to reconfirm the findings of preplanning surveys (no roosts were detected during the walkover surveys). If any roosts are found during these surveys a relevant bat derogation licence shall be sought prior to construction works commencing and works will be carried out under the terms of the relevant derogation licence this shall include any felling works being undertaken, and works will be timed and conducted in a manner to ensure that no bats are harmed as a result of felling.

BIO CONST 8: Lighting shall not be left switched on overnight within the site during the construction phase. The use of lighting within the site can discourage some bat species from using the site, and attract other species due to higher insect activity, increasing their vulnerability to predators.

7.6.1.7 Mitigation by Prevention

BIO CONST 9: The proposed surface water drainage infrastructure as proposed which includes the use of SuDs measures as well as an attenuation system fed by soakaways shall be implemented on

site, therefore preventing impact on the adjacent drainage ditches and the wider aquatic environment, including the European Sites evaluated in the NIS.

7.6.1.8 Mitigation by Reduction

Good site management practices and construction mitigation measures will be implemented as per the CEMP. However, a number of measures are specific for protecting freshwater habitats (drainage ditches) as detailed below:

BIO CONST 10: Construction will follow guidance from Inland Fisheries Ireland (IFI, 2016) for the protection of aquatic habitats. This will include the erection of a geotextile silt fence (or similar barrier) along the western boundary to prevent the ingress of silt to the drainage ditch. Water leaving the site will pass through an appropriately-sized silt trap or settlement pond so that only silt-free run-off will leave the site.

BIO CONST 11: Dangerous substances, such as oils, fuels etc., will be stored in a bunded zone. Emergency contact numbers for the Local Authority Environment Section, Inland Fisheries Ireland, the Environmental Protection Agency and the National Parks and Wildlife Service will be displayed in a prominent position within the site compound. These agencies will be notified immediately in the event of a pollution incident.

BIO CONST 12: Site personnel will be trained in the importance of preventing pollution and the mitigation measures described here to ensure same.

BIO CONST 13: The site manager will be responsible for the implementation of these measures. They will be inspected on at least a daily basis for the duration of works, and a record of these inspections will be maintained.

BIO CONST 14: The area of the proposed works will be kept to the minimum necessary, including all site clearance works, to minimise disturbance to habitats and flora. In this case, particular care to minimise impact to retained hedgerows is required, with no felling, removal or trimming undertaken other than where required to facilitate essential access and to ensure health and safety of operatives. Where individual trees are to be retained within the development, protected fencing must be erected.

7.6.2 Operational Phase

7.6.2.1 Mitigation by Avoidance / Design

BIO OPER 1: The SUDs strategy as designed shall be implemented on site as it will reduce the impact of the flow of surface water and storm water on the adjacent aquatic environments (drainage ditches).

7.6.2.2 Mitigation by Prevention

BIO OPER 2: The habitats to be retained outside of the development shall be fenced off from the public so that they remain undisturbed for wildlife. These habitats include the proposed new pond, new and existing wet grassland and drainage ditches (the latter will be separated from the development by a boundary wall).

7.6.2.3 Mitigation by Reduction

No mitigation proposed.

7.7 RESIDUAL EFFECTS

While the construction of high-density housing in a semi-rural setting will significantly alter the environment for local wildlife and reduce the naturalness of habitats in the area, with the implementation of the biodiversity enhancement measures detailed in Section 7.5 and the mitigation measures in Section 7.6, the potential impact of the proposed development on the habitats, flora and fauna in the local area will be reduced markedly.

Considering the requirement for greater housing capacity, the expansion of urban areas is inevitable, making certain impacts unavoidable. The impact of urban expansion on wildlife and natural and semi-natural habitats can be lessened. However, using the types of mitigation measures, ecological enhancements, drainage design, and environmentally responsible wastewater management systems which are incorporated into this development.

At a higher level, the implementation and maintenance of responsible urban planning policies such as green wedges, which benefit both wildlife and human health and wellbeing can also reduce the impacts associated with urbanisation. Within the MS a mall green wedge has been proposed south of Phase 5 and together with the hedgerows/treelines to be retained and new hedgerows to be planted, will provide connectivity from within the development to the open countryside and reduce the impact of habitat fragmentation.

Considering these mitigating factors, while also acknowledging the magnitude of the change represented by the alteration of the landscape from a semi-rural to an urban environment, the overall residual impact of the proposed development is considered to be *Permanent* but *Moderate*.

7.7.1 Construction Phase

Tree felling and other site clearance works will take place outside the season of peak nesting activity in birds, or the area will be surveyed by an ecologist to confirm that no protected fauna are present. As a result, there will be no impact on nesting birds, and no legal offence under the Wildlife Act 1976 (as amended).

7.7.1 Operational Phase

Bat-sensitive lighting techniques will be incorporated into the lighting plan to avoid light-spill in areas that are likely to be used by bats. As a result, there should be no significant change in bat activity within the Site.

7.8 MONITORING

7.8.1 Construction Phase

Prior to construction water testing should be conducted to provide baseline information on water quality for the two water courses (drainage ditches) adjacent to the overall site.

Suitably qualified personnel will be appointed by the contractor to monitor the construction process and a daily environmental record will be kept of any accidents, leaks or spills and how they were addressed. In addition, the appointed personnel will also monitor the removal of any of the trees and hedgerows and should any nests or bat roosts be identified then work will cease and the ecologist contacted.

Similarly, if any of the Qualifying Interest species for the European Sites should occupy the site during construction (as detailed in the Stage 2 Appropriate Assessment for NIS Report), then works will cease immediately and the relevant authority (NPWS) will be contacted for advice on proceeding.

7.8.1 Operational Phase

On completion of the construction phase water monitoring of surface water must be completed to determine any changes to water quality as a result of the construction process.
All onsite environmental record sheets will be collated and an environmental report compiled on completion of the construction phase. This report will be made available to LC&CC.

A qualified ecologist will complete a walkover survey of the development site on completion to ensure that all SuDs measures and landscaping measures have been implemented. A report of this survey will be made available to LC&CC.

Subject to the successful implementation of these measures, it can be concluded that the proposed development will not cause any significant negative impacts on designated sites, habitats, legally protected species, or any other features of ecological importance.

7.9 REFERENCES

Aughney, T., Kelleher, C. & Mullen, D. (2008). Bat Survey Guidelines: Traditional Farm Buildings Scheme. The Heritage Council. Kilkenny.

Biodiversity Ireland (2017) Accessed 07/02/2023 [http://maps.biodiversityireland.ie/#/Map]

CIEEM. (2006). Guidelines for Ecological Impact Assessment in the United Kingdom. CIEEM.

CIEEM (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd edition. Chartered Institute of Ecology and Environmental Management, Winchester.

CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal, and Marine. Chartered Institute of Ecology and Environmental Management, Winchester.

Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) 1982.

Curtis, T.G.F. & McGough, H.N. (1988) The Irish Red Data Book 1: Vascular Plants. Stationery Office, Dublin.

DEHLG (2009) Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities. DEHLG, Dublin.

DEHLG (2010). Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities. Revision, February, 2010. Department of the Environment, Heritage and Local Government.

EEC (2019) Habitats Directive. Environment European Commission. Accessed 24/11/2020 https://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm

EPA (2002). Guidelines on the Information to be contained in Environmental Impact Statement, Environment Protection Agency

EPA (2003). Advice Notes on Current Practice (in the preparation of Environmental Impact Statements).

Johnstown Castle Estate, Co. Wexford: EPA.

Fossitt, J. (2000) A Guide to Habitats in Ireland. The Heritage council. Kilkenny.

Gilbert G, Stanbury A and Lewis L (2021), "Birds of Conservation Concern in Ireland 2020 –2026". Irish Birds 9: 523—544.

Hubbard, C.E. (1992) Grasses. A guide to their Structure, Identification, uses and Distribution in the British Isles. Penguin Books. Middlesex.

IUCN (2001) IUCN Red List Categories and Criteria. Version 3.1. IUCN, Gland, Switzerland and Cambridge, UK.

IUCN (2003) Guidelines for application of IUCN Red List criteria at regional levels. Version 3.0. Species Survival Commission. IUCN, Gland, Switzerland and Cambridge, UK.

Jahns, H. M. (1987) Collins Guide to the Ferns Mosses and Lichens of Britain and Northern and Central Europe. Collins. London.

Kingston, N. (2012) Checklist of protected and rare species in Ireland. Unpublished National Parks and Wildlife Service Report.

Law Reform Commission (2000) Planning and Development Act 2020. Law Reform Commission. Dublin.

Limerick City and County Council (2022) Development Plan 2022-2028. LC&CC.

Lynas, P., Newton, S.F., & Robinson, J.A. (2009) The status of birds in Ireland: an analysis of conservation concern 2008-2013. Irish Birds 8:149-166.

Marnell, F., Kingston, N. & Looney, D. (2009) Ireland Red List No. 3 – Terrestrial Mammals. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

Mitchell, A. (2001) Collins Field Guide to Trees of Britain and Northern Europe. Collins London.

NPWS (2012) Conservation Objectives: River Shannon and River Fergus Estuaries SPA 004077. Version 1.0. Department of Arts, Heritage and the Gaeltacht.

NPWS (2013) Site Synopsis Lower River Shannon SAC. Department of Arts, Heritage and the Gaeltacht.

NPWS (2015) Conservation Objective Series, Lower River Shannon SAC 002165. Department of Arts, Heritage and the Gaeltacht.

NPWS (2015) Site Synopsis, River Shannon and River Fergus Estuaries SPA 004077. Department of Arts, Heritage and the Gaeltacht.

NRA (2008). Guidelines for the Crossing of Watercourses during the construction of National Road Schemes. National Roads Authority.

NRA (2008a). Environmental Impact Assessment of National Road Schemes – A practical guide. NRA.

NRA (2009a). Guideline for the Assessment of Ecological Impacts of National Road Schemes, National Roads Authority.

NRA (2009b). Ecological surveying techniques for protected flora and fauna during the planning of National Road Schemes – Version 2.

Sharrock, J.T.R. (1976). *The Atlas of Breeding Birds in Britain and Ireland,* T. & A.D. Poyser, Calton

Smith, G.F., P. O'Donohue, K. O'Hora, E. Delaney (2011) Best Practice Guidance for Habitat Survey and Mapping. The Heritage Council. Kilkenny.

Stace, C. (2005) New Flora of the British Isles. Second Edition. Cambridge University Press. Cambridge.

Parnell, J. and T Curtis (2012) *Webb's An Irish Flora*. Eighth Edition. Cork University Press. Cork.

Wildlife Act (1976) and Wildlife [Amendment] Act 2000. Government of Ireland.

Woods-Ballard, B., Kellagher, R., Martin, P., Jefferies, C., Bray, R. and Shaffer, P. (2007). *The SuDS manual CIRIA C697*. Classic House, 174–180 Old Street, London EC1V 9BP.

Wyse Jackson, M., FitzPatrick, Ú., Cole, E., Jebb, M., McFerran, D., Sheehy Skeffington, M. & Wright, M. (2016) Ireland Red List No. 10: Vascular Plants. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin, Ireland.

CHAPTER EIGHT LAND & SOILS, GEOLOGY AND HYDROGEOLOGY

8.1 INTRODUCTION

This chapter assesses the impact on the geological environment from the proposed development. The objectives of this chapter are to provide a review of baseline geological conditions across the footprint of the site; assess the potential impact of the proposed development on the underlying soils, geology and hydrogeology, provide appropriate mitigation measures for any identified potential impacts, if deemed necessary and consider any reasonable alternatives. Potential impacts from planned future works are also assessed. This chapter also identifies all potential sources of contamination or environmental liability associated with the site.

8.2 ASSESSMENT METHODOLOGY

The assessment was undertaken by undertaking the following:

- A desktop study of soils, subsoils, bedrock and hydrogeology;
- A review of available site investigation data;
- Interpretation of all data and reporting.

The following sources of information were also used in the compilation of this assessment:

- Ordnance Survey of Ireland (OSI) Discovery Series;
- Ordnance survey of Ireland (OSI) online historical maps and aerial photographs;
- GSI On-line Groundwater database;
- Soil Map of Ireland (Second Edition, 1980), national Soil Survey of Ireland, An Foras Talúntais.
- National Parks and Wildlife Service On-line database www.npws.ie;
- OPW Hydro-Data (http://www.opw.ie/hydro-data);
- Met Eireann - Met.ie – monthly climatological data;
- Limerick City and County Council Online Planning Files and County Development Plan;
- Landslides in Ireland. GSI. Irish Landslides Working Group (2006); and,
- Directory of Active Quarries, Pits and Mines in Ireland (3rd Edition) GSI. 2002;

This chapter was undertaken in accordance with the following:

- Planning & Development (Environmental Impact Assessment) Regulations 2018;
- Guidelines on the Information to be Contained in Environmental Impact Statements, 2022;
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (August 2018)
- Geology in Environmental Impact Statements a Guide, (IGI, 2002);
- Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes, TII / NRA Document;
- Guidelines for the preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (IGI, 2013);

- Institute of Geologists Ireland (2002): Geology in Environmental Impact Statements – A Guide;

8.3 RECEIVING ENVIRONMENT

The proposed development site (Phase 3) is part of a phased development proposal for a large greenfield area or Masterplan Site (MS). This MS is divided into seven different phases of delivery as detailed in Table 1.1 in Chapter 1.0 Introduction. The overall MS layout which illustrates the indicative layout of the subject site and adjoining lands in the ownership of the applicant is displayed on Figure 1.0 in Chapter 1.0 and full details of the proposed development phases are given in Chapter 2.0.

The study area takes a holistic approach and examines the wider MS area whilst focusing on any areas of significance within the proposed Phase 3 development site.

8.3.1 Topography

The overall site has a high point of +18.00mAOD (Malin Head) in the north east corner. From here the land falls away to the southeast, south and west. The ground profile falls to a low point of +5.00mAOD (Malin Head) along the southern boundary of the site. The land has typical gradients of 2.3% to the southeast, 2.9% to the south and 7.7% to the west.

Figure 8.1 Site Topographical Survey

8.3.2 Bedrock

GSI geological mapping indicates that the major rock unit group in the wider area is the undifferentiated limestone of Carboniferous (Visean) Age. Two rock outcrops have been identified in geological mapping within the site. These are identified as being of the same undifferentiated limestone of Carboniferous (Visean) Age. No karst features have been mapped in the area. The closest karst feature is approx. 6km to the south.

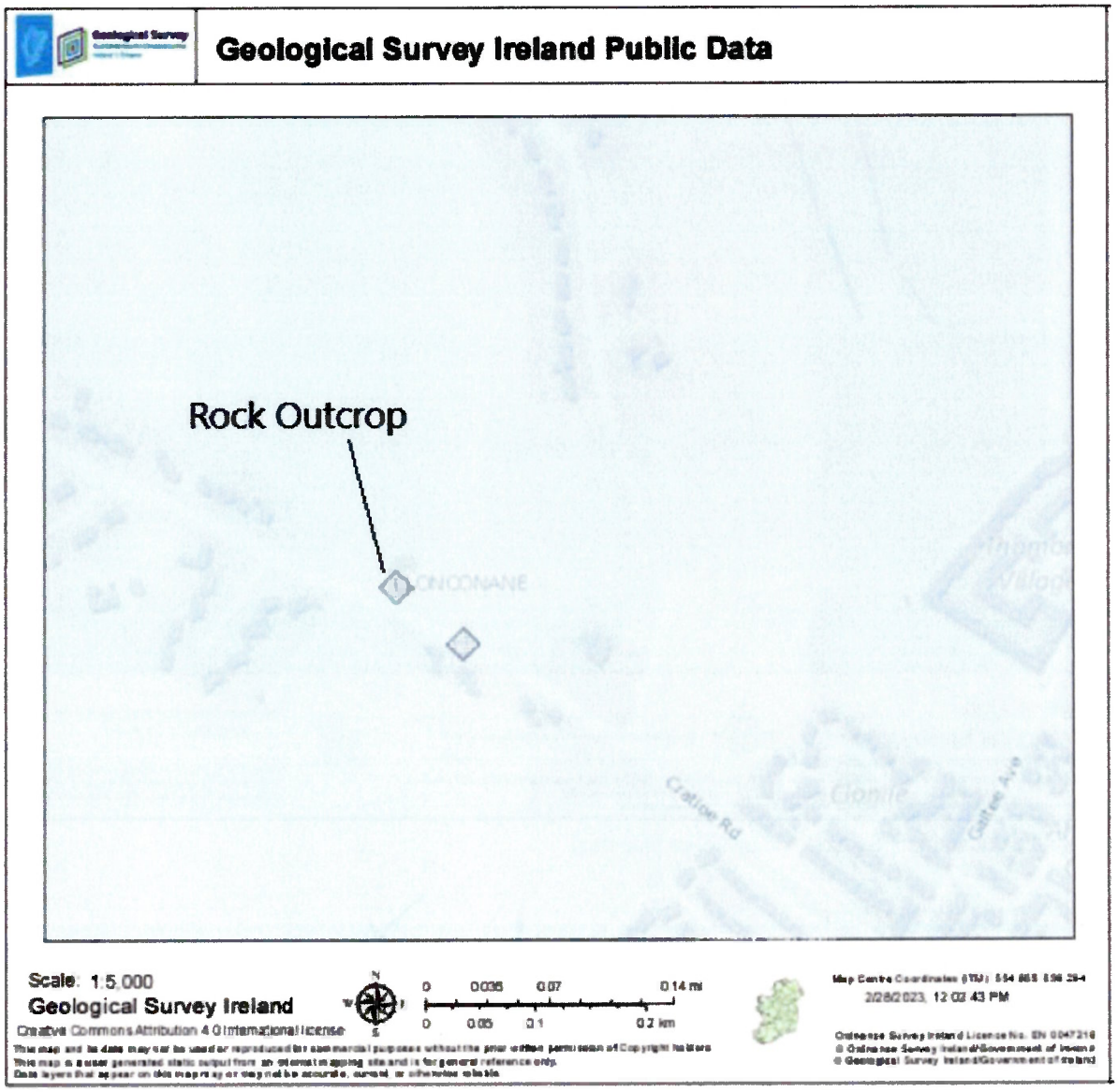


Figure 8.2 Bedrock Geology 100k [GSI Online Mapping]

8.3.3 Soils and Subsoils

GSI geological mapping shows that a significant portion of the site is located above a bedrock outcrop. The periphery of the site and surrounding areas are underlain by glacial till derived from limestones. An underlying layer of estuarine silts and clays encroaches on the southern boundary of the site.

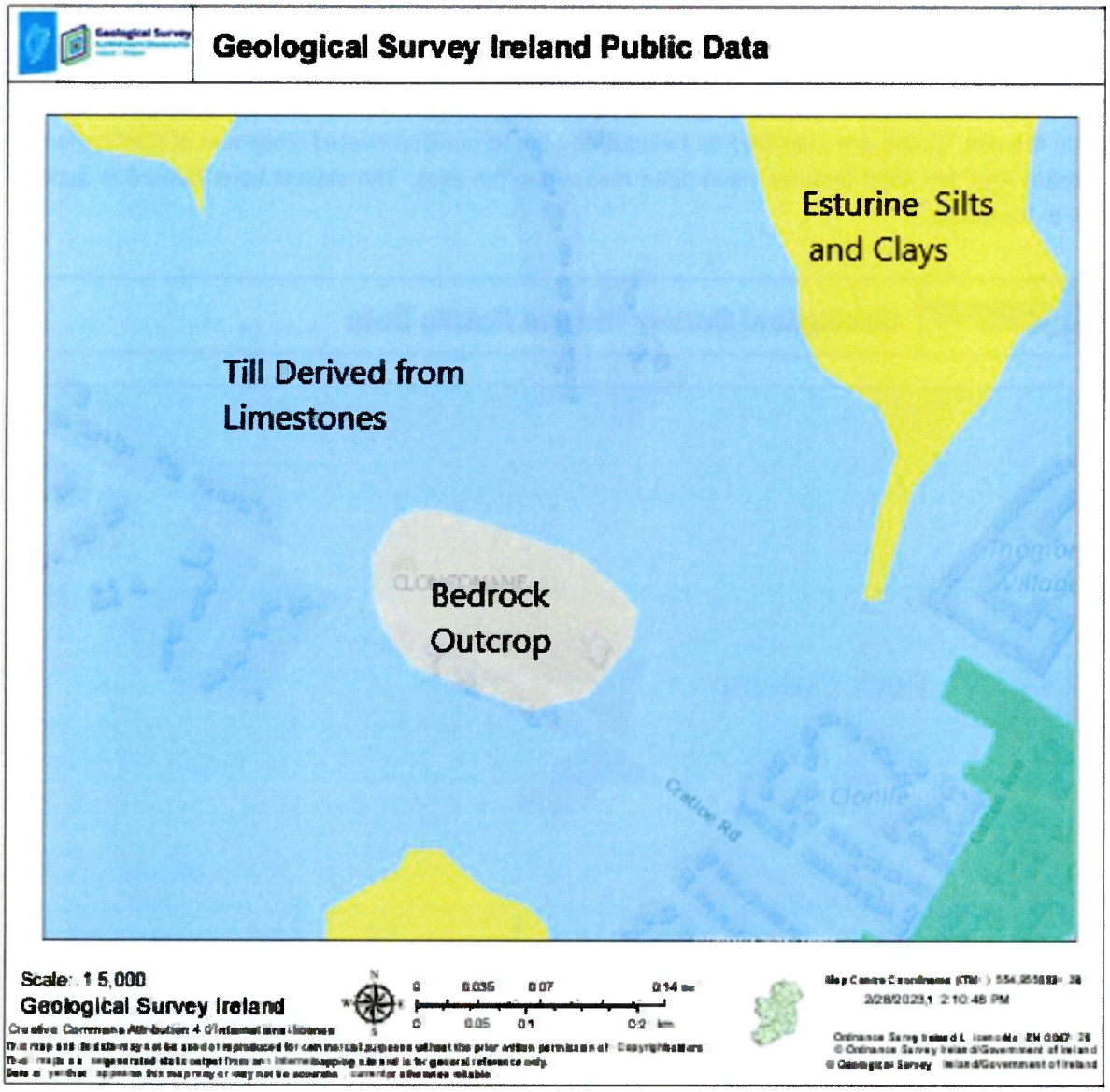


Figure 8.3 Quaternary Sediment [GSI Online Mapping]

8.3.4 Site Investigation

Historic site investigation is available from a large civil engineering project which ran through the area being assessed in this EIAR. The SI pertinent to this site was reviewed in detail below;

- BH01/RC01
  - 300mm – Topsoil
  - 400mm - Dark brown, slightly gravelly slightly sandy clay
  - 3400mm to end of BH – Strong limestone
  - No groundwater encountered
- TP01
  - 550mm – Topsoil
  - Obstruction at 0.55m depth
- TP02
  - 550mm – Silt with many boulders

- Obstruction at 0.55m depth

- TP03
  - 200mm – Topsoil
  - 1100mm - Slightly gravelly sandy clay
  - 600mm - Sandy gravelly silt with some cobbles
  - Obstruction at 1.9m depth
- TP04
  - 225mm – Topsoil
  - 1050mm - Slightly sandy gravelly silt
  - Obstruction at 1.3m depth
- DP01
  - Refusal at 1300mm
- DP02
  - Refusal at 800mm

A generalised summary of ground conditions based on available site investigation is as follows;

- Topsoil 225mm to 550mm thick
- Clay 400mm to 1100mm thick
- Silt 550mm to 1050mm thick
- Limestone rock at 400mm to 1900mm deep

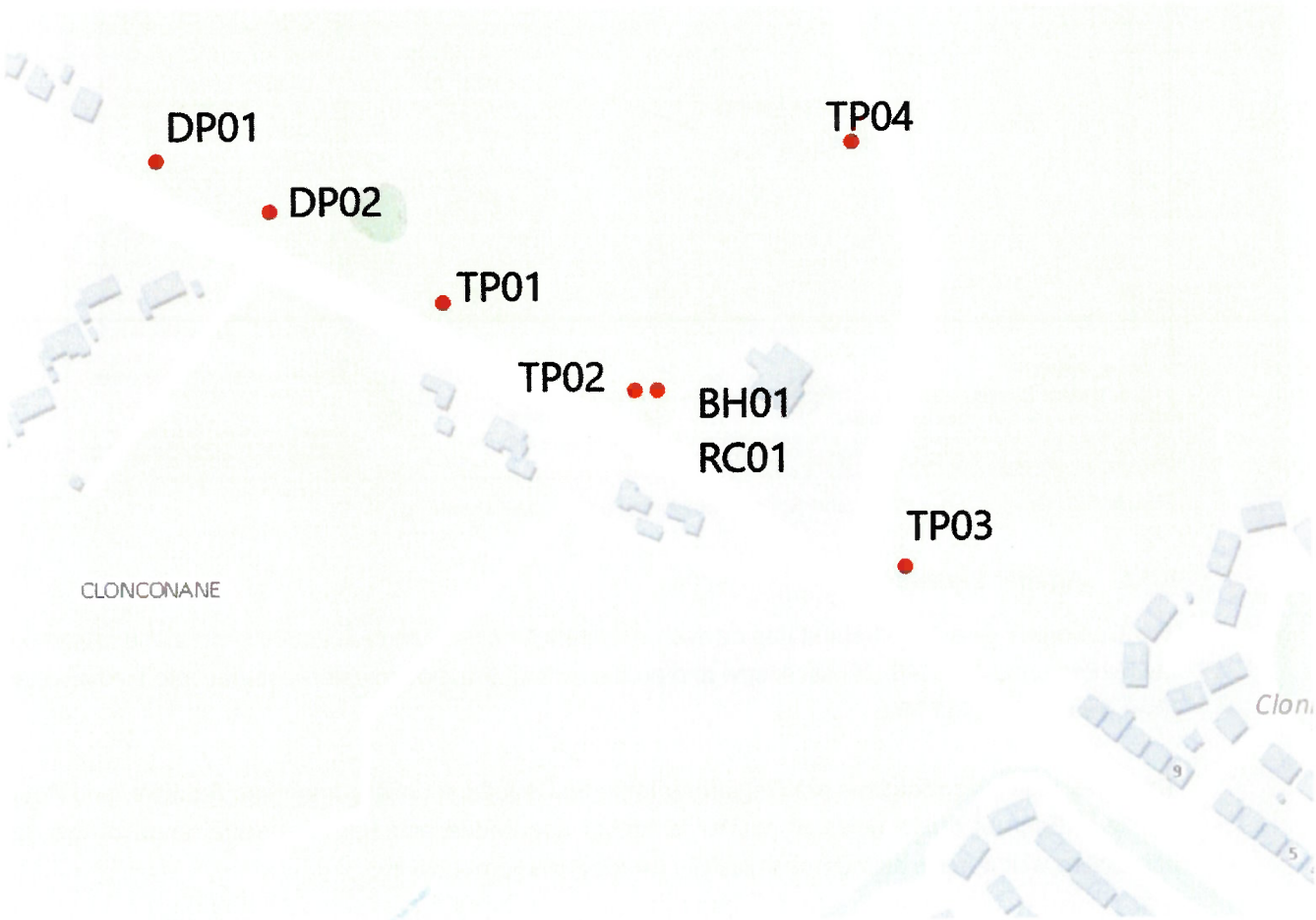


Figure 8.4 Historic SI La

8.3.5 Wells

There is one well identified on GIS records within 1km of the site. This well is located to the southeast at a distance of approx. 450m. The well is likely to be drilled to depths which penetrate the underlying limestone bedrock. The depth of the well is recorded at 6m.

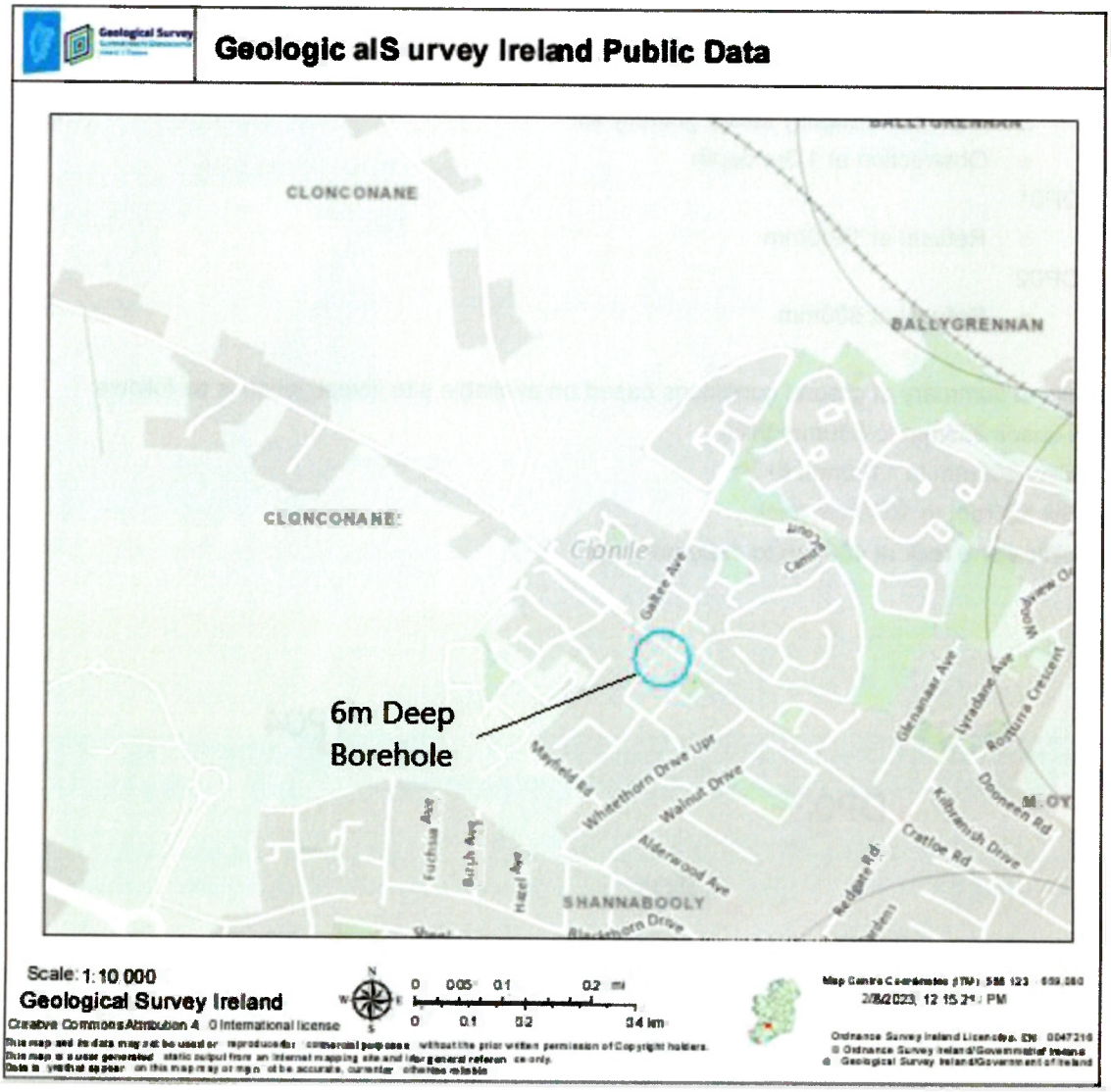


Figure 8.5 Groundwater Wells and Springs Mapping [GSI Online Mapping]

8.3.5 Aquifer Classification

The Geological Survey of Ireland has devised a system for classifying the aquifers in Ireland based on the hydrogeological characteristics, size and productivity of the groundwater resource into the National Draft Bedrock Aquifer Map.

The three main classifications are Regionally Important Aquifers, Locally Important Aquifers, and Poor Aquifers. Each of these types of aquifer is further subdivided and has a specific range of criteria associated with it, such as the transmissivity (m²/day) and productivity.

The development lands are located in an aquifer classified as "Lm": (A Locally Important Aquifer which is generally moderately productive) and both made ground given the previous use as a gold course and areas of moderate permeability subsoil overlain by well drained soil

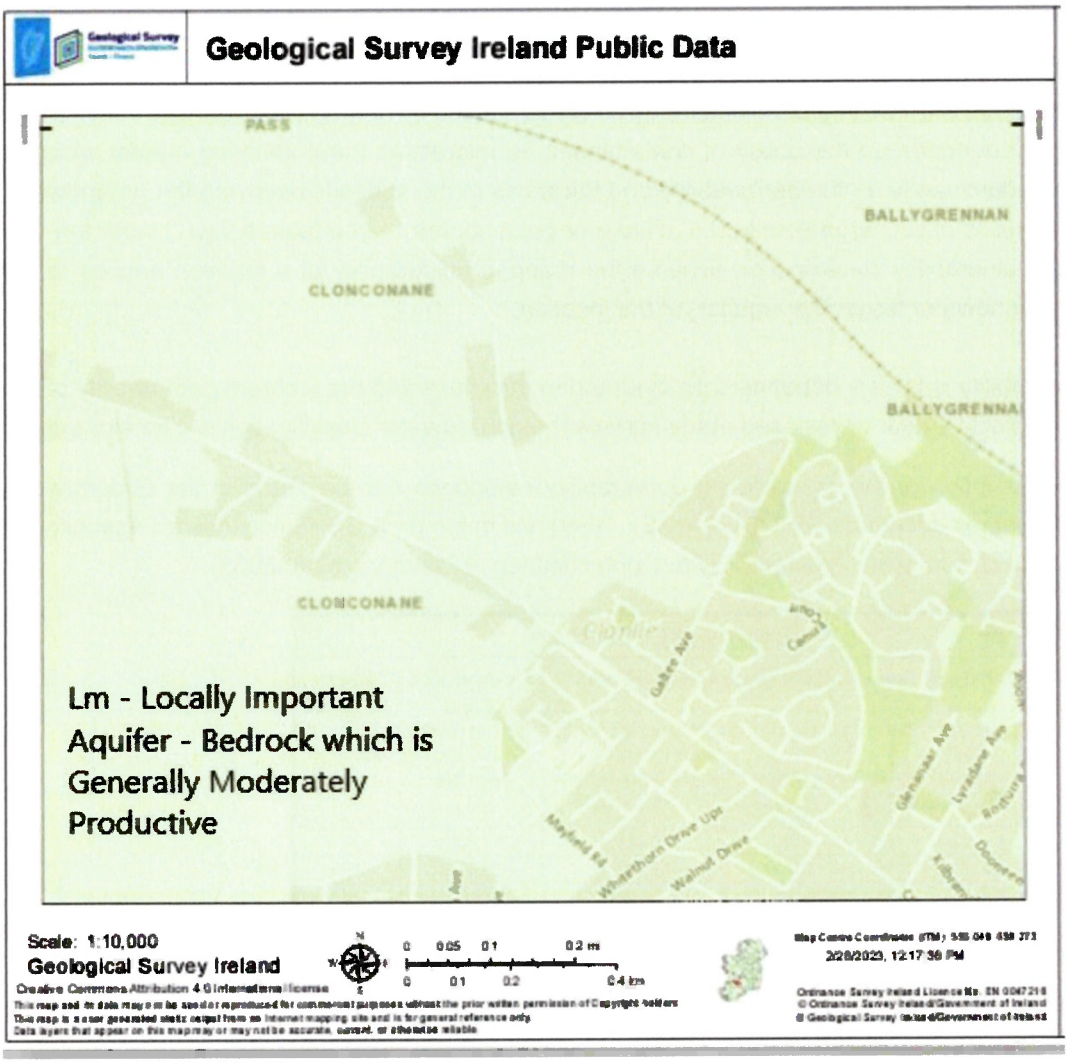


Figure 8.6 Groundwater Resources (Aquifiers)

The Ground Water Body (GWB) is recharged from rainwater percolating through the topsoil and subsoil deposits and directly to the aquifer via outcrop. Regionally, there is no subsoil thickness data currently available to assess this GWB. There is outcropping rock and rock close to surface across the GWB, particularly in the east. The main discharges are to the streams and rivers crossing the GWB, and to the River Shannon that forms the western and southern boundaries of the GWB.

Groundwater levels are generally shallow ranging from near ground level near streams and rivers, up to around 5-15 mbgl away from surface water bodies, depending upon ground elevation. The water table will generally follow the topography. Local groundwater flow will be from the higher ground between surface water bodies to the rivers and streams, where it discharges. Regional groundwater flow directions are generally westwards and southwards to the Shannon, and oblique to the E-W flowing major river within the GWB. Groundwater flow path lengths are on the order of 500–1500m over the bulk of the GWB. In discharge zones, flow paths will be much shorter, at around 100–300m

Groundwater sustains flows in the gaining rivers and streams crossing the GWB. Groundwater will flow into the NHA Inner River Shannon as direct baseflow, and via baseflow to the Crompaun River which flows into the Shannon

8.3.5 Aquifer Vulnerability

The GSI classify aquifer vulnerability as the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities. The vulnerability of groundwater depends on the ability of contaminants to migrate to the underlying aquifer which is dependant predominantly on the permeability and thickness of the subsoils overlying the groundwater body and the types of recharge source (i.e. diffuse or point source) – see table below. Under the GSI groundwater vulnerability classification scheme the mapped vulnerability at a location applies to the shallowest groundwater target (i.e. aquifer) at the location.

Aquifer vulnerability is largely dependent on overburden thickness and the inherent permeability of the bedrock. If bedrock is near or exposed at the surface the groundwater classification will be extreme.

A detailed description of the groundwater vulnerability categories can be found in the Groundwater Protection Schemes document (DELG/EPA/GSI, 1999) and in the draft GSI Guidelines for Assessment and Mapping of Groundwater Vulnerability to Contamination (Fitzsimons et al, 2003).

Vulnerability Rating	Hydrogeological Conditions				
	Subsoil Permeability (Type) and Thickness			Unsaturated Zone	Karst Features
	High permeability (sand/gravel)	Moderate permeability (eg. Sandy subsoil)	Low permeability (e.g. Claycy subsoil, clay, peat)	(Sand/gravel aquifers only)	(<30 m radius)
Extreme (E)	0 - 3.0m	0- 3.0m	0 - 3.0m	0 - 3.0m	-
High(H)	>3 0m	3.0 - 10.0m	3.0 - 5.0m	>3.0m	N/A
Moderate (M)	N/A	>10 0m	5.0- 10.0m	N/A	N/A
Low (L)	NA	N/A	>1 0.0m	N/A	N A

Notes: (1) N/A =not applicable.
(2) Precise permeability values cannot be given at present.
(3) Release point of contaminants is assumed to be 1-2 m below ground surface.

Figure 8.7 Aquifer Vulnerability Rating

Groundwater vulnerability data provided by GIS mapping shows the area to have a moderate to high vulnerability classification. The area of high vulnerability coincides with the bedrock outcrop.

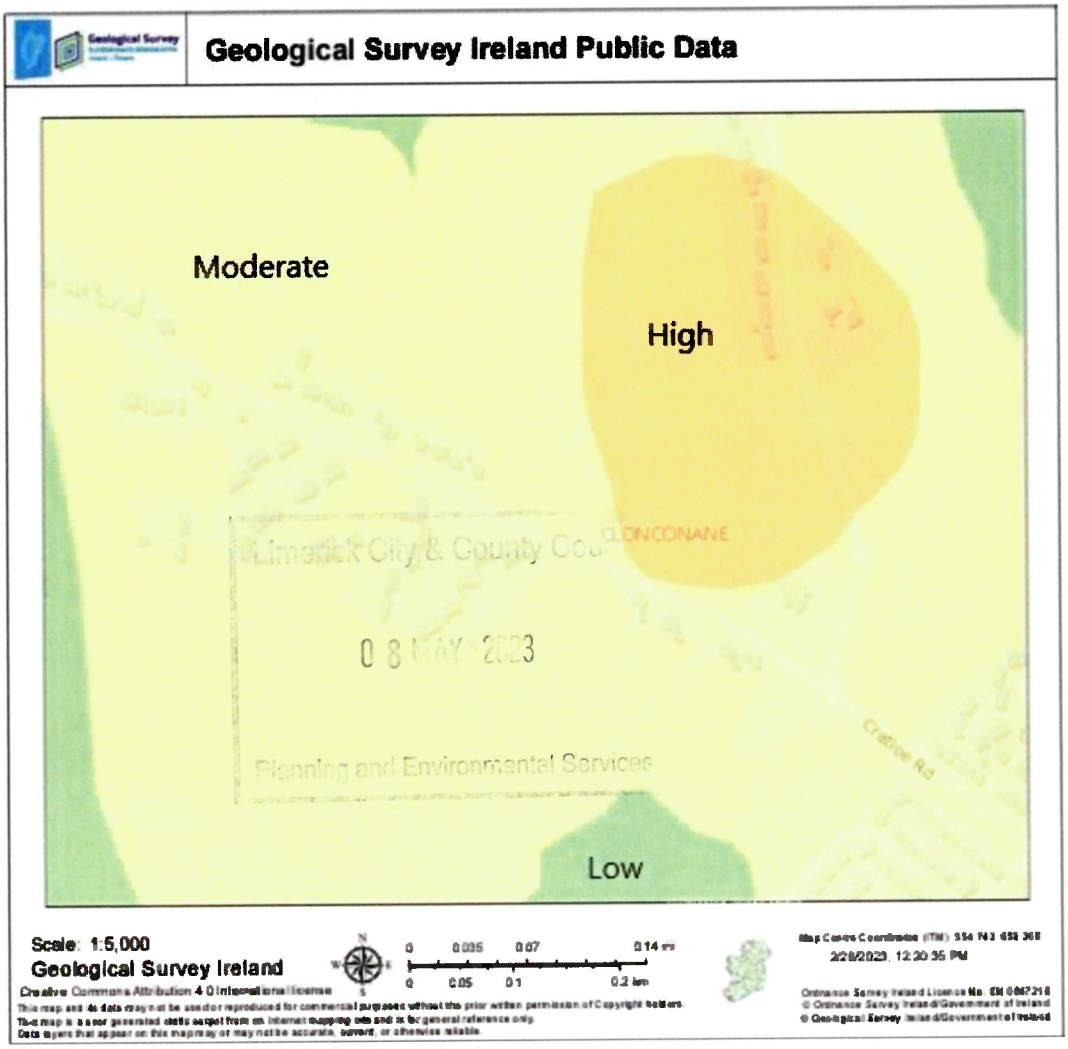


Figure 8.8 Groundwater Vulnerability [GSI Online Mapping]

A review of the subsoil thickness indicates depth to bedrock is generally expected in the range of between 3m and over 10 metres below the land surface. However, as discussed previously bedrock outcropping is to be expected.

8.3.5 Water Framework Directive Groundwater Status

The Water Framework Directive (WFD) classification scheme for water quality includes two status classes: good and poor. The assignment of the status class depends on the ecological and chemical status of the groundwater body.

The underlying groundwater body is the Limerick City Northwest groundwater body (GWB). The relevant European codes is IE_SH_G_140. The groundwater status in this area has been assigned "good" status (Ground Waterbody WFD Status 2016-2021).

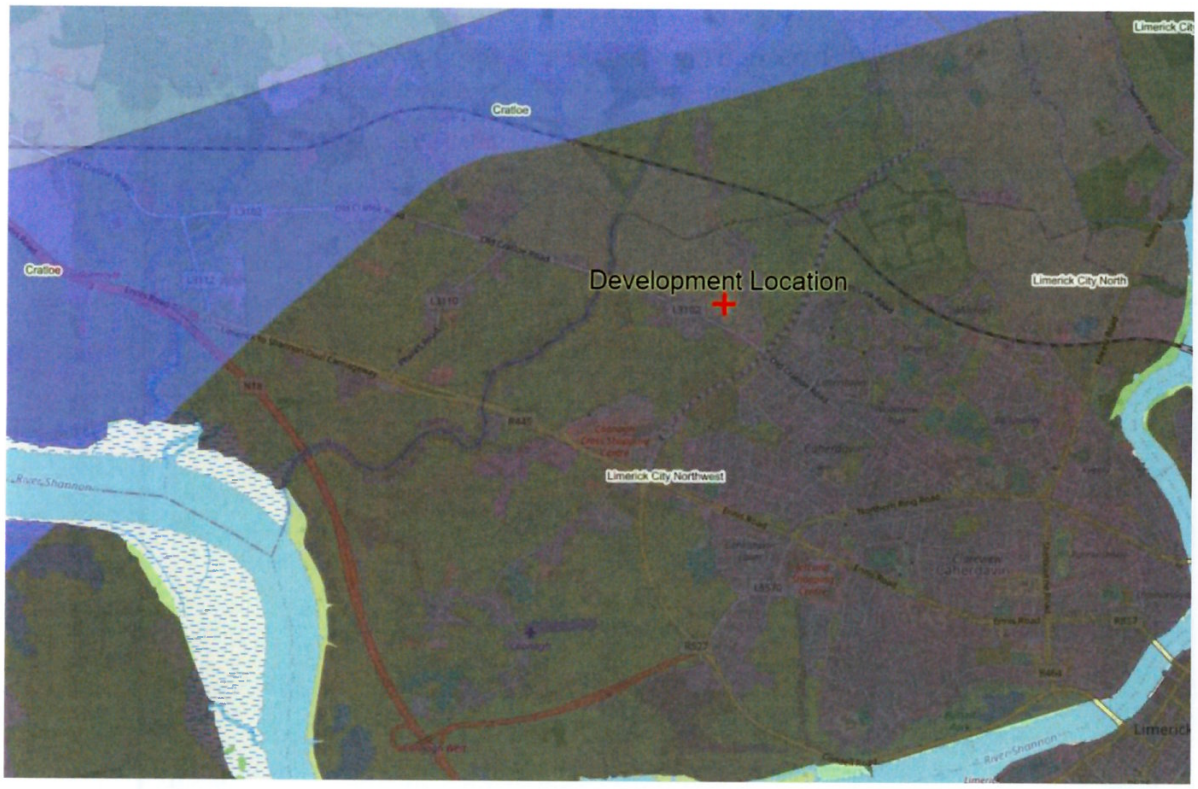


Figure 8.9 Ground Waterbody WFD Status [EPA Online Mapping]

8.3.6 Contamination

EPA online mapping has no recorded waste disposal or contaminated sites located in proximity to the proposed site.

According to the EPA database there are no reported contaminated soil or groundwater issues present at this site.

8.3.7 Designated Protected Areas

The site is not within or directly adjacent to any protected areas. At its nearest point the site is approx. 1.5km North East of the River Shannon and River Fergus Estuaries SPA, the Lower River Shannon SAC and the Fergus Estuary and Inner Shannon, North Shore Proposed NHA.

The Crompaun River lies to the West of the site and this runs into the above mention designated protected areas.

Figure 8.10 Designated Protected Area – [EPA Online Mapping]

8.3.8 Areas of Geological Heritage Importance

GSI mapping shows there is no recorded geological heritage sites in close proximity to the study area. The nearest geological heritage sites are located in Mungret, approximately 10 km to the west. This is a Visean Shelf Limestone Quarry. It is currently classified as a County Geological Site. Adjacent to this site is a road cut excavated through limestone bedrock on the N18 route east of the Limerick Tunnel which is also classified as a County Geological Site.

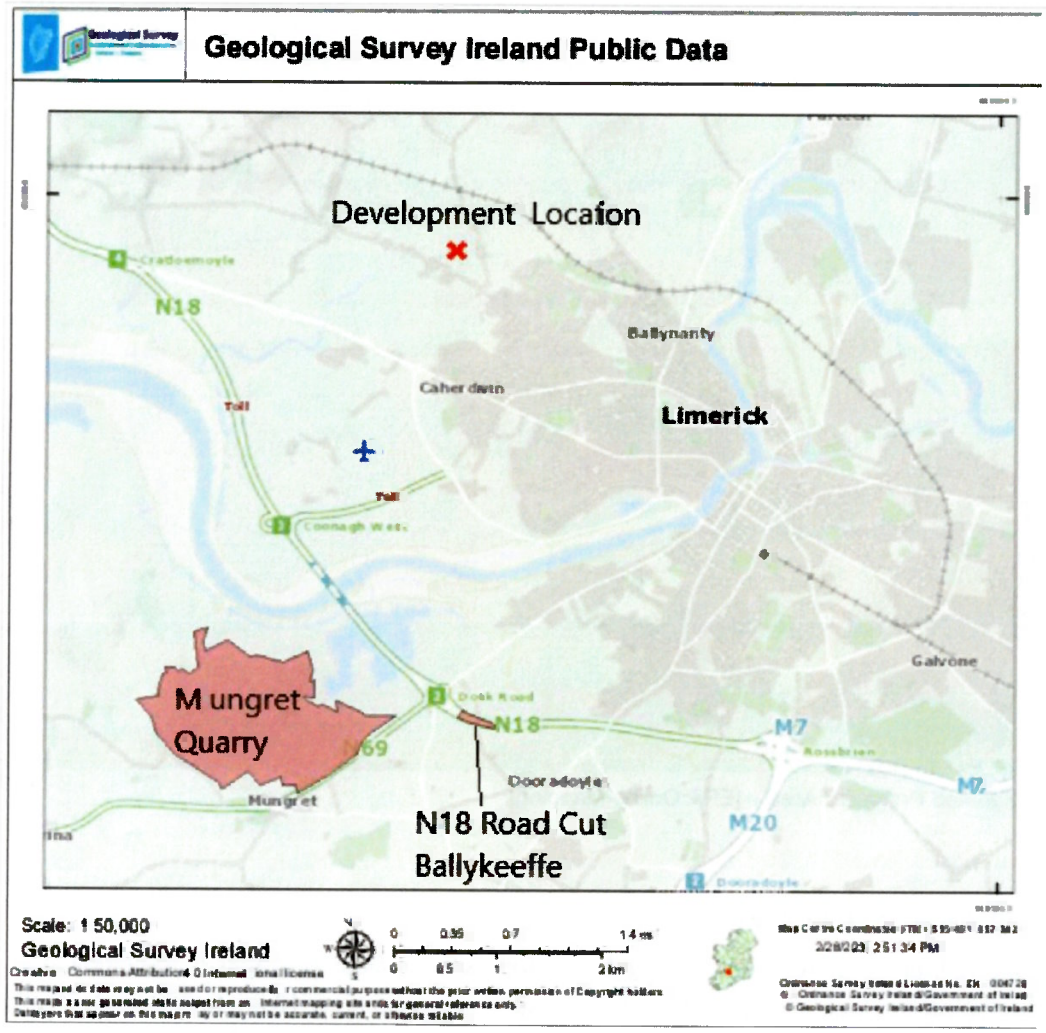


Figure 8.11 Areas of Geological Importance – [GSI Online Mapping]

8.3.9 Radon

EPA radon mapping (pre May 2022) shows a prediction of the number of homes in a given grid square that exceed the national Reference Level. Grid squares in which the predicted percentage of homes is 10% or greater are called High Radon Areas.

Between one and five per cent of the homes in this 10km grid square are estimated to be above the Reference Level

The EPA has issued specific guidelines with respect to underground residential and commercial developments. In relation to the proposed development, following construction the risk of radon impact is considered to be negligible.

8.3.10 Quarries

There are no quarries in the close vicinity of the study area. The nearest quarry is the Bobby O'Connell and Sons Ltd. Crushed Rock Operation at Ardnacrusha approx. 5km to the north of the study area.

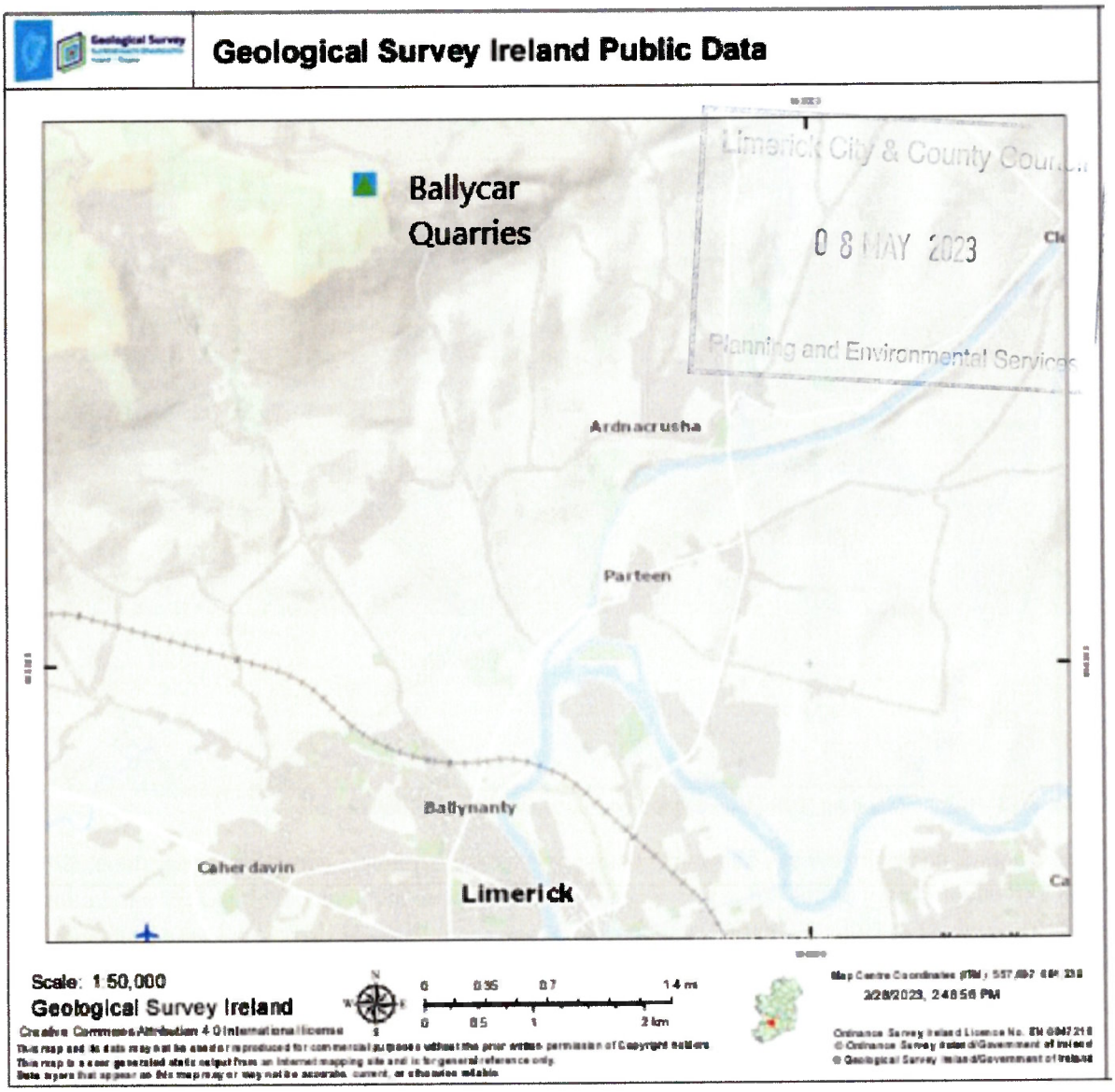


Figure 8.12 Active Quarries [GSI Online Mapping]

8.3.11 Potential Sources of Waste and Contamination

Potential sources of buried waste or contamination were identified and assessed. This report reviewed historical maps and historical activities that reportedly occurred across the site and identified a number of areas requiring further investigation/consideration. These included the following:

There is a historic quarry located in within the lands. This was identified on the OSI 6" last edition map (1829-1841) and 25" map (1897-1913). The location of the quarry correlates with the historical SI which places rock at a shallow depth (TP02 suspected rock at 550mm deep, BH/RC01 rock confirmed at 400mm deep). The quarry does not show up on all historic maps, nor do any of the historical aerial

imagery show any suggestion of quarrying activity at this location. Based on this it can be assumed that the extent of quarrying activity was limited and unlikely to have resulted in large voids that required infilling.

Historic mapping has also shown a pump located within the development. There is no remnant of this well on site. If not appropriately sealed or backfilled, this well may provide a preferential vertical pathway of possible contaminants within the shallow subsoils to the underlying sand and should be appropriately identified and assessed during any redevelopment activities. There is also the potential for the backfilled material to contain contaminants.

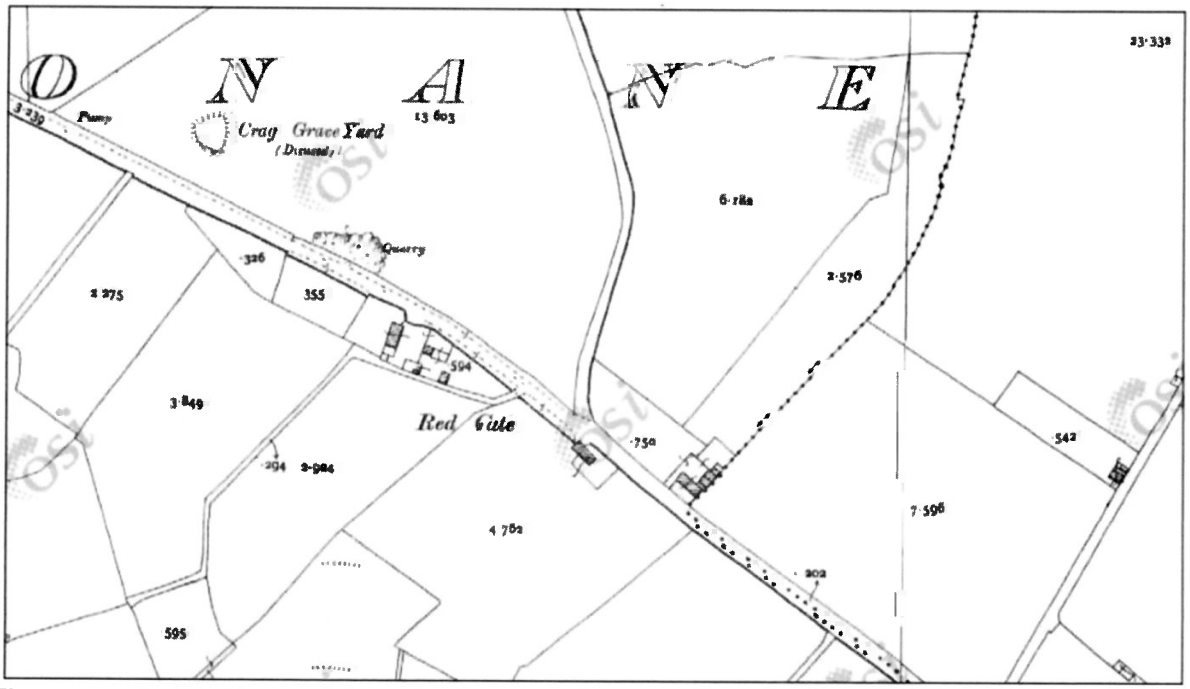


Figure 8.13 Historic Mapping [OSI Online Mapping – Licence CYAL50253692]

Historic aerial imagery of the site show an existing golf course extending across the entire development area. The development of this lands into a golf course may have involved diffing pits for sand bunkers and filling grounds to suite golf course geometries. If any regrading was carried out this would typically not extend into subsoils, except for sand bunkers which would be localised pits. These lands have been subsequently farmed and as such the bunkers and greenways have been ploughed / infilled. Materials imported for the golf course would be limited to sand.

Figure 8.14 Historic Aerial Imagery [OSI Online Mapping – Licence CYAL50253692]

8.4 DESCRIPTION OF EFFECTS

Seven different 'Delivery Phases' of development, as detailed in Chapter 1.0, are proposed to effectively deliver the overall indicative masterplan. This application relates to Phase 3 (98 no. units) as detailed in Chapter 1.0 and 2.0 of this EIAR. Whilst seven different phases are proposed at this point in time, the reality is that some of the phases could be fast-tracked such that two phases advance in construction together. This, however, is very much dependent on market conditions and the specific requirements of contractors. In any case, should different phases cumulatively progress together, the overall impacts are unlikely to be different.

In order to ensure an effective and conclusive environmental assessment consistent with best practise, the assessment of potential effects on the environment also examines the collective cumulative effects of the overall development if all seven development phases, as detailed in Chapter 1.0, were implemented. The examination of the 'all phase' development scenario is consistent with best practice in order to examine a 'worst-case' scenario of the project effects.

8.4.1 Construction Effects

No.	Construction Activity	Attribute	Character of Likely Impact
1.	Excavation Works	Bedrock	Within the development lands bedrock has been identified at shallow depths. This is particularly true along the route of the Old Cratloe Road where depths were confirmed by available site investigation information and a bedrock outcrop is identified within GSI mapping. In order to achieve finished levels and foundation depths, bedrock removal will be required. Therefore, groundworks will likely have an impact on the top of the bedrock within localised sections of the site especially where cut is required to achieve finished levels. The proposed development ie. house levels, road levels, drainage, etc. will naturally follow the existing contours. This will limit in so far as possible the extent of groundworks and bedrock excavation required.
		Site Subsoils	Extensive stripping and wide-scale excavation of soils and sub-soils to prepare and construct the development are proposed. Excavated soils suitable for re-use will be stockpiled on-site and used for backfilling or drainage purposes. This will reduce the total volume of imported material being brought onto site. It is anticipated that the impact on soils arising from the construction phase will be short-term and slight. It is noted that the site would have been subject to regrading works during the construction of the golf course and subsequent farming practices.
		Groundwater	The removal of topsoil and localised excavations across the site will potentially increase the vulnerability of the underlying groundwater aquifer especially given the high level of bedrock present within the site which will be exposed during construction cut and fill works.
2.	Excavation Works leading to soil erosion	Site Subsoils	Earthworks and the removal of topsoil would expose subsoil layers to the effects of weathering and may result in the erosion of soil, particularly in times of adverse weather conditions.
3.	Construction works	Geomorphology	It is considered that the proposed construction works would have minor effects on the geomorphology of the area, as the development would not materially change the local slopes and topography.
4.	Fuel storage/usage on site Fuel storage/usage on site	Subsoils Future Site Users	Accidental spillage of contaminants during construction works may cause short to long term, moderate to significant impacts to subsoils and to future site users if not stored and used in a an environmentally safe manner. This could have an impact on groundwater in particular due to the groundwater vulnerability status.
		Groundwater	
5.	Construction Traffic	Subsoils Future Site Users	There may be a risk of soil and groundwater pollution from site traffic through the accidental release of oils, fuels and other contaminants from vehicles. This could
		Groundwater	

No.	Construction Activity	Attribute	Character of Likely Impact
			have an impact on groundwater in particular due to the groundwater vulnerability status.
6.	Contaminated land/buried waste undetected	Subsoils	Based on historic mapping there is evidence that some sections may comprise of made ground material, eg. Gold sand bunkers and quarry. Asbestos and other contaminants within the existing filled material must be considered a possibility however unlikely.
		Groundwater	Disturbance and release of potential pollutants within the subsurface during site works. This could have an impact on groundwater in particular due to the groundwater vulnerability status.
7.	Contaminated Infill	Subsoils Future Site Users	The importation of unsuitable or contaminated fill material for the purpose of reinstatement works or access roads may pose a risk to the surrounding subsoils and/or to future site user and may pose a risk to groundwater in particular due to the groundwater vulnerability status. The importation of unsuitable or contaminated fill material for the purpose of reinstatement works or access roads
		Ground Water	
8.	Waste Arisings	Subsoils	Waste material generated from construction activities may require disposal off-site if not suitable for reuse on site. Temporary storage on site may be required and impacts to exposed subsoils and groundwater from possible contaminated direct runoff during rainfall events may occur
		Groundwater	
9.	Vandalism	Subsoils Future Site Users	Pollution due to vandalism of stores or plant poses a risk to subsoils and groundwater, groundwater in particular due to the groundwater vulnerability status, and to future site users.
		Groundwater	
10.	Hydrocarbon laden surface water runoff from roads, carparks and general hardstanding	Subsoils	Road surface runoff and poorly designed drainage system being channelled to subsoils before infiltrating to groundwater can result in contamination of the surrounding subsoils.
		Groundwater	
11.	Concrete Wash Water	Groundwater	It is not anticipate that significant concrete wash water will be generated on site. However, inappropriate disposal or uncontrolled runoff of wash water from concrete trucks or wash down facilities has the potential to impact on the quality of the underlying aquifer.

No.	Construction Activity	Attribute	Character of Likely Impact
12.	Excava tion Dewatering Works	Groundwater	Given the high level of bedrock anticipated, the development site works and excavation proposals may intersect the underlying aquifer during the construction phase. Localised dewatering for local groundwater flow from is to be anticipated

8.4.2 Operational Effects

No.	Activity	Attribute	Character of Potential Impact
1	Hydrocarbon laden surface water runoff from roads, carparks and general hardstanding	Subsoils	Road surface runoff and poorly designed drainage system being channelled to subsoils before infiltrating to groundwater can result in contamination of the surrounding subsoils and groundwater.
		Ground Water	
2	Reduction in groundwater replenishment.	Groundwater	The total site area will be developed. There is significant green areas which will continue to percolate rainwater into the ground. Surface water drainage will be based on the principles of SUD's which promotes infiltration of groundwater into the soil without compromise of the underl ying aquafer.

8.5 LIKELIHOOD OF SIGNIFICANT EFFECTS

8.5.4 'Do-Nothing'Effects

If the proposed development did not proceed, based on existing site investigation data to-date, there would be no impact on the underlying soils or hydrogeology. It is envisaged that the land use would remain unchanged as a greenfield site for agricultural use.

8.5.1 Construction Effects

No.	Construction Activity	Attribute	Importance of Attribute	Magnitude of Potential Impact	Significance of Potential Impact
1.	Excavation Works	Bedrock	Medium	Small Adverse	Slight
2.	Excavation Works	Site Subsoils	Medium	Moderate Adverse	Moderate
3.	Excavation Works	Ground Water	Medium	Moderate Adverse	Moderate

No.	Construction Activity	Attribute	Importance of Attribute	Magnitude of Potential Impact	Significance of Potential Impact
4.	Excavation Works leading to soil erosion	Site Subsoils	Medium	Small Adverse	Slight
5.	Construction works	Geomorphology	Medium	Small Adverse	Slight
6.	Fuel storage/usage on site	Subsoils Future Site Users	Medium	Small Adverse	Slight
7.	Fuel storage/usage on site	Groundwater	Medium	Small Adverse	Slight
8.	Construction Traffic	Subsoils Future Site Users	Medium	Small Adverse	Slight
9.	Construction Traffic	Groundwater	Medium	Small Adverse	Slight
10.	Contaminated land/buried waste undetected	Subsoils	Medium	Small Adverse	Slight
11.	Contaminated land/buried waste undetected	Groundwater	Medium	Small Adverse	Slight
12.	Contaminated Infill	Subsoils Future Site Users	Medium	Moderate Adverse	Moderate
13.	Contaminated Infill	Groundwater	Medium	Moderate Adverse	Moderate
14.	Waste Arisings	Subsoils	Medium	Moderate Adverse	Moderate
15.	Waste Arisings	Groundwater	Medium	Moderate Adverse	Moderate
16.	Vandalism	Subsoils Future Site Users	Medium	Small Adverse	Slight
17.	Vandalism	Groundwater	Medium	Small Adverse	Slight
18.	Hydrocarbon laden surface water runoff from roads, carparks and general hardstanding	Subsoils	Medium	Small Adverse	Slight

No.	Construction Activity	Attribute	Importance of Attribute	Magnitude of Potential Impact	Significance of Potential Impact
19.	Hydrocarbon laden surface water runoff from roads, carparks and general hardstandin g	Groundwater	Medium	Small Adverse	Slight
20.	Concrete Wash Water	Groundwater	Medium	Small Adverse	Slight
21.	Excavation Dewatering Works	Groundwater	Medium	Moderate Adverse	Moderate

8.5.2 Operational Effects

No.	Activity	Attribute	Importance of Attribute	Magnitude of Potential Impact	Significance of Potential Impact
1	Hydrocarbon laden surface water runoff from roads, carparks and general hardstanding	Subsoils	Medium	Small Adverse	Slight
2		Groundwater	Medium	Small Adverse	Slight
2	Reduction in groundwater replenishment	Groundwater	Medium	Small Adverse	Slight

8.5.3 Cumulative Effects

The proposed development comprises a phase of the overall development of the applicant's landholding at this location. An examination of the potential for other projects to contribute cumulatively to the impacts from the proposed development was undertaken during the preparation of this EIAR. The cumulative assessment has regard to the entirety of the masterplan site.

Given the scale of the proposed development and the capacity of the surrounding environment to accommodate a development of this nature and size, it is considered that the overall cumulative Masterplan development will have a slight and long term impact on the underlying land, soil, geology and hydrogeology, through the construction of additional buildings, infrastructure and hardstanding required for the development.

Potential impacts on subsoils, water sources and human health may occur should unexpected buried waste or contaminated material be encountered or discharged to ground during the redevelopment

works. However, provided sufficient mitigation measures are in place, as required under this EIAR, the overall impact on the site and regional geology will be slight to imperceptible.

The proposed development does need to be considered in conjunction with the works currently underway, delivering the proposed Coonagh to Knockalisheen Distributor Project. This infrastructure project secured consent from An Bord Pleanála in 2021 and was subject to the preparation of an EIAR and Environmental Impact Assessment. This new infrastructure will provide greater connectivity to existing services and facilities in the area.

8.6 REMEDIAL & MITIGATION MEASURES

8.6.1 Construction Phase

8.6.1.1 Mitigation by Avoidance / Design

L & S CONST 1: Where feasible, the extent of excavation works and depths for dwellings and roads shall be limited through design to minimise disturbance of the original soil, subsoil formations and bedrock and to retain soil structure. This will also help to reduce the volumes of backfill and material to be removed off-site.

L & S CONST 2: Asbestos and other contaminants within any filled material must be considered a possibility. This should be investigated prior to the commencement of development works and suitable mitigation measures (including special environmental and human health contingency plans and procedures, following best-practice guidance) for the unexpected discovery of contaminated land or illegally deposited waste materials shall be developed and implemented as part of a detailed risk assessment under the direction of a contaminated land consultant / hydrogeologist.

L & S CONST 3: Detailed plans to deal with the possibility of encountering contaminated land / materials during construction shall be developed and included within an overall Construction Environmental Management Plan (CEMP) to be approved in advance of the commencement of development works by Limerick City and County Council. In the event that contamination is encountered, the approved plans shall be adhered to at all times by relevant contractors and subcontractors.

L & S CONST 4: Monitoring prior to, during and post construction works of groundwater quality shall be undertaken to ensure minimum disturbance of water quality in the general vicinity of the site. During the construction phase, the monitoring programme shall include daily checks, weekly inspections and monthly audits to ensure compliance with the Construction and Demolition Waste Management Plan (CDWMP) and the CEMP. This shall be undertaken in consultation with Limerick City and County Council

L & S CONST 5: All waste containers (including all ancillary equipment such as vent pipes and refueling hoses) shall be stored within a secondary containment system (e.g. a bund for static tanks or a drip tray for mobile stores and drums). The bunds shall be capable of storing 110% of the tank capacity. Where more than one tank is stored, the bund shall be capable of holding 110% of the largest tank or 25% of the aggregate capacity (whichever is greater). Drip trays used for drum storage shall be capable of holding at least 25% of the drum capacity. Where more than one drum is stored the drip tray shall be

capable of holding 25% of the aggregate capacity of the drums stored. Spill kits shall be kept in these areas in the event of spillages.

L & S CONST 6: All imported soils and stones shall be sourced from a licenced / permitted facility with suitable documentation to confirm the material is inert and fit for purpose.

8.6.1.2 Mitigation by Prevention

L & S CONST 7: Suitable runoff and sediment control measures shall be designed and implemented prior to and during construction activities. These control measures depend upon weather conditions, site characteristics and construction activities and will ensure protection to the underlying subsoils and groundwater aquifer.

L & S CONST 8: Waste fuels and materials shall be stored in designated areas that are isolated from surface water drains or open waters (e.g. excavations). Skips shall be closed or covered to prevent materials being blown or washed away and to reduce the likelihood of contaminated water leakage. Hazardous wastes such as waste oil, chemicals and preservatives, shall be stored in sealed containers and kept separate from other waste materials while awaiting collection by a registered waste carrier. Fueling, lubrication and storage areas and site offices shall not be located within 25m of drainage ditches, surface waters or open excavations. Fuel Interceptor tanks shall be installed on the site to treat any runoff.

L & S CONST 9: All construction vehicles, plant and machinery shall be maintained on a weekly basis and checked daily to ensure any damage or leakages are corrected. Precautions shall be taken to avoid spillages, including:

- Supervision of deliveries and refuelling activities;
- Use of secondary containment e.g. bunds around oil storage tanks;
- Use of drip trays around mobile plant; and
- Designating and using specific impermeable refuelling areas isolated from surface water drains.

L & S CONST 10: All potentially hazardous materials shall be securely stored on site.

L & S CONST 11: Adequate security measures shall be installed on the construction site. Early assessment of sensitivities and risks will assist in the design of the site layout and security measures required. Security measures shall include secure fencing, secure site access, securing plant and equipment, secure storage of materials, sufficient warning signage and security lighting.

L & S CONST 12: The construction phase shall be monitored in relation to:

- Prevention of oil and diesel spillages;
- Adequate runoff control of potential stockpiles of contaminated subsoil;
- Protection of topsoil stockpiled for re-use;
- cleanliness of the adjoining road network.

L & S CONST 13: Soils shall be reused on site where possible. Chemical analysis will be carried out to assess whether the backfill material is inert or presents a risk to human and / or environmental receptors. Suitable soil disposal routes and waste soil receiving facilities shall be determined and incorporated into the Construction & Demolition Waste Management Plan (C&DWMP) for the works.

L & S CONST 14: Excavated materials shall be visually assessed for signs of contamination. Should material appear to be contaminated or potentially contaminated, samples shall be analysed by an appropriate testing laboratory. Contaminated material shall be treated in accordance with the Waste Management Regulations. All excess fill and material considered unacceptable for reuse on site in terms of the residual risk posed to human health and to the environment shall be appropriately disposed of in accordance with the Waste Management Regulations.

8.6.1.3 Mitigation by Reduction

L & S CONST 15: Surplus subsoil arisings caused by excavations for foundations, roads and drainage shall be minimised and where necessary, stockpiled and taken off-site to a licensed landfill facility. Any topsoil that is removed shall be used for re-grading at a later stage.

L & S CONST 16: Top-soiling and landscaping of the works shall be undertaken as soon as finished levels are achieved, in order to reduce weathering and erosion and to retain soil properties. Existing topsoil shall be retained on site to be used for the proposed development

L & S CONST 17: Reusable excavated gravels, sands or rock shall be retained on-site for backfilling or drainage purposes to reduce the total volume of imported material.

L & S CONST 18: Wheel wash facilities shall be provided close to the site entrance to reduce the deposition of mud, soils and other substances on the surrounding road network.

8.6.2 Operational Phase

8.6.2.1 Mitigation by Avoidance / Design

L & S OPER 1: An appropriately designed drainage system has been incorporated into the design of the proposed development. The system has been designed in accordance with accordance with the Greater Dublin Strategic Drainage Study (GDSDS), the CIRIA SUDS Manual 2015 and Recommendations for Site Development Works for Housing Areas published by the Department of the Environment and Local Government. It involves ensuring that suitable protection measures of runoff infiltration to ground including permeable paving, gullies and catch pits, lined attenuation structures and oil-water interceptors are provided. The design takes into consideration the groundwater vulnerability rating and all surface water SUDS features within 1m of the bedrock will be wrapped with impermeable geotextile to prevent potentially contaminated water entering the aquifer.

8.6.2.2 Mitigation by Prevention

No mitigation measures are considered necessary during the operational phase of development if all mitigation measures listed within Section 8.6.1 of this Chapter are implemented.

8.6.2.3 Mitigation by Reduction

No mitigation measures are considered necessary during the operational phase of development if all mitigation measures listed within Section 8.6.1 of this Chapter are implemented.

8.7 RESIDUAL EFFECTS

8.7.1 Construction Phase

No.	Construction Activity	Attribute	Significance of Potential Impact Prior to Mitigation	Significance of Potential Impact with Mitigation
1.	Excavation Works	Bedrock	Slight	Imperceptible
2.	Excavation Works	Site Subsoils	Moderate	Slight
3.	Excavation Works	Ground Water	Moderate	Slight
4.	Excavation Works leading to soil erosion	Site Subsoils	Slight	Imperceptible
5.	Construction works	Geomorphology	Slight	Imperceptible
6.	Fuel storage/usage on site	Subsoils Future Site Users	Slight	Imperceptible
7.	Fuel storage/usage on site	Groundwater	Slight	Imperceptible
8.	Construction Traffic	Subsoils Future Site Users	Slight	Imperceptible
9.	Construction Traffic	Groundwater	Slight	Imperceptible
10.	Contaminated land/buried waste undetected	Subsoils	Slight	Imperceptible
11.	Contaminated land/buried waste undetected	Groundwater	Slight	Imperceptible
12.	Contaminated Infill	Subsoils Future Site Users	Moderate	Slight
13.	Contaminated Infill	Groundwater	Moderate	Slight
14.	Waste Arisings	Subsoils	Moderate	Slight
15.	Waste Arisings	Groundwater	Moderate	Slight

No.	Construction Activity	Attribute	Significance of Potential Impact Prior to Mitigation	Significance of Potential Impact with Mitigation
16.	Vandalism	Subsoils Future Site Users	Slight	Imperceptible
17.	Vandalism	Groundwater	Slight	Imperceptible
18.	Hydrocarbon laden surface water runoff from roads, carparks and general hardstanding	Subsoils	Slight	Imperceptible
19.	Hydrocarbon laden surface water runoff from roads, carparks and general hardstanding	Groundwater	Slight	Imperceptible
20.	Concrete Wash Water	Groundwater	Slight	Imperceptible
21.	Excavation Dewatering Works	Groundwater	Moderate	Slight

8.7.1 Operational Phase

No.	Operational Activity	Attribute	Significance of Potential Impact Prior to Mitigation	Significance of Potential Impact with Mitigation
1	Hydrocarbon laden surface water runoff from roads, carparks and general hardstanding	Subsoils	Slight	Slight
2		Groundwater	Slight	Slight
2	Reduction in groundwater replenishment	Groundwater	Slight	Slight

8.8 MONITORING

8.8.1 Construction Phase

Site investigations to be undertaken as part of the pre-construction development works will include trial holes, boreholes, core holes, contamination testing of spoils and water and infiltration tests.

Soil removed during the construction phase is to be monitored to maximise potential for re-use on site. Monitoring of any hazardous material stored on-site will form part of the proposed Construction & Waste Management Plan. A dust management/monitoring programme should be implemented during the construction phase of the development. The quantities of topsoil and subsoil removed off site will be recorded.

8.8.1 Operational Phase

The ongoing monitoring and maintenance of surface water treatment features such as petrol interceptors, gullies, and catch pit manholes

8.9 REFERENCES

TII Design Manual for Roads and Bridges

Radon Map of Ireland - http://www.epa.ie/radiation/radonmap/

Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions, May 2009, EC DG XI Environment, Nuclear Safety & Civil Protection Ref: NE80328/D1/3

Guidelines on the information to be contained in Environmental Impact Statements (EPA, 2002),

Geology in Environmental Impact Statements a Guide, (IGI, 2002),

Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes, NRA Document.

Guidelines for the preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (IGI, 2013),

Draft EPA revised Guidelines on information to be contained in Environmental Impact Statements; and Advice Notes for preparing EIS, 2015.

Environmental Protection Agency, Ireland (EPA) Geoportal (Online)

Geological Survey Ireland Map Viewer (Online)

CHAPTER NINE HYDROLOGY – SURFACE WATER & FLOODING

9.1 INTRODUCTION

This chapter of the Environmental Impact Assessment Report (EIAR) covers the hydrological assessment of the proposed development. The assessment will cover all natural water bodies including surface freshwater (streams, bogs, ponds, rivers and lakes) which may be affected by the proposed development. Potential impacts from planned future works are also assessed. This chapter also identifies all potential sources of contamination or environmental liability associated with the site.

9.2 ASSESSMENT METHODOLOGY

The assessment of the potential impact of the proposed development on the water bodies was carried out according to the methodology specified by the EPA and the specific criteria set out in the Guidelines on the Information to be Contained in Environmental Impact Statements, 2022, EIA Directive 2014/EU/52, Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (EPA 2003), Planning & Development (Environmental Impact Assessment) Regulations 2018, Guidance for Consent Authorities Regarding Sub-Threshold Development (DoEHLG 2003), Development Management Guidelines (DoEHLG, 2007) and Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (August 2018).

Information was assembled from the following sources:

- Site Walk-over
- Geological Survey of Ireland (GSI) online maps and databases
- CFRAMS Flood Mapping from OPW
- EPA online maps and databases
- OSI data map information
- Topographical Survey
- The Drainage Design Report prepared by Garland
- Local Authority record drawings
- Multi-discipline consultation with other design team members
- Ordnance Survey of Ireland, Discovery Series
- Ordnance survey of Ireland (OSI) online historical maps and aerial photographs
- Geology Maps Geological Survey of Ireland (GSI) (1:100,000)
- GSI On-line Groundwater database. Aquifer Classification, Aquifer Vulnerability, Teagasc Soil Classification
- http://www.gsi.ie/Programmes/Groundwater/Groundwater+web+mapping.htm
- http://www.gsi.ie/Old+Mapping.htm#gsi;
- GSI Limerick City East Groundwater Body (GWB)
- Soil Map of Ireland (Second Edition, 1980), National Soil Survey of Ireland, An Foras Talúntais
- National Parks and Wildlife Service On-line database www.npws.ie
- EPA Online Water Quality Mapping; http://www.epa.ie/rivermap

- OPW Hydro-Data (http://www.opw.ie/hydro-data)
- Met Eireann - Met.ie – monthly climatological data;

9.3 RECEIVING ENVIRONMENT

The proposed development site (Phase 3) is part of a phased development proposal for a large greenfield area or Masterplan Site (MS). This MS is divided into seven different phases of delivery as detailed in Table 1.1 in Chapter 1.0 Introduction. The overall MS layout which illustrates the indicative layout of the subject site and adjoining lands in the ownership of the applicant is displayed on Figure 1.0 in Chapter 1.0 and full details of the proposed development phases are given in Chapter 2.0.

The study area takes a holistic approach and examines the wider MS area whilst focusing on any areas of significance within the proposed Phase 3 development site.

9.3.1 Topography

The overall site has a high point of +18.00mAOD in the north east corner. From here the land falls away to the Southeast, South and West. The ground profile falls to a low point of +5.00mAOD along the southern boundary of the site. The land has typical gradients of 2.3% to the southeast, 2.9% to the south and 7.7% to the west.

Figure 9.1 Site Topographical Survey

9.3.2 River Catchments

The following section will provide a general description of river catchments identified within the study area.

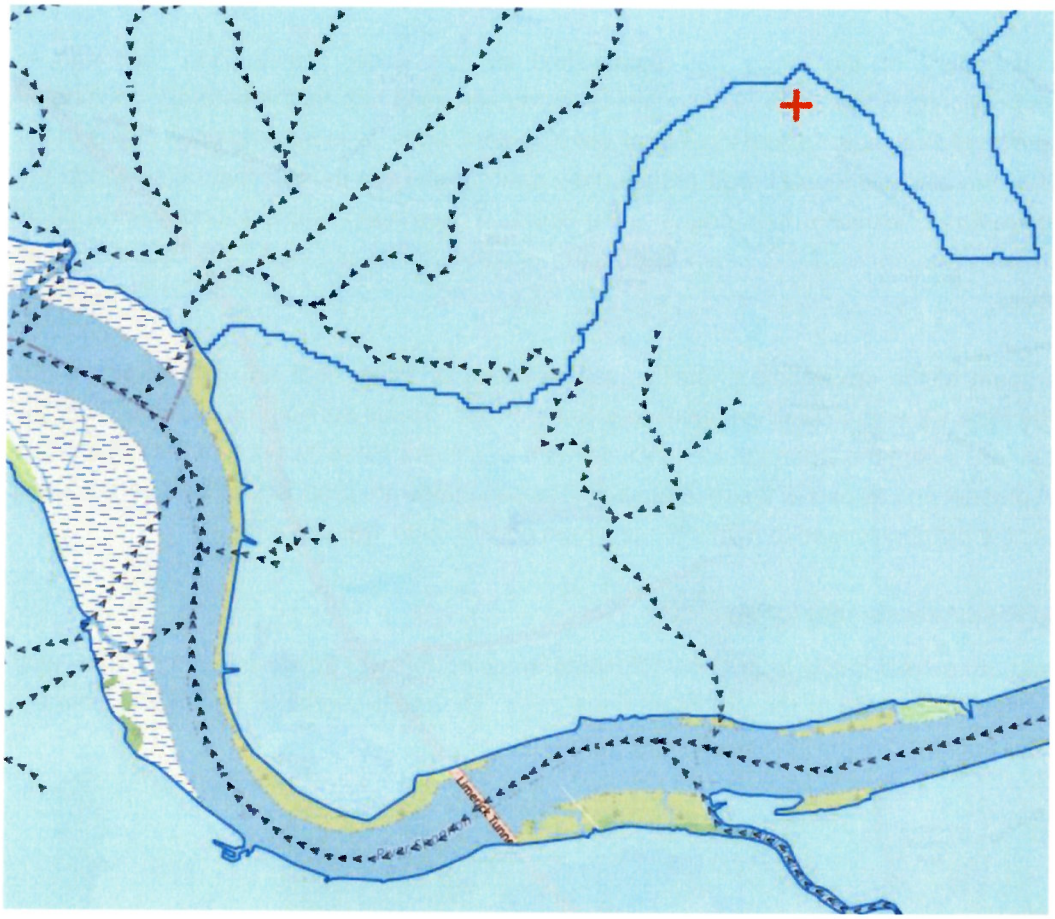


Figure 9.2 River Catchment Mapping (EPA Online Mapping)

9.3.2.1 River Shannon

The proposed development lies within the North Ballycannan sub-basin. This has an area of 27km² and the closest identified drainage path is located approx. 1km from the site. This area is a sub-divide of the Lower Shannon catchment (Hydrometric Area 25) which feeds directly into the River Shannon. The Lower Shannon catchment covers an area of 1,041km². The catchment is characterised by flat limestone plains.

It is anticipated that surface water from the proposed development will flow into the River Shannon via the North Ballycannan surface water drainage network.

9.3.2.2 River Crompaun East

The proposed development lies outside of the Crompaun East sub-basin however it is within approx. 200m of its defined boundary and should be considered as part of this EIAR. The Crompaun East sub-basin has an area of 18km² and feeds directly into the Crompaun River which is a tributary of the River Shannon. The Crompaun East sub-basin is a sub-divide of the Shannon North catchment (Hydrometric Area 27).

9.3.2.2 Watercourses (Open Land Drains)

The western boundary of the lands contains a watercourse (an open land drain) which services over 60% of the development lands. This drain flows to the north where it connects to an OPW maintained channel reference C7/2 that flows to the West.

The eastern boundary of the lands has established by the under construction Coonagh to Knockalisheen Distributor Road. This road construction and new road has cut the naturally draining off the eastern section of the lands, 15% of the overall development lands, from existing open drains to the east. As part of the aforementioned road project, new open drains are being constructed which will drain the lands to further existing open drains to the North. These open drains will connect to OPW maintained channel reference C7/2/3 which flows north into the aforementioned C7/2 Channel which flows to the West.

Lands to the south of the development land contain a series of drains that are collected by OPW maintained channels C2 and C7/5 which discharge to the West. These service remaining 25% of the development lands. Again the Coonagh to Knockalisheen Distributor Road has cut off the natural flow of the lands at present and as part of the road project, these channels are proposed to be diverted along and under the new distributor road to mimic the pre-road construction drainainge flows.

9.3.3 Flood Risk Assessment (FRA)

As can be seen the extract below from OPW CFRAMs mapping for river flooding in a 1 in 1000 year chance, the lands are outside of the predicted flood zone. The main source of flooding is from the Crompaun River and not directly from the River Shannon.

Figure 9.3 CFRAM River Flood Extents Present Day – 1 in 1000 year (Floodinfo.ie)

Furthermore, the extract below from OPW CFRAMs mapping for coastal flooding in a 1 in 1000 year chance. As can be seen, flooding extends to the southern boundary of the development lands. From the topographical survey it was noted that the southern boundary forms a natural low-point for the development and has a general level of +5.00mAOD.

Figure 9.4 CFRAM Coastal Flood Extents Present Day – 1 in 1000 year (Floodinfo.ie)

Based on the OPW CFRAMs Map the lands are located outside Flood Risk Zones A and B, therefore located in Flood Risk Zone C and have been zoned for residential on this basis.

The flood risk from the North of the site is from flooding of The Crompaum (River) flowing from the North as well as from a stream flowing East to West. The 1 in 1000 year coastal and fluvial flood levels in this area are at 2.90m and 2.15m respectively.

The flood risk from the West is from the Crompaum (River) where the modelled 1 in 1000 year coastal and fluvial flood level in this area is 4.72m and 3.05m respectively. The flood risk from the South is again from the Crompaum (River) where the 1 in 1000 year coastal and fluvial flood levels in this area are at 2.90m and 3.03m respectively.

Existing site levels within the development lands are between 5.0m and 18.0 m AOD.

9.3.4 Surface Water Quality

The EPA carries out river quality monitoring and maintains historic records of the results. Rivers are provided with biotic indices (Q values) to reflect average water quality. These are defined as follow;

Q Value*	WFD Status	Pollution Status	Condition**
Q5, Q4-5	High	Unpolluted	Satisfactory
Q4	Good	Unpolluted	Satisfactory
Q3-4	Moderate	Slightly polluted	Unsatisfactory
Q3, Q2-3	Poor	Moderately polluted	Unsatisfactory
Q2, Q1-2, Q1	Bad	Seriously polluted	Unsatisfactory

Table 9.1 EPA River Quality Surveys Biological Classification

9.3.4.1 River Shannon

The River Shannon Lower at the closest monitoring point (25S01) has a current Q value of 3-4.

StationCode	1972	1976	1984	1987	1990	1993	1996	1999	2002	2008	2011	2012	2014	2015	2017	2018	2021
RS25S011960			4-5														
RS25S012010			4-5														
RS25S012030		4-5	4														
RS25S012050			4														
RS25S012060										3-4	4		4		3-4		3-4
RS25S012110			4														
RS25S012300			4														
RS25S012500	4-5		4	4	4	3-4	3-4	3-4	4	3-4		3-4		3-4		3-4	3
RS25S012600			4	4	4	3-4	3-4	3-4	3-4								

Table 9.2 EPA Biological Quality Rating - Shannon (Lower) 25S01

9.3.4.2 River Crompaun

The River Crompaun East at the closest monitoring point (27C09) has a current Q value of 3.

StationCode	1988	1991	1998	2001	2005	2007	2011	2013	2014	2016	2019	2022
RS 27C090300	4-5		4-5	4	4-5				4	3-4	3-4	3-4
RS27C090400		5										
RS 27C090500	5											
RS27C090600	4-5	4-5	4-5	3-4	4	4	3-4	3-4		3	3	3

Table 9.3 EPA Biological Quality Rating - Crompaun East 27C09

There are no water supply abstraction points from either river downstream of the study area.

9.3.5 Proposed Surface Water Drainage

A detailed surface water drainage proposal has been prepared by Garland Consulting Engineers for the lands. Surface water runoff rate is controlled to the greenfield runoff rate. The greenfield runoff rate was determined as the greater of 2 l/s/ha or Qbar as specified in the Limerick Development Plan. The proposal contains Sustainable Urban Drainage Solutions (SUDs) which includes tree pits, bioretention areas and permeable paving and asphalt surfaces. The resulting surface water from the development discharges to a series of stone based infiltration and attenuation areas to promote treatment and infiltration to ground to mimic the natural surface water discharge from the site. Outfall from stone infiltration systems discharges to existing swales or open drains. The surface water from the development is treated via propriety treatment systems to remove containments prior to discharge.

9.4 DESCRIPTION OF EFFECTS

9.4.1 Construction Effects

No.	Construction Activity	Attribute	Character of Likely Impact
1.	Excavation Activities	Surface Water	The removal of topsoil and localised excavations across the site will potentially increase the vulnerability of open streams and downstream channels and rivers including River Crompaun East and River Shannon.
2.	Excavation Dewatering Works	Surface Water	No impact on the streams or Rivers is anticipated and therefore the risk is considered to be imperceptible.
3.	Fuel storage/usage on site	Surface Water	Open streams, downstream channels and rivers including River Crompaun East and River Shannon are located adjacent to and downstream of the site which could lead to direct overland run-off of fuel or oils to same, especially during runoff from rainfall events
4.	Waste Arisings	Surface Water	Contaminated waste material generated from construction activities may require disposal off-site if not suitable for reuse on site. Temporary storage on site may be required and impacts to surface water courses from direct runoff during rainfall events may occur.
5.	Contaminated land/buried waste	Surface Water	Based upon a visual inspection and the results of the site investigation undertaken to date there is no evidence to indicate the presence of contaminated ground within the site. However there remains a risk posed by any potential buried waste or contaminated material within the subsurface when disturbed by construction works which could lead to runoff to surface waters.
6.	Vandalism	Surface Water	Pollution due to vandalism of stores or plant poses a risk to potential run-off to surface waters.

No.	Construction Activity	Attribute	Character of Likely Impact
7.	Contaminated imported fill	Surface Water	The importation of unsuitable or contaminated fill material for the purpose of reinstatement works or the site access roads may also pose a risk to potential run-off to surface waters.
8.	Construction Works	Surface Water	There may be a risk of surface water pollution through the accidental release of oils, fuels and other contaminants from vehicles.
9.	Concrete Wash Water	Surface Water	Inappropriate disposal or uncontrolled runoff of wash water from concrete trucks or wash down facilities has the potential to impact onrun-off from the site as surface water.

9.4.2 Operational Effects

No.	Activity	Attribute	Character of Potential Impact
1.	Hydrocarbon laden surface water runoff from roads, carparks and general hardstanding	Surface Water	Road surface runoff and poorly designed drainage system being directly channelled to groundwater can result in contamination of the groundwater aquifer. Accidental spillages could contaminate Surface water. All runoff will be discharged to the public mains through Class 1 Bypass Interceptors
2.	Increased surface water flow to the open streams, channels and Rivers which could lead to flooding.	Surface Water	The risk posed to the existing streams and Rivers by increased surface water discharge from the site. The development will include flow control and SUDS measures.
3.	Wastewater Disposal	Surface Water	All foul water is proposed to be discharged to mains sewer network with no discharge to surface waters or ground waters.
4.	Contaminated land / waste	Future Site Users Surface Water	The potential for contamination not found or caused during the

No.	Activity	Attribute	Character of Potential Impact
			construction stage which would remain within the lands leading to pollution.

9.5 LIKELIHOOD OF SIGNIFICANT EFFECTS

9.5.4 'Do-Nothing' Effects

If the proposed development did not proceed, there would be no impact on the hydrology of the area. It is envisaged that the land use would remain unchanged as a greenfield site.

9.5.1 Construction Effects

No.	Construction Activity	Attribute	Importance of Attribute	Magnitude of Potential Impact	Significance of Potential Impact
1.	Excavation Activities	Surface Water	Extremely High	Small Adverse	Significant
2.	Excavation Dewatering Works	Surface Water	Extremely High	Negligible	Imperceptible
3.	Fuel storage/usage on site	Surface Water	Extremely High	Small Adverse	Significant
4.	Waste Arisings	Surface Water	Extremely High	Small Adverse	Significant
5.	Contaminated land/buried waste	Surface Water	Extremely High	Small Adverse	Significant
6.	Vandilism	Surface Water	Extremely High	Small Adverse	Significant
7.	Contaminated imported fill	Surface Water	Extremely High	Small Adverse	Significant
8.	Construction Works	Surface Water	Extremely High	Small Adverse	Significant
9.	Concrete Wash Water	Surface Water	Extremely High	Small Adverse	Significant

9.5.2 Operational Effects

No.	Operational Activity	Attribute	Importance of Attribute	Magnitude of Potential Impact	Significance of Potential Impact
1.	Hydrocarbon laden surface water runoff from roads, carparks and general hardstanding	Surface Water	Extremely High	Small Adverse	Significant
2.	I ncreasedsurface water flow to the open streams, channels and Rivers which could lead to flooding.	Surface Water	Extremely High	Small Adverse	Significant
3.	Wastewater Disposal	Surface Water	Extremely High	Small Adverse	Significant
4.	Contaminated land / waste	Future Site Users Surface Water	Extremely High	Small Adverse	Significant

9.5.3 Cumulative Effects

The proposed development comprises a phase of the overall development of the applicant's landholding at this location. An examination of the potential for other projects to contribute cumulatively to the impacts from the proposed development was undertaken during the preparation of this EIAR. The cumulative assessment has regard to the entirety of the masterplan site.

Given the scale of the proposed development and the capacity of the surrounding environment to accommodate a development of this nature and size, it is considered that the overall cumulative Masterplan development will have an imperceptible and long term impact on the surrounding hydrology through the construction of additional buildings, infrastructure and hardstanding required for the development.

Potential impacts on water sources and human health may occur should unexpected buried waste or contaminated material be encountered or discharged to surface water during the redevelopment works. However, provided sufficient mitigation measures are in place, as required under this EIAR, the overall impact on the site and regional hydrology will be slight to imperceptible.

The proposed development does need to be considered in conjunction with the works currently underway, delivering the proposed Coonagh to Knockalisheen Distributor Project. This infrastructure project secured consent from An Bord Pleanála in 2021 and was subject to the preparation of an EIAR

and Environmental Impact Assessment. This new infrastructure will provide greater connectivity to existing services and facilities in the area.

9.6 REMEDIAL & MITIGATION MEASURES

9.6.1 Construction Phase

9.6.1.1 Mitigation by Avoidance / Design

HYDROLOGY CONST 1: Back-up plans to deal with the possibility of contamination or fuel spills, *e.g.* pumping of wells or sumps to collect contaminated groundwater for treatment shall be undertaken and included in an overall Construction & Demolition Waste Management Plan (C&DWMP) and Emergency Operation Plan (EOP).

HYDROLOGY CONST 2: Special environmental and human health contingency plans and procedures, following best-practice guidance, shall be developed for the unexpected discovery of contaminated or illegally deposited waste materials. These may include a detailed environmental site investigation, contamination delineation, risk assessment and appropriate remediation under the design and supervision of an experienced contaminated land engineer/hydrogeologist.

HYDROLOGY CONST 3: Chemical analysis will be carried out to assess whether any fill material presents a risk to human and/ or environmental receptors and to determine a suitable on-site or off-site disposal routes.

HYDROLOGY CONST 4: All imported fill material will be sourced from approved and licenced/permitted facilities. All fill material will be confirmed to be inert prior to importation to the site including confirmation of the chemical testing and a visual assessment.

9.6.1.2 Mitigation by Prevention

HYDROLOGY CONST 5: All waste containers (including all ancillary equipment such as vent pipes and refuelling hoses) shall be stored within a secondary containment system (*e.g.* a bund for static tanks or a drip tray for mobile stores and drums). The bunds shall be capable of storing 110% of the tank capacity. Where more than one tank is stored, the bund shall be capable of holding 110% of the largest tank of 25% of the aggregate capacity (whichever is greater). Drip trays used for drum storage shall be capable of holding at least 25% of the drum capacity. Where more than one drum is stored the drip tray shall be capable of holding 25% of the aggregate capacity of the drums stored.

HYDROLOGY CONST 6: Silt fencing and berms will be installed strategically around and through the site. The location of the silt fencing and berms will be determined in the construction stage C&DWMP and will be subject to a detailed assessment of the planned works methodology and works area. The purpose of the silt fencing and berms are to prevent silt laden water leaving the site and entering adjoining lands and surface waters.

HYDROLOGY CONST 7: Drainage ditches will be installed to intercept surface water where there is a risk of significant water flow into excavations, adjoining lands or watercourses. A lined attenuation pit shall be constructed at the lowest point to capture any surface water at this point. There will also be a

requirement to periodically pump water from excavations. All collected and pumped water will have to be treated prior to discharge. The run-off will be directed through appropriately sized settlement ponds or tanks to remove suspended solids.

HYDROLOGY CONST 8: Monitoring prior to, during and post construction works of surface water and groundwater quality shall be undertaken to ensure minimum disturbance of water quality in the general vicinity of the site. During the construction phase, the monitoring programme will include daily checks, weekly inspections and monthly audits to ensure compliance with the Construction Environmental Management Plan. This will be undertaken in consultation with the wishes of Limerick City & County Council.

HYDROLOGY CONST 9: Waste fuels and materials shall be stored in designated areas that are isolated from surface water drains or open waters (*e.g.* excavations). Skips will be closed or covered to prevent materials being blown or washed away and to reduce the likelihood of contaminated water leakage. Hazardous wastes such as waste oil, chemicals and preservatives, will be stored in sealed containers and kept separate from other waste materials while awaiting collection by a registered waste carrier. Fuelling, lubrication and storage areas and site offices will not be located within 50m of drainage ditches, surface waters or open excavations. Fuel interceptor tanks will be installed on the site to treat any runoff.

HYDROLOGY CONST 10: Wash-out areas on site will be located greater than 50m from any natural watercourse and properly designed with an impermeable liner to contain all cement laden water. No wash-out of ready-mix concrete vehicles shall be located within 10 metres of any temporary or permanent drainage features. Signage shall be erected to clearly identify the wash-out areas. Sufficient wash-out areas shall be provided to cater for all vehicles at peak delivery times.

HYDROLOGY CONST 11: All waste material (both soils and other) generated will be temporarily stored in secure bunded areas thereby preventing the migration of leachate or contaminating substances from impacting on the surrounding environment.

HYDROLOGY CONST 12: Adequate security measures shall be installed on the construction site the design of the construction site layout and security measures required will take account of the sensitivity of the project and potential locations at risk. Security measures will include secure fencing, secure site access, securing site plant and equipment, secure storage of materials, sufficient warning signage, and security lighting.

HYDROLOGY CONST 13: All construction vehicles, plant and machinery shall be maintained on a weekly basis and checked daily to ensure any damage or leakages are corrected. Precautions shall be taken to avoid spillages, including:

- Supervision of deliveries and refuelling activities;
- Use of secondary containment e.g. bunds around oil storage tanks;
- Use of drip trays around mobile plant; and
- Designating and using specific impermeable refuelling areas isolated from surface water drains.

9.6.1.3 Mitigation by Reduction

None Required

9.6.2 Operational Phase

9.6.2.1 Mitigation by Avoidance / Design

HYDROLOGY OPER 1: An appropriately designed drainage system has been incorporated into the design of the proposed development. The system has been designed in accordance with accordance with the Greater Dublin Strategic Drainage Study (GDSDS), the CIRIA SUDS Manual 2015 and Recommendations for Site Development Works for Housing Areas published by the Department of the Environment and Local Government. It involves ensuring that suitable protection measures of runoff to surface water including permeable paving, gullies and catch pits, lined attenuation structures and oil-water interceptors are provided.

9.6.2.2 Mitigation by Prevention

None Required

9.6.2.3 Mitigation by Reduction

None Required

9.7 RESIDUAL EFFECTS

9.7.1 Construction Phase

No.	Construction Activity	Attribute	Significance of Potential Impact Prior to Mitigation	Significance of Potential Impact with Mitigation
1.	Excavation Activities	Surface Water	Significant	Imperceptible
2.	Excavation Dewatering Works	Surface Water	Imperceptible	Imperceptible
3.	Fuel storage/usage on site	Surface Water	Significant	Imperceptible
4.	Waste Arisings	Surface Water	Significant	Imperceptible
5.	Contaminated land/buried waste	Surface Water	Significant	Imperceptible
6.	Vandilism	Surface Water	Significant	Imperceptible
7.	Contaminated imported fill	Surface Water	Significant	Imperceptible
8.	Construction Works	Surface Water	Significant	Imperceptible
9.	Concrete Wash Water	Surface Water	Significant	Imperceptible

9.7.1 Operational Phase

No.	Activity	Attribute	Significance of Potential Impact Prior to Mitigation	Significance of Potential Impact with Mitigation
1.	Hydrocarbon laden surface water runoff from roads, carparks and general hardstan d ng	Surface Water	Significant	Imperceptible
2.	Increased surface water flow to the open streams, channels and Rivers which could lead to floodin g	Surface Water	Significant	Imperceptible
3.	Wastewater Disposal	Surface Water	Significant	Imperceptible
4.	Contaminated land / waste	Future Site Users Surface Water	Significant	Imperceptible

9.8 MONITORING

9.8.1 Construction Phase

Monitoring prior to, during and post construction works of surface water and groundwater quality shall be undertaken to ensure minimum disturbance of water quality in the general vicinity of the site. During the construction phase, the monitoring programme will include daily checks, weekly inspections and monthly audits to ensure compliance with the Construction Environmental Management Plan. This will be undertaken in consultation with the wishes of Limerick City & County Council.

Monitoring of any hazardous material stored on-site will form part of the proposed Construction & Waste Management Plan.

9.8.1 Operational Phase

The ongoing monitoring and maintenance of surface water treatment features such as petrol interceptors, gullies, and catch pit manholes

9.9 REFERENCES

TII / NRA Design Manual for Roads and Bridges, 2011

Radon Map of Ireland - http://www.epa.ie/radiation/radonmap/

Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions, May 2009, EC DG XI Environment, Nuclear Safety & Civil Protection Ref: NE80328/D1/3

Guidelines on the information to be contained in Environmental Impact Statements (EPA, 2002),

Geology in Environmental Impact Statements a Guide, (IGI, 2002),

Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes, NRA Document.

Guidelines for the preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (IGI, 2013),

Institute of Geologists Ireland (2002): Geology in Environmental Impact Statements – A Guide.

Draft EPA revised Guidelines on information to be contained in Environmental Impact Statements; and Advice Notes for preparing EIS, 2015.

CHAPTER TEN AIR QUALITY AND CLIMATE

10.1 INTRODUCTION

This chapter assesses the likely air quality and climate impacts associated with the proposed development Across the proposed Masterplan Site and also the proposed Phase 3 development site. The proposed development will involve the construction of a mix of residential units and associated infrastructure and ancillary works. A full description of the development can be found in Chapter 2.0.

The proposed development forms Phase 3 of an overall masterplan development for the wider site. The masterplan development includes a mix of residential units, a childcare facility and a neighbourhood centre. The masterplan is proposed to be delivered in seven phases in total. Phase 3 of the masterplan development is the focus of this EIAR. However, it was deemed necessary to provide a full assessment of the development in conjunction with the overall masterplan area development to ensure no negative impacts to the environment will occur. As a result the assessments contained within this EIAR chapter includes the entire proposed masterplan development.

10.2 ASSESSMENT METHODOLOGY

10.2.1 Criteria for Rating of Impacts

Ambient Air Quality Standards

In order to reduce the risk to health from poor air quality, national and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or "Air Quality Standards" are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set.

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values. The applicable standards in Ireland include the Air Quality Standards Regulations 2022 (S.I. No. 739 of 2022), which incorporate EU Directive 2008/50/EC, which has set limit values for a number of pollutants. The limit values for NO_2, PM_{10} and $PM_{2.5}$, are relevant to this assessment (see Table 10.1). Although the EU Air Quality Limit Values are the basis of legislation, other thresholds outlined by the EU Directives are used which are triggers for particular actions.

With regards to larger dust particles that can give rise to nuisance dust, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction phase of a development in Ireland. Furthermore, no specific criteria have been stipulated for nuisance dust in respect of this development.

With regard to dust deposition, the German TA-Luft standard for dust deposition (non-hazardous dust) (German VDI, 2002) sets a maximum permissible emission level for dust deposition of 350 $mg/m^2/day$ averaged over a one year period at any receptors outside the site boundary. Recommendations from the Department of the Environment, Heritage & Local Government (DEHLG, 2004) apply the TA-Luft

limit of 350 mg/m²/day to the site boundary of quarries. This limit value can also be implemented with regard to dust impacts from construction of the proposed development.

Pollutant	Regulation Note 1	Limit Type	Value
Nitrogen Dioxide	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 µg/m³
		Annual limit for protection of human health	40 µg/m³
		Critical level for protection of vegetation	30 µg/m³ NO + NO_2
Particulate Matter (as PM_{10})	2008/50/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 µg/m³
		Annual limit for protection of human health	40 µg/m³
Particulate Matter (as $PM_{2.5}$)	2008/50/EC	Annual limit for protection of human health	25 µg/m³

Note 1 EU 2008/50/EC – Clean Air For Europe (CAFÉ) Directive replaces the previous Air Framework Directive (1996/30/EC) and daughter directives 1999/30/EC and 2000/69/EC

Table 10.1 Air Quality Standards Regulations

Climate Agreements & Policies

In 2015, the Climate Action and Low Carbon Development Act 2015 (No. 46 of 2015) (Government of Ireland, 2015) was enacted (the Act). The purpose of the Act was to enable Ireland '*to pursue, and achieve, the transition to a low carbon, climate resilient and environmentally sustainable economy by the end of the year 2050*' (3.(1) of No. 46 of 2015). This is referred to in the Act as the 'national transition objective'. The Act made provision for a national mitigation plan, and a national adaptation framework. In addition, the Act provided for the establishment of the Climate Change Advisory Council with the function to advise and make recommendations on the preparation of the national mitigation and adaptation plans and compliance with existing climate obligations.

The first Climate Action Plan (CAP) was published by the Irish Government in June 2019 (Government of Ireland, 2019). The Climate Action Plan 2019 outlined the current status across key sectors including Electricity, Transport, Built Environment, Industry and Agriculture and outlined the various broadscale measures required for each sector to achieve ambitious decarbonisation targets. The 2019 CAP also detailed the required governance arrangements for implementation including carbon-proofing of policies, establishment of carbon budgets, a strengthened Climate Change Advisory Council and greater accountability to the Oireachtas. The Government published the second Climate Action Plan in November 2021 (Government of Ireland, 2021a) and a third update in December 2022 (Government of Ireland, 2022).

Following on from Ireland declaring a climate and biodiversity emergency in May 2019, and the European Parliament approving a resolution declaring a climate and environment emergency in Europe in November 2019, the Government approved the publication of the General Scheme in December 2019, followed by the publication of the Climate Action and Low Carbon Development (Amendment) Act 2021 (hereafter referred to as the 2021 Climate Act) in March 2021. The Climate Act was signed into Law on the 23rd July 2021, giving statutory effect to the core objectives stated within the CAP.

The purpose of the 2021 Climate Act (Government of Ireland, 2021b) is to provide for the approval of plans "for the purpose of pursuing the transition to a climate resilient, biodiversity rich and climate neutral economy by no later than the end of the year 2050". The 2021 Climate Act will also "provide for carbon budgets and a decarbonisation target range for certain sectors of the economy". The 2021 Climate Act defines the carbon budget as "the total amount of greenhouse gas emissions that are permitted during the budget period".

In relation to carbon budgets, the 2021 Climate Action and Low Carbon Development (Amendment) Act states '*A carbon budget, consistent with furthering the achievement of the national climate objective, shall be proposed by the Climate Change Advisory Council, finalised by the Minister and approved by the Government for the period of 5 years commencing on the 1 January 2021 and ending on 31 December 2025 and for each subsequent period of 5 years (in this Act referred to as a 'budget period')*'. The carbon budget is to be produced for 3 sequential budget periods, as shown in Table 10.2. The carbon budget can be revised where new obligations are imposed under the law of the European Union or international agreements or where there are significant developments in scientific knowledge in relation to climate change. In relation to the sectoral emissions ceiling, the Minister for the Environment, Climate and Communications (the Minister for the Environment) shall prepare and submit to government the maximum amount of GHG emissions that are permitted in different sectors of the economy during a budget period and different ceilings may apply to different sectors. The sectorial emission ceilings for 2030 were published in July 2022 and are shown in Table 10.3. Buildings (Residential) have a 40% reduction requirement and a 2030 emission ceiling of 4 $MtCO_{2eq}$[1].

Sector	Reduction Required	2018 Emissions ($MtCO_{2eq}$)
2021-2025	295 Mt CO_{2eq}	Reduction in emissions of 4.8% per annum for the first budget period.
2026-2030	200 Mt CO_{2eq}	Reduction in emissions of 8.3% per annum for the second budget period.
2031-2035	151 Mt CO_{2eq}	Reduction in emissions of 3.5% per annum for the third provisional budget.

Table 10.2 5-Year Carbon Budgets 2021-2025, 2026-2030 and 2031-2025

[1] Mt CO_{2eq} denotes million tonnes carbon dioxide equivalent.

Sector	Reduction Required	2018 Emissions ($MtCO_{2eq}$)	2030 Emission Ceiling ($MtCO_{2eq}$)
Electricity	75%	10.5	3
Transport	50%	12	6
Buildings (Commercial and Public)	45%	2	1
Buildings (Residential)	40%	7	4
Industry	35%	7	4
Agriculture	25%	23	17.25
Other (F-Gases, Waste & Petroleum refining)	50%	2	1

Table 10.3 Sectoral Emission Ceilings 2030

In December 2022, CAP23 was published (Government of Ireland 2022). This is the first CAP since the publication of the carbon budgets and sectoral emissions ceilings, and it aims to implement the required changes to achieve a 51% reduction in carbon emissions by 2030. The CAP has six vital high impact sectors where the biggest savings can be made: renewable energy, energy efficiency of buildings, transport, sustainable farming, sustainable business and change of land-use. CAP23 states that the decarbonisation of Ireland's manufacturing industry is key for Ireland's economy and future competitiveness. There is a target to reduce the embodied carbon in construction materials by 10% for materials produced and used in Ireland by 2025 and by at least 30% for materials produced and used in Ireland by 2030. CAP23 states that these reductions can be brought about by product substitution for construction materials and reduction of clinker content in cement. Cement and other high embodied carbon construction elements can be reduced by the adoption of the methods set out in the Construction Industry Federation 2021 report Modern Methods of Construction. In order to ensure economic growth can continue alongside a reduction in emissions, the IDA Ireland will also seek to attract businesses to invest in decarbonisation technologies.

10.2.2 Construction Phase Methodology

Air Quality

The Institute of Air Quality Management in the UK (IAQM) guidance document '*Guidance on the Assessment of Dust from Demolition and Construction*' (2014) outlines an assessment method for predicting the impact of dust emissions from construction activities based on the scale and nature of the works and the sensitivity of the area to dust impacts. The IAQM methodology has been applied to the construction phase of this development in order to predict the likely risk of dust impacts in the absence of mitigation measures and to determine the level of site specific mitigation required. The use of UK guidance is recommended by Transport Infrastructure Ireland (TII) in their guidance document *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022a).

The major dust generating activities are divided into four types within the IAQM guidance (2014) to reflect their different potential impacts. These are:

- Demolition.
- Earthworks.

- Construction.
- Trackout (movement of heavy vehicles).

The magnitude of each of the four categories is divided into large, medium or small scale depending on the nature of the activities involved. The magnitude of each activity is combined with the overall sensitivity of the area to determine the risk of dust impacts from site activities. This allows the level of site specific mitigation to be determined.

Construction phase traffic also has the potential to impact air quality and climate. The TII guidance *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022a), states that road links meeting one or more of the following criteria can be defined as being 'affected' by a proposed development and should be included in the local air quality assessment. While the guidance is specific to infrastructure projects the approach can be applied to any development that causes a change in traffic.

- Annual average daily traffic (AADT) changes by 1,000 or more;
- Heavy duty vehicle (HDV) AADT changes by 200 or more;
- Daily average speed change by 10 kph or more;
- Peak hour speed change by 20 kph or more;
- A change in road alignment by 5m or greater.

The construction stage traffic will lead to an increase of at most 153 AADT and 46 HDV AADT on Old Cratloe Road. These predicted increases are significantly less than the screening criteria outlined above. Therefore, as the construction stage traffic does not meet the above scoping criteria a detailed air assessment of construction stage traffic emissions has been scoped out from any further assessment as there is no potential for significant impacts to air quality.

Climate

Ireland has annual GHG targets which are set at an EU level and need to be complied with in order to reduce the impact of climate change. Impacts to climate as a result of GHG emissions are assessed against the targets set out by the EU under *Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No. 525/2013*, which has set a target of 30% reduction in non-ETS sector GHG emissions by 2030 relative to 2005 levels.

As per the EU guidance document *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment* (European Commission, 2013) the climate baseline is first established with reference to EPA data on annual GHG emissions (see Section 10.3.4). The impact of the proposed development on climate is determined in relation to this baseline. The UK Highways Agency has published a DMRB guidance document in relation to climate impact assessments, *LA 114 Climate* (UK Highways Agency 2019). The scoping criteria therein are used to determine whether a detailed climate assessment is required for a proposed project during the construction stage based on a potential greater than 1% change in emissions from the baseline scenario. If emissions will not increase by over 1% then no further assessment is required as there is no potential for significant impacts to climate. The construction stage activities and potential for GHG emissions have been reviewed as part of the construction stage climate assessment and a qualitative assessment conducted.

10.2.3 Operational Phase Methodology

Air Quality

Operational phase traffic has the potential to impact local air quality as a result of increased vehicle movements associated with the proposed development. The TII scoping criteria detailed in Section 10.2.2.1 were used to determine if any road links are affected by the proposed development and require inclusion in a detailed air dispersion modelling assessment. The proposed development (Phase 3 of the masterplan development) when assessed in isolation will not cause a change in traffic of over 1000 AADT. However, as per the EPA EIA criteria (EPA, 2022) cumulative impacts must also be considered within assessments. While the Phase 3 development in isolation will not lead to an increase of over 1000 AADT, when assessed cumulatively with the other phases 1 – 5 of the masterplan development the traffic volumes are higher and have an increase of over 1000 AADT on a number of road links. In order to assess the full cumulative impact of the development traffic data for the full masterplan development has been provided and assessed by carrying out a detailed air dispersion modelling assessment of operational phase traffic emissions.

The impact to air quality as a result of changes in traffic is assessed at sensitive receptors in the vicinity of affected roads. The TII guidance (2022a) states a proportionate number of representative receptors which are located in areas which will experience the highest concentrations or greatest improvements as a result of the proposed development are to be included in the modelling. The TII criteria state that receptors within 200m of impacted road links should be assessed; roads which are greater than 200m from receptors will not impact pollutant concentrations at that receptor. The TII guidance (2022a) defines sensitive receptor locations as: residential housing, schools, hospitals, places of worship, sports centres and shopping areas, i.e. locations where members of the public are likely to be regularly present. A total of 4 no. high sensitivity residential receptors (R1 – R4) were included in the modelling assessment (see Figure 10.1).

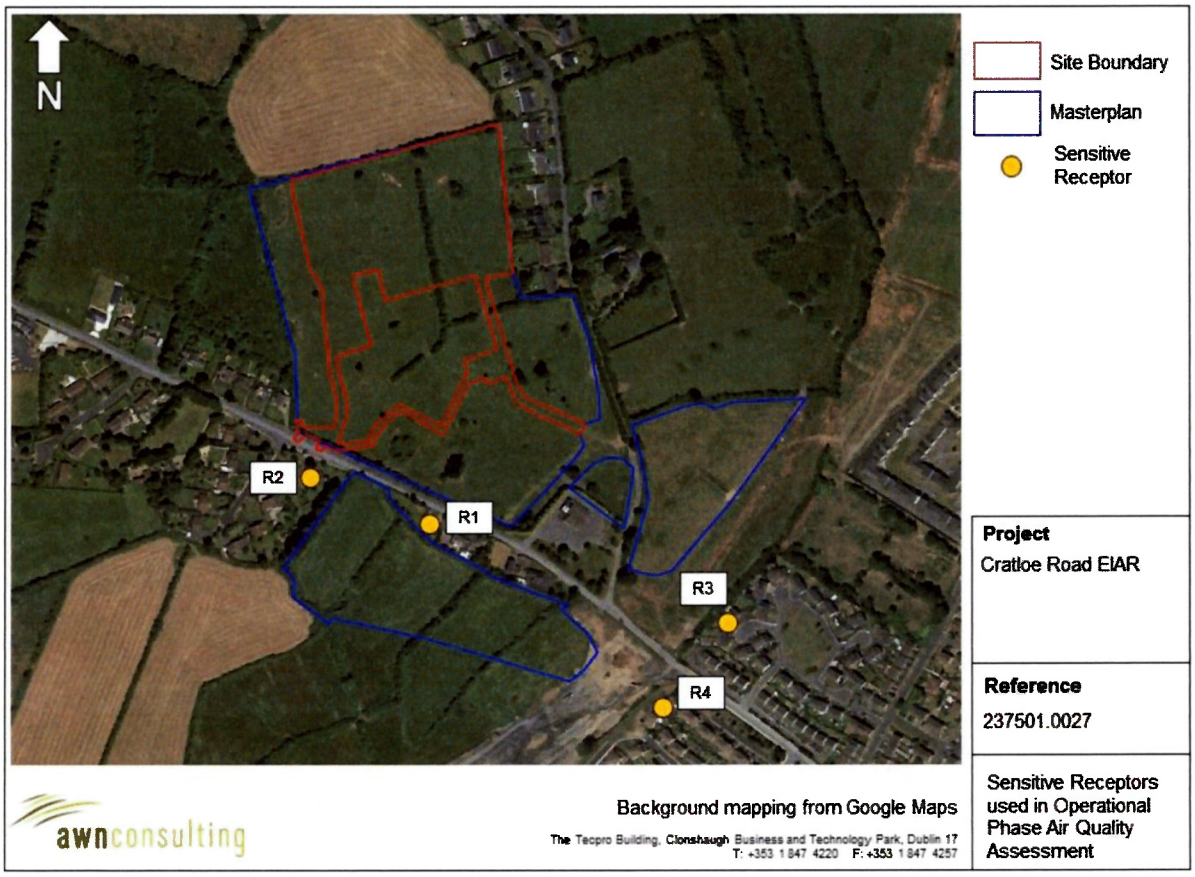


Figure 10.1 Sensitive Receptors used in Operational Phase Air Quality Assessment

The TII guidance (2022a) states that modelling should be conducted for NO_2 and PM_{10} for the base, opening and design years for both the do minimum (do nothing) and do something scenarios. The modelling of PM_{10} can be used to show that the project does not impact on the $PM_{2.5}$ limit value as if compliance with the PM_{10} limit is achieved then compliance with the $PM_{2.5}$ limit will also be achieved. Modelling of operational NO_2 and PM_{10} concentrations has been conducted for the do nothing and do something scenarios using the TII Road Emissions Model (REM) online calculator tool (TII, 2022b).

The following inputs are required for the REM tool: receptor locations, light duty vehicle (LDV) annual average daily traffic movements (AADT), annual average daily heavy duty vehicles (HDV AADT), annual average traffic speeds, road link lengths, road type, project county location and pollutant background concentrations. The *Default* fleet mix option was selected along with the *Intermediate Case* fleet data base selection, as per TII Guidance (TII, 2022b). The *Intermediate Case* assumes a linear interpolation between the *Business as Usual* case – where current trends in vehicle ownership continue and the *Climate Action Plan (CAP)* case – where adoption of low emission light duty vehicles occurs.

Using this input data the model predicts the road traffic contribution to ambient ground level concentrations at the identified sensitive receptors using generic meteorological data. The TII REM uses county-based Irish fleet composition for different road types, for different European emission standards from pre-Euro to Euro 6/VI with scaling factors to reflect improvements in fuel quality, retrofitting, and technology conversions. The TII REM also includes emission factors for PM_{10} emissions associated with brake and tyre wear (TII, 2022b). The predicted road contributions are then added to the existing background concentrations to give the predicted ambient concentrations. The ambient

concentrations are then compared with the relevant ambient air quality standards to assess the compliance of the proposed development with these ambient air quality standards.

The TII document *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022a) details a methodology for determining air quality impact significance criteria for road schemes which can be applied to any project that causes a change in traffic. The degree of impact is determined based on the percentage change in pollutant concentrations relative to the do nothing scenario. The TII significance criteria are outlined in Table 4.9 of *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022a) and reproduced in Table 10.4 below. These criteria have been adopted for the proposed development to predict the impact of NO_2 and PM_{10} emissions as a result of the proposed development.

Long term average concentration at receptor in assessment year	**% Change in concentration relative to Air Quality Standard Value (AQLV)**			
	1%	**2-5%**	**6-10%**	**>10%**
75% or less of AQLV	Neutral	Neutral	Slight	Moderate
76 – 94% of AQLV	Neutral	Slight	Moderate	Moderate
95 – 102% of AQLV	Slight	Moderate	Moderate	Substantial
103 – 109% of AQLV	Moderate	Moderate	Substantial	Substantial
110% or more of AQLV	Moderate	Substantial	Substantial	Substantial

Source: TII (2022a) Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106

Table 10.4 Air Quality Significance Criteria

Traffic Data Used in Modelling Assessment

Traffic flow information was obtained from Coakley Consulting Engineers for the purposes of this assessment. Data for the Base Year 2021 and the Do Nothing and Do Something scenarios for the opening year 2025 and design year 2040 were provided. While the Phase 3 development in isolation will not lead to an increase of over 1000 AADT, when assessed cumulatively with the other phases 1 – 5 of the masterplan development the traffic volumes are higher. In order to assess the full cumulative impact of the development, traffic data for the full masterplan development has been provided and assessed (see Traffic Impact Assessment and Chapter 12 for further details).

The traffic data is detailed in Table 10.5. Only road links that met the TII scoping criteria and that were within 200m of identified receptors were included in the modelling assessment. Background concentrations have been included as per Section 10.3.3 of this chapter based on available EPA background monitoring data (EPA, 2022). This traffic data has also been used in the operational phase climate assessment.

Road Name	Speed (kph)	Base Year 2021	Opening Year 2025		Design Year 2040	
			Do Nothing	Do Something	Do Nothing	Do Something
		LDV AADT (HDV AADT)	LDV AADT (HDV AADT)	LDV AADT (HDV AADT)	LDV AADT (HDV AADT)	LDV AADT (HDV AADT)
A - Old Cratloe Rd (East)	50	2,799 (102)	2,947 (105)	5,397 (105)	3,617 (111)	6,072 (105)
B - Old Cratloe Rd (Central)	50	2,702 (98)	2,845 (102)	4,294 (102)	3,510 (107)	4,964 (102)
C - Old Cratloe Rd (West)	50	2,702 (98)	2,845 (102)	3,908 (102)	3,510 (107)	4,578 (102)
D - Old Cratloe Rd	50	2,702 (98)	2,845 (102)	3,458 (102)	3,510 (107)	4,128 (102)
E - Pass/Meelick Rd (Realigned) South	50	196 (4)	206 (4)	1,875 (4)	254 (4)	1,923 (4)
F - Pass/Meelick Rd (Realigned) North	50	196 (4)	206 (4)	1,662 (4)	254 (4)	1,710 (4)
G - Pass/Meelick Rd (North)	50	196 (4)	206 (4)	206 (4)	254 (4)	254 (4)
H - CKDR (North)	100	0 (0)	4,775 (225)	5,020 (225)	5,900 (236)	6,157 (225)
I - CKDR (South)	100	0 (0)	20,055 (945)	21,770 (945)	24,780 (993)	26,544 (945)
J - Old Cratloe Rd(East of CKDR)	50	2,799 (102)	2,945 (107)	3,435 (107)	3,634 (112)	4,129 (107)

Table 10.5 Traffic Data used in Operational Phase Air Quality & Climate Modelling Assessments

10.2.3.2 Climate

Emissions from road traffic associated with the proposed development have the potential to emit carbon dioxide (CO_2) which will impact climate. The UK Highways Agency DMRB guidance document in relation to climate impact assessments *LA 114 Climate* (UK Highways Agency, 2019b) outlines the following scoping criteria which are used to determine whether a detailed climate assessment is required for a proposed project during the operational stage. During the operational phase, if any of the road links impacted by the proposed development meet the below criteria then further assessment is required.

- A change of more than 10% in AADT;
- A change of more than 10% to the number of heavy duty vehicles; and
- A change in daily average speed of more than 20 km/hr.

There are a number of road links that will experience a change of over 10% in the AADT during the operational phase as a result of the proposed development. As a result a detailed assessment of traffic related carbon dioxide (CO_2) emissions was conducted.

PE-ENV-01104 (TII, 2022a) states that road traffic related emissions information should be obtained from an Air Quality Practitioner. The traffic related emissions were calculated through the use of the TII REM tool (TII, 2022b) which includes detailed fleet predictions for age, fuel technology, engine size and weight based on available national forecasts. The output is provided in terms of CO_2eq for the base year 2021, opening year 2025 and design year 2040. Both the Do Nothing and Do Something scenarios are quantified in order to determine the degree of change in emissions as a result of the proposed development. The traffic data used in the modelling assessment is detailed in Table 10.5.

The EU guidance (2013) also states indirect GHG emissions as a result of a development must be considered, this includes emissions associated with energy usage. In addition to the EU guidance, the Institute of Environmental Management and Assessment (IEMA) guidance note on 'Assessing Greenhouse Gas Emissions and Evaluating their Significance' (IEMA, 2022) states that "*the crux of significance regarding impact on climate is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050*". Mitigation has taken a leading role within the guidance compared to the previous edition published in 2017. Early stakeholder engagement is key and therefore mitigation should be considered from the outset of the project and continue throughout the project's lifetime in order to maximise GHG emissions savings.

A number of measures have been incorporated into the overall design of the development to reduce the impact to climate where possible, in line with the objectives of the IEMA guidance (2022).

10.3 RECEIVING ENVIRONMENT

10.3.1 Site Area Description

The study area for the air quality assessment is limited to a local scale and focusses on sensitive receptors within 350m of the proposed development site (Phase 3) in relation to potential construction dust impacts as per the IAQM guidance (2014). In terms of the operational phase, air quality impacts are likely as a result of traffic emissions from vehicles accessing the site. The operational phase study area is limited to sensitive receptors within 200m of impacted road links as per the TII (2022) guidance. A total of 4 no. sensitive receptors were chosen which are within 200m of impacted road links. As per Table 10.5, there are a number of road links that met the TII screening criteria and were included within the air quality assessment. The changes in traffic on other road links in the vicinity of the site were below the screening criteria and were not included within the assessment. As stated previously the traffic assessment includes traffic associated with the entire masterplan development, not just Phase 3 in isolation.

In terms of the climate assessment, as impacts to climate are assessed with reference to national targets and commitments, the study area can be defined as the Republic of Ireland.

Potential impacts as a result of the development of the entire Masterplan area are considered in Section 10.5.4 Cumulative Impacts.

10.3.2 Meteorological Data

A key factor in assessing temporal and spatial variations in air quality is the prevailing meteorological conditions. Depending on wind speed and direction, individual receptors may experience very significant variations in pollutant levels under the same source strength (i.e traffic levels) (WHO, 2006). Wind is of key importance in dispersing air pollutants and for ground level sources, such as traffic emissions, pollutant concentrations are generally inversely related to wind speed. Thus, concentrations of pollutants derived from traffic sources will generally be greatest under very calm conditions and low wind speeds when the movement of air is restricted. In relation to PM_{10}, the situation is more complex due to the range of sources of this pollutant. Smaller particles (less than $PM_{2.5}$) from traffic sources will

be dispersed more rapidly at higher wind speeds. However, fugitive emissions of coarse particles ($PM_{2.5}$ - PM_{10}) will actually increase at higher wind speeds. Thus, measured levels of PM_{10} will be a non-linear function of wind speed.

The nearest representative weather station collating detailed weather records is Shannon Airport meteorological station, which is located approximately 16 km west of the site. Shannon Airport met data has been examined to identify the prevailing wind direction and average wind speeds over a five-year period (see Figure 10.2). For data collated during five representative years (2017 – 2021), the predominant wind direction is westerly to south-easterly with generally moderate wind speeds (Met Eireann, 2023).

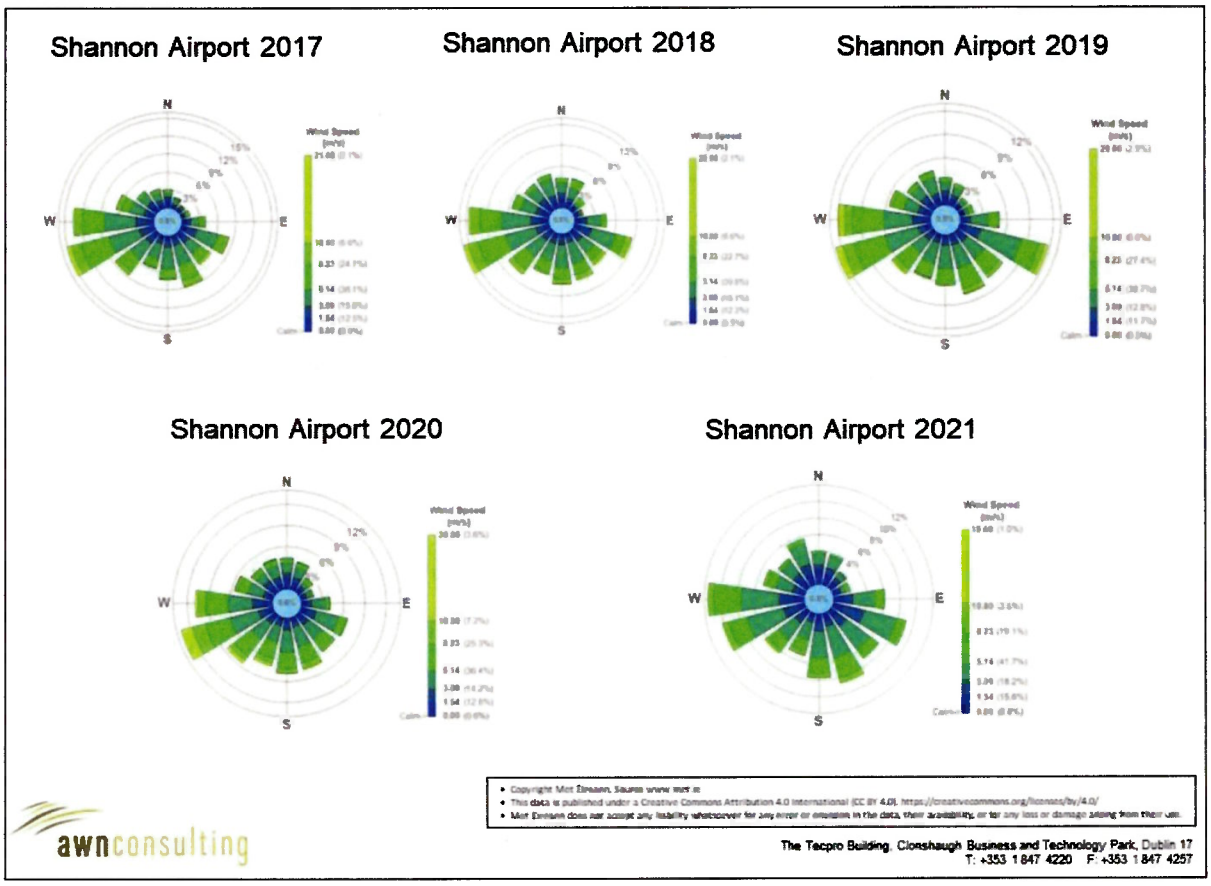


Figure 10.2 Shannon Airport Windroses 2017 - 2021

10.3.3 Baseline Air Quality

Air quality monitoring programs have been undertaken in recent years by the EPA. The most recent annual report on air quality in Ireland is "*Air Quality In Ireland 2021*" (EPA, 2022a). The EPA website details the range and scope of monitoring undertaken throughout Ireland and provides both monitoring data and the results of previous air quality assessments (EPA, 2023).

As part of the implementation of the Air Quality Standards Regulations 2022 (S.I. No. 739 of 2022) four air quality zones have been defined in Ireland for air quality management and assessment purposes (EPA, 2023). Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of 23 towns with

a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000, is defined as Zone D.

In terms of air monitoring and assessment, the proposed development site is within Zone C (EPA, 2023). The long-term monitoring data has been used to determine background concentrations for the key pollutants in the region of the proposed development. The background concentration accounts for all non-traffic derived emissions (e.g. natural sources, industry, home heating etc.).

In 2020 the EPA reported that Ireland was compliant with EU legal air quality limits at all locations, however this was largely due to the reduction in traffic due to Covid-19 restrictions. The EPA *Air Quality in Ireland 2020* report details the effect that the Covid-19 restrictions had on air monitoring stations, which included reductions of up to 50% at some monitoring stations which have traffic as a dominant source. 2020 concentrations are therefore predicted to be an exceptional year and not consistent with long-term trends. For this reason, the data has been included in the baseline section for representative purposes only and previous long-term data has been used to determine baseline levels of pollutants in the vicinity of the proposed development.

Long-term NO_2 monitoring was carried out at four Zone C locations for the period 2017 – 2021, Kilkenny, Portlaoise, Limerick and Dundalk (EPA, 2022a). Annual mean concentrations of NO_2 range from 5 – 14 µg/m^3 over the 2017 – 2021 period (Table 10.6). Long term average concentrations are significantly below the annual average limit of 40 µg/m^3. In addition, there were no exceedances of the 1-hour limit value of 200 µg/m^3 at any of the monitoring stations, albeit 18 exceedances are allowed per year. Monitoring was conducted at Limerick People's Park in 2019, 2020 and 2021, this station is approximately 3.5 km south-east of the proposed development. Monitored concentrations of NO_2 at this location in Limerick were 13 µg/m^3 and 10 µg/m^3 in 2019 and 2021 respectively. Based on the above information, a conservative estimate of the current background NO_2 concentration in the region of the proposed development is 10 µg/m^3.

Station	Averaging Period Notes 1,2	Year				
		2017	2018	2019	2020	2021
Kilkenny	Annual Mean NO_2 (µg/m^3)	5	6	5	4	4
	99.8th%ile 1-hr NO_2 (µg/m^3)	41	45	42	40	35
Portlaoise	Annual Mean NO_2 (µg/m^3)	11	11	11	11	8
	99.8th%ile 1-hr NO_2 (µg/m^3)	60	68	60	52	49
Dundalk	Annual Mean NO_2 (µg/m^3)	-	14	12	10	11
	99.8th%ile 1-hr NO_2 (µg/m^3)	-	-	69	73	67
Limerick (People's Park)	Annual Mean NO_2 (µg/m^3)	-	-	13	10	10
	99.8th%ile 1-hr NO_2 (µg/m^3)	-	-	0	64	59

Note 1 Annual average limit value - 40 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 739 of 2022). 1-hour limit value - 200 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 739 of 2022).

Table 10.6 Trends in Zone C Air Quality – Nitrogen Dioxide (NO_2)

Continuous PM_{10} monitoring was carried out at five Zone C locations from 2017 – 2021, Galway, Portlaoise, Ennis, Limerick and Dundalk. Concentrations range from 10 – 20 µg/m^3 over the 2017 – 2021 period (see Table 10.7). Hence, long term concentrations are significantly below the annual limit value of 40 µg/m^3. In addition, there were at most 17 exceedances (in Ennis) of the 24-hour limit value

of 50 µg/m³ in 2021 albeit 35 exceedances are permitted per year (EPA, 2022a). Monitoring was conducted in Limerick People's Park c. 3.5 km south-east of the proposed development for the years 2019, 2020 and 2021. Monitored concentrations were 13 µg/m³ in 2019, 2020 and 2021. Based on the EPA data, a conservative estimate of the current background PM_{10} concentration in the region of the development is 13 µg/m³.

Station	Averaging Period Notes 1,2	Year				
		2017	2018	2019	2020	2021
Galway	Annual Mean PM_{10} (µg/m³)	-	15	13	13	11
	24-hr Mean > 50 µg/m³ (days)	-	0	1	1	0
Ennis	Annual Mean PM_{10} (µg/m³)	16	16	18	20	19
	24-hr Mean > 50 µg/m³ (days)	9	4	12	19	17
Portlaoise	Annual Mean PM_{10} (µg/m³)	10	11	15	12	11
	24-hr Mean > 50 µg/m³ (days)	0	1	0	0	1
Dundalk	Annual Mean PM_{10} (µg/m³)	-	15	14	13	12
	24-hr Mean > 50 µg/m³ (days)	-	0	2	2	0
Limerick (People's Park)	Annual Mean PM_{10} (µg/m³)	-	-	13	13	13
	24-hr Mean > 50 µg/m³ (days)	-	-	4	1	2

Note1 Annual average limit value - 40 µg/m³ (EU Council Directive 2008/50/EC & S.I. No. 739 of 2022). Daily limit value - 50 µg/m³ (EU Council Directive 2008/50/EC & S.I. No. 739 of 2022).

Table 10.7 Trends in Zone C Air Quality – PM_{10}

Average $PM_{2.5}$ levels in Ennis over the period 2017 – 2021 ranged from 10 – 15 µg/m³, with a $PM_{2.5}/PM_{10}$ ratio ranging from 0.63 – 0.78 (EPA, 2022a). Based on this information, a conservative ratio of 0.8 was used to generate an existing $PM_{2.5}$ concentration in the region of the proposed development of 10.4 µg/m³.

Based on the above information the air quality in Zone C locations, such as the Limerick area is generally good, with concentrations of the key pollutants generally well below the relevant limit values. However, the EPA have indicated that road transport emissions are contributing to increased levels of NO_2 with the potential for breaches in the annual NO_2 limit value in future years at locations within urban centres and roadside locations. In addition, burning of solid fuels for home heating is contributing to increased levels of particulate matter (PM_{10} and $PM_{2.5}$). The EPA predict that exceedances in the particulate matter limit values are likely in future years if burning of solid fuels for residential heating continues (EPA, 2022a).

The current background concentrations have been used in the operational phase air quality assessment for both the opening and design year as a conservative approach in order to predict pollutant concentrations in future years. This is in line with the TII methodology (TII, 2022a).

10.3.4 Climate Baseline

Anthropogenic emissions of greenhouse gases (GHGs) in Ireland included in the European Union's Effort Sharing Regulation (ESR) (EU 2018/842) are outlined in the most recent review by the EPA which details emissions up to 2021 (EPA, 2022b). The greenhouse gas emission inventory for 2021 is the first of ten years over which compliance with targets set in the ESR will be assessed. This Regulation sets 2030 targets for emissions outside of the Emissions Trading Scheme (known as ESR emissions) and

annual binding national limits for the period 2021-2030. Ireland's target is to reduce ESR emissions by 30% by 2030 compared with 2005 levels, with a number of flexibilities available to assist in achieving this. Ireland's ESR emissions annual limit for 2021 is 43.48 Mt CO_2eq. Ireland's 2021 GHG ESR emissions are 46.19 Mt CO_2eq, this is 2.71 Mt CO_2eq more than the annual limit for 2021 (EPA, 2022b). Agriculture continues to be the largest contributor to overall emissions at 37.5% of the total. Transport, energy industries and the residential sector are the next largest contributors, at 17.7%, 16.7% and 11.4%, respectively. GHG emissions for 2021 are 4.7% higher than emissions in 2020, this is due to a gradual lifting of covid restrictions and an increase in the use of coal and less renewables within electricity generation. Ireland's GHG emissions have increased by 11.4% from 1990 – 2021.

National total emissions (including Land Use, Land-use Change and Forestry (LULUCF)) for 2021 are 69.29 Mt CO_2eq, these have used 23.5% of the 295 Mt CO_2eq Carbon Budget for the five-year period 2021-2025. This leaves 76.5% of the budget available for the succeeding four years, requiring an 8.4% average annual emissions reduction from 2022-2025 to stay within budget.

10.3.5 Sensitivity of the Receiving Environment

In line with the IAQM guidance document (2014) prior to assessing the impact of dust from a proposed development, the sensitivity of the area must first be assessed as outlined below. Both receptor sensitivity and proximity to proposed works areas are taken into consideration. For the purposes of this assessment, high sensitivity receptors are regarded as residential properties where people are likely to spend the majority of their time, schools and hospitals. Commercial properties and places of work are regarded as medium sensitivity while low sensitivity receptors are places where people are present for short periods or do not expect a high level of amenity.

The surrounding land-use in the vicinity of the proposed development is predominantly agricultural in nature however, there are some residential properties in linear development along the local roads and in large housing estates further to the east. There are a total of 12 no. high sensitivity residential properties greater than 20m but less than 50m of the Phase 3 proposed development boundary (see Figure 10.3). Based on the IAQM criteria outlined in Table 10.8, the worst case sensitivity of the area to dust soiling is considered medium.

Receptor Sensitivity	**Number Of Receptors**	**Distance from source (m)**			
		<20	**<50**	**<100**	**<350**
High	>100	High	High	Medium	Low
	10-100	High	**Medium**	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table 10.8 Sensitivity of the Area to Dust Soiling Effects on People and Property

In addition to sensitivity to dust soiling, the IAQM guidelines also outline the assessment criteria for determining the sensitivity of the area to human health impacts. The criteria take into consideration the current annual mean PM_{10} concentration, receptor sensitivity based on type and the number of receptors affected within various distance bands from the proposed construction works. A conservative

estimate of the current annual mean PM_{10} concentration in the vicinity of the proposed development is 13 µg/m³ and there are 12 no. high sensitivity receptors located within 20 – 50 m of the site boundary (see Figure 10.3). Based on the IAQM criteria outlined in Table 10.9, the worst case sensitivity of the area to human health impacts is considered low.

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number Of Receptors	Distance from source (m)				
			<20	<50	<100	<200	<350
High	< 24 µg/m³	>100	Medium	Low	Low	Low	Low
		10-100	Low	**Low**	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	< 24 µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	< 24 µg/m³	>1	Low	Low	Low	Low	Low

Table 10.9 Sensitivity of the Area to Dust Related Human Health Impacts

The IAQM guidance also outlines the criteria for determining the sensitivity of an ecological receptor to dust impacts. The sensitivity is determined based on the distance to the source (up to 50m from the site), the designation of the site, (European, National or local designation) and the potential dust sensitivity of the ecologically important species present. There are no ecological sites within 50m of the proposed development and therefore there is no potential for impact and no assessment is required.

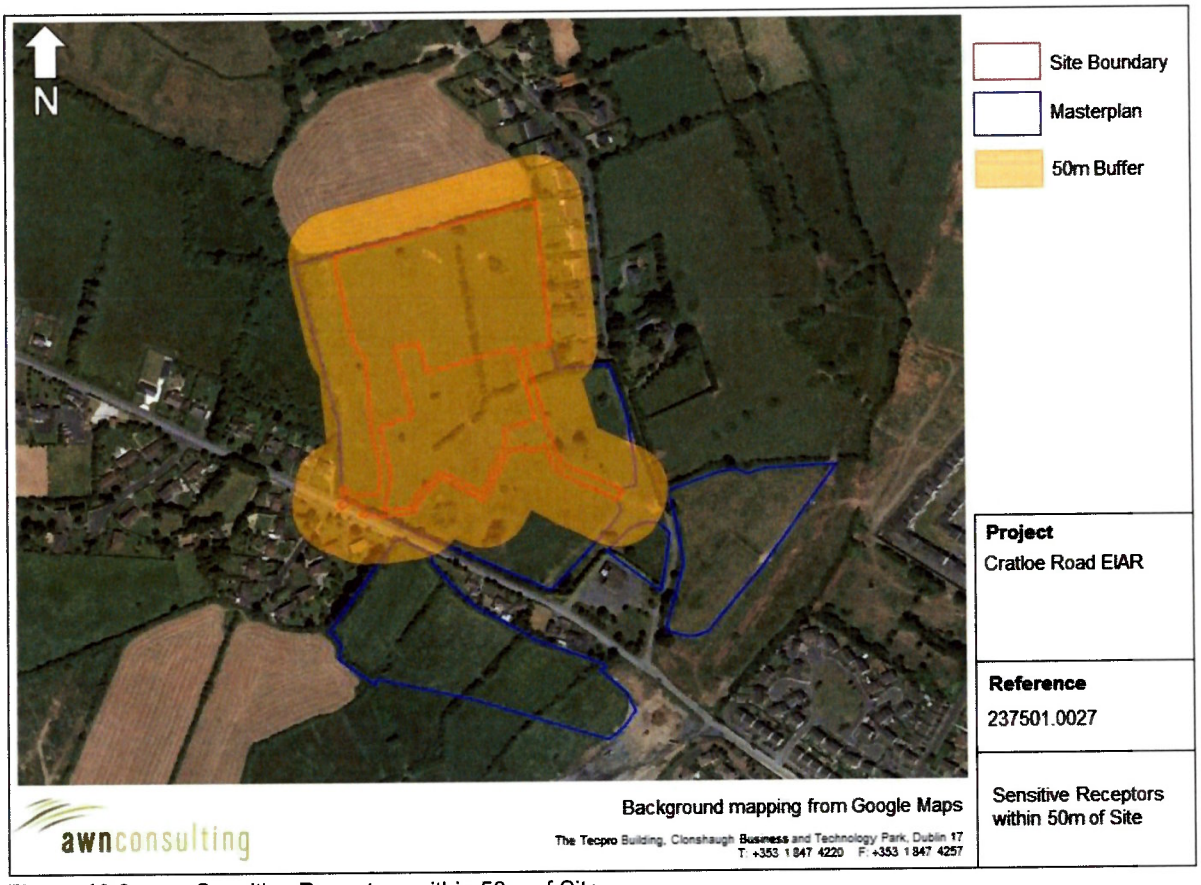


Figure 10.3 Sensitive Receptors within 50m of Site

10.4 DESCRIPTION OF EFFECTS

The proposed development comprises construction of a mix of residential units. The proposed development forms Phase 3 of a masterplan development for the wider site. The Masterplan development is proposed to be delivered over 5 phases. A full description of the development is available in Chapter 2.0. Impacts to air quality and climate will occur during both the construction and operational phases of the proposed development.

10.4.1 Construction Phase

During the construction phase construction dust emission have the potential to impact air quality. Dust emissions will primarily occur as a result of site preparation works, earthworks and the movement of trucks on site and exiting the site. There is also the potential for engine emissions from site vehicles and machinery to impact air quality. The construction phase impacts will be short-term in nature. A series of best practice dust mitigation measures will be proposed for the construction phase of the proposed development and therefore impacts are not predicted to be significant.

Engine emissions from site vehicles and machinery have the potential to impact climate through the release of CO_2 and to a lesser extent, other GHGs. However, due to the short-term duration of the construction phase and the relatively small scale of the development these emissions are not predicted to be significant in terms of Ireland's obligations under the EU 2030 GHG targets.

10.4.2 Operational Phase

Engine emissions from vehicles accessing the site have the potential to impact air quality and climate during the operational phase of the development through the release of NO_2, PM_{10}, $PM_{2.5}$ and CO_2. The additional vehicles associated with the operation of the proposed development are not expected to significantly alter the existing traffic on the surrounding road network. Pollutant emissions are not predicted to be significant. Predicted impacts will be long-term in duration.

10.5 LIKELIHOOD OF SIGNIFICANT EFFECTS

10.5.1 Do Nothing Scenario

Under the Do Nothing Scenario no construction works associated with the proposed Phase 3 development will take place and the identified impacts of fugitive dust and particulate matter emissions and emissions from equipment and machinery will not occur. Impacts from increased traffic volumes and associated air emissions from the proposed Phase 3 development will also not occur. However, the proposed development is part of a wider masterplan site. A number of planning applications for earlier phases of the masterplan development have been submitted to Limerick CC.

It is proposed to develop the entire masterplan site on a phased basis, and therefore impacts as a result of construction works and increased traffic will still occur albeit to a lesser extent due to the smaller scale of development. Further details of the construction phasing strategy can be found in Chapter 2.0. The Do Nothing scenario associated with the operational phase, including traffic associated with the additional phases 1 – 5 of the masterplan development, is assessed within Section 10.5.3 and it was

found to be imperceptible. Therefore, this scenario can be considered neutral in terms of both air quality and climate.

10.5.2 Construction Phase

Air Quality

The greatest potential impact on air quality during the construction phase of the proposed development is from construction dust emissions and the potential for nuisance dust. While construction dust tends to be deposited within 350 m of a construction site, the majority of the deposition occurs within the first 50 m. The extent of any dust generation depends on the nature of the dust (soils, peat, sands, gravels, silts etc.) and the nature of the construction activity. In addition, the potential for dust dispersion and deposition depends on local meteorological factors such as rainfall, wind speed and wind direction. A review of Shannon Airport meteorological data (see Section 10.3.2) indicates that the prevailing wind direction is westerly to south-easterly and wind speeds are generally moderate in nature. In addition, dust generation is considered negligible on days where rainfall is greater than 0.2 mm. A review of historical 30 year average data for Shannon Airport indicates that on average 211 days per year have rainfall over 0.2 mm (Met Eireann, 2023) and therefore it can be determined that over 57% of the time dust generation will be reduced.

In order to determine the level of dust mitigation required during the proposed works, the potential dust emission magnitude for each dust generating activity needs to be taken into account, in conjunction with the previously established sensitivity of the area (see Section 10.3.4). As per Section 10.2.2.1 the major dust generating activities are divided into four types within the IAQM guidance to reflect their different potential impacts. These are demolition, earthworks, construction and trackout. The magnitude of each category must be determined as per the criteria within the IAQM guidance (2014). The magnitude can be classified as either small, medium or large depending on the scale of the works involved. The magnitude of each activity has been determined below for the proposed Phase 3 development.

- Demolition - There are no demolition works proposed as part of the proposed development as it is a greenfield site.
- Earthworks - The total site area is 3.69 ha which indicates that the site is within the 'large' dust emission category in relation to earthworks activities as per the IAQM criteria (IAQM, 2014).
- Construction - There are a total of 98 units proposed as part of the proposed Phase 3 development, the total building volume to be constructed is within the range of 20,000 m^3 – 100,000 m^3 which is the 'medium' magnitude for construction related dust emissions as per the IAQM criteria (IAQM, 2014).
- Trackout (movement of heavy vehicles) – it is predicted that there will be greater than 10 but less than 50 outward HGV movements per day during the construction phase. Therefore the dust emission magnitude in relation to potential trackout is within the 'medium' category.

The magnitude of each dust emission category is then combined with the sensitivity of the area as per Section 10.3.5 to determine the level of risk in relation to dust emissions from the site. Using the IAQM criteria (IAQM, 2014) there is a medium risk of dust soiling impacts from earthworks, construction and trackout activities and a low risk of dust related human health impacts from earthworks, construction and trackout activities.

The risk of dust impacts as a result of the proposed development are summarised in Table 10.10 for each activity. The magnitude of risk determined is used to prescribe the level of site specific mitigation required for each activity in order to prevent significant impacts occurring.

Overall, in order to ensure that no dust nuisance occurs during the earthworks, construction and trackout activities, a range of dust mitigation measures associated with a medium risk of dust impacts will be implemented. In the absence of mitigation dust soiling impacts from construction works are predicted to be short-term, localised, negative and slight.

Potential Impact	**Dust Emission Risk**			
	Demolition	**Earthworks**	**Construction**	**Trackout**
Dust Emission Magnitude	N/A	Large	Medium	Medium
Dust Soiling Risk	N/A	Medium Risk	Medium Risk	Medium Risk
Human Health Risk	N/A	Low Risk	Low Risk	Low Risk

Table 10.10 Summary of Dust Impact Risk used to Define Site-Specific Mitigation

There is also the potential for traffic emissions to impact air quality in the short-term over the construction phase. Particularly due to the increase in HGVs accessing the site. The construction stage traffic has been reviewed and a detailed air quality assessment has been scoped out as none of the road links impacted by the proposed development satisfy the TII assessment criteria in Section 10.2.2.1. It can therefore be determined that the construction stage traffic will have an imperceptible, neutral and short-term impact on air quality.

Climate

There is the potential for a number of greenhouse gas emissions to atmosphere during the construction of the development. Construction vehicles, generators etc., may give rise to CO_2 and N_2O emissions. The Institute of Air Quality Management document *Guidance on the Assessment of Dust from Demolition and Construction* (IAQM, 2014) states that site traffic and plant is unlikely to make a significant impact on climate. As per Section 10.3.4, Ireland had total GHG emissions of 46.19 Mt CO_2eq in 2021, emissions from the construction phase of the proposed development will be a small fraction of this. Therefore, the potential impact on climate is considered to be imperceptible, direct, neutral and short-term.

Human Health

Dust emissions from the construction phase of the proposed development have the potential to impact human health through the release of PM_{10} and $PM_{2.5}$ emissions. As per Table 10.9 the surrounding area is of low sensitivity to dust related human health impacts. In addition, it has been determined that there is at most a low risk of human health impacts from construction dust emissions (Table 10.10). In the absence of mitigation there is the potential for short-term, negative and imperceptible impacts to human health as a result of construction dust emissions.

10.5.3 Operational Effects

Air Quality

The potential impact of the proposed development has been assessed by modelling emissions from the traffic generated as a result of the development. To provide for a worst case assessment traffic associated with the full masterplan development has been included in the air modelling assessment, as this will allow for the impact from the full build out of the site to be determined. The traffic data includes the Do Nothing and Do Something scenarios (see Section 10.2.3.1). The impact of NO_2 and PM_{10} emissions for the opening and design years was predicted at the nearest sensitive receptors to the development. This assessment allows the significance of the development, with respect to both relative and absolute impacts, to be determined.

The TII guidance PE-ENV-01106 (TII, 2022a) details a methodology for determining air quality impact significance criteria for TII road schemes and infrastructure projects however, this significance criteria can be applied to any development that causes a change in traffic. The degree of impact is determined based on both the absolute and relative impact of the proposed development. Results are compared against the 'Do-Nothing' scenario, which assumes that the proposed development is not in place in future years, in order to determine the degree of impact.

The results of the assessment of the impact of the proposed development on NO_2 in the opening year 2025 and design year 2040 are shown in Table 10.11. The annual average concentration is in compliance with the limit value at the worst-case receptors in 2025 and 2040. Concentrations of NO_2 are at most 36% of the annual limit value in 2025 and 29% of the annual limit value in 2040. There are predicted to be some increases in traffic between the opening and design years therefore, any decrease in concentration is due to increased uptake in electric vehicles and lower vehicle exhaust emissions. The TII guidance (2022a) states that the hourly limit value for NO_2 of 200 $\mu g/m^3$ is unlikely to be exceeded at roadside locations unless the annual mean is above 60 $\mu g/m^3$. As predicted NO_2 concentrations are significantly below 60 $\mu g/m^3$ (Table 10.11) it can be concluded that the short-term NO_2 limit value will be complied with at all receptor locations.

The impact of the proposed development on annual mean NO_2 concentrations can be assessed relative to "Do Nothing (DN)" levels. NO_2 concentrations at the receptors assessed will increase as a result of the proposed development when compared with the Do-Nothing scenario. There will be at most an increase of 0.53 $\mu g/m^3$ at receptor R1, this is a 4.8% change from baseline conditions. Where the predicted annual mean concentrations are less than 75% of the air quality standard (see Table 10.1) and there is a less than 5% change in concentrations compared with the Do-Nothing scenario then the impact is considered neutral as per the TII significance criteria (see Table 10.4). Therefore, the impact of the proposed development on NO_2 concentrations is neutral.

In relation to changes in PM_{10} concentrations as a result of the proposed development, the results of the assessment can be seen in Table 10.12 for the opening year 2025 and design year 2040. The annual average concentration is in compliance with the limit value at the worst-case receptors in 2025 and 2040. Concentrations of PM_{10} are at most 40% of the annual limit value in 2025 and 40% of the annual limit value in 2040. In addition, the proposed development will not result in any exceedances of the daily PM_{10} limit value of 50 $\mu g/m^3$. The impact of the proposed development on annual mean PM_{10} concentrations can be assessed relative to "Do Nothing (DN)" levels. PM_{10} concentrations at the

receptors assessed will increase as a result of the proposed development when compared with the Do-Nothing scenario. There will be at most an increase of 0.33 µg/m^3 at receptor R1, this is a 2.4% change from baseline conditions. As with NO_2, where the predicted annual mean concentrations are less than 75% of the air quality standard (see Table 10.1) and there is a less than 5% change in concentrations compared with the Do-Nothing scenario then the impact is considered neutral as per the TII significance criteria (see Table 10.4). Therefore, the impact of the proposed development on PM_{10} concentrations is neutral.

Overall, the impact of the proposed development on ambient air quality in the operational stage is considered long-term, localised, neutral, imperceptible and non-significant.

Receptor	Impact Opening Year				Impact Design Year			
	DN	DS	DS-DN	Description	DN	DS	DS-DN	Description
R1	11.1	11.7	0.53	Neutral	10.5	10.7	0.18	Neutral
R2	10.9	11.3	0.33	Neutral	10.4	10.5	0.11	Neutral
R3	10.0	10.0	0.04	Neutral	10.0	10.0	0.02	Neutral
R4	14.2	14.3	0.13	Neutral	11.6	11.6	0.05	Neutral

Table 10.11 Annual Mean NO_2 Concentrations (µg/m^3)

Receptor	Impact Opening Year				Impact Design Year			
	DN	DS	DS-DN	Description	DN	DS	DS-DN	Description
R1	13.8	14.1	0.33	Neutral	13.9	14.2	0.31	Neutral
R2	13.6	13.8	0.21	Neutral	13.7	13.9	0.19	Neutral
R3	13.0	13.0	0.03	Neutral	13.0	13.0	0.03	Neutral
R4	15.8	15.9	0.07	Neutral	15.9	15.9	0.04	Neutral

Table 10.12 Annual Mean PM_{10} Concentrations (µg/m^3)

Climate

There is the potential for increased traffic volumes to impact climate. The change in traffic was reviewed against the DMRB screening criteria outlined in Section 10.2.3.2 (UK Highways Agency, 2019) and a detailed climate assessment of traffic emissions was conducted.

The predicted concentrations of CO_2 for the future years of 2025 and 2040 are detailed in Table 10.13. These are significantly less than the 2025 and 2030 targets set out under EU legislation (targets beyond 2030 are not available). It is predicted that in 2025 the proposed development will increase CO_2 emissions by 0.00028% of the EU 2025 target. Similarly low increases in CO_2 emissions are predicted to occur in 2040 with emissions increasing by 0.00025% of the EU 2030 target.

The potential climate impact of the proposed development is considered neutral, long-term and imperceptible in relation to traffic emissions.

Year	Scenario	CO_2eq (tonnes/annum)
2025	Do Nothing	1,136
	Do Something	1,245
2040	Do Nothing	1,259
	Do Something	1,343
Increment in 2025		109
Increment in 2040		84
Emission Ceiling (Tonnes) 2025		38,991,362
Emission Ceiling (Tonnes) 2030		33,381,312
Impact in 2025 (%)		0.00028%
Impact in 2040 (%)		0.00025%

Note 1 Target under *Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013*

Table 10.13 Climate Traffic Impact Assessment

Climate change has the potential to alter weather patterns and increase the frequency of rainfall in future years. As a result of this there is the potential for flooding related impacts on site in future years. However, adequate attenuation and drainage have been provided for to account for increased rainfall in future years as part of the design of this development. Therefore, the impact will be long-term, localised, neutral and imperceptible.

The proposed development has been designed to reduce the impact to climate where possible during operation. A number of measures have been incorporated into the design of the development to ensure the operational phase emissions are minimised. The development will be Nearly Zero Energy Building (NZEB) compliant in accordance with the 2021 Part L requirements. Each building will have a Building Energy Rating (BER) to comply with the NZEB requirements. Renewable technologies in the form of air to water heat pumps will be fitted to each unit. Passive design measures include the use of the building fabric to take advantage of the site constraints/orientation to maximise the daylight factors, natural ventilation and solar benefits. Natural daylight factors in accordance with BRE and CIBSE recommendations have been targeted. Further detail is provided in Chapter 2.0.

Human Health

Traffic related air emissions have the potential to impact air quality which can affect human health. However, air dispersion modelling of traffic emissions has shown that levels of all pollutants are below the ambient air quality standards set for the protection of human health. It can be determined that the impact to human health during the operational stage is long-term, neutral, direct and imperceptible.

10.5.4 Cumulative Effects

Construction Phase

According to the IAQM guidance (2014) should the construction phase of the proposed development coincide with the construction of any other permitted developments within 350m of the site then there is the potential for cumulative dust impacts to the nearby sensitive receptors. A review of recent planning applications for the area was conducted in order to identify sites with the potential for cumulative

impacts. The Coonagh to Knockalisheen Distributor Project is currently under construction to the east of the proposed development and it is assumed that the major dust generating construction works would be broadly complete before construction begins on the proposed development.

There is the potential for the construction of the various phases of the proposed masterplan development on the site to overlap with each other. It is proposed to construct the full site masterplan (Phase 1 – 5) on a phased basis (see Chapter 1 and Chapter 2 for further details on construction phasing schedule) with each phase running subsequent to the next. Therefore, the potential for concurrent construction works and cumulative construction dust impacts will be minimised as the majority of construction works on one phase will be completed prior to works commencing on the next phase. When considering the construction of the masterplan site as a whole the surrounding area is considered of medium sensitivity to dust soiling and of low sensitivity to dust related human health impacts. This is based on the number of receptors within 20m of the masterplan site boundary (7 no.) and the criteria in Table 10.8 and Table 10.9.

However, as mentioned construction works will not be undertaken on the full site at any one time as works will be on a phased basis, therefore, a smaller number of receptors will be impacted at any one time. The dust mitigation measures outlined in Section 10.6.1 and Appendix 10.1 will be applied throughout the construction phase of the proposed development with similar mitigation implemented for the additional masterplan phases across the site, this will avoid significant cumulative impacts on air quality. With appropriate mitigation measures in place, the predicted cumulative impacts on air quality associated with the construction phase of the proposed development are deemed short-term, negative, slight and not significant.

The construction stage traffic associated with the build-out of the masterplan development has been reviewed and a detailed air quality assessment has been scoped out as none of the road links impacted by the proposed development satisfy the TII assessment criteria in Section 10.2.2.1.

According to the IAQM guidance (2014) site traffic, plant and machinery are unlikely to have a significant impact on climate. Therefore, cumulative impacts are not predicted.

Operational Phase

Cumulative impacts have been incorporated into the traffic data supplied for the operational stage air and climate modelling assessments. The traffic modelled included the traffic associated with the full masterplan development for the site as a worst-case scenario. A total of 4 no. sensitive receptors were chosen for inclusion in the air quality modelling assessment as these are within 200m of impacted road links (see Figure 10.1). As per Table 10.4, there are a number road links that met the TII screening criteria and were included within the air quality assessment. The changes in traffic on other road links in the vicinity of the site were below the screening criteria and were not included within the assessment. The receptors modelled have been chosen as a representative sample of worst-case receptors and impacts at other nearby receptors will be similar or lesser than reported within this assessment. The results of the modelling assessment (Section 10.5.3) show that there is a long-term, neutral and imperceptible impact to air quality and climate during the operational stage.

10.6 REMEDIAL & MITIGATION MEASURES

10.6.1 Construction Phase

10.6.1.1 Mitigation by Avoidance / Design

No mitigation proposed.

10.6.1.2 Mitigation by Prevention

AIR QLTY & C CONST 1 - The proposed development has been assessed as having a medium risk of dust soiling impacts and a low risk of dust related human health impacts during the construction phase as a result of earthworks, construction and trackout activities (see Section 10.5.2.1). Therefore, dust mitigation measures appropriate for sites with a medium risk of dust impacts shall be implemented during the construction phase of the proposed development. These measures aim to ensure that no significant nuisance occurs at nearby sensitive receptors. The dust mitigation measures have been developed in the form of a Dust Management Plan which is detailed within Appendix 10.1. The Dust Management Plan as detailed in Appendix 10.1 shall be agreed with the planning authority prior to construction and the measures implemented throughout the construction phase of the proposed development.

AIR QLTY & C CONST 2 - The following best practice measures shall be implemented on site to prevent significant GHG emissions and reduce impacts to climate:

- Prevention of on-site or delivery vehicles from leaving engines idling, even over short periods.
- Ensure all plant and machinery are well maintained and inspected regularly.
- Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site.
- Sourcing materials locally where possible to reduce transport related CO_2 emissions.

10.6.1.3 Mitigation by Reduction

No mitigation proposed.

10.6.2 Operational Phase

10.6.2.1 Mitigation by Avoidance / Design

AIR QLTY & C OPER 1 - The development shall be Nearly Zero Energy Building (NZEB) compliant in accordance with the 2021 Part L requirements. Each building shall have a Building Energy Rating (BER) to comply with the NZEB requirements.

AIR QLTY & C OPER 2 - Renewable technologies in the form of air to water heat pumps shall be fitted to each unit. Passive design measures include the use of the building fabric to take advantage of the site constraints/orientation to maximise the daylight factors, natural ventilation and solar benefits. Natural daylight factors in accordance with BRE and CIBSE recommendations have been targeted.

10.6.2.2 Mitigation by Prevention

No mitigation proposed.

10.6.2.3 Mitigation by Reduction

No mitigation proposed.

10.7 RESIDUAL EFFECTS

10.7.1 Construction Phase

Air Quality

When the dust mitigation measures detailed in the mitigation section of this report (Section 10.6.1) and Appendix 10.1 are implemented, the residual effect of fugitive emissions of dust and particulate matter from the site will be short term, direct, negative and imperceptible in nature, posing no nuisance at nearby receptors.

Climate

According to the IAQM guidance (2014) site traffic, plant and machinery are unlikely to have a significant impact on climate. Therefore, the predicted impact is short-term, neutral and imperceptible.

Human Health

Best practice mitigation measures are proposed for the construction phase of the proposed development which will focus on the pro-active control of dust and other air pollutants to minimise generation of emissions at source. The mitigation measures that will be put in place during construction of the proposed development will ensure that the impact of the development complies with all EU ambient air quality legislative limit values which are based on the protection of human health. Therefore, the residual effect of construction of the proposed development will be short term, direct, negative and imperceptible with respect to human health.

10.7.2 Operational Phase

Air Quality

Air dispersion modelling of operational traffic emissions associated with the proposed development was carried out using the TII REM tool. The modelling assessment determined that the change in emissions of NO_2 and PM_{10} at nearby sensitive receptors as a result of the proposed development will be neutral. Therefore, the operational phase impact to air quality is long-term, localised, neutral, imperceptible and non-significant.

Climate

Modelling of operational phase CO_2 emissions as a result of the traffic associated with the proposed development was carried out to determine the impact to climate. It was found that emissions of CO_2 will increase by an imperceptible amount as a result of the proposed development and are significantly below the EU 2030 GHG targets. The operational phase impact to climate is long-term, neutral and

imperceptible. In addition, the proposed development has been designed to reduce the impact to climate where possible during operation.

Human Health

Emissions of air pollutants are predicted to be significantly below the ambient air quality standards which are based on the protection of human health. Therefore, impacts to human health are long-term, direct, neutral, non-significant and imperceptible.

10.8 MONITORING

10.8.1 Construction Phase

Monitoring of construction dust deposition along the site boundary to nearby sensitive receptors during the construction phase, particularly during the ground works phases, of the proposed development is recommended to ensure mitigation measures are working satisfactorily. This can be carried out using the Bergerhoff method in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting vessel is secured to the stand with the opening of the collecting vessel located approximately 2m above ground level. The TA Luft limit value is 350 mg/m^2/day during the monitoring period of 30 days (+/- 2 days).

10.8.1 Operational Phase

There is no monitoring recommended for the operational phase of the development as impacts to air quality and climate are predicted to be imperceptible.

10.9 REFERENCES

BRE (2003) Controlling Particles, Vapours & Noise Pollution From Construction Sites

Department of the Environment Heritage and Local Government (DEHLG) (2004) Quarries and Ancillary Activities, Guidelines for Planning Authorities

Dublin City Council (2018) Air Quality Monitoring and Noise Control Unit's Good Practice Guide for Construction and Demolition

Environmental Protection Agency (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports

Environmental Protection Agency (2022a) Air Quality Monitoring Report 2021 (& previous annual reports)

Environmental Protection Agency (2023) EPA website Available at: http://www.epa.ie/whatwedo/monitoring/air/

European Commission (2013) Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment

German VDI (2002) Technical Guidelines on Air Quality Control – TA Luft

Government of Ireland (2015) Climate Action and Low Carbon Development Act

Government of Ireland (2019) Climate Action Plan 2019

Government of Ireland (2020) Draft General Scheme of the Climate Action (Amendment) Bill 2019

Government of Ireland (2021a) Climate Action Plan 2021

Government of Ireland (2021b) Climate Action and Low Carbon Development (Amendment) Act 2021 (No. 32 of 2021)

Government of Ireland (2022) Climate Action Plan 2023

Institute of Air Quality Management (IAQM) (2014) Guidance on the Assessment of Dust from Demolition and Construction Version 1.1

Institute of Environmental Management & Assessment (IEMA) (2022) Assessing Greenhouse Gas Emissions and Evaluating their Significance

Institute of Environmental Management & Assessment (IEMA) (2017) Assessing Greenhouse Gas Emissions and Evaluating their Significance

Met Éireann (2023) Met Eireann website: https://www.met.ie/

The Scottish Office (1996) Planning Advice Note PAN50 Annex B: Controlling The Environmental Effects Of Surface Mineral Workings Annex B: The Control of Dust at Surface Mineral Workings

Transport Infrastructure Ireland (2022a) Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106

Transport Infrastructure Ireland (2022b) TII Road Emissions Model (REM): Model Development Report – GE-ENV-01107

Transport Infrastructure Ireland (TII) (2022a) PE-ENV-01104: Climate Guidance for National Rods, Light Rail and Rural Cycleways (Offline & Greenways) – Overarching Technical Document

Transport Infrastructure Ireland (TII) (2022b) TII Roads Emissions Model (REM) Online Tool

UK Highways Agency (2019) UK Design Manual for Roads and Bridges (DMRB) Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 14 LA 114 Climate

UK Office of Deputy Prime Minister (2002) Controlling the Environmental Effects of Recycled and Secondary Aggregates Production Good Practice Guidance

USEPA (1997) Fugitive Dust Technical Information Document for the Best Available Control Measures

World Health Organisation (2006) Air Quality Guidelines - Global Update 2005 (and previous Air Quality Guideline Reports 1999 & 2000)

Appendix 10.1 – Dust Management Plan

The proposed development has been assessed as having a medium risk of dust soiling impacts and a low risk of dust related human health impacts during the construction phase as a result of earthworks, construction and trackout activities. Therefore, the following dust mitigation measures shall be implemented during the construction phases of the proposed development. These measures are appropriate for sites with a medium risk of dust impacts and aim to ensure that no significant nuisance occurs at nearby sensitive receptors. The mitigation measures draw on best practice guidance from Ireland (DCC, 2018), the UK (IAQM (2014), BRE (2003), The Scottish Office (1996), UK ODPM (2002)) and the USA (USEPA, 1997). These measures will be incorporated into the overall Construction Environmental Management Plan (CEMP) prepared for the site. The measures are divided into different categories for different activities.

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before works commence on site. Community engagement includes explaining the nature and duration of the works to local residents and businesses.
- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details.

Site Management

- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions. Dry and windy conditions are favourable to dust suspension therefore mitigations must be implemented if undertaking dust generating activities during these weather conditions.
- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out

Preparing and Maintaining the Site

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
- Fully enclose specific operations where there is a high potential for dust production and the site is active for an extensive period.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
- Cover, seed or fence stockpiles to prevent wind whipping.

Operating Vehicles / Machinery and Sustainable Travel

- Ensure all vehicles switch off engines when stationary - no idling vehicles.
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.

- Impose and signpost a maximum-speed-limit of 15 kph haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Waste Management

- Avoid bonfires and burning of waste materials.

Measures Specific to Earthworks

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Only remove the cover in small areas during work and not all at once.
- During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate to ensure moisture content is high enough to increase the stability of the soil and thus suppress dust.

Measures Specific to Construction

- Avoid scabbling (roughening of concrete surfaces) if possible.
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
- For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.

Measures Specific to Trackout

- A speed restriction of 15 kph will be applied as an effective control measure for dust for on-site vehicles.

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Access gates to be located at least 10 m from receptors where possible.

Monitoring

- Undertake daily on-site and off-site inspections, where receptors (including roads) are nearby, to monitor dust, record inspection results in the site inspection log. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100 m of site boundary, with cleaning to be provided if necessary.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- Monitoring of construction dust deposition along the site boundary to nearby sensitive receptors during the ground works phases of the proposed development is required to ensure mitigation measures are working satisfactorily. This can be carried out using the Bergerhoff method in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting vessel is secured to the stand with the opening of the collecting vessel located approximately 2m above ground level. The TA Luft limit value is 350 mg/m^2/day during the monitoring period of 30 days (+/- 2 days).

CHAPTER ELEVEN NOISE AND VIBRATION

11.1 INTRODUCTION

This Chapter has been prepared to assess the potential noise and vibration effects of the proposed development in the context of current relevant standards and guidance as detailed in relevant sections below.

It includes a description of the receiving ambient noise climate in the vicinity of the subject site and an assessment of the potential noise and vibration impact associated with the proposed development, during both the short-term construction phase and the long-term operational phase, on its surrounding environment. The assessment of direct, indirect and cumulative noise and vibration effects on the surrounding environment have been considered in this chapter.

The proposed development site (Phase 3) is part of a phased development proposal for a large greenfield area or Masterplan Site (MS). This MS is divided into seven different phases of delivery as detailed in Table 1.1 in Chapter 1.0 Introduction. The overall MS layout which illustrates the indicative layout of the subject site and adjoining lands in the ownership of the applicant is displayed on Figure 1.0 in Chapter 1.0 and full details of the proposed development phases are given in Chapter 2.0.

The study area takes a holistic approach and examines the wider MS area whilst focusing on any areas of significance within the proposed development site.

Mitigation and monitoring measures are included, where relevant, to ensure the proposed development is constructed and operated in an environmentally sustainable manner in order to ensure minimal impact on the receiving environment.

11.2 ASSESSMENT METHODOLOGY

11.2.1 Proposed Approach

The assessment of effects has been undertaken with reference to the most appropriate guidance documents relating to environmental noise and vibration which are set out within the relevant sections of this report.

The study has been undertaken using the following methodology:

- Review of measured prevailing noise levels in the vicinity of the subject site in order to characterise the existing baseline noise environment;
- A review of the most applicable standards and guidelines has been conducted in order to set a range of acceptable noise and vibration criteria for the construction and operational phases of the proposed development;
- Predictive calculations have been performed during the construction phase of the project at the nearest sensitive locations to the development site; and,
- Review of relevant information to assess the potential for effects associated with the operational phase of the development at the most sensitive locations surrounding the development site.

11.2.2 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 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*.

ABC Method

The approach adopted here calls for the designation of a noise sensitive location into a specific category (A, B or C) based on existing ambient noise levels in the absence of construction noise. This then sets a threshold noise value that, if exceeded at this location, indicates a potential significant noise impact is associated with the construction activities.

The *BS 5228 d*ocument sets out guidance on Construction Noise Thresholds (CNTs) relative to the existing noise environment. Table 11.1 sets out the values which, when exceeded, signify a potential significant effect at the facades of residential receptors as recommended by BS 5228 – 1, depending on context.

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

Table 11.1 Example Construction Noise Thresholds at Dwellings

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 periods (i.e. daytime, evening and night time) the ambient noise leve lis determined and rounded to the nearest 5 dB.

Fixed Limits

When considering non-residential receptors, reference is made to BS 5228-1:2009+A1:2014, which gives several examples of acceptable limits for construction noise, the most simplistic being based upon the exceedance of fixed noise limits. For example, paragraph E.2 states:

> *"Noise from construction and demolition sites should not exceed the level at which conversation in the nearest building would be difficult with the windows shut."*

Paragraph E.2 goes on to state:

> *"Noise levels, between say 07.00 and 19.00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed: 70 decibels (dBA) in rural, suburban areas away from main road traffic and industrial noise; and 75 decibels (dBA) in urban areas near main roads in heavy industrial areas".*

Based on the above information and the prevailing ambient noise environment (set out in Section 11.4), the following CNTs are proposed for the site:

> ***65 dB $L_{Aeq,1hr}$ at noise sensitive residential locations***
> ***75 dB $L_{Aeq,1hr}$ at commercial properties***

Interpretation of the CNT

In order to assist with interpretation of CNTs, Table 11.2 includes guidance as to the likely magnitude of effect associated with construction activities, relative to the CNT. This guidance is derived from Table 3.16 of *DMRB: Noise and Vibration* and adapted to include the relevant significance effects from the *EPA Guidelines* (EPA 2022).

In accordance with the DMRB Noise and Vibration (UKHA 2020), construction noise and construction traffic noise impacts shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:

- Ten or more days or night in any 15 consecutive day or nights; and
- A total number of days exceeding 40 in any six consecutive months

Guidelines for Noise Impact Assessment Significance (DMRB)	CNT per Period	EPA EIAR Significance Effects	Determination
Negligible	Below or equal to baseline noise level	Not Significant	Depending on CNT, duration & baseline noise level
Minor	Above baseline noise level and below or equal to CNT	Slight to Moderate	
Moderate	Above CNT and below or equal to CNT +5 dB	Moderate to Significant	
Major	Above CNT +5 to +15 dB	Significant, to Very Significant	
	Above CNT +15 dB	Very Significant to Profound	

Table 11.2 Construction Noise Signifiance Ratings

Criteria for Rating Vibration Impacts

There are two aspects to the issue of vibration that are addressed in the standards and guidelines: the risk of cosmetic or structural damage to buildings; and human perception of vibration. In the case of this development, vibration levels used for the purposes of evaluating building protection and human comfort are expressed in terms of Peak Particle Velocity (PPV) in mm/s.

There is no published statutory Irish guidance relating to the maximum permissible vibration level. The following standards are the most widely accepted in this context and are referenced here in relation to cosmetic or structural damage to buildings:

- British Standard BS 5228-2 *Code of Practice for noise and vibration control of construction and open sites - Part 2: Vibration* (BSI 2014); and
- British Standard BS 7385-2 *Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration* (BSI 1993).

BS 5228-2 and BS 7385-2 define the following thresholds for cosmetic damage to residential or light commercial buildings: PPV should be below 15 mm/s at 4 Hz to avoid cosmetic damage. This increases to 20 mm/s at 15 Hz and to 50 mm/s at 40 Hz and above. At frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded. This is summarised in Table 11.3 below.

Type of building	Peak component particle velocity in frequency range of predominant pulse	
	4 Hz to 15 Hz	15 Hz and above
Unreinforced or light framed structures. Residential or light commercial buildings.	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Table 11.3 Allowable Vibration during Construction Phase

Note 1: Values referred to are at the base of the building.
Note 2: At frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded.

Furthermore, BS 5228-2 and BS 7385-2 state that minor structural damage can occur at vibration magnitudes greater than twice those in Table 11.3 and major structural damage can occur at vibration magnitudes greater than four times those in Table 11.3.

BS 5228-2 also provides guidance relating to the human response to vibration. Guidance is again provided in terms of PPV in mm/s since this parameter is routinely measured when monitoring the structural effects of vibration. The potential human response at different vibration levels, as set out in BS 5228-2, is summarised in Table 11.4.

Vibration level Note A) B) C) (mm/s)	Effect
0.14	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3	Vibration might be just perceptible in residential environments.
1.0	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.

Table 11.4 Guidance on human response to vibration levels

A) *The magnitudes of the values presented apply to a measurement position that is representative of the point of entry into the recipient.*

B) *A transfer function (which relates an external level to an internal level) needs to be applied if only external measurements are available.*

C) *Single or infrequent occurrences of these levels do not necessarily correspond to the stated effect in every case. The values are provided to give an initial indication of potential effects, and where these values are routinely measured or expected then an assessment in accordance with BS 6472-1 or -2, and/or other available guidance, might be appropriate to determine whether the time varying exposure is likely to give rise to any degree of adverse comment.*

Construction Phase Traffic

Vehicular movement to and from the construction site for the proposed development will make use of the existing road network. In order to assess the potential impact of additional traffic on the human perception of noise, the following two guidelines are referenced; DMRB Noise and Vibration (UKHA 2020) and the EPA Guidelines (EPA, 2022). For construction traffic, due to the short-term period over which this impact occurs, the magnitude of impacts is assessed against the 'short term' period in accordance with the DMRB Noise and Vibration (UKHA 2020) document.

Table 11.5 sets out the classification of changes in noise level to impact on human perception based on the guidance contained in these documents.

Change in Sound Level (dB)	Subjective Reaction	DMRB Magnitude of Impact (Short-term)	EPA Significance of Effect
Less than 1 dB	Inaudible	Negligible	Imperceptible
1 – 2.9	Barely Perceptible	Minor	Not Significant
3 – 4.9	Perceptible	Moderate	Slight, Moderate
≥ 5	Up to a doubling of loudness	Major	Significant

Table 11.5 Classification of magnitude of traffic noise changes in the short-term

11.2.3 Operational Phase – Noise Guidance

Mechanical Services Plant

BS 4142:2014: *Methods for rating and assessing industrial and commercial sound* is the industry standard method for analysing building services plant sound emissions to residential receptors. This standard describes a method for assessing the impact of a specific noise source at a specific location with respect to the increase in "background" noise level that the specific noise source generates. The standard provides the following definitions that are pertinent to this application:

- "Specific sound level, $L_{Aeq,Tr}$" is equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T. This level has been determined with reference to manufacturers information for specific plant items.
- "Rating level" $L_{Ar,Tr}$ is the specific noise level plus adjustments for the character features of the sound (if any), and;
- "Background noise level" is the sound A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T. This level is expressed using the LA90 parameter. These levels were measured as part of the baseline survey.

The assessment procedure in BS4142 is outlined as follows:

1. determine the specific noise level;
2. determine the rating level as appropriate;
3. determine the background noise level, and;
4. subtract the background noise level from the specific noise level in order to calculate the assessment level.

The lower the rating level is relative to the measured background sound level, the less likely it is that the specific source will have an adverse impact or a significant adverse impact. A difference of +10 dB or more is a likely to be an indication of a significant adverse impact. A difference of around +5 dB is likely to be an indication of an adverse impact, dependent on the context. Where the rated plant noise level is equivalent to the background noise level, noise effects are typically considered to be neutral.

Commercial Properties

Limerick Country Club is located to the south east of the site. In terms of noise emissions from the site it is considered that an appropriate building services noise criterion at these locations is 45 dB $L_{Aeq,15min}$.

Additional Traffic on Public Roads

In order to assist with the interpretation of the noise associated with vehicular traffic on public roads, Table 11.6 offers guidance as to the likely impact associated with any particular change in traffic noise level based on the DMRB LA 111 Noise and Vibration (UKHA 2020) and the EPA Guidelines (EPA, 2022). The operational phase traffic is assessed against the 'long term' magnitude of change tables from the DMRB standard.

Change in Sound Level (dB)	Subjective Reaction	DMRB Magnitude of Impact (Short-term)	EPA Significance of Effect
0	Inaudible	No Change	Neutral
0.1 – 2.9	Barely Perceptible	Negligible	Imperceptible
3 – 4.9	Perceptible	Minor	Slight
5 – 9.9	Up to a doubling of loudness	Moderate	Moderate
10+	Doubling of loudness and above	Major	Significant

Table 11.6 Classification of magnitude of traffic noise changes in the long term

11.2.4 Operational Phase – Vibration Guidance

The development is mixed-use-residential in nature, therefore it is not anticipated that there will be any impact associated with vibration during the operational phase.

11.2.5 Inward Noise Impact Assessment

The Professional Practice Guidance on Planning & Noise (ProPG) document was published in May 2017. The document was prepared by a working group comprising members of the Association of Noise Consultants (ANC), the Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH). Although not a government document, since its adoption it has been generally considered as a best practice guidance and has been widely adopted in the absence of equivalent Irish guidance.

The ProPG outlines a systematic risk-based 2-stage approach for evaluating noise exposure on prospective sites for residential development. The two primary stages of the approach can be summarised as follows:

Stage 1 – Comprises a high-level initial noise risk assessment of the proposed site considering either measured and or predicted noise levels; and,

Stage 2 – Involves a full detailed appraisal of the proposed development covering "key elements" that include:

- Element 1 – Good Acoustic Design Process;
- Element 2 – Noise Level Guidelines;
- Element 3 – External Amenity Area Noise Assessment

The initial noise risk assessment is intended to provide an early indication of any acoustic issues that may be encountered. It calls for the categorisation of the site as a negligible, low, medium or high risk based on the pre-existing noise environment. Presents the basis of the initial noise risk assessment, it provides appropriate risk categories for a range of continuous noise levels either measured and/or predicted on site.

It should be noted that a site should not be considered a negligible risk if more than 10 L_{AFmax} events exceed 60 dB during the night period and the site should be considered a high risk if the L_{AFmax} events exceed 80 dB more than 20 times a night.

Element 2 of the ProPG document sets out recommended internal noise targets derived from BS 8233 (2014). The recommended indoor ambient noise levels are set out in Table 11.7 and are based on annual average data, that is to say they omit occasional events where higher intermittent noisy events may occur.

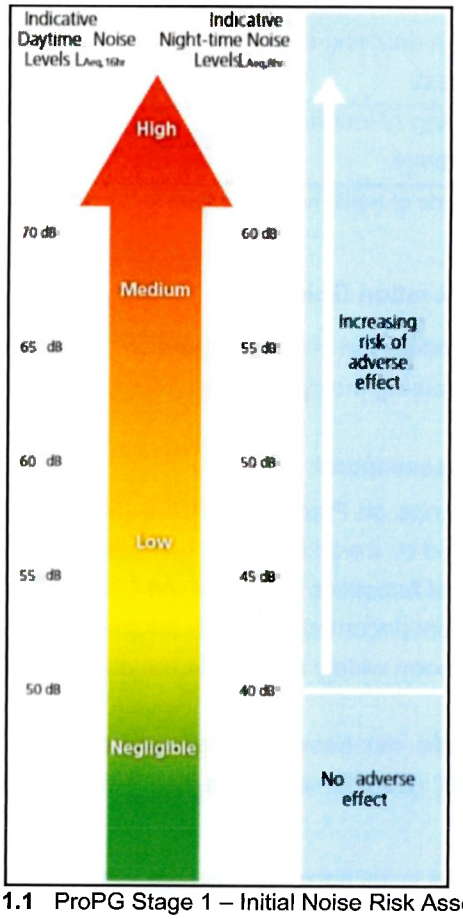


Figure 11.1 ProPG Stage 1 – Initial Noise Risk Assessment

Activity	Location	Day (07:00 to 23:00hrs) dB $L_{Aeq,16hr}$	Night (23:00 to 07:00hrs) dB $L_{Aeq,8hr}$
Restin g	Livin groom	35 dB $L_{Ae\ q16hr}$	-
Dinin g	Diningroom/area	40 dB $L_{Aeq,16hr}$	-
Sleeping (daytime restin g)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$ 45 dB $L_{Amax,T}$*

Table 11.7 ProPG Internal Noise Levels

**Note The document comments that the internal $L_{Afmax,T}$ noise level may be exceeded no more than 10 times per night without a significant impact occurring.*

In addition to these absolute internal noise levels ProPG provides guidance on flexibility of these internal noise level targets. For instance, in cases where the development is considered necessary or desirable, and noise levels exceed the external noise guidelines, then a relaxation of the internal L_{Aeq} values by up to 5 dB can still provide reasonable internal conditions.

ProPG provides the following advice with regards to external noise levels for amenity areas in the development:

> *"The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$."*

11.2.6 Forecasting Methods

Construction noise calculations have been conducted generally in accordance with BS 5228 - 1: 2009+A1:2014: *Code of practice for noise control on construction and open sites - Noise.*

Prediction calculations for building services noise, loading/unloading activity and vehicle movements on site have been conducted generally in accordance with ISO 9613 (1996): *Acoustics – Attenuation of sound during propagation 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.

11.3 RECEIVING ENVIRONMENT

An environmental noise survey has been conducted in order to quantify the existing noise environment. The survey was conducted in accordance with ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise. Specific details are set out below.

11.3.1 Site Context

An environmental noise survey has been conducted in order to quantify the existing noise environment. The noise measurement locations were selected to represent the noise environment at the nearest Noise Sensitive Locations (NSLs) surrounding the proposed development. The noise survey locations are discussed below and shown in Figure 11.2.

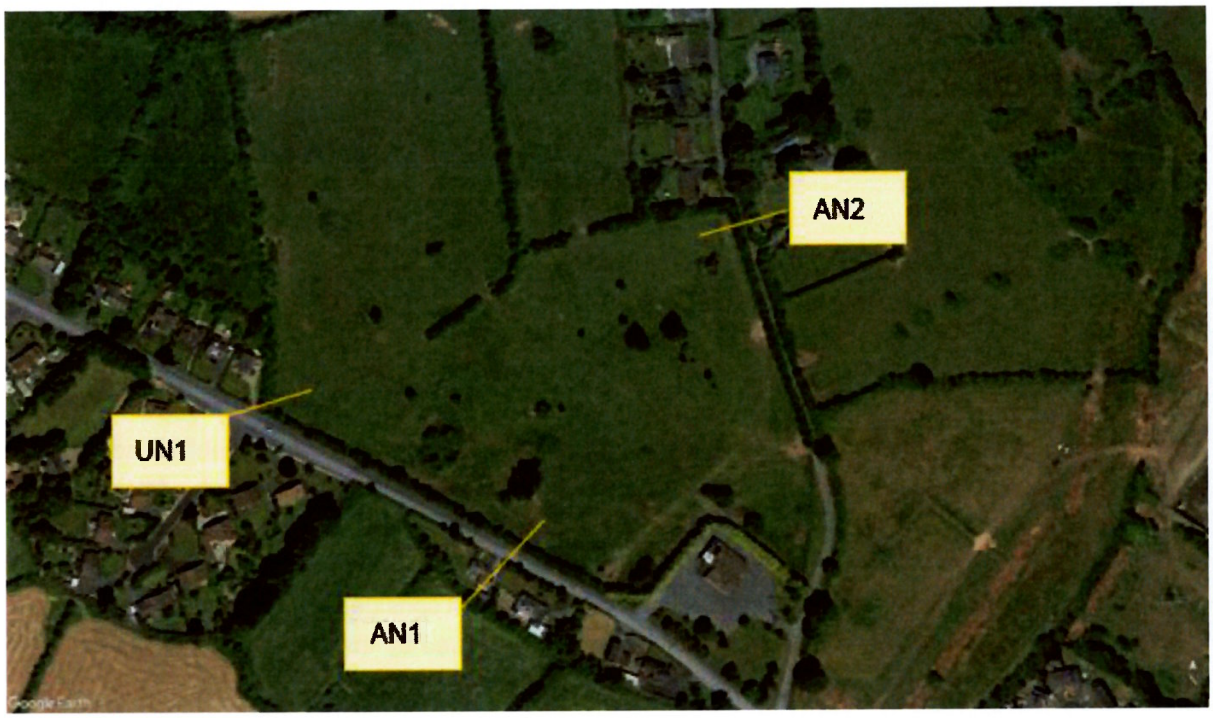


Figure 11.2 Noise Survey Locations.

Location AN1 Attended measurement location to capture the noise levels representative of houses to the south of the proposed development.

Location AN2 Attended measurement location to capture the noise level near a set of houses to the east of the proposed development.

Location UN3 Unattended measurement location to capture the noise level near a set of houses to the west of the proposed development.

11.3.2 Survey Details

Daytime attended measurements were carried out between 14:05 hrs to 16:00 on 01 February 2023. The weather during the survey periods was dry with 100 cloud cover. Wind speeds were generally moderate and below 5m/s; however, they were not considered to have had any significant effect on the noise measurements.

AWN Consulting carried out the attended noise survey. The noise measurements were performed using a Brüel & Kjær Type 2250 Sound Level Meter and a Rion NL52. Before and after the survey the measurement apparatus was check calibrated using a Rion Sound Level Calibrator.

Equipment	Type	Serial Number	Calibration Date
Sound Level Meter	Brüel & Kjær Type 2250	3006754	May 2021
Calibrator	Rion NC-75	34724227	July 2022

Table 11.8 Instrumentation Data is

The noise survey results are presented in terms of the following parameters.

L_{Aeq} is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period.

L_{A90} is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

The "A" suffix for the noise parameters denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to $2x10^{-5}$ Pa.

Measurement equipment was configured to record noise levels over consecutive 15-minture intervals. The equipment was check-calibrated using a sound level meter calibrator at the time of installation and again at collection. Survey personnel noted the primary noise sources contributing to noise build-up during site visits.

11.3.3 Survey Results

The survey results are summarised below in Tables 11.9 and 11.10

Location	Start Time (hrs)	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)	
		$L_{Aeq,15min}$	$L_{A90,15min}$
AN1	14:04	56	45
	14:47	58	47
	15:25	57	46
AN2	14:29	45	42
	15:06	47	44
	15:43	47	44

Table 11.9 Summary of Attended Results - Daytime

At AN1, noise levels were in the range 56 to 58 dB $L_{Aeq,15min}$ and 45 to 47 dB $L_{A90,15min}$. Noise from road traffic Old Cratloe Road was the dominant source at this location. Wind noise in foliage, bird song were audible intermittently at this location and noise associated with a distant bottle bank was audible during the first measurement period.

At AN2, noise levels were in the range 45 to 47 dB $L_{Aeq,15min}$ and in the range of 42 to 44 dB $L_{A90,15min}$. Birdsong was the dominant source at this location with distant road traffic noise and occasional local traffic pass-bys. No other significant noise sources were observed.

Unattended Survey

Location	Period	Start Time (hrs)	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)	
			$L_{Aeq,15min}$	$L_{A90,15min}$
UN1	13:50 – 14:06	Average	73	58
		Max	76	58
		Min	67	58

Table 11.10 Summary of Unattended Results - Daytime

At AN2, noise levels were in the range 67 to 76 dB $L_{Aeq,15min}$ and in of the order of 58 dB $L_{A90,15min}$. Birdsong was the dominant source at this location with distant road traffic noise and occasional local

traffic pass-bys. Horses were noted to have been nearby upon collection of the unattended meter, this may account for the elevated L_{Aeq} measurements when compared with AN1 in the same time period.

11.3.4 Review of EPA Noise Mapping

In order to obtain representative noise levels for use in the assessment, a review of EPA Noise Mapping was carried out. The figure below presents the site location in the context of the 'Round 3' noise maps.

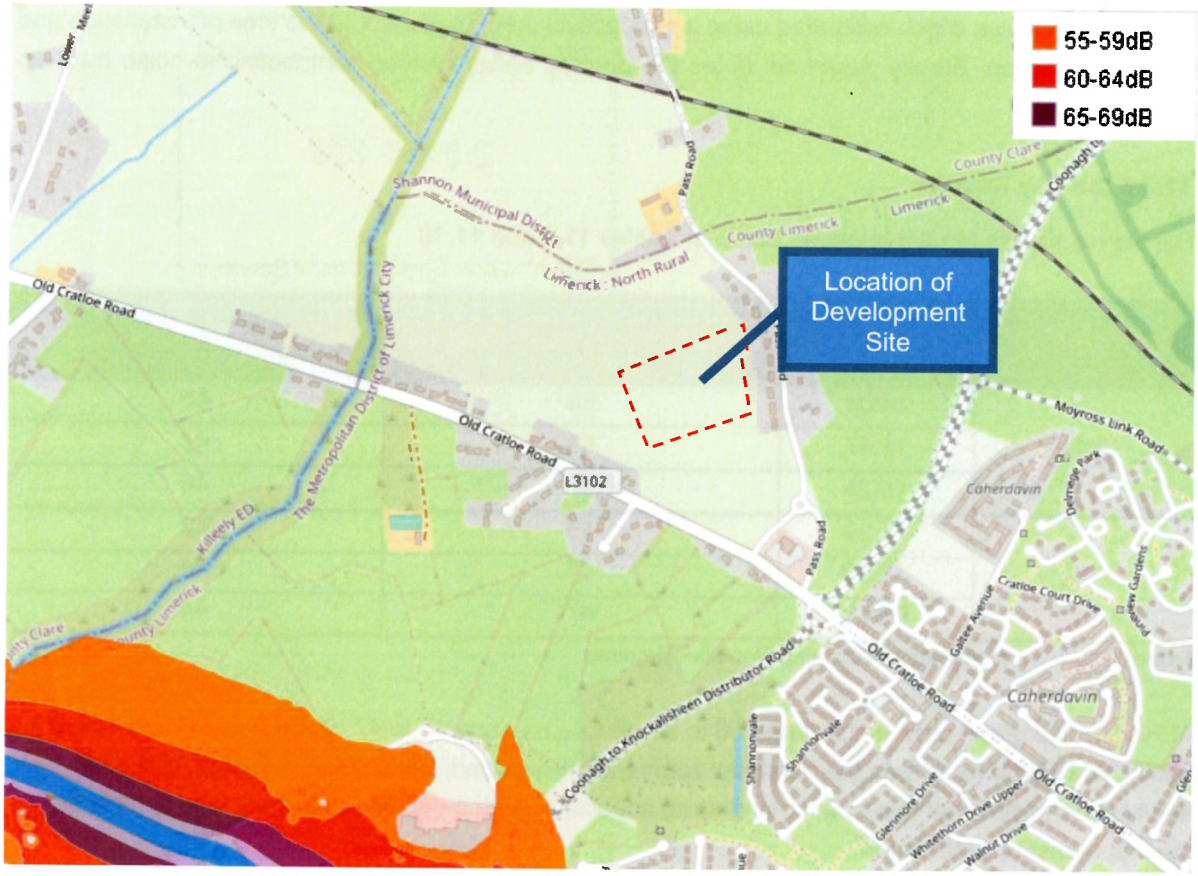


Figure 11.3 EPA Maps Lden Noise Levels

Review of the noise mapping indicates the proposed development is situated below the 55 – 59 dB L_{den} contours for road noise.

The L_{den} parameter is a weighted average across a 24-hour period and is typically of the order of 3-5 dB higher than the corresponding daytime noise levels ($L_{Aeq,T}$).

Figure 11.4 EPA Maps Lnight Noise Levels

Review of the noise mapping indicates the proposed development is situated below the 50 – 54 dB L_{night} contour for road noise at night.

11.3.5 Future Noise Environment

Review of the wider study area has identified the Coonagh to Knockalisheen Distribution Road heading north from Old Cratloe Road and Coonagh to Knockalisheen Distribution Road heading south from Old Cratloe Road. The northern distributor road passes to the east of the proposed development and represents a noise source with potential to cause impacts on the proposed development. Figure 11.5 overleaf presents these new road links.

Predicted traffic volumes have been prepared by Coakley Consulting Engineers. These additional traffic volumes have been included informing the ProPG assessment, details of the ProPG assessment are found in Section 11.4.2.

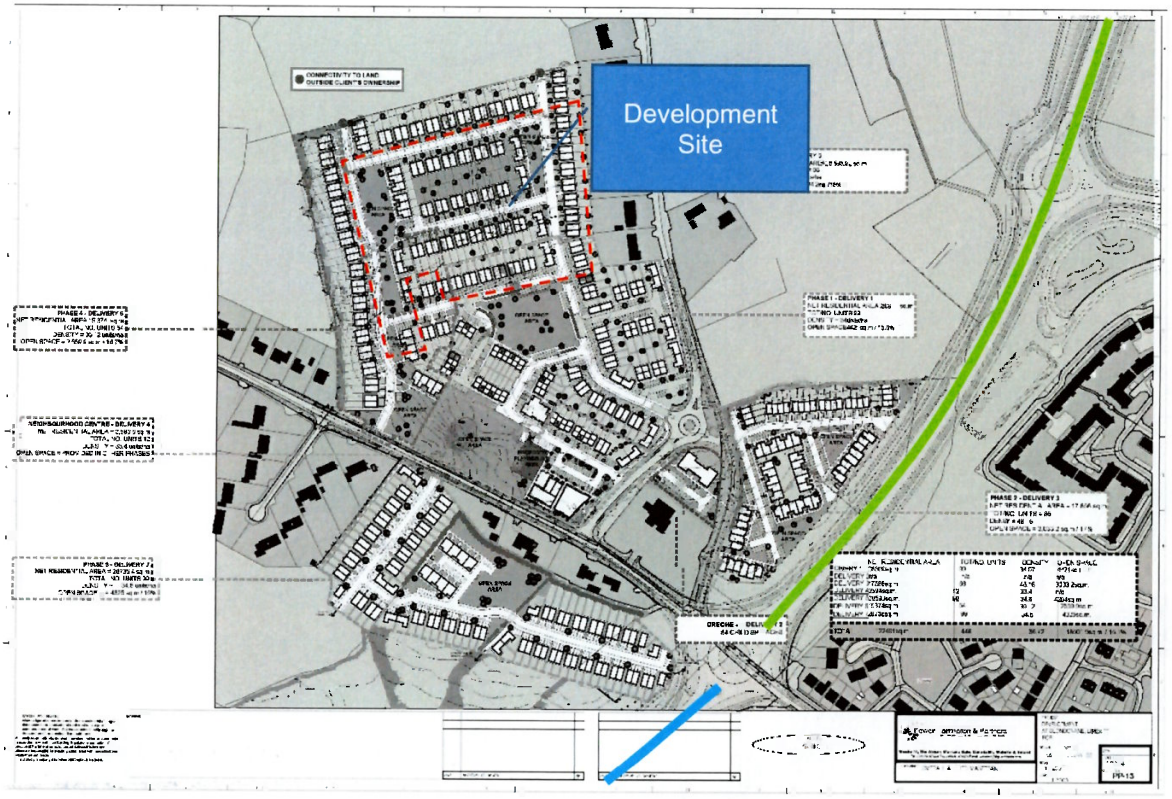


Figure 11.5 Future Road Links

11.4 Potential Impacts of the Proposed Development

11.4.1 Construction Phase – Noise

During the construction phase of the proposed development, a variety of items of plant will be in use, such as excavators, dumper trucks, compressors and generators. Due to the nature of daytime activities undertaken on a construction site such as this, 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.

BS 5228-1 contains noise level data for various construction machinery. The noise levels relating to site clearance, ground excavation, piling and loading lorries (dozers, tracked excavators and wheeled loaders) reach a maximum of 81 dB $L_{Aeq,T}$ at a distance of 10 m. For this assessment, a worst-case scenario is assumed of 3 no. such items with a sound pressure level (SPL) of 81 dB at 10 m operating simultaneously along the closest works boundary. This would result in a total noise level of 86 dB at 10 m and an equivalent combined sound power level of 114 dB LWA. This worst-case scenario is the typical assumption made for developments of this size, on the basis that it is unlikely that more than 3 no. items of such plant/equipment would be operating simultaneously in such close proximity to each other.

Guidance on the approximate attenuation achieved by standard construction hoarding surrounding construction sites is also provided in BS 5228-1. It states that when the top of the plant is just visible to the receiver over the noise barrier, an approximate attenuation of 5 dB can be assumed, while a 10 dB

attenuation can be assumed when the noise screen completely hides the sources from the receiver. The former scenario can be assumed in this case due to the proximity of the noise-sensitive locations, i.e. houses along the site boundary are positioned such that upper storeys are overlooking the site and perimeter hoarding is expected to partially hide the noise source.

Error! Reference source not found..10 shows the potential noise levels calculated at various distances based on the assumed sound power level and attenuation provided by the barrier of 5 dB.

The closest noise sensitive locations have been identified as shown in Figure 11.6. The closest residential noise sensitive properties to the proposed development are houses at Pass Road some 40m to the east of the site (represented by NSL1) and houses at Old Cratloe Road approximately 60m to the south west of the site (represented by NSL2, NSL3 and NSL4).

Review of the baseline noise survey and the threshold values indicates that the appropriate daytime noise criteria for construction noise are as follows:

- Residential receptors 65 dB $L_{Aeq,T}$
- Education receptors 65 dB $L_{Aeq,T}$
- Commercial/industrial receptors 75 dB $L_{Aeq,T}$

A night-time threshold is not included as construction work will not be taking place at night.

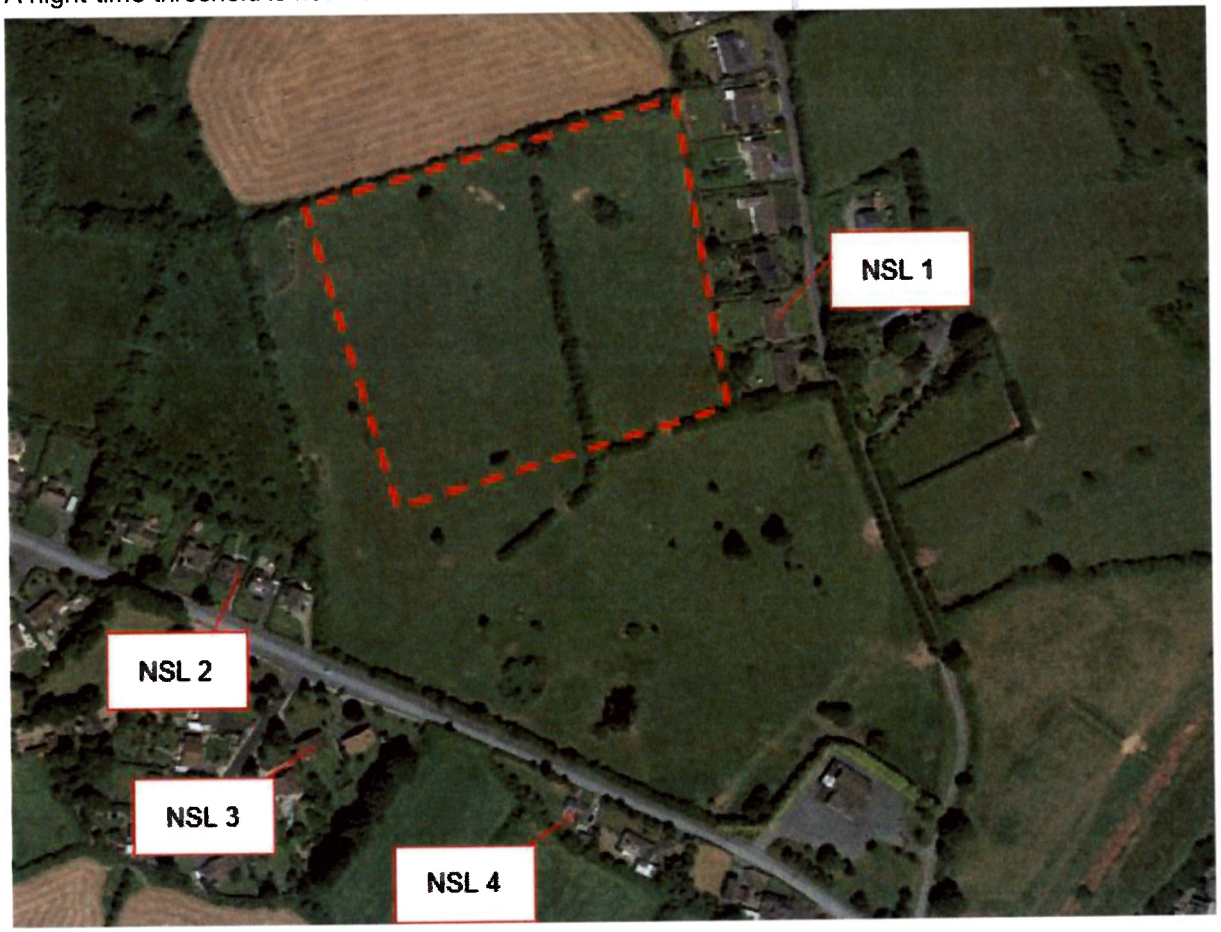


Figure 11.6 Noise Sensitive Locations

Predicted construction noise levels at various distances from areas of works are set out below.

Description of Noise Source	Sound Power Level (dB $L_{w(A)}$)	Calculated noise levels at varying distances (dB $L_{Aeq,T}$)		
		30m	50m	100m
3 no. items each with SPL of 81 dB at 10 m operating simultaneously.	114	67	62	55

Table 11.11 Significance in Change of Noise Level

The calculated noise levels in **Error! Reference source not found.**Table 11.11 show that the significance criteria for residential receptors will be exceeded at locations that are up to 40m from areas of major construction works. In this instance the nearest houses representative of NSL 1 are some 30-35m from the site boundary and therefore worst case contribution of construction noise is predicted to be in the range of +2 dB above the recommended criteria, therefore a negative, moderate to significant and short-term impact is expected at these nearest residential locations. At residential NSLs located at distances further than 40m, the expected effect is negative, moderate and short term.

In order to minimise the impact of construction activity good practice measures are detailed in Section 11.5.

Rock Breaking

Site investigations indicate that rock breaking may be required during the construction phase. In order to determine the potential noise impact associated with this activity, using guidance set out in BS 5228-1:2009+A1:2014. Table 11.12 outlines typical plant items and associated noise levels that are anticipated for rock breaking. An on-time for the activities has assumed to be 50% of a 12-hour working day.

Activity	Item of Plant (BS5228 Ref)	L_{Aeq} at 10m
Rock Breaking	Excavator Mounted Rock Breaker (C.9.12)	85
	Dump Truck (C2.30)	79
	Dozer (C2.13)	78

Table11.12 Potential Construction Noise Levels associated with Rock Breaking

Table 11.13 below presents the predicted daytime noise levels associated with rock breaking at the nearest noise sensitive locations.

Construction Phase	Item of Plant (BS 5228-1 Ref)	L_{Aeq} at distance (m)	
		(30m)	(50m)
Rock Breaking	Excavator Mounted Rock Breaker (C.9.12)	67	63
	Dump Truck (C2.30)	61	57
	Dozer (C2.13)	60	56

Table 11.13 Indicative Construction Noise Levels at Nearest Noise Sensitive Locations

With reference to **Error! Reference source not found.**3, construction noise predictions indicate that a moderate to significant impact may temporarily occur when works are on-going at the site boundaries, i.e. at distances of 30-40m from the nearest NSLs. The predicted noise levels at distances of 50m and greater from rock breaking is predicted to be of negative, moderate and temporary impact.

It should be noted that these are worst case scenarios that assume plant for the activity will operate along the boundary line at the closest point to a sensitive receptor, under real world conditions the rock breaking activity will only occur where rock is discovered and determined that removal is necessary.

Where rock breaking takes place away from boundaries, towards the centre of the site, the distances to nearby NSLs will be larger and therefore construction noise levels will be lower than these levels, for the majority of the time. It should also be noted that blasting is not proposed at any stage of the project and rock will be extracted via mechanical means. The duration of rock breaking activity will be measured in weeks rather than months with the exact duration dependant on ground conditions and the contractors approach.

Construction Traffic

The proposed development site is located between Pass Road and Old Cratloe Road. It is expected that Pass Road will be the primary construction access route to the development for construction traffic taking approximately 70% of construction related traffic, while the remaining 30% of construction traffic will arrive from Old Cratloe Road.

A traffic noise assessment has been undertaken to determine whether the increase in traffic along both access roads.

Construction traffic volumes to and from the site has been provided by Coakley Consulting Engineers, this allows for assessment of any increase in traffic noise associated with vehicle movements to and from the proposed development. During the construction phase a total of 25 HGVs are forecast to access the site per day (resulting in a total of 50 vehicle movements over the 12-hour day). Up to 60 light vehicles for staff and other small deliveries are expected per day (resulting in a total of 120 vehicle movements).

The noise level associated with an event of short duration, such as a passing vehicle movement, may be expressed in terms of its Sound Exposure Level (L_{AX}). The Sound Exposure Level can be used to calculate the contribution of an event or series of events to the overall noise level in a given period.

The appropriate formula is given below:

$L_{Aeq,T} = L_{AX} + 10\log^{10}(N) - 10\log^{10}(T) + 25\log^{10}(r1/r2)$ dB

where:

$L_{Aeq,T}$ is the equivalent continuous sound level over the time period T (in seconds);

L_{AX} is the "A-weighted" Sound Exposure Level of the event considered(dB);

N is the number of events over the course of time period T;

r1 is the distance at which L_{AX} is expressed;

r2 is the distance to the assessment location.

The assumed mean value of Sound Exposure Level for cars and HGV's is in the order of 68 dB L_{AX} and 85 dB L_{AX} respectively at a distance of 10 metres.

Construction traffic noise has been calculated along the two potential site access roads, Old Cratloe Road and a second entrance at the round-about on Pass Road where it will travel south east to the Old Cratloe Road. Baseline and construction traffic noise levels have been summed and the increase in noise levels determined. The results of the comparison are presented in Table 11.14.

Location	Calculated Noise Level, baseline traffic dB $L_{Aeq,1hr}$	Total Noise Level (Baseline + Construction) dB $L_{Aeq,1hr}$	Change in Noise Level dB
Old Cratloe Road	58	58	+0.4

Table 11. 14 Predicted Noise Levels due to Development Traffic at 10 from road edge

The assessment indicates a potential increase in noise level of up to 7.2 dB along the section from the Pass Road roundabout to Old Cratloe Road assuming worst case construction traffic, however the only one sensitive receiver along this road link, is non-residential.

With reference to the calculations above, the predicted increase in noise level associated with construction traffic going to and from the proposed development on the Old Cratloe Road would be less than 1 dB. With reference to Table 11.3, this represents a negligible magnitude of change and the overall impact is determined as not significant.

Construction Phase – Vibration

Potential for vibration impacts during the construction phase programme are associated with rock breaking and excavations.

During rock breaking in the excavation phase, there is potential for vibration to propagate through the ground. Empirical data for this activity is not provided in the BS 5228- 2:2009+A1:2014 standard, however the likely levels of vibration from this activity is expected to be below the vibration threshold for building damage on experience from other sites.

AWN have previously conducted vibration measurements under controlled conditions, during trial construction works, on a sample site where concrete slab breaking was carried out. The trial

construction works consisted of the use of the following plant and equipment when measured at various distances:

- 3 tonne hydraulic breaker on small CAT tracked excavator
- 6 tonne hydraulic breaker on large Liebherr tracked excavator

Vibration measurements were conducted during various staged activities and at various distances. Peak vibration levels during staged activities using the 3 Tonne Breaker ranged from 0.48 to 0.25 PPV (mm/s) at distances of 10 to 50m respectively from the breaking activities. Using a 6 Tonne Breaker, measured vibration levels ranged between 1.49 to 0.24 PPV (mm/s) at distances of 10 to 50m respectively.

The range of values recorded provides some context in relation to typical ranges of vibration generated by rock breaking activity which may be required on the proposed development site. This range of vibration magnitudes indicate vibration levels at the closest neighbouring buildings, located 30m from the site boundary are expected to be below the limits set out in Table 11.14 to avoid any cosmetic damage to buildings.

In terms of disturbance to building occupants, breaking works undertaken within close proximity to the receptors on the northern site perimeter have the potential to emit perceptible vibration levels.

The potential vibration impact during the construction phase if of negative, not significant and temporary impact.

Notwithstanding the above, any construction activities undertaken on the site will be required to operate below the recommended vibration threshold set out in Table 11.4 during all activities.

11.4.2 Operational Phase – Noise

Additional Traffic on Adjacent Roads

During the operational phase of the proposed development, there will be an increase in vehicular traffic associated with the site on some surrounding roads. A traffic impact assessment relating to the proposed development has been prepared by Coakley Consulting Engineers, as part of this EIAR. Traffic flows associated with the overall masterplan have been to inform predictions. Road links used for the additional traffic noise assessment are outlined below in Figure 11.7.

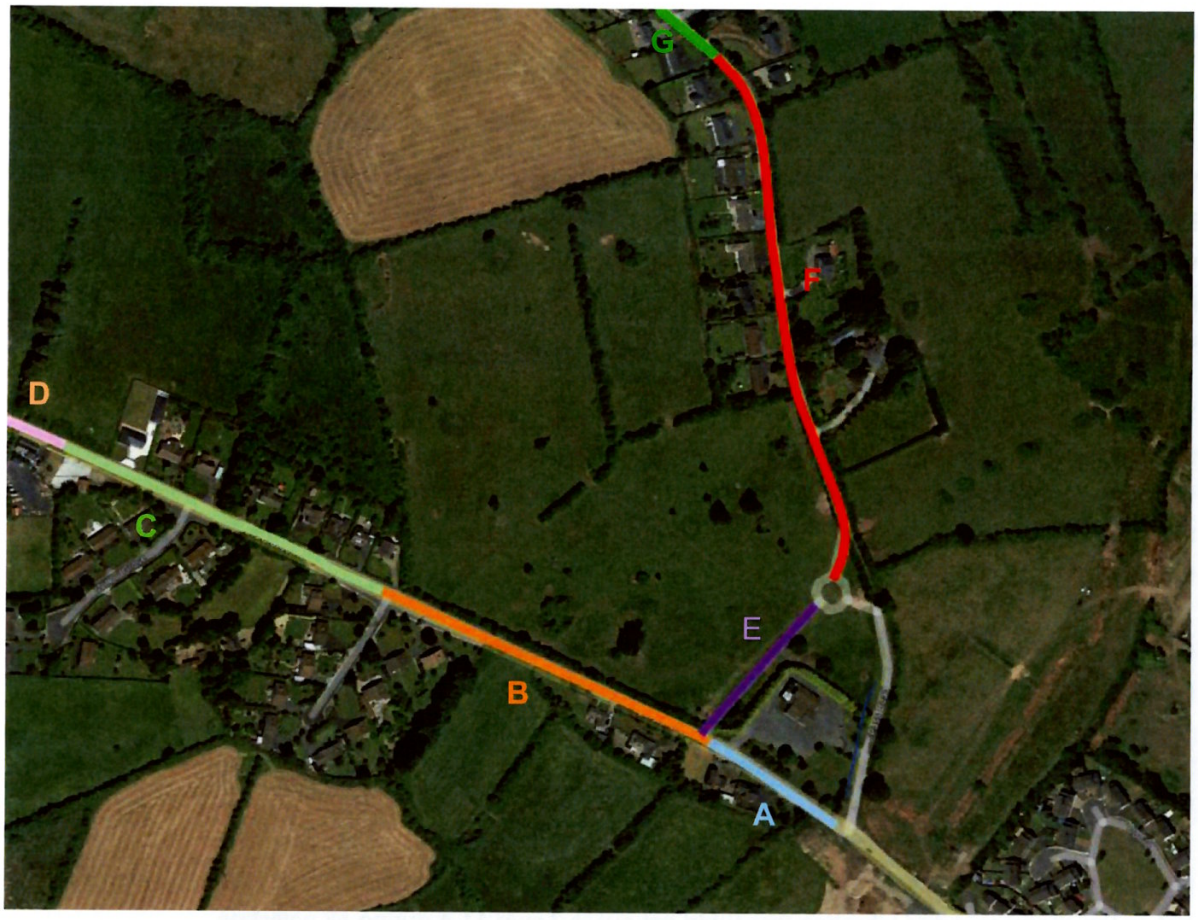


Figure 11.7 Road Links associated with the development site

Table 11.15 below presents the predicted change in noise level at different road links around the site for the year of opening and the design year using the Annual Average Daily Traffic (AADT) flows along the road links under consideration.

Road Link	Opening Year		
	Do Nothing - AADT Without De velopment	Do Something - AADT With De velopment	Change in Noise Level (dB)
A (Old Cratloe Rd East)	3,052	5,502	+1.5
B (Old Cratloe Rd Central)	2,947	4,396	+1.1
C (Old Cratloe Rd West)	2,947	4,009	+1.0
D (Old Cratloe Rd)	2,947	3,559	+0.7
E (Pass/Meelick Rd South)*	211	1,879	+7.3
F (Pass/Meelick Rd North)*	211	1,666	+6.9
G (Pass/Meelick Rd North)*	211	211	+0.3

Table 11.15 Predicted Change in Noise Level associated with Vehicular Traffic – Opening Year

* Methods for estimating traffic flows along road links are set out in the Traffic Engineers report.

With reference to Table 11.15, for the Opening Year of the masterplan the predicted change in noise level associated with additional traffic on the surrounding existing road network range between +0.7 - +1.5 dB for road links A,B,C & D on Old Cratloe Road. The impact is therefore neutral, imperceptible and long term.

With reference to Table 11.15, for load links E, F & G on Pass Road, for the opening year increases in the range of +0.3 – +7.3 dB are predicted. As such with reference to Table 11.6, the impact is therefore neutral, imperceptible, long term to negative, moderate significance and long term.

Road Link	Design Year		
	Do Nothing - AADT Without Development	Do Something - AADT With Development	Change in Noise Level (dB)
A (Old Cratloe Rd East)	3,727	6,178	+1.2
B (Old Cratloe Rd Central)	3,617	5,066	+0.9
C (Old Cratloe Rd West)	3,617	4,679	+0.7
D (Old Cratloe Rd)	3,617	4,229	+0.6
E (Pass/Meelick Rd South)*	258	1,927	+6.6
F (Pass/Meelick Rd North)*	258	1,714	+6.1
G (Pass/Meelick Rd North)*	258	258	+0.3

Table 11.16 Predicted Change in Noise Level associated with Vehicular Traffic

* Methods for estimating traffic flows along road links are set out in the Traffic Engineers report.

With reference to Table 11.16, for the Design Year of the masterplan the predicted change in noise level associated with additional traffic for road links A,B,C & D on the Old Cratloe Road network is in the range of +0.7 - +0.9 dB. The impact is therefore neutral, imperceptible and long term.

For road links E,F & G on Pass Road, with reference to Table 11.16, for the opening year increases in the range of +0.3 – +6.6 dB are predicted. As such with reference to Table 11.6, the impact is therefore neutral, imperceptible and long term to negative, moderate and long term.

Mechanical Plant and Services

It is expected that the principal items of building and mechanical services plant will be associated with ventilation and heating of the residences. These items will be selected at a later stage, however, they will be designed and located so that there is no negative impact on sensitive receivers in proximity to the proposed development. The services plant will be designed/attenuated to meet the relevant plant noise criteria for day and night-time periods at nearby sensitive receivers as set out in Section 11.2.3.

The effect associated with building services plant, once designed to achieve the relevant noise criteria, is categorised as negative, imperceptible and long term.

Inward Noise Impact Assessment

The development lands are set back from Pass Road, partially screened by existing residential buildings to the east. In order to establish noise levels across the development site an acoustic noise model was developed and calibrated against noise levels measured during the baseline study on site and EPA noise maps.

Noise Model of Study Area

Proprietary noise calculation software was used for the purposes of establishing the prevailing noise levels on the proposed site. The selected software, Brüel & Kjær Type 7810 Predictor, calculates noise levels in accordance with the Calculation of Road Traffic Noise (CRTN - ISBN 0 11 550847 3) issued by the UK Department of Transport in 1988. This is the standard recognised for the prediction of road traffic noise by Transport Infrastructure Ireland (TII) and the Environmental Noise Regulations 2006 SI/140 2006.

Road Traffic Noise Modelled

A change in road layout is proposed as part of the new development. Road traffic data provided by Coakly Consulting Engineers was used to account for the impact this new road layout would have on the amenity areas and the inward noise impact in the proposed development site.

Noise Model Validation

Noise levels obtained during the baseline noise survey and EPA round 3 noise maps were used to calibrate the noise model to within 1 dB of the calculated values. The resultant daytime levels output from the model calibration are slightly higher that the average measured levels (AN3) but are representative of periods of higher noise levels measured on site. This is regarded as very strong correlation in respect of predicted noise levels. Noise levels are calculated over daytime periods, i.e. 07:00 to 23:00hrs and night-time periods, 23:00 to 07:00 hrs.

Location	Time Period	Measured Noise Level (dB)	Calculated Noise Level (dB)
AN1	Daytime $L_{Aeq16hr}$	56-58	59

Table 11.17 Calculated and Measured Noise Levels at Development Site

Figure 11.8 and Figure 11.9 display the calculated noise contours across the site for day and night-time periods at a height of 4m above ground, i.e. the typical height of a first floor window.

The results of the modelling exercise demonstrate that highest noise levels are experienced along the south of the site in proximity to the road edges and reduce by 5 dB towards the north of the site, in the absence of any development buildings.

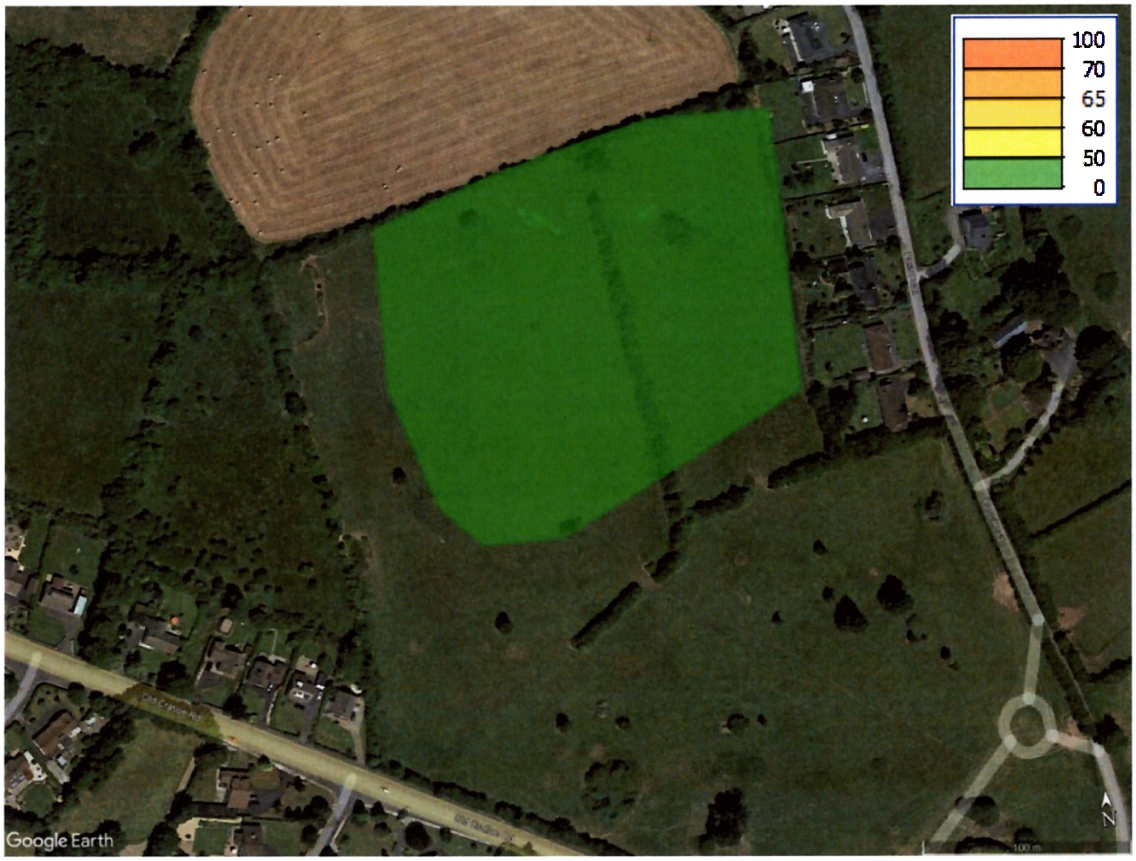


Figure 11.8 Initial Noise Risk Assessment – Daytime (4m height)

Figure 11.9 Initial Noise Risk Assessment – Night time (4m height)

Giving consideration to the noise levels presented in the previous sections the initial site noise risk assessment has concluded that the level of risk across the site lies within the Negligible to Low noise risk categories.

ProPG states the following with respect to Negligible and Low risks areas:

> *"Low Risk At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development."*
>
> *"Negligible Risk These noise levels indicate that the development site is likely to be acceptable from a noise perspective, and the application need not normally be delayed on noise grounds."*

Given the above, it can be concluded that the development site may be categorised as Negligible to Low Noise Risk and as such the Acoustic Design Statement (following here and also in Section 10.6.2.1) is required to demonstrate that suitable care and attention has beenapplied in mitigating and minimising noise impact to such an extent that an adverse noise impactswill beavoided in the final development.

It should be noted that ProPG states the following with regard to how t heinitial site noise risk is to be used:

> *"2.12 It is important that the assessment of noise risk at aproposed residential development site is not the basis for the eventual recommendation tothe decision maker. The recommended approach is intended to giv ethe developer, the noise practitioner, and the decision maker an early indication of the likely initial suitability of the site for new residential development from a noise perspective and the extent of the acoustic issues that would be faced. Thus, a site considered to be high risk will be recognised as presenting more acoustic challenges than a site considered as low risk. A site considered as negligible risk is likely to be acceptable from a noise perspective and need not normally be delayed on noise grounds. A potentially problematical site will be flagged at the earliest possible stage, with an increasing risk indicating the increasing importance of good acoustic design."*

Following the guidance contained in ProPG, therefore, the development can catagorised as low to medium risk according to how it is defined in ProPG.

Acoustic Design Statement – Part 1

Façade Noise Levels

Noise levels have been predicted across the proposed development site during day and night-time periods using the noise model developed to include the development buildings. Figure 11.10 and Figure 11.11 illustrate the predicted traffic noise levels for daytime and night-time at heights of 4m.

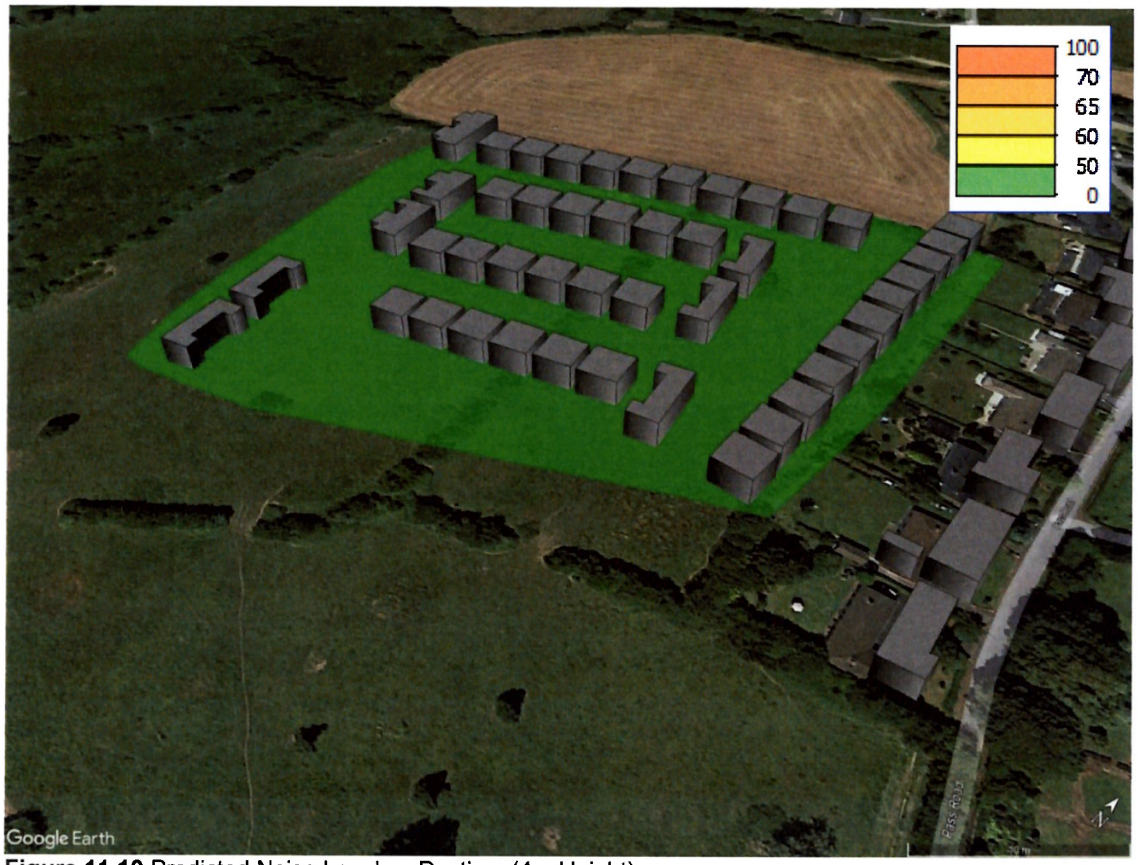


Figure 11.10 Predicted Noise Levels – Daytime (4m Height)

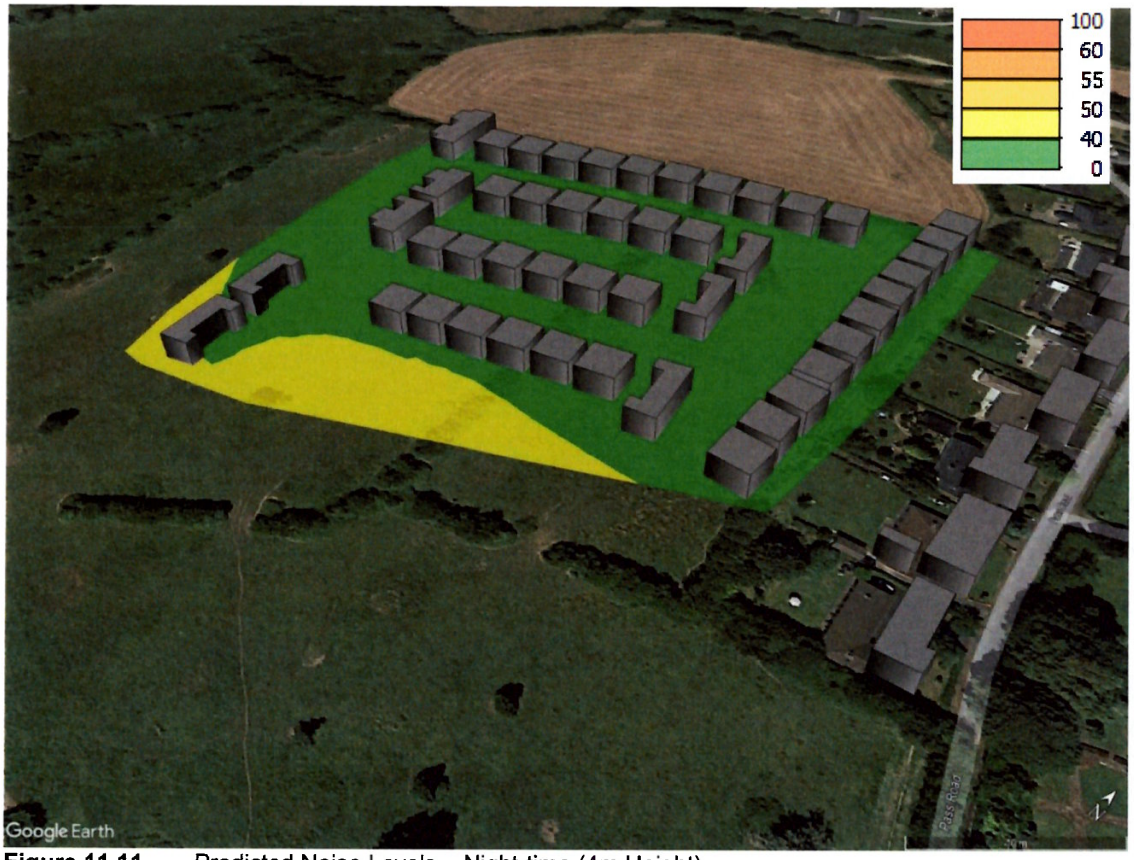


Figure 11.11 Predicted Noise Levels – Night-time (4m Height)

Predicted daytime noise levels across the site range from <50 dB in sheltered areas, the site is significantly screened and set back from sources of traffic noise.

Predicted night-time noise levels across the site range from <40 - 50 dB, with highest levels to the south of the proposed development as a result of noise generated at the new Coonagh to Knocklisheen Distribution Road.

Where façade noise levels are less than 55 dB $L_{Aeq,16hr}$ during the day and 50 dB $L_{Aeq,8hr}$ at night it is possible to achieve reasonable internal noise levels while also allowing for supplementary ventilation of dwellings with open windows. Therefore, for those properties where the façade noise levels are less than 55 dB $L_{Aeq,16hr}$ during the day and 50 dB $L_{Aeq,8hr}$ at night, no further mitigation is required.

External Noise Levels

Figure 11.12 presents the calculated day time noise levels across the site with the development buildings in place. The contours are calculated for a height of 1.5m.

Due to set back distance from Old Cratloe Road and the new Coonagh to Knocklisheen Distribution Road external noise levels within amenity areas such as open space areas and gardens, across the development site are within the recommended range of noise levels from ProPG of between 50 – 55 dB $L_{Aeq,16hr}$. It is considered that the objectives of achieving suitable external noise levels is achieved within the overall site, therefore no further mitigation is required to control external noise levels across amenity areas.

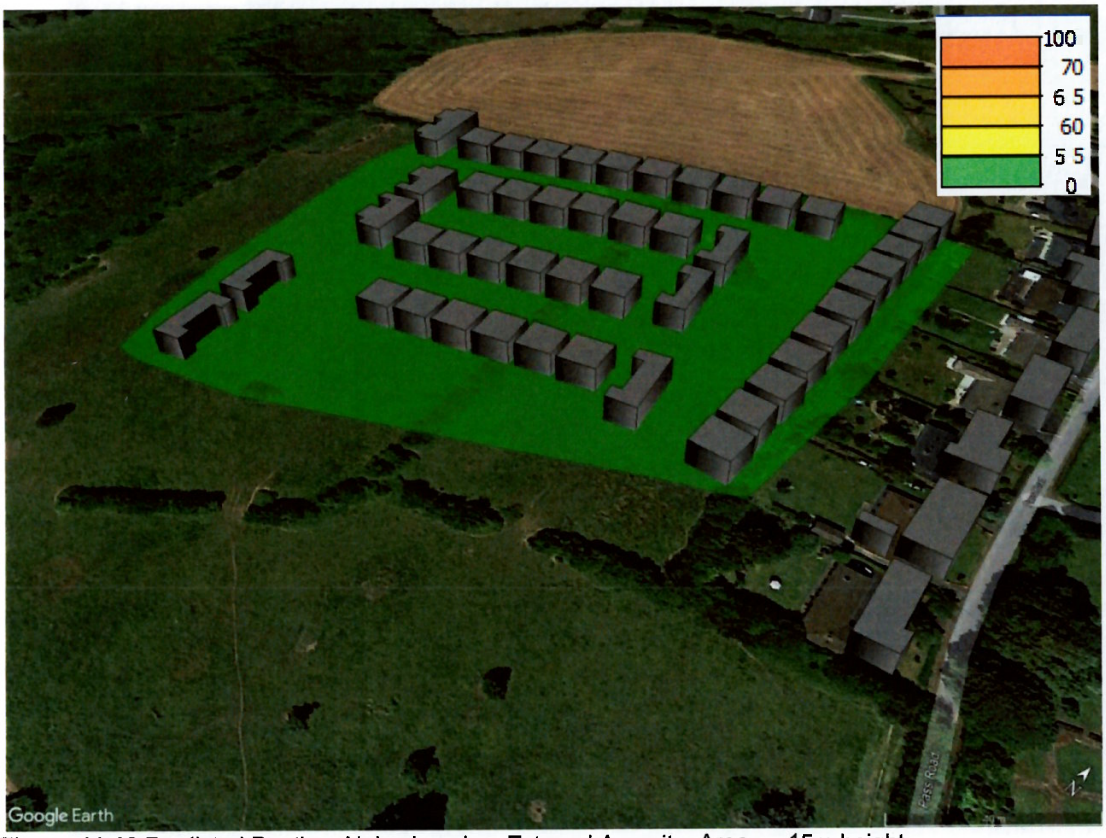


Figure 11.12 Predicted Daytime Noise Levels – External Amenity Areas – 15m height

11.5 LIKELIHOOD OF SIGNIFICANT EFFECTS

11.5.1 'Do-Nothing' Effects

In the absence of the proposed development being constructed there will be no significant effects.

11.5.2 Construction Effects

During the construction phase of the development a high likelihood of negative, moderate to significant and short-term impact is expected at these nearest residential locations as a result of plant noise associated with construction. Details of construction phase impacts are outlined in Section 11.4.1

11.5.3 Operational Effects

No significant effects are predicted to occur during the operational phase of the proposed development.

11.5.4 Cumulative Effects

In terms of construction noise, with reference to the Masterplan Site there is potential for construction works to occur concurrently, relating to other phases. In the scenario whereby construction on multiple phases is ongoing simultaneously there is potential for significant noise impact at nearby NSL's. The more likely scenario is that construction of the various phases will take place sequentially thereby reducing the risk of cumulative noise impacts.

There is a potential for cumulative impacts associated with construction noise traffic, with an increase of +3 dB representing the worst case scenario of a doubling of construction traffic when compared to either site operating in isolation.

Cumulative impacts will need to be considered and managed during the construction phase. It is recommended that liaison between both construction sites is on-going throughout the duration of the construction phase. Contractors should schedule work in a co-operative effort to limit the duration and magnitude of potential cumulative impacts on nearby sensitive receptors. Cumulative construction noise impacts are expected to be moderate impact, moderate significance and short-term.

At operational stage, cumulative noise impacts associated with the proposed development and other developments in the area are most likely to be associated with increase noise associated with traffic. An increase +3 dB represents a worst case scenario of a doubling in volume of traffic, representing a perceptible change with moderate impact, moderate significance and long-term.

The noise limits set for off-site noise sensitive locations are designed to avoid any significant increase in the prevailing background noise environment. Operational noise limits included in this report refer to cumulative noise from all fixed installations on site. The design of plant and other fixed installations will be progressed during the design stage to ensure the noise limits at offsite noise sensitive locations are not exceeded.

11.6 REMEDIAL AND MITIGATION MEASURES

The noise and vibration impact assessment has concluded that significant effects associated with construction are not expected. The following noise and vibration reduction measures are included in order to prevent excessive noise and vibration emissions.

11.6.1 Construction Phase

11.6.1.1 Mitigation by Avoidance / Design

No mitigation proposed

11.6.1.2 Mitigation by Prevention

N & V CONST 1: Screening - Screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to all other forms of noise control. Construction site hoarding will be constructed around the site boundaries as standard. The hoarding will be constructed of a suitable material in order to provide a good level of sound insulation. In addition, careful planning of the site layout will also be considered. The placement of site buildings such as offices and stores will be used, where feasible, to provide noise screening when placed between the source and the receiver.

N & V CONST 2 : Selection of Quiet Plant - This practice is recommended in relation to static plant such as compressors and generators. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures. The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item should be selected wherever possible. Should a particular item of plant already on the site be found to generate high noise levels, the first action should be to identify whether or not said item can be replaced with a quieter alternative.

N & V CONST 3: Project Programme - The phasing programme will be arranged so as to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity. During excavation/ demolition or other high noise generating works are in progress on a site at the same time as other works of construction that themselves may generate significant noise and vibration, the working programme will be phased so as to prevent unacceptable disturbance at any time.

11.6.1.3 Mitigation by Reduction

N & V CONST 4: The contract documents will clearly specify the construction noise criteria included in this chapter which the construction works must operate within. The Contractor undertaking the construction of the works will be obliged to take specific noise abatement measures and comply with the recommendations of *BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Noise* and the European Communities (Noise Emission by Equipment for Use Outdoors) Regulations, 2001. Noise control measures that will be considered include the selection of quiet plant, enclosures and screens around noise sources, limiting the hours of work and noise and vibration monitoring, where required.

N & V CONST 5: Noise Control at Source - If replacing a noisy item of plant is not a viable or practical option, consideration will be given to noise control "at source". This refers to the modification of an item

of plant or the application of improved sound reduction methods in consultation with the supplier. For example, resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can often be controlled by fixing resilient materials in between the surfaces in contact.

Referring to the potential noise generating sources for the works under consideration, the following best practice migration measures should be considered:

- For mobile plant items such as dump trucks, excavators and loaders, the installation of an acoustic exhaust and or maintaining enclosure panels closed during operation can reduce noise levels by up to 10dB. Mobile plant should be switched off when not in use and not left idling. For all materials handling ensure that materials are not dropped from excessive heights, lining drops chutes and dump trucks with resilient materials.
- For compressors, generators and pumps, these can be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation.
- Demountable enclosures can also be used to screen operatives using hand tools and will be moved around site as necessary.
- All items of plant should be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

N & V CONST 6: Liaison with the Public - A designated environmental liaison officer will be appointed to site during construction works. Any noise complaints should be logged and followed up in a prompt fashion by the liaison officer. In addition, where a particularly noisy construction activity is planned or other works with the potential to generate high levels of noise, or where noisy works are expected to operate outside of normal working hours etc., the liaison officer will inform the nearest noise sensitive locations of the time and expected duration of the noisy works.

11.6.2 Operational Phase

Inward Impact Conclusion

Plant items will be designed and selected so that cumulative noise emissions are within the recommended noise criteria. Therefore, no mitigation is required. During the operational phase of the development, noise mitigation measures with respect to the outward impact of traffic from the development are not deemed necessary.

As is the case in most buildings, the glazed elements and ventilation paths of the building envelope are typically the weakest element from a sound insulation perspective. In general, all wall constructions (i.e. block work or concrete and spandrel elements) offer a high degree of sound insulation, much greater than that offered by the glazing systems. Therefore, noise intrusion via the wall construction will be minimal.

Predicted noise levels have demonstrated that the recommended internal noise criteria can be achieved through with standard façade elements at the design stage. The calculated glazing and ventilation specifications are preliminary and are intended to form the basis for noise mitigation at the detailed design stage. Consequently, these may be subject to change as the project progresses.

The proposed development is not anticipated to generate any appreciable level of vibration once operational and therefore no vibration mitigations measures are necessary.

11.7 RESIDUAL IMPACTS

11.7.1 Construction Phase

The construction noise assessment has shown that predicted noise levels associated with construction activity at the nearest residential NSLs, at distances of 30-40m, are +2 dB above the recommended criteria in CNT and therefore for these works a negative, moderate to significant and short-term effect is predicted.

11.7.2 Operational Phase

Mechanical Plant

Assuming the operational noise levels do not exceed the adopted design goals in line with the relevant noise criteria, the resultant residual noise impact from this source will be of neutral, imperceptible, long term impact.

Additional Vehicular Traffic

In the context of the existing noise environment, the predicted change in noise levels associated with additional traffic is predicted to range from imperceptible, long term to a negative, moderate, long term effect along the existing road networks for nearby residential locations.

11.8 MONITORING

11.8.1 Construction Phase

Where required, construction noise monitoring will be undertaken at periodic sample periods at the nearest noise sensitive locations to the development works to check compliance with the construction noise criterion. Noise monitoring should be conducted in accordance with the International Standard ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise.

11.9 REFERENCES

Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017);

Guidelines on the Information to be Contained in Environmental Impact Assessment Reports – (EPA, 2022);

BSI (1993). BS 7385: 1993 Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration;

BSI (2019) BS 4142: 2014 +A1 2019: Methods for Rating and Assessing Industrial and Commercial Sound;

BSI (2014). BS 5228-1:2009 +A1:2014 Code of Practice for noise and vibration control of construction and open sites - Part 1: Noise;

BSI (2014). BS 5228-2:2009+A:2014 Code of Practice for noise and vibration control of construction and open sites - Part 2: Vibration;

ISO (2016). ISO 1996-1:2016 Acoustics - Description, measurement and assessment of environmental noise. Part 1: Basic quantities and assessment procedures;

UK Department of Transport (1998). Calculation of Road Traffic Noise;

UKHA (2020). Design Manual for Roads and Bridges Sustainability & Environment Appraisal LA 111 Noise and Vibration Revision 2.

CHAPTER TWELVE MATERIAL ASSETS – TRAFFIC AND TRANSPORT

12.1 INTRODUCTION

This chapter of the EIAR comprises an assessment of the likely impact of the proposed development on the surrounding road network and transport infrastructure as well as identifying proposed mitigation measures to minimise any impacts.

The information contained within this chapter should be read in conjunction with the other design drawings and suite of reports, which accompany this planning application.

The objectives of this chapter are as follows:

- Produce a study of the existing road network and transport infrastructure in the vicinity of the proposed development.
- Identify the possible effects of the development on the surrounding road network and transport infrastructure (Construction phase and Operational phase).
- Propose measures to mitigate, eliminate or remediate any possible impacts from this development.

A Traffic and Transport Assessment (TTA) was completed for the proposed development by Coakley Consulting Engineers. This TTA is included in Appendix 12.1

12.2 ASSESSMENT METHODOLOGY

The assessment focuses on the effects of increased traffic on the local road network during the post construction (Operational Phase) scenario of the overall masterplan lands. The assessment considers the impact of peak hour traffic from the overall masterplan lands on the baseline and future design year traffic levels which is the cumulative 'worst-case' assessment. If the overall development on the masterplan lands can be shown to be satisfactory, then individual planning applications, such as Phase 3, within the development will also be deemed to be satisfactory.

The approach to the preparation of this chapter has regard to the requirements of publications by Transport Infrastructure Ireland (TII), National Transport Authority (NTA), Department of Transport (DoT) and other best practice guidance and documents outlined in Section 12.9.

An initial site inspection reviewed the existing access to the surrounding road and transportation network as well as independent surveys to quantify the volume of traffic on the adjacent roads.

12.3 RECEIVING ENVIRONMENT

12.3.1 Area Description - Site Location

As shown in Figure 12.1, the proposed development site is located in Clonconane off the Old Cratloe Road (L3102) in a sub-urban residential area approx. 3.0 km west of Limerick City centre. The site is

bounded by the Old Cratloe Road to the south and the Meelick Road to the east, both of which are being upgraded and realigned as part of the Coonagh–Knockalisheen Distributor Road (CKDR) scheme which is currently on site and expected to be complete by 2025/26.

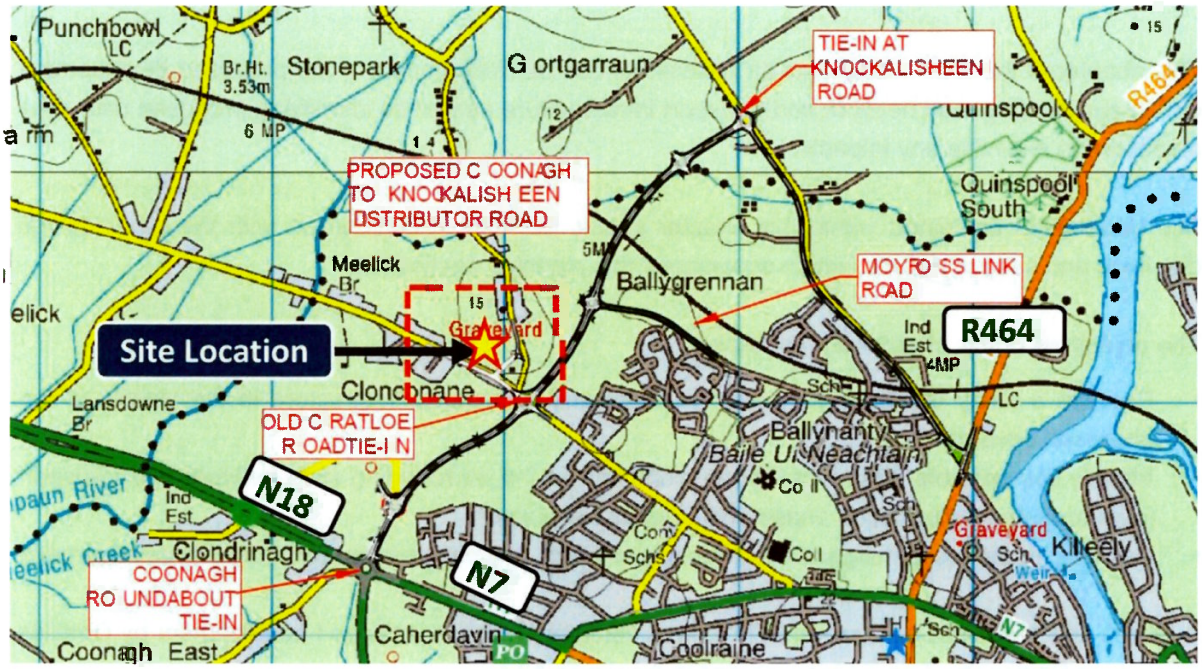


Figure 12.1 Site Location and Current/Future Local Road Network

12.3.2 Area Description - Local Road Network

As shown in Figure 12.1, the proposed development site is ideally located and is surrounded by an existing and future road network (currently under construction) with easy access to Limerick city centre, the national road network and the TUS (Technological University Shannon) campus formerly LIT. A well-lit roadside footpath and other pedestrian facilities from the site towards the city centre on the Old Cratloe Road are available for vulnerable road users.

- The subject site is located between the Old Cratloe Road (L3102) and a realigned section of Pass Road, which is also known as Meelick Road.
- Speed Limit of 50km/h exists on the local road network

12.3.3 Area Description - Proposed Infrastructure

As shown in Figure 12.2 and labelled for ease of understanding, a section of the existing local road network is currently being upgraded to TII and DMURS standards as part of the Coonagh-Knockalisheen Distributor Road (CDKR) scheme (see CKDR EIS, Figure 3.9, Scheme Layout Sheet 8 of 9) which is expected to be complete by 2025/26.

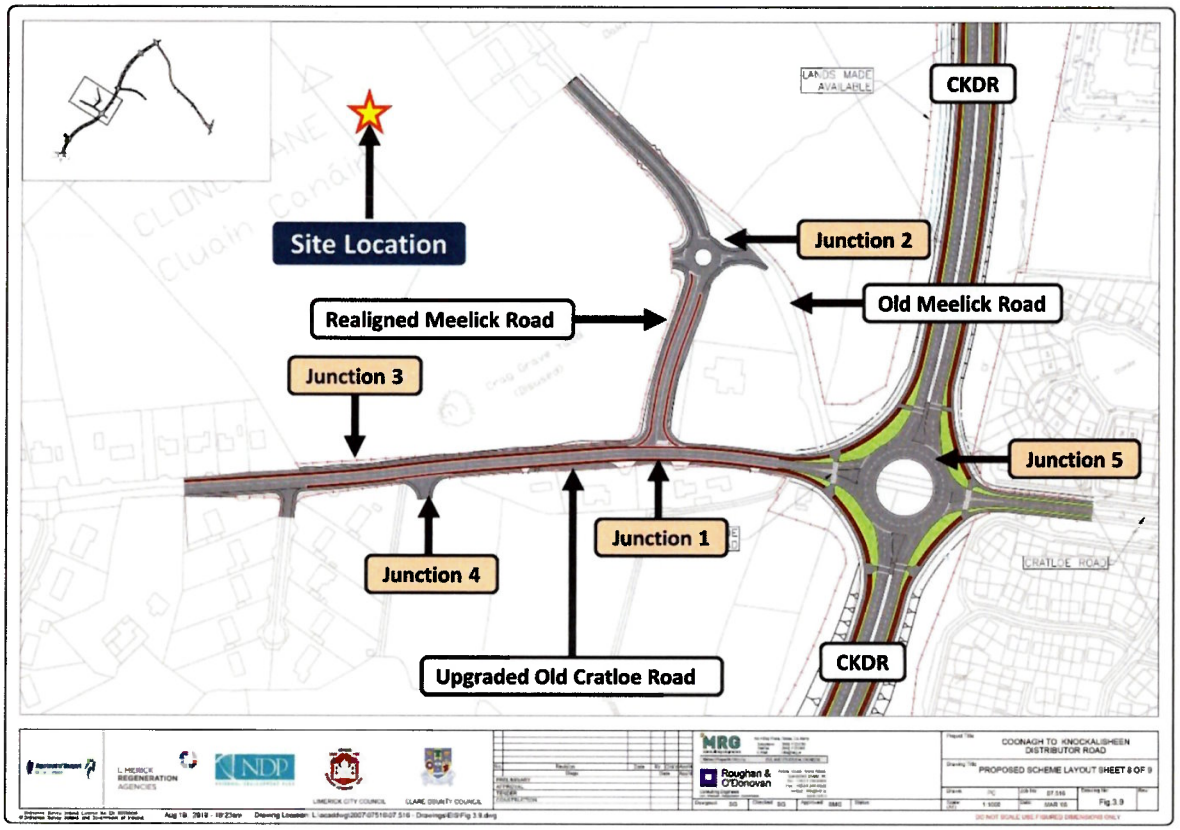


Figure 12.2 Proposed Upgrade of Old Cratloe Road as part of CKDR scheme (labelled extract EIS Figure 3.9)

As shown in Figure 12.2 and overleaf in Figure 12.3, access to the proposed development will be via a standards 'T' junction on the Old Cratloe Road (Junction 1) and the proposed roundabout (Junction 2) on the realigned section of the Meelick Road, both of which have been designed as part of the CKDR scheme to provide high quality vehicular access to the subject zoned lands. Junctions No. 3 and No. 4 are potential access junctions to future development phases.

The proposed cross-section of the upgraded Old Cratloe Road and realigned Meelick Road will comprise a Carriageway width of 6.5m. 1.8m wide cycle lanes and 2.0m wide footpaths on both sides.

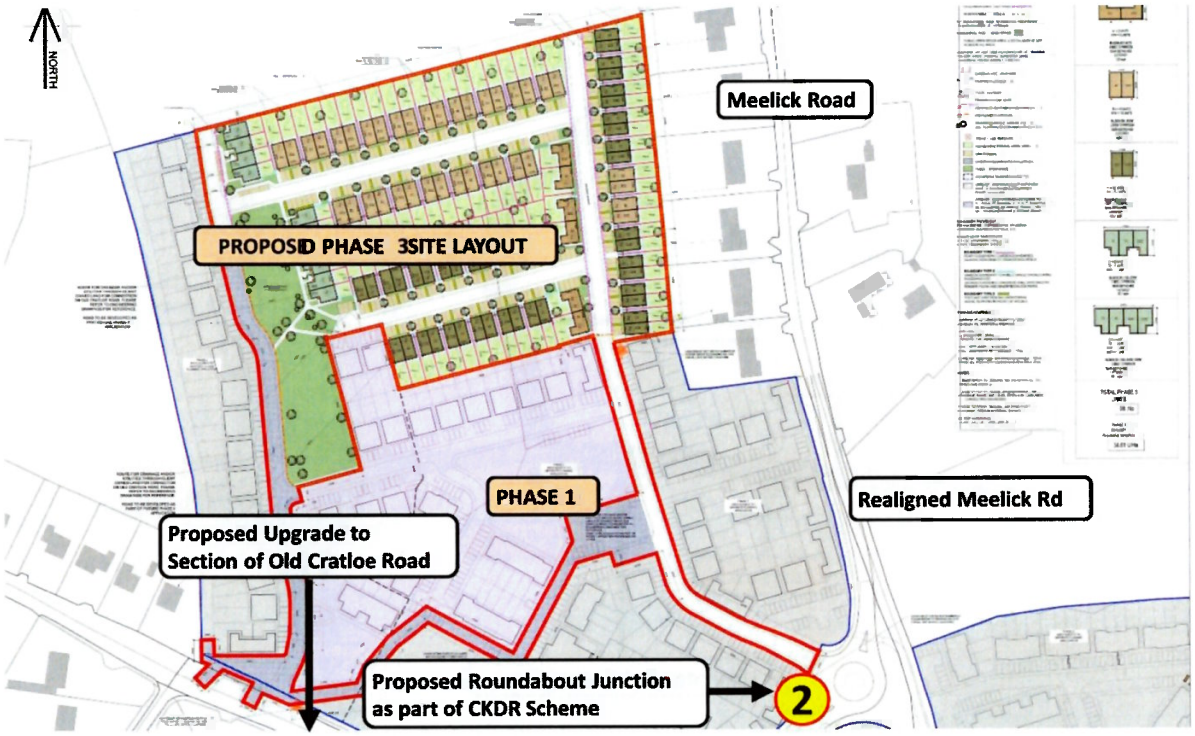


Figure 12.3 Proposed Road Layout (extract from site layout drawing & labelled for ease of understanding)

12.3.4 Existing Traffic Volumes

An independent turning count survey was undertaken on Thursday 11th November 2021 by Traffinomics Ltd. at the existing junction between the Old Cratloe Road (L3102) and the Meelick Road. Note: Although these 2021 traffic count surveys were undertaken during the ongoing Covid-19 pandemic, there were no formal travel restrictions in place at the time and schools were open. It should also be noted that the Meelick Road was unavoidably closed to the public due to ongoing construction works and only plant vehicles were permitted on this road. Without this closure, the nature of the Meelick Road lends itself to extremely low traffic flows as it serves less than 40 residential properties. For analysis purposes only, an assumed 'worst case' peak hour traffic flow of 40 vehicles (two-way) on the Meelick Road were used as shown below.

This traffic count data is used as part of the traffic impact and junction analysis for the proposed development. A summary of the 2021 AM (8-9am) and PM (5-6pm) peak hour flows from the above turning count survey is shown in Figure 12.4a.

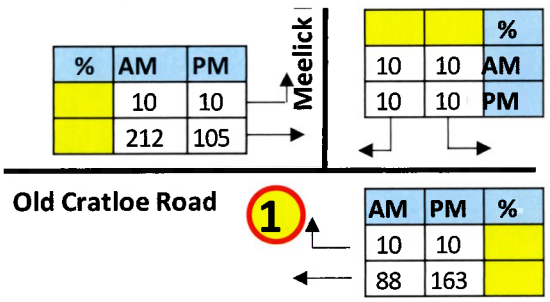


Figure 12.4a - Existing Base Year Traffic Flows (2021) – Peak Hour Flows

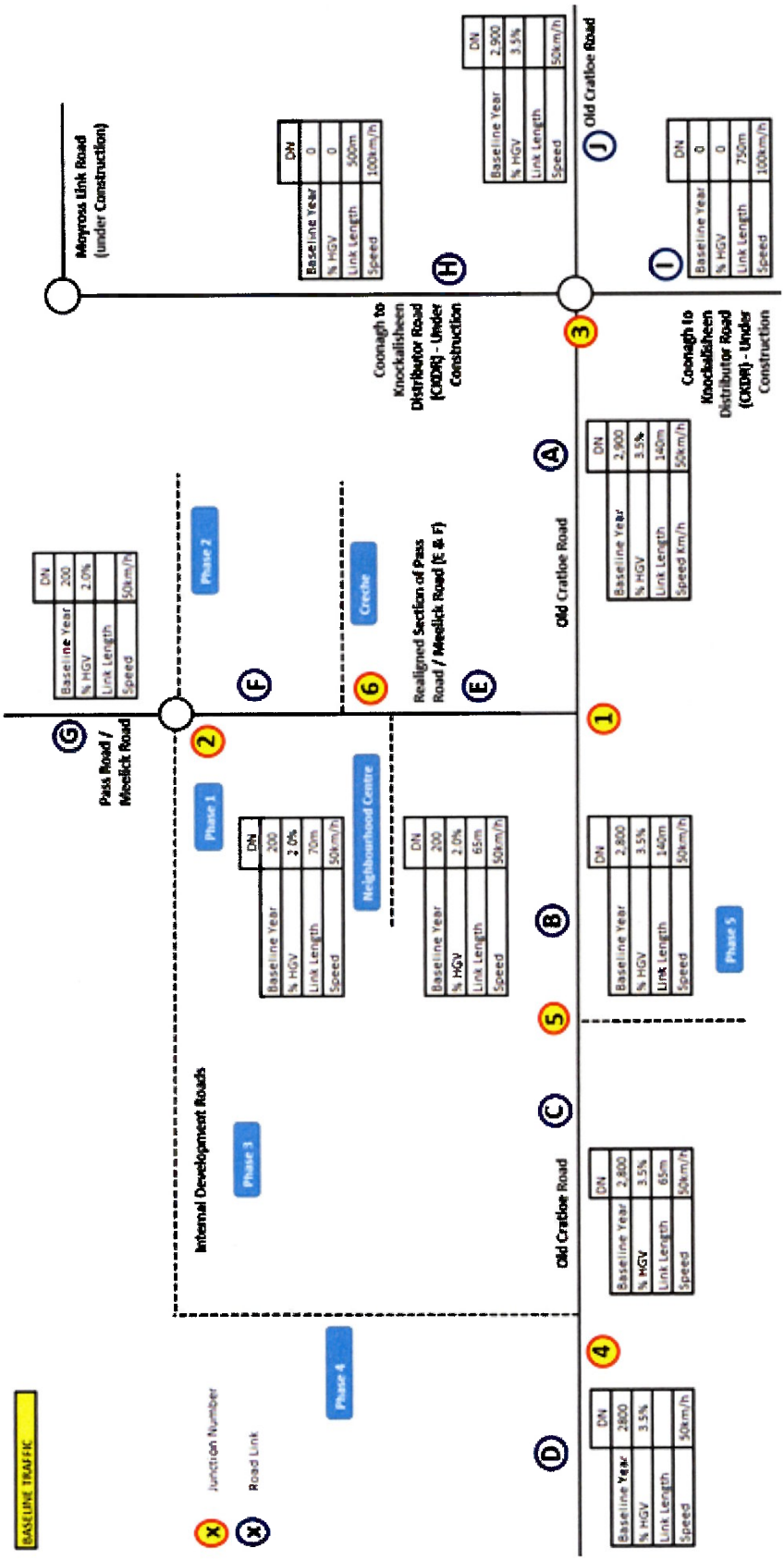


Figure 12.4b - Existing Baseline Traffic Flows (2021) – AADT, %HGV, Link Length and 85% Speeds

The estimated daily flows (AADT), percentage of heavy goods vehicles (% HGV), length of each key road link and vehicle speed on each link (i.e speed limit) are shown below in Figure 12.4b

Using this 2021 traffic data, the Annual Average Daily Traffic (AADT) and following traffic flow patterns were estimated using industry standard calculations, guidelines, and best practice[1] and future growth rates applied taking into account national standards[2].

The AADT (Annual Average Daily Traffic) range on the Old Cratloe Road was estimated to be only 2,800-2,900 vehicles per day (two-way), which suggests that the Old Cratloe Road operates under capacity[3] with substantial reserve capacity available for future growth and traffic from zoned development lands.

Daily traffic flows on the Meelick Road were estimated to be in the order of <200 vehicles per day. ,The estimated average daily flows on the Old Cratloe Road (L3102) is shown below in Figure 12.5, average 24-hour traffic flow profile shown in Figure 12-6 and daily flows by month in Figure 12.7.

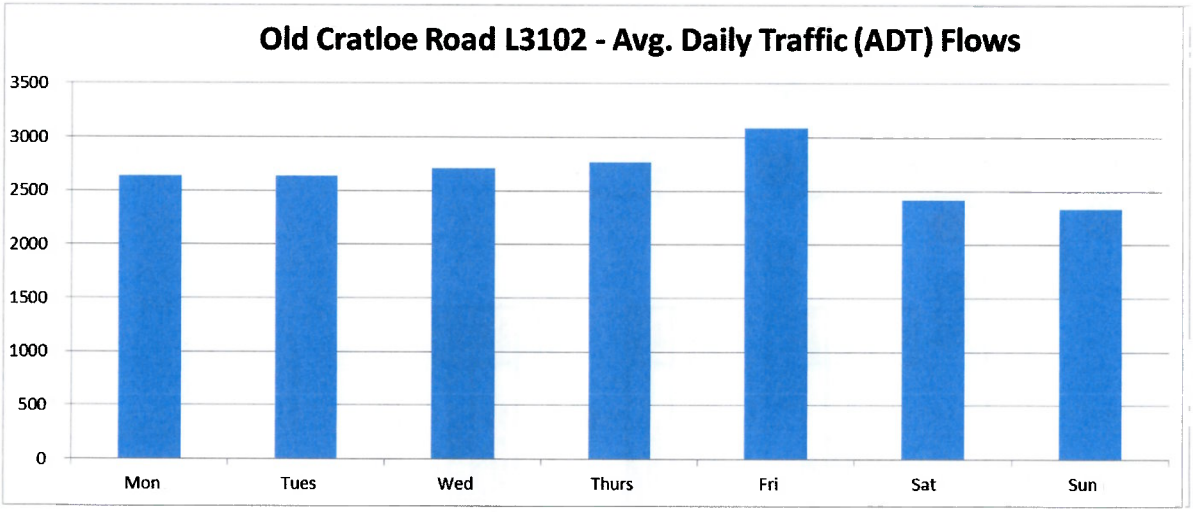


Figure 12.5 2021 Estimated Average Daily Traffic Flows

[1]Transport Infrastructure Ireland (Tii) document 'Expansion Factors for Short Period Traffic Counts 2016'
[2]Transport Infrastructure Ireland (Tii) document 'Link Based Traffic Forecasting 2011'
[3] TII technical document TA 79/99 'Traffic Capacity of Urban Roads' Old Cratloe Rd (UAP 3) capacity of 900veh/hr one/way

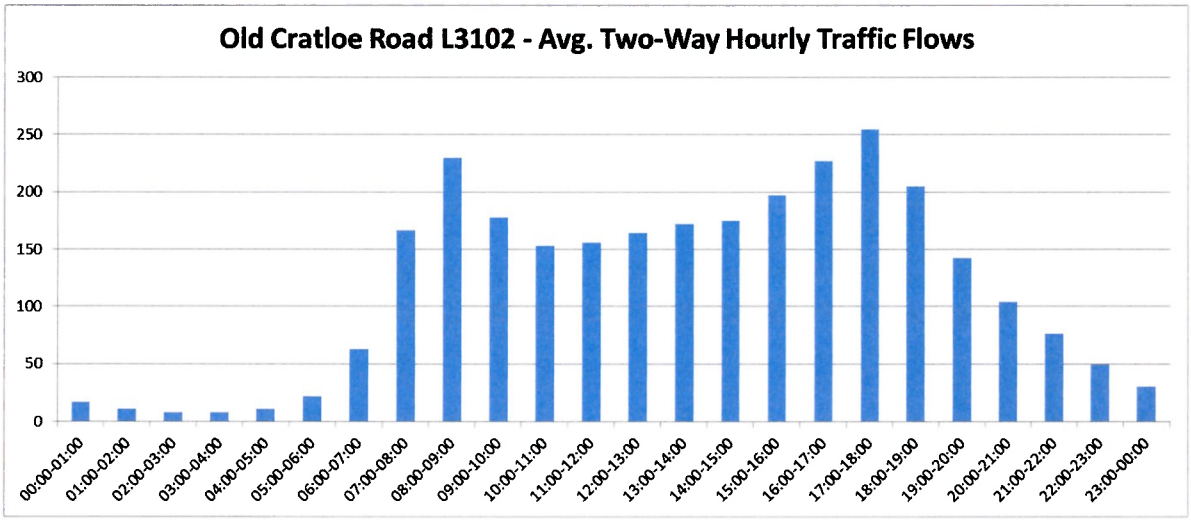


Figure 12.6 2021 Estimated Hourly Traffic Flows

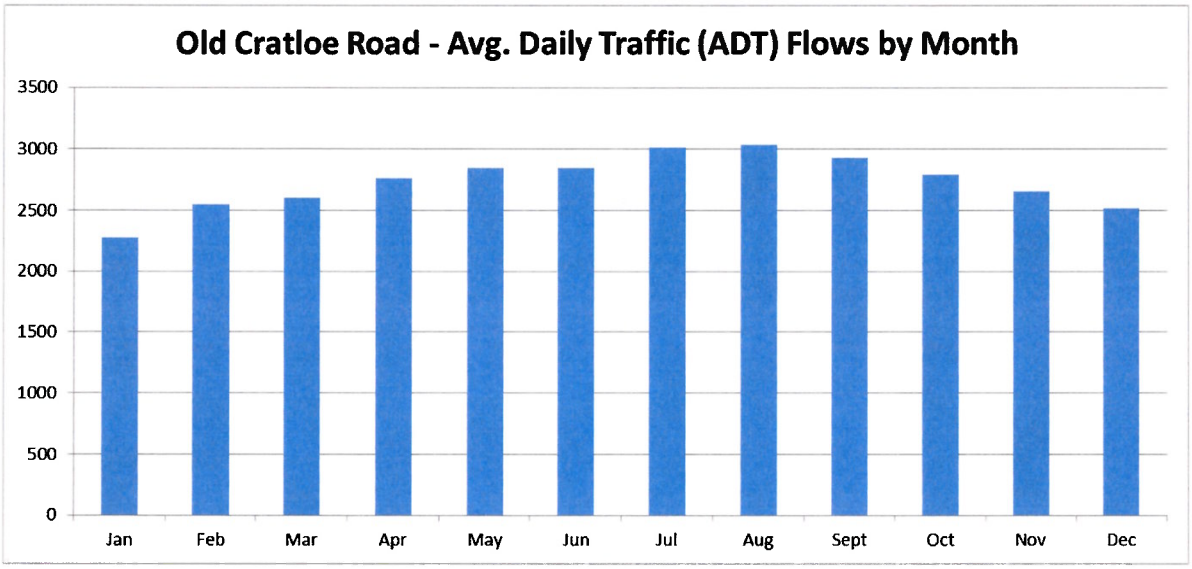


Figure 12.7 2021 Estimated Daily Traffic Flows by Month

12.3.5 Future Traffic Volumes

Estimated Future traffic volumes have taken into account the industry standard TII growth rates document 'Link Based Traffic Growth Forecasting', the modelled changes to traffic patterns undertaken as part of the Coonagh – Knockalisheen Distributor Road (CKDR) 2010 EIS report (Figures 5.2 to 5.5 of the original EIS Appendix 3) and the National Transport Authority (NTA) document 'Limerick and Shannon Metropolitan Area Transport Strategy - Demand Analysis Report 2020'.

The CKDR was discussed with project engineers MRG Consulting Engineers regarding predicted traffic flows and more at the project outset.

Based on discussions with MRG, the CKDR EIS report modelled traffic scenarios between 2008 and 2025 based on 2007 traffic flow surveys. Although this traffic flow data could now be considered 'out of date', the general modelled change in travel patterns on each road link still apply. Extracts visible from

the historic CKDR EIS report document (Figures 5.2 to 5.5 of the EIS report Appendix 3) are shown below in Figures 12.8 and 12.9 and labelled for ease of understanding.

The CKDR EIS report predicted both daily and AM peak hour traffic flows as part of a future 'Do Nothing' and two 'Do Something' scenarios

1) No Nothing Scenario – a future Scenario where the CKDR is not constructed
2) Scenario 1 – CKDR without a potential future Northern Distributor Road to the R464
3) Scenario 2 – CKDR with a potential future Northern Distributor Road to the R464

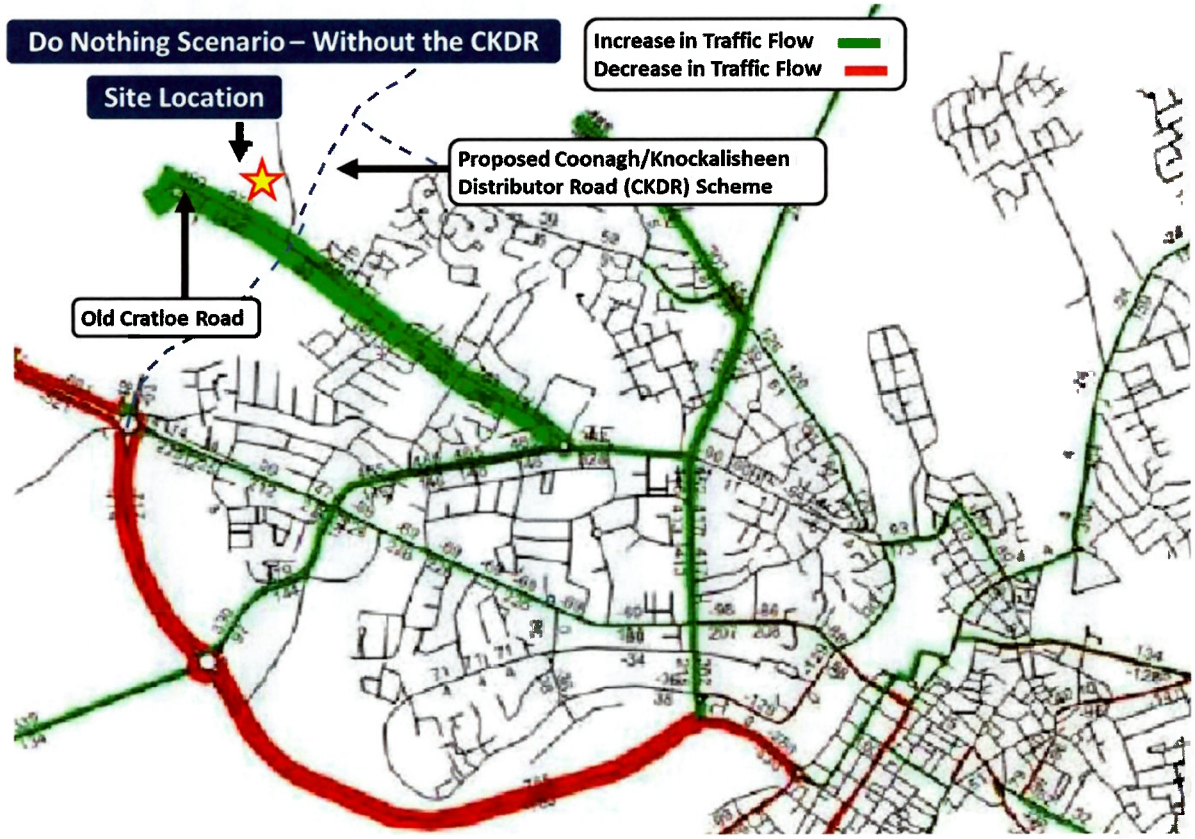


Figure 12.8 Do Nothing Scenario – Future Traffic Flows without the CKDR

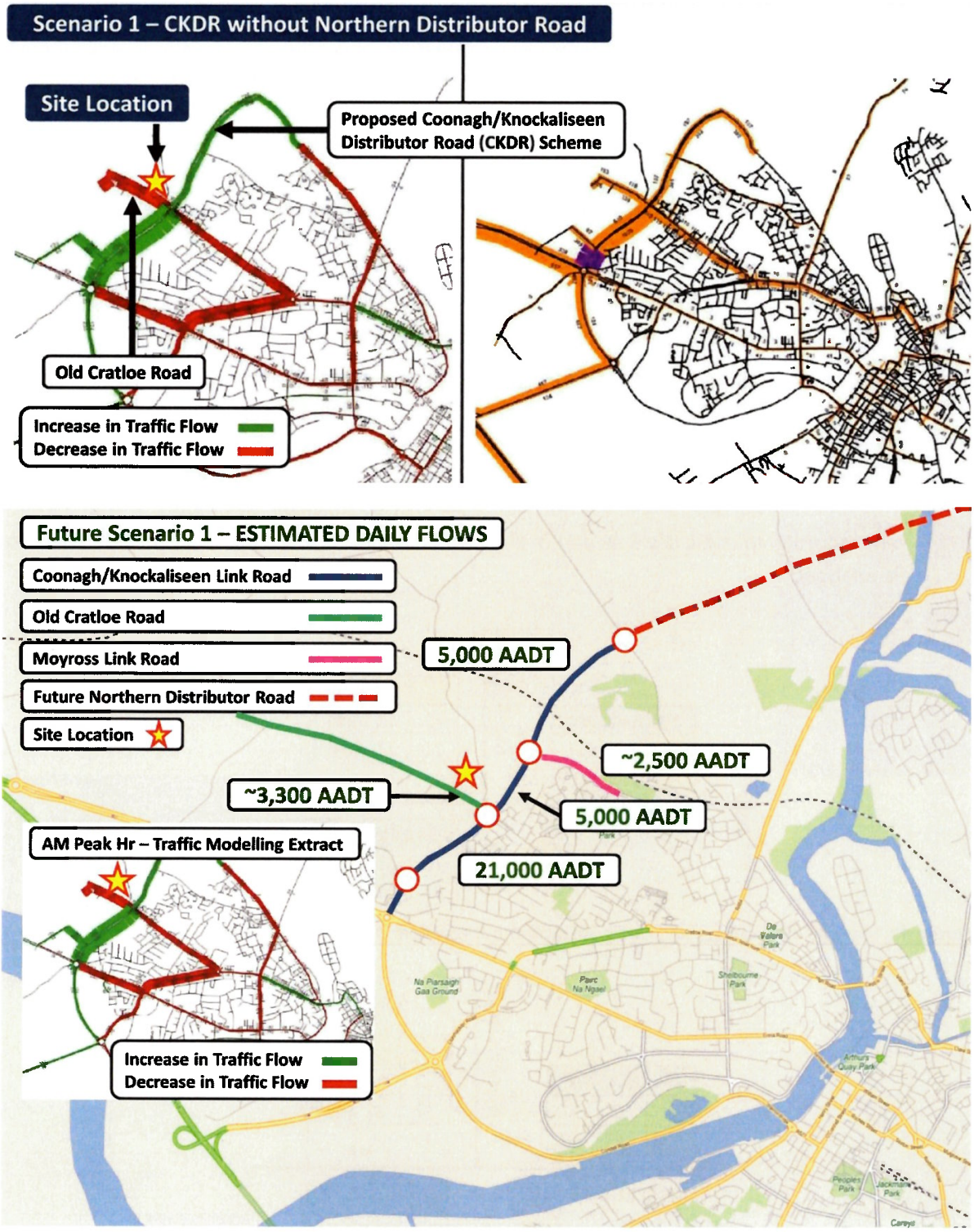


Figure 12.9 Scenario 1 Traffic Flows with CKDR but without Northern Distributor Road

As set out in Chapter 14 of the Limerick Shannon Metropolitan Area Transport Strategy (LSMATS) 2040 report, funding for the Limerick Northern Distributor Road (LNDR) does not form part of the Governments National Development Plan 2021-2040 and therefore this future scenario been omitted from this assessment.

What is clear from the EIS report traffic modelling is that opening of the new distributor roads will lead to a significant decrease in traffic flows on the Old Cratloe Road by 60-80% of vehicles removed during each peak hour, with local traffic having the new available route options on the CKDR.

As noted in the EIS, lands along the CKDR route are zoned for future development (including the subject lands). Therefore, it is assumed, and it appears that the traffic flows from the development of these zoned lands have already been included in the traffic modelling for the overall roads scheme contained within the CKDR EIS report (i.e. Do Nothing and Do Something Scenarios).

The future 2038 AM and PM peak hour traffic volumes 'without' the proposed development traffic are shown in Figures 12.10a, 12.10b and 12.10c were estimated based on the following:

- A 5% growth rate from 2021 to 2025 (Opening Year) and robust 20% growth rate from 2021 to 2038 (future Design Year) based on Transport Infrastructure Ireland (Tii) document 'Link Based Traffic Forecasting 2011'.
- Based on the above traffic modelling, it is reasonable to assume that traffic flows on the Old Cratloe Road will reduce with the opening of the CKDR. However, this report has not applied any reduction to traffic flows as part of the junction analysis, ensuring a 'worst case' scenario is analysed.

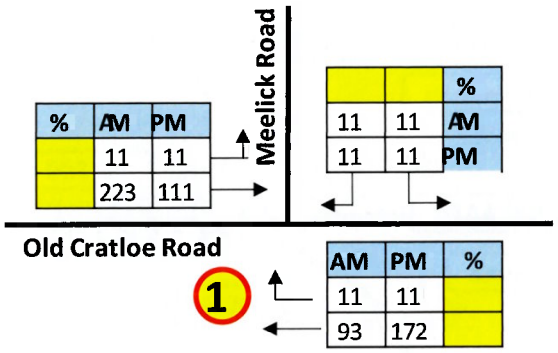


Figure 12.10a – 2025 Opening Year Traffic Flows **without** proposed Development Traffic

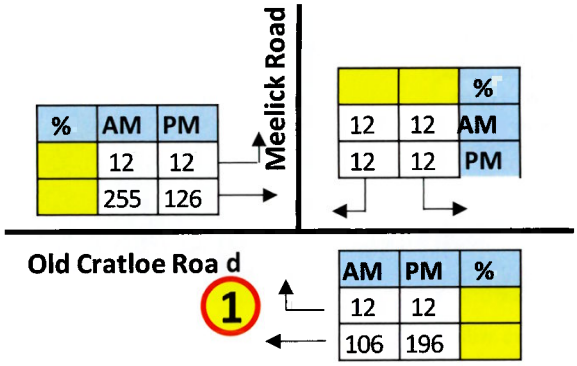


Figure 12.10b– 2038 Future Design Year Traffic Flows **without** proposed Development Traffic

The future design year estimated daily flows (AADT), percentage of heavy goods vehicles (% HGV), length of each key road link and vehicle speed on each link (i.e speed limit) are shown below Figure 12.10c.

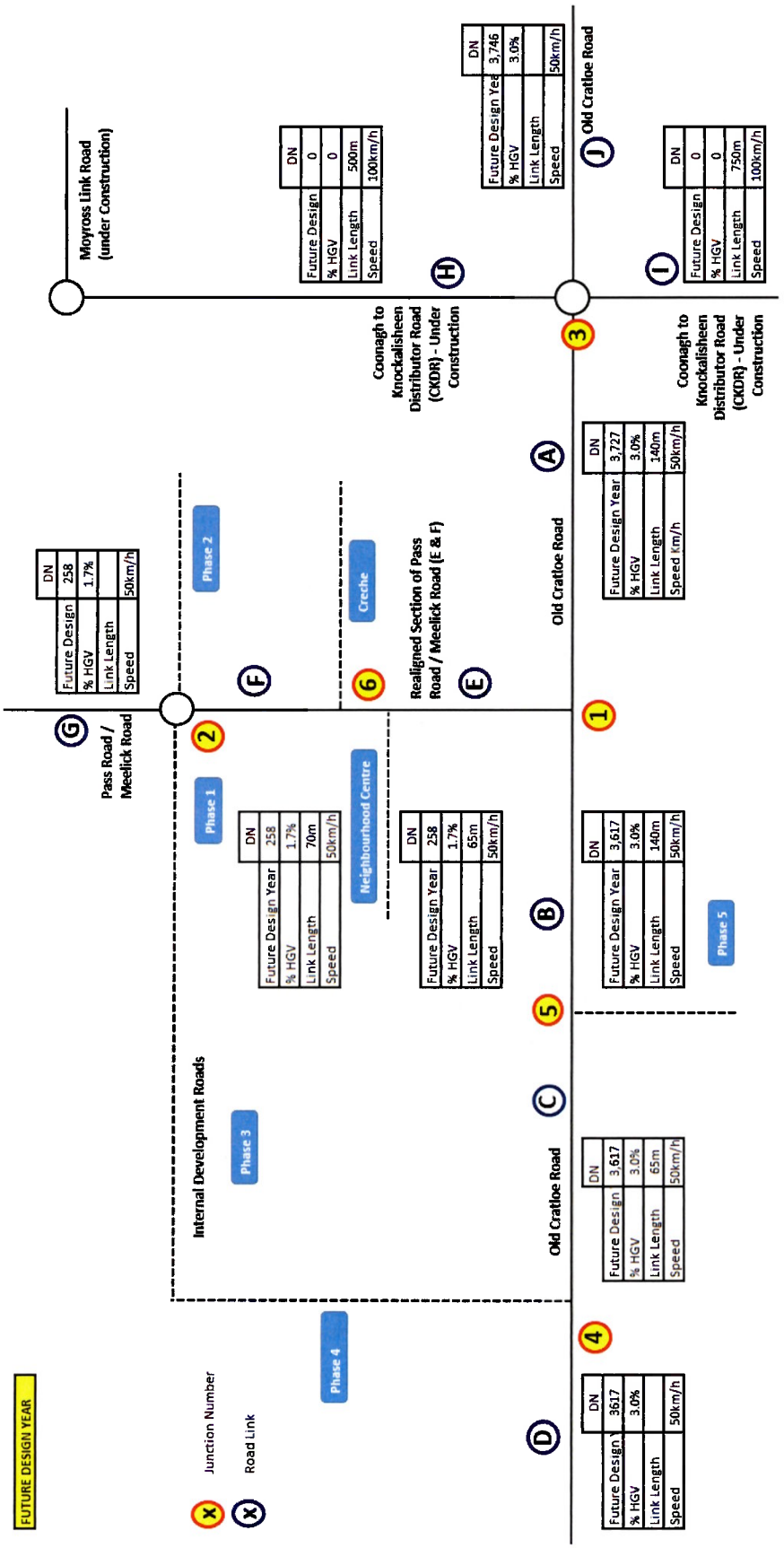


Figure 12.10c – Estimate Future Design Year Traffic Flows – AADT, %HGV, Link Length and 85% Speeds

12.3.6 Existing Travel Patterns – CSO

The proposed development site is located in close proximity to a wide range of local amenities and is within easy walking and cycling distance of several key attractors and typical vehicle trip generators. The Central Statistics Office (CSO) Census 2016 Small Area Population Statistics (SAPMAP) has been used to gather data for existing commuting travel patterns for 'Population aged 5 years and over by means of travel to school, work or college'.

Table 12.1 outlines modes of travel for both the overall Limerick City and Suburbs (settlement area) shown in Figure 12.11 and the combined travel patterns for several local CSO SAPMAP small areas broken down into travel to/from work and travel to/from college/school. These small areas include both an established residential areas and the existing Cratloe Wood Student Village.

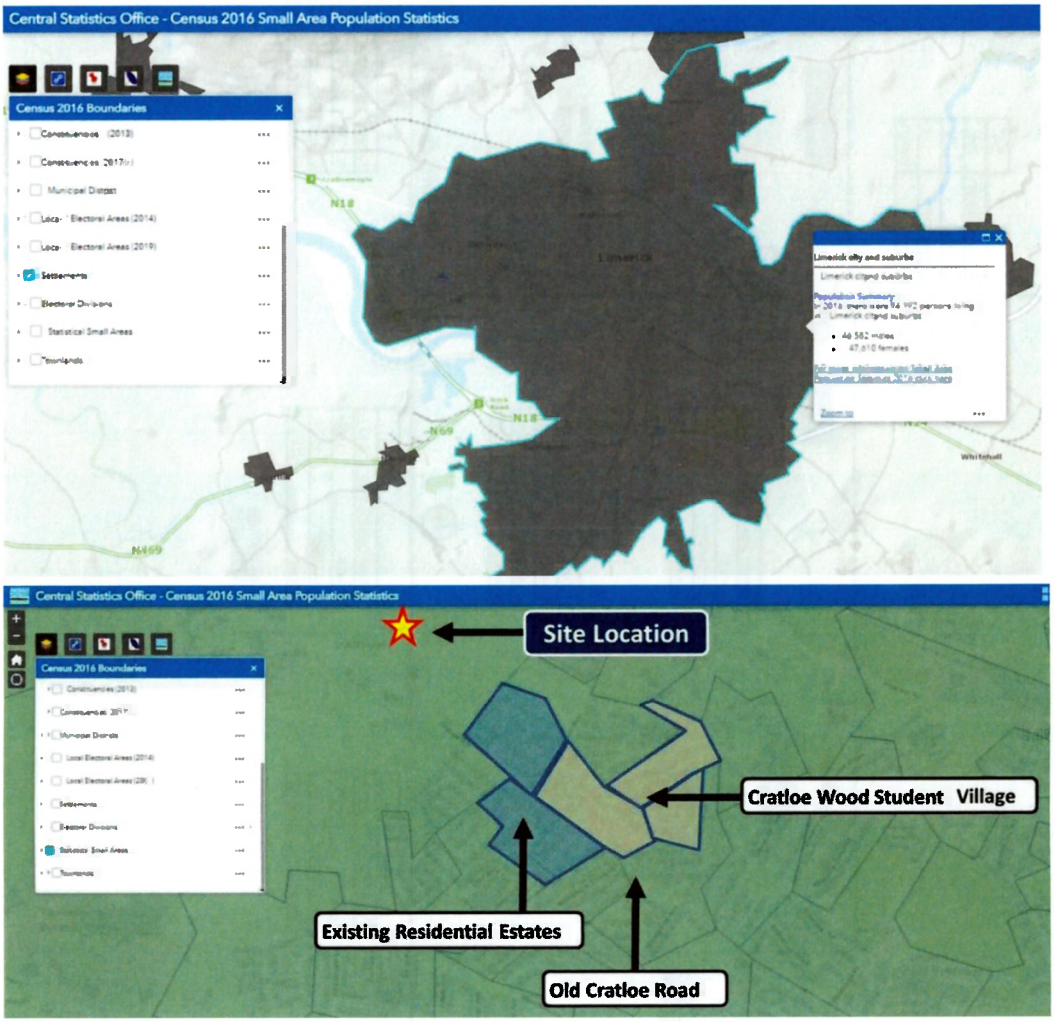


Figure 12.11 – CSO SAPMAP screenshots (Limerick City Settlement Area and Several Local Small Areas)

Travel Mode	2016 Mode of Travel to Work/School/College		
		Local CSO Small Areas (see Figure 3.1)	
	Limerick City	Existing Estates	Existing Student Village
On foot	22.34%	11%	48%
Bicycle	2.79%	3%	1%
Bus, minibus or coach	7.27%	4%	20%
Train, DART or LUAS	0.21%	0%	0%
Motorcycle or scooter	0.21%	0%	0%
Car driver	38.51%	42%	13%
Car passenger	18.56%	32%	13%
Van	2.13%	4%	2%
Other (incl. lorry)	0.13%	0%	0%
Work mainly at or from home	1.44%*	2%	0%
Not stated	6.42%	2%	3%
TOTAL	**100%**	**100%**	**100%**

**Working from home is likely to increase significantly post Covid*

Table 12.1 2016 CSO Limerick City Settlement Area & Local Area Surrounding Site - Mode of Travel

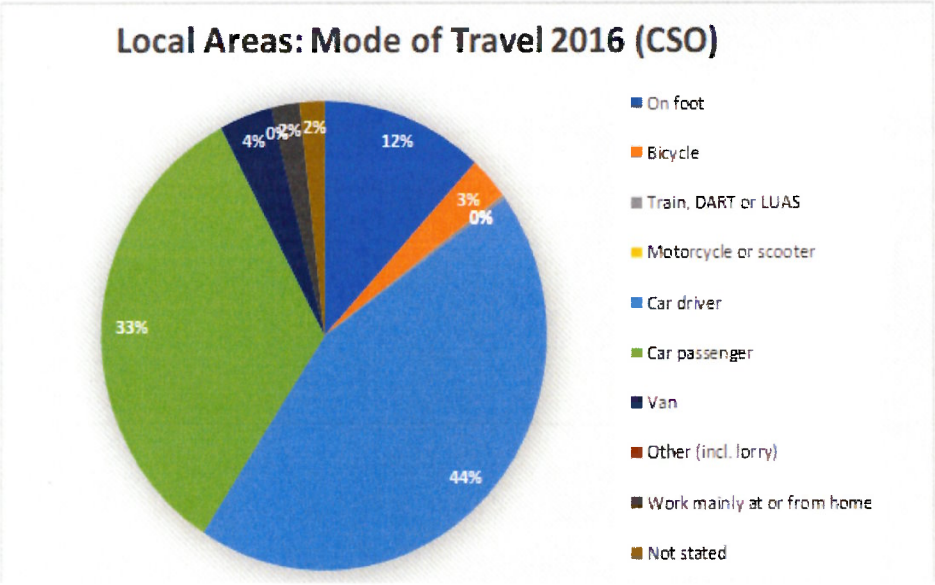


Figure 12.12 CSO SAPMAP – 2016 CSO 'Travel to Work/School' Modal Split – Local Area – Dwellings

These results demonstrates that residents living in the proposed development have the potential to avail of sustainable modes of transport and rely less on provide car use for typical daily trips.

12.3.7 Walking

Although the proposed site is located in a suburban area on the fringes of Limerick city, there are existing footpaths and street lighting on the northern side of the Old Cratloe Road which provide access to the city centre (30-40mins walk) and local bus services. Once the CKDR is complete, this road will open up routes to access existing shops (Coonagh) and more within a 10-minute walk time and this road will also facilitate the creation of new bus routes serving the area. The site is within reasonable leisure and commuting walking distance of several schools and sports clubs within a 10-15min walk.

Typical walk times are outlined on Table 12.2 and Figure 12.13 shows a isochrones diagram illustrating how far the average Adult (3.1mph/5km/h) can walk in 10, 20 and 40 minutes from the site (pre CKDR road and footpaths). The entire town centre is within 15min walk of this ideal site location.

Walking Time	Avg. Distance (Child)	Avg. Distance (Adult)	Avg. Distance (Commuter)
	4.3 km/h or 1.21m/s	**5km/h or 1.39m/s**	**6km/h or 1.65m/s**
5 minutes	363m	417m	495m
10 minutes	726m	834m	990m
20 minutes	1,452m (1.45km)	1,668m (1.67km)	1,980m (1.98km)

Table 12.2a – Average Walk Times and Distances

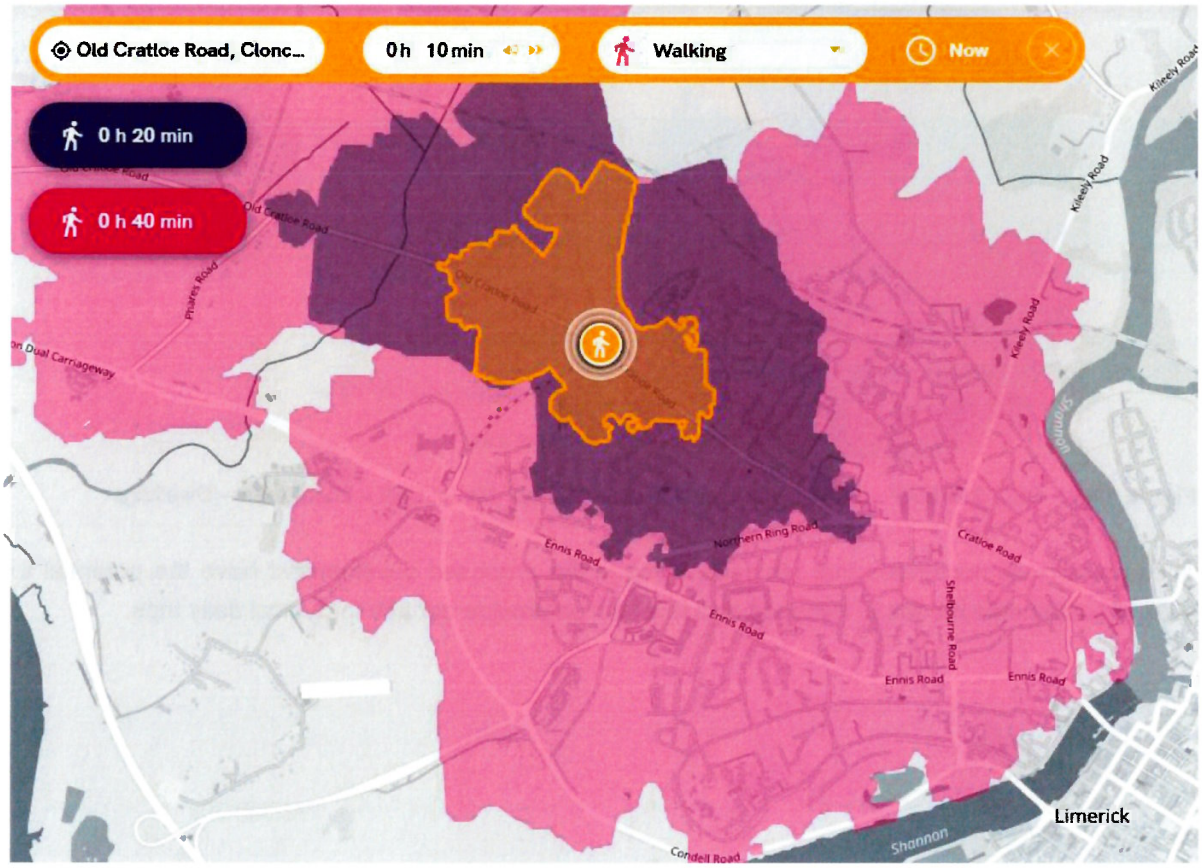


Figure 12.13 Approx. Walking Time Isochrones Diagram

12.3.8 Cycling

Similar to walking, the proposed site will ideally located adjacent to the CKDR which will not only provide significantly high quality cycle lane infrastructure but also open up new cycle routes provides easier access to all parts of the city. The proposed site is within an easy (5-15mins) and acceptable cycling distance of the city centre, local schools and more. Typical cycling times are outlined below in Table 12-2b based on typical cycle speeds for school children (<14yrs), adults (14yrs+) and commuters and Figure 12-14 illustrates far the average Adult can cycle in 5, 10 and 15 minutes from the site (pre CKDR road and cycle lanes).

Cycle Time	Avg. Distance (Child)	Avg. Distance (Adult)	Avg. Distance (Commuter)
	13.7km/h or 3.8m/s	16km/h or 4.5m/s	24km/h or 6.7m/s
5 minutes	1,140m (1.14km)	1,341m (1.34km)	2,010m (2.01km)
10 minutes	2,280m (2.28km)	2,682m (2.68km)	4,020m (4.02km)
20 minutes	4,560m (4.56km)	5,364m (5.36km)	8,040m (8.04km)
30 minutes	6,840m (6.84km)	8,046m (8.05km)	12,060m (12.06km)

Table 12.2b Average Cycle Times and Distances

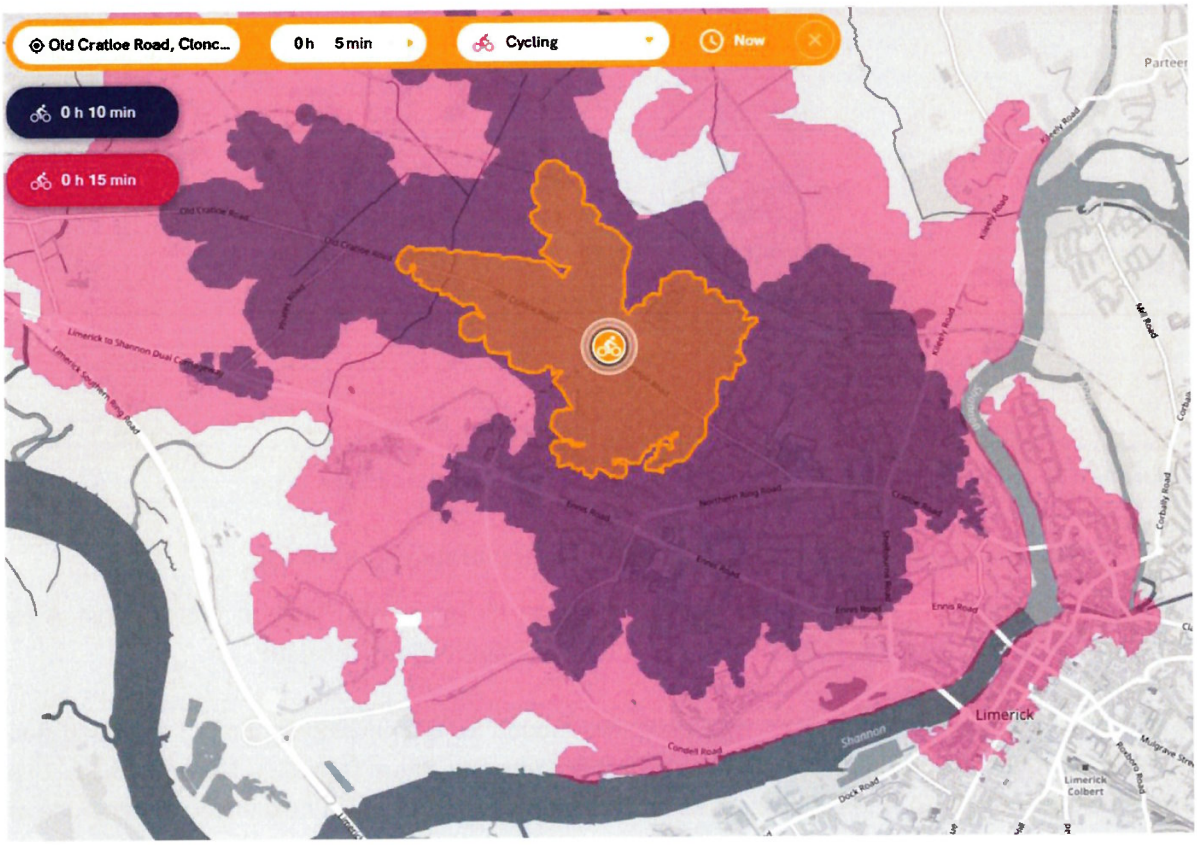


Figure 12.14 Approx. Cycle Time Isochrones Diagram

Figure 12.14 above shows that the city centre is within only a 15 min cycle time of the proposed site which suggests that cycling could be an easy and practical alternative to provide car trips.

12.3.9 Public Transport

The proposed site is located within a 10 minute walk from the Route 302 bus stop on Old Cratloe Road which provides access to local amenities and the city centre including the main bus and train station (services every 20mins during peak times). The introduction to the CKDR scheme will introduce changes to the existing bus routes (to be confirmed) which should lead to significantly improved public transport options available to residents of the proposed development and surrounding local road. As shown in Section 12.3.6, the existing CSO statistics indicate that the proposed development has the potential for relatively high public transport use up to 20% (when compared to the existing student village nearby). Timetables for the various public transport routes can be found at www.journeyplanner.transportforireland.ie

Figure 12.15 Local Public Transport – Bus Stops, Routes and Train Station (source TFI.ie)

12.3.10 Limerick Shannon Metropolitan Area Transport Strategy (LSMATS)

Riverpoint Construction Limited made a submission to the Limerick Shannon Metropolitan Area Transport Strategy (LSMATS) in relation to transport, in particular Bus Transport.

In summary, the submission outlined the Applicants support for the development of an extended Bus Route E1 on the Old Cratloe Road as shown on the 'Potential Short Term Bus Network' map. This extended bus route E1 passes the proposed development lands and would help encourage the use of more sustainable transport modes and reduce the reliance on the private car. As part of this support, the Applicant has included the provision for a Bus Stop (s) including bus shelter and layby for consideration as part of the overall masterplan development. The final location and layout of which will

be discussed and agreed with LCCC as part of the planning process for application reference P22/917 (12 res. units & neighbourhood facility

12.3.11 Draft Bus Connects Limerick

Riverpoint Construction Limited are currently reviewing and intend to make a submission to the Draft BusConnects Limerick project which is currently in public consultation and feedback stage. BusConnects Limerick is a programme of nine measures to fundamentally transform Limerick's bus system. This programme will assist in realising the ambition of the Limerick Shannon Metropolitan Area Transport Strategy to significantly increase public transport use. The NTA has drafted a New Bus Network for Limerick for public consultation which will greatly enhance bus travel with new and improved services transforming the public transport network.

In particular, the proposed Bus Route no. 3 from Coonagh Shopping Centre to O'Malley Park via the upcoming new Coonagh – Knockalisheen Distributor Road (CKDR) will have a frequency of 'every 15mins' and has the potential of catering for residential of the proposed development.

Similar to the submission outlined above, the Applicant again intends to support the draft BusConnects proposals and submit that the proposed Bus Route 3 could include a minor diversion into the proposed development, thereby significantly increasing the routes residential catchment and thereby encourage an increased number of bus passengers on this route and resultant reduced car trips. Using New Network Online Map system on www.busconnects.ie, the data suggests that new proposed bus network will enable the proposed development to access +4000 more jobs within a 30min bus journey and +12,000 more jobs within a 45min bus journey.

12.4 DESCRIPTION OF EFFECTS

Table 12.1 Potential Impacts during Construction Phase and Table 12.2 Potential Operational Impacts outline the range of potential impacts associated with the construction and operational phases of the proposed development.

The potential impacts were focused on the area of land associated with this planning application (Phase 3). It is noted, however, that in accordance with traffic engineering best practice, the junction capacity analysis and other traffic assessments, have been assessed for the worst case and cumulative scenario of development of the entire masterplan development lands (all phases) and the analysis is not solely for this planning application in isolation.

As outlined in Section 12.3.5, it should also be noted that the potential cumulative impact of the overall masterplan will likely coincide and be wholly offset by the expected positive impact and modelled significant decrease in traffic flows on the Old Cratloe Road by 60-80% with the opening of the Coonagh – Knockalisheen Distributor Road (CKDR) which is currently under construction.

12.4.1 'Do-Nothing' Scenario

If the proposed development did not proceed, no additional construction and operational trips as a result of the development would arise. Additional infrastructure for cyclists and pedestrians would not be

installed within the lands which would not allow greater interconnectivity and route selection. Other than the opening of the Coonagh – Knockalisheen Distributor Road (CKDR) which is currently under construction and potential changes in travel patterns on the Old Cratloe Road, it is envisaged that the land use would remain unchanged as a greenfield site.

12.4.2 Construction Phase

No.	Construction Activity	Attribute	Character of Likely Impact
1	Generation of heavy traffic for construction purposes	Existing road network and junctions	Increased vehicle movements consisting of HGVs and construction plant that may result in traffic congestion on roads
2	Generation of construction trips resulting in congestion / Journey dela ys	Existing road network and junctions	Increased vehicle movements associated with construction staff and management travelling to/ from the site. Iincreased queuing and congestion
3	Generation of construction trips resulting in reduction in safety levels along road network	Existing road network and junctions	Increased conflict between pedestrians/ cyclists and vehicle traffic
4	Construction works requiring Temporary severance of pedestrian and cycle routes and intimidation and delay on the road network	Existing roads, footpaths and cycle paths	Increased road crossings for Pedestrians and Cyclists. Perceived difficulty and discomfort in crossing a road.
5	Creation of Construction Trips	Air Pollution	The effects of air pollution are detailed within Chapter 10, Air Quality & Climate, this EIAR
6	Creation of Construction Trips	Noise	The effects of noise are detailed within Chapter 11, Noise and Vibration, of this EIAR

Table 12.1 Potential Impacts during Construction Phase

12.4.3 Operational Phase

No.	Operational State	Attribute	Character ofPotential Impact
1	Increase in Peak Hour Development Trips resulting in Congestion / Journ ey delays	Existing and proposed road network and junctions	Increased movements to access the development consisting of cars, pedestrians and bicycles that may result in traffic congestion on roads and infrastructure. Increased queue lengths at junctions.
2	Increase in Peak Hour Development Trips resulting in reduction in safety levels along road network	Existing and proposed road network and junctions	Increased conflict between pedestrians/ cyclists and vehicle traffic

No.	Operational State	Attribute	Character of Potential Impact
3	Change of pedestrian and cycle routes including more route section and increase connectivity	Existing and proposed road network and junctions	Increased road crossings for Pedestrians and Cyclists. Perceived difficulty and discomfort in crossing a road. Increase in route choice and interconnection for pedestrians and cyclists as a result of an increase in infrastructure.
4	Increase in Daily Development Trips	Air Pollution	The effects of noise are detailed within Chapter 10, Air Quality & Climate, this EIAR
5	Increase in Daily Development Trips	Noise	The effects of noise are detailed within Chapter 11, Noise and Vibration, of this EIAR

Table 12.2 Potential Operational Impacts

12.4.4 Potential Cumulative Impacts

An examination of the potential for other projects to contribute cumulatively to the impacts from the proposed development was undertaken during the preparation of this EIAR.

Given the scale of the proposed residential development and the capacity of the surrounding environment to accommodate a development of this nature and size, it is considered that the overall cumulative development of the overall lands will have a moderate and long-term impact on the surrounding environment.

12.5 DESCRIPTION AND SIGNIFICANCE OF IMPACTS

The effects on the receiving environment are measured as the likely natural or physical changes in the environment resulting directly or indirectly from the development processes. As per Chapter 1.0, consideration of these effects was undertaken by assessing the proposed development against the defined environmental variables set out in the Planning and Development Regulations 2001 and EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.

12.5.1 Construction Phase

The applicant will provide a contractors compound within the site boundaries to accommodate all construction staff, parking, deliveries and safe vehicle turning within the site. Typically, construction would commence a minimum of 1 month after grant of full planning permission and construction traffic levels are anticipated to be significantly lower than those tested for the operational state. The impact of the construction phase will be temporary to short term and will be replaced by the operational state. As outlined in Chapter 2.0 Project Description, it is anticipated that circa 99 no. units shall be delivered per year, resulting in the overall delivery of the phased masterplan over a 5-year period – subject to market circumstances.

Delivery	Development	Gross Site Area	Status	Planning Ref. No.
Delivery 1	Phase 1: 99 residential units	3.31 ha.	Planning permission granted	P21/1800
Delivery 2	Childcare Facility.	0.43 ha.	FI Response Submitted	P22/790
Delivery 3	Phase 2: 86 residential units	2.19 ha.	FI Response Submitted	P22/817
Delivery 4	12 res. units & neighbourhood centre	1.40 ha.	FI Response Submitted	P22/917
Delivery 5	Phase 3: 98 residential units	3.69 ha.	Subject Development	P22/959
Delivery 6	Phase 4: 54 residential units	2.55 ha.	Further Information Request	P22/1114
Delivery 7	Phase 5: 99 residential units	2.87 ha.	Future development	

Table E rror! No text of specified style in document..**6** Approximate Schedule of Phase Construction Delivery Over 5-year Period

The estimated construction traffic flows during any of the above delivery phases (worst case equates to 99no. units) are shown in Table 12.7.

Construction	DAILY		AM PEAK (8-9)		PM PEAK (5-6)	
Traffic Flows	A rrivals	Departures	Arrivals	Departures	Arrivals	Departures
Deliveries	25	25	3	3	3	3
Staff	55	55	11	2	2	11
Misc.	5	5	1	1	1	1
T otal	85	85	15	6	6	15
Total Two-Way	170		21		21	

Table Error! No text of specified style in document..**7** Estimated 'Worst Case ' Construction Traffic Flows

No	Construction Activity	Attribute	Importance of Attribute	Magnitude of Potential Impact Error! Reference source not found.	Significance of Potential Impact	Duration of Potential Impact
1	Construction Trips	Increase in heavy traffic on the road network	Medium	Minor Adverse	Moderate	Short-Term
2	Construction Trips	Congestion / Journey delays on Road Network	Medium	Minor Adverse	Moderate	Short-Term

No	Construction Activity	Attribute	Importance of Attribute	Magnitude of Potential Impact Error! Reference source not found.	Significance of Potential Impact	Duration of Potential Impact
3	Construction Trips	Reduction in safety levels on road network	Medium	Minor Adverse	Moderate	Short-Term

Table Error! No text of specified style in document..**3** Significance of Impacts during 'worst case' Construction Phase

12.5.2 Operational Phase

The assessment below focuses on the effects of increased traffic on the local road network during the post construction (Operational Phase) scenario of the overall masterplan lands. The assessment considers the impact of the traffic from the overall masterplan lands on the baseline and future design year traffic levels which is the cumulative 'worst-case' assessment. If the overall development on the masterplan lands can be shown to be satisfactory, then individual planning applications, such as Phase 3, within the development will also be deemed to be satisfactory.

This section of the chapter assesses the traffic generation, junction capacity and traffic impact of the entire development lands as a Cumulative Impact scenario.

The long-term development impact on the local road network was undertaken by analysing the capacity of the following junctions:

- Junction 1: Priority 'T' junction between the upgraded Old Cratloe Road and the realigned Meelick Road (designed as part of the CKDR scheme).
- Junction 2: Roundabout Junction between the proposed site access and realigned Meelick Road (designed as part of the CKDR scheme).

If required, additional detail regarding trip rates, traffic generation, and more is contained in the full Traffic and Transport Assessment (TTA) submitted as part of the application.

Estimated Development Traffic

The estimated cumulative 'worst-case' development traffic from ALL phases of the overall masterplan lands is shown in Table 12.9 and is based on the masterplan schedule outlined in Table 12.6. The estimated development traffic was undertaken using trip rate from the industry standard TRICS database.

Overall Masterplan	Arrivals	Departures
AM 08:00-09:00	69	186
PM 17:00-18:00	169	100

Table Error! No text of specified style in document..**4** House Unit Trip Rate used to estimate Development Traffic

The estimated traffic and trip rates used for all individual phases and lands uses which make up the above cumulative masterplan development traffic flows are shown in detail in the full TTA report which is contained in Appendix 12.1

In terms of traffic impact and flows, it is reasonable to assume that the proposed creche and neighbourhood centre including café and retail trips will generate predominately internal trips due to the location of the development (i.e. Home-Creche, Home-Shop, Home-Café, Café-Shop etc). However, in order to undertake a robust 'worst case' scenario assessment it was assumed that the proposed Neighbourhood Centre development would generate a conservative 20% new external trips for analysis purposes only.

As shown in Figure 12.2, an additional vehicular access junction is proposed on the Old Cratloe Road as part of the future Phase 4 development (labelled junction 3 on the traffic flow figures overleaf). These access junction options will therefore help disperse and dilute the overall impact of the above masterplan development traffic flows. It is assumed that:

- Junctions 1 and 2 will cater for Phase 1 (99 units), Phase 2 (86 units) and 50% of Phase 3 (98 units) with estimated traffic flows shown in Table 12-10 and Figure 12-16. Junction 1 will also cater for traffic generated by the Neighbourhood centre phase.
- Junction 3 will cater for Phase 4 (54 units) and 50% of Phase 3 (98 units) with estimated traffic flows shown in Table 12.11 and Figure 12-16.
- Junction 4 will cater for the future Phase 5 application (99 units) with estimated traffic flows shown in Table 12-12 and Figure 12-16.

Entire Development	Arrivals	Departures
AM 08:00-09:00	37	93
PM 17:00-18:00	87	54

Table 12.10 Estimated Masterplan Trips for ALL Phases via Junctions 1 and 2

Entire Development	Arrivals	Departures
AM 08:00-09:00	16	46
PM 17:00-18:00	41	24

Table 12.11 Estimated Masterplan Trips for Phases 3 & 4 via Junction 34

Entire Development	Arrivals	Departures
AM 08:00-09:00	14	40
PM 17:00-18:00	35	20

Table 12.12 Estimated Masterplan Trips for Phase 5 via Junction

For preliminary analysis purposes only, the estimated assignment and distribution of these potential future masterplan traffic flows is shown in Figure 12.16 and the 2025 (opening year) and 2038 (future design year) traffic including masterplan development traffic are shown in Figures 12.17 and 12.18 respectively.

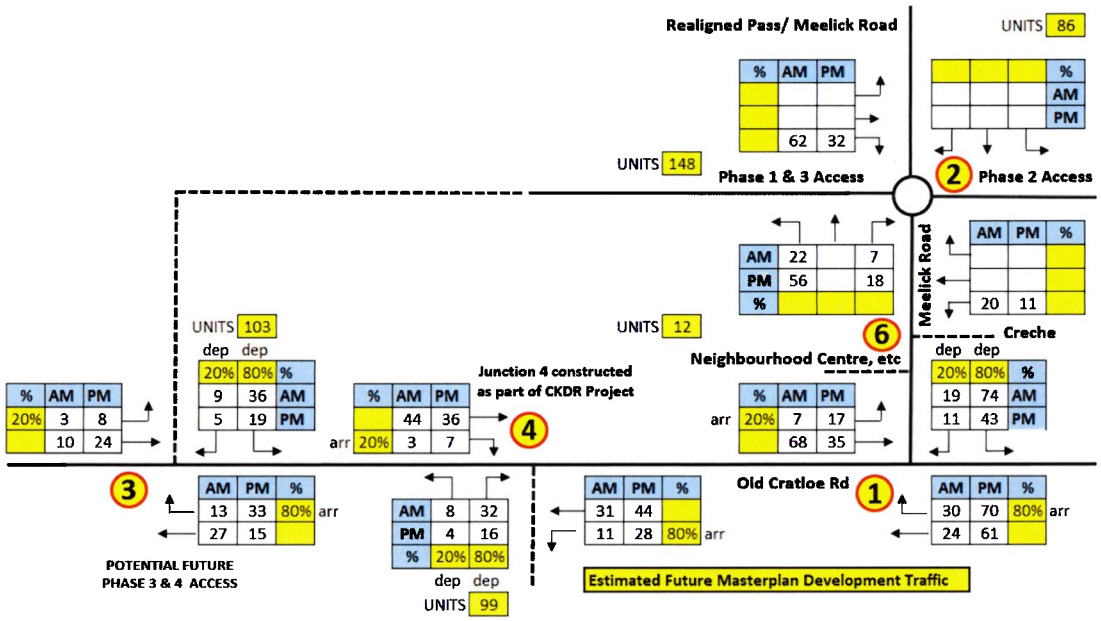


Figure 12.16 Estimated Traffic Flows from the Potential Entire Masterplan Development (ALL Phases)

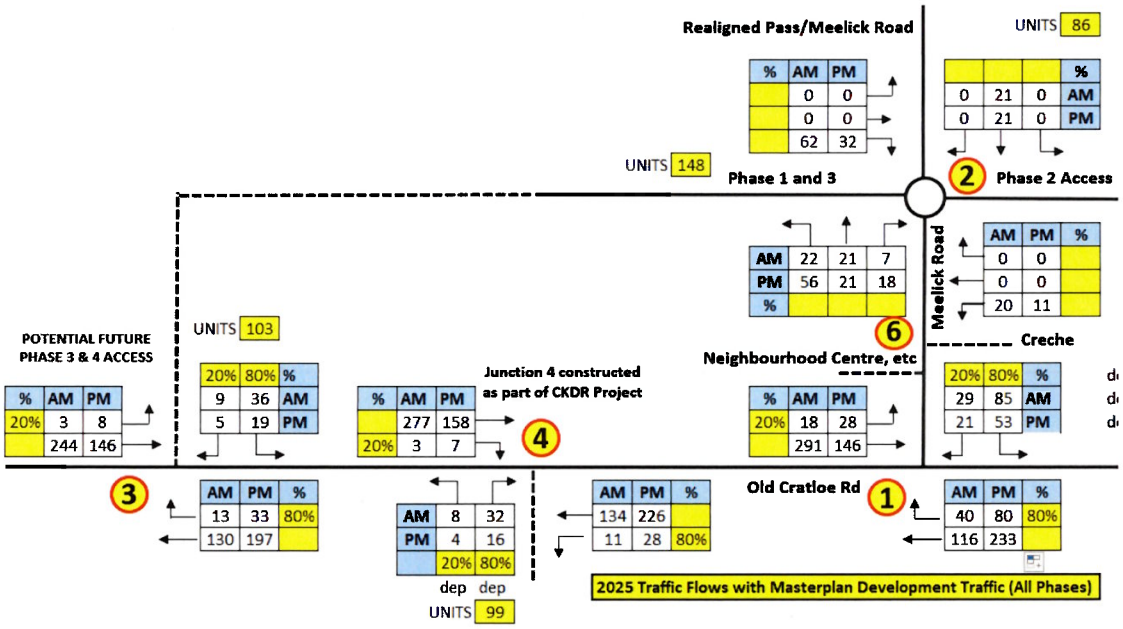


Figure 12.17 2025 Traffic Flows with Estimated Traffic from Entire Masterplan Development (ALL PHASES)

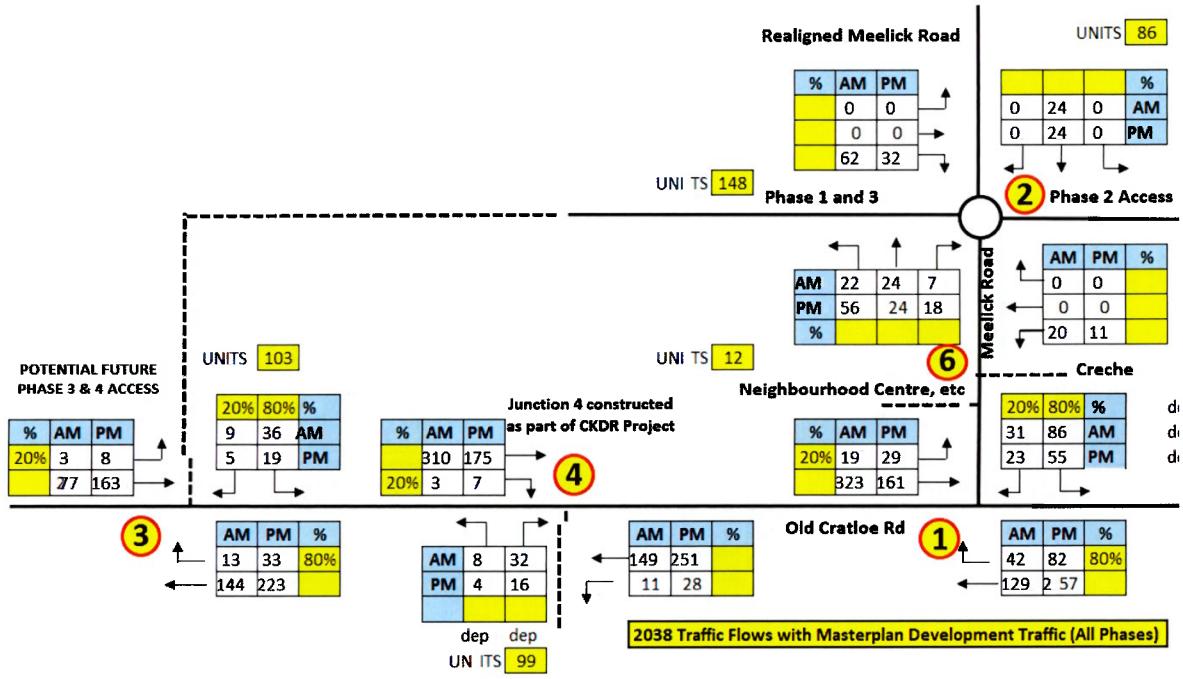


Figure 12.18 2038 Traffic Flows with Estimated Traffic from Entire Masterplan Development (ALL PHASES)

Junction Capacity Analysis

The junction capacity analysis was undertaken using the Transport Research Laboratory's (TRL) computer programme PICADY for uncontrolled priority junctions and ARCADY for roundabout junctions. The junction naming convention is illustrated below in Figure 12.19

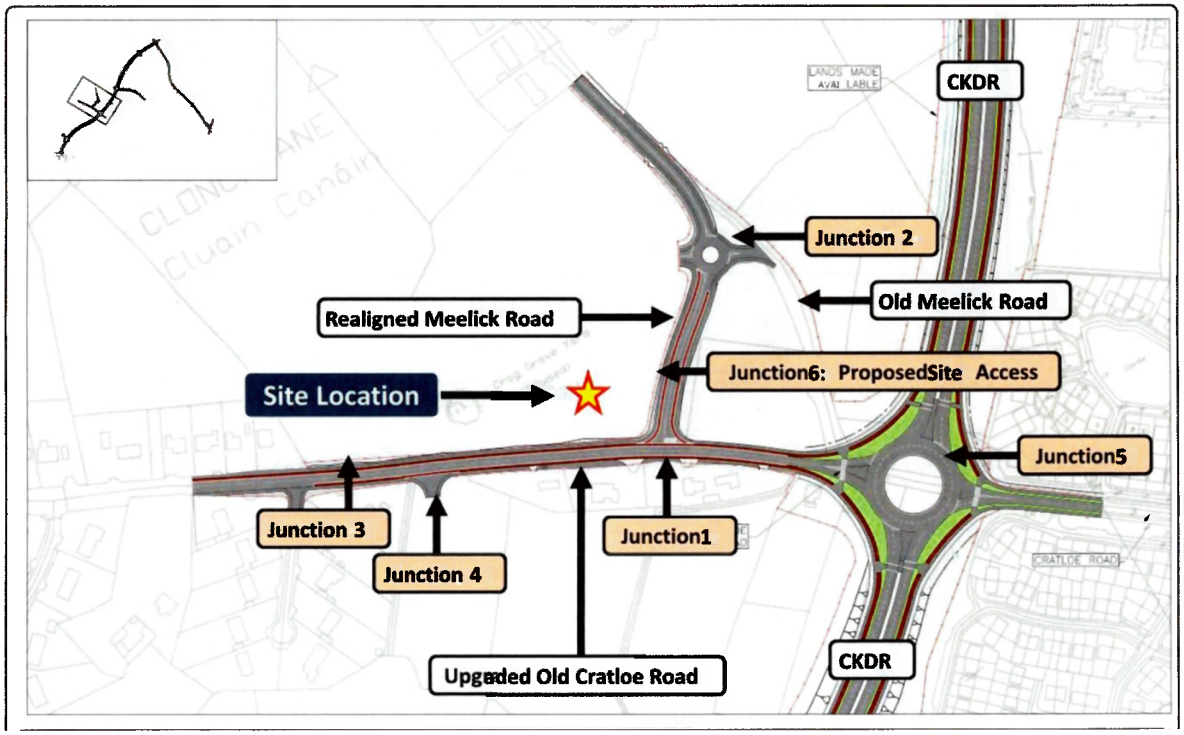


Figure 12.19 Junction Naming Convention for Capacity Analysis

The assessment considers the impact of the traffic from the overall masterplan lands on the baseline and future design year traffic levels which is the cumulative 'worst-case' assessment.

In terms of development planning and TII guidance, traffic impact is determined by the impact on junction capacity during the AM and PM peak hours, when the local road network experiences the highest traffic flows.

The junction capacity analysis was carried out for the following scenarios – 'with' (Do Something) and 'without' (Do Nothing) the estimated 'worst case' traffic from ALL phases of the entire draft masterplan development (See Figure 12.16).

- Base Year traffic flow scenario - see Figure 12.4a
- Opening Year traffic flows scenarios - see Figures 12.10a and 12.17
- Future Design Year traffic flows scenarios - see Figures 12.10b and 12.18

A summary of junction capacity analysis results for the above scenarios are outlined below in Table 12.13. A ratio of flow to capacity (RFC) above the 85% **(0.85)** threshold value are considered above capacity junctions, where queuing and delay issues would begin to occur and build up. The summary of results show the maximum predicted capacity experienced on a single junction arm for each analysis scenario and each junction.

AM Peak Hour	**'Without' Masterplan Traffic**		**'With' Masterplan Traffic**	
	'Do Nothing'		**'Do Something'**	
2022 Base Year	**Max. Capacity**	**Max. Q (veh)**	**Max. Capacity**	**Max. Q (veh)**
Junction 1	0.044 (4%)	0	na	na
Junction 2	0.019 (2%)	0	na	na
Junction 3	na	na	na	na
Junction 4	na	na	na	na
Junction 6	na	na	na	na
2025 Opening Year				
Junction 1	0.049 (5%)	0.1 (<1 veh)	0.251 (25%)	0.3 (<1 veh)
Junction 2	0.020 (2%)	0	0.070 (7%)	0.1 (<1 veh)
Junction 3	na	na	0.094 (9%)	0.1 (<1 veh)
Junction 4			0.106 (11%)	0.1 (<1 veh)
Junction 6	na	na	0.024 (3%)	0
2038 Design Year				
Junction 1	0.055 (6%)	0.1 (<1 veh)	0.264 (26%)	0.4 (<1 veh)
Junction 2	0.023 (2%)	0	0.070 (7%)	0.1 (<1 veh)
Junction 3	na	na	0.096 (10%)	0.1 (<1 veh)
Junction 4			0.109 (11%)	0.1 (<1 veh)
Junction 6	na	na	0.025 (3%)	0
PM Peak Hour	**'Without' Masterplan Traffic**		**'With' Masterplan Traffic**	
2022 Existing	**Max. Capacity**	**Max. Q (veh)**	**Max. Capacity**	**Max. Q (veh)**
Junction 1	0.043 (4%)	0	na	na

Junction 2	0.019 (2%)	0	na	na
Junction 3	na	na	na	na
Junction 4	na	na	na	na
Junction 6	na	na	na	na
2025 Opening Year				
Junction 1	0.047 (65%)	0	0.197 (20%)	0.4 (<1 veh)
Junction 2	0.020 (2%)	0	0.090 (9%)	0.1 (<1 veh)
Junction 3	na	na	0.077 (8%)	0.1 (<1 veh)
Junction 4	na	na	0.055 (6%)	0.1 (<1 veh)
Junction 6	na	na	0.026 (3%)	0
2038 Design Year				
Junction 1	0.052 (5%)	0.1 (<1 veh)	0.207 (21%)	0.4 (<1 veh)
Junction 2	0.023 (2%)	0	0.106 (11%)	0.1 (<1 veh)
Junction 3	na	na	0.081 (8%)	0.1 (<1 veh)
Junction 4	na	na	0.056 (6%)	0.1 (<1 veh)
Junction 6	na	na	0.028 (3%)	0

Table 12.13 Cumulative 'Worst Case' Assessment of overall Masterplan Development (ALL Phases)

The capacity results in Table 12.13 clearly demonstrate that all junctions operate significantly below maximum capacity (<0.85 or 85%) for all analysis scenarios with imperceptible or negligible queuing or delay experienced by drivers both 'with' and 'without' the cumulative 'worst-case' traffic flows from the overall masterplan lands (all Phases).

The introduction of development traffic from the entire masterplan has negligible impact on the Old Cratloe Road with junctions continuing to operate significantly under capacity (i.e. max 26%), meaning that there is large reserve capacity available to cater for any unforeseen or additional future traffic flows. These results are in-line with the CKDR EIS traffic modelling results.

In addition, the predicted masterplan development traffic will also have a negligible traffic and junction capacity impact on the CKDR and associated high-capacity roundabout junctions. No traffic impact or junction operation issues are predicted. Further sensitivity analysis can be undertaken on request. The impact of these cumulative 'worst-case' traffic flows from the overall masterplan lands (all Phases) on the Annual Average Daily Traffic (AADT) against the opening year and future design year are detailed in Table 12.14.

It is important to note that the conservative analysis and results outlined above use 'worst case' traffic flows and scenarios that are unlikely to occur in reality and provide a level on confidence (safety buffer) to the analysis that must be recognised and taken into account when evaluating the results. For example, the assessment has not taken into account the potential reduction of future traffic flows on the Old Cratloe Road as a result of the opening of the new Distributor Road.

No	Construction Activity	Attribute	Importance of Attribute	Magnitude of Potential Impact Error! Reference source not found.	Significance of Potential Impact	Duration of Potential Impact
1	Increase in Peak Hr Development Trips resulting in Congestion / Journey delays	Existing and proposed road network and junctions	Medium	Negligible	Slight	Long-term
2	Increase in Peak Hr Development Trips resulting in reduction in safety levels along road network	Existing and proposed road network and junctions	Medium	Negligible	Imperceptible	Long-term
3	Change of pedestrian & cycle routes including more route section and increase connectivity	Existing and proposed road network and junctions	Low	Minor Beneficial	Slight	Long-term

Table Error! No text of specified style in document..**14** Significance of Operational Impacts – Cumulative 'Worst Case' Overall Masterplan

12.6 REMEDIAL AND MITIGATION MEASURES

12.6.1 Construction Stage

T & T CONST 1: A Construction Traffic Management Plan (CTMP) is to be prepared in consultation with Limerick City and County Council. The CTMP will mitigate traffic impact through:

- programming deliveries outside of peak periods
- ensuring construction vehicles route to site via agreed routes and junctions
- ensuring the construction compound accommodate all construction staff, parking, deliveries and safe vehicle turning
- ensuring construction vehicles will be covered during dry weather to prevent dust emissions
- ensuring wheel washers provided to ensure debris and mud are not taken onto the local road
- ensuring trained banksmen will marshal delivery vehicles within the site & access/exit.

12.6.2 Operational Stage

None required or envisaged.

12.7 RESIDUAL IMPACTS

12.7.1 Construction Stage

Each construction phase will result in a temporary increase in traffic volumes along the construction route. However, as set out in Section 0 these increases will be negligible and temporary in nature and will be significantly less than the operational stage.

As no significant adverse effects have been identified in the construction phase of the development, no additional mitigation is necessary over and above the Construction Traffic Management Plan (CTMP) which forms part of the mitigation measures outlined in this chapter.

12.7.1 Operational Phase

Once operational the potential cumulative development of all phases in the overall masterplan will result in changes to hourly traffic flows on the adjoining road network within the study area. However, as set out in Section 12.5.2 of this chapter, these increases are in the range of slight to imperceptible impact. The introduction of new infrastructure and connections for pedestrians and cyclists is predicted will result in a slight benefit. The impacts will be long-term.

The residual impacts in terms of daily traffic flows are considered further in Chapters 10.0 Air Quality & Climate and Chapter 11.0 Noise and Vibration which are the direct environmental impacts because of increased overall daily traffic flows.

It should also be noted that the introduction of the Coonagh – Knockalisheen Distributor Road (CKDR) infrastructure which is currently under construction will introduce several 'Major Beneficial' impacts and 'Permanent' effects for road users from both the subject lands and the surrounding road network.

12.8 MONITORING

12.8.1 Construction Phase

The appointed contractor will be obliged to appoint a traffic liaison officer/traffic manager who will be involved in preparing the CTMP and to monitor the performance of the CTMP. The traffic liaison officer will be available to receive complaints, comments and queries about the traffic generated by the construction site and traffic issues associated with the site.

Regular meetings will be held on-site to which with all relevant stakeholders will be invited. The traffic liaison officer/traffic manager will liaise with:

- Limerick City and County Council (LCCC) including Elected Members
- An Garda Siochana
- Other relevant statutory bodies
- Members of the community.
- Adjacent contractors

The traffic liaison officer/traffic manager will be sufficiently senior in position and will be responsible for

dealing with any complaints and remedying any non-compliance and developing solutions to prevent re-occurrence.

12.8.2 Operational Phase

Once constructed, the overall facilities on site such as internal roads, footpaths, public/visitor parking, and green areas will be maintained and managed by a management company and ultimately 'taken in charge' by LCCC.

12.9 REFERENCES

Traffic and Transport Assessment Guidelines by TII May 2014

Design Manual for Urban Roads and Streets (DMURS) by DOEHLG 2019

Limerick Shannon Metropolitan Area Transport Strategy 2040 (LSMATS) by NTA 2022

Limerick Metropolitan District Movement Framework Study by LCCC 2015

Limerick Development Plan 2022-2028

Original Coonagh–Knockalisheen Distributor Road (CKDR) Design Drawings & EIS report 2010

Smarter Travel: A Sustainable Transport Future by Department of Transport 2009

Geometric Design of Junctions DN-GEO-03060 by TII 2017 formerly DMRB TD42

Rural Road Link Design DN-GEO-03031 by TII 2017 formerly DMRB TD09

Road Safety Audit guidelines GE-STY-01024 by TII 2017 formerly NRA HD 19

National Cycle Manual by NTA 2011

The Road Safety Authority's website www.rsa.ie for statistics on collisions in the study area

Draft BusConnects Limerick, National Transport Authority (NTA), February 2023

COAKLEY
CONSULTING ENGINEERS

Phase 3 Residential Development at Clonconane, Limerick
Riverpoint Construction Limited
Updated Traffic and Transport Assessment Report – FI Response

Coakley Consulting Engineers
March 2023

DOCUMENT CONTROL SHEET

Client	Riverpoint Construction Limited					
Project Title	Phase 3 Residential Development at Clonconane, Limerick					
Document Title	Updated Traffic and Transport Assessment Report – FI Response					
Document No.	CCE0294Rp0008					
This Document Comprises	DCS	TOC	Text	List of Tables	List of Figures	No. of Appendices
	1	1	26	-	-	4

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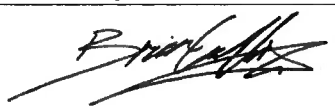
F01	Final		14/03/23

Table of Contents

1 Introduction

1.1 General

Coakley Consulting Engineers (CCE) have been commissioned on behalf of the applicant, Riverpoint Construction Limited, to prepare a response to specific Traffic and Transportation elements contained in the Request for Further Information (RFI) letter from Limerick City and County Council (CCC) dated 27th October 2022 in relation to planning application Ref: 22/959 for Phase 3 of a proposed phased housing development at Old Cratloe Road, Clonconane, Co. Limerick, the location of which is shown below in Figure 1.1. CCE are traffic and transport consultants based in Tralee, Co. Kerry.

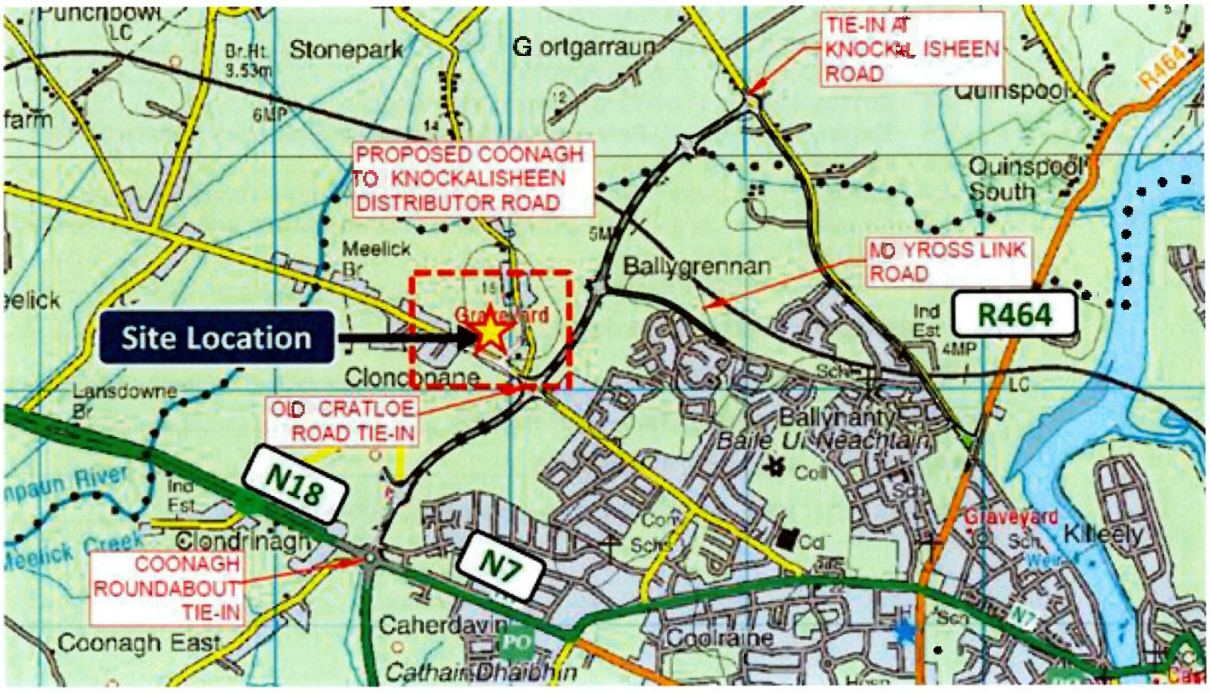
This report should be read in conjunction with all other documents submitted as part of this planning application, including original scale drawings, the draft masterplan and information contained in the granted Phase 1 (21/1800), Phase 2(22/817), Phase 4 (22/1114), Creche (22/790) and Neighbourhood Centre and Residential Development (22/917) and future Phase 5 planning applications. Coakley Consulting Engineers have made reference to the following documents in preparation of this report.

- Site Layout Drawings by Fewer Harrington and Partners (FHP) and Garland (GL)
- Original Coonagh–Knockalisheen Distributor Road (CKDR) Design Drawings & EIS report
- TII standards and DoT document 'Design Manual for Urban Roads and Streets' DMURS
- Current and Draft Development Plans and other relevant documents and information

1.2 Proposed Development Site Location

As shown below in Figure 1.1, the proposed development site is located in Clonconane off the Old Cratloe Road (L3102) in a sub-urban residential area approx. 3.0 km west of Limerick City centre. The site is bounded by the Old Cratloe Road to the south and the Meelick Road to the east, both of which are being upgraded and realigned as part of the Coonagh–Knockalisheen Distributor Road (CKDR) scheme which is currently on site and expected to be complete by 2025/26.

Figure 1.1 *Site Location and Current/Future Local Road Network*



The original Traffic and Transport Assessment (TTA) Report was updated to take into account overall key changes to the development requested and addressed by the response to RFI items below.

1.3 Request for Further Information (RFI)

This report provides a response to RFI Item 1a and 1b, which are shown below for reference and ease of understanding.

The response to other road design items have been addressed through the revised site layout drawings and other information submitted as part of the overall response.

1.4 RFI Items 1(A) and 1 (B)

An extract from RFI Item 1 (a) is shown below:

1. In relation to traffic and pedestrian issues:
   a. The applicant shall submit a Stage 1 & 2 Road Safety Audit. The recommendations of these audits shall be shown on a revised Site Layout Plan, which must be clearly labelled.
   b. The applicant shall justify the parking numbers.

1.5 RFI Response: Item 1(a)

In response to RFI Item 1(a), as shown in Section 3.6 of this report, a Stage 1/2 Road Safety Audit report of the Phase 3 layout was undertaken by a TII approved team of independent auditors and is contained in Appendix B.

The RSA undertaken included all phases of the overall masterplan including the subject Phase 3 Site Layout (RSA Section 3.1 and 3.4). The Phase 3 recommendations made by the RSA report have been reviewed and accepted in full by the design team and these recommendations have been incorporated into all design drawings, including the final revised site layout in Drawing PP-01.

The location of each RSA recommendation has been labelled for ease of understanding as part of the Garland set of drawings submitted as part of the overall response.

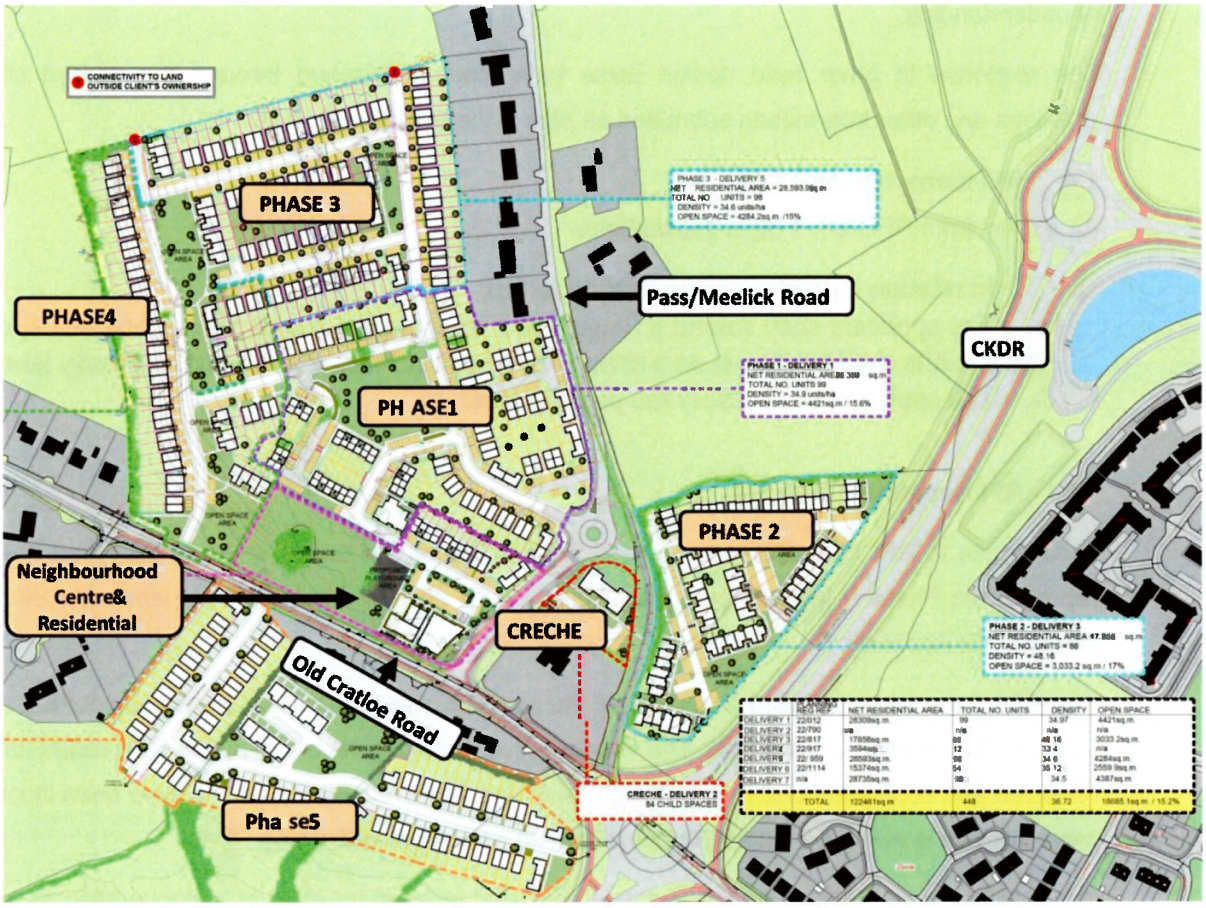
1.6 RFI Response: Item 1(b)

In response to RFI Item 1(b), as shown in Section 3.7 of this report and on the revised Site Layout Plan drawing PP-01 (see also Figure 3.3), the proposed car parking provision complies with the Zone 3 parking requirements laid down in Table DM 8(a) of the recently adopted Limerick Development Plan 2022-2028 and is therefore justified and considered appropriate.

1.7 Proposed Site Layout and Overall Phased Masterplan (Draft)

For ease of understanding and context, the overall *draft* Masterplan layout drawing (subject to change through the various ongoing planning applications) is shown below in Figure 1.2 and in Appendix A.

Figure 1.2 – *Extract of Proposed Draft Masterplan (labelled for ease of understanding & illustrative purposes only)*



2 Road Network & Traffic Flows

2.1 General

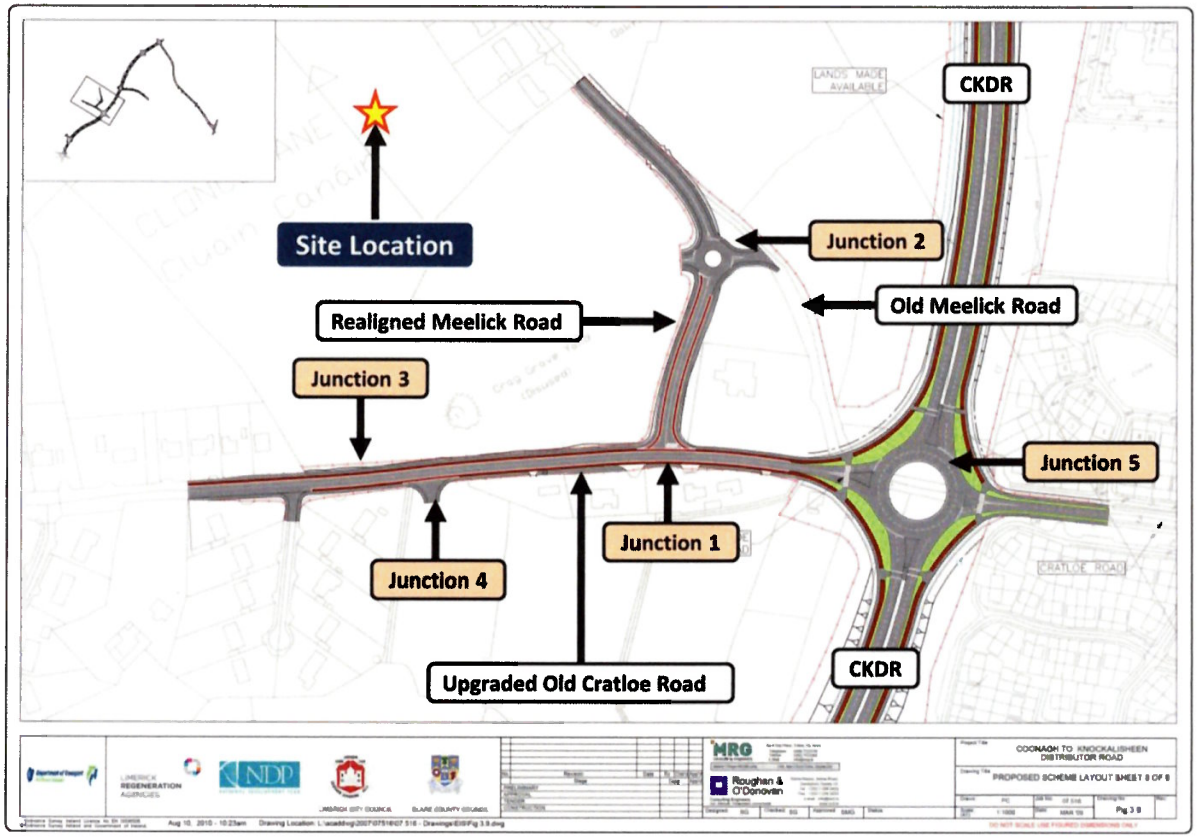
As shown in Figure 1.1 above, the proposed development site is ideally located and is surrounded by an existing and future road network (currently under construction) with easy access to Limerick city centre, the national road network and the TUS (Technological University Shannon) campus formerly LIT. A well-lit roadside footpath and other pedestrian facilities from the site towards the city centre on the Old Cratloe Road are available for vulnerable road users.

- The subject site is located between the Old Cratloe Road (L3102) and realigned Pass/Meelick Road
- Speed Limit of 50km/h exists on the local road network

2.2 Local Road Network and Proposed Infrastructure

As shown in Figure 2.1 below and labelled for ease of understanding, a section of the existing local road network is currently being upgraded to TII and DMURS standards as part of the Coonagh-Knockalisheen Distributor Road scheme (see CKDR EIS, Figure 3.9, Scheme Layout Sheet 8 of 9) which is expected to be complete by 2024/25.

Figure 2.1 *– Proposed Upgrade of Old Cratloe Road as part of CKDR scheme (labelled extract EIS Figure 3.9)*



As shown in Figure 2.1 and overleaf in Figure 2.2, the access to the proposed development will be a standard DMURS complaint priority 'T' junction located between Junctions 1 and 2 on the realigned section of the Meelick Road which has been designed as part of the CKDR scheme to provide high quality vehicular access to the subject zoned lands. Junction No. 3 is a potential access to a future

development phase discussed further in Sections 3.2 and 4.5 and Junction No. 4 is also proposed as part of the CKDR scheme.

The proposed cross-section of the upgraded Old Cratloe Road and realigned Meelick Road will comprise a Carriageway width of 6.5m. 1.8m wide cycle lanes and 2.0m wide footpaths on both sides.

Figure 2.2– *Proposed Road Layout (extract from FHP site layout drawing labelled for ease of understanding)*

SEE REVISED ARCHITECTURAL AND ENGINEERING DRAWINGS PACKAGES SUBMITTED FOR PLANNING AS PART OF THE RFI RESPONSE

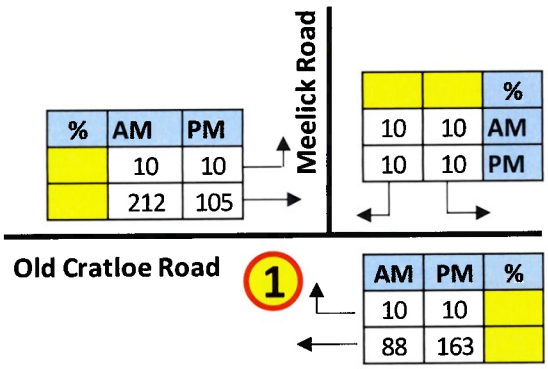
2.3 Existing Traffic Volumes

As part of the previous Phase 1 application, an *independent* turning count survey was undertaken on Thursday 11th November 2021 by Traffinomics Ltd. at the existing junction between the Old Cratloe Road (L3102) and the Meelick Road.

Note: Although these 2021 traffic count surveys were undertaken during the ongoing Covid-19 pandemic, there were no formal travel restrictions in place at the time and schools were open. It should also be noted that the Meelick Road was unavoidably closed to the public due to ongoing construction works and only plant vehicles were permitted on this road. Without this closure, the nature of the Meelick Road lends itself to extremely low traffic flows as it serves less than 40 residential properties. For analysis purposes only, an assumed 'worst case' peak hour traffic flow of 40 vehicles (two-way) on the Meelick Road were used as shown below.

This traffic count data is used as part of the traffic impact and junction analysis for the proposed development. A summary of the 2021 AM (8-9am) and PM (5-6pm) peak hour flows from the above turning count survey is shown in Figure 2.3.

Figure 2.3 *- Existing Traffic Flows (2021)*



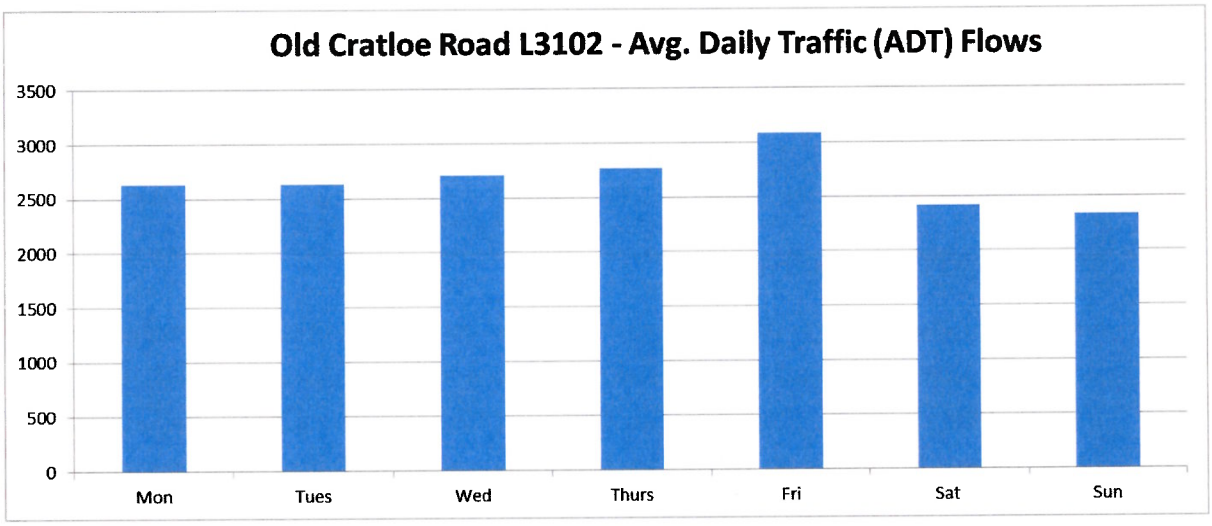
Using this 2021 traffic data, the Annual Average Daily Traffic (AADT) and following traffic flow patterns were estimated using industry standard calculations, guidelines, and best practice[1] and future growth rates applied taking into account national standards[2].

The AADT (Annual Average Daily Traffic) was estimated to be only ***2,730*** vehicles per day (two-way), which suggests that the Old Cratloe Road operates under capacity[3] with substantial reserve capacity available for future growth and traffic from zoned development lands.

Daily traffic flows on the Meelick Road were estimated to be in the order of <***200*** vehicles per day.

The estimated average daily flows on the Old Cratloe Road (L3102) is shown below in Figure 2.4, average 24-hour traffic flow profile shown in Figure 2.5 and daily flows by month in Figure 2.6.

Figure 2.4 *– 2021 Estimated Average Daily Traffic Flows*



[1]Transport Infrastructure Ireland (Tii) document 'Expansion Factors for Short Period Traffic Counts 2016'
[2]Transport Infrastructure Ireland (Tii) document 'Link Based Traffic Forecasting 2011'
[3] TII technical document TA 79/99 'Traffic Capacity of Urban Roads' Old Cratloe Rd (UAP 3) capacity of 900veh/hr one/way

Figure 2.5 *– 2021 Estimated Hourly Traffic Flows*

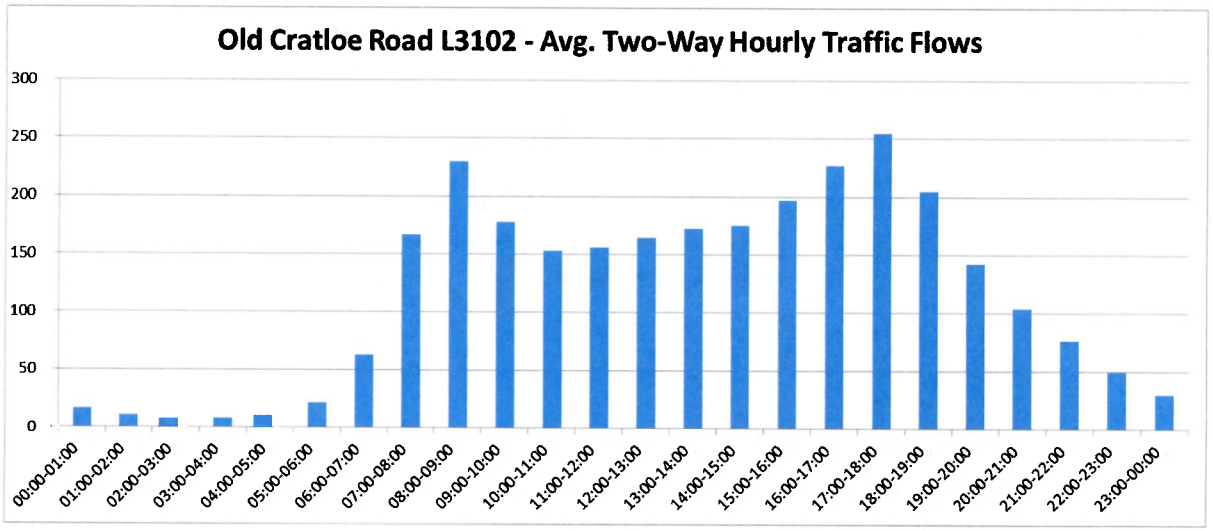
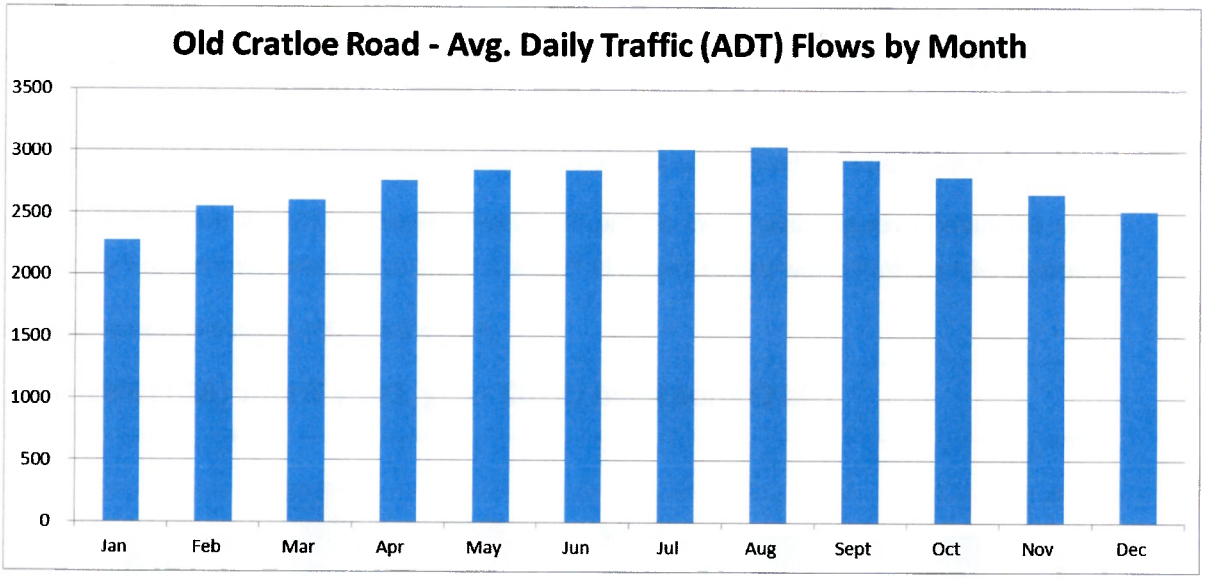


Figure 2.6 *– 2021 Estimated Daily Traffic Flows by Month*



2.4 Future Traffic Volumes

Estimated Future traffic volumes have taken into account the industry standard TII growth rates document 'Link Based Traffic Growth Forecasting', the modelled changes to traffic patterns undertaken as part of the Coonagh – Knockalisheen Distributor Road (CKDR) 2010 EIS report (Figures 5.2 to 5.5 of the original EIS Appendix 3) and the National Transport Authority (NTA) document 'Limerick and Shannon Metropolitan Area Transport Strategy - Demand Analysis Report 2020'.

The CKDR was discussed with project engineers MRG Consulting Engineers regarding predicted traffic flows and more at the project outset.

Based on discussions with MRG, the CKDR EIS report modelled traffic scenarios between 2008 and 2025 based on 2007 traffic flow surveys. Although this traffic flow data could now be considered 'out of date', the general modelled change in travel patterns on each road link still apply. Extracts visible from the historic CKDR EIS report document (Figures 5.2 to 5.5 of the EIS report Appendix 3) are shown below in Figures 2.7 and 2.8 and labelled for ease of understanding.

The CKDR EIS report predicted both daily and AM peak hour traffic flows as part of a future 'Do Nothing' and two 'Do Something' scenarios

1) No Nothing Scenario – a future Scenario where the CKDR is not constructed
2) Scenario 1 – CKDR without a potential future Northern Distributor Road to the R464
3) Scenario 2 – CKDR with a potential future Northern Distributor Road to the R464

Figure 2.7 *– Do Nothing Scenario – Future Traffic Flows without the CKDR*

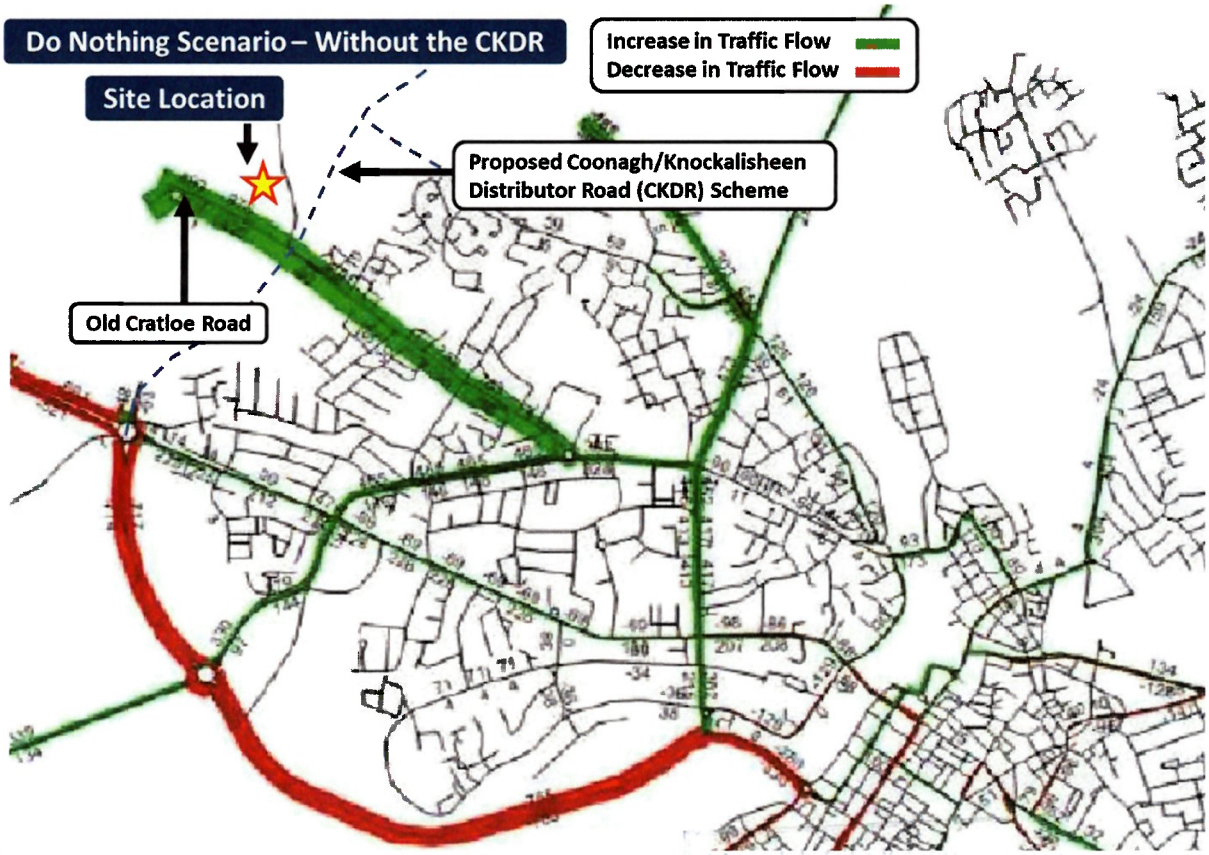
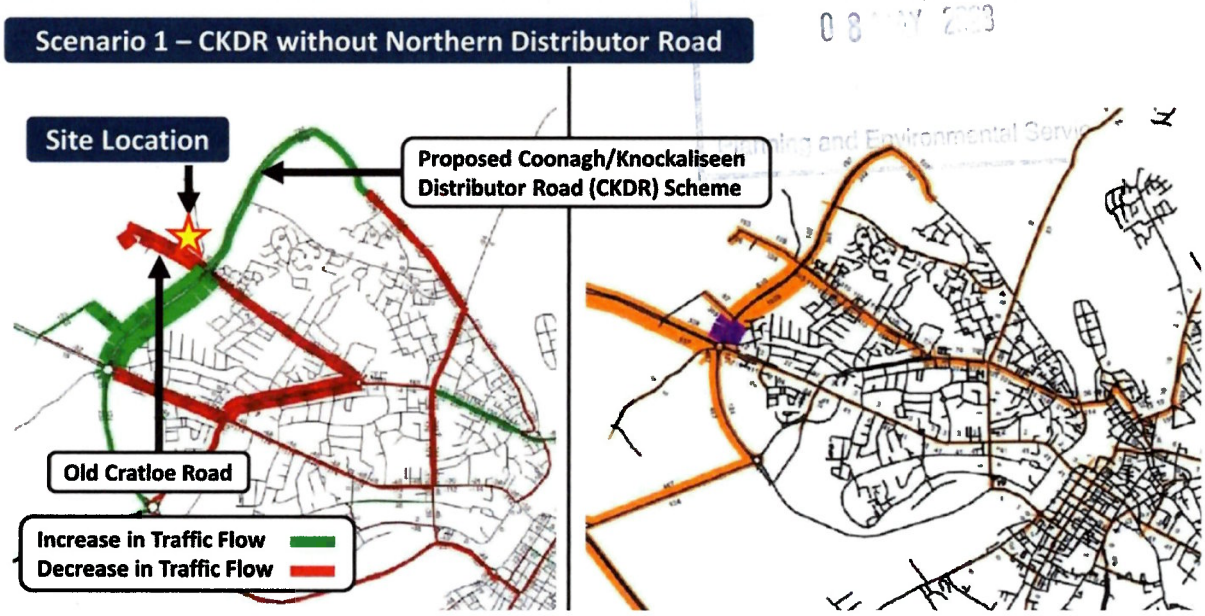
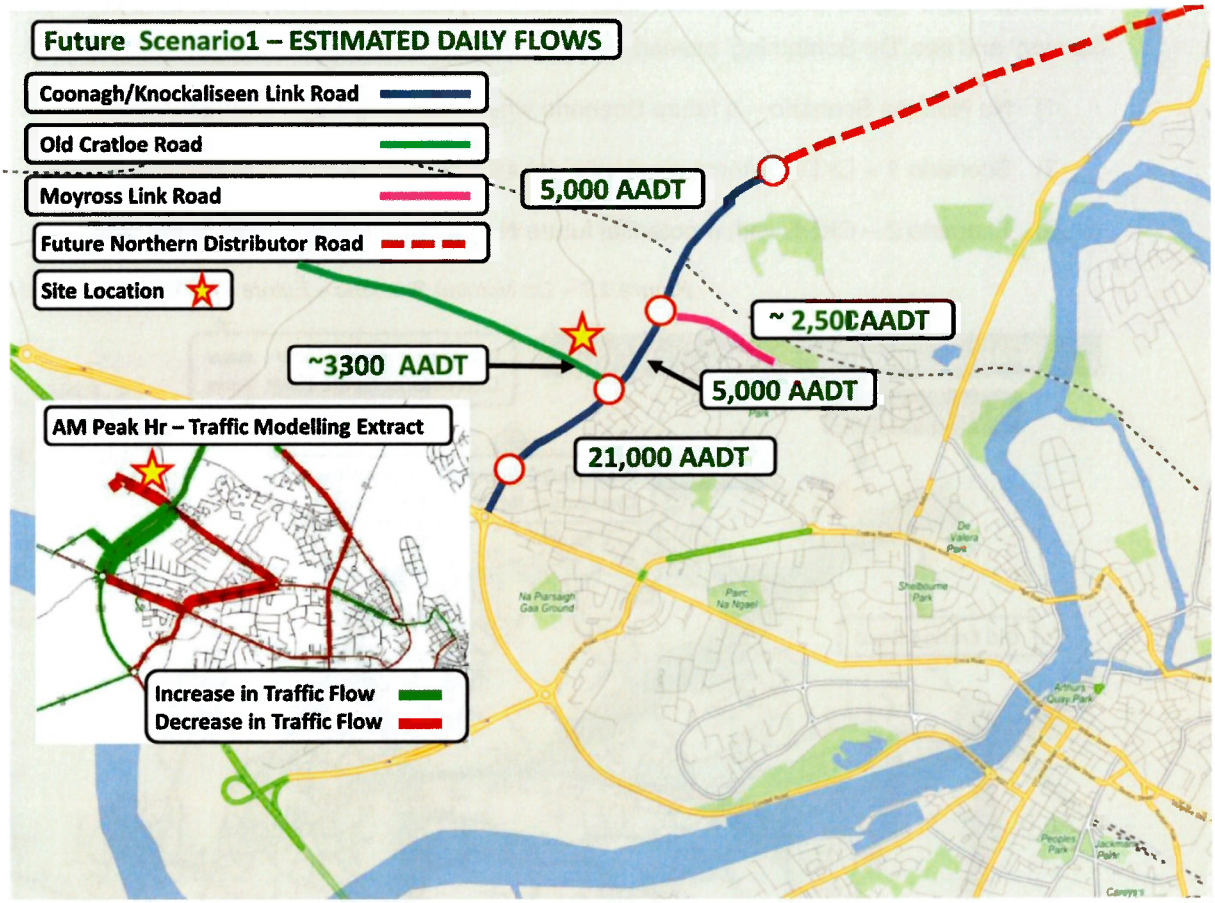


Figure 2.8 *– Scenario 1 Traffic Flows with CKDR but without Northern Distributor Road (see also overleaf)*





As set out in Chapter 14 of the current Revised Draft Limerick Shannon Metropolitan Area Transport Strategy (LSMATS) 2040 report, funding for the Limerick Northern Distributor Road (LNDR) does not form part of the Governments National Development Plan 2021-2040 and therefore this future scenario been omitted from this assessment.

What is clear from the EIS report traffic modelling and Figures 2.7 and 2.8 above is that opening of the new distributor roads will lead to a significant decrease in traffic flows on the Old Cratloe Road by 60-80% of vehicles removed during each peak hour, with local traffic having the new available route options on the CKDR.

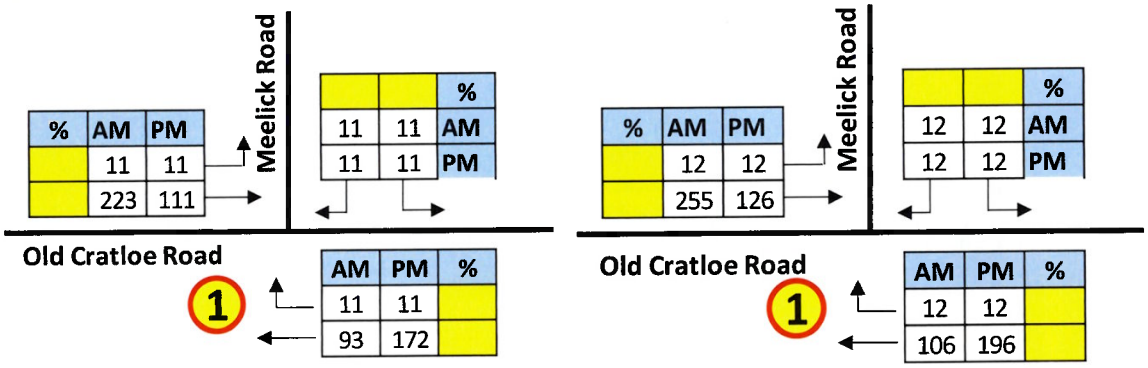
As noted in the EIS, lands along the CKDR route are zoned for future development (including the subject site). Therefore, it is assumed, and it appears that the traffic flows from the development of these zoned lands has already been included in the traffic modelling for the overall roads scheme contained within the EIS report (i.e. Do Nothing and Do Something Scenarios).

The future 2038 AM and PM peak hour traffic volumes 'without' the proposed development traffic are shown in Figure 2.6 were estimated based on the following

- A ~5% growth rate from 2021 to 2025 (Opening Year) and robust 20% growth rate from 2021 to 2038 (future Design Year) based on Transport Infrastructure Ireland (Tii) document 'Link Based Traffic Forecasting 2011'.
- Based on the above traffic modelling, it is reasonable to assume the existing 2021 traffic flows on the Old Cratloe Road (see Figure 2.3) will reduce with the opening of the CKDR. However,

this report has not applied any reduction to traffic flows as part of the junction analysis, ensuring a 'worst case' scenario is analysed.

***Figure 2.6** – 2025 Opening Year (Left) & 2038 Design Year Traffic Flows **without** proposed Development Traffic*



2.5 Existing Travel Patterns – CSO

The proposed development site is located in close proximity to a wide range of local amenities and is within easy walking and cycling distance of several key attractors and typical vehicle trip generators.

The Central Statistics Office (CSO) Census 2016 Small Area Population Statistics (SAPMAP) has been used to gather data for existing commuting travel patterns for 'Population aged 5 years and over by means of travel to school, work or college'.

Table 3.1 outlines modes of travel for both the overall Limerick City and Suburbs (settlement area) shown in Figure 3.1 and the combined travel patterns for several local CSO SAPMAP small areas broken down into travel to/from work and travel to/from college/school. These small areas include both an established residential areas and the existing Cratloe Wood Student Village.

***Figure 3.1** – CSO SAPMAP screenshots (Limerick City Settlement Area and Several Local Small Areas)*

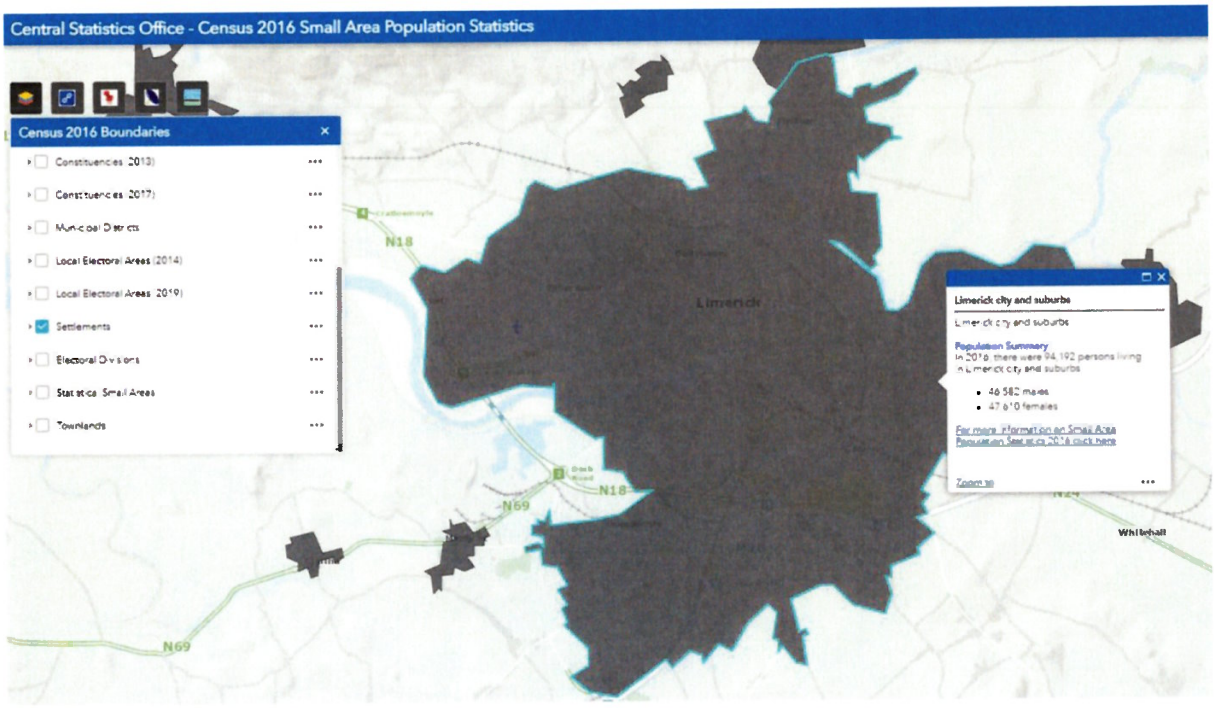
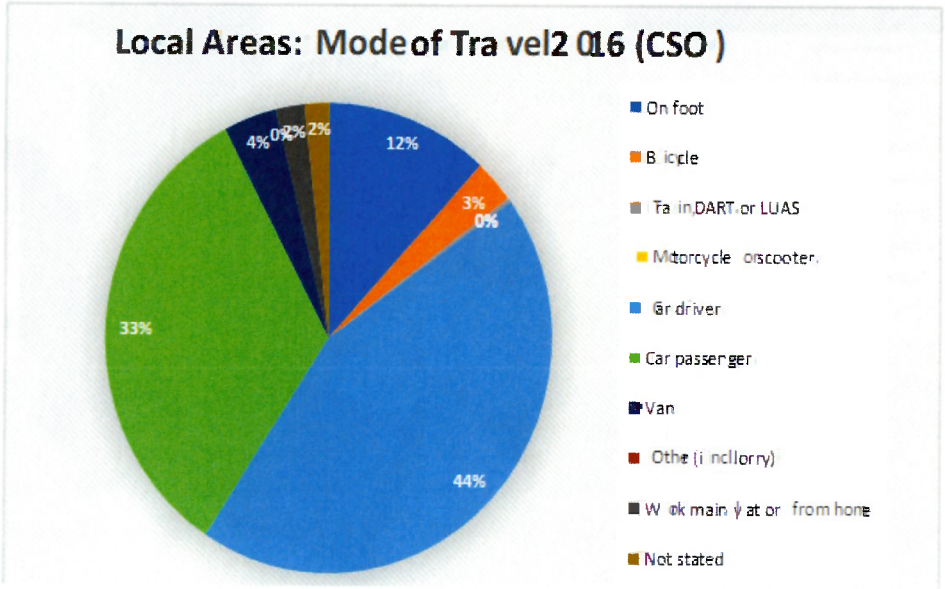


Table 3.1 *– 2016 CSO Limerick City Settlement Area & Local Area Surrounding Site - Mode of Travel*

TravelMo de	2016 Mode of Travel to Work/Schoo l/College		
		Loca l CSO Small Areas (see F igure 3.1)	
	Limerick City	Exi sting Estates	Existin g Student Village
On foot	2234%	11%	48%
Bicycle	27 9%	3%	1%
Bus, minibus or coach	7.27%	4%	20%
Train, DART or LUAS	0.21%	0%	0%
Motorcycle or scooter	0.21%	0%	0%
Car driver	38.51%	42%	13%
Car passenger	1856 %	32%	13%
Van	2.13%	4%	2%
Other (incl. lorry)	0.13%	0%	0%
Work mainly at or from home	1.44%*	2%	0%
Not stated	6.42%	2%	3%
T OTAL	**100%**	**100%**	**100%**

**Working from home is likely to increase significantly post Covid*

Figure 3.2 *– CSO SAPMAP – 2016 CSO 'Travel to Work/School' Modal Split – Local Area – Dwellings*



These results demonstrates that residents living in the proposed development have the potential to avail of sustainable modes of transport and rely less on provide car use for typical daily trips.

3 Proposed Development

3.1 Proposed Site Layout and Development Configuration

The Applicant proposes to the following Phase 3 schedule of development outlined below in Table 3.1

***Table 3.1** – Proposed Phase 3 Development Schedule*

Proposed Development	Units and approx. GFA
Houses (4 bed)	**44no.**
Houses (3 bed)	**44no.**
Houses (2 bed)	**10no.**
Total Units	**98no.**

The 'Proposed Site Plan' layout, an extract of which is shown below in Figure 3.1 (see also Appendix A at reduced scale), was designed and revised by Fewer Harrington and Partners Architects with engineering input from Garland Engineering services.

The design has taken into account DMURS standards and is designed with the principles of safety, accessibility and sustainability. The design allows for safe access and movement for both vehicles and vulnerable road users in terms of junction type, crossing points, pedestrian desire lines and vehicle speeds, sightlines, dropped kerbs, tactile paving and more. As shown, the alignment of the internal road layout has been carefully designed to ensure and encourage low vehicle speeds by means of measures such as signage, changes of horizontal alignment, raised table junctions, reduced junction radii, shared surfaces, short straight road sections and off-street parking

***Figure 3.1** – Proposed Revised Site Plan Layout (extract from drawing PP-01)*

SEE REVISED ARCHITECTURAL AND ENGINEERING DRAWINGS PACKAGES SUBMITTED FOR PLANNING AS PART OF THE RFI RESPONSE

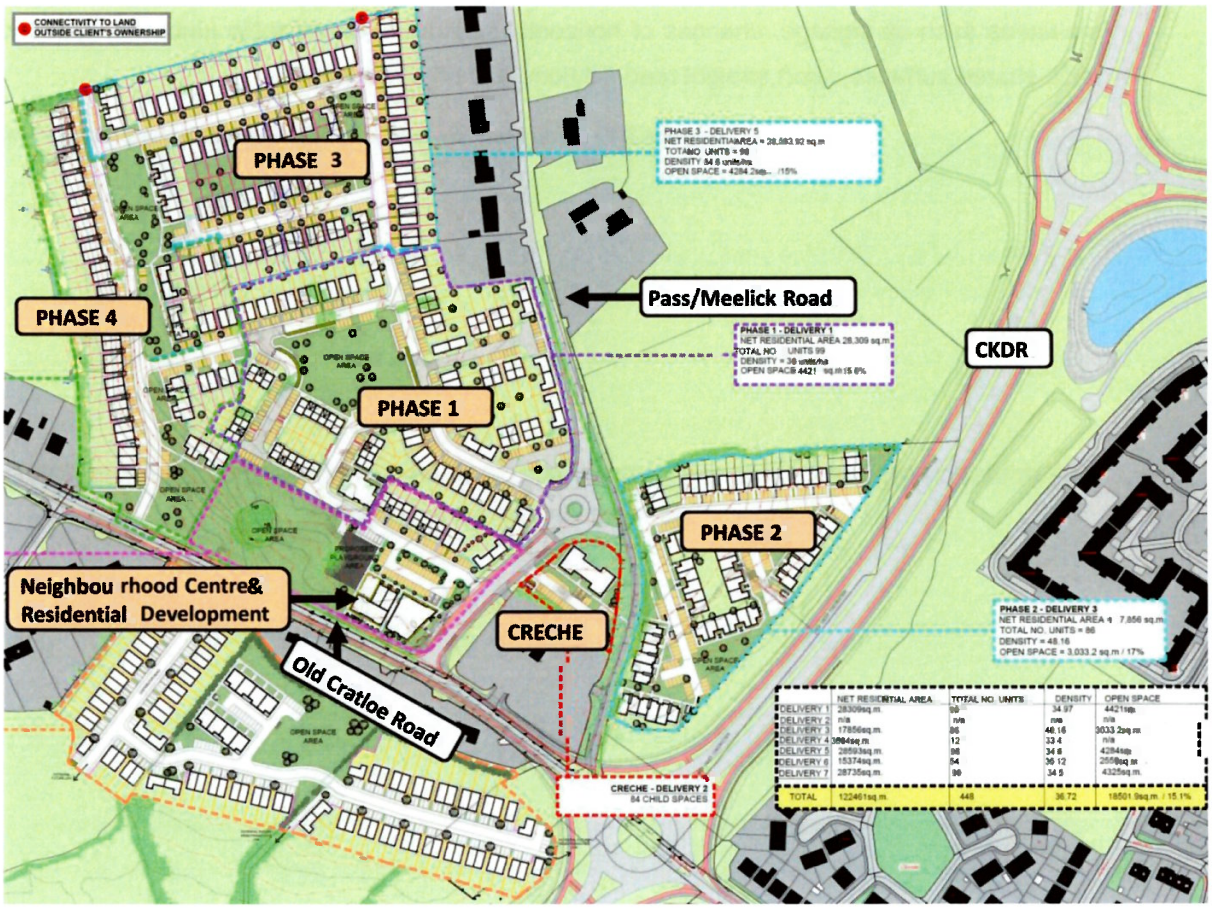
3.2 Overall Masterplan

Individual phases and schedule of the overall draft masterplan development on zoned lands are shown below in Table 3.2 and Figure 3.2 (see Also Appendix A).

***Table 3.2** – Proposed Current DRAFT Masterplan Development Schedule*

Proposed Masterplan	Total Units	Houses	Apartments	GFA
Phase 1: Planning Ref: 21/1800	99	87	12	
Phase 2: Planning Ref: 22/817	86	46	40	
Phase 3: Planning Ref: 22/959	98	98	0	
Phase 4: Planning Ref: 22/1114	54	54	0	
Creche: Planning Ref: 22/790				~413m²
Neighbourhood Centre: Ref: 22/917				
▪ Houses	12	12	0	
▪ Café / Coffee Shop				~207sqm
▪ Retail Units (2no.)				~150sqm
▪ Foodstore				~450sqm
Phase 5: Planning Ref: TBC	99	83	16	
TOTAL	448	380	68	

***Figure 3.2** – Proposed Draft Masterplan (extract & labelled for ease of understanding)*



The masterplan is subject to change through on the ongoing planning application process for each phase. A preliminary junction impact assessment of the above draft masterplan schedule and

distribution of trips is contained in Section 4 and forms the 'worst case' traffic scenario. In order to undertake a robust assessment, additional analysis has also been undertaken to include a percentage of externally generated trips from the proposed Neighbourhood Centre development.

3.3 Proposed Site Access Junction

As shown in Figure 3.3 (see also Garland Drawing 350), the proposed site access will be via a roundabout on the realigned Pass/Meelick Road which has been designed (by others) to the required standards, is being constructed as part of the CKDR scheme (which is currently on site) an has been subject to an independent Road Safety Audit as part of Phase 1 (21/1800). The junction design is DMURS complaint and also incorporates the CDKR scheme cycle lanes.

***Figure 3.3** – Proposed Development Access Layout (extract from Garland Drawing 350)*

SEE REVISED ARCHITECTURAL AND ENGINEERING DRAWINGS PACKAGES SUBMITTED FOR PLANNING AS PART OF THE RFI RESPONSE

3.4 Junction Sightlines and Visibility

As shown in Figure 3.4 above and Garland Drawing 340, the required DMURS visibility sightlines are available to drivers emerging from (Sightlines) and on the approach to the site access (Stopping Sight Distance – SSD) and within the development. Visibility requirements are based on Table 4.2 of the Department of Transport document DMURS as shown in Figure 3.3. It should be noted that the special 'Slow Zone' 30 km/h speed limit is proposed within the entire development and as expected, the proposed road alignment will encourage further speed reductions.

***Figure 3.4** – Sightline Requirements – DMURS*

SSD STANDARDS

Design Speed (km/h)	SSD Standard (metres)
10	7
20	14
30	23
40	33
50	45
60	59

Forward Visibility

Design Speed (km/h)	SSD Standard (metres)
10	8
20	15
30	24
40	36
50	49
60	65

Forward Visibility on Bus Routes

Table 4.2: Reduced SSD standards for application within cities towns and villages. Reduced forward visibility increases driver caution and reduces vehicle speeds.

3.5 Site Layout Design and AutoTrack Analysis

An AutoTrack assessment was undertaken during the site layout design process to ensure that multiple vehicle types including emergency, service and waste/delivery vehicles can access, egress and turn

safely within site and also safely negotiate the internal road layout, junctions, turning heads, Cul de Sacs and potential future road connections throughout the site. See Garland Drawing 360 submitted for planning (see also Appendix A). A swept path assessment was also undertaken to ensure that a standard bus can easily access and egress the proposed Bus Stop on the realigned Meelick Road and turn using the proposed CKDR roundabout to the north (Junction 2).

3.6 Road Safety Audit

As requested in RFI Item 1(a), an *independent* Road Safety Audit (RSA) report of the proposed Phase 3 site layout was undertaken by PMCE Consulting Engineers and is contained in Appendix B.

The RSA included all phases of the overall masterplan including the subject Phase 3 Site Layout (RSA Section 3.1 and 3.4). The Phase 3 recommendations made by the RSA report have been reviewed and accepted in full by the design team and these recommendations have been incorporated into all design drawings, including the final revised site layout in Drawing PP-01 in Appendix A with RSA items clearly labelled for ease of understanding as part of the Garland set of drawings submitted.

3.7 Proposed Parking Provision

RFI Item 1(b) requests that the applicant justify parking numbers. In response, as shown in the revised Site Layout Plan drawing PP-01 (see also Figure 3.3) and Table 3.3 below, the proposed car parking provision complies with the Zone 3 parking requirements laid down in Table DM 8(a) of the recently adopted Limerick Development Plan 2022-2028 and is therefore justified.

Table 3.3 *– Car Parking requirements & provision (Table DM 8a - Zone 3)*

Element	Units/GFA	Max Parking Requirements	Required Parking	Proposed
Houses	10	1.5 / unit (<3 bed units)	15	15
Houses	88	2 / unit (>=3 bed units)	176	176
Total			**191**	**191**

3.8 Vulnerable Road Users and Site Accessibility

As part of the internal layout design, dropped kerbs and tactile paving for typical uncontrolled pedestrian crossing points are proposed at several locations throughout the development as shown in Figure 3.1 (Drawing PP-01). The proposed location of these crossing points match the likely desire lines of pedestrians and with short straight road sections proposed, the internal road layout ensures low vehicle speeds will be encouraged within the site.

3.9 Walking

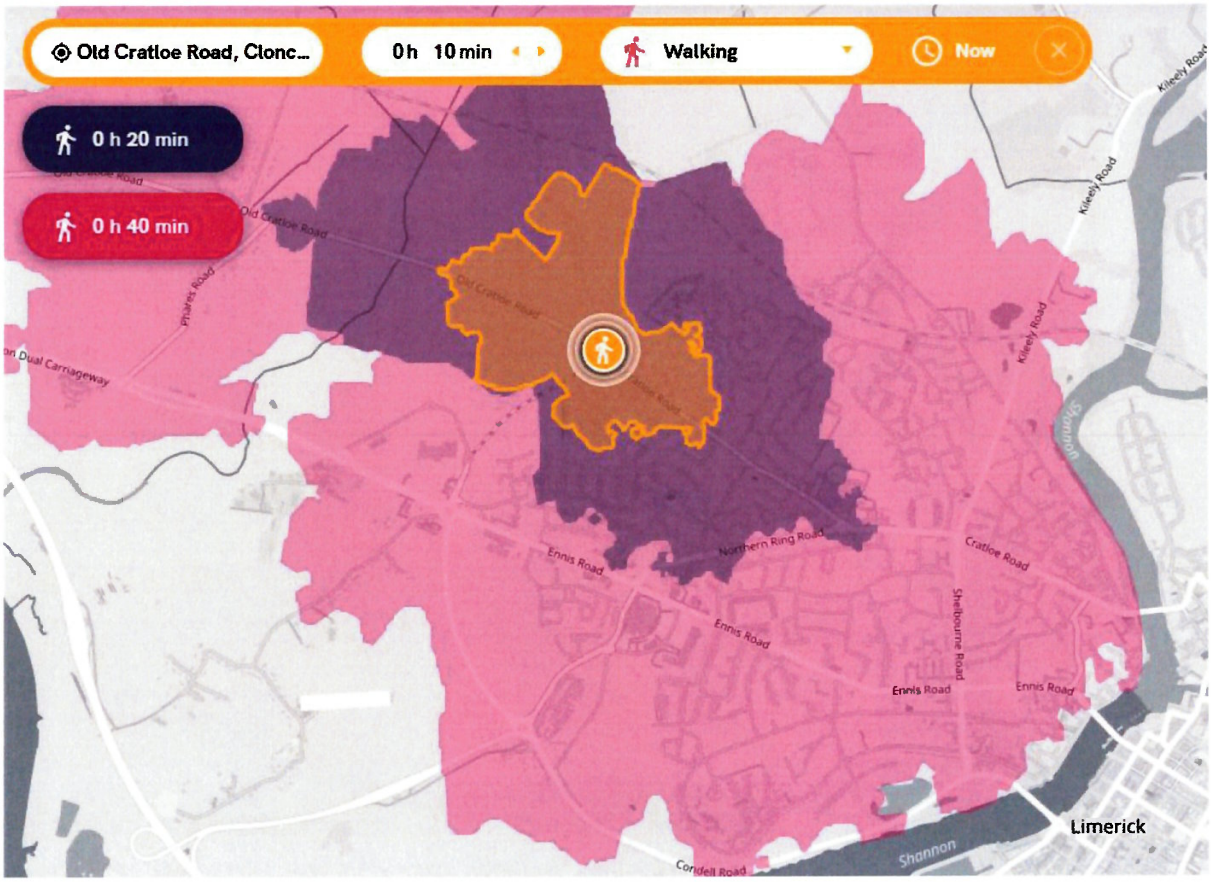
Although the proposed site is located in a suburban area on the fringes of Limerick city, there are existing footpaths and street lighting on the northern side of the Old Cratloe Road which provide access to the city centre (30-40mins walk) and local bus services. Once the CKDR is complete, this road will open up routes to access existing shops (Coonagh) and more within a 10-minute walk time and this road will also facilitate the creation of new bus routes serving the area. The site is within reasonable leisure and commuting walking distance of several schools and sports clubs within a 10-15min walk.

Typical walk times are outlined on Table 3.4 and Figure 3.5 shows a isochrones diagram illustrating how far the average Adult (3.1mph/5km/h) can walk in 10, 20 and 40 minutes from the site (pre CKDR road and footpaths). The entire town centre is within 15min walk of this ideal site location.

***Table 3.4** – Average Walk Times and Distances*

Walking Time	Avg. Distance (Child)	Avg. Distance (Adult)	Avg. Distance (Commuter)
	4.3 km/h or 1.21m/s	5km/h or 1.39m/s	6km/h or 1.65m/s
5 minutes	363m	417m	495m
10 minutes	726m	834m	990m
20 minutes	1,452m (1.45km)	1,668m (1.67km)	1,980m (1.98km)

***Figure 3.5** Approx. Walking Time Isochrones Diagram*



3.10 Cycling

Similar to walking, the proposed site will ideally located adjacent to the CKDR which will not only provide significantly high quality cycle lane infrastructure but also open up new cycle routes provides easier access to all parts of the city. The proposed site is within an easy (5-15mins) and acceptable cycling distance of the city centre, local schools and more. Typical cycling times are outlined below in Table 3.5 based on typical cycle speeds for school children (<14yrs), adults (14yrs+) and commuters and Figure 3.6 illustrates far the average Adult can cycle in 5, 10 and 15 minutes from the site (pre CKDR road and cycle lanes).

Table 3.5– *Average Cycle Times and Distances*

Cycle Time	Avg. Distance (Child)	Avg. Distance (Adult)	Avg. Distance (Commuter)
	13.7km/h or 3.8m/s	16 km/hor 4.5m/s	24km/h or 6 7m/s
5 minutes	1,140m (1.14km)	1,341m (1.34km)	2,010m (2.01km)
10 minutes	2,280m (2.28km)	2,682m (2.68km)	4,020m (4.02km)
20 minutes	4,560m (4.56km)	5,364m (5.36km)	8,040m (8.04km)
30 minutes	6,840m (6.84km)	8,046m (8.05km)	12,060m (12.06km)

Figure 3.6 *Approx. Cycle Time Isochrones Diagram*

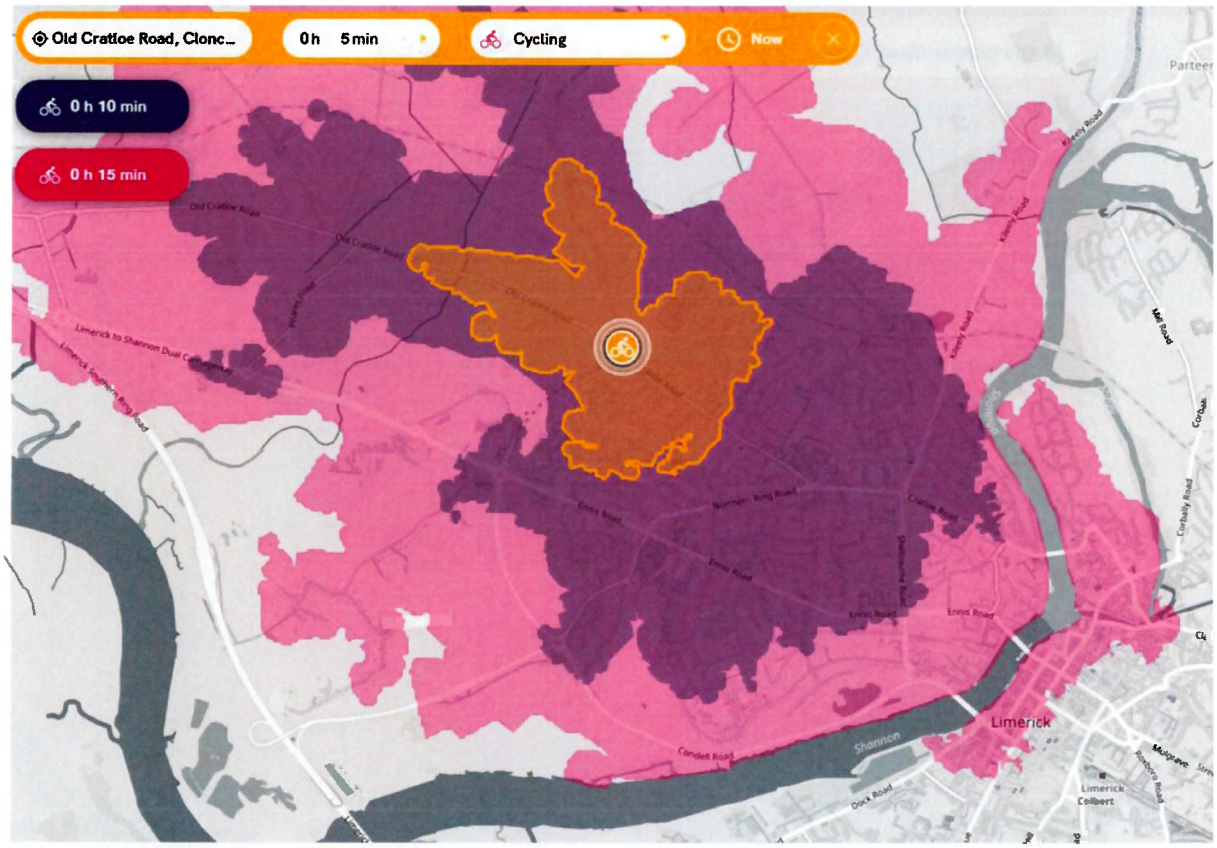


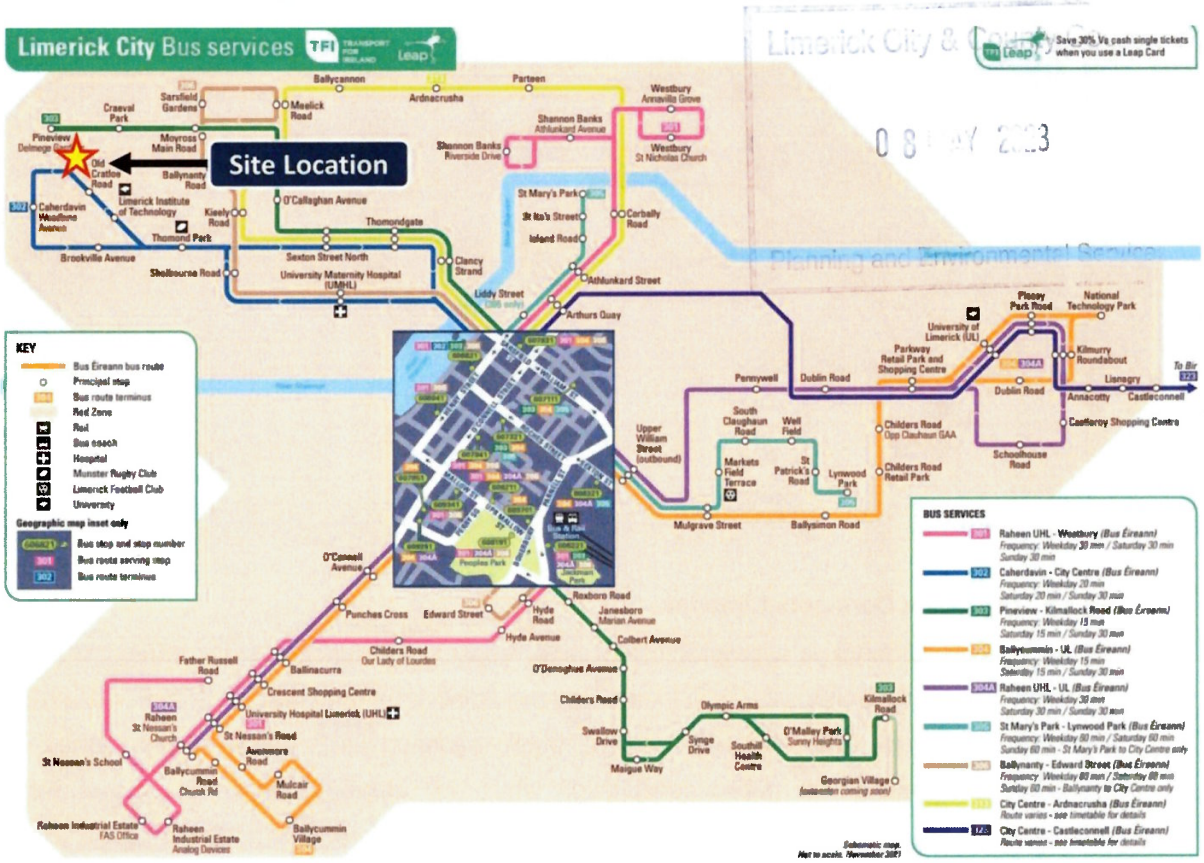
Figure 3.4 above shows that the city centre is within only a 15 min cycle time of the proposed site which suggests that cycling could be an easy and practical alternative to provide car trips.

3.11 Public Transport

As shown in 3.7, the proposed site is located within a 10 min walk from the Route 302 bus stop on Old Cratloe Road which provides access to local amenities and the city centre including the main bus and train station (services every 20mins during peak times). The introduction to the CKDR scheme will introduce changes to the existing bus routes (to be confirmed) which should lead to significantly improved public transport options available to residents of the proposed development and surrounding local road. As shown in Section 2.5, the existing CSO statistics indicate that the proposed development has the potential for relatively high public transport use up to 20% (when compared to the existing student village nearby).

Timetables for the various public transport routes can be found at www.journeyplanner.transportforireland.ie with a sample timetable and more in Appendix D.

***Figure 3.7** – Local Public Transport – Bus Stops, Routes and Train Station (source TFI.ie)*

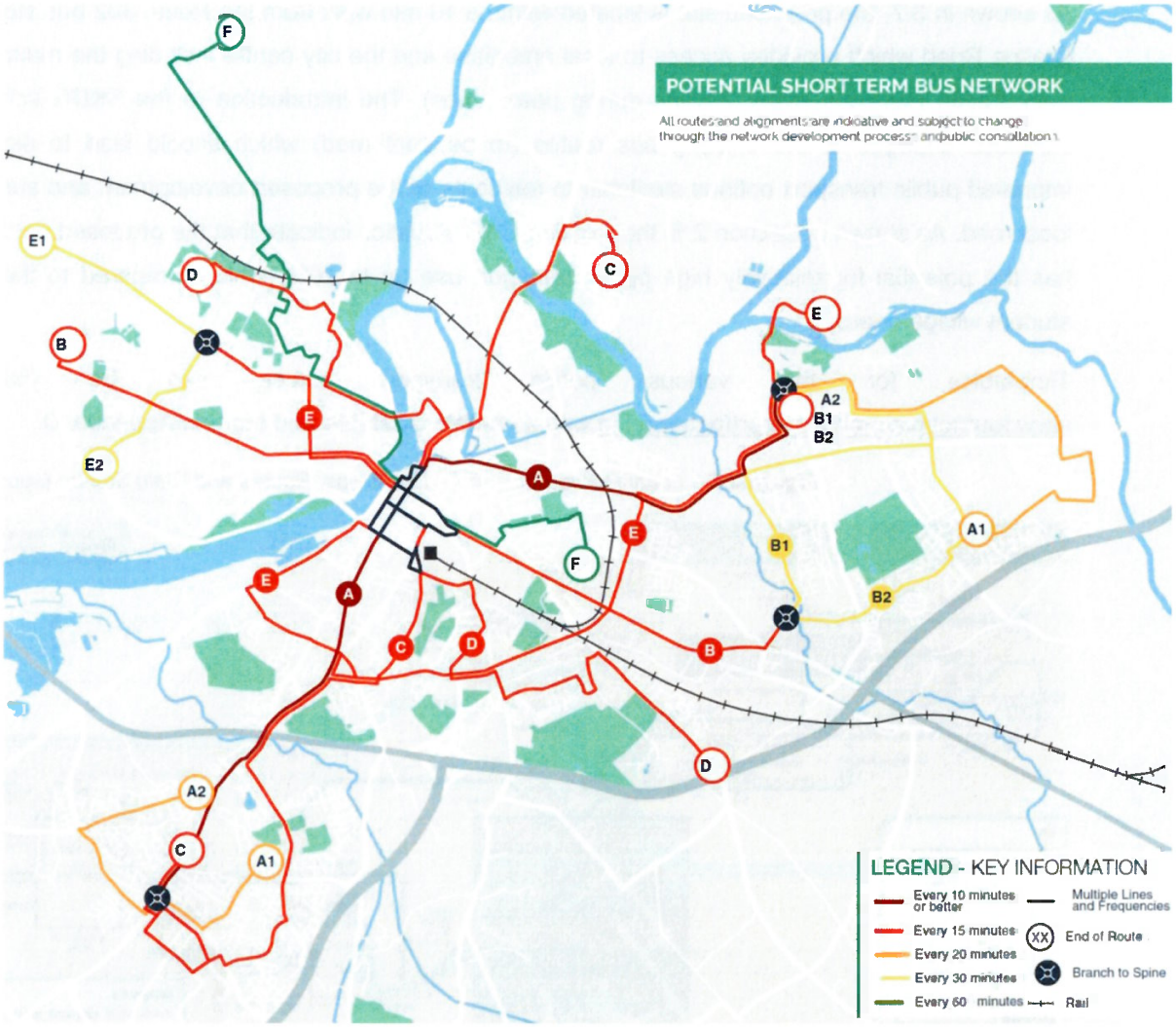


3.12 Limerick Shannon Metropolitan Area Transport Strategy (LSMATS)

Riverpoint Construction Limited have made a submission to the Revised Draft Limerick Shannon Metropolitan Area Transport Strategy (LSMATS) in relation to Transport, in particular Bus Transport.

In summary, the submission outlined the Applicants support for the development of an extended Bus Route E1 on the Old Cratloe Road as shown on the 'Potential Short Term Bus Network' map (see Figure 3.8 overleaf). This extended bus route E1 passes the proposed development lands and would help encourage the use of more sustainable transport modes and reduce the reliance on the private car. As part of this support, the Applicant has included the provision for a Bus Stop (s) including bus shelter and layby for consideration as part of this proposed development. The final location and layout of which will be discussed and agreed with LCCC as part of the planning process.

Figure 3.8 – *Potential Short Term Bus Network' LSMATS Measure BC6 (map on Page 67)*



3.13 Draft Bus Connects Limerick

BusConnects Limerick is a programme of nine measures to fundamentally transform Limerick's bus system. This programme will assist in realising the ambition of the Limerick Shannon Metropolitan Area Transport Strategy to significantly increase public transport use. The NTA has drafted a New Bus Network for Limerick for public consultation which will greatly enhance bus travel with new and improved services transforming the public transport network. In particular, the proposed Bus Route no. 3 from Coonagh Shopping Centre to O'Malley Park via the upcoming new Coonagh – Knockalisheen Distributor Road (CKDR) will have a frequency of 'every 15mins' and has the potential of catering for residential of the proposed development.

The Applicant again intends to make a submission in support the draft BusConnects proposals and suggest that the proposed Bus Route 3 could potentially include a minor diversion into the proposed development, thereby significantly increasing the routes residential catchment and thereby encourage an increased number of bus passengers on this route and resultant reduced car trips. Using New Network Online Map system on www.busconnects.ie, the data suggests that new proposed bus network will enable the proposed development to access +4000 more jobs within a 30min bus journey and +12,000 more jobs within a 45min bus journey.

4 Traffic Impact

4.1 Traffic Impact Assessment

This section of the report assesses the traffic impact of the proposed development outlined in Table 3.1 on the local road network by analysing the capacity of the following junctions

- Junction 1: Priority 'T' junction between the upgraded Old Cratloe Road and the realigned Meelick Road (designed as part of the CKDR scheme).
- Junction 2: Roundabout Junction between the proposed site access and realigned Meelick Road (designed as part of the CKDR scheme).

This traffic assessment adopts the approach requested as part of the Phase 1 Request for Further Information (Planning Ref 21/1800).

4.2 Estimated Development Traffic Generation

The estimated development traffic generation is based on the TRICS trip rate database. TRICS contains a wide sample of traffic surveys from various types of development throughout Ireland and the UK. The predicted development traffic[4] is shown below.

Table 4.1 – Houses – Phase 3 - *TRICS Trip Rates and Predicted Traffic*

Houses	Arrivals		Departures		Total	
98 Units	Trip Rate	No. of Trips	Trip Rate	No. of Trips	Trip Rate	No. of Trips
Time		(vehicles)		(vehicles)		(vehicles)
08:00-09:00	0.152	15	0.440	43	0.592	58
17:00-18:00	0.398	39	0.231	23	0.629	62

Full details of the trip rates used are contained in Appendix B.

As shown above, walking and cycling are realistic modes of daily transport for work, school or leisure trips considering the sites location and existing CSO mode of travel statistics (see Section 2.5).

However, for junction analysis purposes only, it is assumed that ALL estimated trips (100%) to and from the development will be by private car (i.e. 'worst case') with no reduction for likely trips on foot, cycling or public transport.

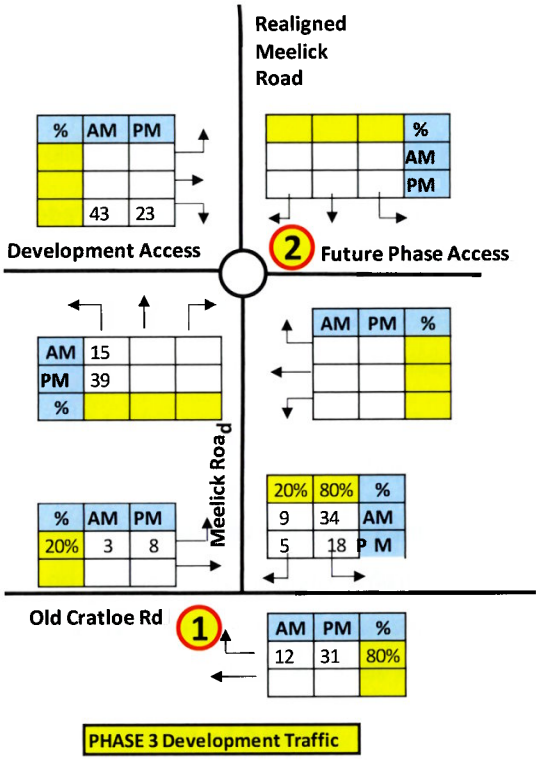
This robust approach should give the Local Authority and others added confidence in the junction capacity analysis results and demonstrate that the proposed development can be easily accommodated into the local road network with minimal impact. Further sensitivity analysis can be undertaken on request.

4.3 Trip Assignment and Distribution

For analysis purposes, the estimated development traffic has been assigned and distributed onto the local road network taking into account both the location of nearby typical trip attractors (i.e. city centre, future CKDR road, employment, schools, leisure, and more) and the existing traffic flow patterns. Considering all factors, it was assumed that 80% of trips would arrive and depart to/from the east (city centre) as shown in Figure 4.1 below.

[4] All trip calculations and estimated traffic flows have been rounded up to the nearest 1no. vehicle.

***Figure 4.1** – Estimated Phase 3 Development Traffic Flows*

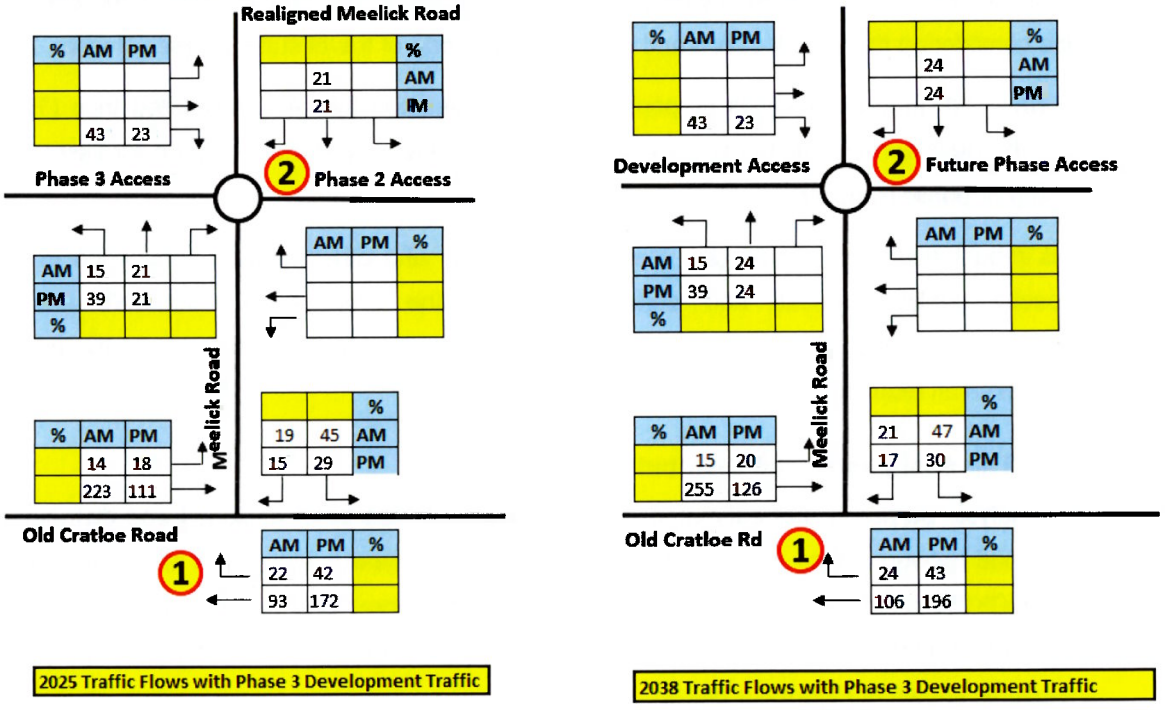


4.4 Future Traffic Flows and Assessment Years

The future 2025 Opening Year and 2038 Design Year traffic flows **'with'** the above Phase 3 development traffic flows are shown in Figure 4.2 and combine:

1. Figure 2.6 - Future 2025 and 2038 Traffic Flows 'without' Development Traffic
2. Figure 4.1 - Estimated Phase 3 Development Traffic Flows

***Figure 4.2** – 2025 Opening Year (Left) and 2038 Future Design Year (Right) 'with' Phase 3 Development Traffic*



4.5 Entire Masterplan - Preliminary Estimated Development Traffic Flows

The future design year (2038) assessment of the entire masterplan development (All Phases in place) is considered the 'worst case' traffic scenario and can therefore cover all other interim traffic analysis scenarios such as opening year 2025. For example, if the subject junctions operate under capacity with the inclusion of traffic/trips from the entire masterplan development in place (i.e. 2038 'worst case' scenario), then logically, each individual development phase or interim analysis scenario (i.e. opening year 2025, etc) will also operate under capacity.

The estimated trips/traffic from ALL phases of the overall masterplan is shown in Table 4.2 and is based on the draft phased masterplan schedule outlined in Table 3.2.

Table 4.2– *Estimated 'Worst Case' Masterplan Trips from ALL Development Phases (New Trips / Vehicles)*

Entire Development	Arrivals	Departures
AM 08:00-09:00	69	186
PM 17:00-18:00	169	100

The estimated traffic flows from all individual phases which make up the above estimated total Masterplan development flows are shown in Appendix B.

In terms of traffic impact and flows, it is reasonable to assume that the proposed creche, neighbourhood centre including café and retail trips will generate predominately internal trips due to the location of the development (i.e. Home-Creche, Home-Shop, Home-Café, Café-Shop etc). Therefore, these elements of the development would likely have negligible near zero impact on the surrounding public roads, in particular during peak hours. However, in order to undertake a robust 'worst case' scenario assessment it was assumed that the proposed Neighbourhood Centre development would generate a conservative 20% new external trips for analysis purposes only.

As shown in Figure 2.1, an additional vehicular access junction is proposed on the Old Cratloe Road as part of the future Phase 4 development (labelled junction 3 on Figure 2.1). These access junction options will therefore help disperse and dilute the overall impact of the above masterplan development traffic flows. It is assumed that:

- Junctions 1 and 2 will cater for Phase 1 (99 units), Phase 2 (86 units) and 50% of Phase 3 (98 units) with estimated traffic flows shown in Table 4.3 and Figure 4.3. Junction 1 will also cater for traffic generated by the Neighbourhood centre.
- Junction 3 will cater for Phase 4 (59 units) and 50% of Phase 3 (98 units) with estimated traffic flows shown in Table 4.4 and Figure 4.3.
- Junction 4 will cater for the future Phase 5 application with estimated traffic flows shown in Table 4.5 and Figure 4.3.

Table 4.3 *– Estimated Masterplan Trips for ALL Phases via Junctions 1 and 2*

Entire Development	Arrivals	Departures
AM 08:00-09:00	37	93
PM 17:00-18:00	87	54

Table 4.4 *– Estimated Masterplan Trips for Phases 3 & 4 via Junction 3*

Entire Development	Arriva ls	Departures
AM 08:00-09:00	16	46
PM 17:00-18:00	41	24

Table 4.5 *– Estimated Masterplan Trips for Phase 5 via Junction 4*

Entire Deve lopment	Arrivals	Departures
AM 08:00-09:00	14	40
PM 17:00-18:00	35	20

For preliminary analysis purposes only, the estimated assignment and distribution of these potential future masterplan traffic flows is shown in Figure 4.2 and the 2038 design year traffic including masterplan development traffic is shown in Figure 4.3.

Figure 4.2 *– Estimated Traffic Flows from the Potential Entire Masterplan Development (ALL Phases)*

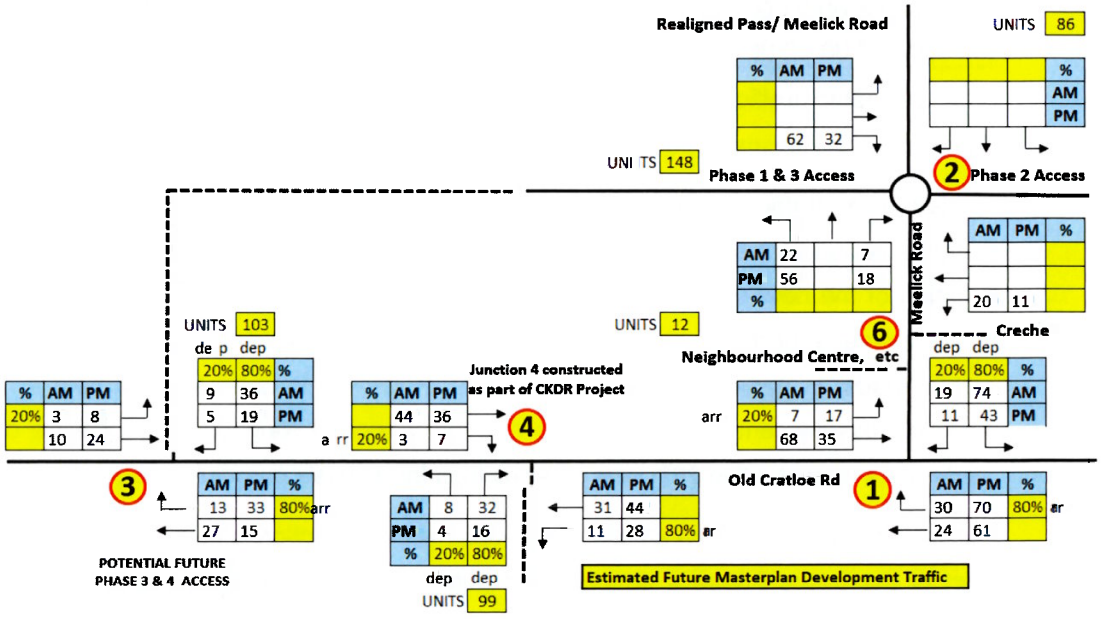


Figure 4.3 *– 2025 Traffic Flows with Estimated Traffic from Entire Masterplan Development (ALL PHASES)*

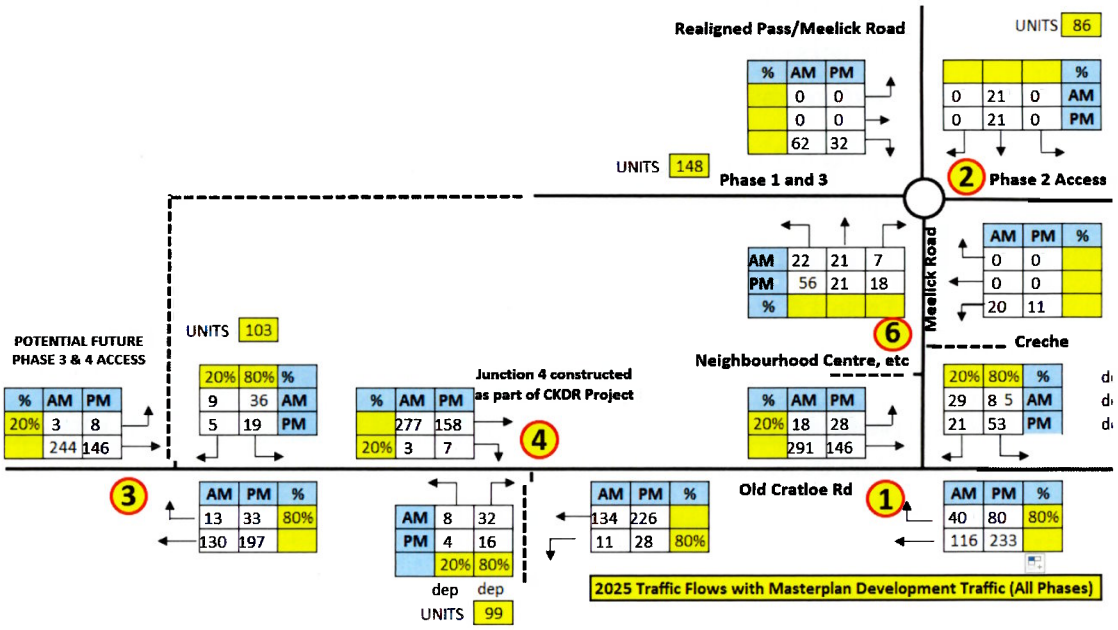
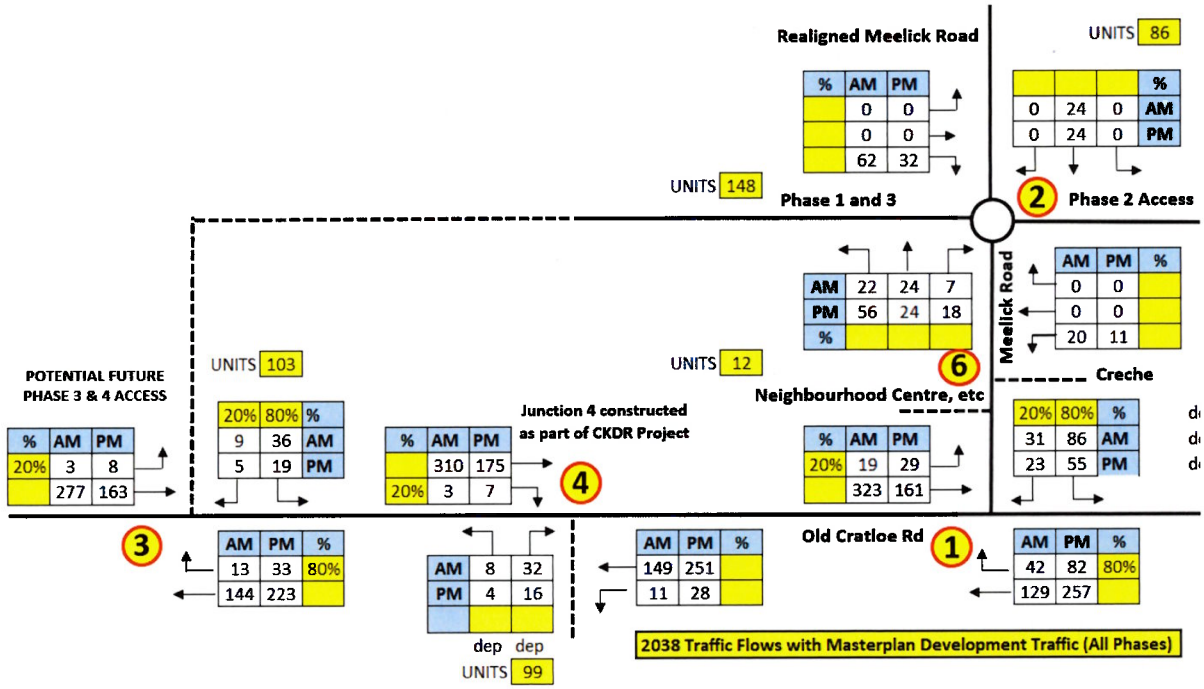


Figure 4.3 – 2038 Traffic Flows with Estimated Traffic from Entire Masterplan Development (ALL PHASES)

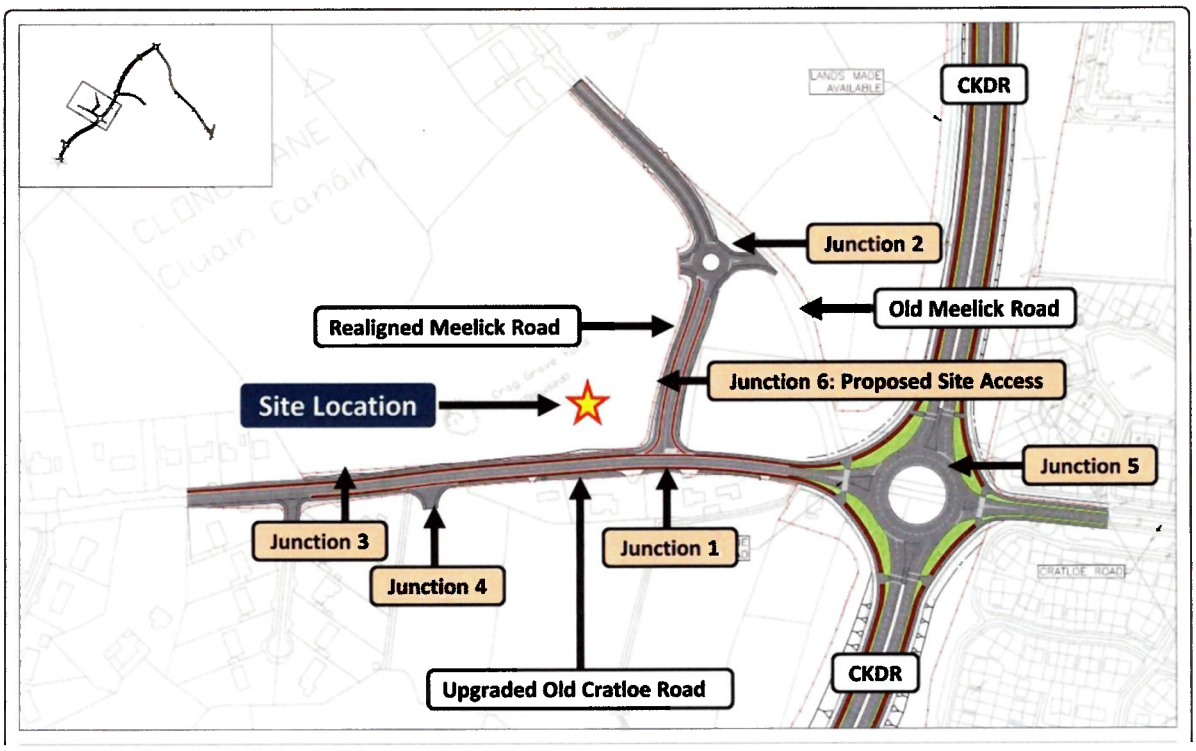


4.6 Junction Capacity Analysis

The junction capacity analysis was undertaken using the Transport Research Laboratory's (TRL) computer programme PICADY for uncontrolled priority junctions and ARCADY for roundabout junctions.

A ratio of flow to capacity (RFC) above the threshold values outlined below are considered above capacity, where queuing and delay issues would begin to occur and build up:

- A priority junction capacity value of over 85% **(0.85)** – RFC – PICADY
- A roundabout junction capacity value of over 85% **(0.85)** – RFC – ARCADY



4.7 Capacity Analysis – With and Without Phase 3 Development Traffic

As requested by the Local Authority as part of the Further Information request for planning reference 21/1800 (Phase 1), a summary of junction capacity analysis results for the following scenarios are outline below. Junction capacity analysis was undertaken for the Existing Year 2022, Opening Year 2025 and Future Design Year 2038 scenarios.

1) AM Peak Hour 'without' and 'With' Phase 3 Development Traffic – Results See Table 4.5
2) PM Peak Hour 'without' and 'With' Phase 3 Development Traffic – Results See Table 4.6
3) AM and PM Peak Hour 'with' Masterplan Development Traffic (All Phases) – See Table 4.7

Results below show the maximum predicted capacity experienced on a single junction arm for each analysis scenario. The maximum capacity or RFC (Ratio of flow to Capacity) for a junction arm is 0.85 or 85% when queuing and delays begin to build.

***Table 4.5** – AM Peak Hour Capacity Analysis 'with' and 'without' Phase 3 Development Traffic*

AM Peak Hour	'Without' Phase 3 Traffic		'With' Phase 3 Traffic	
	Max. Capacity[5]	Max. Q (veh)	Max. Capacity	Max. Q (veh)
Existing Year				
Junction 1	0.044 (4%)	0	na	na
Junction 2	0.019 (2%)	0	na	na
Opening Year				
Junction 1	0.049 (5%)	0.1 (<1 veh)	0.136 (14%)	0.2 (<1 veh)
Junction 2	0.020 (2%)	0	0.048 (5%)	0.1 (<1 veh)
Design Year				
Junction 1	0.055 (6%)	0.1 (<1 veh)	0.148 (15%)	0.2 (<1 veh)
Junction 2	0.023 (2%)	0	0.049 (5%)	0.1 (<1 veh)

***Table 4.6** – PM Peak Hour Capacity Analysis 'with' and 'without' Phase 3 Development Traffic*

PM Peak Hour	'Without' Phase 3 Traffic		'With' Phase 3 Traffic	
	Max. Capacity	Max. Q (veh)	Max. Capacity	Max. Q (veh)
2022 Existing Year				
Junction 1	0.043 (4%)	0	na	na
Junction 2	0.019 (2%)	0	na	na
2025 Opening Year				
Junction 1	0.047 (5%)	0.0 (<1 veh)	0.095 (10%)	0.2 (<1 veh)
Junction 2	0.020 (2%)	0	0.057 (6%)	0.1 (<1 veh)
2038 Design Year				
Junction 1	0.052 (5%)	0.1 (<1 veh)	0.101 (10%)	0.2 (<1 veh)
Junction 2	0.023 (2%)	0	0.060 (6%)	0.1 (<1 veh)

The capacity results in Tables 4.5 and 4.6 clearly demonstrate that both 'Junction 1' and 'Junction 2' operate significantly below maximum capacity (<0.85 or 85%) for all analysis scenarios with negligible queuing or delay experienced by drivers with or without the inclusion of the estimated Phase 3 development traffic.

The maximum junction capacity predicted at either junction 1 or 2 for any assessment scenario is only 14% at Junction 1 for the 2038 Design year analysis 'with' the inclusion of Phase 3 development traffic.

No traffic impact or junction operation issues are predicted for Phase 3 traffic flows.

[5] Results show the maximum predicted capacity experienced on a single junction arm for each analysis scenario. The maximum capacity or RFC (Ratio of flow to Capacity) for a junction arm is 0.85 or 85%.

4.8 Capacity Analysis – With and Without Overall Masterplan Development Traffic

As outlined in Section 4.5, junction capacity analysis was carried out for the future 2038 design year 'worst case' scenario 'with' and 'without' the estimated traffic from ALL phases of the entire draft masterplan development. A summary of junction capacity analysis results for the Masterplan 'worst case' scenario is outlined below in Table 4.7.

- The requested summary of results show the maximum predicted capacity experienced on a single junction arm for each analysis scenario and each junction.
- The maximum allowable capacity or RFC (Ratio of flow to Capacity) for a junction arm is 0.85 or 85%.

***Table 4.7** – 2038 AM & PM Peak Hour Capacity Analysis 'with' Masterplan Development Traffic (ALL Phases)*

AM Peak Hour	**'Without' Masterplan Traffic**		**'With' Masterplan Traffic**	
2022 Existing	**Max. Capacity**	**Max. Q (veh)**	**Max. Capacity**	**Max. Q (veh)**
Junction 1	0.044 (4%)	0	na	na
Junction 2	0.019 (2%)	0	na	na
Junction 3	na	na	na	na
Junction 4	na	na	na	na
Junction 6	na	na	na	na
2025 Opening Year				
Junction 1	0.049 (5%)	0.1 (<1 veh)	0.251 (25%)	0.3 (<1 veh)
Junction 2	0.020 (2%)	0	0.070 (7%)	0.1 (<1 veh)
Junction 3	na	na	0.094 (9%)	0.1 (<1 veh)
Junction 4			0.106 (11%)	0.1 (<1 veh)
Junction 6	na	na	0.024 (3%)	0
2038 Design Year				
Junction 1	0.055 (6%)	0.1 (<1 veh)	0.264 (26%)	0.4 (<1 veh)
Junction 2	0.023 (2%)	0	0.070 (7%)	0.1 (<1 veh)
Junction 3	na	na	0.096 (10%)	0.1 (<1 veh)
Junction 4			0.109 (11%)	0.1 (<1 veh)
Junction 6	na	na	0.025 (3%)	0
PM Peak Hour	**'Without' Masterplan Traffic**		**'With' Masterplan Traffic**	
2022 Existing	**Max. Capacity**	**Max. Q (veh)**	**Max. Capacity**	**Max. Q (veh)**
Junction 1	0.043 (4%)	0	na	na
Junction 2	0.019 (2%)	0	na	na
Junction 3	na	na	na	na
Junction 4	na	na	na	na
Junction 6	na	na	na	na
2025 Opening Year				
Junction 1	0.047 (65%)	0	0.197 (20%)	0.4 (<1 veh)
Junction 2	0.020 (2%)	0	0.090 (9%)	0.1 (<1 veh)
Junction 3	na	na	0.077 (8%)	0.1 (<1 veh)
Junction 4	na	na	0.055 (6%)	0.1 (<1 veh)
Junction 6	na	na	0.026 (3%)	0
2038 Design Year				
Junction 1	0.052 (5%)	0.1 (<1 veh)	0.207 (21%)	0.4 (<1 veh)
Junction 2	0.023 (2%)	0	0.106 (11%)	0.1 (<1 veh)
Junction 3	na	na	0.081 (8%)	0.1 (<1 veh)
Junction 4	na	na	0.056 (6%)	0.1 (<1 veh)
Junction 6	na	na	0.028 (3%)	0

The capacity results in Table 4.9 clearly demonstrate that all junctions operate significantly below maximum capacity (<0.85 or 85%) for all analysis scenarios with negligible queuing or delay

experienced by drivers both 'with' and 'without' the inclusion of the estimated draft Masterplan development traffic (ALL Phases).

The introduction of development traffic from the entire masterplan has negligible impact on the Old Cratloe Road with junctions continuing to operate significantly under capacity (i.e. max 29%), meaning that there is large reserve capacity available to cater for any unforeseen or additional future traffic flows. These results are in-line with the CKDR EIS traffic modelling results.

Key extracts from PICADY and ARCADY output files are contained in Appendix E with full output files available on request.

In addition, the predicted masterplan development traffic will also have a negligible traffic and junction capacity impact on the CKDR and associated high-capacity roundabout junctions. No traffic impact or junction operation issues are predicted. Further sensitivity analysis can be undertaken on request.

4.9 CKDR Junctions

Junction analysis of the nearby roundabout on the CKDR itself can be undertaken if required using estimated traffic flows. However, more up to date CKDR traffic modelling and traffic data would be required in order to model the roundabout with more confidence using ARCADY software.

4.10 Construction Phase

The applicant will provide a contractor's compound within the site boundaries to accommodate all construction staff, parking, deliveries and safe vehicle turning within the site. Typically, construction would commence 1 month after grant of full planning permission.

The following are a number of simple construction stage details:

- Construction vehicles will be covered during dry weather to prevent dust emissions;
- Wheel washers provided to ensure debris and mud are not taken onto the local road;
- Trained banksmen will marshal delivery vehicles within the site & access/exit.

5 Summary and Conclusion

This Traffic and Transport Assessment (TTA) report has been updated in response to specific roads and traffic elements contained in the Request for Further Information (RFI) letter from Limerick City and County Council (CCC) dated 27th October 2022 in relation to planning application Ref: 22/959 for Phase 3 of a proposed phased housing development at Old Cratloe Road, Clonconane, Co. Limerick. The proposed Phase 3 development comprises 98no residential units will form part of an overall phased masterplan development of zoned lands comprising approx. *448* residential units in total, creche and neighbourhood centre with café, retail and foodstore units, playground and open space. The site is located adjacent to the Coonagh–Knockalisheen Distributor Road (CKDR) scheme which is currently under construction and will therefore benefit from ease of access to the local high quality road network.

Proposed Phase 3 Development	**Units**
Houses (2, 3 and 4 beds)	**98no.**

A summary of the main elements and conclusions of the report are as follows:

- The estimated Phase 3 development traffic:

	Arrivals	**Departures**	**Total (two-way)**
AM 08:00-09:00	15	43	58
PM 17:00-18:00	39	23	62

- The overall site layout design has taken into account DMURS principles of safety, accessibility and sustainability to allow safe access, movement and parking throughout the site for vehicles and especially vulnerable road users such as pedestrians and cyclists.
- The layout addresses natural pedestrian desire lines such as crossing points, dropped kerbs, tactile paving and required visibility at key locations, in addition to site connectivity and permeability with the overall Masterplan layout
- Access to the proposed development will be new junctions on the realigned Meelick Road including a roundabout serving Phase 3 and a 'T' junction with the upgraded Old Cratloe Road, both of which have been designed and are currently under construction as part of the CKDR scheme to provide high quality vehicular access to the subject zoned lands.
- The junction capacity analysis results clearly demonstrate that all junctions operate significantly below max. capacity (<0.85 or 85%) for all analysis scenarios (including the 'worst case' overall masterplan traffic scenario) with negligible queuing or delay predicted and are in-line with the CKDR EIS traffic modelling results.
- Adopting this conservative approach provides a safety buffer and flexibility to all traffic analysis results and give confidence to the Local Authority and others that the zoned lands can be developed, and associated traffic accommodated onto the local road network with minimal impact.

Overall Conclusion: It is considered that on the basis of the above, the application, in terms of roads, traffic and junction capacity, would operate in a safe and efficient manner, with minimal impact on other road users and on the capacity of local road network well into the future.

Appendix A – Drawings

Drawings at A4 only (not to scale). If required, please refer to original scale drawing submitted as part of the overall planning application.

Appendix B – Road Safety Audit

Coakley Consulting Engineers

Residential Development, Cratloe, Co. Limerick – Multiple Phases

Stage 1 & 2 Road Safety Audit

P·M·C·E

March 2023

Coakley Consulting Engineers

Residential Development, Cratloe, Co. Limerick – Multiple Phases

Stage 1 & 2 Road Safety Audit

Document Ref:	P22-177-RSA-PD-RP-001

Rev	Prepared By	Reviewed By	Approved By	Issue Date	Reason for Revision
4.0	TAG	AOR	TAG	6th March 2023	Final Report (All Phases)
3.0	TAG	AOR	TAG	10th Feb 2023	Draft Report (All Phases)
2.0	TAG	AOR	TAG	2nd Nov 2022	Final Report (Phase 1)
1.0	TAG	AOR	TAG	26th Oct. 2022	Draft Report

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Table of Contents

1 Introduction

1.1 General

This report results from a Stage 1 & 2 Road Safety Audit on the proposed Residential Development in Cratloe, Co. Limerick (Multiple Phases), carried out at the request of Mr Brian Coakley of Coakley Consulting Engineers.

The members of the Road Safety Audit Team are independent of the design team, and include: -

Mr. Aly Gleeson
(BSc, MEng, MBA, RSACert, CEng, FIEI)
Road Safety Audit Team Leader

Mr. Alan O'Reilly
(BA BAI MSc CEng MIEI RSACert)
Road Safety Audit Team Member

The Road Safety Audit took place between October 2022 and February 2023 and comprised an examination of the documents provided by the designers (see Appendix B). In addition to examining the documents supplied the Road Safety Audit Team visited the site of the proposed measures on the 20th October 2022. Weather conditions during the site visit were dry and the road surface was damp. Traffic volumes during the site visit were low, pedestrian and cyclist volumes were low and traffic speeds were considered to be generally within the posted speed limit.

Where problems are relevant to specific locations these are shown on drawing extracts within the main body of the report and their locations are shown in Appendix D. Where problems are general to the proposals sample drawing extracts are within the main body of the report, where considered necessary.

This Combined Stage 1 & 2 Road Safety Audit has been carried out in accordance with the requirements of GE-STY-01024 - Road Safety Audit (December 2017), contained on the Transport Infrastructure Ireland (TII) Publications website.

The scheme has been examined and this report compiled in respect of the consideration of those matters that have an adverse effect on road safety and considers the perspective of all road users. It has not been examined or verified for compliance with any other standards or criteria. The problems identified in this report are considered to require action in order to improve the safety of the scheme and minimise collision occurrence.

If any of the recommendations within this road safety audit report are not accepted, a written response is required, stating reasons for non-acceptance. Comments made within the report under the heading of Observations are intended to be for information only. Written responses to Observations are not required.

1.2 Items Not Submitted for Auditing

Details of the following items were not submitted for audit; therefore no specific problems have been identified at this stage relating to these design elements, however where the absence of this information has given rise to a safety concern it has been commented upon in Section 3: -

- Personal Injury Collision data
- Vehicle swept paths
- Drainage
- Public Lighting
- Visibility splays

2 Project Description

2.1 General

A new multi-phased residential development is proposed in Co. Limerick, near the border between Co. Clare and Co. Limerick (see Figure 2-1). The overall development shall include a number of residential streets, a mix of houses and apartments, a neighbourhood centre with playground area, a creche, and several areas of public open space.

The development access shall be provided via a newly constructed roundabout, which is located on the realigned Meelick Road section. Additional accesses shall be provided in the southwest corner of the development, providing access onto the Old Cratloe Road. The realigned Meelick Road cross section includes a two-way carriageway, and segregated pedestrian footway and off-road cycle track on both sides of the road.

FIGURE 2-1: LOCATION PLAN (SOURCE: WWW.OPENSTREETMAP.ORG)

2.2 Report Structure

This report has been broken into sections to reflect the phased nature of the development. Road Safety Problems which are common to all phases are discussed in Section 3.1, 'General Problems'.

Problems which are specific to each Phase have been discussed in Sections 3.2 to 3.8 (i.e. 'Phase 1 Problems', 'Phase 2 Problems', etc).

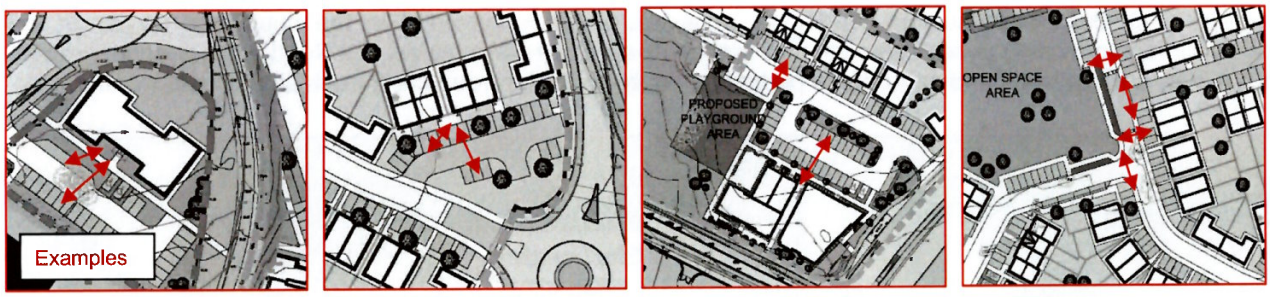
3 Main Report

3.1 General Problems

3.1.1 Problem

Location: *General Problem*

Summary: *Pedestrian desire lines not catered for in all instances.*



Pedestrian crossings have not been indicated within the proposed development. It is therefore unclear if these will be provided along pedestrian desire lines. If crossings, including dropped kerbs and tactile paving, are not provided on pedestrian desire lines, particularly to/from the areas of open space, there is a risk of pedestrians crossing the carriageway at unsafe locations where drivers may not anticipate them to cross, resulting in an increased risk of vehicle-pedestrian collisions.

Recommendation

Ensure that pedestrian crossings, including dropped kerbs and tactile paving are provided on all pedestrian desire lines, and that footways do not direct pedestrians to cross landscaped areas.

3.1.2 Problem

Location: *General Problem*

Summary: *Visitor parking within Public Open Spaces requires drivers to cross the footway when entering/exiting the parking spaces, which may increase the risk of a vehicle/pedestrian collision.*

Visitor parking is provided at the Public Open Spaces within the development. The parking spaces are offset from the carriageway, which will require drivers to cross the pedestrian footway when entering/exiting the parking spaces. Given the available space within the Public Open Space, this conflicting movement appears unnecessary, and may increase the risk of vehicle/pedestrian collisions.

Recommendation

The footway should be relocated behind the parking spaces.

3.1.3 Problem

Location: *General Problem*

Summary: *Unclear how Shared Surfaces will be passively enforced.*

Several roads within the development are identified as being Shared Surfaces. As such, pedestrians and drivers will share the carriageway. It is not clear, however, how driver behaviour will be controlled in these Shared Surface Access Roads, as no measures are indicated within the Shared Surface. Additionally, it is not clear how visually impaired pedestrians will navigate the Shared Surfaces. Failure to provide safe zones for visually impaired pedestrians, including clear transitions between Shared Surfaces and standard road cross sections, may increase the risk of vehicle/pedestrian collisions. This problem may be exacerbated in instances where driver speeds are not passively controlled.

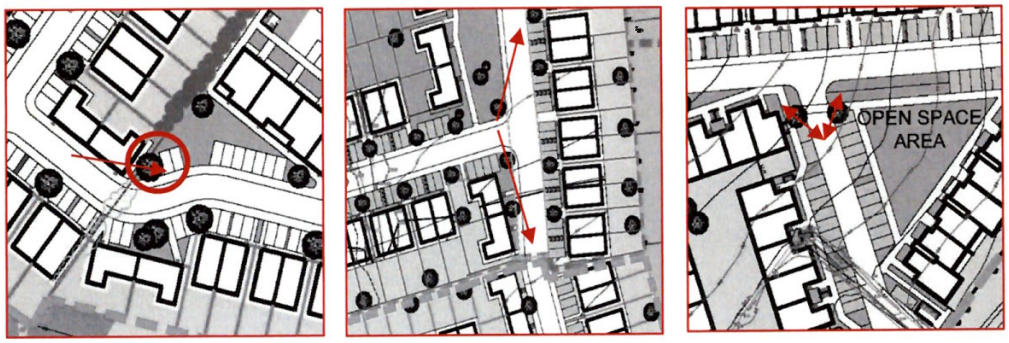
Recommendation

Shared Surfaces should include features that passively reduce vehicle speeds, as well as clearly advising drivers that they are entering/exiting a Shared Surface. Additionally, safe zones for visually impaired pedestrians should be provided in each Shared Surface Access Road.

3.1.4 Problem

Location: *General Problem*

Summary: *Tree locations may limit inter-visibility, and increase the risk of side-on or vehicle/cyclist collisions.*



A number of trees are proposed within the development. Where these trees are located near internal junctions, or at pedestrian crossings, visibility may be reduced or impacted resulting in drivers being unaware of vehicles exiting parking spaces and side road junctions, as well as approaching pedestrian crossing locations. This may result in side-on or vehicle/pedestrian collisions.

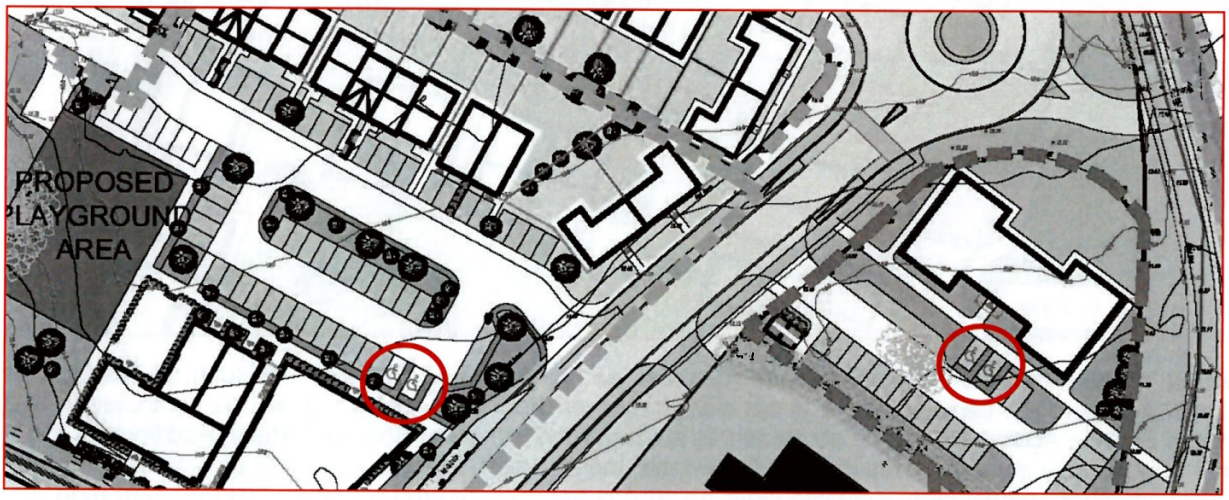
Recommendation

Locate trees outside visibility splays, and ensure they do not reduce inter-visibility between drivers and Non-Motorised Users.

3.1.5 Problem

Location: *General Problem*

Summary: *Dropped kerb and tactile paving has not been indicated adjacent the proposed mobility impaired parking spaces at the Creche, or the Neighbourhood Centre.*



Mobility impaired parking spaces have been proposed within the development. However, no dropped kerb and tactile paving has been indicated adjacent the mobility impaired parking space. This could result in a mobility impaired pedestrian being unable to ascend the kerb and access the footpath after exiting their vehicle. As a result, they may be required to travel along the carriageway to access a dropped kerb, where there is an increased risk of being struck by a vehicle.

Recommendation

Ensure the proposed mobility impaired parking spaces include a dropped kerb and associated tactile paving.

3.1.6 Problem

Location: *General Problem*

Summary: *Discontinuities in the road layout, and active work sites, may increase the risk of material damage and personal injury collisions.*

The development's multi-phase construction strategy will lead to phases being delivered at different times, which may result in access roads that continue between phases being terminated for a potentially long period of time. This may result in difficult turning manoeuvres for drivers, as well as construction materials and plant being stored in areas occupied by pedestrians and cyclists. This could result in material damage and personal injury if not carefully managed.

Recommendation

Ensure temporary turning heads are provided at each tie-in until the subsequent adjoining phase, and thus the through access road, is constructed. Also, ensure that materials and plant are secured away from pedestrians and cyclists.

3.2 Phase 1 Problems

3.2.1 Problem

Location: *Site Visit Observation on Realigned Meelick Road and Old Cratloe Road*

Summary: *The absence of ladder and tramline tactile paving on the section of realigned Meelick Road may increase the risk of personal injury collisions.*

The realigned section of Meelick Road includes segregated footways and an off-road cycle track on both sides of the road. However, there is currently no solid white line marking separating the footway and the off-road cycle track, which have been constructed at the same level, whilst ladder and tramline tactile paving has not been provided where the off-road cycle track transitions to an on-road cycle lane.

There is a risk that visually impaired pedestrians may inadvertently continue down the cycle ramp and into the carriageway, where there is an increased risk of vehicle/pedestrian collisions.

This problem was also noted on Old Cratloe Road, where ladder and tramline tactile paving has not been installed, and red surfacing across the junction mouth has not been provided.

Recommendation

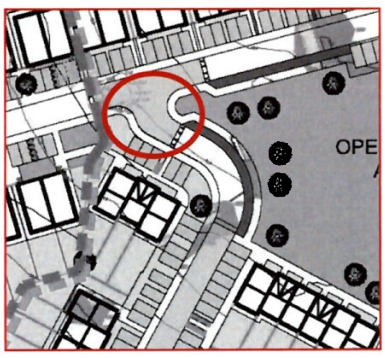
The existing non-motorised user facilities on the realigned section of Meelick Road, as well as Old Cratloe Road, should be fully reviewed. Ladder and tramline tactile paving should be provided at the start/end of the segregated facilities within the development, and across the development's external accesses within the local road network, particularly where the cycle track transitions to an on-road cycle lane facility.

Red surfacing should be provided where on street cycle lanes continue across side road junctions.

3.2.2 Problem

Location: *Drawing No PP-13 (Jan 23)*

Summary: *Priority may not be clear at the junction between Access Road 4 and Link Road 1.*



The priority control at the junction between Access Road 4 and Link Road 1 may not be clear to drivers on Access Road 4, as the horizontal alignment includes two tight radii. Drivers on Access Road 4 may inadvertently continue into Link Road 1, increasing the risk of overshoot or side-on collisions.

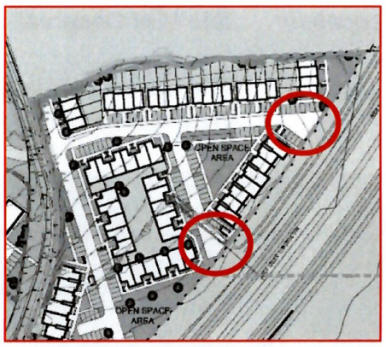
Recommendation

Provide a Stop control junction, including signage and road markings, at the junction between Access Road 4 and Link Road 1.

3.3 Phase 2 Problems

3.3.1 Problem

Location: *Drawing No PP-13 (Jan 23)*



Summary: *Vehicles may experience difficulty when undertaking turning manoeuvres, leading to material damage collisions, or unsafe reversing.*

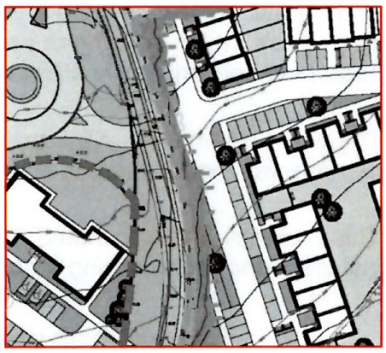
Two of the three roads in Phase 2 terminate without a standard turning head. The absence of a standard turning head may increase the risk of unsafe turning manoeuvres, leading to drivers mounting the kerb, or striking stationary vehicles, resulting in material damage collisions.

Recommendation

Undertake swept path analysis to confirm that a large vehicle can safely perform a U-turn manoeuvre at the termination of the roads identified in Phase 2 and, if required, modify the layout as necessary.

3.3.2 Problem

Location: *Drawing No PP-13 (Jan 23)*



Summary: *It is unclear how the footpath crosses the access road to Phase 2 from the roundabout.*

A pedestrian footway extends across the access road between the roundabout and entrance to Phase 2. It is unclear what measures will be provided to support safe pedestrian movement at this location. The absence of pedestrian crossing measures may increase the risk of vehicle/pedestrian collisions, particularly as the crossing will be located near a cross-road junction.

Recommendation

Ensure adequate pedestrian crossing measures are provided at this location, including tactile paving, dropped kerbs, and that sufficient inter-visibility between drivers and pedestrians/cyclists is available.

3.4 Phase 3 Problems

No specific problems.

However, please refer to 'General Problems' and 'Observations' noted in Section 3.1 and Section 4, respectively.

3.5 Phase 4 Problems

3.5.1 Problem

Location: *Drawing No PP-13 (Jan 23)*

Summary: *The horizontal road alignment in Phase 4 may lead to poor lane discipline and possible head-on collisions.*

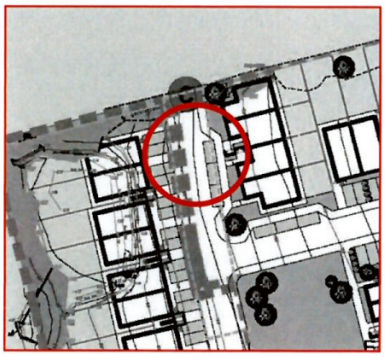
The horizontal alignment is relatively straight in Phase 4, however, a localised deflection is indicated on the internal street running in a north-south direction. The horizontal deflection may result in drivers crossing the centreline when travelling through the bend, which could increase the risk of a head-on collision should an opposing driver adopt a similar central position in the carriageway.

Recommendation

Traffic calming should be provided to passively control vehicle speeds through the horizontal deflection.

3.5.2 Problem

Location: *Drawing No PP-13 (Jan 23)*



Summary: *Vehicles may experience difficulty undertaking turning manoeuvres, leading to material damage collisions, or unsafe reversing.*

Three parallel parking spaces are located on the street at the northern extents of Phase 4, which terminates at the development's northern boundary. The absence of a standard turning head may increase the risk of unsafe turning manoeuvres when exiting these parking spaces, leading to drivers mounting the kerb, or striking stationary vehicles, resulting in material damage collisions.

Recommendation

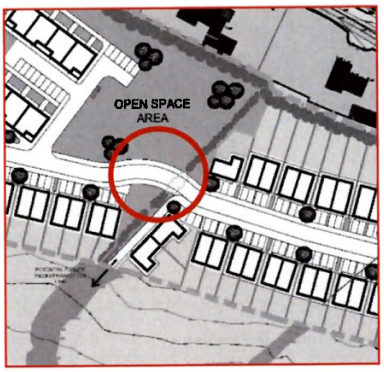
Provide a turning head where the development's street terminates at the northern boundary.

3.6 Phase 5 Problems

3.6.1 Problem

Location: *Drawing No PP-13 (Jan 23)*

Summary: *The horizontal road alignment in Phase 5 may lead to poor lane discipline and possible head-on collisions.*



The horizontal alignment is relatively straight in Phase 5, however, a localised deflection is indicated on the internal street running in an east-west direction. The horizontal deflection may result in drivers crossing the centreline when travelling through the bend, which could increase the risk of a head-on collision should an opposing driver adopt a similar central position in the carriageway.

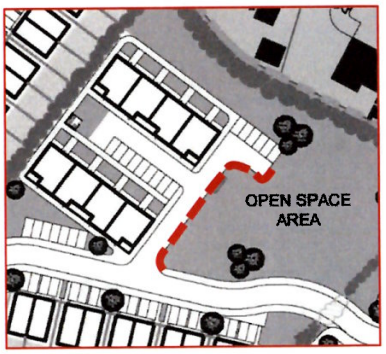
Recommendation

Traffic calming should be provided to passively control vehicle speeds through the horizontal deflection.

3.6.2 Problem

Location: *Drawing No PP-13 (Jan 23)*

Summary: *The lack of a pedestrian footpath may result in the creation of informal paths, leading to rutting, ponding and possible slips, trips, and falls.*



The footway terminates prematurely at the short cul de sac within Phase 5. Pedestrians travelling to the vehicle, or cycle, parking may choose to stay within the grass verge, which may lead to rutting and ponding overtime. This may increase the risk of slips, trips, and falls.

Recommendation

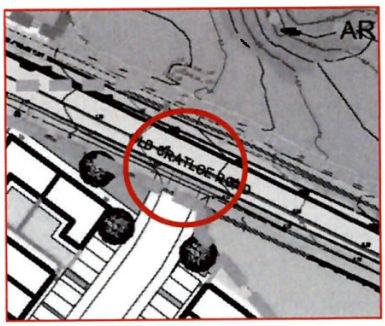
A footway should be provided on both sides of the street heading north into the short cul de sac, providing safe access to the vehicle, and cycle, parking.

In addition, the cycle parking should be located on an area of hardstanding outside the footway.

3.6.3 Problem

Location: *Drawing No PP-13 (Jan 23)*

Summary: *The absence of pedestrian and cycle facilities at the access to Phase 5 may increase the risk of vehicle/pedestrian and vehicle/cyclist collisions.*



The layout at the access to Phase 5 has not been indicated on the proposed layout. Therefore, the audit team are unable to determine the intended layout proposed. The absence of good quality pedestrian and cycle infrastructure at the access to Phase 5 may increase the risk of vehicle collisions with pedestrians and cyclists.

Recommendation

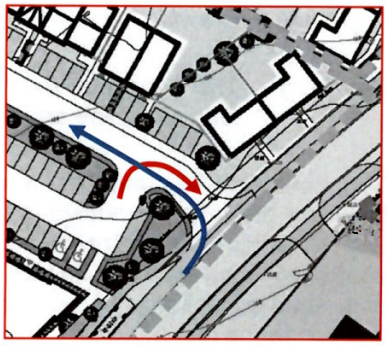
Provide adequate pedestrian and cycle facilities at the access to Phase 5.

3.7 Neighbourhood Centre Problems

3.7.1 Problem

Location: *Drawing No PP-13 (Jan 23)*

Summary: *Carpark access may be too close to the side road junction, reducing the time a driver has to react to a vehicle exiting the Neighbourhood Centre carpark, leading to side-on collisions.*



The Neighbourhood Centre carpark access includes two junctions, presumably both permitting entry and exit. The eastern access is located in close proximity to a side road junction, and may lead to side-on collisions where drivers exit the Neighbourhood Centre in front of a driver turning into the internal street.

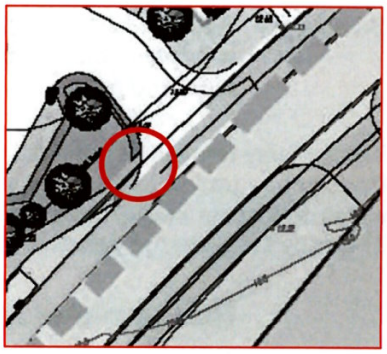
Recommendation

The Neighbourhood Centre carpark should operate under a one-way system, with cars only permitted to enter at the eastern access, and exit at the western access. The width of the accesses should be reduced accordingly.

3.7.2 Problem

Location: *Drawing No PP-13 (Jan 23)*

Summary: *Footway appears to terminate prematurely at the side road access, possibly constraining the width required to provide an uncontrolled pedestrian crossing.*



The footway does not appear to extend around the side road junction, just north of the inset bus bay. This may preclude the provision of a standard uncontrolled pedestrian crossing at the side road, and increase the risk of pedestrians, particularly visually impaired pedestrians, stepping out into the path of a turning vehicle, resulting in a vehicle/pedestrian collision.

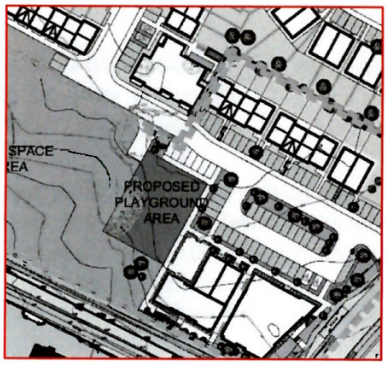
Recommendation

The footway should extend into the side road junction as far as a safe location to provide an uncontrolled pedestrian crossing which is offset from the main road.

3.7.3 Problem

Location: *Drawing No PP-13 (Jan 23)*

Summary: *The absence of cycle parking at the playground may increase the risk of informal cycle parking, leading to restrictions on the footway, and possible trips and falls.*



The playground is likely to attract a number of children from within the broader development. Failure to provide cycle parking stands at the playground may lead to informal parking, where bicycles are left on the footway, or near building accesses/exits. Informal parking may increase the risk of slips, trips, and falls.

Recommendation

Ensure bicycle parking is provided at the playground.

3.8 Creche Problems

No specific problems.

However, please refer to 'General Problems' and 'Observations' noted in Section 3.1 and Section 4, respectively.

4 Observations

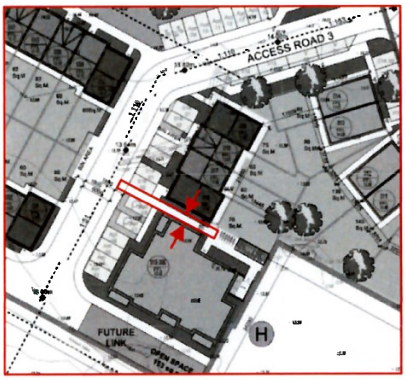
4.1 **General Observation:** The current design drawings do not indicate line marking, signage, tactile paving, drainage, lighting, swept path analysis, kerb details or cross sections. The Road Safety Audit team acknowledge that these packages would not be typically developed at this early stage in the design process, but wish to highlight the importance of these packages as the design progresses. These design packages should be prepared at the next stage of design.

4.2 A cycle parking area has been provided near the Apartment Block on Access Road 3. The footway connecting Access Road 3 with the cycle stands appears to be narrow, and may not sufficiently accommodate pedestrians and cyclists. Ensure the footway is wide enough to accommodate pedestrians and cyclists.

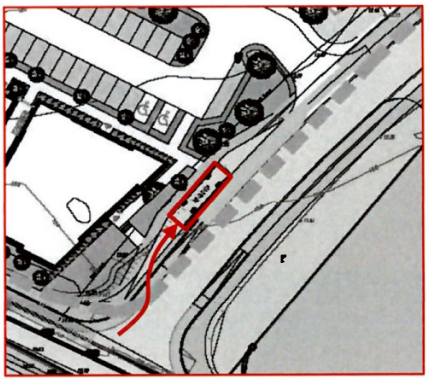
4.3 Bus stop entry manoeuvre appears to conflict with the existing segregated footway. This is assumed to be a CAD error. The design should be developed to confirm the finished layout, such that the shared pedestrian/cycle route is located outside the path of a bus entering the bus stop.

4.4 Parking should be relocated to the kerb edge.

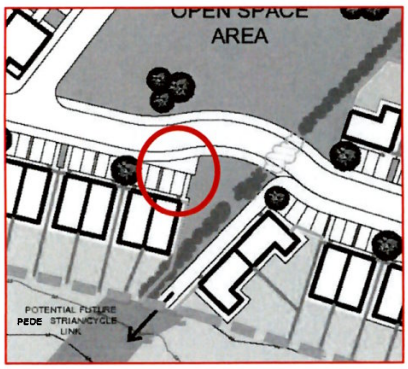
4.5 Parking should be relocated to the kerb edge.



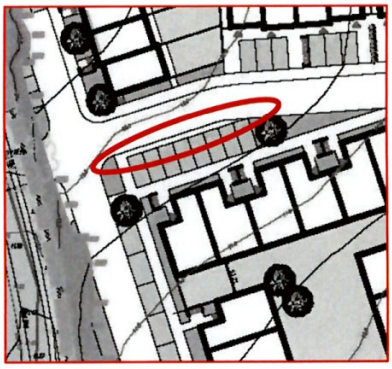
Observation 4.2



Observation 4.3



Observation 4.4



Observation 4.5

5 Road Safety Audit Team Statement

We certify that we have examined the drawings referred to in this report. The examination has been carried out with the sole purpose of identifying any features of the design that could be removed or modified in order to improve the safety of the scheme.

The problems identified have been noted in this report together with associated safety improvement suggestions, which we would recommend should be studied for implementation.

No one on the Road Safety Audit Team has been involved with the design of the scheme.

ROAD SAFETY AUDIT TEAM LEADER

Aly Gleeson Signed: _____

Dated: 6th March 2023

ROAD SAFETY AUDIT TEAM MEMBER

Alan O'Reilly Signed: _____

Dated: 6th March 2023

Appendix A – Road Safety Audit Brief Checklist

Have the following been included in the audit brief?: (*if 'No', reasons should be given below)*

		Yes	No
1.	The Design Brief	☐	☑
2.	Departures from Standard	☐	☑
3.	Scheme Drawings	☑	☐
4.	Scheme Details such as signs schedules, traffic signal staging	☐	☑
5.	Collision data for existing roads affected by scheme	☐	☑
6.	Traffic surveys	☐	☑
7.	Previous Road Safety Audit Reports and Designer's Responses/Feedback Form	☐	☑
8.	Previous Exception Reports	☐	☑
9.	Start date for construction and expected opening date	☐	☑
10.	Any elements to be excluded from audit	☐	☑

Any other information?

(if 'Yes', describe below)

☐ ☑

Appendix B – Documents Submitted to the Road Safety Audit Team

DOCUMENT/DRAWING TITLE	DOCUMENT/DRAWING NO.	REVISION
Overall Phased Masterplan	PP-13	Jan 23

Appendix C – Feedback Form

Road Safety Audit Feedback Form

Scheme: Cratloe, Co. Limerick - Multi Application Masterplan

Route No.: Local Roads

Audit Stage: 1 & 2 **Date Audit Completed:** 10th Feb 2023

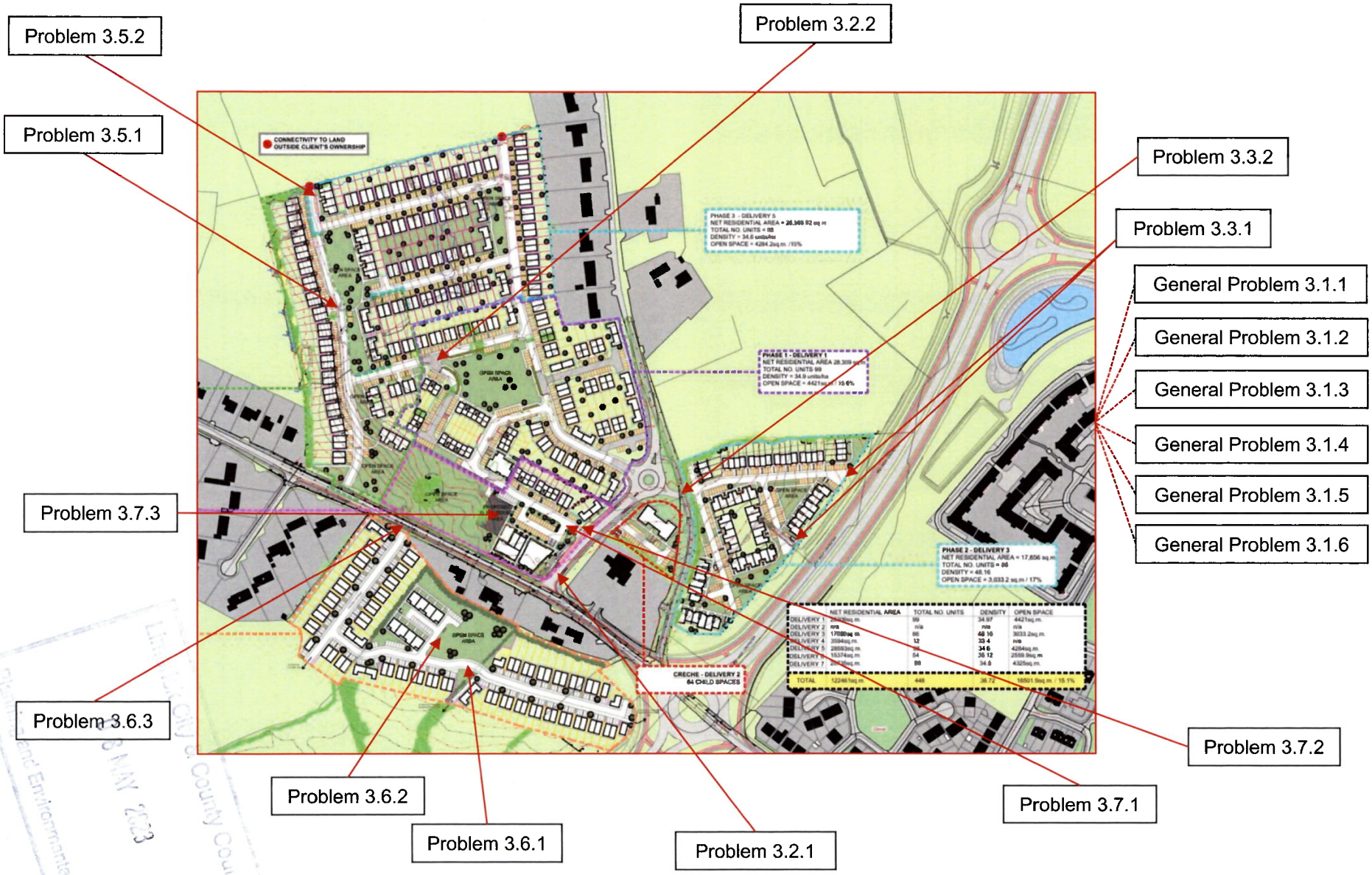
	To be Completed by Designer			To be Completed by Audit Team Leader
Paragraph No. in Safety Audit Report	**Problem Accepted (Yes/No)**	**Recommended Measure(s) Accepted (Yes/No)**	**Describe Alternative Measure(s). Give reasons for not accepting recommended measure**	**Alternative Measures or Reasons Accepted by Auditors (Yes/No)**
3.1.1	Yes	Yes		
3.1.2	Yes	Yes		
3.1.3	Yes	Yes		
3.1.4	Yes	Yes		
3.1.5	Yes	Yes		
3.1.6	Yes	Yes		
3.2.1	Yes	Yes		
3.2.2	Yes	Yes		
3.3.1	Yes	Yes		
3.3.2	Yes	Yes		
3.5.1	Yes	Yes		
3.5.2	Yes	Yes		
3.6.1	Yes	Yes		
3.6.2	Yes	Yes		
3.6.3	Yes	Yes		
3.7.1	Yes	Yes		
3.7.2	Yes	Yes		
3.7.3	Yes	Yes		

Signed: _____ Designer **Date** 01.03.23

Signed: _____ Audit Team Leader **Date** 6th Mar 2023

Signed: _____ Employer **Date** 2/3/23.

Appendix D – Problem Locations


Problem 3.5.2
Problem 3.2.2
Problem 3.5.1
Problem 3.3.2
Problem 3.3.1
General Problem 3.1.1
General Problem 3.1.2
General Problem 3.1.3
General Problem 3.1.4
General Problem 3.1.5
General Problem 3.1.6
Problem 3.7.3
Problem 3.6.3
Problem 3.7.2
Problem 3.6.2
Problem 3.7.1
Problem 3.6.1
Problem 3.2.1
CONNECTIVITY TO LAND OUTSIDE CLIENT'S OWNERSHIP
PHASE 3 - DELIVERY 5
PHASE 1 - DELIVERY 1
PHASE 2 - DELIVERY 3
CRECHE - DELIVERY 2
64 CHILD SPACES
NET RESIDENTIAL AREA
TOTAL NO. UNITS
DENSITY
OPEN SPACE

Appendix C – Trip Rates

Trip Rates used in Estimated Traffic Generation and Junction Analysis

HOUSES

Time Range	ARRIVALS No. Days	ARRIVALS Ave. HHOLDS	ARRIVALS Trip Rate	DEPARTURES No. Days	DEPARTURES Ave. HHOLDS	DEPARTURES Trip Rate	TOTALS No. Days	TOTALS Ave. HHOLDS	TOTALS Trip Rate
00:00- 01:00	10	225	0.028	10	225	0.016	10	225	0.044
01:00- 02:00	10	225	0.015	10	225	0.008	10	225	0.023
02:00 - 03:00	10	225	0.008	10	225	0.006	10	225	0.014
03:00- 04:00	10	225	0.005	10	225	0.004	10	225	0.009
04:00- 05:00	10	225	0.006	10	225	0.008	10	225	0.014
05:00- 06:00	10	225	0.008	10	225	0.032	10	225	0.040
06:00- 07:00	10	225	0.032	10	225	0.120	10	225	0.152
07:00- 08:00	73	158	0.079	73	158	0.304	73	158	0.383
08:00- 09:00	73	158	0.152	**73**	**158**	**0.440**	73	158	0.592
09:00- 10:00	73	158	0.167	73	158	0.219	73	158	0.386
10:00- 11:00	73	158	0.145	73	158	0.173	73	158	0.318
11:00- 12:00	73	158	0.176	73	158	0.173	73	158	0.349
12:00- 13:00	73	158	0.203	73	158	0.181	73	158	0.384
13:00- 14:00	73	158	0.193	73	158	0.191	73	158	0.384
14:00- 15:00	73	158	0.204	73	158	0.201	73	158	0.405
15:00- 16:00	73	158	0.280	73	158	0.213	73	158	0.493
16:00- 17:00	73	158	0.335	73	158	0.210	73	158	0.545
17:00- 18:00	**73**	**158**	**0.398**	73	158	0.231	**73**	**158**	**0.629**
18:00- 19:00	73	158	0.323	73	158	0.250	73	158	0.573
19:00 - 20:00	10	225	0.298	10	225	0.265	10	225	0.563
20:00- 21:00	10	225	0.203	10	225	0.147	10	225	0.350
21:00- 22:00	10	225	0.161	10	225	0.109	10	225	0.270
22:00 - 23:00	10	225	0.123	10	225	0.079	10	225	0.202
23:00- 24:00	10	225	0.093	10	225	0.064	10	225	0.157
Total Rates:			3.635			3.644			7.279

APAR TMENTS

Time Range	ARRIVALS No. Days	ARRIVALS Ave. HHOLDS	ARRIVALS Trip Rate	DEPARTURES No. Days	DEPARTURES Ave. HHOLDS	DEPARTURES Trip Rate	TOTALS No. Days	TOTALS Ave HHOLDS	TOTALS Tip Rate
00.00- 01.00	0	0	0.000	0	0	0.000	0	0	0.000
01.00- 02.00	0	0	0.000	0	0	0 000	0	0	0.000
02 00- 03 00	0	0	0 000	0	0	0.000	0	0	0.000
03:00 - 0400	0	0	0.000	0	0	0.000	0	0	0.000
04.00- 05.00	0	0	0.000	0	0	0.000	0	0	0.000
05.00- 06.00	0	0	0.000	0	0	0.000	0	0	0.000
06 00- 07 00	0	0	0 000	0	0	0 000	0	0	0.000
07: 00- 08:00	21	95	0.033	21	95	0.125	21	95	0.158
08.00- 09.00	21	95	0.074	**21**	**95**	**0.194**	21	95	0.268
09.00- 10.00	21	95	0.057	21	9 5	0. 093	21	95	0.150
10:00- 1100	21	95	0.054	21	95	0.079	21	95	0.133
11:00- 12 00	21	95	0.058	21	95	0.068	21	95	0.126
12:00- 13.00	21	95	0.066	21	95	0.081	21	95	0.147
13:00- 14 00	21	95	0 062	21	95	0 082	21	95	0.144
14:00- 15 00	21	95	0 073	21	95	0.060	21	95	0.133
15:00 - 16:00	21	95	0.079	21	95	0. 080	21	95	0.159
16.00- 17:00	21	95	0.099	21	95	0.066	21	95	0.165
17.00- 18.00	21	95	0.135	21	95	0 067	21	95	0.202
18 00- 19 00	21	95	0 139	21	95	0 086	21	95	0.225
1900 - 2000	**2**	**25**	**0.160**	2	25	0.140	**2**	**25**	**0300**
20:00 - 21:00	2	25	0.100	2	25	0.100	2	25	0.200
21:00- 22.00	0	0	0.000	0	0	0 000	0	0	0.000
2200 - 2300	0	0	0.000	0	0	0.000	0	0	0.000
23:00 - 24:00	0	0	0.000	0	0	0.000	0	0	0.000
Total Rates:			1.189			1.321			2.510

TRIP RATE for Land Use 01 - RETAIL/I - SHOPPING CENTRE - LOCAL SHOPS

VEHICLES

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00	0	0	0.000	0	0	0.000	0	0	0.000
01:00 - 02:00	0	0	0.000	0	0	0.000	0	0	0.000
02:00 - 03:00	0	0	0.000	0	0	0.000	0	0	0.000
03:00 - 04:00	0	0	0.000	0	0	0.000	0	0	0.000
04:00 - 05:00	0	0	0.000	0	0	0.000	0	0	0.000
05:00 - 06:00	0	0	0.000	0	0	0.000	0	0	0.000
06:00 - 07:00	0	0	0.000	0	0	0.000	0	0	0.000
07:00 - 08:00	13	1084	3.370	13	1084	3.029	13	1084	6.399
08:00 - 09:00	14	1339	4.102	14	1339	3.627	14	1339	7.729
09:00 - 10:00	14	1339	4.913	14	1339	4.246	14	1339	9.159
10:00 - 11:00	14	1339	5.260	14	1339	4.929	14	1339	10.189
11:00 - 12:00	14	1339	5.366	14	1339	5.217	14	1339	10.583
12:00 - 13:00	**14**	**1339**	**6.279**	**14**	**1339**	**6.156**	**14**	**1339**	**12.435**
13:00 - 14:00	14	1339	5.543	14	1339	5.927	14	1339	11.470
14:00 - 15:00	14	1339	5.254	14	1339	5.409	14	1339	10.663
15:00 - 16:00	14	1339	5.543	14	1339	5.393	14	1339	10.936
16:00 - 17:00	14	1339	5.921	14	1339	5.889	14	1339	11.810
17:00 - 18:00	14	1339	5.692	14	1339	6.087	14	1339	11.779
18:00 - 19:00	14	1339	5.281	14	1339	5.398	14	1339	10.679
19:00 - 20:00	12	1307	3.219	12	1307	3.583	12	1307	6.802
20:00 - 21:00	8	1483	2.209	8	1483	2.723	8	1483	4.932
21:00 - 22:00	0	0	0.000	0	0	0.000	0	0	0.000
22:00 - 23:00	0	0	0.000	0	0	0.000	0	0	0.000
23:00 - 24:00	0	0	0.000	0	0	0.000	0	0	0.000
Total Rates:			67.952			67.613			135.565

Café/Restaurant*	Arrivals	Departures	Total
Time	Trip Rate/100m²	Trip Rate	Trip Rate
08:00-09:00	4.050	2.025	6.075
17:00-18:00	3.063	1.810	4.873

*Based on Irish survey data (including both staff and customer trips) as the TRICS database does not contain similar development types.

Estimated Masterplan Development Traffic flows from all Phases

Table 4.2a – Houses – Phase 1 - *TRICS Trip Rates and Predicted Traffic*

Houses	Arrivals		Departures		Total	
87 Units	Trip Rate	No. of Trips	TripRate	No. of Trips	TripRate	No. of Trips
Time		(vehicles)		(vehicles)		(vehicles)
08:00-09:00	0.152	13	0.44	38	0.592	52
17:00-18:00	0.398	35	0.231	20	0.629	55

Table 4.2b – Apartments – Phase 1 - *TRICS Trip Rates and Predicted Traffic*

Apartments	Arrivals		Departures		Total	
12 Units	Trip Rate	No. of Trips	TripRate	No. of Trips	Trip Rate	No. of Trips
Time		(vehicles)		(vehicles)		(vehicles)
08:00-09:00	0.074	1	0.194	2	0.268	3
17:00-18:00	0.135	2	0.067	1	0.202	2

Table 4.2c – Houses – Phase 2 - *TRICS Trip Rates and Predicted Traffic*

Houses	Arrivals		Departures		Total	
46 Units	TripRate	No. of Trips	TripRate	No. of Trips	Trip Rate	No. of Trips
Time		(vehicles)		(vehicles)		(vehicles)
08:00-09:00	0.152	7	0.44	20	0.592	27
17:00-18:00	0.398	18	0.231	11	0.629	29

Table 4.2d – Apartments – Phase 2 - *TRICS Trip Rates and Predicted Traffic*

Apartments	Arrivals		Departures		Total	
40 Units	TripRate	No. of Trips	TripRate	No. of Trips	Trip Rate	No. of Trips
Time		(vehicles)		(vehicles)		(vehicles)
08:00-09:00	0.074	3	0.194	8	0.268	11
17:00-18:00	0.135	5	0.067	3	0.202	8

Table 4.2e – Houses – Phase 3 - *TRICS Trip Rates and Predicted Traffic*

Houses	Arrivals		Departures		Total	
98 Units	TripRate	No. of Trips	TripRate	No. of Trips	Trip Rate	No. of Trips
Time		(vehicles)		(vehicles)		(vehicles)
08:00-09:00	4.050	15	2.025	43	6.075	58
17:00-18:00	1.624	39	1.658	23	3.282	62

Table 4.2f – Houses – Phase 4 - *TRICS Trip Rates and Predicted Traffic*

Houses	Arrivals		Departures		Total	
51 Units	TripRate	No. of Trips	Trip Rate	No. of Trips	TripRate	No. of Trips
Time		(vehicles)		(vehicles)		(vehicles)
08:00-09:00	0.152	8	0.44	22	0.592	30
17:00-18:00	0.398	20	0.231	12	0.629	32

Table 4.2g – Apartments – Phase 4 *- TRICS Trip Rates and Predicted Traffic*

Apartments	Arrivals		Departures		Total	
8 Units	Trip Rate	No. of Trips	Trip Rate	No. of Trips	Trip Rate	No. of Trips
Time		(vehicles)		(vehicles)		(vehicles)
08:00-09:00	0.074	1	0.194	2	0.268	2
17:00-18:00	0.135	1	0.067	1	0.202	2

Table 4.2g – Neighbourhood Centre Houses *- TRICS Trip Rates and Predicted Traffic*

Houses	Arrivals		Departures		Total	
12 Units	Trip Rate	No. of Trips	Trip Rate	No. of Trips	Trip Rate	No. of Trips
Time		(vehicles)		(vehicles)		(vehicles)
08:00-09:00	0.152	2	0.44	5	0.592	7
17:00-18:00	0.398	5	0.231	3	0.629	8

Table 4.2h – Neighbourhood Centre Cafe *- TRICS Trip Rates and Predicted Traffic*

CAFÉ ~ 207m²	Arrivals		Departures		Total	
20% External	Trip Rate	No. of Trips	Trip Rate	No. of Trips	Trip Rate	No. of Trips
Time		(vehicles)		(vehicles)		(vehicles)
08:00-09:00	4.050	2	2.025	1	6.075	3
17:00-18:00	3.063	1	1.810	1	4.873	2

Table 4.2i–- Total Retail – Neighbourhood Centre Local Retail & Food store *- TRICS Trip Rates and Traffic*

Retail ~ 600m²	Arrivals		Departures		Total	
20% External	Trip Rate	No. of Trips	Trip Rate	No. of Trips	Trip Rate	No. of Trips
Time		(vehicles)		(vehicles)		(vehicles)
08:00-09:00	4.102	5	3.627	4	7.729	9
17:00-18:00	5.692	7	6.087	7	11.779	14

Table 4.2j– Houses – Phase 5 *- TRICS Trip Rates and Predicted Traffic*

Houses	Arrivals		Departures		Total	
83 Units	Trip Rate	No. of Trips	Trip Rate	No. of Trips	Trip Rate	No. of Trips
Time		(vehicles)		(vehicles)		(vehicles)
08:00-09:00	0.152	13	0.44	37	0.592	49
17:00-18:00	0.398	33	0.231	19	0.629	52

Table 4.2k – Apartments – Phase 5 *- TRICS Trip Rates and Predicted Traffic*

Apartments	Arrivals		Departures		Total	
16 Units	Trip Rate	No. of Trips	Trip Rate	No. of Trips	Trip Rate	No. of Trips
Time		(vehicles)		(vehicles)		(vehicles)
08:00-09:00	0.074	1	0.194	3	0.268	4
17:00-18:00	0.135	2	0.067	1	0.202	3

Appendix D – Public Transport

302 | **Henry St (Stop B) - Sarsfield St (Stop B)** | TFI

operated by Bus Éireann

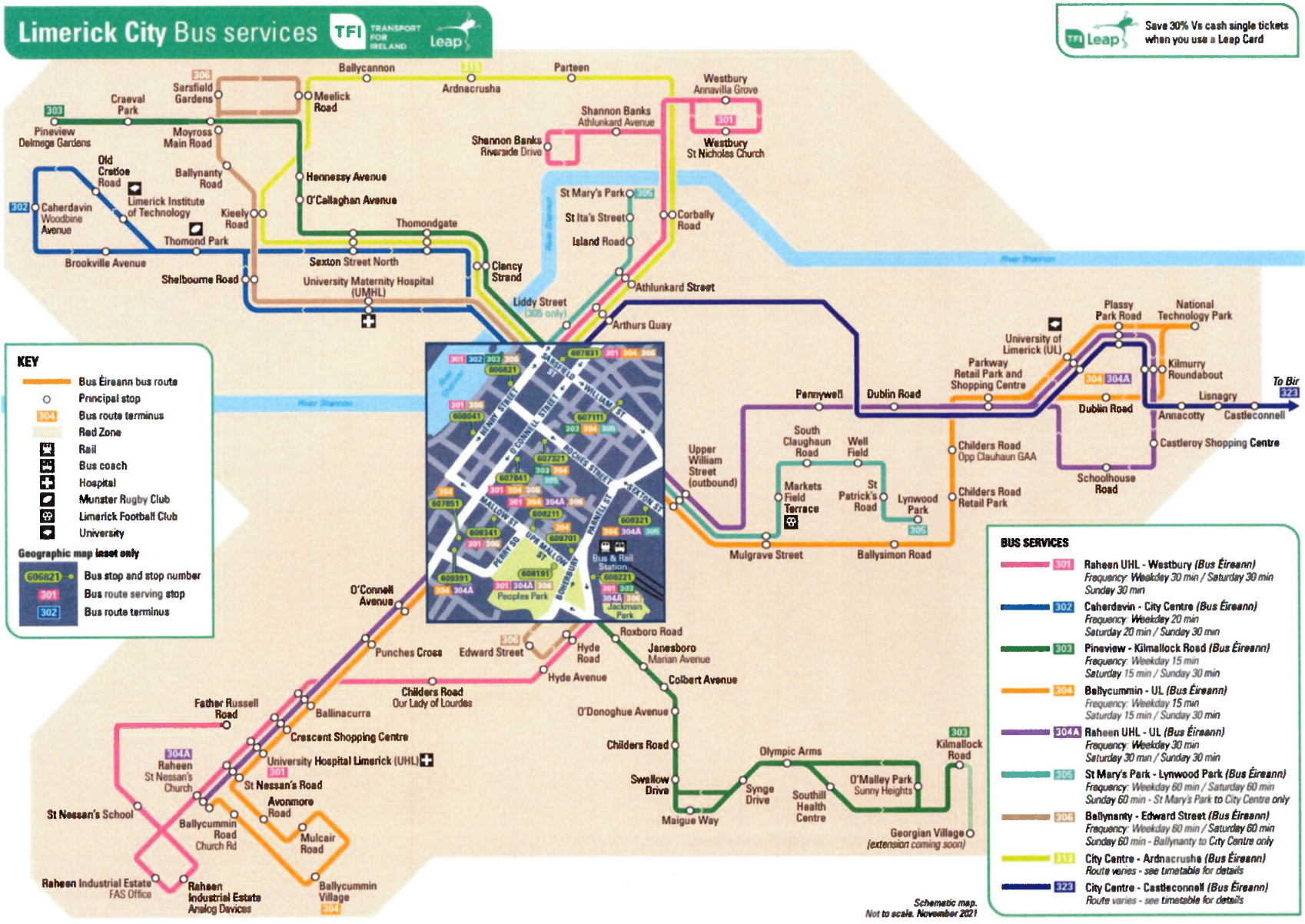
Limerick City, Henry Street, stop 610001 (1)	10.00	10.30	11.00	11.30	12.00	12.30	13.00	13.30	14.00	14.30	15.00	15.30	16.00	16.30	17.00	17.30	18.00	18.30	19.00	19.30	20.00	20.30	21.00	21.30	22.00	22.30
Old Thomondgate, Treaty Stone, stop 608891 (1)	10.02	10.32	11.02	11.32	12.02	12.32	13.02	13.32	14.02	14.32	15.02	15.32	16.02	16.32	17.02	17.32	18.02	18.32	19.02	19.32	20.02	20.32	21.02	21.32	22.02	22.32
Limerick City, High Road, stop 607341	10.03	10.33	11.03	11.33	12.03	12.33	13.03	13.33	14.03	14.33	15.03	15.33	16.03	16.33	17.03	17.33	18.03	18.33	19.03	19.33	20.03	20.33	21.03	21.33	22.03	22.33
Hassett's Cross, Thomond Park, stop 606861	10.04	10.34	11.04	11.34	12.04	12.34	13.04	13.34	14.04	14.34	15.04	15.34	16.04	16.34	17.04	17.34	18.04	18.34	19.04	19.34	20.04	20.34	21.04	21.34	22.04	22.34
Mayorstone, Mayorstone Upper, stop 606871	10.05	10.35	11.05	11.35	12.05	12.35	13.05	13.35	14.05	14.35	15.05	15.35	16.05	16.35	17.05	17.35	18.05	18.35	19.05	19.35	20.05	20.35	21.05	21.35	22.05	22.35
Ballynanty, Old Cratloe Road, stop 637081 (NW-bound)	10.05	10.35	11.05	11.35	12.05	12.35	13.05	13.35	14.05	14.35	15.05	15.35	16.05	16.35	17.05	17.35	18.05	18.35	19.05	19.35	20.05	20.35	21.05	21.35	22.05	22.35
Moylish, Old Cratloe Road, stop 606881	10.06	10.36	11.06	11.36	12.06	12.36	13.06	13.36	14.06	14.36	15.06	15.36	16.06	16.36	17.06	17.36	18.06	18.36	19.06	19.36	20.06	20.36	21.06	21.36	22.06	22.36
Ballygrennan, Ashwood Avenue, stop 606891	10.06	10.36	11.06	11.36	12.06	12.36	13.06	13.36	14.06	14.36	15.06	15.36	16.06	16.36	17.06	17.36	18.06	18.36	19.06	19.36	20.06	20.36	21.06	21.36	22.06	22.36
Caherdavin, Whitethorn Drive Upr, stop 606901	10.08	10.38	11.08	11.38	12.08	12.38	13.08	13.38	14.08	14.38	15.08	15.38	16.08	16.38	17.08	17.38	18.08	18.38	19.08	19.38	20.08	20.38	21.08	21.38	22.08	22.38
Caherdavin, Blackthorn Drive, stop 606911	10.09	10.39	11.09	11.39	12.09	12.39	13.09	13.39	14.09	14.39	15.09	15.39	16.09	16.39	17.09	17.39	18.09	18.39	19.09	19.39	20.09	20.39	21.09	21.39	22.09	22.39
Caherdavin, Derravaragh Road, stop 606921	10.11	10.41	11.11	11.41	12.11	12.41	13.11	13.41	14.11	14.41	15.11	15.41	16.11	16.41	17.11	17.41	18.11	18.41	19.11	19.41	20.11	20.41	21.11	21.41	22.11	22.41
Clareview (Limerick), Brookville Avenue, stop 606931	10.12	10.42	11.12	11.42	12.12	12.42	13.12	13.42	14.12	14.42	15.12	15.42	16.12	16.42	17.12	17.42	18.12	18.42	19.12	19.42	20.12	20.42	21.12	21.42	22.12	22.42
Mayorstone, Limerick IT, stop 606941	10.13	10.43	11.13	11.43	12.13	12.43	13.13	13.43	14.13	14.43	15.13	15.43	16.13	16.43	17.13	17.43	18.13	18.43	19.13	19.43	20.13	20.43	21.13	21.43	22.13	22.43
Ballynanty, Cratloe Road, stop 606951 (E-bound)	10.14	10.44	11.14	11.44	12.14	12.44	13.14	13.44	14.14	14.44	15.14	15.44	16.14	16.44	17.14	17.44	18.14	18.44	19.14	19.44	20.14	20.44	21.14	21.44	22.14	22.44
Thomondgate, Sexton Street N, stop 607441	10.15	10.45	11.15	11.45	12.15	12.45	13.15	13.45	14.15	14.45	15.15	15.45	16.15	16.45	17.15	17.45	18.15	18.45	19.15	19.45	20.15	20.45	21.15	21.45	22.15	22.45
Old Thomondgate, High Road, stop 607411	10.15	10.45	11.15	11.45	12.15	12.45	13.15	13.45	14.15	14.45	15.15	15.45	16.15	16.45	17.15	17.45	18.15	18.45	19.15	19.45	20.15	20.45	21.15	21.45	22.15	22.45
Castle, Treaty Stone, stop 606981 (S-bound)	10.16	10.46	11.16	11.46	12.16	12.46	13.16	13.46	14.16	14.46	15.16	15.46	16.16	16.46	17.16	17.46	18.16	18.46	19.16	19.46	20.16	20.46	21.16	21.46	22.16	22.46
Limerick City, Sarsfield Bridge, stop 606991	10.17	10.47	11.17	11.47	12.17	12.47	13.17	13.47	14.17	14.47	15.17	15.47	16.17	16.47	17.17	17.47	18.17	18.47	19.17	19.47	20.17	20.47	21.17	21.47	22.17	22.47
Limerick City, Sarsfield St, stop 610031 (1)	10.19	10.49	11.19	11.49	12.19	12.49	13.19	13.49	14.19	14.49	15.19	15.49	16.19	16.49	17.19	17.49	18.19	18.49	19.19	19.49	20.19	20.49	21.19	21.49	22.19	22.49

Limerick City, Henry Street, stop 610001 (1)	23.00	23.30	7.20	7.40	8.00	8.20	8.40	9.00	9.20	9.40	10.00	10.20	10.40	11.00	11.20	11.40	12.00	12.20	12.40	13.00	13.20	13.40	14.00	14.20	14.40	15.00
Old Thomondgate, Treaty Stone, stop 608891 (1)	23.02	23.32	7.22	7.42	8.03	8.23	8.43	9.02	9.22	9.42	10.02	10.22	10.42	11.02	11.22	11.42	12.02	12.22	12.42	13.02	13.22	13.42	14.02	14.22	14.42	15.02
Limerick City, High Road, stop 607341	23.03	23.33	7.23	7.43	8.04	8.24	8.44	9.03	9.23	9.43	10.03	10.23	10.43	11.03	11.23	11.43	12.03	12.23	12.43	13.03	13.23	13.43	14.03	14.23	14.43	15.03
Hassett's Cross, Thomond Park, stop 606861	23.04	23.34	7.25	7.45	8.06	8.26	8.46	9.05	9.25	9.45	10.05	10.25	10.45	11.05	11.25	11.45	12.05	12.25	12.45	13.05	13.25	13.45	14.05	14.25	14.45	15.05
Mayorstone, Mayorstone Upper, stop 606871	23.05	23.35	7.25	7.45	8.07	8.27	8.47	9.05	9.25	9.45	10.05	10.25	10.45	11.05	11.25	11.45	12.05	12.25	12.45	13.05	13.25	13.45	14.07	14.27	14.47	15.07
Ballynanty, Old Cratloe Road, stop 637081 (NW-bound)	23.05	23.35	7.26	7.46	8.08	8.28	8.48	9.06	9.26	9.46	10.06	10.26	10.46	11.06	11.26	11.46	12.06	12.26	12.46	13.06	13.26	13.46	14.08	14.28	14.48	15.08
Moylish, Old Cratloe Road, stop 606881	23.06	23.36	7.27	7.47	8.09	8.29	8.49	9.07	9.27	9.47	10.07	10.27	10.47	11.07	11.27	11.47	12.07	12.27	12.47	13.07	13.27	13.47	14.09	14.29	14.49	15.09
Ballygrennan, Ashwood Avenue, stop 606891	23.06	23.36	7.28	7.48	8.10	8.30	8.50	9.08	9.28	9.48	10.08	10.28	10.48	11.08	11.28	11.48	12.08	12.28	12.48	13.08	13.28	13.48	14.10	14.30	14.50	15.10
Caherdavin, Whitethorn Drive Upr, stop 606901	23.08	23.38	7.30	7.50	8.13	8.33	8.53	9.10	9.30	9.50	10.10	10.30	10.50	11.10	11.30	11.50	12.10	12.30	12.50	13.10	13.30	13.50	14.12	14.32	14.52	15.12
Caherdavin, Blackthorn Drive, stop 606911	23.09	23.39	7.31	7.51	8.14	8.34	8.54	9.11	9.31	9.51	10.11	10.31	10.51	11.11	11.31	11.51	12.11	12.31	12.51	13.11	13.31	13.51	14.13	14.33	14.53	15.13
Caherdavin, Derravaragh Road, stop 606921	23.11	23.41	7.33	7.53	8.16	8.36	8.56	9.13	9.33	9.53	10.13	10.33	10.53	11.13	11.33	11.53	12.13	12.33	12.53	13.13	13.33	13.53	14.15	14.35	14.55	15.15
Clareview (Limerick), Brookville Avenue, stop 606931	23.12	23.42	7.34	7.54	8.17	8.37	8.57	9.14	9.34	9.54	10.14	10.34	10.54	11.14	11.34	11.54	12.14	12.34	12.54	13.14	13.34	13.54	14.16	14.36	14.56	15.16
Mayorstone, Limerick IT, stop 606941	23.13	23.43	7.36	7.56	8.19	8.39	8.59	9.15	9.35	9.55	10.15	10.35	10.55	11.15	11.35	11.55	12.15	12.35	12.55	13.15	13.35	13.55	14.18	14.38	14.58	15.18
Ballynanty, Cratloe Road, stop 606951 (E-bound)	23.14	23.44	7.37	7.57	8.21	8.41	9.01	9.17	9.37	9.57	10.17	10.37	10.57	11.17	11.37	11.57	12.17	12.37	12.57	13.17	13.37	13.57	14.19	14.39	14.59	15.19
Thomondgate, Sexton Street N, stop 607441	23.15	23.45	7.38	7.58	8.23	8.43	9.03	9.18	9.38	9.58	10.18	10.38	10.58	11.18	11.38	11.58	12.18	12.38	12.58	13.18	13.38	13.58	14.21	14.41	15.01	15.21
Old Thomondgate, High Road, stop 607411	23.15	23.45	7.39	7.59	8.24	8.44	9.04	9.19	9.39	9.59	10.19	10.39	10.59	11.19	11.39	11.59	12.19	12.39	12.59	13.19	13.39	13.59	14.22	14.42	15.02	15.22
Castle, Treaty Stone, stop 606981 (S-bound)	23.16	23.46	7.40	8.00	8.26	8.46	9.06	9.20	9.40	10.00	10.20	10.40	11.00	11.20	11.40	12.00	12.20	12.40	13.00	13.20	13.40	14.00	14.23	14.43	15.03	15.23
Limerick City, Sarsfield Bridge, stop 606991	23.17	23.47	7.41	8.01	8.28	8.48	9.08	9.22	9.42	10.02	10.22	10.42	11.02	11.22	11.42	12.02	12.22	12.42	13.02	13.22	13.42	14.02	14.25	14.45	15.05	15.25
Limerick City, Sarsfield St, stop 610031 (1)	23.19	23.49	7.44	8.04	8.33	8.53	9.13	9.26	9.46	10.06	10.26	10.46	11.06	11.26	11.46	12.06	12.26	12.46	13.06	13.26	13.46	14.06	14.29	14.49	15.09	15.29

Limerick City, Henry Street, stop 610001 (1)	15.20	15.40	16.00	16.20	16.40	17.00	17.20	17.40	18.00	18.20	18.40	19.00	19.30	20.00	20.30	21.00	21.30	22.00	22.30	23.00	23.30	7.20	7.40	8.00	8.20	8.40
Old Thomondgate, Treaty Stone, stop 608891 (1)	15.22	15.42	16.02	16.22	16.42	17.02	17.22	17.42	18.02	18.22	18.42	19.02	19.32	20.02	20.32	21.02	21.32	22.02	22.32	23.02	23.32	7.22	7.42	8.03	8.23	8.43
Limerick City, High Road, stop 607341	15.23	15.43	16.03	16.23	16.43	17.03	17.23	17.43	18.03	18.23	18.43	19.03	19.33	20.03	20.33	21.03	21.33	22.03	22.33	23.03	23.33	7.23	7.43	8.04	8.24	8.44
Hassett's Cross, Thomond Park, stop 606861	15.25	15.45	16.05	16.25	16.45	17.05	17.25	17.45	18.05	18.25	18.45	19.05	19.35	20.05	20.35	21.05	21.35	22.05	22.35	23.05	23.35	7.25	7.45	8.06	8.26	8.46
Mayorstone, Mayorstone Upper, stop 606871	15.27	15.47	16.07	16.27	16.47	17.07	17.27	17.47	18.07	18.27	18.47	19.05	19.35	20.05	20.35	21.05	21.35	22.05	22.35	23.05	23.35	7.25	7.45	8.07	8.27	8.47
Ballynanty, Old Cratloe Road, stop 637081 (NW-bound)	15.28	15.48	16.08	16.28	16.48	17.08	17.28	17.48	18.08	18.28	18.48	19.06	19.36	20.06	20.36	21.06	21.36	22.06	22.36	23.06	23.36	7.26	7.46	8.08	8.28	8.48
Moylish, Old Cratloe Road, stop 606881	15.29	15.49	16.09	16.29	16.49	17.09	17.29	17.49	18.09	18.29	18.49	19.06	19.36	20.06	20.36	21.06	21.36	22.06	22.36	23.06	23.36	7.27	7.47	8.09	8.29	8.49
Ballygrennan, Ashwood Avenue, stop 606891	15.30	15.50	16.10	16.30	16.50	17.10	17.30	17.50	18.10	18.30	18.50	19.07	19.37	20.07	20.37	21.07	21.37	22.07	22.37	23.07	23.37	7.28	7.48	8.10	8.30	8.50
Caherdavin, Whitethorn Drive Upr, stop 606901	15.32	15.52	16.12	16.32	16.52	17.12	17.32	17.52	18.12	18.32	18.52	19.09	19.39	20.09	20.39	21.09	21.39	22.08	22.38	23.08	23.38	7.30	7.50	8.13	8.33	8.53
Caherdavin, Blackthorn Drive, stop 606911	15.33	15.53	16.13	16.33	16.53	17.13	17.33	17.53	18.13	18.33	18.53	19.10	19.40	20.10	20.40	21.10	21.40	22.09	22.39	23.09	23.39	7.31	7.51	8.14	8.34	8.54
Caherdavin, Derravaragh Road, stop 606921	15.35	15.55	16.15	16.35	16.55	17.15	17.35	17.55	18.15	18.35	18.55	19.12	19.42	20.12	20.42	21.12	21.42	22.10	22.40	23.10	23.40	7.33	7.53	8.16	8.36	8.56
Clareview (Limerick), Brookville Avenue, stop 606931	15.36	15.56	16.16	16.36	16.56	17.16	17.36	17.56	18.16	18.36	18.56	19.13	19.43	20.13	20.43	21.13	21.43	22.11	22.41	23.11	23.41	7.34	7.54	8.17	8.37	8.57
Mayorstone, Limerick IT, stop 606941	15.38	15.58	16.18	16.38	16.58	17.18	17.38	17.58	18.18	18.38	18.58	19.14	19.44	20.14	20.44	21.14	21.44	22.12	22.42	23.12	23.42	7.36	7.56	8.19	8.39	8.59
Ballynanty, Cratloe Road, stop 606951 (E-bound)	15.39	15.59	16.19	16.39	16.59	17.19	17.39	17.59	18.19	18.39	18.59	19.15	19.45	20.15	20.45	21.15	21.45	22.12	22.42	23.12	23.42	7.37	7.57	8.21	8.41	9.01
Thomondgate, Sexton Street N, stop 607441	15.41	16.01	16.21	16.41	17.01	17.21	17.41	18.01	18.21	18.41	19.01	19.16	19.46	20.16	20.46	21.16	21.46	22.13	22.43	23.13	23.43	7.38	7.58	8.23	8.43	9.03
Old Thomondgate, High Road, stop 607411	15.42	16.02	16.22	16.42	17.02	17.22	17.42	18.02	18.22	18.42	19.02	19.16	19.46	20.16	20.46	21.16	21.46	22.14	22.44	23.14	23.44	7.39	7.59	8.24	8.44	9.04
Castle, Treaty Stone, stop 606981 (S-bound)	15.43	16.03	16.23	16.43	17.03	17.23	17.43	18.03	18.23	18.43	19.03	19.17	19.47	20.17	20.47	21.17	21.47	22.15	22.45	23.15	23.45	7.40	8.00	8.26	8.46	9.06
Limerick City, Sarsfield Bridge, stop 606991	15.45	16.05	16.25	16.45	17.05	17.25	17.45	18.05	18.25	18.45	19.05	19.19	19.49	20.19	20.49	21.19	21.49	22.16	22.46	23.16	23.46	7.41	8.01	8.28	8.48	9.08
Limerick City, Sarsfield St, stop 610031 (1)	15.49	16.09	16.29	16.49	17.09	17.29	17.49	18.09	18.29	18.49	19.09	19.21	19.51	20.21	20.51	21.21	21.51	22.18	22.48	23.18	23.48	7.44	8.04	8.33	8.53	9.13

Limerick City, Henry Street, stop 610001 (1)	9.00	9.20	9.40	10.00	10.20	10.40	11.00	11.20	11.40	12.00	12.20	12.40	13.00	13.20	13.40	14.00	14.20	14.40	15.00	15.20	15.40	16.00	16.20	16.40	17.00	17.20
Old Thomondgate, Treaty Stone, stop 608891 (1)	9.02	9.22	9.42	10.02	10.22	10.42	11.02	11.22	11.42	12.02	12.22	12.42	13.02	13.22	13.42	14.02	14.22	14.42	15.02	15.22	15.42	16.02	16.22	16.42	17.02	17.22
Limerick City, High Road, stop 607341	9.03	9.23	9.43	10.03	10.23	10.43	11.03	11.23	11.43	12.03	12.23	12.43	13.03	13.23	13.43	14.03	14.23	14.43	15.03	15.23	15.43	16.03	16.23	16.43	17.03	17.23
Hassett's Cross, Thomond Park, stop 606861	9.05	9.25	9.45	10.05	10.25	10.45	11.05	11.25	11.45	12.05	12.25	12.45	13.05	13.25	13.45	14.05	14.25	14.45	15.05	15.25	15.45	16.05	16.25	16.45	17.05	17.25
Mayorstone, Mayorstone Upper, stop 606871	9.05	9.25	9.45	10.05	10.25	10.45	11.05	11.25	11.45	12.05	12.25	12.45	13.05	13.25	13.45	14.07	14.27	14.47	15.07	15.27	15.47	16.07	16.27	16.47	17.07	17.27
Ballynanty, Old Cratloe Road, stop 637081 (NW-bound)	9.06	9.26	9.46	10.06	10.26	10.46	11.06	11.26	11.46	12.06	12.26	12.46	13.06	13.26	13.46	14.08	14.28	14.48	15.08	15.28	15.48	16.08	16.28	16.48	17.08	17.28
Moylish, Old Cratloe Road, stop 606881	9.07	9.27	9.47	10.07	10.27	10.47	11.07	11.27	11.47	12.07	12.27	12.47	13.07	13.27	13.47	14.09	14.29	14.49	15.09	15.29	15.49	16.09	16.29	16.49	17.09	17.29
Ballygrennan, Ashwood Avenue, stop 606891	9.08	9.28	9.48	10.08	10.28	10.48	11.08	11.28	11.48	12.08	12.28	12.48	13.08	13.28	13.48	14.10	14.30	14.50	15.10	15.30	15.50	16.10	16.30	16.50	17.10	17.30
Caherdavin, Whitethorn Drive Upr, stop 606901	9.10	9.30	9.50	10.10	10.30	10.50	11.10	11.30	11.50	12.10	12.30	12.50	13.10	13.30	13.50	14.12	14.32	14.52	15.12	15.32	15.52	16.12	16.32	16.52	17.12	17.32
Caherdavin, Blackthorn Drive, stop 606911	9.11	9.31	9.51	10.11	10.31	10.51	11.11	11.31	11.51	12.11	12.31	12.51	13.11	13.31	13.51	14.13	14.33	14.53	15.13	15.33	15.53	16.13	16.33	16.53	17.13	17.33
Caherdavin, Derravaragh Road, stop 606921	9.13	9.33	9.53	10.13	10.33	10.53	11.13	11.33	11.53	12.13	12.33	12.53	13.13	13.33	13.53	14.15	14.35	14.55	15.15	15.35	15.55	16.15	16.35	16.55	17.15	17.35
Clareview (Limerick), Brookville Avenue, stop 606931	9.14	9.34	9.54	10.14	10.34	10.54	11.14	11.34	11.54	12.14	12.34	12.54	13.14	13.34	13.54	14.16	14.36	14.56	15.16	15.36	15.56	16.16	16.36	16.56	17.16	17.36
Mayorstone, Limerick IT, stop 606941	9.15	9.35	9.55	10.15	10.35	10.55	11.15	11.35	11.55	12.15	12.35	12.55	13.15	13.35	13.55	14.18	14.38	14.58	15.18	15.38	15.58	16.18	16.38	16.58	17.18	17.38
Ballynanty, Cratloe Road, stop 606951 (E-bound)	9.17	9.37	9.57	10.17	10.37	10.57	11.17	11.37	11.57	12.17	12.37	12.57	13.17	13.37	13.57	14.19	14.39	14.59	15.19	15.39	15.59	16.19	16.39	16.59	17.19	17.39
Thomondgate, Sexton Street N, stop 607441	9.18	9.38	9.58	10.18	10.38	10.58	11.18	11.38	11.58	12.18	12.38	12.58	13.18	13.38	13.58	14.21	14.41	15.01	15.21	15.41	16.01	16.21	16.41	17.01	17.21	17.41
Old Thomondgate, High Road, stop 607411	9.19	9.39	9.59	10.19	10.39	10.59	11.19	11.39	11.59	12.19	12.39	12.59	13.19	13.39	13.59	14.22	14.42	15.02	15.22	15.42	16.02	16.22	16.42	17.02	17.22	17.42
Castle, Treaty Stone, stop 606981 (S-bound)	9.20	9.40	10.00	10.20	10.40	11.00	11.20	11.40	12.00	12.20	12.40	13.00	13.20	13.40	14.00	14.23	14.43	15.03	15.23	15.43	16.03	16.23	16.43	17.03	17.23	17.43
Limerick City, Sarsfield Bridge, stop 606991	9.22	9.42	10.02	10.22	10.42	11.02	11.22	11.42	12.02	12.22	12.42	13.02	13.22	13.42	14.02	14.25	14.45	15.05	15.25	15.45	16.05	16.25	16.45	17.05	17.25	17.45
Limerick City, Sarsfield St, stop 610031 (1)	9.26	9.46	10.06	10.26	10.46	11.06	11.26	11.46	12.06	12.26	12.46	13.06	13.26	13.46	14.06	14.29	14.49	15.09	15.29	15.49	16.09	16.29	16.49	17.09	17.29	17.49

Limerick City, Henry Street, stop 610001 (1)	17.40	18.00	18.20	18.40	19.00	19.30	20.00	20.30	21.00	21.30	22.00	22.30	23.00	23.30	7.20	7.40	8.00	8.20	8.40	9.00	9.20	9.40	10.00	10.20	10.40	11.00
Old Thomondgate, Treaty Stone, stop 608891 (1)	17.42	18.02	18.22	18.42	19.02	19.32	20.02	20.32	21.02	21.32	22.02	22.32	23.02	23.32	7.22	7.42	8.03	8.23	8.43	9.02	9.22	9.42	10.02	10.22	10.42	11.02
Limerick City, High Road, stop 607341	17.43	18.03	18.23	18.43	19.03	19.33	20.03	20.33	21.03	21.33	22.03	22.33	23.03	23.33	7.23	7.43	8.04	8.24	8.44	9.03	9.23	9.43	10.03	10.23	10.43	11.03
Hassett's Cross, Thomond Park, stop 606861	17.45	18.05	18.25	18.45	19.05	19.35	20.05	20.35	21.05	21.35	22.05	22.35	23.05	23.35	7.25	7.45	8.06	8.26	8.46	9.05	9.25	9.45	10.05	10.25	10.45	11.05
Mayorstone, Mayorstone Upper, stop 606871	17.47	18.07	18.27	18.47	19.05	19.35	20.05	20.35	21.05	21.35	22.05	22.35	23.05	23.35	7.25	7.45	8.07	8.27	8.47	9.05	9.25	9.45	10.05	10.25	10.45	11.05
Ballynanty, Old Cratloe Road, stop 637081 (NW-bound)	17.48	18.08	18.28	18.48	19.06	19.36	20.06	20.36	21.06	21.36	22.06	22.36	23.06	23.36	7.26	7.46	8.08	8.28	8.48	9.06	9.26	9.46	10.06	10.26	10.46	11.06
Moylish, Old Cratloe Road, stop 606881	17.49	18.09	18.29	18.49	19.06	19.36	20.06	20.36	21.06	21.36	22.06	22.36	23.06	23.36	7.27	7.47	8.09	8.29	8.49	9.07	9.27	9.47	10.07	10.27	10.47	11.07
Ballygrennan, Ashwood Avenue, stop 606891	17.50	18.10	18.30	18.50	19.07	19.37	20.07	20.37	21.07	21.37	22.07	22.37	23.07	23.37	7.28	7.48	8.10	8.30	8.50	9.08	9.28	9.48	10.08	10.28	10.48	11.08
Caherdavin, Whitethorn Drive Upr, stop 606901	17.52	18.12	18.32	18.52	19.09	19.39	20.09	20.39	21.09	21.39	22.08	22.38	23.08	23.38	7.30	7.50	8.13	8.33	8.53	9.10	9.30	9.50	10.10	10.30	10.50	11.10
Caherdavin, Blackthorn Drive, stop 606911	17.53	18.13	18.33	18.53	19.10	19.40	20.10	20.40	21.10	21.40	22.09	22.39	23.09	23.39	7.31	7.51	8.14	8.34	8.54	9.11	9.31	9.51	10.11	10.31	10.51	11.11
Caherdavin, Derravaragh Road, stop 606921	17.55	18.15	18.35	18.55	19.12	19.42	20.12	20.42	21.12	21.42	22.10	22.40	23.10	23.40	7.33	7.53	8.16	8.36	8.56	9.13	9.33	9.53	10.13	10.33	10.53	11.13
Clareview (Limerick), Brookville Avenue, stop 606931	17.56	18.16	18.36	18.56	19.13	19.43	20.13	20.43	21.13	21.43	22.11	22.41	23.11	23.41	7.34	7.54	8.17	8.37	8.57	9.14	9.34	9.54	10.14	10.34	10.54	11.14
Mayorstone, Limerick IT, stop 606941	17.58	18.18	18.38	18.58	19.14	19.44	20.14	20.44	21.14	21.44	22.12	22.42	23.12	23.42	7.36	7.56	8.19	8.39	8.59	9.15	9.35	9.55	10.15	10.35	10.55	11.15
Ballynanty, Cratloe Road, stop 606951 (E-bound)	17.59	18.19	18.39	18.59	19.15	19.45	20.15	20.45	21.15	21.45	22.12	22.42	23.12	23.42	7.37	7.57	8.21	8.41	9.01	9.17	9.37	9.57	10.17	10.37	10.57	11.17
Thomondgate, Sexton Street N, stop 607441	18.01	18.21	18.41	19.01	19.16	19.46	20.16	20.46	21.16	21.46	22.13	22.43	23.13	23.43	7.38	7.58	8.23	8.43	9.03	9.18	9.38	9.58	10.18	10.38	10.58	11.18
Old Thomondgate, High Road, stop 607411	18.02	18.22	18.42	19.02	19.16	19.46	20.16	20.46	21.16	21.46	22.14	22.44	23.14	23.44	7.39	7.59	8.24	8.44	9.04	9.19	9.39	9.59	10.19	10.39	10.59	11.19
Castle, Treaty Stone, stop 606981 (S-bound)	18.03	18.23	18.43	19.03	19.17	19.47	20.17	20.47	21.17	21.47	22.15	22.45	23.15	23.45	7.40	8.00	8.26	8.46	9.06	9.20	9.40	10.00	10.20	10.40	11.00	11.20
Limerick City, Sarsfield Bridge, stop 606991	18.05	18.25	18.45	19.05	19.19	19.49	20.19	20.49	21.19	21.49	22.16	22.46	23.16	23.46	7.41	8.01	8.28	8.48	9.08	9.22	9.42	10.02	10.22	10.42	11.02	11.22
Limerick City, Sarsfield St, stop 610031 (1)	18.09	18.29	18.49	19.09	19.21	19.51	20.21	20.51	21.21	21.51	22.18	22.48	23.18	23.48	7.44	8.04	8.33	8.53	9.13	9.26	9.46	10.06	10.26	10.46	11.06	11.26


Limerick City Bus services
TFI TRANSPORT FOR IRELAND
Leap
Save 30% Vs cash single tickets when you use a Leap Card
KEY
Bus Éireann bus route
Principal stop
Bus route terminus
Red Zone
Rail
Bus coach
Hospital
Munster Rugby Club
Limerick Football Club
University
Geographic map inset only
Bus stop and stop number
Bus route serving stop
Bus route terminus
Ballycannon
Ardnacrusha
Parteen
Westbury Annavilla Grove
Westbury St Nicholas Church
Shannon Banks Athlunkard Avenue
Shannon Banks Riverside Drive
Sarsfield Gardens
Meelick Road
Craeval Park
Pineview Delmege Gardens
Moyross Main Road
Old Cratloe Road
Ballynanty Road
Limerick Institute of Technology
Caherdavin Woodbine Avenue
Kieely Road
Thomond Park
Brookville Avenue
Shelbourne Road
Hennessy Avenue
O'Callaghan Avenue
Thomondgate
Sexton Street North
University Maternity Hospital (UMHL)
Clancy Strand
St Mary's Park
St Ita's Street
Island Road
Corbally Road
Athlunkard Street
Liddy Street (305 only)
Arthurs Quay
River Shannon
Pennywell
Dublin Road
Upper William Street (outbound)
Mulgrave Street
Ballysimon Road
South Claughaun Road
Well Field
Markets Field Terrace
St Patrick's Road
Lynwood Park
Childers Road Opp Clauhaun GAA
Childers Road Retail Park
Parkway Retail Park and Shopping Centre
University of Limerick (UL)
Plassy Park Road
National Technology Park
Kilmurry Roundabout
Dublin Road
Annacotty
Lisnagry
Castleconnell
To Birr
Castleroy Shopping Centre
Schoolhouse Road
Bus & Rail Station
Peoples Park
Jackman Park
O'Connell Avenue
Punches Cross
Edward Street
Hyde Road
Hyde Avenue
Roxboro Road
Janesboro Marian Avenue
Colbert Avenue
Childers Road Our Lady of Lourdes
O'Donoghue Avenue
Childers Road
Swallow Drive
Maigue Way
Synge Drive
Olympic Arms
Southill Health Centre
O'Malley Park Sunny Heights
Kilmallock Road
Georgian Village (extension coming soon)
Father Russell Road
Ballinacurra
Crescent Shopping Centre
University Hospital Limerick (UHL)
St Nessan's Road
Raheen St Nessan's Church
St Nessan's School
Ballycummin Road Church Rd
Avonmore Road
Mulcair Road
Raheen Industrial Estate FAS Office
Raheen Industrial Estate Analog Devices
Ballycummin Village
BUS SERVICES
301 Raheen UHL - Westbury (Bus Éireann)
Frequency: Weekday 30 min / Saturday 30 min
Sunday 30 min
302 Caherdavin - City Centre (Bus Éireann)
Frequency: Weekday 20 min
Saturday 20 min / Sunday 30 min
303 Pineview - Kilmallock Road (Bus Éireann)
Frequency: Weekday 15 min
Saturday 15 min / Sunday 30 min
304 Ballycummin - UL (Bus Éireann)
Frequency: Weekday 15 min
Saturday 15 min / Sunday 30 min
304A Raheen UHL - UL (Bus Éireann)
Frequency: Weekday 30 min
Saturday 30 min / Sunday 30 min
305 St Mary's Park - Lynwood Park (Bus Éireann)
Frequency: Weekday 60 min / Saturday 60 min
Sunday 60 min - St Mary's Park to City Centre only
306 Ballynanty - Edward Street (Bus Éireann)
Frequency: Weekday 60 min / Saturday 60 min
Sunday 60 min - Ballynanty to City Centre only
City Centre - Ardnacrusha (Bus Éireann)
Route varies - see timetable for details
323 City Centre - Castleconnell (Bus Éireann)
Route varies - see timetable for details
Schematic map.
Not to scale. November 2021

Iarnród Éireann
Irish Rail

- Main Terminal Station
- Regional Station
- InterCity Rail Network
- TranslinkNetwork
- Passenger transfersonly

Appendix E – Key Junction Capacity output files

Junction 1 – Priority 'T' Junction between Old Cratloe Rd and Realigned Meelick Rd

```
RUN TITLE
*********
Old Cratloe Road


.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****************************************

INPUT DATA
----------

                  MAJOR ROAD (ARM C) ---------------------- MAJOR ROAD (ARM A)
                                                I
                                                I
                                                I
                                                I
                                                I
                                                I
                                          MINOR ROAD (ARM B)

ARM A IS Old Cratloe Road WEST
ARM B IS Meelick Road - Development Access
ARM C IS Old Cratloe Road EAST
```

AM Peak hour 2025 without development traffic

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
B-AC	0.40	8.16	0.049		0.0	0.1	0.8	
C-AB	0.24	9.71	0.025		0.0	0.0	0.5	
C-A	1.66							
A-B	0.20							
A-C	4.08							

AM Peak hour 2025 with Phase 3 development traffic

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
B-AC	1.17	8.61	0.136		0.1	0.2	2.3	
C-AB	0.49	9.70	0.050		0.1	0.1	1.0	
C-A	1.62							
A-B	0.26							
A-C	4.08							

PM Peak hour 2025 without development traffic

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
B-AC	0.40	8.55	0.047		0.0	0.0	0.7	
C-AB	0.28	11.12	0.025		0.0	0.0	0.5	
C-A	3.07							
A-B	0.20							
A-C	2.03							

PM Peak hour 2025 with Phase 3 development traffic

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
B-AC	0.80	8.85	0.091		0.1	0.1	1.5	
C-AB	1.06	11.09	0.095		0.1	0.2	2.3	
C-A	2.86							
A-B	0.33							
A-C	2.03							

AM Peak hour 2038 without development traffic

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
B-AC	0.44	7.98	0.055		0.0	0.1	0.8	
C-AB	0.27	9.74	0.028		0.0	0.0	0.5	
C-A	1.88							
A-B	0.22							
A-C	4.66							

AM Peak hour 2038 with Phase 3 development traffic

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
B-AC	1.24	8.40	0.148		0.1	0.2	2.5	
C-AB	0.55	9.73	0.056		0.1	0.1	1.2	
C-A	1.83							
A-B	0.27							
A-C	4.66							

PM Peak hour 2038 without development traffic

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
B-AC	0.44	8.42	0.052		0.0	0.1	0.8	
C-AB	0.31	11.34	0.028		0.0	0.0	0.5	
C-A	3.49							
A-B	0.22							
A-C	2.30							

PM Peak hour 2038 with Phase 3 development traffic

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
B-AC	0.86	8.67	0.099		0.1	0.1	1.6	
C-AB	1.15	11.34	0.101		0.1	0.2	2.5	
C-A	3.22							
A-B	0.37							
A-C	2.30							

AM Peak hour 2038 with Phase 3 and draft masterplan development traffic

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
B-AC	1.85	8.22	0.225		0.2	0.3	4.2	
C-AB	0.85	9.73	0.087		0.1	0.1	1.9	
C-A	2.04							
A-B	0.33							
A-C	5.52							

PM Peak hour 2038 with Phase 3 and draft masterplan development traffic

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
B-AC	2.12	8.61	0.246		0.2	0.3	4.7	
C-AB	2.99	11.71	0.255		0.3	0.5	7.3	
C-A	3.24							
A-B	0.64							
A-C	2.76							

Junction 2 – Roundabout Junction between Realigned Meelick Rd and Development Access

RUN TITLE
****
Cratloe Meelick Roundabout CKDR

INPUT DATA
****
ARM A - Meelick Road South
ARM B - Phase 1 Access
ARM C - Meelick Road North
ARM D - Future Access

GEOMETRIC DATA

ARM	V (M)	E (M)	L (M)	R (M)	D (M)	PHI (DEG)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	3.25	7.00	5.00	20.00	31.00	40.0	0.559	21.220
ARM B	3.00	5.00	4.00	15.00	31.00	40.0	0.515	18.064
ARM C	3.25	5.50	5.00	75.00	31.00	25.0	0.598	22.190
ARM D	3.00	4.00	1.00	9.00	31.00	43.0	0.456	14.637

AM Peak hour 2025 with Phase 3 development traffic

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
ARM A	0.66	19.29	0.034		0.0	0.0	0.5	
ARM B	0.79	16.22	0.048		0.0	0.1	0.8	
ARM C	0.38	19.70	0.019		0.0	0.0	0.3	
ARM D	0.00	14.05	0.000		0.0	0.0	0.0	

AM Peak hour 2038 with Phase 3 development traffic

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
ARM A	0.71	19.29	0.037		0.0	0.0	0.6	
ARM B	0.79	16.20	0.049		0.0	0.1	0.8	
ARM C	0.44	19.70	0.022		0.0	0.0	0.3	
ARM D	0.00	14.02	0.000		0.0	0.0	0.0	

AM Peak hour 2038 with draft Masterplan development traffic

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
ARM A	1.06	19.29	0.055		0.0	0.1	0.9	
ARM B	1.10	16.07	0.068		0.1	0.1	1.1	
ARM C	0.44	19.37	0.023		0.0	0.0	0.3	
ARM D	0.69	12.60	0.055		0.0	0.1	0.9	

PM Peak hour 2025 with Phase 3 development traffic

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
ARM A	1.10	19.29	0.057		0.0	0.1	0.9	
ARM B	0.42	16.22	0.026		0.0	0.0	0.4	
ARM C	0.38	19.92	0.019		0.0	0.0	0.3	
ARM D	0.00	14.23	0.000		0.0	0.0	0.0	

PM Peak hour 2038 with Phase 3 development traffic

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
ARM A	1.15	19.29	0.060		0.1	0.1	0.9	
ARM B	0.42	16.19	0.026		0.0	0.0	0.4	
ARM C	0.44	19.92	0.022		0.0	0.0	0.3	
ARM D	0.00	14.20	0.000		0.0	0.0	0.0	

PM Peak hour 2038 with draft Masterplan development traffic

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
ARM A	2.05	19.29	0.106		0.1	0.1	1.8	
ARM B	0.57	15.87	0.036		0.0	0.0	0.5	
ARM C	0.44	19.46	0.023		0.0	0.0	0.3	
ARM D	0.37	12.85	0.028		0.0	0.0	0.4	

Junction 3 – Priority 'T' Junction between Old Cratloe Rd and Phase 4 Access

```
RUN TITLE
*********
Old Cratloe Road Junction 3


.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
**************** ********************

INPUT DATA
----------

                  MAJOR ROAD (ARM C) ---------------------- MAJOR ROAD (ARM A)
                                                I
                                                I
                                                I
                                                I
                                                I
                                                I
                                              MINOR ROAD (ARM B)

ARM A IS Old Cratloe Road WEST
ARM B IS Phase 4 and 3 Development Access
ARM C IS Old Cratloe Road EAST
```

AM Peak hour 2038 with draft Masterplan development traffic

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
B-AC	0.80	8.62	0.093		0.1	0.1	1.5	
C-AB	0.29	10.09	0.029		0.0	0.0	0.6	
C-A	2.43							
A-B	0.05							
A-C	4.99							

PM Peak hour 2038 with draft Masterplan development traffic

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH .MIN/ TIME SEGMENT)
08.15-08.30								
B-AC	0.40	9.13	0.044		0.0	0.0	0.7	
C-AB	0.85	11.50	0.074		0.1	0.1	2.0	
C-A	3.71							
A-B	0.15							
A-C	2.85							

Junction 6 – Proposed Development Access on realigned Meelick Road

```
RUN TITLE
*********
Cratloe J6 NC Dev Access


.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****************************************

INPUT DATA
----------

                    MAJOR ROAD (ARM C) ---------------------- MAJOR ROAD (ARM A)
                                                I
                                                I
                                                I
                                                I
                                                I
                                                I
                                              MINOR ROAD (ARM B)

ARM A IS Meelick Rd SOUTH
ARM B IS Development Access
ARM C IS Meelick Rd NORTH
```

AM Peak hour 2038 with draft Masterplan development traffic

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
B-AC	0.18	7.21	0.025		0.0	0.0	0.4	
C-AB	0.00	9.28	0.000		0.0	0.0	0.0	
C-A	2.23							
A-B	0.15							
A-C	1.06							

PM Peak hour 2038 with draft Masterplan development traffic

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
B-AC	0.20	7.10	0.028		0.0	0.0	0.4	
C-AB	0.00	9.03	0.000		0.0	0.0	0.0	
C-A	1.37							
A-B	0.24							
A-C	2.05							

.

CHAPTER THIRTEEN MATERIAL ASSETS – BUILT SERVICES

13.1 INTRODUCTION

This Chapter presents the likely and significant impacts associated with the material asset (built services) environments associated with the proposed development, namely urban settlements, ownership and access, traffic infrastructure, potable water supply, wastewater discharge, electricity supply, gas supply, telecoms and municipal waste.

The following aspects of the proposed development will affect material assets within the vicinity of the development site:

- Urban Settlements (Also refer to Chapter 6.0)
- Ownership & Access (Also refer to Chapter 12.0)
- Transport Infrastructure (Refer to Chapter 12.0)
- Municipal Waste (Refer to Chapter 14.0)
- Potable Water Supply Infrastructure;
- Waste Water Infrastructure;
- Surface Water Disposal (Also refer to Chapter 9.0 Hydrology – Surface Water & Flooding)
- Electricity;
- Telecommunications.

13.2 ASSESSMENT METHODOLOGY

The potential impact of this development in relation to material assets built services was assessed in accordance with EPA Guidelines (2002) and Advice Notes (2003).

Economic assets of natural origin, which include biodiversity, land & soil and water, are addressed elsewhere in this EIAR, in particular Chapter 7.0, 8.0 and 9.0 respectively. Cultural Assets of a Physical Type and Cultural Heritage of a Social Type are addressed in Chapter 15.0 of this EIAR.

A desktop study was carried out on existing material assets associated with the site of the proposed development. Projections of resource use were undertaken for both the construction and operational phases of the proposed development, and the impacts assessed. Mitigation measures are proposed where appropriate.

13.3 RECEIVING ENVIRONMENT

13.3.1 Urban Settlements

A growing and developing suburban area to the north west of Limerick City, the character of the area is dominated by mid – low density residential development with clusters of commercial development interspersed at nodal locations. The settlement pattern is varied, dominated by individual 'housing estates' with little permeability and connectivity.

The site is located approximately 3.5km from Limerick City centre and is located and surrounded by an existing and future road network (currently under construction) with easy access to Limerick city centre, the national road network and the TUS (Technological University Shannon) campus formerly LIT.

The general area comprising the masterplan site has a rural feel, notwithstanding significant residential and educational developments immediately to the east. The majority of site is surrounded by green fields apart from one off dwellings on the Pass Road to the east, the Willow Grove development on the southern side of the Cratloe Road, and the County Club Bar adjoining the site to the east. at the Old Cratloe Road - Pass Road junction. Further to the east, developments such as Thomond Village, Clonile and Shannonvale lie next to the site and mark the edge of the built up area of the Limerick suburbs.

The masterplan lands benefits from three different land use zonings, with the primary land use comprising 'New Residential Use'. The objective of this landuse is *"to provide for new residential development in tandem with the provision of social and physical infrastructure".* The other landuse zonings are positioned fronting onto the Old Cratloe Road, including 'Open Space Use' (surrounding an existing archaeological monument) and a 'Local Centre Use'. Whilst the objective of the open space use is *"to protect, provide for and improve open space, active and passive recreational amenities",* the objective of local centre use is "*to protect and provide local centre facilities to serve the needs of new/existing neighbourhoods and residential areas*".

The application site is located wholly on lands zoned for 'New Residential Use'. The purpose of this zoning is intended primarily for new high quality housing development. The quality and mix of residential areas and the servicing of lands is intended as a priority to support balanced communities. It states that new housing and infill developments should include a mix of housing types, sizes and tenures, to cater for all members of society and design should be complimentary to the surroundings and should not adversely impact on the amenity of adjoining residents.

13.3.2 Ownership & Access

The applicant owns the Masterplan site, the subject site (Phase 3) and the adjoining land to the south of proposed Phase 5. The applicant acquired the land in April 2021.

The Masterplan lands will be accessed at three separate locations including, the recently constructed roundabout on the realigned Pass /Meelick Road and two separate standard DMURS compliant property 'T' junctions located on the southern and northern side of the upgraded section of the Old Cratloe Road which has been designed as part of the Coonagh – Knockalisheen Distributor Road Scheme which is expected to be completed by 2025 / 26. The upgraded Old Cratloe Road immediately south of the site and the realigned Meelick Road to the east, will comprise a 6.6m carriageway with footpaths and cycle lanes on both sides.

The subject lands comprising Phase 3 will be accessed via the constructed roundabout on the realigned Pass / Meelick Road. It is estimated that 70% of construction traffic (staff/misc. via cars, etc) will arrive/depart via the proposed roundabout junction to the east and 30% of construction traffic (deliveries via HGV) will arrive/depart via a new proposed junction to the west on the Old Cratloe Road.

13.3.3 Foul Water

Based on existing record drawings, surveys and site visits it was established that the following foul water drainage infrastructure is located within the vicinity of the site:

- A new foul water network is proposed to be installed as part of the Old Cratloe Road upgrade works south of the development.

It is proposed to provide a single gravity foul sewer system to serve the development proposal. The foul sewerage from the overall development is planned to discharge to the foul network to be installed as part of the Old Cratloe Road upgrade works south of the development. The foul sewer network was designed in accordance with Irish Water Code of Practice July 2020 and to IS EN 12056/ IS EN 752, using hydraulic modelling software WinDes, which uses the Colebrook White equation.

A pre-connection enquiry was lodged with Irish Water (Connection Reference No. CDS22003876) for the development outlining the proposed flows and loads which would be generated by the development. This application was undertaken to determine if there is adequate capacity in the existing public foul sewer network to cater for this development. The proposal was accepted as feasible in principle by Irish Water.

The estimated daily foul loading for the proposed development has been calculated as 39.7 m^3/day

13.3.4 Surface Water

Based on existing record drawings, surveys and site visits it was established that the following surface water drainage infrastructure is located within the vicinity of the site:

- An existing watercourse to the west of the Masterplan Site and the proposed development that drains the site that discharges north to an OPW channel.
- A new stormwater network is proposed to be installed as part of the Old Cratloe Road upgrade works south of the development.

A new surface water sewer network shall be provided for the proposed development which will be entirely separate from the foul water sewer network. The design of the storm water network and SUDS allow for 30% climate change and 10% urban creep of the housing area for the developed site. The storm pipe network has been designed in accordance with IS EN 12056, IS EN752 and the Greater Dublin Strategic Drainage Study.

The storm drainage from the roads and footpaths will be collected in gullies and discharged via a traditional storm pipe network. Given the topography of the site and available green spaces, two networks with separate infiltration and storage areas are proposed in Phase 3. Storage Area 1 infiltrates and attenuates the surface water flow from the entrance road to the development and is oversized to cater for stormwater flows from the wider Masterplan Site. The flow from Area 1 discharges through a pipe network to the Storage Area 2 at the southern boundary at a rate of 1.0l/s. Storage Area 3 infiltrates and attenuates the surface water flow from the majority of the remainder of the development and also discharges via a pipe network to Storage Area 2 but at a rate of 7.12 l/s. Storage Area 2 infiltrates and attenuates the surface water flow from a limited number of housing units and also caters for the restricted from Areas 1 and 3. Area 2 discharges to the existing watercourse at the western boundary at a rate of 9.12l/s.

Surface water run-off from roof areas and hardstanding areas are designed to be collected by a gravity pipe network. Surface water will be collected and discharged via a mixture of traditional and Sustainable Urban Drainage Systems (SuDS). Prior to discharging to the existing open drains, surface water will flow through attenuation tank, class 1 bypass separators and flow control devices. Forward flow from the development will be restricted to either 2l/s/ha for the net drained area of the site or the greenfield runoff rate of the net drained area of the site which is in accordance with Limerick Development Plan 2022-2028.

The proposed development has been assessed in relation to Sustainable Urban Drainage Systems (SuDS) and a variety of SuDS measures have been adopted to decrease the impact of the development on the receiving environment by reducing surface water run-off and also providing amenity and biodiversity in many cases. The proposed SuDS measures include:

- Rainwater butts
- Permeable paving
- Bypass separator
- Infiltration and storage areas

13.3.5 Water Supply

Based on existing record drawings, surveys and site visits it was established that the following watermain infrastructure is located within the vicinity of the site:

- An existing 200mm diameter watermain is proposed to be upgraded as part of the Old Cratloe Road upgrade works south of the development.

It is proposed to provide a 150mm diameter watermain for the proposed development.

The estimated daily demand for the proposed development has been calculated as 39.7 m^3/day

To reduce the water demand on Local Authority water supplies and to reduce the foul discharge from the development, water conservation measures will be incorporated in the sanitary facilities throughout the development, e.g., dual flush toilets, monobloc low volume push taps and waterless urinals.

13.3.6 Natural Gas Supply

Gas Networks Ireland has a capped 125mm PE 80 4 Bar gas supply in the area which will serve the proposed site.

13.3.7 Electrical Supply

ESB have low voltage (LV) lines traversing the site and medium voltage (MV) lines in close proximity which will be used to facilitate several cabinet Kiosk type MV/LV substations. There will be a separate Kiosk substation per 150 units. The LV network will be distributed via underground ducting and ESB Mini pillars.

13.3.8 Information and Communications Technology (ICT)

There are currently telecom services in the area, operated by SIRO or Virgin Media and these will be extended into the site to provide telecoms & broadband services to each home user. A full duct

infrastructure to facilitate EIR FTTH (Fibre To The Home) 10Gigabit Broadband will be provided so each unit will have access to the national broadband plan. This infrastructure will ensure the provider can provide current and next generation broadband to each home.

13.4 DESCRIPTION OF EFFECTS

Seven different 'Delivery Phases' of development, as detailed in Chapter 1.0, are proposed to effectively deliver the overall indicative masterplan. This application relates to Phase 3 (98 no. units) as detailed in Chapter 1.0 and 2.0 of this EIAR. Whilst seven different phases are proposed at this point in time, the reality is that some of the phases could be fast-tracked such that two phases advance in construction together. This, however, is very much dependent on market conditions and the specific requirements of contractors. In any case, should different phases cumulatively progress together, the overall impacts are unlikely to be different.

In order to ensure an effective and conclusive environmental assessment consistent with best practise, the assessment of potential effects on the environment also examines the collective cumulative effects of the overall development if all seven development phases, as detailed in Chapter 1.0, were implemented. The examination of the 'all phase' development scenario is consistent with best practice in order to examine a 'worst-case' scenario of the project effects.

It is not envisaged that the proposed development will result in any significant long-term effects on the environment due to the built services associated with the proposed development. There is however likely to be some minor impact experienced, by way of temporary disruption, during the construction phase of this development.

13.4.1 'Do – Nothing' Scenario

The site is appropriately zoned for development and accordingly has been 'planned' for development within the Limerick Development Plan 2022 -2028, to facilitate residential and ancillary commercial use within a local centre. A *'do nothing'* impact would result in the subject lands remaining undeveloped and underutilised having regard to its zoning provisions and its location within an urban area.

Continuing with the land in an undeveloped state would be an underutilisation of the site from a sustainable planning and development perspective, particularly considering the serviced nature of the lands, the new road network under construction and its location in proximity to Limerick city centre. The status of the environmental receptors described throughout this EIAR document would likely remain unchanged. The potential for any likely and significant adverse environmental impacts arising from both the construction and operational phases of the proposed development would not arise.

In terms of the likely evolution without implementation of the project as regards natural changes from the baseline scenario, it is considered there would be no change from the baseline scenario in relation to material assets. Further, there would be no additional demand or loading on material assets, built services.

However, similarly the potential for any likely and significant positive environmental impacts arising from both the construction and operational phases of the proposed development would also not arise. The site is largely zoned for residential use purposes within the Development Plan with objectives to

promote, the development and creation of sustainable communities on appropriately zoned lands, accessible by public and sustainable modes of transport.

13.4.2 Construction Phase

The new development will require new connections to all service providers as well as to public water supply and waste water networks, which may result in temporary disruption of existing services in the vicinity of the development in order to facilitate the connection.

The surface water runoff to the existing open drains will need to be managed on site during construction. Refer to Chapter 9.0 Hydrology – Surface Water & Flooding for details of proposals on site.

It is anticipated that between 50 – 60 work personnel will be employed on site during peak construction periods. The existence of the construction site and site personnel will result in an increase in the demand for power, water and also result in an increase in foul water discharges.

13.4.3 Operational Phase

The existence of the proposed development will result in an increase in the demand on all required services. Having regard to the potential of the overall masterplan site to accommodate 448 no. units, including the subject site, the potential is for the masterplan to result in a projected population of approximately 1,210 people. This will result in a sizeable new community within the area. This is considered significant, permanent and positive, particularly in the context of current housing demand, but it will place significant additional strains on existing services in the area.

The important consideration is that the potential population generated from the proposed development has already been planned for in the context of the Limerick Development Plan 2022 - 2028 and the projected household growth in Limerick city of an additional 11,054 residential units between 2022 – 2028. The new Limerick Development Plan was adopted in 2022 with adequate planned provision made for supporting services and facilities over the plan period.

The existence of the proposed development will increase the impermeable areas of the site and reduce the permeable greenfield nature of the site. However, as outlined in section 13.3.4, surface water SUDS measures, including restricting surf water outflows to predeveloped peak flows, will be implemented in order to reduce the impact on the environment.

13.4.4 Cumulative Impacts

The proposed development will increase the impact on the existing built assets and water services in the area. Having regard to other permitted developments in the area, which are either under construction or where construction has not yet commenced, there is potential for greater impact arising from the demand of additional population working in the area.

The potential cumulative impacts of the proposed development on built services have been considered in conjunction with the ongoing changes in the surrounding area. A planning history review was undertaken to identify any recently approved or pending developments which may have a cumulative impact with the proposed development. There are no significant developments permitted in the area,

which have not yet been constructed, save for the Masterplan site itself which have been detailed in Chapter 1.0 Table 1.1.

The proposed development does need to be considered in conjunction with the works currently underway, delivering the proposed Coonagh to Knockalisheen Distributor Project. This infrastructure project secured consent from An Bord Pleanála in 2021 and was subject to the preparation of an EIAR and Environmental Impact Assessment. This new infrastructure will provide greater connectivity to existing services and facilities in the area.

The individual and combined effects as discussed above when considered holistically are likely to have a negative, not significant and temporary impact on, built services as long as mitigation measures outlined are put in place.

13.5 DESCRIPTION AND SIGNIFICANCE OF 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 of the proposed development. The existence of the proposed development is likely to result in an increase in the demand on all required services.

13.5.1 Construction Phase

Foul Water

The proposal will involve providing a connection to the existing foul water infrastructure. The connection will be made before the development is occupied. The impact is likely to be neutral, imperceptible and temporary.

The site compound will require a temporary foul connection. The impact is likely to be neutral, imperceptible and temporary.

Surface Water

The proposal will involve providing new surface water outfall to an existing open drain. The proposed surface water drainage network will not interact with the existing surface water drainage network outside the site boundary. The impact is likely to be neutral.

The site compound will require appropriate temporary soakways. Refer to Chapter 9.0 Hydrology – Surface Water & Flooding for further details of surface water management during construction. The impact is likely to be neutral, imperceptible and temporary.

Potable Water Supply

The proposal will involve providing a new connection to the existing potable water supply network. There is potential for some short-term impacts by way of disruption in water supply due to these works to facilitate connecting the development to the existing public water supply network. This could lead to disruption in water supply to nearby residences and buildings for short periods. The potential impact on the local public water supply network is likely to be negative, not significant and temporary.

The site compound will require a temporary watermain connection. The impact is likely to be negative, not significant and temporary.

Natural Gas Supply

The proposal will involve providing a new connection to the existing Gas Networks Ireland network. There is potential for some short-term impacts by way of disruption in Gas supply due to these works to facilitate connecting the development to the existing public Gas supply network. This could lead to disruption in Gas supply to nearby residences and buildings for short periods. The potential impact on the local Gas supply network is likely to be negative, not significant and temporary.

Electrical Supply

The proposal will involve rerouting of existing LV Lines through the site. There is potential for some short-term impacts by way of disruption in Electricity supply due to these works to facilitate connecting the development to the existing ESB Networks supply network. This could lead to disruption in electricity supply to nearby residences and buildings for short periods. The potential impact on the local ESB network is likely to be negative, not significant and temporary.

Information and Communications Technology

The proposal will involve routing ductwork from the existing network to each building. This will have negligible or no impact to nearby residences and buildings.

13.5.2 Operational Phase

Foul Water

The impact of the proposed development on the public foul sewerage system is likely to be an increase in the quantity of wastewater discharging to the Bunlicky Waste Water Treatment Plant, Dock Road, Limerick.

A pre-connection enquiry was lodged with Irish Water for the development outlining the proposed flows and loads which would be generated by the development. This application was undertaken to determine if there is adequate capacity in the existing public foul sewer network to cater for this development. The proposal was accepted as feasible in principle by Irish Water.

The potential impact of the proposed development on the public foul sewerage system is likely to be negative, slight and long term.

Surface Water

Surface water run-off discharge rates from the development site may be increased because of an increase in impermeable surfaces, shorter flow paths through pipes and reduced roughness co-efficient. However, implementation of SuDS measures and surface water infiltration and attenuation would aim to restrict runoff rates to 2l/s/ha or the pre-development greenfield runoff for the site which is in accordance with Limerick Development Plan 2022-2028. Therefore, the impact is likely to be neutral.

Water Supply

The impact of the proposed development on the public water supply is likely to be an increase in demand on the existing supply.

A pre-connection enquiry was lodged with Irish Water for the development outlining the proposed flows and loads which would be associated with the housing development. This application was undertaken to determine if there is adequate capacity in the existing public watermain network to cater for this development. The proposal was accepted as feasible in principle by Irish Water reference number CDS22003876.

The potential impact of the proposed development on the public water supply network is likely to be negative, slight and long term.

Natural Gas Supply

The impact of the proposed development on the GNI supply is likely to involve an increase in demand as there will additional buildings to be serviced from the network, however in saying this, each of the proposed building types will be constructed to achieve an enhanced Thermal performance and will be Fully Part L compliant, resulting in reduced energy demands for same.

Electrical Supply

The impact of the proposed development on the ESB Networks supply is likely to be an increase in demand on the existing supply. There will be a separate MV/LV substation per 150 units. The potential impact of the proposed development on the electricity supply is likely to be negative, slight and long term.

Information and Communications Technology (ICT)

The impact of the proposed development on the Telecommunications network is likely to be an increase in demand on the existing capacity. There is capacity within the network to supply expected demand. There are numinous ICT utility companies within the area, and the proposed development will provide ducting to accommodate same, ensuring a competitive market is available to all proposed buildings.

13.6 REMEDIAL & MITIGATION MEASURES

13.6.1 Construction Phase

The following mitigation measures are recommended for the construction phase of the development:

BUILT SERV CONST 1 - Provision of Utilities shall be carried out and monitored in accordance with the recommendations and requirements of the relevant statutory bodies (ESB, Gas Networks Ireland, Irish Water, EIR, Limerick City and County Council etc.) and to ensure compliance with health & safety legislation.

BUILT SERV CONST 2 - Prior to the commencement of excavations in public areas, all utilities and public services are to be identified and checked; to ensure that adequate protection measures are implemented to minimise the risk of service disruption.

BUILT SERV CONST 3 - All proposed connections to existing services shall be constructed at off-peak times to minimise disruption to neighbouring properties.

BUILT SERV CONST 4 - Water metering shall be included to record consumption to ensure there are no leaks as a result of the project.

Refer to Chapter 9.0 Hydrology – Surface Water & Flooding for details of surface water mitigation measures proposed on site. With the implementation of these mitigation measures, the severity of the impact of the proposed development on the built services will be minimised, with tie-ins to existing services and installation of new services completed in a satisfactory manner for the relevant service providers.

13.6.2 Operational Phase

The design and construction of the required services infrastructure in accordance with the relevant guidelines and codes of practice is likely to mitigate any potential impacts during the operational phase of the development. Any additional mitigation measures required for the proposed built services, if required, during the operational phase will be as advised by the relevant service provider. The operational phase of private assets should be monitored by the management company for the relevant buildings.

13.7 RESIDUAL IMPACTS

13.7.1 Construction Phase

Residual impacts on the built services during the construction phase is considered to be temporary and occasional in nature and not significant, where service is unavoidably disrupted to facilitate the construction phase.

13.7.2 Operational Phase

Residual impacts on built services during the operational phase given the new infrastructure, is considered to be long term with a positive impact to all end users once the appropriate mitigation and monitoring measures are implemented.

13.8 MONITORING

13.8.1 Construction Phase

- Water consumption will be monitored for the development during construction through the use of water meters. This will ensure that any potential leaks as a result of construction are addressed promptly.
- All water mains to be pressure tested and cleaned in accordance with the Irish Water code of practice prior to connecting to the existing potable water supply network. This will ensure that the watermain is leak free, clean and ready to receive water before the development is operational.

- All foul sewers to be pressure tested and cleaned in accordance with the Irish Water code of practice prior to connecting to the existing foul sewer network. This will ensure that the foul sewer is leak free, clean and ready to receive foul effluent before the development is operational.

13.8.2 Operational Phase

- All new infrastructure, which is to serve the proposed development, is to be routinely inspected with any maintenance carried out, as required.
- Any monitoring of the built services required during the operational phase of the proposed project will be as advised by the relevant services providers.

13.9 REFERENCES

Irish Water Code of Practice for Wastewater Infrastructure

Irish Water Code of Practice for Water Infrastructure

Limerick Development Plan 2022-2028

https://www.esbnetworks.ie/staying-safe/contractor-safety/digging-and-excavation-work

https://www.gasnetworks.ie/corporate/freedom-of-information/make-a-request/

https://cbyd.emaps.eircom.ie/Eircom-CBYD/

Guidelines on the information to be contained in Environmental Impact Assessment Reports, EPA, (2022)

CHAPTER FOURTEEN MATERIAL ASSETS – WASTE MANAGEMENT

14.1 INTRODUCTION

This chapter evaluates the impacts, if any, which the proposed development may have on Material Assets as defined in Directive 2014/52/EU, the EPA Guidelines on the Information to be contained in EIAR (2022) and EPA Draft Advice Notes for EIS 2015.

This chapter has also been prepared to address the issues associated with material assets during the construction and operational phases of the proposed development as described in Chapter 2.0 (Project Description & Policy). It has been prepared in accordance with European Commissions Guidelines, Guidance on the preparation of the Environmental Impact Assessment Report (2017), the EPA Guidelines on the Information to be contained in EIAR (2022) and the EU Commission Notice on changes and extensions to projects (2021).

14.1.1 Legislation and Guidance

These documents will ensure the management of wastes arising at the proposed development site in accordance with legislative requirements and best practice standards.

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)

EU and Irish National waste policy also aims to contribute to the Circular Economy by extracting high-quality resources from waste as much as possible. CE is a sustainable alternative to the traditional linear (take-make-dispose) economic model, reducing waste to a minimum by reusing, repairing, refurbishing and recycling existing materials and products. (Figure 14.2).

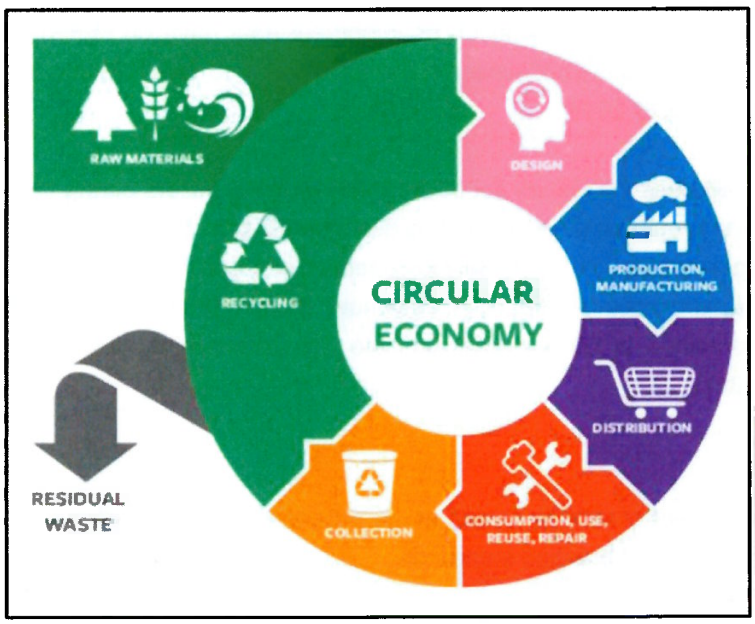


Figure 14.2 Circular Economy (Source: Repak)

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 (WAPCE), 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.

One of the first actions to be taken from the WAPCE was the development of the Whole of Government Circular Economy Strategy 2022-2023 'Living More, Using Less' (2021) to set a course for Ireland to transition across all sectors and at all levels of Government toward circularity and was issued in December 2021.

The Circular Economy and Miscellaneous Provisions Act (2022) was signed into law in July 2022. The Act underpins Ireland's shift from a "take-make-waste" linear model to a more sustainable pattern of production and consumption, that retains the value of resources in our economy for as long as possible and that will to significantly reduce our greenhouse gas emissions. The Act defines Circular Economy for the first time in Irish law, incentivises the use of recycled and reusable alternatives to wasteful, single-use disposable packaging, introduces a mandatory segregation and incentivised charging regime for commercial waste, streamlines the national processes for End-of-Waste and By-Products decisions, tackling the delays which can be encountered by industry, and supporting the availability of recycled secondary raw materials in the Irish market, and tackles illegal fly-tipping and littering.

The strategy for the management of waste from the construction phase is in line with the requirements of the EPA's 'Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021). The guidance documents, Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects and Construction and Demolition Waste Management: A Handbook for Contractors and Site Managers (FÁS & Construction Industry Federation, 2002), were 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 Waste Management Plan 2015 – 2021, BS 5906:2005 Waste Management in Buildings – Code of Practice, the LCCC City and County of Limerick (Segregation, Storage and Presentation of Household and Commercial Waste) Bye-Laws (2019) the EPA National Waste Database Reports 1998 – 2019 and the EPA National Waste Statistics Web Resource.

14.2 ASSESSMENT 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.

This chapter is based on the proposed development, as described in Chapter 2 (Project Description & Policy) and considers the following aspects:

- Legislative context;
- Construction phase (including demolition, site preparation and excavation); and
- Operational 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 and are included in Section 14.3.1 of this chapter. 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.

A detailed review of the existing ground conditions on a regional, local and site-specific scale are presented in Chapter 8.0 Land & Soils, Geology & Hydrogeology.

14.3 RECEIVING ENVIRONMENT

In terms of waste management, the receiving environment is in the jurisdiction of Limerick City and County Council (LCCC) 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 Waste Management Plan 2015-2021 and the Waste Action Plan for a circular economy – Waste Management Policy in Ireland. Currently the southern region and other regional waste management plans are under review and the Regional Waste Management Planning Offices expect to publish the final plan in 2022.

The Southern Region Waste Management Plan 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 55% of managed municipal waste by 2025; 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 Plan sets out the strategic targets for waste management in the region and 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. Ireland achieved 84 per cent material recovery of such waste in 2019, and therefore surpassed the 2020 target and is currently surpassing the 2025 target. The National Waste Statistics update published by the EPA in November 2021 identifies that Ireland's current 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)" was met for 2020 at 51% however they are currently not in line with the 2025 target (55%).

The LCCC Limerick Development Plan 2022-2028 also sets out policies and objectives for the LCCC area which reflect those set out in the regional waste management plan.

In terms of physical waste infrastructure, LCCC 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, in the surrounding counties and over Ireland and Northern Ireland, for management of waste from the construction industry as well as municipal sources. These include soil recovery facilities, inert

C&D waste facilities, hazardous waste treatment facilities, municipal waste landfills, material recovery facilities, waste transfer stations and two waste-to-energy facilities.

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 and serviceability.

14.3.1 Site Area

The characteristics of the proposed development that are relevant in terms of waste management are primarily construction related including site clearance and topsoil stripping; and earthworks. A cut and fill exercise was undertaken for the entire masterplan site and Phase 3 based on existing site levels minus 300mm for topsoil versus the finished site levels and minus 300mm for an average imported fill build-up to roads, footpaths and slabs. Assumed bedrock level based on desktop studies and available SI information. Not included in the figures is excavation relating to the provision of attenuation areas, services and the excavation of foundations are these are considered to be typical of any construction project.

Masterplan Area

For the overall Masterplan Site, it has been determined that circa 33,500m^3 of subsoil material will need to be excavated to facilitate the proposed development and that imported fill of 25,500m^3 is required. The quantum of fill required will be reduced by reusing bedrock as Class 1 material any other existing site won materials as appropriate. Top soil stripping will result in circa 42,000m^3 of material although it is envisaged that circa 15,000m^3 of this will be reused.

Subject Site

For the Phase 3 subject site it has been determined that circa 14,000m^3 of subsoil material will need to be excavated to facilitate the proposed development and that imported fill of 1,200m^3 is required. The quantum of fill required will also be reduced by reusing bedrock as Class 1 material any other existing site won materials as appropriate. Top soil stripping will result in circa 10,500m^3 of material although it is envisaged that circa 4,000m^3 of this will be reused.

14.4 DESCRIPTION OF EFFECTS

Impacts on waste management will occur during both the construction and operational phases of the proposed development.

14.4.1 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 contractually required to ensure that oversupply of materials is kept to a minimum and opportunities for reuse of suitable materials is maximised.

There will be waste materials generated from the excavation of soil, stones, gravel and clay to facilitate site clearance, site levelling, construction of new building foundations and installation of services. It is currently envisaged that circa 25% of the subsoil cut could be reused on site thereby reducing waste generated from the development and reducing the quantum of imported fill required. Within the masterplan site it is envisaged that circa 8,375 m^3 of subsoil material will be reused and within the Phase 3 application site it is envisaged that circa 3,500 m^3 of subsoil material will be reused, thereby reducing the movement of waste from the site.

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 in accordance with Regulation 15 (By-products) (Previously Article 27 and referred to as Article 27 in this report) of European Union (Waste Directive) Regulations 2011-2020).

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).

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.

Table 14.1 provides an estimate of the main waste types likely to be generated during the construction phase of the proposed Phase 3 development.

Waste Type	Tonnes	Reuse		Recycle/Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	74	10	7	80	60	10	7
Timber	63	40	25	55	35	5	3
Plasterboard	23	30	7	60	14	10	2
Metals	18	5	1	90	16	5	1
Concrete	14	30	4	65	9	5	1
Other	34	20	7	60	20	20	7
Total	226						

Table 14.1 Estimated off-site reuse, recycle and disposal rates for construction waste

14.4.2 Operational Phase

A strategy for segregation (at source), storage and collection of all wastes generated within the buildings (houses & commercial units) during the operational phase including dry mixed recyclables (DMR), organic waste and mixed non-recyclable waste (MNR) is proposed as well as a strategy for management of waste glass, batteries, WEEE, chemicals, textiles, waste cooking oil and furniture.

The proposed development will give rise to additional waste generation arising from an increase in population in the area.

The handling of waste within the site will be through a bin management system, with the location of bins serving apartments provided within dedicated waste storage areas (WSA's) identified on the drawings and bins serving houses located within their curtilage. As required, the residents and tenants will need to bring these segregated wastes from their units to their allocated Waste Storage Areas (WSAs).

It is an objective to ensure that the proposed development contributes to the targets outlined in the Southern Region Waste Management Plan 2015 – 2021, Waste Action Plan for a Circular Economy – Waste Management Policy in Ireland and the LCCC "City and County of Limerick (Segregation, Storage and Presentation of Household and Commercial Waste) Bye-Laws (2019)".

14.4.3 Cumulative Impacts

As has been identified in the receiving environment section cumulative development primarily relate to the Masterplan Site along with existing development already built and in operation. These have all contributed to characterisation of the baseline environment. As such any further environmental impacts that the proposed development may have in addition to these already constructed and operational, have been assessed in the preceding sections of this chapter.

Construction Phase

There are existing residential and commercial developments close by, along with the planning permission granted for Phase 1 although currently on third party appeal to An Bord Pleanála. In a worst-case scenario, multiple developments in the area could be developed concurrently or overlap in the construction phase, including construction of the Coonagh – Kinockalisheen Road.

Due to the high number of waste contractors in the LCC region, as provided from the National Waste Collection Permit Office and the EPA, 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 of 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 cumulative effect will be short-term, imperceptible and neutral.

Operational Phase

There are existing residential and commercial developments close by, along with the potential development arising from the Masterplan Site, as discussed above. 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 mitigate any potential cumulative impacts associated with waste generation and waste management. As such the cumulative effect will be long-term, imperceptible and neutral.

14.5 LIKELIHOOD OF SIGNIFICANT EFFECTS

This section details the potential waste effects associated with the proposed development.

14.5.1 Do-Nothing Impact

If the proposed development were not to go ahead (i.e. in the Do-Nothing scenario) there would be no excavation or construction or operational waste generated at this site. There would, therefore, be a neutral effect on the environment in terms of waste.

The site is zoned for development, and it is likely that in the absence of this subject proposal that a development of a similar nature would be progressed on the site that accords with national and regional policies and therefore the likely effects would be similar to this proposal.

14.5.2 Construction Phase

The proposed development will generate a range of non-hazardous and hazardous waste materials during site 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 in the construction site compound or adjacent to it, 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 and pollution issues is the presence of vermin, impacts on local

biodiversity and the potential for downstream impacts on proximate watercourses and designated sites in areas affected. In the absence of mitigation, the effect on the local and regional environment is likely to be 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 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 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 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. 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 short-term, significant and negative.

There is a quantity of 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 8.0 Land & Soils, Geology & Hydrogeology. The project engineers have estimated the quantity of excavated material that will be generated to be circa 10,500m^3 of topsoil, circa 25,000m^3 of clay/gravel and circa 4,400m^3 of bedrock. It is currently envisaged that all the excavated bedrock, circa 4,000m^3 of topsoil and circa 6,000m^3 of the clay/gravel will retained and reused on site. The remainder of the topsoil (circa 6,500m^3), and clay/gravel excavated (circa 19,000m^3), will be reused on site where possible but it is currently anticipated that it will require removal offsite for reuse, recovery and/or disposal. If material is removed off-site, it could be reused as a by-product (and not as a waste). If this is done, it will be done in accordance with Regulation 15 (By-products) (Previously Article 27 and referred to as Article 27 in this report) of European Union (Waste Directive) Regulations 2011-2020, which requires that certain conditions are met and that by-product notifications are made to the EPA via their online notification form. Excavated material will not be removed from site until approval from the EPA has been received. The potential to reuse material as a by-product will be confirmed during the course of the excavation works, with the objective of eliminating any unnecessary disposal of material. It is envisaged that c 20,000m^3 of selected imported fill as hardocre will be required for under building ground floor slabs, roads, paths and services excavations as well as for use within the attenuation storage and infiltration areas.

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 short-term, significant and negative.

14.5.3 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 that is not suitable for recycling is can be 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, long-term, significant and negative.

Waste contractors will be required to service the proposed development on a scheduled 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 long-term, significant and negative.

14.6 REMEDIAL AND MITIGATION MEASURES

The concept of the 'waste hierarchy' is employed when considering all mitigation measures. The waste hierarchy states that the preferred option for waste management is prevention and minimisation of waste, followed by preparing for reuse and recycling / recovery, energy recovery (i.e. incineration) and, least favoured of all, disposal.

14.6.1 Construction Phase

The following mitigation measures will be implemented during the construction phase of the proposed development:

14.6.1.1 Mitigation by Avoidance / Design

WM CONST 1 - Cut and fill on the site has been minimised through the design process. . The quantum of fill required on site shall be reduced by reusing bedrock as Class 1 material any other existing site won materials as appropriate.

166.1.2 Mitigation by Prevention

WM CONST 2 - Prior to commencement, the appointed Contractor(s) will be required to prepare a Resource Waste Management Plan (RWMP) in agreement with LCCC, 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 RWMP throughout the duration of the proposed construction phase.

WM CONST 3 - A Resource 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.

WM CONST 4 - Building materials will be chosen with an aim 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.

14.6.1.3 Mitigation by Reduction

WM CONST 5 - A quantity of soil, stone, gravel and clay will need to be excavated to facilitate the proposed development. 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.

WM CONST 6 - 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; (alternatively, the waste will be sorted for recycling, recovery or disposal).

WM CONST 7 - 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).

WM CONST 8 - All waste leaving site will be reused, recycled or recovered, where possible, to avoid material designated for disposal and will be transported by suitably permitted contractors and taken to suitably registered, permitted or licenced facilities.

WM CONST 9 - All waste leaving the site will be recorded and copies of relevant documentation maintained. 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.

14.6.2 Operational Phase

The following mitigation measures will be implemented during the operational phase of the proposed development:

14.6.2.1 Mitigation by Avoidance / Design

No mitigation proposed

14.6.2.2 Mitigation by Prevention

No mitigation proposed

14.6.2.3 Mitigation by Reduction

RES & WM OPER 1: 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.
RES & WM OPER 2: All waste collected from the development will be reused, recycled or recovered where possible, with the exception of those waste streams where appropriate facilities are currently not available.

RES & WM OPER 3: All waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities.

14.7 RESIDUAL IMPACTS

The implementation of the mitigation measures outlined in Section 14.6 will ensure that targeted 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 EU, national and regional legislative waste requirements with regard to waste are met and that associated targets for the management of waste are achieved.

14.7.1 Construction Phase

A carefully planned approach to waste management as set out in Section 14.6.1 of this chapter, and adherence to the RWMP the construction phase will ensure that the predicted effect on the environment will be short-term, imperceptible and neutral.

14.7.2 Operational Phase

When 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.

14.8 MONITORING

The management of waste during the construction phase will be monitored by the Contactor's appointed Resource Manager to ensure compliance with the above-listed mitigation measures, and relevant waste management legislation and local authority requirements, including maintenance of waste documentation.

14.8.1 Construction Phase

The objective of setting targets for waste management is only achieved if the actual waste generation volumes are calculated and compared. This is particularly important during the excavation and construction works, where there is a potential for waste management objectives to become secondary to other objectives, i.e. progress and meeting construction schedule targets. A Resource Manager shall be appointed, who will have responsibility for monitoring the actual waste volumes being generated and ensuring that contractors and sub-contractors are segregating waste as required. Where targets are not being met, the Resource Manager will identify the reasons for this and work to resolve any issues. Recording of waste generation during the construction phase of the proposed development will enable better management of waste contractor requirements and identify trends. The data should be maintained to advise on future developments.

14.9 REFERENCES

Waste Management Act 1996 (No. 10 of 1996) as amended.

Environmental Protection Agency Act 1992 as amended.

Litter Pollution Act 1997 (S.I. No. 12 of 1997) as amended.

Southern Waste Region, Southern Region Waste Management Plan 2015 – 2021 (2015).

Department of Environment and Local Government (DoELG) Waste Management – Changing Our Ways, A Policy Statement (1998).

European Commission, Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (2017).

Environmental Protection Agency (EPA) 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' (2022).

Forum for the Construction Industry – Recycling of Construction and Demolition Waste.

Department of Communications, Climate Action and Environment (DCCAE), Waste Action Plan for the Circular Economy - Ireland's National Waste Policy 2020-2025 (Sept 2020).

DCCAE, Whole of Government Circular Economy Strategy 2022-2023 'Living More, Using Less' (2021).

Circular Economy and Miscellaneous Provisions Act 2022.

Environmental Protection Agency (EPA) 'Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021).

Department of Environment, Heritage and Local Government, Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects (2006).

FÁS and the Construction Industry Federation (CIF), Construction and Demolition Waste Management – a handbook for Contractors and site Managers (2002).

Limerick City and County Council (LCCC), *Limerick Development Plan 2022-2028 (2022).*

Limerick City and County Council (LCCC) City and County of Limerick (Segregation, Storage and Presentation of Household and Commercial Waste) Bye-Laws (2019).

BS 5906:2005 Waste Management in Buildings – Code of Practice.

Planning and Development Act 2000 (No. 30 of 2000) as amended.

Environmental Protection Agency (EPA), Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous (2015).

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.

EPA, European Waste Catalogue and Hazardous Waste List (2002).

EPA, National Waste Database Reports 1998 – 2016.

US EPA, Characterisation of Building Uses (1998).

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).

CHAPTER FIFTEEN CULTURAL HERITAGE

15.1 INTRODUCTION

This chapter of the Environmental Impact Assessment Report (EIAR) covers the cultural heritage assessment of the proposed development as described in Chapter 2.0. UNESCO define the term 'Cultural Heritage' as encompassing several aspects of tangible assets (*immovable*: archaeological sites and monuments, architectural heritage buildings; *movable*: artefacts; and *underwater:* shipwrecks and ruins) and intangible assets (e.g. folklore, oral tradition and language).

The chapter is accompanied by the following Appendices:

- 15.1 Photographic Record
- 15.2 Cultural Heritage Inventories
- 15.3 Figures
- 15.4 Previous Excavations.

The proposed development site (Phase 3) is part of a phased development proposal for a large greenfield area or Masterplan Site (MS). This MS is divided into seven different phases of delivery as detailed in Table 1.1 in Chapter 1.0 Introduction. The overall MS layout which illustrates the indicative layout of the subject site and adjoining lands in the ownership of the applicant is displayed on Figure 1.0 in Chapter 1.0 and full details of the proposed development phases are given in Chapter 2.0.

The study area takes a holistic approach and examines the wider MS area whilst focusing on any areas of significance within the proposed development site.

15.1.1 Relevant Guidance

The guidelines relevant to the assessment include the *Architectural Heritage Protection: Guidelines for Planning Authorities* (Department of Arts, Heritage and Gaeltacht 2011) and the *Framework and Principles for the Protection of Archaeological Heritage* (Department of Arts, Heritage, Gaeltacht and the Islands 1999). The assessment was also informed by the Environmental Protection Agency (EPA 2022) *Guidelines for Information to be Contained in EIAR* and the International Council on Monuments and Sites (ICOMOS 2011) G*uidance on Heritage Impact Assessments for Cultural World Heritage Properties*.

15.2 ASSESSMENT METHODOLOGY

The assessment was based on a programme of desktop research combined with a field survey of the MS in addition to advance archaeological testing of the Phase 1, Phase 2, Phase 3, Phase 4 and Neighborhood Centre areas and geophysical surveys of the Phase 2 and Phase 5 (northern portion) areas. These programmes of site investigations were carried out in order to identify any previously unrecorded features of archaeological, architectural, or cultural heritage significance likely to be impacted by the proposed development. The recorded and potential cultural heritage resource within a

study area encompassing the lands comprising the MS and surrounding lands extending for 1km in all directions, was assessed in order to compile a comprehensive cultural heritage context for the area.

The following presents an overview of the assessment studies and the methodology applied to determine the nature and significance of potential impacts on the cultural heritage resource.

15.2.1 Desktop Study

Documentary research on the recorded and potential cultural heritage resource within the study area was carried out in order to identify any recorded archaeological, architectural and other cultural heritage sites and features. This information has provided an insight into the diachronic development of the study area over time and also assisted in an evaluation of the potential presence of hitherto unrecorded cultural heritage sites or features within the proposed development site.

The principal sources reviewed for the assessment of the recorded archaeological resource were the Sites and Monuments Record (SMR) and the Record of Monuments and Places (RMP) maintained by the Department of Housing, Local Government and Heritage. The current Record of Protected Structures (RPS) and structures listed in the National Inventory of Architectural Heritage (NIAH) were reviewed in order to assess the designated architectural heritage resource within the study area.

Other sources consulted as part of the assessment included the following:

- *Development Plans*: The current *Limerick Development Plan 2022-2028* (adopted 17 June 2022) and *Clare County Development plan 2017-2023* (as varied) were consulted as part of this assessment. These publications identify buildings listed in the Record of Protected Structures and outline the respective Council's policies for the protection of the archaeological and architectural heritage resources.
- *Limerick Heritage Plan*: The Limerick Heritage Plan 2017-2030 Is a non-statutory document that 'is intended to outline broad aims and objectives for the future development, protection, promotion, and maintenance of a very unique and valuable resource, that is, Limerick's heritage'.
- *Database of Irish Excavation Reports*: The Database of Irish Excavation Reports contains summary accounts of all archaeological excavations carried out in Ireland (North and South) from 1970 to present. Current data was accessed via www.excavations.ie in February 2023 and relevant entries are presented in **Appendix 15.4**.
- *Literary Sources*: Various published literary sources were consulted in order to assess the archaeological, historical, architectural heritage and folklore record of the study area and these are listed in Section 15.9 of this chapter.
- *Archaeological Survey of Ireland*: While there is no published archaeological inventory for counties Limerick or Clare, the National Monuments Service's online Historical Environment Viewer (www.archaeology,ie) presents inventory descriptions compiled by the Archaeological Survey of Ireland for a range of known archaeological sites within the county. All available inventory entries for sites located within the study area are included within **Appendix 15.2**.
- *Historic Maps*: The detail on historic maps sources can indicate the presence of past settlement patterns, including features of archaeological and architectural heritage significance that no longer have any surface expression. Available cartographic sources dating from the seventeenth-century onward were reviewed and relevant extracts are presented in **Appendix 15.3.**

- *Aerial/Satellite Imagery*: A review of available online aerial and satellite images of the study area was undertaken in order to ascertain if any traces of unrecorded archaeological sites were visible and to review the extent of development within the study area during recent decades and relevant extracts are presented in **Appendix 15.3**.
- *LiDAR Imagery*: The proposed development is within the coverage area of Office of Public Works (OPW) LiDAR data which has been published online by the Geological Survey Ireland. This form of imagery has the potential to reveal the presence of archaeological sites with low surface expressions and was reviewed as part of the assessment.
- *Irish Heritage Council: Heritage Map Viewer*: This online mapping source (www.heritagemaps.ie) is a spatial data viewer which collates various cultural heritage datasets sourced from, among others, the National Monuments Service, National Museum of Ireland, local authorities, the Royal Academy of Ireland and the Office of Public Works.
- *National Museum of Ireland Topographical Files*: These files comprise a written and digital database which records known information in relation to the discovery locations of Irish archaeological artefacts, including those held in the museum's collection. The files are archived in the museum's premises in Kildare Street, Dublin and were inspected as part of the desktop study. The archive contains one recorded artefact from the townland of Clonconane, a stone line sinker (NMI Reg. No. 1967:69) recovered during drainage work of marshy ground. The exact find location is unknown.
- *Irish National Folklore Collection*: Transcribed material from the National Folklore Collection archive has been digitised and published online at www.duchas.ie.
- *Placenames Database of Ireland*: This online database (www.logainm.ie) provides a comprehensive management system for data, archival records and place names research conducted by the State.
- *UNESCO designated World Heritage Sites and Tentative List*: There are two World Heritage Sites in Ireland (Brú na Bóinne and Sceilg Mhichíl) and a number of other significant sites are included in a Tentative List that has been put forward by Ireland for consideration in 2022[1]. None of these are located within the environs of the proposed development.
- *Evolutionary Study Report on the Maritime, Military and Industrial Heritage of Limerick City and County:* This is an EU funded study of the maritime, military and industrial heritage of the shoreline of the Shannon Estuary from the border with Co. Kerry upriver to the border with Co. Tipperary undertaken by Limerick City & County Council. A review of the locations of heritage features recorded by this project was carried out as part of the assessment.

15.2.2 Site Inspection

A field survey of the MS was carried out to assess potential impacts on recorded heritage assets within or immediately adjacent to the proposed development site and to assess the site in terms of modern land use, vegetation cover and the potential for the presence of previously unrecorded archaeological sites or structures of architectural heritage interest. The field survey results are described within Section 15.3.3.6 of this chapter and extracts from the photographic record are presented in **Appendix 15.1**.

[1]https://www.worldheritageireland.ie/news/news-single-view/article/ministers-announce-new-world-heritage-tentative-list-for-ireland/?cHash=376a52892e7c00bd7825a9d98fe89068

15.2.3 Archaeological Investigations

A programme of archaeological testing was undertaken across the proposed Phase 3 development site in January 2023. The archaeological testing (under licence 23E0018) comprised the excavation and evaluation of 32 no. of machine excavated test trenches with a combined length of 1418m. A small number of potential archaeological features were identified at the northern portion of the site (see Section 15.3.3.7 below for details).

15.2.4 Methodology for Assessment of Impacts

The methodology used for the assessment of potential impacts has been informed by the Environmental Protection Agency (EPA 2022) *Guidelines for Information to be Contained in EIAR*, in accordance EIA requirements of codified EU Directive 2011/92/EU as amended by EU Directive 2014/52/EU, per current Planning Legislation, concerning EIA assessment: Planning and Development Act, 2000 (as amended) (Part X) and in Part 10 of the Planning and Development Regulations, 2001 (as amended).

The *Magnitude of Effect* is based on the degree of change, incorporating any mitigation measures, and is based on a consideration of the character, duration, probability and consequences (Table 15.1). The magnitude can be negative or positive and is ranked without regard to the value of the asset according to the following scale: High; Medium; Low and Negligible. The descriptions of magnitudes presented in Table 15.1 is based on guidance published in *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties* (ICOMOS 2011, 16-7).

Magnitude	Description
High	Most or all key archaeological or architectural materials affected such that the resource is totally altered Comprehensive changes to setting Changes to most or all key historic landscape elements, parcels or components; extreme visual effects; fundamental changes to use or access; resulting in total change to historic landscape character Major changes to area that affect Intangible Cultural Heritage activities or associations or visual links and cultural appreciation
Medium	Changes to many key archaeological or historic building materials/elements such that the resource is clearly/significantly modified. Considerable changes to setting that affect the character of the archaeological asset. Changes to the setting of a historic building, such that it is significantly modified. Change to many key historic landscape elements, parcels or components, visual change to many key aspects of the historic landscape, considerable changes to use or access, resulting in moderate changes to historic landscape character. Considerable changes to area that affect the Intangible Cultural Heritage activities or associations or visual links and cultural appreciation.
Low	Changes to key archaeological materials/historic building elements, such that the resource is slightly altered/slightly different. Slight changes to setting of an archaeological monument. Change to setting of a historic building, such that it is noticeably changed. Change to few key historic landscape elements, parcels or components; slight visual changes to few key aspects of historic landscape; slight changes to use or access; resulting in limited change to historic landscape character Changes to area that affect the Intangible Cultural Heritage activities or associations or visual links and cultural appreciation.
Negligible	Very minor changes to key archaeological materials or setting. Slight changes to historic building elements or setting that hardly affect it.

Magnitude	Description
	Very minor changes to key historic landscape elements, parcels or components; virtually unchanged visual effects; very slight changes to use or access; Very minor changes to area that affect the Intangible Cultural Heritage activities or associations or visual links and cultural appreciation.

Table 15.1 Magnitudes of Effect on Cultural Heritage Assets

Value Assessment

While various legal designations exist for elements of the Irish cultural heritage resource (see Section 15.3.2), there are currently no formal criteria for grading the values of individual elements of this resource. The National Inventory of Architectural Heritage (NIAH) does apply a ranking system (Local, Regional and National) to structures included in that inventory and, while these rankings do not confer a graduated level of protection they have been utilised as a value indicator for NIAH-listed structures for the purpose of assessment.

Given the absence of formal criteria the evaluations used in this assessment have been informed by guidelines presented in the *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties* (ICOMOS 2011). The evaluation of the values of cultural heritage assets is, therefore, not intended as definitive but rather as an indicator which contributes to a wider judgment based the individual circumstances of each asset. The application of values included a consideration of their legal designations (e.g., National Monuments), condition / preservation; historical significance, group value, rarity, visibility in the landscape, fragility/vulnerability and amenity value on a case-by-case basis. It is noted that archaeological monuments, whether extant or levelled, have the potential to possess sub-surface attributes, such as artefacts, human burials or other archaeological remains, that may possess values that cannot be discerned without recourse to archaeological excavation but are unlikely to be affected in the absence of direct negative impacts. The value of all known or potential assets that may be impacted by development are ranked according to the following scale as defined by ICOMOS: Very High; High; Medium; Low, Negligible, Unknown (Table 15.2). The values assigned to relevant cultural heritage assets within the area were determined following the completion of the desktop research combined with subsequent site inspections and are outlined in Section 15.3.3.8.

Value	Description
Very High	World Heritage Sites (including Tentative List properties) Sites, buildings or landscapes of acknowledged international importance Intangible associations with individuals or innovations of global significance
High	Nationally designated sites, buildings and landscapes of significant quality, rarity, preservation and importance Undesignated assets of the quality and importance to be designated Assets that can contribute significantly to acknowledged national research objectives Archaeological Landscapes with significant group value Intangible associations with individuals or innovations of national significance
Medium	Designated or undesignated assets that can contribute significantly to regional research objectives, including buildings that can be shown to have exceptional qualities in their fabric or historical associations

Value	Description
	Conservation Areas and historic townscapes containing buildings that contribute significantly to its historic character Intangible associations with individuals or innovations of regional significance
Low	Assets compromised by poor preservation and/or poor survival of contextual associations Assets of limited value, but with potential to contribute to local research objectives Historic Townscape or built-up areas of limited historic integrity in their buildings and settings Intangible associations with individuals or innovations of local significance
Negligible	Assets with very little or no surviving archaeological interest Landscapes little or no significant historical interest Buildings or urban areas of no architectural or historical note; buildings of an intrusive character
Unknown Potential	Assets whose importance has not been ascertained Buildings with some hidden (i.e., inaccessible) potential for historic significance

Table 15.2 Indicative Factors for Assessing the Value of Cultural Heritage Assets

The *Significance of Effects* is assessed based on a consideration of the Magnitude of the Impact (graded from High to Negligible, based on a consideration of character, duration, probability and consequences) combined with the Value (graded from High to Negligible, based on a consideration of significance/sensitivity) of the cultural heritage asset. The Significance of Effects can be described as Profound, Very Significant, Significant, Moderate, Slight, Not Significant or Imperceptible (Table 15.3 and Table 15.4).

Significance	Description
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 but 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 most of a sensitive aspect of the environment
Profound	An effect which obliterates sensitive characteristics

Table 15.3 Significance of Effects (per EPA EIAR Guidelines 2022)

Magnitude of Impact					
	High	Not Significant/ Slight	Moderate/ Significant	Significant/ Very Significant	Very Significant/ Profound
	Medium	Not Significant	Slight	Moderate/ Significant	Significant/ Very significant
	Low	Not Significant/ Imperceptible	Slight/ Not Significant	Slight	Moderate
	Negligible	Imperceptible	Not Significant/ Imperceptible	Not Significant/ Slight	Slight
		Negligible	**Low**	**Medium**	**High**
			Value/Sensitivity of the Asset		

Table 15.4 Significance of Effects Matrix (after EPA EIAR Guidelines 2022)

15.3 RECEIVING ENVIRONMENT

15.3.1 Site Area Description

The proposed MS comprises a parcel of agricultural land in the townland of Clonconane, County Limerick, close to the County Clare border and approximately 3.5km from Limerick City centre. The site, which is located to the north and south of the Old Cratloe Road is bounded to the north by a mature hedge and to the east by modern housing. A map regression study suggests that its location comprised undeveloped agricultural land from the mid-seventeenth century until the mid-twentieth century. Aerial photographic images show that much of the site was part of a golf course in 1995 but had reverted back to agricultural usage by around 2000 and has mostly been used for grazing since then. Parallel east to west orientated linear trends evident in LiDAR images and on some aerial imagery suggest that the site have been used for tillage in the past and some of the landscaped features associated with the former golf course also retain surface expression. The site comprises portions of fields of moderate to good quality, undulating pastural land. There is one recorded archaeological monument located within the Masterplan area. This is a children's burial ground LI005-007----, which comprises an overgrown area of approximate 20m diameter defined by a sub-circular earthen bank. This archaeological monument is outside the Phase 3 site, however, a portion of eth Phase 3 redline boundary encroaches within the *Zone of Notification* (ZoN) surrounding the monument.

15.3.2 Legal and Planning Context

This section presents a concise summary of the legal and planning policy frameworks relevant to this assessment in order to provide a context for the statutory protection assigned to the cultural heritage resource. The management and protection of cultural heritage in Ireland is achieved through a framework of national laws and policies which are in accordance with the provisions of the Valetta Treaty (1995) (formally the European Convention on the Protection of the Archaeological Heritage, 1992) ratified by Ireland in 1997; the Granada Convention (1985) (formally the European Convention on the Protection of Architectural Heritage), ratified by Ireland in 1997; and the UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage, 2003, ratified by Ireland in 2015. The locations of World Heritage Sites (Ireland) and the Tentative List of World Heritage Sites submitted by the Irish State to UNESCO were reviewed and none are located within the environs of the study area.

The National Monuments Service (NMS), which is currently based in the Department of Housing, Local Government and Heritage, is responsible for the protection and promotion of Ireland's archaeological heritage.
The national legal statutes and guidelines relevant to this assessment include:

- National Monuments Acts 1930 (as amended)
- Heritage Act 1995 (as amended)
- National Cultural Institutions Act 1997
- The Architectural Heritage (National Inventory) and Historic Monuments (Misc) Provisions Act 1999
- Planning and Development Act 2000 (as amended)
- Department of Arts, Heritage and Gaeltacht 2011 *Architectural Heritage Protection: Guidelines for Planning Authorities.*
- Department of Arts, Heritage, Gaeltacht and the Islands 1999 *Framework and Principles for the Protection of Archaeological Heritage*

Relevant Legislation and Planning Policies

The National Monuments Act 1930 and its Amendments, the Heritage Act 1995 and relevant provisions of the National Cultural Institutions Act 1997 are the primary means of ensuring the satisfactory protection of archaeological remains. There are a number of mechanisms under the National Monuments Acts that are applied to secure the protection of archaeological monuments. These include the designation of National Monument status for sites of national significance, the Register of Historic Monuments (RHM), the Record of Monuments and Places (RMP), the Sites and Monuments Record (SMR), and the placing of Preservation Orders and Temporary Preservation Orders on endangered sites.

Section 2 of the National Monuments Act, 1930 defines a National Monument as 'a monument or the remains of a monument, the preservation of which is a matter of national importance'. The State may acquire or assume guardianship of examples through agreement with landowners or under compulsory orders. Archaeological sites within the ownership of local authorities are also deemed to be National Monuments. The prior written consent of the Minister is required for any works at, or in proximity to, a National Monument or at sites which are subject to a Preservation Order. There are no National Monuments in State Care or sites assigned Preservation Orders located within the study area.
The RMP was established under Section 12(1) of the National Monuments (Amendment) Act, 1994 and was based on the earlier SMR and RHM. It comprises lists and maps of all known archaeological monuments and places for each county in the State and all listed archaeological sites receive statutory protection under the National Monuments Act 1994. No works can be undertaken at their locations or within their surrounding Zones of Notification without providing two months advance notice to the NMS. There is one recorded archaeological site located within the boundary of the proposed development site (Masterplan area) which comprises a children's burial ground (LI005-007---) which will be preserved *in situ*. Additionally, some portions of the proposed development site encroach into the archaeological *Zone of Notification* (ZoN) which surrounds a settlement cluster (LI005-039---) (**Table 15.5** and **Figure 15.3**). Neither of these sites are National Monuments in State Care or are included in the current list of monuments that have been assigned Preservation Orders.

The *Limerick Development Plan 2022-2028* (adopted 17 June 2022) includes the following relevant objectives in relation to the protection of the archaeological resource within the county:

Objective EH O36 Preservation of the Archaeological Heritage *It is an objective of the Council to seek the preservation of all known sites and features of historical and archaeological interest. This is to include all the sites listed in the Record of Monuments and Places as established under Section 12 of the National Monuments (Amendment) Act 1994. The preferred option is preservation in situ, or at a minimum preservation by record.*

Objective EH O37 Preservation of unrecorded/newly discovered Archaeological Heritage *It is an objective of the Council to protect and preserve the preservation in situ (or at a minimum by record) of all sites and features of historical and archaeological interest, discovered subsequent to the publication of the Record of Monuments and Places.*

Objective EH O39 Protection of the setting of Archaeological Monuments *It is an objective of the Council to ensure that no development shall have a negative impact on the character or setting of an archaeological monument.*

Objective EH O40 Proper procedures during the planning process *It is an objective of the Council to:*

a) Ensure early engagement at preplanning stage is undertaken with the Local Authority Archaeologist to promote the 'preservation in situ' of archaeological remains and settings in development.

b) Adopt a policy of archaeological monitoring of developments where the scale and nature of such developments may, in the opinion of the Planning Authority, have a negative impact on previously unknown archaeological features/ artefacts.

c) Require the preparation of an Archaeological Heritage Assessment in cases where it is deemed that Archaeological Heritage would be affected by a proposed development (due to their location, size or nature). The report shall be prepared by a suitably qualified archaeologist on the archaeological implications, if any, of the proposed development either prior to a decision on a planning application or prior to commencement of development on site.

Objective EH O43 Industrial Archaeology It is an objective of the Council *to: a) Seek the preservation of buildings and infrastructure associated with former industrial sites;*

b) Ensure detailed recording of these remains; promote knowledge and interpretation of these sites among the general public;

c) Support the work of the Interreg Atlantic Coast Area project, (MMIAH) The recovery and valorisation of Maritime Military and Industrial Heritage.

Objective EH O45 Raise public awareness and encourage active participation *It is an objective of the Council to generally raise public awareness of the archaeological and historic heritage and to assist and encourage active participation by the public, following consultation with National Monuments Service, in the conservation, consolidation and presentation of landmark sites, where this is appropriate and subject to available resources.*

Objective EH O46 Heritage Plan 2017-2030 *It is an objective of the Council to support the archaeological objectives in the Heritage Plan.*

Objective EH O48 Assessment and Recognition of Archaeological Landscapes *It is an objective of the Council to designate archaeological landscapes as part of an ongoing appraisal for Historic Landscape Characterisation of Limerick.*

Objective EH O49 Climate Change Sectoral Adaptation Plan for Built and Archaeological Heritage *It is an objective of the Council to support the Climate Change Sectoral Adaptation Plan for Built and Archaeological Heritage 2019, as published by the Department of Culture, Heritage and the Gaeltacht and any subsequent guidance or plans for dealing with climate change and archaeological heritage. The Council shall seek to:*

- *Promote awareness and the appropriate adaptation of Ireland's built and archaeological heritage to deal with the effects of climate change;*
- *Identify the built and archaeological heritage in Local Authority ownership and areas at risk from climate change including, but not necessarily restricted to, the Record of Monuments and Places, Protected Structures and Architectural Conservation Areas designated in the Development Plan;*
- *Undertake climate change vulnerability assessments for the historic structures and sites in its area, subject to resources and funding;*
- *Develop disaster risk reduction policies addressing direct and indirect risks to the built and archaeological heritage in its area;*
- *Develop resilience and adaptation strategies for the built and archaeological heritage in its area;*
- *Develop the skills capacity within the Local Authority to address adaptation/ mitigation/emergency management issues affecting historic structures and sites in order to avoid inadvertent loss or damage in the course of climate change adaptation or mitigation works.*

The protection of architectural heritage is provided for through a range of legal instruments that include the Heritage Act 1995, the Architectural Heritage (National Inventory) and National Monuments (Misc. Provisions) Act 1999, and the Planning and Development Act 2000. The Planning and Development Act 2000 requires all Planning Authorities to keep a 'Record of Protected Structures' (RPS) of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest. As of the 1st January 2000, all structures listed for protection in current Development Plans, have become 'protected structures'. Since the introduction of this legislation, planning permission is required for any works to a protected structure that would affect its character. A protected structure also includes the land and other structures within its curtilage. While the term 'curtilage' is not defined by legislation, the Architectural Heritage Protection Guidelines for Local Authorities (Department of Arts, Heritage and the Gaeltacht 2011), describes it as the parcel of land immediately associated with a structure and which is (or was) in use for the purposes of the structure. In addition, local authorities must provide for the preservation of places, groups of structures and townscapes of architectural heritage significance through designation of Architectural Conservation Areas (ACAs).

The National Inventory of Architectural Heritage (NIAH) was established to record architectural heritage structures within the State and while inclusion in the NIAH does not provide statutory protection listing in the inventory is a signifier of architectural heritage value and it is intended to advise local authorities on compilation of their Record of Protected Structures. The NIAH also includes a Survey of Historic Gardens and Landscapes which comprises a non-statutory, desk-based survey of such features. Details on the Protected Structures and NIAH-listed features within the study area are provided in Section 15.3.3.2 of this chapter.

The *Limerick Development Plan 2022-2028* (adopted 17 June 2022) presents a number of objectives to ensure the protection of the architectural heritage resource within the County and these include:

Objective EH O50 Work to Protected Structures *It is an objective of the Council to:*

a) Protect structures included on the RPS from any works that would negatively impact their special character and appearance.
b) Ensure that any development proposals to Protected Structures, their curtilage and setting, shall have regard to the Architectural Heritage Protection Guidelines for Planning Authorities published by the Department of the Arts, Heritage and the Gaeltacht.
c) Ensure that all works are carried out under the supervision of a qualified professional with specialised conservation expertise.
d) Ensure that any development, modification, alteration, or extension affecting a Protected Structure and/ or its setting, is sensitively sited and designed and is appropriate in terms of the proposed scale, mass, height, density, layout and materials.
e) Ensure that the form and structural integrity of the Protected Structure is retained in any redevelopment and that the relationship between the Protected Structure and any complex of adjoining buildings, designed landscape features, or views and vistas from within the grounds of the structure are respected.
f) Respect the special interest of the interior, including its plan form, hierarchy of spaces, architectural detail, fixtures and fittings and materials.
g) Support the re-introduction of traditional features on protected structures where there is evidence that such features (e.g. window styles, finishes etc.) previously existed.
h) Ensure that new and adapted uses are compatible with the character and special interest of the Protected Structure.
i) Protect the curtilage of Protected Structures and to refuse planning permission for inappropriate development within the curtilage and attendant grounds, that would adversely impact on the special character of the Protected Structure.
j) Protect and retain important elements of built heritage including historic gardens, stone walls, entrance gates and piers and any other associated curtilage features.
k) Ensure historic landscapes and gardens associated with Protected Structures are protected from inappropriate development.

Objective EH O51 Energy Efficiency of Protected Structures *It is an objective of the Council to have regard to the Department of Environment, Heritage and Local Government's publication on Energy Efficiency in Traditional Buildings (2010) and the Irish Standard IS EN 16883:2017 Conservation of Cultural Heritage – Guidelines for Improving the Energy Performance of Historic Buildings (2017) and any future advisory documents in assessing proposed works on Protected Structures.*

Objective EH O52 National Inventory of Architectural Heritage (NIAH) *It is an objective of the Council to review and update the RPS on foot of any Ministerial recommendations including the NIAH and any future updates. The Ministerial Recommendations, made under Section 53 of the Planning Act, will be taken into account when the Planning Authority is considering proposals for development that would affect the historic or architectural interest of these structures.*

Objective EH O53 Architectural Conservation Areas *It is an objective of the Council to:*
a) Protect the character and special interest of an area, which has been designated as an Architectural Conservation Area (ACA) as set out in Volume 3.
b) Ensure that all development proposals within an ACA be appropriate to the character of the area having regard to the Character briefs for each area.

c) Ensure that any new development or alteration of a building within an ACA or immediately adjoining an ACA, is appropriate in terms of the proposed design, including scale, height, mass, density, building lines and materials.
d) Seek a high quality, sensitive design for any new development(s) that are complementary and/or sympathetic to their context and scale, whilst simultaneously encouraging contemporary design which is in harmony with the area. Direction can also be taken from using traditional forms that are then expressed in a contemporary manner, rather than a replica of a historic building style.
e) Seek the retention of all features that contribute to the character of an ACA, including boundary walls, railings, soft landscaping, traditional paving and street furniture.
f) Seek to safeguard the Georgian heritage of Limerick.

15.3.3 Archaeological and Historical Context

There are a total of eight recorded archaeological sites located within the 1km study area and these are listed in Table 15.5 and mapped in Figure 15.3. There is one recorded archaeological site located within the boundary of the proposed development site and this comprises a children's burial ground (LI005-007---). Additionally, some portions of the proposed development site encroach into the archaeological Zone of Notification (ZoN) which surrounds settlement cluster (LI005-039---) (see Figure 15.4). This settlement was depicted on the seventeenth-century Down Survey Map (see Section 15.3.3.3), however, much of its location is now occupied by the Clonile and Shanrath housing estates. The children's burial ground (LI005-007----) is depicted on the first edition 6-inch Ordnance Survey (OS) map of 1844 with the inscription '*Crag Grave yd.*' while the 25-inch OS map of 1902 labels it as '*Crag Grave Yard (disused).*', indicating that it was no longer in active use by the start of the twentieth century. According to Ordnance Survey letters from 1840, "only children were being interred there" at that time, suggesting that the graveyard formerly acted as a more formal burial ground.

The six other recorded monuments located within the 1km study area surrounding the proposed development site comprise, a burial cairn (LI005-005----) located in Clondrinagh, enclosures (CL063-001---- & CL063-002----) located in the townlands of Pass and Gortgarraun in County Clare, Ballygrennan Castle (LI005-010----) and a historic bridge (LI005-038---- & CL062-049---) which traverses the Crompaun River (also named Meelick Creek) and connects the townland of Clonconane in County Limerick with Meelick in County Clare. The extant bridge dates to *circa* 1800, however, it may have been built on the site of the medieval bridge that is depicted on the seventeenth-century century Down Survey map of the Barony of North Liberties. These archaeological sites are all located over 450m from the boundary of the proposed development site (Table 15.5).

Furthermore, there are two recorded archaeological sites located within the townland of Clonconane whose precise location is unknown. These sites consist of Clonconane Castle (LI005-058001-) and an associated deserted medieval settlement (LI005-058002-) which are depicted within the townland on the Down Survey mapping. However, it is unlikely that these sites are located within the subject lands as the Down Survey mapping depicts them as being located a significant distance to the west.

SMR No.	Class	Townland	ITM refs	Distance from development
CL062-049----	Bridge	Meelick (Bunratty Lower By.)	554143, 659507	c.515m east
CL063-001----	Enclosure	Pass	554694, 660102	c.560m north
CL063-002----	Enclosure	Gortgarraun	555364, 660352	c.900m northeast
LI005-005----	Cairn - burial cairn	Clondrinagh	554406, 658780	c.470m southwest
LI005-007----	Children's burial ground	Clonconane	554812, 659256	Within development site
LI005-010----	Castle - unclassified	Ballygrennan (Pubblebrien By.)	555963, 659858	c.940m northeast
LI005-038----	Bridge	Clonconane	554146, 659504	c.515m east
LI005-039----	Settlement cluster	Ballygrennan (North Liberties By.), Clonconane	555236, 659030	Outer edge of ZoN extends into development site

Table 15.5: List of recorded archaeological sites located within 1km of the overall development site

The following presents summary details of the main periods within the Irish archaeological record with references to the recorded archaeological sites located within the study area. The dating framework used for each period is based on *Guidelines for Authors of Reports on Archaeological Excavations* as published by the National Monuments Service (NMS).

Prehistoric Periods

Traditionally, the earliest recorded evidence for human settlement in Ireland dates to the Mesolithic period (7000–4000 BC) when groups of hunter-gatherers arrived on the island. However, recent evidence in the form of a butchered bear patella found in 'Alice and Gwendoline' Cave near Ennis in County Clare now suggests that humans were present in Ireland during the Palaeolithic period between 12,800 to 12,600 cal BC (Dowd and Carden 2016, 161). Similarly, re-examination of a reindeer bone fragment discovered in Castlepook Cave near Doneraile, County Cork revealed human butchery marks on the bone which was radiocarbon dated to 31,000 BC (Carden 2020), establishing human activity in Ireland more than 20,000 years earlier than previously thought. While these prehistoric settlers did not construct settlements or monuments that have left any above ground traces, their presence can often be identified by scatters of worked flint in ploughed fields.

The Neolithic period (*circa* 4000-2400 BC) began with the arrival and establishment of agriculture as the principal form of economic subsistence, which resulted in more permanent settlement patterns. As a consequence of the more settled nature of agrarian life, new site-types, such as more substantial rectangular timber houses and various types of megalithic tombs, begin to appear in the archaeological record during this period.

The Irish Bronze Age (*circa* 2400–500 BC) commenced with the arrival of metal-working techniques to the island and this technological advance resulted in the introduction of a new artefactual assemblage into the Irish archaeological record. This period was also associated with the construction of new monument types such as standing stones, stone rows, stone circles, barrows and *fulachta fia*. *Fulacht fia* translates as cooking places of the wild (or of deer), they are often interpreted as the remains of cooking sites and are the most numerous archaeological site type in Ireland, numbering some 7000

recorded examples. Radiocarbon dating of excavated examples has generally produced dates in the Bronze Age. A number of alternative interpretations have been forwarded as to the function of these archaeological sites, such as their potential uses as bathing, saunas, garment washing and dyeing, leather processing and even brewing sites (Hawkes 2015).

A burial cairn (LI005-005----), revealed during pre-development archaeological investigations (Licence ref. 03E1144) in the townland of Clondrinagh, likely dates to the Bronze Age period. A partial excavation undertaken on the monument uncovered a circular mound, *circa* 23m in diameter and standing 1.5m above the surrounding field. It was found that the mound, or cairn, was made up of small and medium-sized stones to a depth of 1m. On the western side of the cairn, a combination of larger stones and the natural bedrock acted as revetting for the cairn material. On the old ground surface beneath the cairn, fragments of cremated human bone were found in a discrete deposit. No evidence for any cists or deposits of bone within the cairn was found in the limited area examined.

The arrival of iron-working technology in Ireland saw the advent of the Iron Age (600 BC – 400 AD). This period has been traditionally associated with a Celtic 'invasion' but this view is no longer widely accepted as recent archaeological evidence points instead to a gradual acculturation of the Irish Bronze Age communities following centuries of contacts with Celtic-type cultures in Europe. Relatively little has been traditionally known about Iron Age settlement and ritual practices until recent decades when the corpus of evidence has been greatly increased by the discovery of Iron Age sites during schemes such as bog-cutting and road construction projects.

Archaeological investigations (E4440) in advance of the proposed Coonagh – Knockalisheen Distributor Road in Counties Limerick and Clare revealed evidence of Bronze Age and Iron Age activity. Thirteen burnt stone spreads (four with possible troughs), a wooden trackway potentially contemporary with one of the burnt stone spreads, four burnt stone pits, two pits associated with charcoal production, a probable ring-barrow, two pits of unknown function and a curvilinear feature were all revealed. The discovery of these sites demonstrates a significant settlement pattern in the lands around the proposed development site during the later prehistoric periods.

Medieval and post-medieval periods

The early medieval period began with the introduction of Christianity and continued up to the arrival of the Anglo-Normans in the late twelfth century (*circa* 400–1169 AD). While the medieval period saw the emergence of the first phases of urbanisation around the larger monasteries and the Hiberno-Norse ports, the dominant settlement pattern was still rural-based and centred around enclosed farmsteads known as ringforts (earth/timber built) and cashels (stone built). Ringforts are one of the most numerous monuments in the Irish landscape, with some 45,000 recorded examples (Stout 1997, 53). These sites comprise broadly circular enclosures delimited by one or more concentric banks and ditches in the case of ringforts and drystone walls in the case of cashels. They were formerly known by the names ráth/lios/cathair/dún, which still form some of the most common place-name elements within the Irish landscape. The majority of excavated examples have produced evidence for the remains of timber houses, outbuildings and stockades as well as a variety of agricultural and craft activities such as grain processing and metalworking. An enclosure (CL063-002----) at Gortgarraun, loacted 900m northeast and enclosure (CL063-001----) located in the townland of Pass, County Clare, *circa* 560m to the north of the proposed development site, likely date to the early medieval period.

The following summary includes high-level information on the urban settlement of Limerick in order to provide a wider context for the study area during the period from the nineth century onward. The area of the proposed development is located in the Barony of the North Liberties. It is recorded in the Annals that in AD 744 the *Dál Cais* defeated the *Corcu Modruad*, occupying the latter's strategic lands in Clare which controlled the Shannon. Viking raiders first appeared on the Shannon *circa* AD 825. Although there are some references to a nineth-century settlement in Limerick, the permanent settlement appears to have been established in AD 922 by Tamar MacAilche on the island in the Shannon formed by the Abbey River. This island became known as *Inis Sibhton*, or *Inis an Ghaill Duibh*, later King's Island. The Viking town is still visible in the street pattern of the old city on King's Island. Viking Limerick allied with the Irish in Munster in AD 926 to repel an incursion from the Vikings of Waterford.

The arrival and conquest of large parts of Ireland by the Anglo-Normans in AD 1169 marks the advent of the late medieval period which continued until approx. AD 1550. This period saw the continuing expansion of Irish urbanisation as many of the port cities developed into international trading centres and numerous villages and towns developed as local or regional market centres. The below summary of the late medieval period includes high-level information on the urban settlement of Limerick in order to provide a wider context for the study area during this period.

In 1174, Domhnall Mór Ó Briain burned Limerick city to prevent it falling to the Normans. The city was finally captured in 1195, under Prince John and was granted a charter and mayor, Adam Sarvant (1197-98), and bailiffs were John Bambery and Walter White. King John's Castle was erected between 1200 and 1207, along with the original Thomond Bridge.

Prince John and his Norman Chief Justiciar, or solicitor, Myler Fitzhenry conferred 40 ploughlands (*seisreacha*) on the people of Limerick, each with its own castle. Twenty-four of these ploughlands were located south of the Shannon and sixteen to the north; these included several areas within the study area, such as Knock, Caherdavin, Shanabooley, Ballygrennan, Clonconane, Clondrinagh, and Moylish. A Limerick Corporation Inquisition of 1615 states that, "they were in the possession of Richard de Clare (of Bunratty) from the Kings of England as tenants of the Mayor and Corporation". In 1316, Edward Bruce, brother of King Robert I of Scotland, captured Limerick. The occupation was short lived and ended when Edward was killed in 1318 and the Scots were defeated. Construction of the town wall on King's Island, known as Englishtown, began in the fourteenth century and continued until the end of the fifteenth century. Irishtown, which developed on the other side of the Abbey River, was also enclosed by a wall. Limerick prospered as a port and trading centre; farm produce was exported and wine was imported from France and Spain. In 1497 and 1498 there were great famines, followed by plague in 1521 but the settlement recovered thereafter and a 1574 document prepared for the Spanish ambassador attests to the wealth of the city. By 1641, Limerick was the third largest city in Ireland, with a population estimated at about 3,500. In the fifteenth and sixteenth centuries - in common with other major Irish towns - Limerick became a virtual city-state, due to the breakdown of effective English rule throughout the country. While the city remained loyal to the Crown and conscious of its status as a Royal city, the Reformation created acute tensions between the citizens' conflicting allegiances to the Catholic Church and the Protestant English monarchy.

Limerick was besieged several times in the seventeenth century. In 1642, Irish Confederates seized King John's Castle. The city was besieged by Oliver Cromwell's army under Henry Ireton in 1651; after a blockade several months long Cromwellian forces retook the castle. Limerick was besieged during

the Williamite Wars in 1690 and again in 1691, which ended with the signing of the Treaty of Limerick. These wars decimated both the population and the city. Ballygrennan Castle or Castle Park is located *circa* 850m to the northeast of the proposed development. It was built and occupied in 1620 by the O'Brien's of Thomond. In 1782 it became the property of the Ormsbys under the name of Blackland Castle, and lastly, in 1833, it became the property of Christopher Delmege who rebuilt large portions of the structure.

The post-medieval period (1550+) saw the development of high and low status stone houses throughout the Irish country. During this period any given settlement cluster is likely to have consisted primarily of single-storey thatched cottages with associated farm buildings while two-storey farmhouses became more common in the nineteenth century. The settlement cluster (LI005-039----) in Ballygrennan and Clonconane, Ballygrennan Castle (LI005-010----), located c.940m northeast of the overall development site and Clonconane Castle (LI005-058001-) and an associated deserted medieval settlement (LI005-058002-), which are depicted on the 17th century Down Survey mapping likely dates from this period. Although the ZoN for the settlement cluster (LI005-039----) extends into the proposed development site, much of its site is now occupied by the Clonile and Shanrath housing estates. A pit and a burnt spread were uncovered in this area during archaeological monitoring (Licence No. 98E0321) of the construction phase a housing development in 1998 (O'Rahilly1998). Archaeological test trenching (Licence No. 04E0851) and monitoring of a site on the opposite side of the Cratloe Road, did not reveal anything of archaeological significance at that location (Dunne 2004).

The eighteenth century was a period of growth and expansion for the city and environs of Limerick. The construction of public buildings and infrastructure projects were paid for with local taxes on trans-Atlantic trade. The medieval city walls and its 17 gates were for the most part pulled down in 1760. In 1733, George III approved the repair of the road from the North Liberties of Limerick, to Cratloe and Sixmilebridge. The road is now known as the Old Cratloe Road or Wood Road. Meelick Bridge (LI005-038---- and CL062-049----), which traverses the Crompaun River or Meelick Creek connecting the townland of Clonconane to Meelick in County Clare, may have been built on the site of the medieval bridge that is depicted on the seventeenth-century Down Survey map of the Barony of North Liberties.

In the nineteenth century prominent industries within the Limerick area included tanning, lace, flour milling, clothing, tobacco, brewing, papermaking and milk processing. Wellesley Bridge (later Sarsfield Bridge), connecting the city with the western side of the Shannon, was built in 1827, and Thormond Bridge was rebuilt in 1836. The Great Southern & Western Railway reached Limerick in 1848. While it is estimated that the Great Famine reduced the population of County Limerick by 70,000, the population of the city actually rose slightly, as people fled to the workhouses.

The children's burial ground (SMR LI005-007----) located within the boundary of the MS but outside of the subject development site is a site type often traditionally associated with the Famine period of the late 1840s. However, according to Ordnance Survey letters from 1840, the graveyard was in use prior to then when, "only children were being interred there" at that time, perhaps suggesting that the site formerly acted as a more formal burial ground.

15.3.3.1 Database of Irish Excavation Reports

The Database of Irish Excavation Reports contains summary accounts of archaeological investigations undertaken in the Republic of Ireland and Northern Ireland from 1969 to present (www.excavations.ie).

A search of the townland of Clonconane, County Limerick and the surrounding townlands of Ballygrennan, Knock, Gortgarraun and Shannabooley, County Limerick and Clondrinagh, Meelick, Pass and Punchbowl, County Clare has revealed that 16 licensed archaeological investigations have taken place within these areas, with seven of these are associated the Coonagh – Knockalisheen Distributor Road (see Appendix 15.4 for details). Of these investigations, nine produced prehistoric material (one also produced medieval and post-medieval material), particularly associated with burnt mounds. A further six investigations produced no archaeological evidence and one provided evidence of ephemeral undated activity and nineteenth-century material.

Details on recent archaeological investigations within the MS are provided below (Section 15.3.3.7).

15.3.3.2 Architectural Heritage

There are two protected structures listed in the *Limerick Development Plan 2022-2028*, which are also listed in the National Inventory of Architectural Heritage (NIAH), located within the 1km study area surrounding the proposed development site and these comprise Meelick Bridge and Ballygrennan Castle (Table 15.6 and Figure 15.3). These structures are also recorded archaeological monuments and neither are located within 500m of the proposed development site.

NIAH No.	RPS No.	Name	Townland	ITM refs	Distance from development
21900501	3308	Meelick Bridge	Clonconane	554143, 659507	c.515m east
21900502	3306	Castle Park	Ballygrennan	555963, 659858	c.940m northeast

Table 15.6: List of NIAH and Protected Structures located within 1km of the overall development site

15.3.3.3 Cartographic Review

The detail on historic cartographic sources demonstrates the nature of past settlements and land use patterns in recent centuries and can also highlight the impacts of modern developments and agricultural practices. This information can aid in the identification of the location and extent of unrecorded or partially levelled features of archaeological or architectural heritage interest. The cartographic sources examined for the study areas include the Down Survey map (surveyed in the 1650s) (see Figure 15.8), the first edition of the 6-inch OS maps (published in 1844) (see Figure 15.9) and the 25-inch OS maps (published in 1902) (see Figure 15.10).

The townland of Clonconane is referred to as 'Clonecanane' on the seventeenth-century Down Survey map. The area is located within the barony of the North Liberties; however, the survey also included it within the barony of Bunratty in County Clare. This maps clearly shows that the boundaries of the townland of Clonconane and the surrounding townlands were well established by the mid-seventeenth century. It is also clear that Pass Road was the main thoroughfare extending to the northwest from Limerick City.

A collection of buildings (settlement cluster LI005-039----) is shown on either side of Pass Road (circled in red on Figure 15.8). The road continues northwest-ward to Meelick Bridge (LI005-038----/ CL062-049----), which traverses the Crompaun River or Meelick Creek connecting the townland of Clonconane, County Limerick to Meelick in County Clare. The Down Survey map also depicts Clonconane Castle

(LI005-058001-) and an associated deserted medieval settlement (LI005-058002-) within the townland of Clonconane. However, it is unlikely that these sites are located within the proposed development site as the Down Survey mapping depicts them as being located a significant distance to the west.

The area is referred to by its existing name 'Clonconane' on the first edition 6-inch OS map and on the subsequent 25-inch edition map. The Children's burial ground (LI005-007----) within the western portion of the proposed development site is referred to as '*Crag Grave Yard*' on both map editions, with the 25-inch map indicating that the graveyard was disused by 1902. An area marked 'Red Gate' is included in both the first edition 6-inch and the 25-inch OS maps to the southeast of the proposed development site and this may be a historical place name associated with the settlement cluster (LI005-039----). The recorded location of the settlement cluster is shown as undeveloped agricultural land on both of the OS maps. No potential unrecorded archaeological features are depicted within the proposed development site on either edition of the OS maps.

15.3.3.4 Review of Aerial, Satellite and LiDAR Imagery

A review of publicly accessible aerial, satellite and LiDAR sources published online by the Ordnance Survey of Ireland, Google, Bing Maps and the Geological Survey of Ireland (LiDAR) was undertaken in order to assess if any traces of potential unrecorded archaeological sites were visible within the proposed development site. A review of available aerial/satellite imagery for a variety of years from 1995 to 2022 indicates that the fields that comprise the overall development site have generally been in use as grazing land in recent decades. These images show that the portion of the overall development site that includes Phases 1, 3 and 4, and the Neighbourhood Centre and Creche was in use as a golf course during the 1990s but had reverted back to pasture by 2000. Part of the Phase 2 area contained a playing pitch in 1995, whilst the Phase 5 area continued to be used for agriculture. A number of landscaped features associated the golf course are visible on the reviewed images and these are not archaeological in origin. The recorded archaeological monument (children's burial ground LI005-007----) within the site is clearly visible on all reviewed images.

A series of parallel east to west orientated linear trends are evident in LiDAR images and on some aerial images are agricultural in appearance and indicates that fields within the proposed development site have also been used for tillage in the past (see Figure 15.7). No potential previously unrecorded archaeological features are visible within the proposed development site on any of the reviewed images.

15.3.3.5 Undesignated Cultural Heritage Assets

While encompassing the archaeological and designated architectural heritage resources, cultural heritage also includes various undesignated assets such as settlements, demesne landscapes, vernacular structures, townland boundaries, folklore, placenames and historical events.

The detail on the Down Survey maps indicates that the boundary of Clonconane townland was well established by at least the middle of the seventeenth century. A review of the historic OS maps revealed that the overall proposed development site is contained within Clonconane and there are no townland boundaries located within the site. Townlands are the smallest unit of territorial divisions in the Irish landscape, and many may preserve early Gaelic territorial boundaries that pre-date the Anglo-Norman conquest. The layout and nomenclature of Irish townlands was recorded and standardised by the work of the Ordnance Survey in the nineteenth century. The Irish translations their names often refer to

natural topographical features, but name elements may also indicate the presence of past human activity within the townland, e.g., dun, lios or rath indicate the presence of a ringfort while temple, saggart, termon or kill likely record an association with a church site. The proposed development site is located within the townland of Clonconane (*Cluain Canáin*) with the *cluain* meaning 'meadow/pasture' (www.loganim.ie). The townland is described by Mr John McMahon in the National Folklore Commission's Schools Collection as 'Conan's Meadow' (www.duchas.ie).

A review of the National Folklore Commission's Schools Collection[2] revealed that it contains a few mentions Clonconane townland. A reference to the townland collected by P. Nic Mhathghamhna for Meelick School from Mr John McMahon noted the following:

> *The houses are all slated now. The remains of a couple of the old thatched homes may still be seen. There were far more people in this townland long ago. Many of them settled down in America. McMahon is the principal name. There is only one man over seventy and he has not Irish. The land is rich and fertile. It is a great plain and it is good meadow-land.*

15.3.3.6 Field Survey

The MS and its environs were inspected on 11 November 2021 and 14 November 2022 and the Phase 5 area was also inspected on 7 March 2023. The site was assessed in terms of historic landscape, land use, vegetation cover, presence and potential for undetected archaeological and architectural heritage sites/features. Weather conditions were dry and bright at the time of survey, and this provided excellent landscape visibility. No difficulties were encountered during topographical survey. The MS comprises a parcel of moderate to good quality, undulating pastural land to the north of the Old Cratloe Road in the townland of Clonconane, County Limerick. The disused Children's burial ground (LI005-007----), is visible as a circular overgrown area defined by a *circa* 1m high earthen and stone bank, with frequent scrub and rush overgrowth and occasional trees. It is accessed via a gap in the bank and vegetation cover on the east side and the internal area of the burial ground is obscured by overgrowth.

The field surveys revealed the presence of a number of potential archaeological features that have low surface expressions, the morphology of which is similar to ring barrows and other circular burial and settlement sites. However, the detail on an OSI aerial image from 1995 shows that these correlate to the locations of landscaped features within a golf course and it is concluded that these features are, therefore, not archaeological in nature. No other surface traces of potential archaeological, architectural or cultural heritage features were noted during the field surveys and extracts from the photographic record are provided in Appendix 15.1.

15.3.3.7 Archaeological Site Investigations

Seven programmes of archaeological investigations, which comprised a combination of geophysical surveys and archaeological testing, have been undertaken for the various phases of the proposed development in recent years (Table 15.7).

[2] https://www.duchas.ie/en

Phase	Planning ref	Details
Phase 1	21/1800	A programme of archaeological test trenching was undertaken for Phase 1 Housing Development at Old Cratloe Road, Clonconane, County Limerick under Excavation Licence 22E0664 in September 2022. This programme involved the excavation of 40 no. trenches, totalling 1335 linear metres. Nothing archaeological was identified. (see Plate 15.9 & Figure 15.15)
Phase 2	22/817	A geophysical survey of the Phase 2 area at Old Cratloe Road, Clonconane, County Limerick was undertaken under survey licence 22R0379 in November 2022. A number of anomalies of archaeological potential, including a u-shaped feature at the northern portion of the area were observed. A programme of archaeological test trenching, comprising the excavation of 18 no. test trenches across the Phase 2 area was undertaken in February 2023 under Excavation Licence 23E0034. Linear and curvilinear anomalies identified in the geophysical survey were ground-proofed during the testing programme. Archaeological material was identified in three of the trenches; Trenches 3, 4 and 7, while potential archaeological material was also identified in four trenches; Trenches 7, 8, 9 and 11. A semi-circular ditch, identified in the geophysics was targeted by Trenches 3 and 4 which were positioned to cross this anomaly. Portions of an infilled ditch, measuring between 3.5 to 4.5m in width were located on the three points indicated by the geophysics survey results. This feature bears all the hallmarks of a levelled ringfort, with an internal diameter of approximately 29m. Further features, consisting of four small pits or postholes were identified within the area enclosed by the curvilinear ditch close to the intersection of Trenches 3 and 4. Some linear features were also noted in Trench 3 (though these linear features may relate to later agriculture). It is believed that these features relate to early medieval activity and further mitigation in the form of preservation by record will be undertaken prior to construction activities associated with the proposed development. (see Plates 15.8, 15.10, 15.11, 15.12 & Figures 15.16,15.18)
Phase 3	22/959	A programme of archaeological test trenching was undertaken in January 2023 under Excavation Licence 23E0018. A total of 32 no. trenches were excavated in the Phase 3 area. Archaeological material was identified in two of these trenches; Trenches 14 and 18. These areas of activity are located 55m apart. An oval-shaped pit was identified in Trench 14, measuring 1.5m x 1.25m in plan. The upper portion of this pit was truncated by a linear furrow, indicating that the pit pre-dated the agricultural activity represented by the furrow. Four small possible archaeological features were identified in Trench 18. These may represent three postholes and a stakehole. These were clustered within an area measuring 3.1m north to south and 1.5m east to west. A quadrant was investigated in one of these features and a cut with straight sides was noted, the fill of the feature included charcoal and possible flecks of burnt bone. Trenches 31 and 32 were within the zone of notification (but 20m from) the Children's Burial Ground LI005-0070000, but no related material was identified in those trenches. Further mitigation in the form of preservation by record will be undertaken prior to construction activities associated with the proposed development for the archaeological material uncovered

Phase	Planning ref	Details
		during this phase. (see Plates 15.1, 15.13, 15.14, 15.15 & Figures 15.11, 15.12, 15.13, 15.14, 15.16, 15.18)
Phase 4	22/1114	A programme of archaeological test trenching was undertaken in February 2023 under Excavation Licence 22E0091. A total of 11 no. test trenches were excavated with a combined length of 422m. Ten trenches (T1-10) were excavated in their original locations with one 27m long trench (T4b) added to the original layout. The testing programme identified one archaeological feature, a burnt mound measuring a minimum of c.20m NNW-SSE by 8m E-W in Trench 4. The feature is located on a west facing slope near the western boundary of the site, immediately northeast of a pond. One c.27m long additional trench (4b) was excavated across Trench 4 in order to investigate the extent of the burnt mound. The full extent of the burnt mound to the south could not be identified since an overhead powerline meant that T4b could not be excavated for more than 8m in this direction. The burnt mound was not present within Trench 2. Further mitigation in the form of preservation by record will be undertaken prior to construction activities associated with the proposed development for the archaeological material uncovered during this phase. (see Plates 15.6, 15.16, 15.17, 15.18 & Figure 15.19)
Neighbourhood Centre	22/917	A programme of archaeological test trenching was undertaken in January 2023 under Excavation Licence 23E0016. Nothing archaeological was identified within this area. (see Plates 15.1, 15.6, 15.7, 15.19 & Figure 15.16, 15.20)
Crèche	N/A	No archaeological works required
Phase 5		A geophysical survey of the northern portion of the Phase 5 area (the southern portion proposed for a wet grassland is too wet for survey) was undertaken in January 2023 under survey licence 23R0025. A small number of anomalies of potential archaeology were identified but the results indicate that these are not significant in terms of number or complexity. Targeted archaeological testing of these anomalies will need to be undertaken to elucidate their archaeological significance. (see Plate 15.20 & Figures 15.21, 15.22)

Table 15.7: Results from archaeological investigations within the overall proposed development site

15.3.3.8 Summary

The review of the historic mapping indicates that the MS has been occupied by farmland since at least the early nineteenth century (and possibly as far back as the seventeenth century) and it has retained it agricultural character with only a slight alteration of field boundaries since the production of the historic OS maps.

The Down Survey map depicts a cluster of buildings within the environs of the proposed development and the Archaeological Survey of Ireland have established a Zone of Notification around this settlement cluster (LI005-039----) which extends slightly into the southern end of the proposed development site. There is no evidence of any features associated with this settlement cluster on any of the later OS maps or recent aerial images and much of the location of the settlement cluster is now occupied by modern housing.

The children's burial ground (LI005-007----) within the boundary of the MS but located outside of the subject application Phase 3 site is depicted on the historic OS maps and is clearly visible as a sub-circular feature on all reviewed aerial images. In addition, extant remains of this site were noted during

field surveys carried out as part of this assessment and it survives as a heavily overgrown enclosed feature that is not accessible to the public.

While the desktop studies and field surveys did not identify other potential archaeological or architectural heritage features within the proposed development site, a number of previously unrecorded archaeological features were identified during recent archaeological site investigations (Table 15.7).

There are a total of six other recorded archaeological monuments located within the 1km study area surrounding the overall development site and none of these are located within 450m of its boundary (Table 15.5). There are also two Protected Structures located within the 1km study area around the proposed development site and neither of these are located within 500m of its boundary (Table 15.6). These known cultural heritage assets comprise features of medium-high values and their current condition and indicative values, as well as potential sensitivities to indirect impacts of a visual nature, have been assessed based on their locations, classifications, designations, inventory descriptions and reviews of historical maps and modern aerial/satellite images. It should be noted that all archaeological sites, including levelled examples, have the potential to possess sub-surface features, artefacts, human burials and other archaeological remains, that may be of High or Very High values. However, this cannot be ascertained without recourse to archaeological excavation, and these are attributes unlikely to be subject to effects in the absence of direct impacts.

15.4 DESCRIPTION OF EFFECTS

This section of the chapter deals specifically with the Phase 3 area within the overall proposed development as shown in Figure 15.2.

15.4.1 Construction Effects

There are no recorded archaeological sites within the application site Phase 3 area, although a small portion of the area encroaches into the ZoN around the children's burial ground (LI005-007----) (Figure 15.3). This archaeological site is clearly defined on the ground and will not be directly impacted by the construction phase of the proposed Phase 3 development. There are no other extant recorded monuments within the Phase 3 area and therefore, the construction phase will have no predicted impact on the known archaeological resource.

A programme of archaeological test trenching was undertaken across the Phase 3 area in January 2023 and a small quantity of previously unrecorded features of archaeological potential were uncovered within a discrete portion of the area (Table 15.7). While a full archaeological excavation, including post-excavation analyses, is required to ascertain if these features are archaeological in origin, construction phase ground excavation works at their locations will result in permanent, direct, negative effects on these features and this will require mitigation.

There are no designated architectural heritage structures or undesignated structures of architectural heritage interest located within the Phase 3 area. There are two designated architectural heritage structures within the surrounding 1km study area, both of with are located more than 500m from the

Phase 3 area (**Table 15.6**). The construction phase of the proposed development will have no predicted impact on designated or undesignated structures of architectural heritage interest.

There are no undesignated vernacular structures, demesne lands or townland boundaries located within the Phase 3 area and no intangible attributes, such as historical or folklore associations, were noted during the assessment. The construction phase will, therefore, have no predicted impacts on the undesignated cultural heritage resource.

15.4.2 Operational Effects

The overgrown children's burial ground (LI005-007----) will be visible from the southern portions of the Phase 3 development and, therefore, the proposed development will have a slight, indirect, permanent, negative effect on the setting of this recorded monument.

The location of the recorded settlement cluster (LI005-039---) to the east of the proposed development retains no surface remains and much of its location is occupied by modern housing. The operational phase will, therefore, result in no predicted impacts on the location or setting of this levelled site.

There are a total of six other recorded archaeological monuments located within the 1km study area surrounding the overall development site and none of these are located within 450m of its boundary (Table 15.5). There are also two Protected Structures located within the 1km study area around the proposed development site and neither of these are located within 500m of its boundary (Table 15.6). Given the distance of these constraints from the proposed development, no operational phase impacts on their settings are predicted.

15.5 LIKELIHOOD OF SIGNIFICANT EFFECTS

15.5.1 'Do-Nothing 'Effects

A 'Do Nothing Scenario' will see the continued preservation of recorded and potential cultural heritage features within the study area and will not result in any predicted significant effects on the cultural heritage resource.

15.5.2 Construction Effects

No potential significant construction phase effects on the cultural heritage resource have been identified.

15.5.3 Operational Effects

No potential significant operational phase effects on the cultural heritage resource have been identified.

15.5.4 Cumulative Effects

The Phase 3 development is part of a larger proposed development that includes a number of contiguous phases of development within the Masterplan area. There is one recorded archaeological site children's burial ground (LI005-007---) within the overall Masterplan area and the archaeological *Zone of Notification* (ZoN) which surrounds settlement cluster (LI005-039---) also extends within the

Masterplan area. The development has been designed to avoid any direct impacts on the children's burial ground (LI005-007---), which will be preserved *in situ* as a greenspace within the Masterplan area. An Archaeological Management Plan for this monument, which contains mitigation measures to protect and enhance this archaeological site during the operational phase of the entire Masterplan area, including Phase 3, has been submitted to Limerick City and County Council (Planning Ref. 21/1800) (see Section 15.6.2.1). The archaeological Zone of Notification (ZoN) which surrounds settlement cluster (LI005-039---) also extends within the eastern end of the Masterplan area. This settlement cluster depicted on a seventeenth-century cartographic source but is not present on nineteenth-century OS mapping and its recorded location is now occupied by modern housing. No sub-surface traces of the settlement cluster were identified during the various phases of archaeological investigation completed within the Masterplan area. There are no other recorded archaeological sites located within 450m of the overall development area.

Areas containing previously unrecorded features of archaeological potential have been identified during site investigations in the Phase 2 and Phase 3 area of the overall Masterplan area. Potential impacts on these potential archaeological features will be ameliorated by a programme of archaeological excavation (preservation by record). A small number of archaeological sites were identified during works on the Coonagh - Knockalisheen Distributor Road, part of which bisects the Masterplan area. These archaeological sites were excavated and recorded as part of that scheme.

Following the implementation of the operational phase measures to protect and enhance the children's burial ground (LI005-007---) (see Section 15.6.2.1) and the full systematic archaeological excavation of the potential archaeological features identified within the Masterplan area, the Phase 3 development is not predicted to result in any significant cumulative effects on the archaeological resource. There are no designated architectural heritage structures located within 500m of the Masterplan area and no potential undesignated examples, or other features of cultural heritage interest, have identified within its boundary or its close environs. It is, therefore, concluded that the proposed Phase 3 development will not result in any predicted significant cumulative effects on these elements of the cultural heritage resource.

15.6 REMEDIAL & MITIGATION MEASURES

15.6.1 Construction Phase

15.6.1.1 Mitigation by Avoidance / Design

CH CONST 1: The children's burial ground (LI005-007---) located within the Masterplan area will be preserved *in situ* as an undeveloped greenspace and is outside the Phase 3 area. A 20m buffer from the outer edge of the monument will be established prior to any construction works commencing within the site.

15.6.1.2 Mitigation by Prevention

CH CONST 2: The 20m buffer around the children's burial ground (LI005-007---) will be fenced-off with Harris fencing prior to the commencement of construction to protect the site during the course of works. This fence shall remain in place until all development works have been completed. The fencing will be

erected under archaeological supervision and no construction related activities, such as machine movements, dumping of spoil or storage of materials will occur within the fenced-off area.

15.6.1.3 Mitigation by Reduction

CH CONST 3: Archaeological investigations have identified the existence of previously unrecorded features of potential archaeological origin within the Phase 3 area. As preservation *in situ* of the identified features of archaeological potential is not a viable option within the proposed development, these features will be preserved by record through a programme of archaeological excavation and recording under licence from the National Monuments Service (NMS) in the Department of Housing, Local Government and Heritage.

The archaeological excavations will involve the stripping of topsoil from appropriate areas around the identified archaeological features within the development site and this will be carried out under the constant supervision of a suitably qualified archaeologist. The stripped area will include at least 10m of clearance from the outermost archaeological feature to the edge of the excavation. The supervised topsoil stripping will be undertaken using a mechanical excavator fitted with a toothless bucket which will remove the topsoil down to the uppermost archaeological layer or the surface of natural subsoil in areas where not archaeological material is present. A systematic programme of manual archaeological excavation of all revealed features of archaeological potential will then be carried out in accordance with the method statement submitted to the NMS as part of the licence application process. This will include the manual excavation of all identified archaeological features, the compilation of written, drawn and photographic records, the retrieval of archaeological objects and a programme of environmental sampling.

The archaeological excavations will be undertaken in advance of the main construction works in the relevant areas in order to allocate adequate time to appropriately excavate and record the archaeological deposits/features.

Following the completion of excavations, a post-excavation phase of works, involving analysis, reporting and dissemination to the relevant authorities will be undertaken off site. The level of the post-excavation analysis and reporting will be commensurate with the level of archaeology excavated on site.

15.6.2 Operational Phase

15.6.2.1 Mitigation by Avoidance / Design

There are no recorded archaeological sites located within the Phase 3 area, although a small portion of the area encroaches into the ZoN around the children's burial ground (LI005-007----). This archaeological site is clearly defined on the ground and will not be directly impacted by the proposed Phase 3 development which has been designed to avoid this recorded monument and it will be preserved *in situ* within a greenspace area.

CH OPER1: An Archaeological Management Plan for the Phase 1 area (Planning Ref. 21/1800) was submitted to Limerick City and County Council. This included mitigation measures to manage and protect the children's burial ground (LI005-007----) during the operational phase which will also apply for the operational phase of Phase 3 and these are as follows:

- A policy of minimal change shall be adopted with regard to the existing features of the archaeological monument. The existing site is surrounded by bushes and thick bramble and these shall be retained to define the perimeter of the monument. Any non-woody shrubs around the perimeter of the monument shall be pruned/removed by hand during routine maintenance. Maintenance involving minimal chance will help the site to retain its current character, ensure that the archaeological monument remains inviolate and that the plant and animal ecosystems that have developed naturally on the monument are not unnecessarily disturbed.
- The site will be framed by a buffer of wildflower meadow around its periphery, which will be subject to bi-annual maintenance, which will include strimming/cutting of vegetation using hand tools. Material will be removed from the site to a designated dumping site located outside the 20m buffer around the monument. Any wind-blown modern plastics or other debris identified within the site during routine maintenance shall be collected and removed to an appropriate facility. No burning of materials shall occur.
- Routine bi-annual maintenance shall include monitoring the condition of the monument and its surrounds and the identification of evidence of inappropriate usage or anti-social behaviour.
- Interpretive signage shall be erected approximately 20m from the exterior edge of the feature (outside the buffer surrounding the monument). The signage shall include a description of the site as provided by the Archaeological Survey of Ireland and a generic explanation of the monument type.

15.6.2.2 Mitigation by Prevention

Following the implementation of the mitigation measures presented in Section 15.6.2.1, no mitigation measures by prevention will be required to maintain the children's burial ground (LI005-007----).

15.6.2.3 Mitigation by Reduction

Following the completion of the archaeological mitigation measures presented in Section 15.6.1.3, it is concluded that no further mitigation measures by reduction will be required during the operational phase.

15.7 RESIDUAL EFFECTS

15.7.1 Construction Phase

The mitigation measures presented in Section 15.6 will result in the appropriate recording of the previously unrecorded features of archaeological potential identified during recent site investigations within the Phase 3 area by a full archaeological excavation. This shall result in a high magnitude of impact, albeit ameliorated by the creation of a full and detailed archaeological record, the results of which shall be disseminated. This shall result in a potential moderate range of significance of effect in the context of residual impacts on the unrecorded archaeological resource.

15.7.1 Operational Phase

Following the implementation of the mitigation measures presented in Section 15.6.2.1, it is predicted that the Phase 3 development will result in a not significant, indirect, permanent, negative impact on the setting the children's burial ground located within the Masterplan area.

15.8 MONITORING

15.8.1 Construction Phase

There are a number of obligatory processes to be undertaken as part of applications to the National Monuments Service for licences to carry out archaeological excavations and these will allow for monitoring of the successful implementation of mitigation measures. A detailed method statement stating the proposed strategy for the pre-construction archaeological excavations will accompany the submitted licence application which will clearly detail the extent of the archaeological works and outline the processes to be enacted to excavate and record all identified archaeological materials. A preliminary report on the archaeological excavations will then be submitted to the National Monuments Service, the National Museum of Ireland and the Planning Authority which will clearly describe the results of all archaeological works in written, mapped and photographic formats. Following the completion of all required post-excavation analyses, including environmental, artefact studies and dating, a final report on the excavations will be submitted to the above bodies.

15.8.1 Operational Phase

All required onsite archaeological excavation mitigation measures will be enacted prior to and during the construction phase and, therefore, no cultural heritage mitigation measures requiring monitoring are predicted during the operational phase of the proposed development. The Archaeological Management Plan for the Phase 1 area proposed "Routine bi-annual maintenance shall include monitoring the condition of the monument and its surrounds and the identification of evidence of inappropriate usage or anti-social behaviour". The proposed measures to protect the children's burial ground (LI005-007---) will also apply for the operational phase of Phase 3.

15.9 REFERENCES

An Bord Pleanála. 2010. Coonagh – Knockalisheen Distributor Road - Environmental Impact Statement. Available at: https://www.pleanala.ie/en-ie/home. [Accessed: 09/12/2021].

Carden, R. 2020. *Reindeer bone found in Cork cave shows human activity in Ireland 33,000 years ago.* Available at: https://www.thejournal.ie/reindeer-bone-cork-cave-5413607-Apr2021/. [Accessed: 09/12/2021].

Clare County Council. 2017. *Clare County Development plan 2017-2023 (as varied)* . Available at: https://www.clarecoco.ie/services/planning/ccdp2017-2023/. [Accessed: 19/01/2023].

Database of Irish Excavation Reports. Available at: https://excavations.ie/. [Accessed: 13/07/2022].

Dowd, M. and Carden, R. 2016. First evidence of a Late Upper Palaeolithic human presence in Ireland. *Quaternary Science Reviews* 139, 158–63.

Dunne, L. 2004. License number: 04E0851. Available at: https://excavations.ie/report/2004/Limerick/0012105/. [Accessed: 09/12/2021].

Environmental Protection Agency (EPA). 2022. Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR). Available at: https://www.epa.ie/publications/monitoring--assessment/assessment/guidelines-on-the-information-to-be-contained-in-environmental-impact-assessment.php. [Accessed: 19/01/2023].

Geological Survey of Ireland. *Open Topographic Data Viewer – LiDAR data. Available at: https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=b7c4b0e763964070ad69bf8c1572c9f5.* [Accessed: 19/01/2023].

Google Earth Pro. Available at: https://www.google.com/earth/versions. [Accessed: 11/08/2022].

Government of Ireland. 2021. *Historic Environment Viewer*. Available at: http://webgis.archaeology.ie/historicenvironment/. [Accessed 26/08/2022].

Hawkes, A. 2015. *Fulachtaí fia* and Bronze Age cooking in Ireland: reappraising the evidence. *Proceedings of the Royal Irish Academy: Archaeology, Culture, History, Literature Vol. 115C*. 47-77.

Heritage Council. 2021. *Heritage Map Viewer*. Available at: https://heritagemaps.ie/WebApps/HeritageMaps/index.html [Accessed 15/12/2021].

ICOMOS. 2011. *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties*. Paris: International Council on Monuments and Sites (ICOMOS).

Lewis, S. 1837. *A Topographical Dictionary of Ireland*, 2 vols, London: Samuel Lewis & Son.

Limerick County Council. 2017. *Limerick Heritage Plan (2017)*. Available at: https://www.limerick.ie/council/services/planning-and-property/natural-built-heritage/limericks-heritage-plan-2017-2030. [Accessed: 19/01/2023].

Limerick City and County Council. 2019. *Evolutionary Study Report on the Maritime, Military and Industrial Heritage of Limerick City and County.* Available at: *https://www.limerick.ie/council/services/business-and-economy/eu-programmes/mmiah-project*. [Accessed: 19/01/2023].

Limerick County Council. 2022. *Limerick County Development Plan 2022-2028*. Available at: https://www.limerick.ie/council/services/planning-and-property/limerick-development-plan/limerick-development-plan-2022-2028. [Accessed: 19/01/2023].

National Folklore Commission. *Schools Collection*. Available at: www.duchas.ie. . [Accessed: 19/01/2023].

O'Rahilly, C. 1998. Licence number: 98E0321. Available at: https://excavations.ie/report/1998/Limerick/0003561/. [Accessed: 09/12/2021].

Ordnance Survey of Ireland. 2021. *Geohive*. Available at: http://map.geohive.ie/mapviewer.html. [Accessed 26/08/2022].

Placenames Database of Ireland. Available at: www.logainm.ie [Accessed 07/09/2021].

Stout, M. 1997. *The Irish Ringfort*. Dublin: Four Courts Press.

Trinity College Dublin. *Down Survey*. Available at: http://downsurvey.tcd.ie/. [Accessed: 09/12/2021].

APPENDIX 15.1: PHOTOGRAPHIC RECORD

Plate 15.1 *Aerial view with main development area, facing northwest*

Plate 15.2 *Drone photo of the Children's burial ground (LI005-007---), facing south*

Plate 15.3 *View of the Children's burial ground (LI005-007---), facing north from Old Cratloe Road*

Plate 15.4 *View of former golf course feature, facing north*

Plate 15.5 *Drone view of former golf course feature, facing northeast*

Plate 15.6 *Drone view of Clonconane, facing northeast from Old Cratloe Road*

Plate 15.7 *Drone view of Clonconane, facing southwest*

Plate 15.8 *Drone view of Phase 2 area, Clonconane, facing east*

Plate 15.9 *Drone view of Phase 1 area, Clonconane following test trenching, facing north*

Plate 15.10 *Infilled ditch in west of Trench 3 (Phase 2 area), facing west*

Plate 15.11 *Infilled ditch in west of Trench 3 (Phase 2 area), facing west*

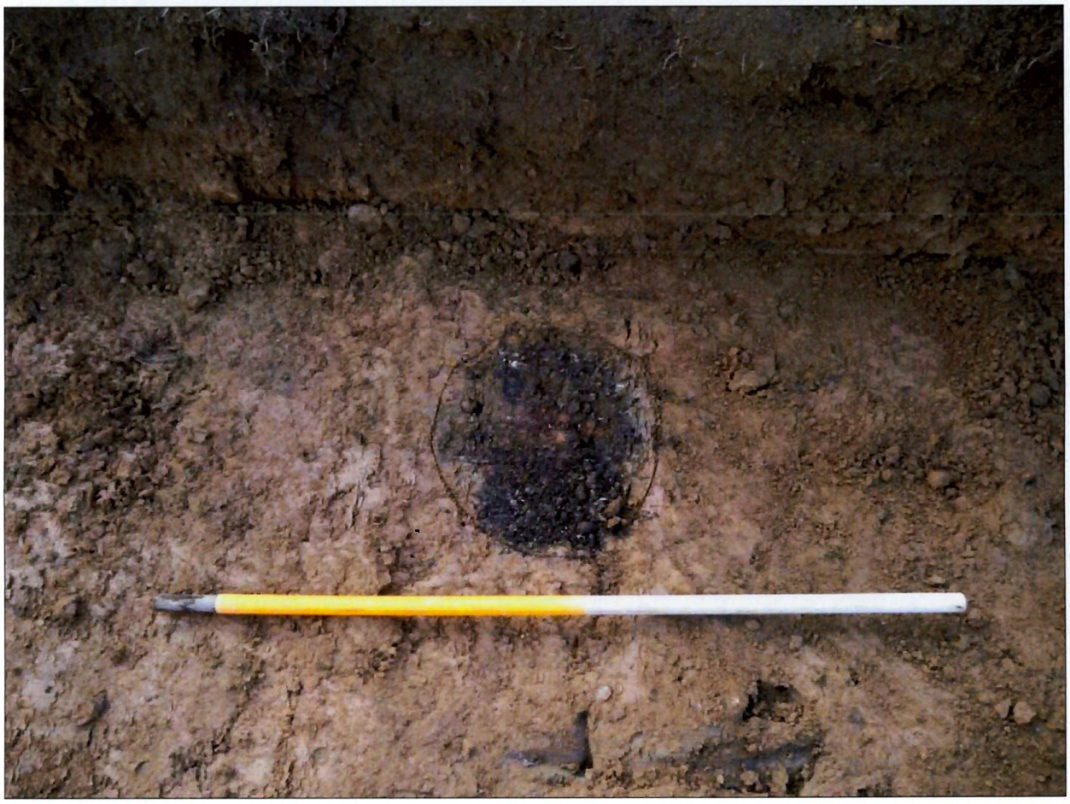


Plate 15.12 *Pit containing charcoal and burnt bone within Trench 7 (Phase 2 area), facing southwest*

Plate 15.13 *Aerial image of closed trenches in the Phase 3 area, facing northeast*

Plate 15.14 *Pit in Trench 14 (Phase 3 area)*

Plate 15.15 *Potential features in Trench 18 (T18) (Phase 3 area)*

Plate 15.16 *Trench 4 (T4) facing east (Phase 4 area)*

Plate 15.17 *T4 facing north-northwest (Phase 4 area)*

Plate 15.18 *T4 extension (Phase 4 area)*

Plate 15.19 *Trench 11 (Neighbourhood Centre), facing west. Considerable disturbance was noted in the area of a historic quarry*

Plate 15.20 *View of geophysical survey of the Phase 5 area, January 2023*

Plate 15.21 *View of proposed wet grassland habitat (Phase 5 area), facing southwest*

Plate 15.22 *View of proposed wet grassland habitat (Phase 5 area), facing southwest*

Plate 15.23 *View of proposed wet grassland habitat (Phase 5 area), facing northeast*

Plate 15.24 *View of proposed pond location within wet grassland habitat (Phase 5 area)*

Plate 15.25 *View of ground conditions in northern portion of proposed wet grassland habitat (Phase 5 area), facing southeast*

APPENDIX 15.2: CULTURAL HERITAGE INVENTORIES

Inventory of Archaeological sites within the 1km Study Area

SMR No.	Class	Townland	Description
LI005-005----	Cairn - burial cairn	Clondrinagh	Scheduled for inclusion in the next revision of the RMP: Yes Description: Situated on a rise, in the lowlying floodplain of the river Shannon. A flat-topped circular mound (diam. 23m; H 1.5m) with a near vertical gradient on the N side and more gentle gradients at S and W. The site was partially archaeologically excavated in advance of road construction works. Prior to archaeological investigation, the site consisted of a circular mound (diam. c. 23m; H 1.5m). In 2003 archaeological test excavation was carried out by Florence Hurley under licence No. 03E1144. Two hand-dug trenches, one on the W edge of the mound (7m by 1m) and one on top of the mound (2m by 2m), were excavated. These confirmed that the mound, or cairn, was made up of small and medium-sized stones (D 1m). A combination of larger stones and natural bedrock acted as revetting on the western side of the cairn. Fragments of cremated human bone were found in a discrete deposit on the old ground surface beneath the cairn. No evidence for any cists or deposits of bone within the cairn was found in the limited area examined. No external ditch was present.
LI005-007----	Children's burial ground	Clonconane	Scheduled for inclusion in the next revision of the RMP: Yes Description: Burial ground known locally as 'Crag Grave Yard' described in 1840 as following; 'There is an old burial place in the townland of Cluain Chanáin (Cloon conan) about two miles to the north of the city in the parish of St. Munchin to the north of the city of Limerick, but only children are now interred in it' (OSL Vol. 1, 57). Outline of circular-shaped burial ground (approx. diam. 20m) visible today on Digital Globe aerial photographs.
LI005-038----	Bridge	Clonconane	Scheduled for inclusion in the next revision of the RMP: Yes Description: Meelick Bridge which traverses the Crompaun River or Meelick Creek connecting

SMR No.	Class	Townland	Description
			the townland of Clonconane to Meelick in County Clare may have been built on the site of the medieval bridge that is depicted on the 17th century Down Survey map of the Barony of North Liberties (Hib. Reg.). Cross referenced with CL062-049----.
LI005-039----	Settlement cluster	Ballygrennan (North Liberties By.),Clonconane	Scheduled for inclusion in the next revision of the RMP: Yes Description: On low-lying pasture, in the angle of Cratloe Road and Galtee Avenue. Site of Castle Park castle (LI005-010----) lies c. 1km to NE. Shown as a cluster of dwellings either side of the road out of Limerick City on the Down Survey barony map of the North Liberties (Hib. Reg.). The name Red Gate is depicted on the 1840 OS 6-inch map, c. 65m to NW and may be of some significance (O' Rahilly 1998). A pit and a burnt spread were uncovered from this area during archaeological monitoring (License No. 98E0321) for a development in 1998 (ibid). Area is now occupied by Clonile and Shanrath housing estates. Archaeological test trenching (License No. 04E0851) and monitoring of a site directly on the opposite side of the Cratloe Road, proved negative for archaeology (Brewer February 2004; Dunne July 2004).
CL063-001----	Enclosure	Pass	Scheduled for inclusion in the next revision of the RMP: Yes Description: The Archaeological Survey of Ireland (ASI) is in the process of providing information on all monuments on The Historic Environment Viewer (HEV). Currently the information for this record has not been uploaded.
CL062-049----	Bridge	Meelick	Scheduled for inclusion in the next revision of the RMP: Yes Description: The Archaeological Survey of Ireland (ASI) is in the process of providing information on all monuments on The Historic Environment Viewer (HEV). Currently the information for this record has not been uploaded.
CL063-002----	Enclosure	Gortgarraun	Scheduled for inclusion in the next revision of the RMP: Yes

SMR No.	Class	Townland	Description
			Description: The Archaeological Survey of Ireland (ASI) is in the process of providing information on all monuments on The Historic Environment Viewer (HEV). Currently the information for this record has not been uploaded.
LI005-010----	Castle - unclassified	Ballygrennan (Pubblebrien By.)	Scheduled for inclusion in the next revision of the RMP: Yes Description: Ballygrennan Castle or Castle Park described by Westropp (1906-7, 81) as following; '1610 David McCanney owned the C[astle]. of Parck (Inq. Chan., Car. I., 29). 1631 Pardon to Simon Fanning for alienation of the C[astle]. of Park in the County of the City (Pat R.). 1655 Ballygrenane C[astle]. (Petty 63)'. Castle depicted as a tower house type structure on the Down Survey map of the North Liberties in Limerick (Hib. Reg.). Castle Park (NIAH Reg. No. 21900502) described in the Ordnance Survey Field Name Books for St. Munchins parish as following; 'The former name of this edifice was Castlepark, and it was built and occupied in 1620 by the O'Brien's of Thomond. In 1782 it became the property of the Ormsbys under the name of Blackland Castle, and lastly, in 1833, it became the property of Christopher Delmege Esq. who improved and rebuilt the greater portion of it. it is a splendid edifice, 4 story high, overlooking the Shannon' (OSNB Parish of St. Munchin, 1542).

Inventory of Architectural Heritage sites within the 1km Study Area

NIAH No.	RPS No.	Class	Description
21900501	3308	Bridge	Single-arched humpback road bridge, built c. 1800, over the River Crompaun or Meelick Creek. Rubble limestone and sandstone walls. Extended to north elevation. Red brick voussoirs to round-headed arch. This solidly built road bridge is indicative of the skill of early nineteenth-century craftsmen. The bridge forms a pleasing silhouette in the landscape.
N/A	3306	Christ The King Roman Catholic Church	Circular church opened in 1985, designed by John and Nuala Kernan
21900502	3306	Castle Park House	Detached five-bay two-storey country house, built c. 1750, comprising floating pediment to front (south) elevation, full-height canted bay to east elevation having extension adjoining remodelled tower house to east with crenellated curtain wall. Two-bay four-storey extension to rear (north) elevation. Now in disuse. This substantial house, attributed to Francis Bindon, displays characteristic features of his work such as the lunette resting on the Venetian window's keystone. Built in different phases, the house retains its eighteenth-century façade with earlier fabric to the rear elevation. Castle Park is distinguished by its finely carved limestone dressings, which are indicative of the skill of eighteenth-century craftsmen. Battlements were added in the nineteenth century, when the castle style of architecture was in vogue.

APPENDIX 15.3: FIGURES

Figure 15.1 *Location map with the proposed development site circled in red (Source: The Heritage Council)*

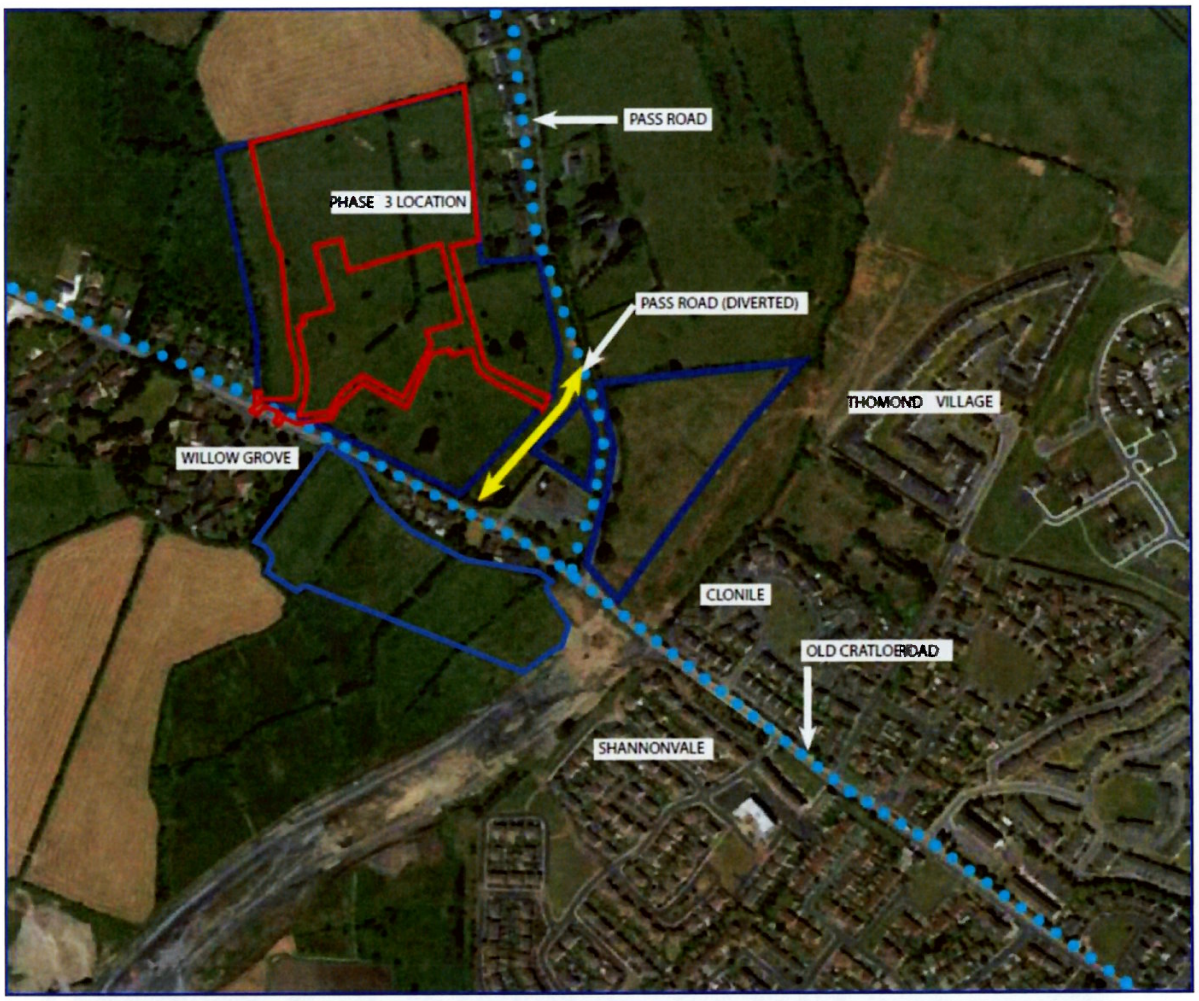


Figure 15.2 *Location of Site in Context of Masterplan site outlined in blue with the Phase 3 area outlined in red*

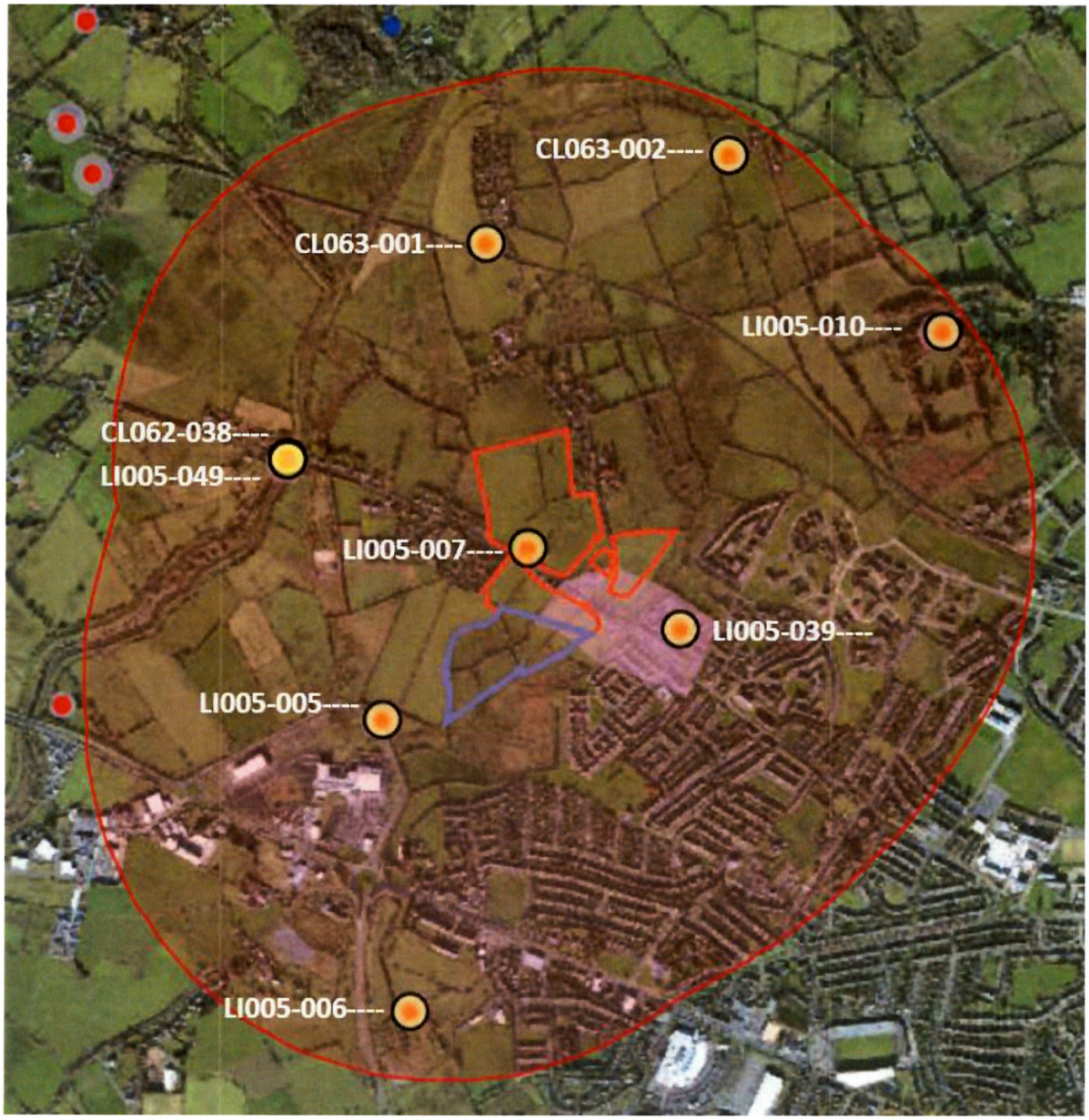


Figure 15.3 *Recorded archaeological sites (as recorded by ASI) within 1km of the Masterplan site, including proposed wet grassland habitat in blue (Source: Government of Ireland, Historic Environment Viewer)*

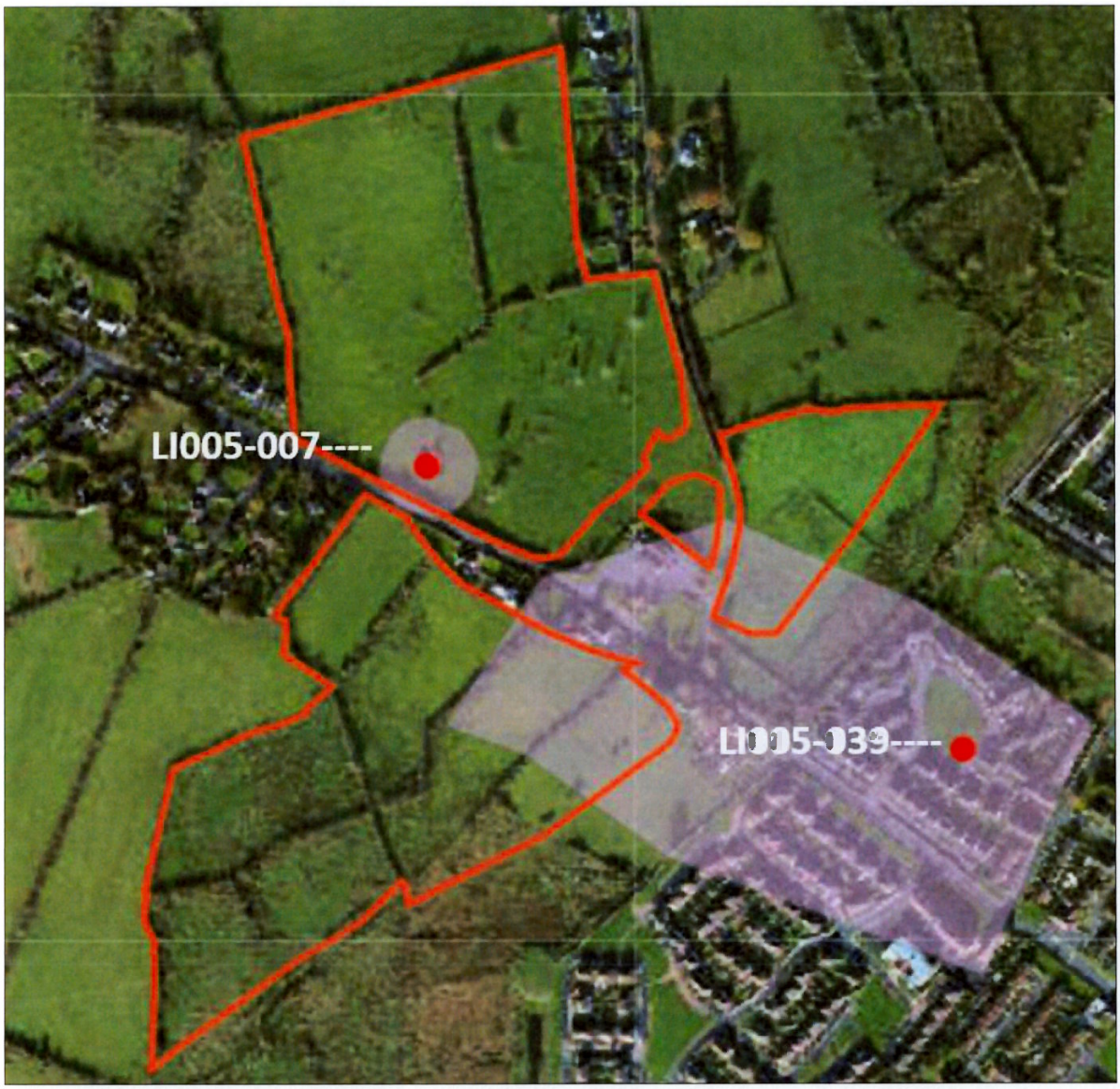


Figure 15.4 *Recorded archaeological sites that interact with the Masterplan site (Source: Government of Ireland, Historic Environment Viewer)*

Figure 15.5 *NIAH sites within 1km of the Masterplan site, including proposed wet grassland habitat in blue (Source: Government of Ireland, Historic Environment Viewer)*

Figure 15.6 *Recorded archaeological sites (red dots) and their ZoNs (shaded purple) located within approximately 1km of the Phase 3 area*

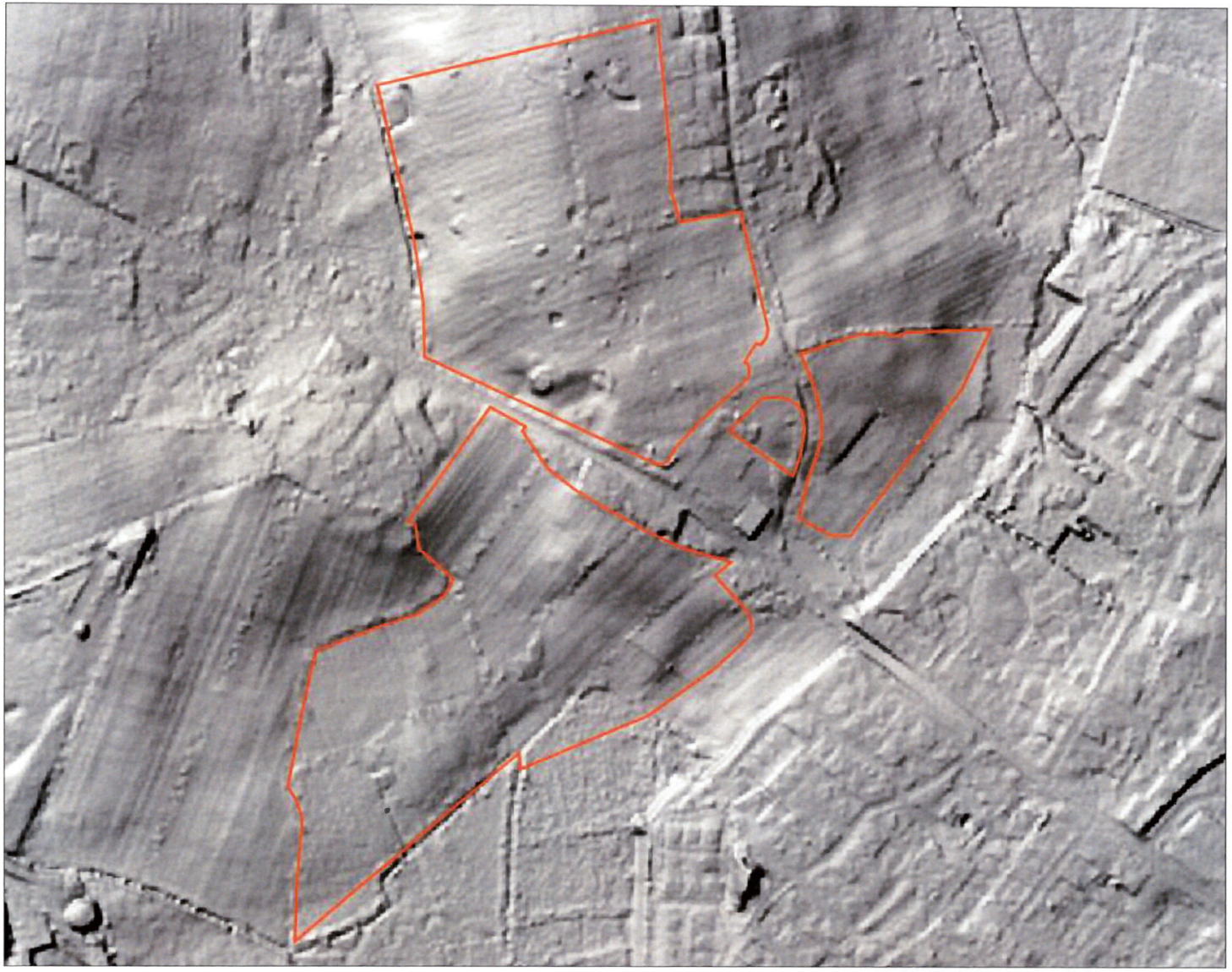


Figure 15.7 *LiDAR image, showing the Masterplan site (Source: Geological Survey of Ireland - Open Topographic Data Viewer)*

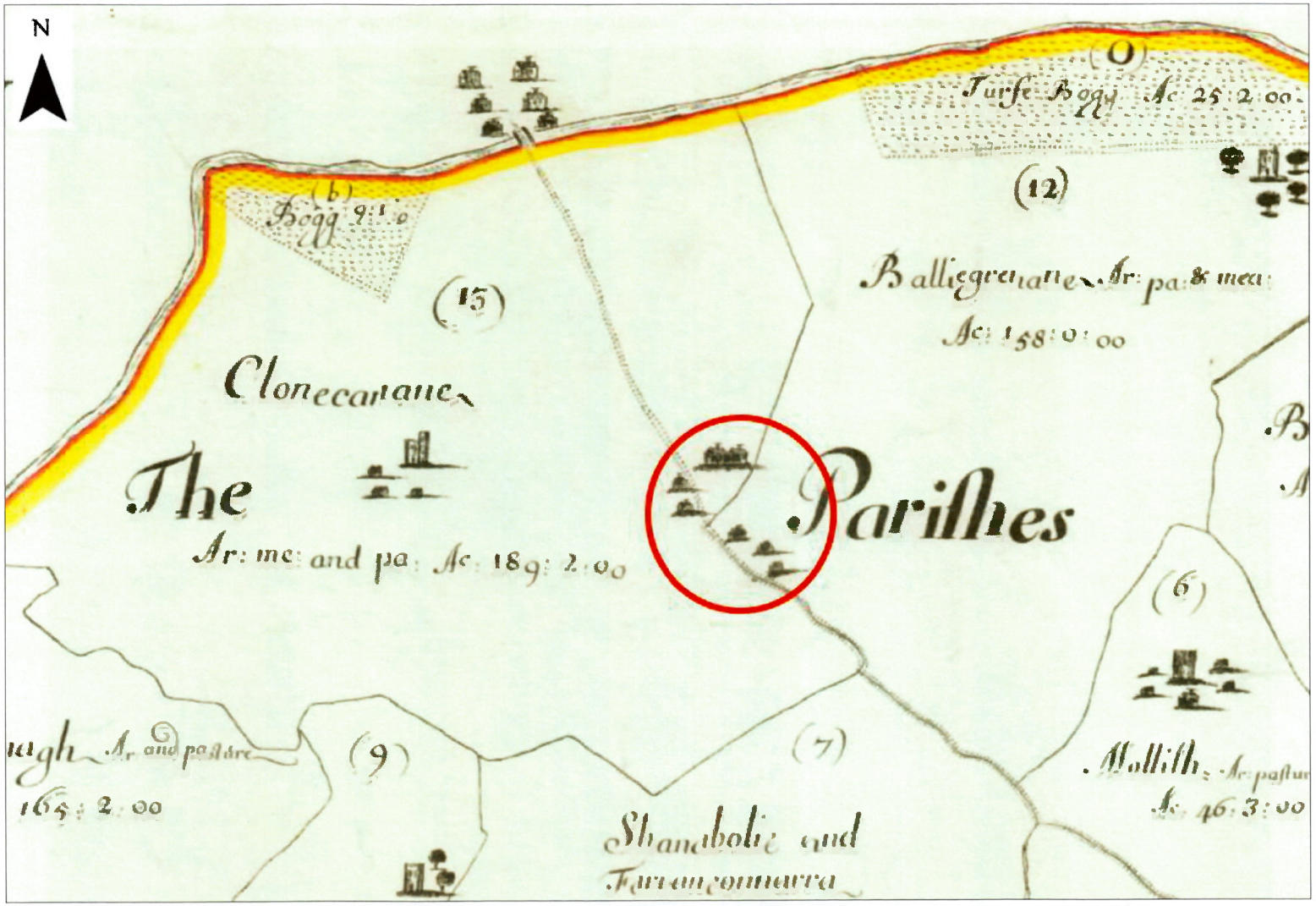


Figure 15.8 *Extract from the Down Survey map of barony of the North Liberties, with the settlement cluster circled in red (Source: Trinity College Dublin)*

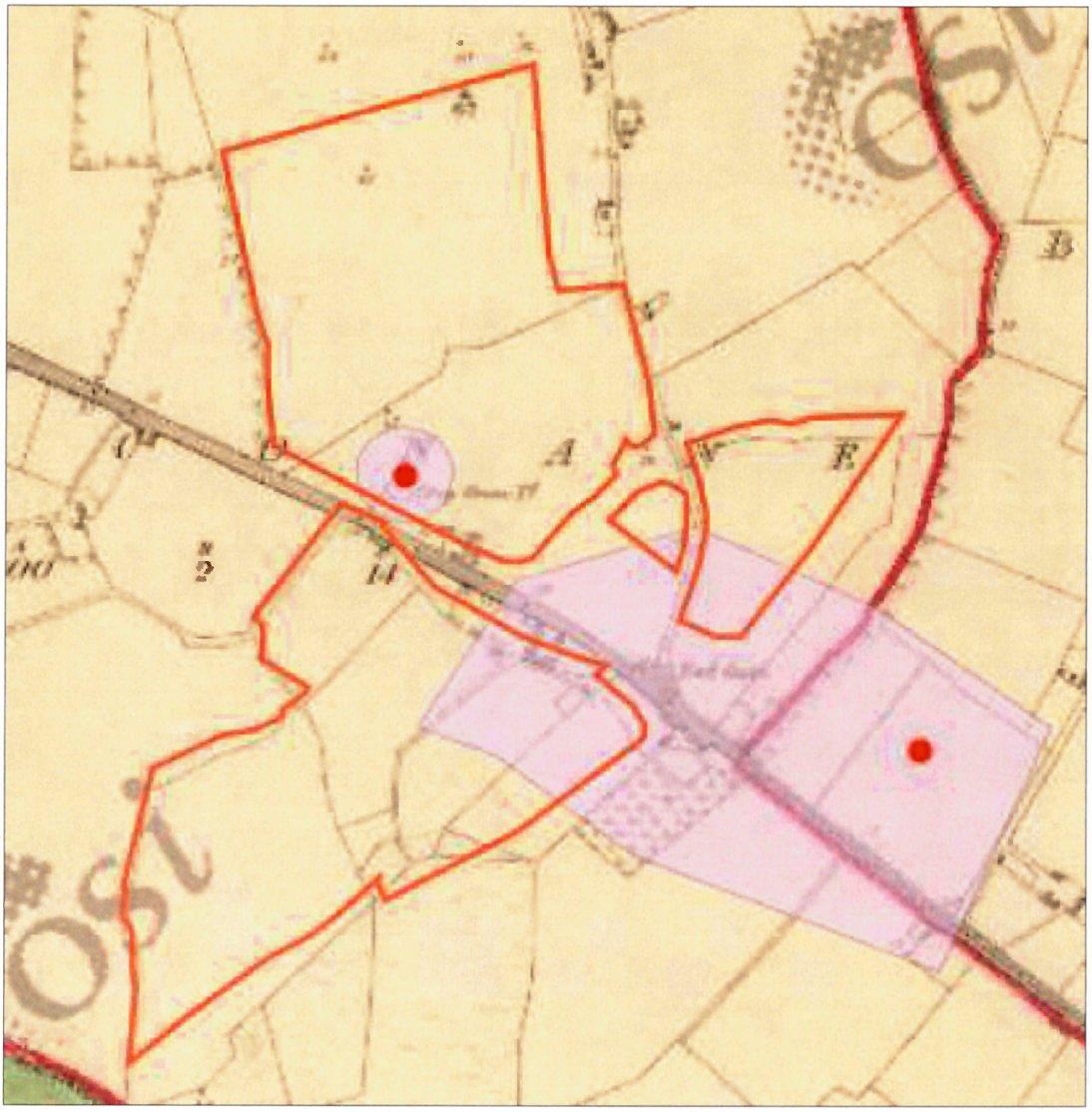


Figure 15.9 *Extract from the first edition 6-inch OS map with the boundary of the Masterplan site outlined in red (Source: Ordnance Survey of Ireland)*

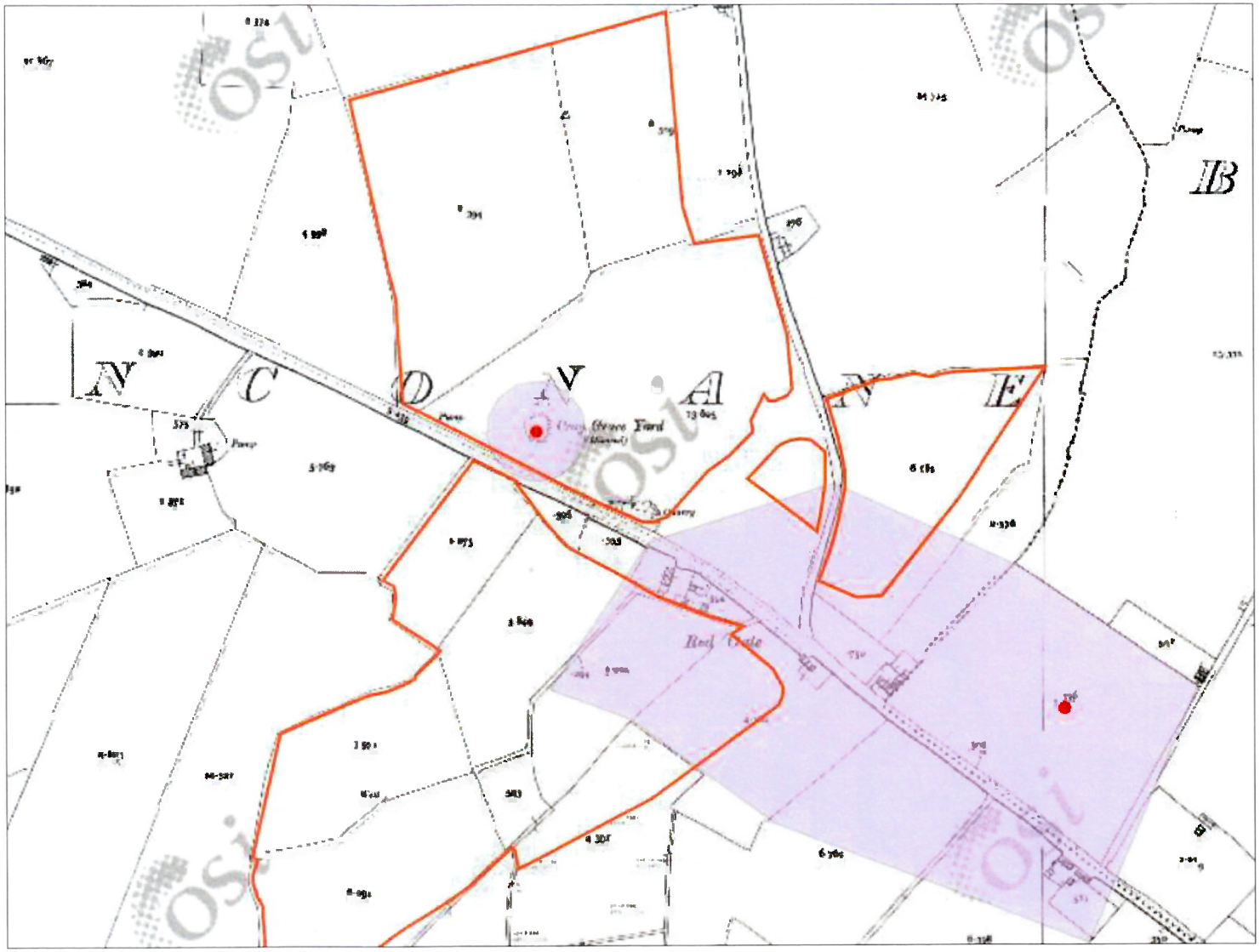


Figure 15.10 *Extract from the 25-inch OS map with the boundary of the Masterplan site outlined in red (Source: Ordnance Survey of Ireland)*

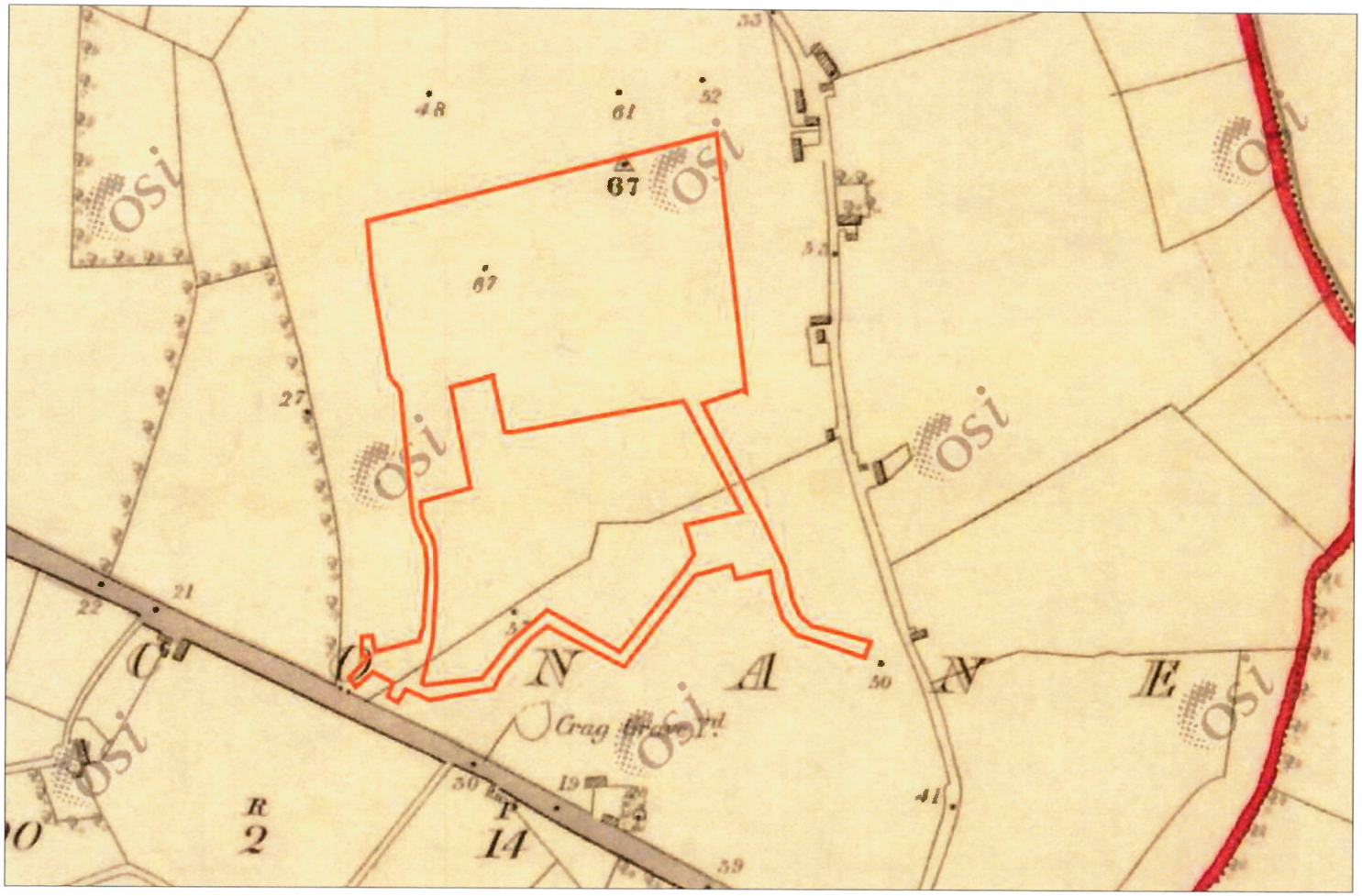


Figure 15.11 *Extract from the first edition 6-inch OS map with the boundary of the Phase 3 area outlined in red (Source: Ordnance Survey of Ireland)*

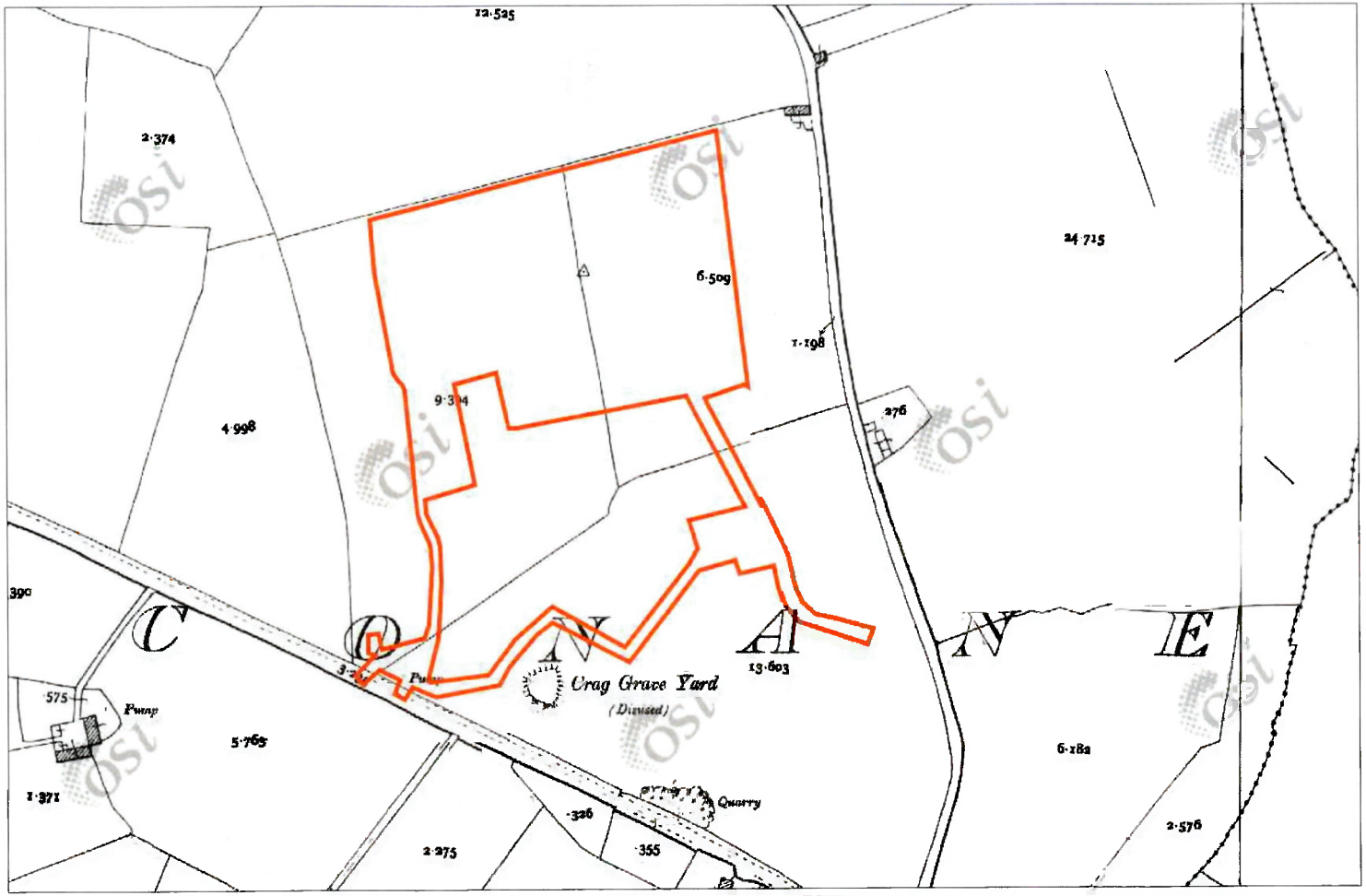


Figure 15.12 *Extract from the 25-inch OS map with the boundary of the Phase 3 area outlined in red (Source: Ordnance Survey of Ireland)*

Figure 15.13 *Aerial image from 1995 showing the Phase 3 area outlined in red (Source: Ordnance Survey of Ireland)15.14*

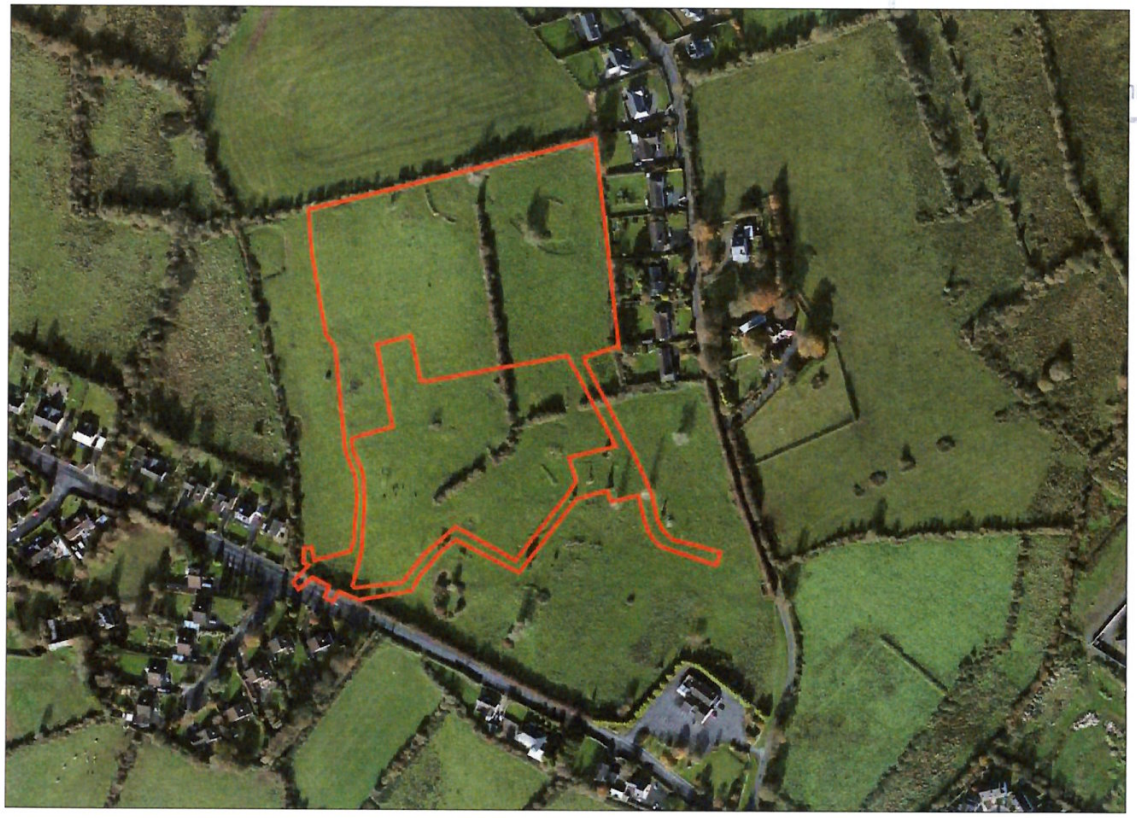


Figure 15.14 *Aerial image from 2013-2018 showing the Phase 3 area outlined in red (Source: Ordnance Survey of Ireland)*

Figure 15.15 *Location of test trenches excavated across the Phase 1 area*

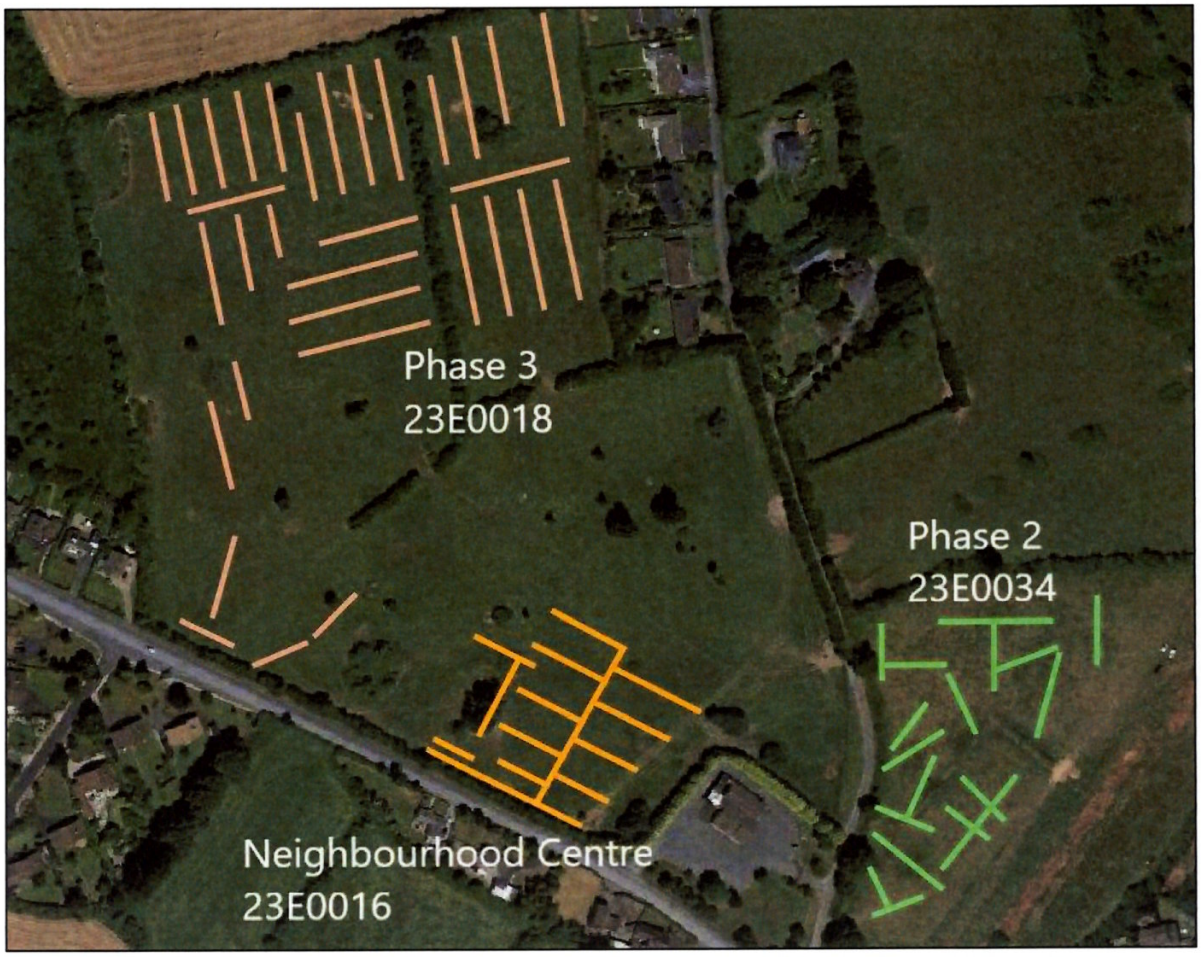


Figure 15.16 *Location of test trenches excavated across the Phase 2, Phase 3 and Neighbourhood Centre areas*

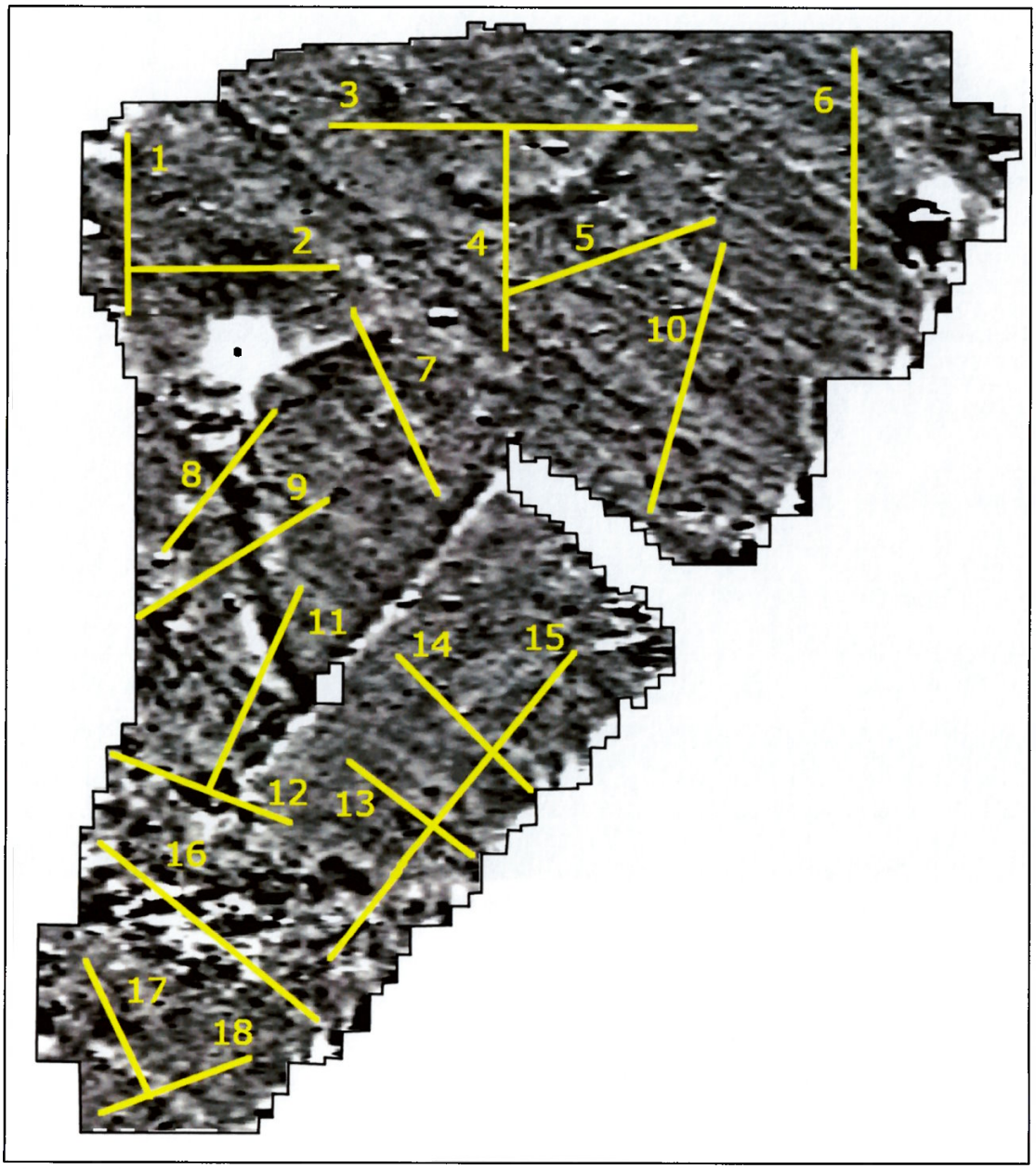


Figure 15.17 *Test trench layout for Phase 2, over greyscale image from geophysical survey*

Figure 15.18 *Location of test trenches excavated across the Phase 3 area with potential archaeological features circled in black*

Figure 15.19 *L ocationof test trenches excavated across the Phase 4 area*

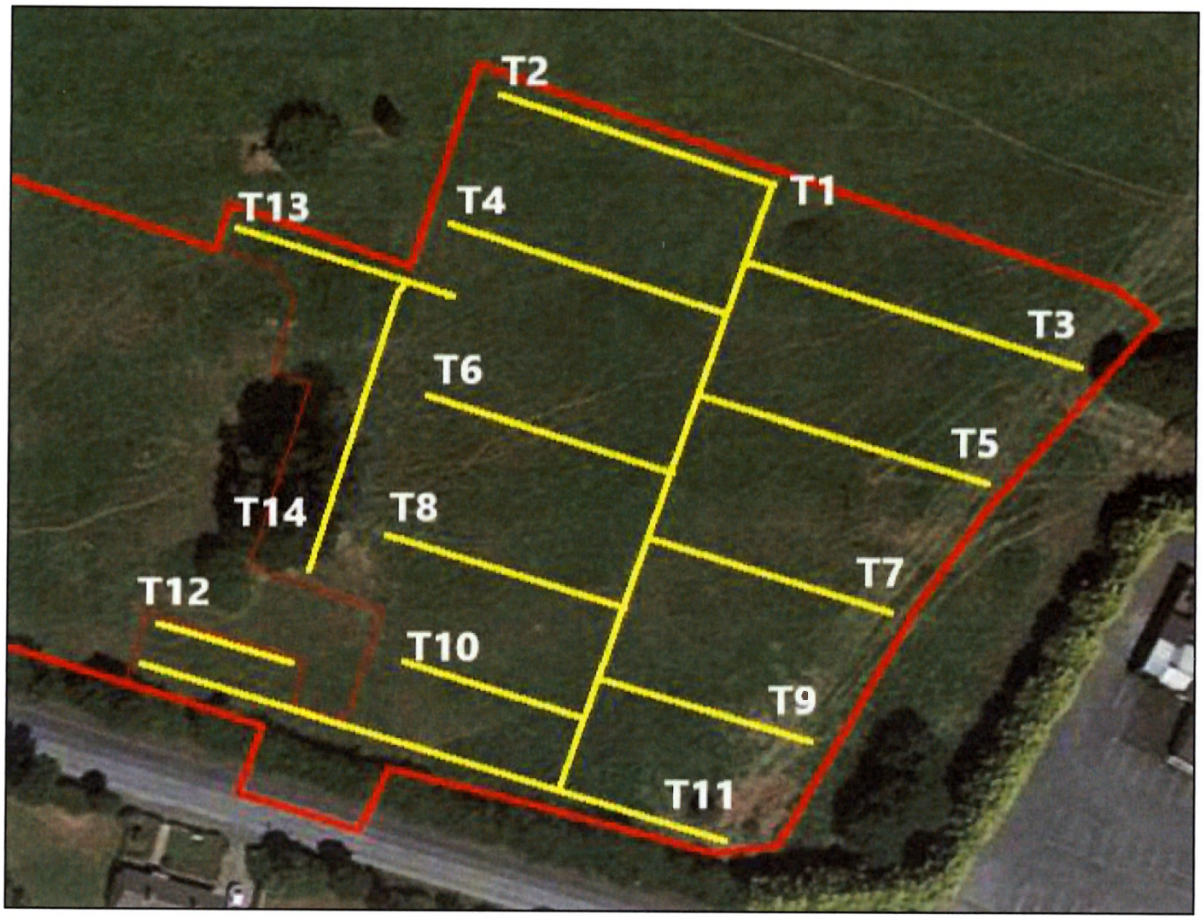


Figure 15.20 *Location of test trenches excavated across the Neighbourhood Centre area*

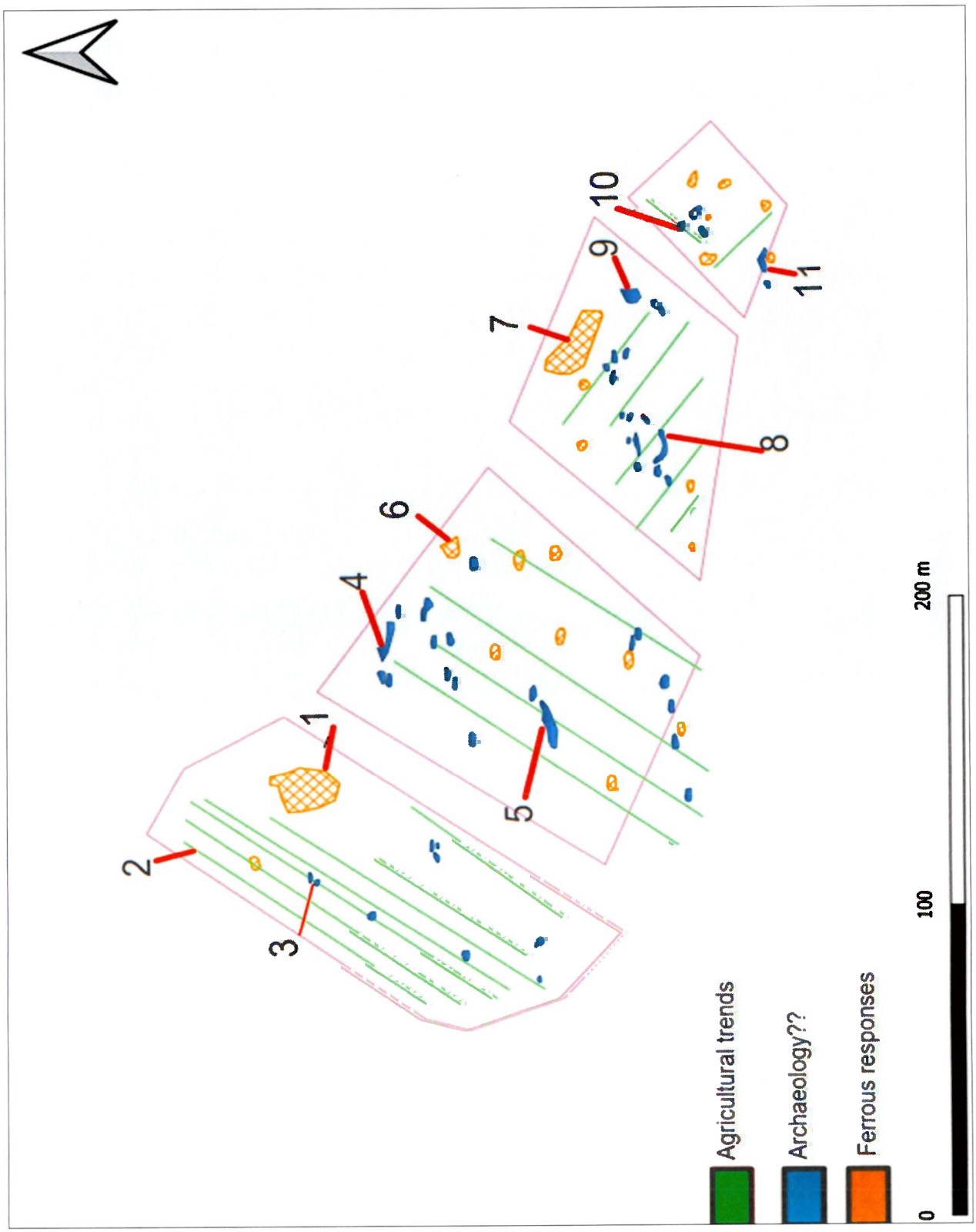


Figure 15.21 *Interpretive mage from geophysical survey of the Phase 5 area*

Figure 15.22 *Greyscale image from geophysical survey of the Phase 5 area*

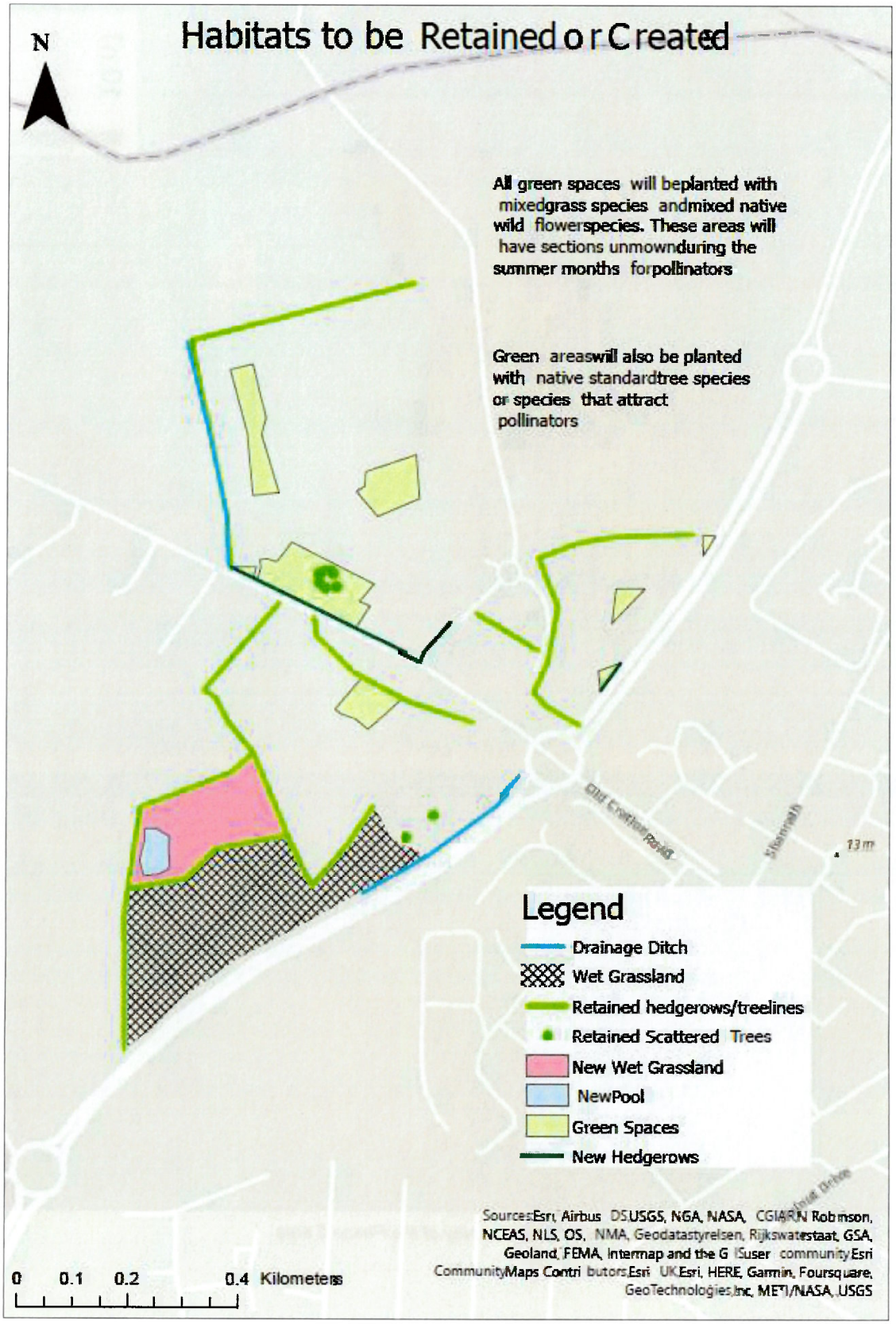


Figure 15.23 *Habitats to be retained or created, including a proposed new wet grassland and pond in the Phase 5 area*

APPENDIX 15.4: PREVIOUS EXCAVATIONS

Location	Licence	Summary
Clonconane, County Limerick	04E0851	Planning permission was granted for the construction of 200 houses and ancillary works at Clonconane. The north section of the development site is within the zone of archaeological potential of a possible settlement site. Phase 1 of archaeological works consisted of monitoring of topsoil removal at the northern end of the site. Phase 2 consisted of the excavation of 57 test-trenches over the area of the rest of the site. The trenches were excavated on the footprint of the house sites and access roads. The topsoil was removed to an average depth of 0.3-0.5m. The topsoil was a mid-brown clay and contained occasional sherds of modern pottery and glass. The subsoil consisted mainly of mid-orange/brown silty clay with frequent limestone outcrops. No evidence of archaeological activity was recorded.
Knock, Clonconane and Ballygrennan townlands, County Limerick Clondrinagh, Monabraher and Ballynanty More, County Clare	E4440	Test trenching on the route of the proposed Coonagh – Knockalisheen Distributor Road in Counties Limerick and Clare revealed thirteen burnt stone spreads (four with possible troughs), four burnt stone pits, two pits associated with charcoal production, a probable ring-barrow, two pits of unknown function and a curvilinear feature (?barrow, ?house). See below Nos 84, 382-4, 391-2 and 399 (E4452-8).
Clonconane, County Limerick	E4455	Clonconane 1 was located on the proposed Coonagh – Knockalisheen Distributor Road. Six burnt stone spreads, pits and two wooden structures were excavated over six areas. The burnt stone spread in Area A measured 4.3m by 2.5m, was 0.03m deep and was composed of dark brown clayey silt with frequent charcoal and heat-affected stone inclusions. In Area B the burnt stone spread was similarly composed and measured 4.4m by 4.2m and was 0.07-0.1m deep. In Area C a wooden trackway, a post-and-stake structure and two burnt stone spreads were excavated. The trackway and post-and-stake structure were located adjacent to one of the burnt stone spreads, but it was not apparent during excavation if the three were contemporary. They were then covered by clay and a second burnt stone spread was located on top of the clay. The wooden trackway measured 3.05m long orientated from the south-west to the north-east and was 1.82m wide; the north-western edge had collapsed into a natural sink hole. The trackway was composed of 19 horizontal timbers and five vertical posts/stakes. The horizontal timbers consisted mostly of roundwoods and at least three

Location	Licence	Summary
		split timbers in a poor to moderate condition. The posts and stake were located at the corners of the surviving horizontals. A post-and-stake structure formed a distinct square, 1.9m by 1.41m, adjacent to the trackway. Three of the four posts were supported by a stake. The posts and stakes were roundwoods, were wholly converted and had numerous facet marks. The posts were uniform in size being between 0.12-0.15m in diameter. The stakes were worked into pencil points and had a diameter of 0.06m and 0.08m. To the east of the wooden structures was a burnt stone spread, composed of loose mid greyish black peaty silt with frequent heat-shattered stone and charcoal, measured 10m by 5.02m and was 0.17m thick. The burnt stone spread located over the clay may be an ex situ deposit. The spread was blackish dark grey silty peat with frequent heat-shattered stone and charcoal flecks measuring 4.84m by 3.42m and 0.18m thick. Area D contained a single burnt stone spread of moderately compact dark brownish black sandy silt with frequent burnt stone and charcoal flecking. The spread measured 7.9m by 6.1m and was between 0.7-0.8m thick. There was a single pit in Area E, ovoid in plan, concave with a flattish base, measuring 1.9m by 1m and 0.27m deep. The single fill was soft black peaty silt with frequent charcoal and heat-shattered stone. Area F contained a large burnt stone spread, c. 23m in diameter. The spread was made up of two in situ manmade burnt stone deposits, redeposited natural, an up-casted burnt stone material, a collapsed/washed down burnt stone deposit, disturbance from a probable drain cutting and a layer of burnt stone mixed with topsoil. No cut features were uncovered under the main body of the burnt stone spread, however two pits were recorded to the north of the spread. The only feature recorded under the spread was a natural depression that appeared to have been modified as a fire pit. The base of the depression was filled with a charcoal-rich deposit. Both pits were oval and flat based containing a single fill of dark brownish black peaty silt with frequent charcoal and heat-shattered stone. The pits measured 1.8m by 1.3m and 0.24m deep and 1.52m by 1.03m and 0.23m deep.
Clonconane, County Limerick	E4456	Clonconane 2 was located on the proposed Coonagh – Knockalisheen Distributor Road. A charcoal production pit and a deposit were identified at the site. The pit measured 1.8m by 1.4m with a depth of 0.4m. The base of the pit was fire reddened and contained a basal deposit of charcoal 0.13m thick which was sealed by a deposit of dark brown silty clay. A furrow cut through the pit. The deposit was located close to the pit and measured 5.25m by 1.5-2.9m and 0.05m thick. The deposit is likely to be a by-product of the

Location	Licence	Summary
		charcoal production. The charcoal production pit extended beyond the limit of the road scheme.
Clonconane/ Ballynanty More/ Monabraher, County Limerick	E4502	Following the main phase of testing in 2012 (E4440), test trenching took place in several previously inaccessible areas on the route of the proposed Coonagh – Knockalisheen Distributor Road in County Limerick. No additional archaeological features, deposits or artefacts were revealed.
Clondrinagh and Clonconane, Limerick	17E0392	Monitoring was requested by Limerick City and County Council during the advance works stage of the construction of the new northern distributor road in Limerick city. A full archaeological presence was maintained during the initial phase of the peat and topsoil removal on a section of the road scheme extending from the Coonagh roundabout on the Ennis road terminating at the Cratloe road, in Clonconane townland. The route travels through part of the River Shannon flood plain and the Crampaun River lies to the west of the road scheme. Pre-development testing of the entire route was undertaken by TVAS (Ireland) over 2012-2013 and several archaeological sites were identified and excavated. The nearest archaeological monument is a burial cairn (L1005-005) located 190m to the west of the road scheme. Groundworks were mostly undertaken in wet low-lying marshy ground where the peat deposits had an average depth of 2m and reached a maximum depth of 3.5m in the central portion of the wayleave. Monitoring was also undertaken on higher ground close to the Cratloe Road. The topsoil here varied from 0.35-0.42m in depth and two pits were exposed and excavated close to where this section of the road scheme terminated at the Cratloe road. They appeared on the surface as localised spreads of dark sediment containing occasional charcoal. Pit(C2) measured 0.45m north-south by 0.49m and was 0.2m deep. The sides of the pit were steep and straight, and the base was flat and uneven. It was filled with dark brown/black moderately compacted silt with frequent charcoal flecks and clay inclusions. The entire contents of the pit were sieved but no further finds or organic matter were recovered. Pit (C5) was located 0.5m north of the previously described pit. It was oval in plan measuring 0.84m north-south by 0.7m with a maximum depth of 0.37m. The pit contained two fills: a lower fill of black charcoal-enriched silt with some clay (C4) measuring 0.18m in depth and an upper layer of clay (C3), measuring 0.1m in depth which sealed the lower fill. A single cow tooth was recovered from the base of the pit. This was submitted to Queen`s University Radiocarbon laboratory in Belfast but there was insufficient collagen in the tooth to enable a date to be obtained. No further features or finds of archaeological significance were uncovered.

Location	Licence	Summary
Clondrinagh, County Limerick	03E1078	Monitoring of topsoil-stripping in the vicinity of an enclosure (SMR 5:5) was requested by Dúchas. The monument is near the northern edge of a large site being developed as a shopping complex at Clondrinagh, on the Ennis Road in Limerick. As virtually all the site is low-lying, the levels are being raised by approximately 2-3m across the site using imported soil, rubble and stone. Large-scale earthmoving and topsoil-stripping had been carried out on most of the site over the previous two years, with limited archaeological involvement. Monitoring was requested for the small amount of topsoil-stripping remaining. This was in the field containing the monument, in the northern part of the site. An examination of some of the areas already stripped was also requested, to determine if any archaeological remains were present. No archaeological remains were noted.
Clondrinagh, County Limerick	03E1144	Testing of an 'enclosure' was requested by the developer. The monument, which lies near the northern edge of a large site being developed as a shopping complex, is on the route of one of the main distributor roads, which will give access to the complex and will also allow the development of lands to the north of the site. Both the developer and Dúchas sought further information on the nature of the monument, in order to develop a suitable mitigation strategy. The possibility of rerouting the road was limited by the location of the monument on the edge of the site and the design and financial implications of routing the distributor road further south into the site. The monument is listed as an enclosure in the RMP, based on cartographic evidence. It is in fact a circular mound, c. 23m in diameter and standing 1.5m above the surrounding field. Small bushes and trees are present along its northern, eastern and southern edges. Testing was carried out, with the excavation of two hand-dug trenches, one on the western edge of the mound (7m by 1m) and one on the top, in the centre of the mound (2m by 2m). These found that the mound, or cairn, is made up of small and medium-sized stones to a depth of 1m. On the western side of the cairn, a combination of larger stones and the natural bedrock acted as revetting for the cairn material. On the old ground surface beneath the cairn, fragments of cremated human bone were found in a discrete deposit. No evidence for any cists or deposits of bone within the cairn was found in the limited area examined. There was no external ditch. The nature of the site and the presence of cremated bone indicate that the monument is a prehistoric burial cairn. This appears to utilise a small area of higher ground caused by an outcrop of bedrock in an otherwise low-lying boggy area. A mitigation strategy has not yet been finalised.

Location	Licence	Summary
Clondrinagh, Ennis Road, County Limerick	05E0304	Four test-trenches were excavated in advance of the redevelopment of a halting site. No features or finds of archaeological significance were revealed.
Clondrinagh, County Limerick	93E0085	Four cuttings were made on the site of a proposed warehouse adjacent to the monument. The site was found to have been infilled with c. 1m of modern rubble which overlay a "blue mud", presumably of estuarine origin. Nothing of archaeological interest noted.
Clondrinagh, County Limerick	01E1000	The digging of foundation trenches for two industrial units was monitored because of proximity to SMR 5:45, a possible medieval settlement to the north of the area. Nothing of archaeological significance was uncovered in the monitoring of this development.
Gortgarraun, County Clare	E4457	Gortgarraun 1 was located on the proposed Coonagh – Knockalisheen Distributor Road. The excavation revealed a fulacht fiadh with two trough pits and three smaller burnt stone spreads. A Palaeolithic channel was also recorded across the site. The fulacht fiadh measured 7.2m by 5.8m with a depth between 0.08m to 0.1m. The first trough pit measured 1.3m by 0.88m and 0.14-0.17m deep, was sub-rectangular in shape and contained a basal fill that was more charcoal-rich than the fulacht fiadh material. Two flat stones were located in the base of the pit. The second trough pit was 1.48m by 1m and 0.1-0.28m deep, also sub-rectangular in shape and contained a single deposit of charcoal-rich silty sand with occasional heat-shattered stone. The three smaller burnt stone spreads were much degraded and measured 2.6m by 2.1m and 0.02m deep; 4m by 1.5-2m and 0.03-0.06m deep and 4.38m by 2.67m and 0.06-0.24m deep.
Ballygrennan 1 County Limerick	E4452	Ballygrennan 1 was located on the proposed Coonagh – Knockalisheen Distributor Road. The excavation revealed a burnt stone spread, c. 20m in diameter, with a trough pit and pit. The burnt stone spread was subsequently cut by a field drain before being inundated with between 1-2m of construction rubble. The trough pit was centrally located under the burnt stone spread. The pit was sub-rectangular in plan and measured 3.5m by 1.4m and was 0.36m deep. The single fill was black silty clay with frequent large angular heat-shattered stones and charcoal. A very black charcoal-rich deposit may represent burning adjacent to the south-eastern side of the trough. The south-western edge of the trough was cut by a pit. This pit was sub-circular with near vertical sides and measured 2.8m by 1.88m and 0.88m deep. The pit naturally filled with water and contained charcoal-rich fill with a high density of heat-shattered stone. The trough pit was centrally located under the burnt stone spread. The pit was sub-rectangular in plan and measured 3.5m by 1.4m and was 0.36m deep. The single fill was black silty clay with frequent large

Location	Licence	Summary
		angular heat-shattered stones and charcoal. A very black charcoal-rich deposit may represent burning adjacent to the south-eastern side of the trough. The south-western edge of the trough was cut by a pit. This pit was sub-circular with near vertical sides and measured 2.8m by 1.88m and 0.88m deep. The pit naturally filled with water and contained charcoal-rich fill with a high density of heat-shattered stone.
Ballygrennan 2 County Limerick	E4453	Ballygrennan 2 was located on the proposed Coonagh – Knockalisheen Distributor Road. The excavation revealed a burnt stone spread with two pit troughs, a shallow burnt stone spread and pit, an enclosure ditch, 29m in diameter, and post-medieval ditches/drains. The burnt stone spread was an obviously truncated, likely by modern ploughing, 'horse shoe'-shaped fulacht fiadh. The spread extended an area of 6.47m by 5.66m, the larger side of the 'horse shoe' being 3.39m wide, and 0.11m at its deepest. Two trough pits were located beneath the spread; Pit 1 was under the north 'arm' of the spread and Pit 2 was centrally located. Pit 1 was an irregular oval shape; it sloped in from the eastern side, had a concave base and measured 2.3m by 1.4m and was 0.95m deep. The basal fill was sticky light grey sandy silt with occasional heat-affected stone and charcoal. The main fill was soft greyish black sandy silt containing heat-shattered stone and charcoal and was 0.4m thick. A deposit of brownish grey silty clay sealed the pit. Pit 2 was a sub-rectangular in plan, with steeply sloped sides and a flat base, measuring 1.95m by 1.2m and 0.6m deep. The basal fill was moderately compacted brownish black clayey silt with much charcoal. The main fill was the same as that of Pit 1 but contained many heat-shattered stones and was 0.45m thick. Two trough pits were located beneath the spread; Pit 1 was under the north 'arm' of the spread and Pit 2 was centrally located. Pit 1 was an irregular oval shape; it sloped in from the eastern side, had a concave base and measured 2.3m by 1.4m and was 0.95m deep. The basal fill was sticky light grey sandy silt with occasional heat-affected stone and charcoal. The main fill was soft greyish black sandy silt containing heat-shattered stone and charcoal and was 0.4m thick. A deposit of brownish grey silty clay sealed the pit. Pit 2 was a sub-rectangular in plan, with steeply sloped sides and a flat base, measuring 1.95m by 1.2m and 0.6m deep. The basal fill was moderately compacted brownish black clayey silt with much charcoal. The main fill was the same as that of Pit 1 but contained many heat-shattered stones and was 0.45m thick. The enclosure ditch was dug into the brow of a slope in the field, following the natural inclination of the ground from east to west. The majority of the enclosure was located within the road take. The circular ditch had an internal diameter (north-south) of 29m, enclosing an

Location	Licence	Summary
		approximate area of 790m², and a north-facing break in the ditch. The sides of the cut were very steep, particularly around the edge of the natural slope, the base was very gently rounded, and was between 1-1.5m wide on average and was deepest along the western side at 0.9m and shallowest at the southern and northern sides at 0.5m. Evidence of a possible internal bank was noted in a single fill recorded in the base and internal side of the cut. There were two drains opened contemporarily with the ditch. Extensive ploughing was also noted meaning that no internal features survived. Two linear features cut the top of the enclosure to the north and south.
Ballygrennan 3 County Limerick	E4454	Ballygrennan 3 was located on the proposed Coonagh – Knockalisheen Distributor Road. A burnt stone spread with a trough pit and a second trough pit were identified at the site. The burnt stone spread measured 7.8m by 4.5m with a depth between 0.05-0.3m. The centrally located pit measured 2.5m by 1.1m and 0.45deep, was oblong in shape and contained a basal fill that was darker than the main spread material. The second trough pit was 2.6m by 1.1m and 0.47m deep, also oblong in shape, and contained a single deposit of burnt stone.
Ballygrennan County Limerick	98E0321	The site, on the north-eastern side of the Old Cratloe Road, was bordered to the south-east by Galtee Avenue, originally a road leading to a farm, now defining the western limits of a housing estate. To the north-western side it was defined by the townland boundary, and to the north-eastern by a field boundary. On the earlier maps there was a north-east by south-west subdivision of the field. The eastern field was slightly elevated; the western one, low-lying and prone to flooding, was, along the western and northern boundaries, permanently marshy. A possible settlement (Down Survey maps) was marked partly on this side of the western boundary. The topsoil-stripping of the area of the proposed development was monitored. With the exception of a localised spread of burnt stone and a pit/ditch, which it was not possible to date, there was no trace of any activity pre-19th century, and this consisted mainly of attempts to drain the land. The area where the 'possible settlement' was allegedly situated was particularly prone to flooding. The level ground on this part of the site, together with the high level of the impermeable clay, has resulted in a total lack of natural soakage. If there had been a settlement it is more likely that it was either on the higher ground to the east or outside the area of the proposed development, i.e. to the west or south.
Phase 1 Housing Development,	22E0664	A programme of archaeological test trenching was undertaken for Phase 1 Housing Development at Old Cratloe Road, Clonconane, County Limerick under Excavation Licence 22E0664. The works were carried out over a period of four days between Thursday 1st and

Location	Licence	Summary
Clonconane, County Limerick		Tuesday 6th September 2022. A total of 40 no. linear trenches (T1 - T40) were excavated under archaeological supervision across the footprint of the area proposed for development and within the boundaries of the subject site. All trenches were located within agricultural land which is currently used as pasture. A total of 1335 linear metres were excavated at different locations within the area proposed for development using a tracked 360° mechanical excavator fitted with a toothless grading bucket operating under strict supervision by the licensee. The excavated spoil from all trenches was also systematically inspected to assist with artefact retrieval. Nothing archaeological was identified.

CHAPTER SIXTEEN THE LANDSCAPE

16.1. INTRODUCTION

This chapter should be read in conjunction with the site layout plans for the proposed development and the proposed overall masterplan and project description provided in Chapter 2.0. The purpose of this chapter is to analyse the existing landscape and to assess the likely potential visual impacts arising from the Phase 3 proposed development and overall masterplan on the existing landscape and any mitigation measures proposed.

The proposed scheme is to create a new residential community in an existing urban setting, close to the amenities of the city. It is proposed to deliver the overall scheme in seven phases with the proposed development comprising Phase 3 of an overall development. The indicative masterplan for the overall site covers 28.13 hectares, However, the proposed Phase 3 development comprises an application for 98 no. units only on a gross site area of 9.37 hectares gross with 2.8 hectares of net residential area located on the northern side of the Cratloe Road. The 'Receiving Environment' section of this study assesses the full study area which comprises the 28.13 hectare masterplan site. In the assessment of the landscape and visual impacts the full masterplan development is assessed with reference to this specific development, Phase 3.

16.2. ASSESSMENT METHODOLOGY

The criteria as set out in the current EPA Guidelines on Information to be contained in Environmental Impact Assessment Reports (Published May 2022) are used in the assessment of the likely impacts. Chapter 1.0 of this EIAR sets out the methodology used in the assessment in detail.

The assessment was carried out by visiting the site and its surroundings in February 2022 and by analysis of the relevant documents as listed below:

- Limerick Development plan 2000-2024
- Assessment of the accurately surveyed and modelled photomontages of the proposed development
- Current and historic aerial photographs,
- Historic maps of the site and surrounds using the Ordnance Survey Ireland's National Historic Maps Archive

Through analysis of the above, the subject lands were assessed in relation to their surrounding environment to identify a study area in which both visual and landscape character impacts would be perceivable. Important landscape features on subject lands and in the wider area were identified as part of this process.

The proposed viewpoints for the verified views were selected to represent points in the local landscape from which the development would potentially be visible and are relate to views from potential visual receptors. Various viewpoints have been selected to provide a well-rounded and realistic representation of how the development will look from different aspects and demonstrate views from sensitive receptors.

Views are located, North, South, East and West of the subject lands, both at close-range and long-range, and have been selected from specific locations where more expansive views are possible.

The buildings roads and landscape are modelled in three-dimensional AutoCAD software by the CGI consultant (Digital Dimensions Ltd). Two-dimensional AutoCAD drawings are provided by the design team for the CGI consultant to accurately model the external parts of the development. Liaison between the CGI consultant and the project Architect, Engineer and Landscape Architect on their respective designs informs the final appearance of the verified views. For details on methodology in relation to the surveying of photo view locations, lenses and specifics on the development of the verified views, refer to the accompanying Appendix completed by Digital Dimensions Ltd. (EIAR Volume II – Appendix 16.1).

16.2.1 Assessment of Landscape and Visual Effects

The GLVIA 3rd Edition (Landscape Inst. + IEMA 2013) gives specific guidelines for landscape and visual impact assessment. The GLVIA advises that effects on views and visual amenity be assessed separately from the effects on landscape, however acknowledging the two topics are fundamentally linked.

'Landscape' results from the interaction of the physical, social, and natural components of our surroundings. How these elements interact creates the intrinsic landscape character of a place. Landscape impact assessment identifies the changes to this character which would result from the proposed development and assesses the significance of those effects on the landscape. Visual impact assessment is concerned with changes that arise in the composition of available views (primarily public views), the response of people to these changes and the overall effects on visual amenity.

16.3. RECEIVING ENVIRONMENT

16.3.1 Site Area Description

The Masterplan Site (MS) is situated on the northwest fringe of Limerick city in the townland of Clonconane. It is located 475 to 500m to the east of the Crompaun River, a small tributary of the Shannon and 180m to the south of the County Clare Boundary. The MS measures approximately 28.13 hectares and is divided by several public roads into four distinct sections.

The main section (Map ref. A) to the north of the Old Cratloe road is over 9.1 hectares in size and measures approximately 400m on its longest north-south axis and approximately 400m on its longest east-west axis. A large portion of the study area (Map ref. B) lies to the south of the Old Cratloe Road and is located between the existing residential development and the new ring road (Condell road extension, under construction). This area is 8.6 hectares and measures approximately 490m on its longest north-south axis and approximately 400m on its longest east-west axis. A smaller section of the lands lies to the east of Pass Road (Map ref. C) and bounds the new link road to the east. This section is 1.79 hectares and in triangular form with it's longest north-south axis approximately 180m and the east-west axis varies between 50m in the south and 150m in the north. The fourth section of the MS lands is a small section (Map ref. C) nestled between the Pass Road, the new roundabout and spur connecting to the Old Cratloe rd. This section measures 50 x 70m on it's longest axes and measures approximately 0.25 hectares. This section bounds the Country Club to the south.

The ground levels generally fall from land in the very north of the MS towards the south, east and west. There are some notable level areas in the main sections of the study area (A+D) , however generally the land has a slope of approximately 1:20. The general surrounding landscape would be a very softly undulating landscape with some large level sections. This changes in the northwest where the levels rise to the hills at Woodcock Hill and Ballycar. At the lowers levels of the site in the very south of the MS the vegetation changes to a wet meadow. In the northern section of the lands there are some notable trees and small groves of trees scattered throughout the fields. Most of these trees are non-native species that were planted when this area was used as a golf course. A visually prominent clump of vegetation just north of the Old Cratloe Rd is growing in a historic graveyard. This is recorded in the County Development plan as a historic site and is noted on the historic maps as Crag Graveyard.

Figure 16.1 Site Context.

16.3.2 Site Area Context

To the north. west and north-east the landscape is mostly agricultural land as well with some rural residential settlement located mostly along the side of the public roads. The field patterns and boundary hedgerows are typical for that region. To the east, the site is bordered by new ring road which is currently under construction. This local link road connects the northern parts of the city to the west of the city and main arterial route to the N18 going west, the R445. The subject lands bound existing residential properties along Pass Road and the Old Cratloe Road with the roads forming parts of the perimeter of the study area. All other boundaries are traditional field boundary hedgerows.

The study area lies 3.5km from the centre of Limerick city. The land to the east and south of the study area is the western fringe of the city and is primarily residential developments. These residential areas are mostly low-rise developments from the 1960s. There are also a number or educational facilities nearby and associated student housing at Cratloe Wood Student Village and Thomond Student Village.

To the south of the study area the built development is characterised by large commercial buildings and car parking, most notable at the 'Tesco Superstore' and the Westlink Business Park.

16.3.3 Character of the Site

Within the Limerick County Development Plan, the subject lands fall under the Urban Character Area 5, where it is classed as part of the city landscape and the gateway from the west.

The landscape character of the study site and its environs has largely been determined by the following:

- gentle undulating topography on the site and its surrounding environs
- landscape history of agricultural use with grassland and traditional hedgerow field boundaries and drainage ditch
- landscape history of use as a golf course with remnant scattered non native tree planting in parts.
- historic remnants of Crag Graveyard
- wetland meadow area in the south of the subject lands
- recent removal of mature roadside hedgerow to facilitate road improvements and installation of timber post and rail fencing
- new road infrastructure recently built and currently under construction.
- number of large industrial and commercial buildings and associated infrastructure in the local landscape.
- urban residential landscape to the east and a number of individual residences and small groups of houses located in the area

Figure 16.2 View from Old Cratloe Road to north. Crag graveyard and scatted trees visible. Recently installed timber fence where roadside hedgerow has been removed.

Figure 16.3 View from Pass Road to north. Scattered trees and hedgerows visible. Recently installed timber fence where roadside hedgerow has been removed.

Figure 16.4 View from Old Cratloe Road at Shannonvale to the west. Subject lands are visible in the background beyond the road construction works

Most of the subject lands would be considered to have the character of an 'agricultural field' typified by traditional hedgerow boundaries both around and within the site. The main area of the subject lands (Map ref A) has a different character due to the scatted individual and small groups of trees. This is due to the recent history of this area where is was used as a golf course. The subject lands are primarily bounded by robust and healthy field boundary hedgerows, while hedgerows and drainage ditches also traverse the site. The boundary of area A and the Old Cratloe and Pass Roads is now defined by a new timber post and rail fence. The hedgerows in this area have been recently removed to facilitate the road upgrades. Subsequently the character of this area has more or a peri-urban feel than the rural feel of other parts of the subject lands. The new road to the east of the site (under construction) will extend the urban landscape of the city to the edge of the subject lands. Through a comparison of the historical Ordnance Survey maps and aerial photography with the current site and through analysis by site visits it is evident that there has been little change to the study area until recent times. The subject lands were open farmland through both sets of historic maps, 6-inch maps (1837-1842) and 25-inch maps (1888-1913). The field boundaries and patterns in the historic maps are much the same as would have been visible until the most recent road works. There is some more sub-division of fields visible today than historically Crag Graveyard is marked on all the historic maps and the roads appear to have remained mostly on the same alignment until the most recent changes.

16.3.4 Landscape Sensitivity and Planning

Within the Limerick County Development Plan, the subject lands fall under the Urban Character Area 5, where it is classed as part of the city landscape and the gateway from the west. The lands are not

included in any of the Landscape Character Areas. The land is not located within or adjoining any Natura 2000 designated sites or nationally designated NHA or pHNA . There are no Tree Preservation Orders , listed views or prospects or any other landscape designation applied to the subject lands or its immediate surrounds.

Sensitivity	Description
Very High	Areas where the landscape exhibits a very strong, positive character with valued elements, features and characteristics that combine to give an experience of unity, richness, and harmony. These attributes are recognised in landscape policy or designations. In such areas the landscape character exhibits a very low capacity for change in the form of development. Examples of which are high value landscapes, protected at an international or national level (World Heritage Site/National Park).
High	Areas where the landscape exhibits strong, positive character with valued elements, features and characteristics. These attributes are recognised in landscape policy or designations as being of national, regional, or county. In such areas the landscape character exhibits a very low capacity for change in the form of development. Examples of which are high value landscapes, protected at a national or re gional level (Area of Outstandi ngNatural Bea uty)
Medium	Areas where the landscape has certain valued elements, features or characteristics but where the character is mixed or not particularly strong. The character of the landscape is such that there is some capacity for change in the form of development. These areas may be recognised in landscape policy at local or county level and the principal management objective may be to consolidate landsca pe character or facilitate appropriate,neces saryc hange
Low	The character of the landscape is such that it has capacity for change; where development would make no significant change or would make a positive change. Such landscapes are generally unrecognised in policy and where the principal management objective is to facilitate change through development, re pair, restoration, or enhancement.
Negligible	Areas where the landscape exhibits negative character, with no valued elements, features or characteristics. The character of the landscape is such that its capacity for accommodating change is high; where development would make no significant change or would make a positive change. Such landscapes include derelict industrial lands or extraction sites, as well as sites or areas that are designated for a particular type of development. The principal management objective for the area is to facilitate change in the landscape through d evelopment,re pair ,or restoration.

Table 16.1 Categories of Landscape Sensitivity
Categories of Landscape Sensitivity, *Developed by KFLA ltd for this study based on GLVIA (Guidelines for Landscape and Viaul Impact Assessment) 3rd Edition (Landscape Inst. + IEMA 2013)*

The MS is covered by three different land use zonings, with the primary land use comprising 'New Residential Use'. This land use is described in the development plan as "to provide for new residential development in tandem with the provision of social and physical infrastructure". The area in proximity to the archaeological monument is designated as 'Open Space Use' . The objective of the open space use is "to protect, provide for and improve open space, active and passive recreational amenities" A small area of the lands is designated as 'local centre use' which is described as "to protect and provide local centre facilities to serve the needs of new/existing neighbourhoods and residential areas". The application site is located wholly on lands zoned for 'New Residential Use'. The purpose of this zoning is intended primarily for new high quality housing development.

With the above considered the sensitivity of the landscape to built development would be low to medium. The lands have the capacity to accommodate built development with minimal risks to the landscape in terms of character or visual amenity.

Figure 16.5 Location of Potential Sensitive Visual Receptors as listed in table 16.3.

16.3.4 Sensitivity of Local Visual Receptors

The sensitivity of a receptor is determined by a combination of several factors, the type of viewer, the viewer's relationship with the locality and how direct and regular the view is, the quality of the view and the quality of the existing environment from where the development will be viewed.

For this study the sensitivity of receptors is divided in 5 categories based on the criteria in Table 5.0 below.

Sensitivity Rating	Visual Receptor
Very high	Designated views, viewpoints, and vistas. Areas containing protected views as outlined in Development Plans or landscape policies. Very highly aesthetic views and vistas.
High	Local residences and local facilities with a direct and prolonged view of the development. High quality views from public open spaces Non-designated views of distinctive or characteristic landscapes from general road network. Views to and from local ridges, hills, high-points, buildings of note. Views to and from sites of r egionalecolo gical and / or cultural interest.
Medium	Viewers with a moderate interest in their environment such as recreational travelers and less frequent users of recreational facilities, e.g. walkers along canal, users of any adjacent parks, Viewers within a landscape dominated by traffic. Visual condition of the landscape is degraded. Views to and from open spaces, local parks. Views from sports and recreational facilities. Views to and from sites of local ecological and / or cultural interest. Views from general community, schools, institutional buildings, and associated outdoor areas.
Low	Viewers with a passing interest in their surroundings or whose interest is not specifically focused on the landscape, e.g. workers. Viewers within an exclusively trafficked landscape (i.e. a major roadway or adjacent to one with no mitigation) Views of unremarkable landscapes from general road network. Views of unremarkable landscapes from residences where significant road infrastructure exists in the vicinity. Views to and from industrial/commercial landscapes of little or no cultural heritage antiquity or aesthetic merit.
Negligible	Views to and from degraded or abandoned urban or peri-urban landscapes or areas of dereliction with very low aesthetics value and little or no elements of interest. Views dominated by transportation and other infrastructure of no aesthetics merit.

Table 16.2 Sensitivity Categories for Visual Receptors

Rating of Visual Sensitivity of Receptors *(Developed by KFLA ltd for this study based on Transport Infrastructure Ireland Publication, Landscape Character Assessment (LCA) and Landscape and Visual Impact Assessment (LVIA) of Specified Infrastructure Projects - Overarching Technical Document, Document No. PE-ENV-01101)*

Receptor	Description	Sensitivity
VR 1	Single detached house with house on opposite side of Pass Rd with si gnificant vegetation screenin g	**Medium**
VR 2	Line of 6 single storey houses on Pass Road with rear gardens bounding the study lands. A dense vegetated boundary exists for most of the bou ndary	**Medium**
VR 3	Line of 5 houses (9 no. single storey and 2 no. two storey) on Pass Road with rear gardens separated by agricultural field from the study lands. A dense vegetated bou ndaryexists alongthis bou ndary	**Medium**
VR 4	Line of 3 single storey houses on Old Cratloe Road with rear gardens se parated by agricultural fields and h edgerows from the st udylands.	**Medium**

VR 5	Line of 5 houses (4 no. single storey dormers and 1 no. two storey) on Old Cratloe Road with rear gardens separated by agricultural fields and hedgerows from the study lands.	**Medium**
VR 6	Group of 10 single storey units in a cul-de-sac style development on the opposite site of Old Cratloe Road.	**Low**
VR 7	Line of 4 houses (2 no. single storey and 2 no. two storey) on Old Cratloe Road with front and side gardens fronting road with a combination of walls and hedges as boundaries.	**Low**
VR 8	'The Country Club' sports and social club fronting on to Old Cratloe Road. The club and car park are substantially screened from the site by dense vegetation.	**Low**
VR 9	Low density semi-detached housing at Shannnonvale on opposite side of new road infrastructure.	**Low**
VR 10	Low density semi-detached housing at Clonile on opposite side of new road infrastructure. The residences are substantially screened from the site by dense vegetation.	**Low**
VR11	Medium density student housing at Thomond Village on opposite side of new road infrastructure. The residences are moderately screened from the site by dense vegetation.	**Low**

Table 16.4 Sensitive Visual Receptors

16.4. DESCRIPTION OF EFFECTS

This section describes the effects that the overall masterplan development inclusive of the proposed Phase 3 development could have without consideration of ameliorative landscape and visual mitigation measures. Incorporated design mitigation measures have been considered.

16.4.1 Construction Effects

The change of use of the site from its current state to that of a construction site has the potential to result in the following impacts:

- Visual impacts due to the introduction of new structures, access roads, machinery, materials storage, associated earthworks, car parking, lighting and hoarding.
- Change of character due to the change in use.
- Visual impacts due change in ground levels and earthworks.
- Visual and landscape character impacts due to the removal of existing vegetation.

16.4.2 Operational Effects

The proposed development has the potential to result in the following impacts:

- Visual impacts due to the introduction of new buildings and built structures.
- Visual impacts due to the introduction of new roads, parking, mechanical plant and lighting.
- Visual impacts due to the introduction of services and waste handling areas and litter.
- Change of character due to the change in use.
- Visual impact of landscape proposals – planting, lighting, hard surfaces etc.
- Landscape and visual impacts due to the removal of existing vegetation
- Landscape and visual impacts due to the installation of trees and vegetation

16.5. LIKELIHOOD OF SIGNIFICANT EFFECTS

Landscape assessments measure the sensitivity of specific landscape types and features and describe the nature and significance of changes to that landscape occurring because of a proposed development. In general it can be assumed that landscape and visual impacts are intrinsically linked however both types of impacts are assessed separately in this study where a development characteristic may result in a starkly different type, quality or magnitude of impact in landscape or visual terms. The assessment of likely significant impacts has been made on the basis that all incorporated design mitigation measures are included.

Character, for the purposes of this assessment refers to the interaction of elements in the landscape that combine to give the area its identity. In this context, impacts on character include the effect on existing land uses and responses that are felt towards the combined effects of the new development.

These effects have been compiled to identify any areas where the proposed development may impact the landscape character and visual amenity of the local area and represents the potential impact rather than the eventual long-term effect. This section identifies potential, rather than actual, impacts which facilitates the identification of further landscape mitigation measures beyond incorporated design mitigation. Potential impacts from the proposed Phase 3 development and overall masterplan development are included with the effects listed separately where they are not the same.

16.5.4 'Do-Nothing'Effects

In the event of this scenario, the majority of the site would likely continue to be used for agricultural purposes. Existing woodland and hedgerow on the site would continue to mature, while some of the site would continue to be left in the 'transition state' as it is currently for a period. The existing areas of scrub and grassland would continue to grow wild and eventually scrub vegetation would start to dominate. As the area has a specific zoning for development it is likely that the site would be developed in the future in a similar scale and type as is currently proposed.

16.5.1 Construction Effects

Landscape Character

As described under 16.4.1 above, the initial construction operations created by the clearance of the site and the construction of the buildings and roads will give rise to temporary or short-term impacts on the landscape character, through the introduction of new structures, machinery etc. and the removal of a small amount of vegetation. The conversion of parts of the site from a greenfield landscape type to a building site, is likely to be perceived in the short term as a significant, negative 'loss' of landscape character, particularly by sections of the local community closest to it.

The removal of existing vegetation will also cause a negative impact on the landscape character, however a large portion of the existing vegetation on the site is to be retained and incorporated into the landscape design.

With the above considered the negative visual impact on the landscape character during construction would be considered moderate in magnitude. However, these impacts would only be short-term in duration.

Visual

The introduction of the visual elements associated with the activities listed under 16.4.1 will give rise to negative visual impacts for the users of the public realm and the sensitive visual receptors listed in table 16.2. Visual impacts during construction will affect all sensitive receptors identified with the magnitude of that effect changing over the course of the construction period.

Proposed Development

The proposed development itself will mostly negatively impact sensitive visual receptors 1, 2 and 3. The visual impact on VR 2 is likely to be significant however only short-term in duration.

Masterplan Development

The proposed masterplan development with negatively impact sensitive visual receptors 1, 2, 3, 5, 6 and 7. The visual impact on VR 2, 6 and 7 is likely to be significant however only short-term in duration.

16.5.2 Operational Effects

Landscape Character

The landscape character of the subject lands will be notably changed from its current largely undeveloped character to that of built environment. As described in section 16.3.3 of this report the sections of the current landscape has the character of a traditional agricultural landscape that is common in the wider environment and some sections have a peri-urban character. The lands are zoned for this type of development, and it is unlikely that the land will remain as they are currently. Therefore, its current state is temporary.

The proposed development and the overall masterplan include a landscape scheme which includes the retention and enhancement of the hedgerows around the perimeter, and the creation of a network of landscape spaces. This landscape scheme will improve the local biodiversity, provide a range of high-quality amenity options to both the new residents and the current residents. The typology of the housing proposed is consistent with the existing typologies in the surrounding area in terms of layout, form, mass and materiality. These design measures will mitigate the level of impact.

The initial change to a new landscape that includes built development may be perceived negatively by some people, however due to the surrounding suburban and peri-urban environment this would be only moderate in significance and long term in duration.

Visual

The extent of potential visual impact of the proposed development on the built environment from seven representative view locations around the proposed development is assessed in the following section. The view locations are representative of locations from which it was suggested by mapping analysis and review in the field, that the proposed development might be visible. Photomontages from these locations are submitted as part of the application, as a separate A3 document by Digital Dimensions Ltd.

Views from specific locations

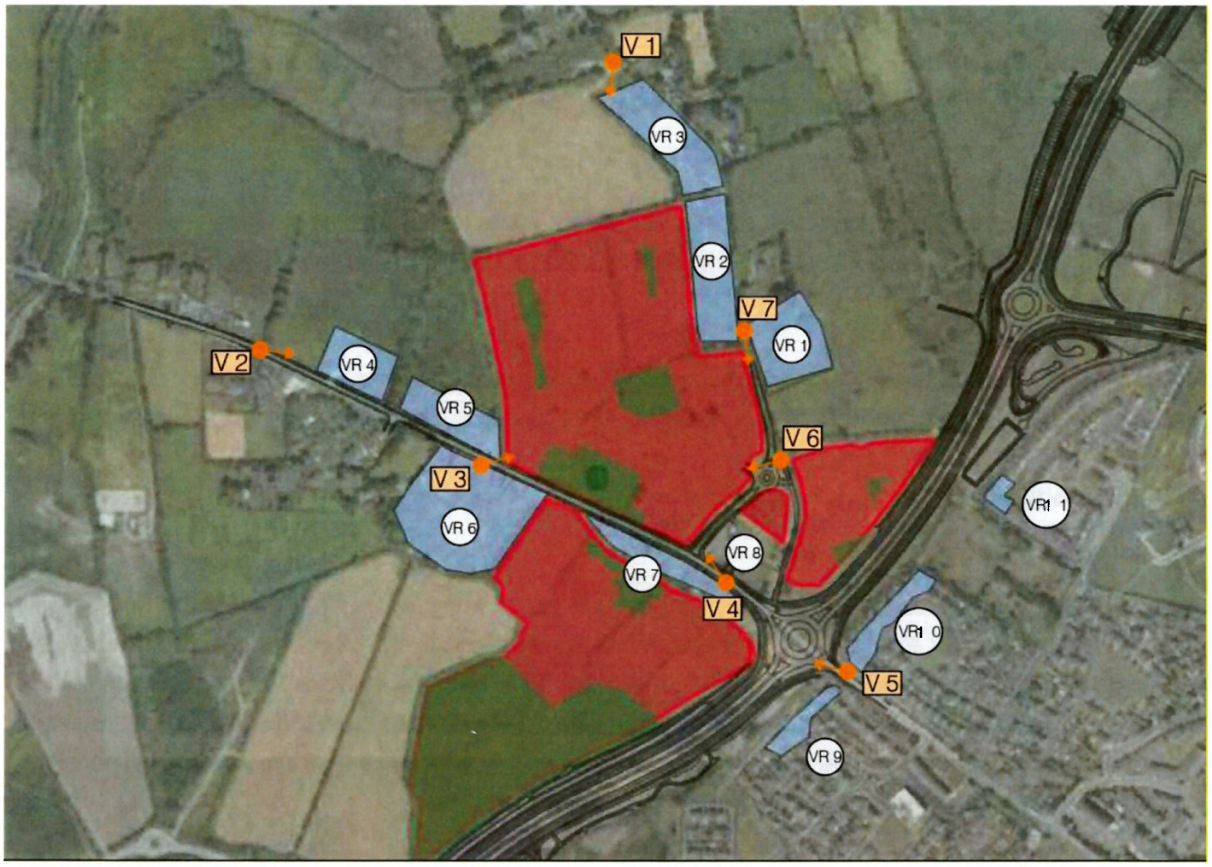


Figure 16.6 Location of Viewpoints in relation to subject lands and the Sensitive Visual Receptors as listed in Table 16.3.

View 01	190m from edge of masterplan lands
Existing View : A medium-range view taken on the Pass road to the north of the proposed development. The viewpoint is located on Pass road in the vicinity of the group of residences listed as VR 3 in this study. The foreground of the view is mostly taken up by the roadside hedgerow and back garden hedges and trees of the houses. Beyond this, some of the trees on the site are visible where they form a small part of the background of the view. .	
Proposed View Year 5 : Due to the distance between the viewpoint and the proposed development and intervening features in the local landscape, the proposed development is mostly hidden from view. The roofs of the most northern units are visible, however they are mostly screened by vegetation and do not abstract any part of the view. The View is a small glimpsed view through a section break in the roadside hedgerow reducing the impact further	
Predicted impact of the development	A not significant and long-term negative visual impact.
Predicted impact of the full masterplan	A not significant and long-term negative visual impact.

View 02	280m from edge of masterplan lands
Existing View : A medium-range view taken to the west of the proposed development. The viewpoint is located on Old Cratloe Road in the vicinity of the group of residences listed as VR 4 in this study. The foreground of the view is mostly taken up by the roadside hedgerow and the roofs of the residences. Beyond this, some of the larger trees on the site are visible where they form a small part of the background of the view.	
Proposed View Year 5 : Due to the distance between the viewpoint and the proposed development and intervening features in the local landscape, the proposed development is mostly hidden from view. The uppermost sections of the buildings on the western edge of the masterplan lands are barely visible above the horizon line. The visible elements do not cause any visual obstruction.	
Predicted impact of the development	The development is not visible in views from this location
Predicted impact of the full masterplan	An imperceptible and long-term negative visual impact.

View 03	38m from edge of masterplan lands
Existing View : A short-range view taken to the west of the proposed masterplan lands. The viewpoint is located on Old Cratloe Road in the vicinity of the group of residences listed as VR 5 and 6 in this study. The subject lands are visible in the centre of the view with the trees and scrub at Crag Graveyard visible on the right side of the view. The scattered trees and some of the hedgerows are also visible. The roadside hedgerow has recently been removed and replaced with a timber fence making this view more expansive than previously.	
Proposed View Year 5 : The proposed masterplan development will result in a notable change to this view. The housing along the western perimeter will be prominent and change the character of the existing view. Crag Graveyard and the trees in the 'Open Space' lands will be visible and unchanged in the view. Due to the removal of the roadside hedgerow during the recent road works this view is quite expansive and residences and public realm users in this area would be impacted.	
Predicted impact of the development	Due to the other phases of the masterplan proposals the proposed development is not visible in views from this location
Predicted impact of the full masterplan	A significant and long-term negative visual impact.

View 04	120m from edge of masterplan lands
Existing View : A medium-range view taken from the road adjacent to 'The Country Club' (VR8) and the residences listed as VR7 in this study. The viewpoint is located on Old Cratloe Road where the large belt of conifers at the sports and social club is dominant creating a significant visual screen. The trees in the 'Open Space' zoned lands and the new boundary fence on the site are visible in this view. The ridgeline of the view is formed by the higher lands at Woodcock Hill	

Proposed View Year 5 : The new community centre building is clearly visible in the centre of the however no other built development is visible due to the screening provided by the existing vegetation. The development would be consistent in scale and typology to the existing development directly to the east.	
Predicted impact of the development	The development is not visible in views from this location
Predicted impact of the full masterplan	A moderate and long-term negative visual impact.

View 05	80m from edge of masterplan lands
Existing View : A medium-range view taken from the public road adjacent to the residences listed as VR9 and VR10 in this study. The viewpoint is located on Old Cratloe Road at the future junction with the new ring road. The constrcution works for this road are visible in the foreground. The trees in the southern section of the masterplan lands are visible in this view. Woodcock Hill forms a distant background of part of the view.	
Proposed View Year 5 : The housing in the southern section of the masterplan lands is quite prominent in this view. The development would be consistent in scale and typology to the existing development in the vicinity of the viewer. The new proposed development read as an extension of the existing built landscape.	
Predicted impact of the development	The development is not visible in views from this location
Predicted impact of the full masterplan	A moderate and long-term negative visual impact.

View 06	15m from edge of masterplan lands
Existing View : A short-range view taken from the public road at the junction of the new public road and the upgraded section of Pass road. The viewpoint is located on the edge of the masterplan lands with the new road infrastructure and fencing dominant in the foreground. The subject lands are visible in the centre of the view with the scattered trees of the old golf course quite prominent. The roadside hedgerow has recently been removed and replaced with a timber fence making this view more expansive than previously.	
Propo sed View Year 5 : The housing in the permitted phase of the masterplan lands are prominent in this view. The development would be consistent in scale and typology to the existing development directly to the east. The impact of the development on this view is reduced due to the significant alterations to this area by the building of the new road infrastructure and removal of vegetation.	
Predicted impact of the development	The development is not visible in views from this location

Predicted impact of the full masterplan	A moderate and long-term negative visual impact.

View 07	15m from edge of masterplan lands
Existing View : A short-range view taken from the public road at the junction of the new public road and the upgraded section of Pass road. The viewpoint is located on the edge of the masterplan lands with the new road infrastructure and fencing dominant in the foreground. The subject lands are visible in the centre of the view with the scattered trees of the old golf course quite prominent. The roadside hedgerow has recently been removed and replaced with a timber fence making this view more expansive than previously.	
Proposed View Year 5 : The housing in the permitted phase of the masterplan lands is prominent in this view. The development would be consistent in scale and typology to the existing development directly to the east. The housing will read visually as a continuation of the built environment between the existing housing on Pass road and Old Cratloe Road. The impact of the development on this view is reduced due to the significant alterations to this area by the building of the new road infrastructure and removal of vegetation.	
Predicted impact of the development	The development is not visible in views from this location
Predicted impact of the full masterplan	A moderate and long-term negative visual impact.

View	Relevant Receptors	Receptor Sensitivity	Quality	Significance	Probability	Duration
01	VR3	Medium	Negative	Not significant	Likely	Long term
02	VR4	Medium	Negative	Imperceptible	Likely	Long term
03	VR 5+6	Low/ Medium	Negative	Significant	Likely	Long term
04	VR 7+8	Low/ Medium	Negative	Moderate	Likely	Long term
05	VR 9+10	Low	Negative	Moderate	Likely	Long term
06	VR 1	Medium	Negative	Moderate	Likely	Long term
07	VR 1+2	Medium	Negative	Moderate	Likely	Long term

Table 16.4 Summary of Effects of the Overall Masterplan Proposal on Sensitive Visual Receptors before mitigation (assessment takes account of integrated design mitigation measures only)

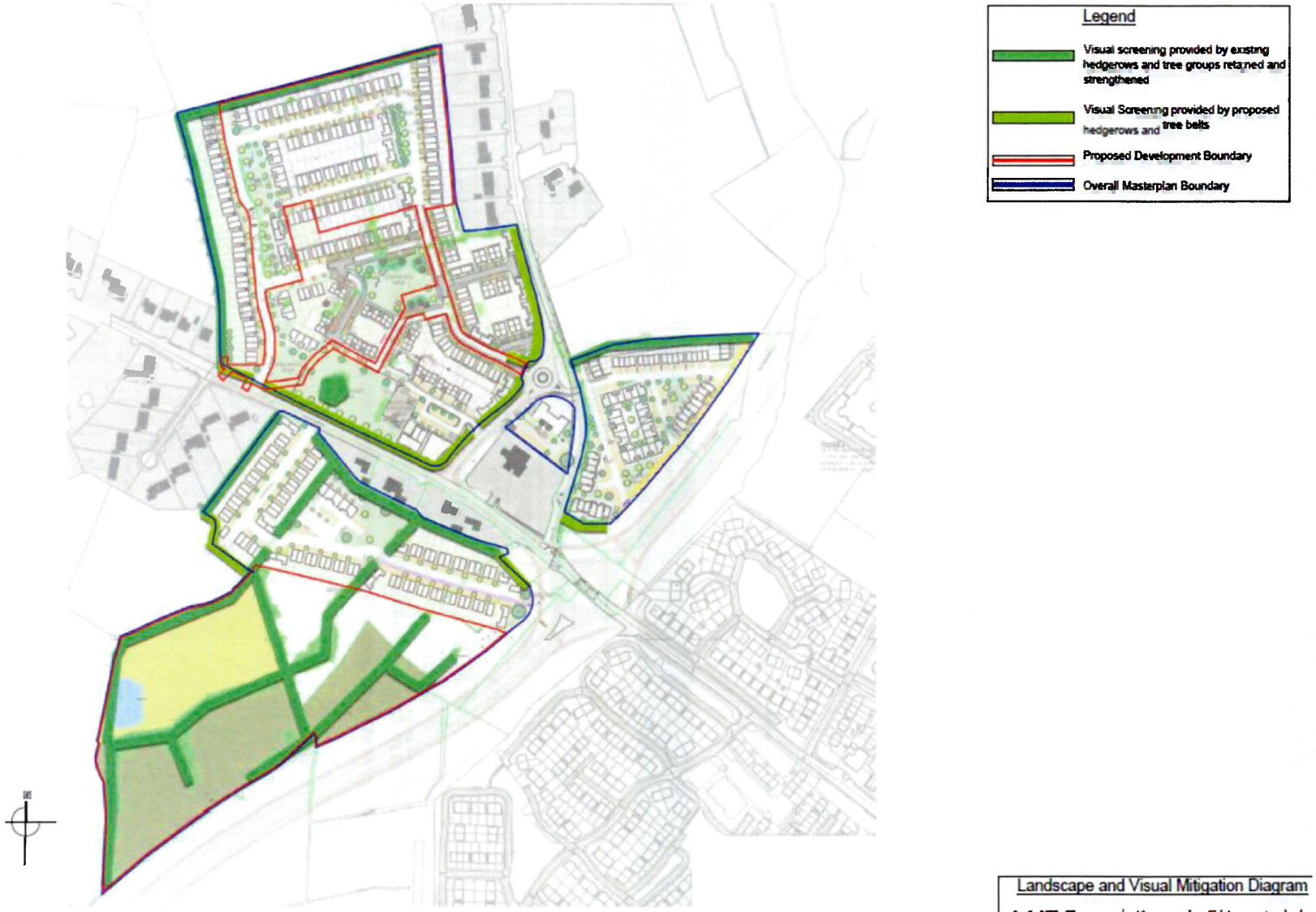


Figure 16.7 Landscape and Visual Mitigation Diagram

16.5.3 Cumulative Effects

The proposed development is one of a series of proposed developments on the subject lands. It is proposed to deliver the overall scheme in seven phases with the proposed development comprising Phase 3 of an overall development. The indicative masterplan for the overall site covers 28.13 hectares, However, the proposed Phase 3 development comprises an application for 98 no. units only on a gross site area of 9.37 hectares and a net site area of 2.8 hectares in the northern section of the study area. In the assessment of the landscape and visual impacts the full masterplan development is assessed with reference to this specific development, Phase 3. The visual impact of the proposed development is reduced when the overall masterplan is factored into the assessment. Due to the arrangement of the proposed built environment of the masterplan the proposed development is screened by other phases of the masterplan development in some views. When the overall masterplan is considered the effects on landscape character are increased slightly as the area of character change is larger. The increased effect is mitigated by landscape and visual mitigation measures contained within the overall masterplan.

The new road currently under construction and the recent road upgrades would have impacted on the same sensitive receptors as identified for this development. This could potentially lead to potential impacts of a slightly higher level of significance on the identified receptors when assessed cumulatively. The most significant impact of these developments is the loss of vegetation and an impact on views. The proposed development reverses much that vegetation loss. Any increase in impact of the proposed scheme by the cumulative impact of the road developments would be balanced by the restoration of the roadside vegetation as part of the proposed masterplan development.

16.6. REMEDIAL & MITIGATION MEASURES

16.6.1 Construction Phase

16.6.1.1 Mitigation by Avoidance / Design

LVA CONST 1 – A site planning design strategy to retain boundary hedgerows and tree protection measures was designed and is to be implemented on site as detailed in Figure 16.7 Landscape and Mitigation Diagram.

16.6.1.2 Mitigation by Prevention

LVA CONST 2 – Site hoarding shall be erected to screen views of construction activities.

LVA CONST 3 - Tree protection measures shall be installed to ensure vegetation to be retained is fully protected during the construction process.

16.6.2 Operational Phase

16.6.2.1 Mitigation by Avoidance / Design

LVA OPER 1 - The architectural design of the buildings as proposed shall be delivered as per the planning drawings as they aim to reduce the visual mass through its form and choice of materials.

LVA OPER 2 - The retention of existing native hedgerows as detailed in the Landscape and Visual Mitigation Diagram shall assist the visual integration of the building into the landscape and mitigate the visual impact.

LVA OPER 3 - The landscape proposals as detailed on the Landscaping Plan inclusive of green links, trees, hedgerows, wetlands, SUDS features, woodland blocks and wildflower meadow shall be implemented in full. These elements will assist the visual integration of the building into the landscape and mitigate the visual impact.

16.6.2.2 Mitigation by Prevention

LVA OPER 4 - The visual screening provided by the proposed hedgerows and tree belts indicated on the KFLA Landscape and Visual Mitigation Diagram shall be implemented during the first planting season following construction of the houses.

16.6.2.3 Mitigation by Reduction

LVA OPER 5 - Periodic tree surveys and implementation of a tree management plan for the mature trees on site to ensure their continued sustainability shall be undertaken.

LVA OPER 6 - The implementation and monitoring of the landscape management plan shall be undertaken for the full duration of the defects liability period to ensure successful establishment of the proposed planting scheme and trees.

16.7. RESIDUAL EFFECTS

16.7.1 Construction Phase

The predicted residual effects will be as set out in section 16.5.1. The preventative and reduction mitigation measures listed will ensure the integrated design mitigation measures are successful. The integrated design mitigation measures are considered in the assessment section 16.5.1.

16.7.2 Operational Phase

The ameliorative mitigation measures as listed in section 16.6.2.2 will reduce the effects of the masterplan development on several of the listed visual receptors, as below.

View 3 – The creation of a new robust hedgerow on the western perimeter and along the Old Cratloe road will reduce the visual impact of the built development. This measure will also reverse the effect of the recent roadside hedgerow removal on this stretch of road. The impact on this view from the road and visual receptors 5 + 6 will be reduced from significant and negative to moderate and negative.

View 6 – The creation of a new robust hedgerow on the edge of the new road infrastructure will reduce the visual impact of the built development. This measure will also reverse the effect of the recent roadside hedgerow removal on this stretch of road. The impact on this view from the road and visual receptor 1 will be reduced however remain moderate and negative.

View 7 – The creation of a new robust hedgerow on the edge of the new road infrastructure will reduce the visual impact of the built development. This measure will also reverse the effect of the recent roadside hedgerow removal on this stretch of road. The impact on this view from the road and visual receptors 1+2 will be reduced however remain moderate and negative.

View	Relevant Receptors	Receptor Sensitivity	Quality	Significance	Probability	Duration
01	VR3	Medium	Negative	Not significant	Likely	Long term
02	VR4	Medium	Negative	Imperceptible	Likely	Long term
03	VR 5+6	Low/ Medium	Negative	Moderate	Likely	Long term
04	VR 7+8	Low/ Medium	Negative	Moderate	Likely	Long term
05	VR 9+10	Low	Negative	Moderate	Likely	Long term
06	VR 1	Medium	Negative	Moderate	Likely	Long term
07	VR 1+2	Medium	Negative	Moderate	Likely	Long term

Table 16.4 Summary of Residual Effects Overall Masterplan Proposal on Sensitive Visual Receptors (after prevention and reduction mitigation measures)

16.8. MONITORING

16.8.1 Construction Phase

Contracts will ensure good working practices to reduce any negative impacts arising from construction to the lowest possible level and to ensure that all machinery operates within clearly defined construction areas. Storage areas will be located to avoid impacting on sensitive views, trees, hedgerows, drainage patterns etc. and such areas will be fully re-instated prior to, and at the end of the construction contract. The works will also have continuous monitoring to ensure adequate protection of areas outside of the construction works. All tree protection measures will be monitored by a qualified Arborist throughout the construction period.

16.8.2 Operational Phase

A landscape management plan will form part of the works contract and include for ongoing maintenance of the planting scheme. A qualified landscape architect will monitor the post installation management and maintenance of the scheme by a suitable qualified landscape contractor. The landscape works and maintenance contracts will include a requirement for replacement planting to ensure the full design intent is realised.

CHAPTER SEVENTEEN INTERACTIONS BETWEEN ENVIRONMENTAL FACTORS

17.1 INTRODUCTION

All environmental factors are inter-related and this chapter cross references the individual environmental assessment reports undertaken, including the proposed mitigation measures, having regard to current knowledge and methods of assessment. An indication is also given of the cumulative effects of the proposed development when considered with other permitted development in the area, not yet constructed.

In practice many impacts have slight or subtle interactions with other disciplines. This chapter highlights those interactions which are considered to potentially be of a significant nature. Discussions of the nature and effect of the impact is primarily undertaken within each of the relevant chapters, while this chapter identifies the most important potential interactions.

17.2 METHODOLOGY

The preparation and coordination of this EIAR ensured that each of the specialist consultants liaised with each other on an ongoing basis and dealt with the likely interactions between effects predicted as a result of the proposed development. This process ensured that appropriate mitigation measures are incorporated into the design process.

At the screening stage in the preparation of the EIAR for the proposed development, the potential for significant cumulative and indirect impacts and interactions were examined and identified. Where identified such impacts and interaction of impacts were included in the scope and addressed in the baseline and impact assessment studies for each of the relevant environmental issues and aspects of the project. The cumulative and indirect impacts and interaction of impacts are presented in each of the EIAR chapters.

The primary interactions can be summarised as follows:

- Architectural design, landscape design, and road and services design and archaeology;
- Landscape design and engineering services with biodiversity and archaeology;
- Stormwater attenuation design with biodiversity and soil & geology;
- Visual impact with biodiversity and archaeology;
- Biodiversity with water and soils;
- Architectural and landscape design with noise;
- Noise and vibration and population and human health;
- Air quality and climate and population and human health; and
- Material Assets with population and human health, water, noise and vibration, air quality and climate

The matrix and expert opinion approaches, as outlined in the EU Guidelines, were used in the identification of the potential for significant cumulative and indirect impacts and interactions. Refer to Table 17.1 for the matrix of potential interactions.

	Population & Human Health	Biodiversity	Archaeology & Cultural Heritage	The Landscape	Land Soils	Water Hydrology & Flood Risk	Air Quality & Climate	Noise & Vibration	Water Services	Material Assets Traffic & Transport	Material Assets Built Services
Population & Human Health		-	-	O	CO	-	CO	CO	-	CO	O
Biodiversity	-		-	C0	C	C	-	C	-	-	-
Archaeology & Cultural Heritage	-	-		CO	-	-	-	-	-	-	-
The Landscape	O	C0	CO		C	-	-	-	-	-	-
Land & Soils	-	C	-	-		C	C	-	-	-	-
Water, Hydrology & Flood Risk	CO	C	-	-	C		-	-	-	-	-
Air Quality & Climate	CO	-	-	-	C	-		-		CO	-
Noise & Vibration	CO	C	-	-	-	-	-			CO	-
Water Services	CO	C	-	-	-	-	-	-		-	CO
Material Assets: Traffic & Transport	CO	-	-	-	-	-	CO	CO	-		-
Material Assets: Built Services	CO	-	-	-	-	CO	CO	-	-	-	

C- Construction **O** – Operation **C0** – Construction & Operation

Table 17.1 Potential Interaction of Effects Matrix

17.3 DESCRIPTION OF THE INTERACTIONS

Each chapter of the EIAR details baseline information and identifies the significant potential and residual construction and operational effects/impacts of the proposed development. However, this Chapter details the significant interactive and inter-related effects/impacts. Table 17.2 indicates the key elements and activities of the proposed development during both the site preparation and operational phases and how they inter-act and inter-relate with the various environmental aspects considered in detail in Chapter 6.0 through to Chapter 16.0 of this EIAR.

The following Table 17.2 is indicative only and does not purport to contain or replace all or any of the issues raised in the main assessment sections of this EIAR. Their purpose is to demonstrate the main likely and significant inter-relationships and inter-actions between different environmental aspects considered. While many inter-relationships and inter-actions have been identified, it is anticipated that the mitigation measures included in the proposed development (and outlined in the other relevant sections of the EIAR) will also minimise or off-set potential for significant effects. With mitigation measures in place, no significant residual negative impacts are predicted

	Interaction With	Interaction
Population & Human Health	Landscape	The proposal has the potential to impact on the landscape and visual resources perceived by human beings. However, landscape proposals including provision of open space, trees and hedgerows shall mitigate and ensure that no significant impact arises.
	Land & Soils	There is potential for significant impact on human health from dust associated with the construction activities. A
	Material Assets - Traffic & Transport	Traffic flow for construction vehicles in the locality has potential to impact upon road safety; Traffic flow during operation within the site has the potential to create safety risks for pedestrians and cyclists, if the design does not provide for safe pedestrian / cycling environments;
	Material Assets – Resources & Waste Services	At operational stage increased population will create a greater demand on built services, placing greater demand on water requirements and the pubic sewer, which will need to be treated and delivered.
	Air & Climate	There is potential for impact on human health arising from dust during construction and from climate change associated with greenhouse gas emissions at operational stage. Subject to the implementation of a comprehensive dust minimisation plan and mitigation measures proposed, no significant impacts occur.
	Noise & Vibration	Noise and vibration generated from the construction and operational phases of the development have the potential to impact upon local population centres. With the proposed mitigation measures in place the noise impacts will be similar to the existing situation.
Biodiversity	Land & Soils	Excavation and soil works (i.e. through site clearance, re-profiling etc.) during the construction stage has the potential to cause impact on the biodiversity of the site, for example through disturbance of the available habitats. No potential operational interactions were identified.
	Water, Hydrology & Flood Risk	Surface water contamination has a potential to effect biodiversity in the area of the site. No potential operational interactions were identified.

	The Landscape	Vegetation is an important aspect with respect to providing wildlife corridors. However, where mature vegetation will be removed as part of the proposed redevelopment, it will be replaced and overall there will no significant impact. The proposed development contains landscaping proposals.
	Noise & Vibration	Noise from construction and operational phases of the development has potential to impact on the fauna in the vicinity of the proposed redevelopment. However, the ecology chapters of the EIAR have predicted that following suitable mitigation, no significant impacts will occur.
The Landscape	Population & Human Health	The proposal has the potential to impact on the landscape and visual resources perceived by human beings. However, landscape proposals including provision of open space, trees and hedgerows shall mitigate and ensure that no significant impact arises.
	Biodiversity	Vegetation is an important aspect with respect to providing wildlife corridors. The development does necessitate the removal of hedgerows. However, the proposed development contains landscaping including the provision of trees and shrubs which shall mitigate any significant impacts arising.
	Land & Soils	There is potential for impact on landscaping from the reuse of fill material and the appropriateness of available soils during construction phase; The landscape plan will impact on the quality of the private and public open spaces, which will impact on people's health and well-being.
	Archaeology & Cultural Heritage	Landscaping construction has the potential to impact upon unknown archaeological features on site. The landscaping plan has an impact upon awareness and preservation of cultural heritage within the development and impact on local monuments.
Water, Hydrology & Flood Risk	Population & Human Health	Control of surface water during construction has potential to impact human health due to emissions from site to the hydrosphere or potential flooding during ground works. During the operational stage surface water management has the potential to cause flooding which may impact human health and safety;
	Biodiversity	Surface water contamination has a potential to effect biodiversity where works are proposed in proximity to the existing drainage ditch within the site as there is potential for discharge of these contaminants to the Lower River Shannon Special Area of Conservation (SAC) and River Shannon and River Fergus Estuaries Special Protection Area (SPA). However, it is proposed to construct a berm on the western boundary of the site to mitigate against such impacts.

	Land & Soils	Excavation and soil works (i.e. through site clearance, re-profiling etc.) during the construction stage has the potential to cause significant impact on the hydrology and hydrogeology of the site by increasing aquifer vulnerability, deposition of silt in streams, leakage of hydrocarbons, altering the surface water characteristics. Mitigation is proposed to offset such concerns.
Land & Soils	Landscape	Imported soils and materials necessary to undertake landscaping have the potential to impact the landscape. Any necessary imported soils will be chemically analysed and screened against generic screening values for a commercial end use to ensure that it does not pose a risk to human health.
	Biodiversity	Excavation and soil works (i.e. through site clearance, re-profiling etc.) during the construction stage have the potential to cause impact on the biodiversity of the site, for example through disturbance of the available habitats. Clearance works on site are restricted to certain months to protect breeding habitats.
	Water, Hydrology & Flood Risk	Excavation and soil works (i.e. through site clearance, re-profiling etc.) during the construction stage have the potential to cause significant impact on the hydrology and hydrogeology of the site by increasing aquifer vulnerability, deposition of silt in streams, leakage of hydrocarbons, altering the surface water characteristics
	Air & Climate	Excavation works and exposure of soil during the construction phase can influence the microclimate in an area. The movement of soils during the construction phase may result in the spread of dust and mud onto surrounding land uses and public roads. The air quality assessment indicates that there is no significant impact associated with these matters.
Air Quality & Climate	Population & Human Health	The construction and operational phases of the development have the potential to generate impacts in terms of air quality upon local population centres. Chapter 10.0 Air Quality & Climate does identify dust as a potential issue but puts forward mitigation and appropriate Dust Minimisation Plans to address the issue.
	Land & Soils	Excavation works and exposure of soil during the construction phase can influence the microclimate in an area. The movement of soils during the construction phase may result in the spread of dust and mud onto surrounding land uses and public roads. The air quality puts forward adequate mitigation and indicates that there is no significant impact associated with these matters.

	Traffic & Transport	Traffic generation has potential to result in impacts on Air Quality. Chapter 10 Air Quality & Climate has been prepared in close co-operation with the Traffic Consultant and has determined that no significant air quality impacts will occur due to traffic generation.
Noise & Vibration	Population & Human Health	Noise and vibration generated from the construction and operational phases of the development have the potential to impact upon local population centres. With the proposed mitigation measures in place the noise impacts will be similar to the existing situation.
	Biodiversity	Noise from construction and operational phases of the development has potential to impact on the fauna in the vicinity of the proposed redevelopment. However, Chapter 7.0 Biodiversity have predicted that following suitable mitigation, no significant impacts will occur.
	Traffic & Transport	Traffic generation has potential to result in noise related impacts. Chapter 11.0 Noise & Vibration has been prepared in close co-operation with the Traffic Consultant and has determined that no significant noise impacts will occur due to traffic generation.
Archaeology & Cultural Heritage	The Landscape	Landscaping construction has the potential to impact upon unknown archaeological features on site. The landscaping plan has an impact upon awareness and preservation of cultural heritage within the development and impact on local monuments.
Material Assets: Built Services	Population & Human Health	At operational stage increased population will create a greater demand on built services, placing greater demand on water requirements and the public sewer, which will need to be treated and delivered. Irish Water has confirmed capacity in the existing systems.
	Water, Hydrology & Flood Risk	The water and sewage connections at construction and operational stages have a potential interaction with available water supply and potential emissions to hydrological cycle. Best practie construction methods shall be used to avoid potential impacts.
	Air Quality & Climate	Construction of the site services have an potential interaction with air quality through impact of construction activities. The built services have an interaction with climate in the availability and use of non-greenhouse gas reliant power and heat sources.

Water Services	Population & Human Health	At operational stage increased population will create a greater demand on water services, placing greater demand on water requirements and the pubic sewer, which will need to be treated and delivered. Irish Water has confirmed capacity in the existing systems.
	Biodiversity	The construction of water services on site has the potential to impact on the flora & fauna in the vicinity of the proposed redevelopment.
	Material Assets – Resources & Waste Services	At operational stage increased population will create a greater demand on built services, placing greater demand on water requirements and the pubic sewer, which will need to be treated and delivered.
Material Assets: Traffic & Transport	Population & Human Health	Traffic flow for construction vehicles in the locality has potential to impact upon road safety; Traffic flow during operation within the site has the potential to create safety risks for pedestrians and cyclists, if the design does not provide for safe pedestrian / cycling environments;
	Air & Climate	Construction traffic has the potential to have a significant impact in terms of air quality. The Air Quality & Cimate chapter has been prepared in close consultation with the traffic consultant. Operational traffic has the potential to have a significant impact in terms of air quality. The Air Quality chapter has been prepared in close consultation with the traffic consultant.
	Noise & Vibration	Construction traffic has the potential to have a significant impact in terms of noise and vibration. The Noise and Vibration chapter has been prepared in close consultation with the traffic consultant. Operational traffic has the potential to have a significant impact in terms of noise and vibration. The Noise and Vibration chapter has been prepared in close consultation with the traffic consultant;

Table 17.2 Summary of Key Proposed Activities and Scheme Elements that Inter-Act and Cause Inter-Related Effects

17.4 CUMULATIVE EFFECTS

Cumulative effects address the long-term changes that may result from the construction and operation of the proposed development and the combined effect of this development with other developments in the area. This review is undertaken to ensure that the combined effects of the proposed development and other influences are assessed in total, and not as individual aspects of the environmental assessment.

A planning history review was undertaken to identify any recently approved or pending developments which may have a cumulative impact with the proposed development. There are no significant developments permitted in the area, which have not yet been constructed, save for the Masterplan site itself, details of which have been provided in Chapter 1.0 Introduction and Chapter 6.0 in Table 6.2.

The proposed development does need to be considered in conjunction with the works currently underway, delivering the proposed Coonagh to Knockalisheen Distributor Project. This infrastructure project secured consent from An Bord Pleanála in 2021 and was subject to the preparation of an EIAR and Environmental Impact Assessment. The cumulative impacts associated with noise and dust during construction have been considered in Chapters 10.0 and 11.0 of the EIAR, whilst potential effects arising from increased traffic have also been considered in Chapter 12.0.

The overall cumulative impact of the proposed development and the adjoining road currently under construction, will result in:

- An increase in economic activity in the local area region;
- A slight increase in traffic on the local road network which can be adequately managed;
- No significant environmental nuisance from an air quality perspective subject to implementation of the mitigation measures and adherence to good working practices; and
- No significant landscape visual effects due to the nature of the existing, surrounding built environment and the planting of trees.

17.5 REFERENCES

Advice Notes on Current Practice (in the preparation of Environmental Impact Statements), EPA 2003

Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, EPA, 2022.

EU Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions.

CHAPTER EIGHTEEN SUMMARY OF MITIGATION MEASURES

18.1 INTRODUCTION

This chapter provides a summary of mitigation measures proposed in Chapters 6.0 to 15.0. The appointed contractor will be required to adhere to the mitigation contained in the EIAR for the protection of the environment and to ensure sustainable development.

18.2 INCORPORATED DESIGN MITIGATION

A number of mitigation measures have been incorporated into the design proposal, following an iterative assessment during the design stage. In some instances, these mitigatory measures have shaped the design of the scheme, the juxtaposition of the buildings and the mix of uses proposed.

The design rationale and detail employed seeks to mitigate potential negative effects on a series of environmental factors and considerations.

18.2.1 Landscape & Visual

- Establishing an integrated relationship between the proposed development and surrounding buildings and the broader urban landscape, incorporating aspects of prevalent built forms, scale, texturing, colour and materials and in particular the established building line fronting onto THE Old Cratloe Road and the Pass (Meelick) Road;
- The insertion, positioning and detailed modelling of the buildings in order to assist in the visual assimilation of their mass;
- Appropriate architectural detailing to assist in the integration of the external building facades – including the modulation of openings and fenestration in a manner that reflects building function and harmonises with current local proportions and rhythms;
- Facilitating an active streetscape fronting onto the Pass Road;
- Rationalisation of all services elements and any other potential visual clutter and its incorporation internally within building envelopes;
- Simplification and rationalisation of the proposed roof lines;
- Development of a biodiversity area south of the Old Cratloe Rod adjoining proposed Phase 5; and
- The use of appropriate materials to reflect the existing context and ensure a harmonious balance is achieved.

18.2.2 Material Assets – Traffic & Transport

- Development of an internal road network in compliance with DMURS;
- Focused provision on connections to uture transport links including Bus Connects; and
- Provision of bicycle, car and motorcycle spaces in accordance with the requirements of the Limerick Development Plan 2022 – 2028 and in proximity to the houses and commercial buildings they are intended to serve.

18.2.3 Population & Human Health

- Development of land and provision of houses in an area that is located outside of identified flood risk areas;
- Provision of a creche and neighbourhood centre facilities to support the creation of a new neighbourhood and ensure adequate capacity in the area for childcare services;
- Modifications to site layout plan to accommodate future bus infrastructure including provision of a bus stop adjoining the masterplan site

18.2.4 Material Assets – Resources & Waste Management

- Reuse of excavated material on site insofar as possible;
- Design depths of proposed infrastructure are to be optimised to existing excavated levels so that excessive excavations are avoided where possible;
- Products and materials are supplied locally where possible; and
- Provision of Waste Storage Areas (WSA's) to facilitate segregation of waste types generated during construction.

18.2.5 Water & Hydrology

- Incorporating Sustainable Drainage Systems where practicable including the provision of permeable paving within dedicated parking areas and bioretention pods at key strategic locations; and
- Optimising design depths of proposed infrastructure so that excessive excavations are avoided.

18.2.6 Biodiversity

- Proposing natural hedgerow planting to compensate for loss of woody hedgerow habitat on site and to facilitate an appropriate environment for potential nesting; and
- Development of a biodiversity area as part of Phase to the south of the Old Cratloe Road thereby enhancing biodiversity within the development proposal.

18.3 CONSTRUCTION PHASE MITIGATION

18.3.1 Population & Human Health

POP & HH CONST 1: In order to protect the amenities enjoyed by nearby residents and the adjoining school, a Construction and Environmental Management Plan (including traffic management) shall be prepared by the contractor and implemented during the construction phase.

POP & HH CONST 2: A berm shall be constructed at the western boundary of the site to prevent any flow of surface water into the drainage ditch during construction.

18.3.2 Biodiversity

BIO CONST 1: In order to prevent flow into the drainage ditches, silt fencing with geotextile membrane shall be erected around the site to prevent any discharge to water courses. To further protect the drainage ditches identified in Figure 7.1, berms shall be constructed. This is particularly important as

the overall MS is at a higher elevation than both of the ditches and the likelihood of discharge from the construction site during periods of rainfall are high.

BIO CONST 2: A lined attenuation pit shall be constructed at the lowest point to capture any surface water during the construction phase.

BIO CONST 3: The phased ground clearance works for the proposed development that involve the removal/disturbance of any hedgerow, treeline or occasional mature trees, will be undertaken outside of peak bird breeding season (March 1st to August 31st inclusive); if hedgerow clearance cannot be limited to outside this period, a qualified ecologist will be required to oversee clearance operations, with works being halted in the event that nesting birds are observed.

BIO CONST 4: Construction operations shall take place during the hours of daylight to minimise disturbances to roosting birds and to minimise disturbances to faunal species at night. No badger or otter activity was observed during the walk over surveys.

BIO CONST 5: If site lighting is required during construction works it will be placed with consideration of and away from the potential foraging/roosting areas of protected species associated with the wider area such as hedgerows/treelines

BIO CONST 6: A pre-construction mammal survey will be undertaken within the footprint of the development in order to confirm that none of these species have colonised the site following the walkover surveys. In the event that a badger sett or otter spraint or holts should be encountered at any point, the NPWS will be informed and in the case of badger, NRA Guidelines for the Treatment of Badgers Prior To the Construction of National Road Schemes will be followed. Should evidence of Otters be found then a derogation licence will be required.

BIO CONST 7: As part of best practice construction measures a preconstruction bat survey shall be carried out within the site prior to construction to reconfirm the findings of preplanning surveys (no roosts were detected during the walkover surveys). If any roosts are found during these surveys a relevant bat derogation licence shall be sought prior to construction works commencing and works will be carried out under the terms of the relevant derogation licence this shall include any felling works being undertaken, and works will be timed and conducted in a manner to ensure that no bats are harmed as a result of felling.

BIO CONST 8: Lighting shall not be left switched on overnight within the site during the construction phase. The use of lighting within the site can discourage some bat species from using the site, and attract other species due to higher insect activity, increasing their vulnerability to predators.

BIO CONST 9: The proposed surface water drainage infrastructure as proposed which includes the use of SuDs measures as well as an attenuation system fed by soakaways shall be implemented on site, therefore preventing impact on the adjacent drainage ditches and the wider aquatic environment, including the European Sites evaluated in the NIS.

BIO CONST 9: Construction will follow guidance from Inland Fisheries Ireland (IFI, 2016) for the protection of aquatic habitats. This will include the erection of a geotextile silt fence (or similar barrier)

along the western boundary to prevent the ingress of silt to the drainage ditch. Water leaving the site will pass through an appropriately-sized silt trap or settlement pond so that only silt-free run-off will leave the site.

BIO CONST 10: Dangerous substances, such as oils, fuels etc., will be stored in a bunded zone. Emergency contact numbers for the Local Authority Environment Section, Inland Fisheries Ireland, the Environmental Protection Agency and the National Parks and Wildlife Service will be displayed in a prominent position within the site compound. These agencies will be notified immediately in the event of a pollution incident.

BIO CONST 11: Site personnel will be trained in the importance of preventing pollution and the mitigation measures described here to ensure same.

BIO CONST 12: The site manager will be responsible for the implementation of these measures. They will be inspected on at least a daily basis for the duration of works, and a record of these inspections will be maintained.

BIO CONST 13: The area of the proposed works will be kept to the minimum necessary, including all site clearance works, to minimise disturbance to habitats and flora. In this case, particular care to minimise impact to retained hedgerows is required, with no felling, removal or trimming undertaken other than where required to facilitate essential access and to ensure health and safety of operatives. Where individual trees are to be retained within the development, protected fencing must be erected.

18.3.3 Land & Soils, Geology & Hydrogeology

L & S CONST 1: Where feasible, the extent of excavation works and depths for dwellings and roads shall be limited through design to minimise disturbance of the original soil, subsoil formations and bedrock and to retain soil structure.

L & S CONST 2: Asbestos and other contaminants within any filled material must be considered a possibility. This should be investigated prior to the commencement of development works and suitable mitigation measures (including special environmental and human health contingency plans and procedures, following best-practice guidance) for the unexpected discovery of contaminated land or illegally deposited waste materials shall be developed and implemented as part of a detailed risk assessment under the direction of a contaminated land consultant / hydrogeologist.

L & S CONST 3: A Construction Environmental Management Plan (CEMP) to be prepared and approved in advance of the commencement of development works by Limerick City and County Council. In the event that contamination is encountered, the approved plans shall be adhered to at all times by relevant contractors and subcontractors.

L & S CONST 4: Monitoring prior to, during and post construction works of groundwater quality shall be undertaken to ensure minimum disturbance of water quality in the general vicinity of the site. During the construction phase, the monitoring programme shall include daily checks, weekly inspections and monthly audits to ensure compliance with the Construction and Demolition Waste Management Plan (CDWMP) and the CEMP. This shall be undertaken in consultation with Limerick City and County Council

L & S CONST 5: All waste containers (including all ancillary equipment such as vent pipes and refueling hoses) shall be stored within a secondary containment system (e.g. a bund for static tanks or a drip tray for mobile stores and drums). The bunds shall be capable of storing 110% of the tank capacity. Where more than one tank is stored, the bund shall be capable of holding 110% of the largest tank or 25% of the aggregate capacity (whichever is greater). Drip trays used for drum storage shall be capable of holding at least 25% of the drum capacity. Where more than one drum is stored the drip tray shall be capable of holding 25% of the aggregate capacity of the drums stored. Spill kits shall be kept in these areas in the event of spillages.

L & S CONST 6: All imported soils and stones shall be sourced from a licenced / permitted facility with suitable documentation to confirm the material is inert and fit for purpose.

L & S CONST 7: Suitable runoff and sediment control measures shall be designed and implemented prior to and during construction activities. These control measures depend upon weather conditions, site characteristics and construction activities and will ensure protection to the underlying subsoils and groundwater aquifer.

L & S CONST 8: Waste fuels and materials shall be stored in designated areas that are isolated from surface water drains or open waters (e.g. excavations). Skips shall be closed or covered to prevent materials being blown or washed away and to reduce the likelihood of contaminated water leakage. Hazardous wastes such as waste oil, chemicals and preservatives, shall be stored in sealed containers and kept separate from other waste materials while awaiting collection by a registered waste carrier. Fueling, lubrication and storage areas and site offices shall not be located within 25m of drainage ditches, surface waters or open excavations. Fuel Interceptor tanks shall be installed on the site to treat any runoff.

L & S CONST 9: All construction vehicles, plant and machinery shall be maintained on a weekly basis and checked daily to ensure any damage or leakages are corrected. Precautions shall be taken to avoid spillages, including:

- Supervision of deliveries and refuelling activities;
- Use of secondary containment e.g. bunds around oil storage tanks;
- Use of drip trays around mobile plant; and
- Designating and using specific impermeable refuelling areas isolated from surface water drains.

L & S CONST 10: All potentially hazardous materials shall be securely stored on site.

L & S CONST 11: Adequate security measures shall be installed on the construction site. Early assessment of sensitivities and risks will assist in the design of the site layout and security measures required. Security measures shall include secure fencing, secure site access, securing plant and equipment, secure storage of materials, sufficient warning signage and security lighting.

L & S CONST 12: The construction phase shall be monitored in relation to:

- Prevention of oil and diesel spillages;
- Adequate runoff control of potential stockpiles of contaminated subsoil;
- Protection of topsoil stockpiled for re-use;
- cleanliness of the adjoining road network.

L & S CONST 13: Soils shall be reused on site where possible. Chemical analysis will be carried out to assess whether the backfill material is inert or presents a risk to human and / or environmental receptors. Suitable soil disposal routes and waste soil receiving facilities shall be determined and incorporated into the Construction & Demolition Waste Management Plan (C&DWMP) for the works.

L & S CONST 14: Excavated materials shall be visually assessed for signs of contamination. Should material appear to be contaminated or potentially contaminated, samples shall be analysed by an appropriate testing laboratory. Contaminated material shall be treated in accordance with the Waste Management Regulations. All excess fill and material considered unacceptable for reuse on site in terms of the residual risk posed to human health and to the environment shall be appropriately disposed of in accordance with the Waste Management Regulations.

L & S CONST 15: Surplus subsoil arisings caused by excavations for foundations, roads and drainage shall be minimised and where necessary, stockpiled and taken off-site to a licensed landfill facility. Any topsoil that is removed shall be used for re-grading at a later stage.

L & S CONST 16: Top-soiling and landscaping of the works shall be undertaken as soon as finished levels are achieved, in order to reduce weathering and erosion and to retain soil properties. Existing topsoil shall be retained on site to be used for the proposed development

L & S CONST 17: Reusable excavated gravels, sands or rock shall be retained on-site for backfilling or drainage purposes to reduce the total volume of imported material.

L & S CONST 18: Wheel wash facilities shall be provided close to the site entrance to reduce the deposition of mud, soils and other substances on the surrounding road network.

18.3.4 Hydrology – Surface Water & Flooding

HYDROLOGY CONST 1: Back-up plans to deal with the possibility of contamination or fuel spills, *e.g.* pumping of wells or sumps to collect contaminated groundwater for treatment shall be undertaken and included in an overall Construction & Demolition Waste Management Plan (C&DWMP) and Emergency Operation Plan (EOP).

HYDROLOGY CONST 2: Special environmental and human health contingency plans and procedures, following best-practice guidance, shall be developed for the unexpected discovery of contaminated or illegally deposited waste materials. These may include a detailed environmental site investigation, contamination delineation, risk assessment and appropriate remediation under the design and supervision of an experienced contaminated land engineer/hydrogeologist.

HYDROLOGY CONST 3: Chemical analysis will be carried out to assess whether any fill material presents a risk to human and/ or environmental receptors and to determine a suitable on-site or off-site disposal routes.

HYDROLOGY CONST 4: All imported fill material will be sourced from approved and licenced/permitted facilities. All fill material will be confirmed to be inert prior to importation to the site including confirmation of the chemical testing and a visual assessment.

HYDROLOGY CONST 5: All waste containers (including all ancillary equipment such as vent pipes and refuelling hoses) shall be stored within a secondary containment system (*e.g.* a bund for static tanks or a drip tray for mobile stores and drums). The bunds shall be capable of storing 110% of the tank capacity. Where more than one tank is stored, the bund shall be capable of holding 110% of the largest tank of 25% of the aggregate capacity (whichever is greater). Drip trays used for drum storage shall be capable of holding at least 25% of the drum capacity. Where more than one drum is stored the drip tray shall be capable of holding 25% of the aggregate capacity of the drums stored.

HYDROLOGY CONST 6: Silt fencing and berms will be installed strategically around and through the site. The location of the silt fencing and berms will be determined in the construction stage C&DWMP and will be subject to a detailed assessment of the planned works methodology and works area. The purpose of the silt fencing and berms are to prevent silt laden water leaving the site and entering adjoining lands and surface waters.

HYDROLOGY CONST 7: Drainage ditches will be installed to intercept surface water where there is a risk of significant water flow into excavations, adjoining lands or watercourses. A lined attenuation pit shall be constructed at the lowest point to capture any surface water at this point. There will also be a requirement to periodically pump water from excavations. All collected and pumped water will have to be treated prior to discharge. The run-off will be directed through appropriately sized settlement ponds or tanks to remove suspended solids.

HYDROLOGY CONST 8: Monitoring prior to, during and post construction works of surface water and groundwater quality shall be undertaken to ensure minimum disturbance of water quality in the general vicinity of the site. During the construction phase, the monitoring programme will include daily checks, weekly inspections and monthly audits to ensure compliance with the Construction Environmental Management Plan. This will be undertaken in consultation with the wishes of Limerick City & County Council.

HYDROLOGY CONST 9: Waste fuels and materials shall be stored in designated areas that are isolated from surface water drains or open waters (*e.g.* excavations). Skips will be closed or covered to prevent materials being blown or washed away and to reduce the likelihood of contaminated water leakage. Hazardous wastes such as waste oil, chemicals and preservatives, will be stored in sealed containers and kept separate from other waste materials while awaiting collection by a registered waste carrier. Fuelling, lubrication and storage areas and site offices will not be located within 50m of drainage ditches, surface waters or open excavations. Fuel interceptor tanks will be installed on the site to treat any runoff.

HYDROLOGY CONST 10: Wash-out areas on site will be located greater than 50m from any natural watercourse and properly designed with an impermeable liner to contain all cement laden water. No wash-out of ready-mix concrete vehicles shall be located within 10 metres of any temporary or permanent drainage features. Signage shall be erected to clearly identify the wash-out areas. Sufficient wash-out areas shall be provided to cater for all vehicles at peak delivery times.

HYDROLOGY CONST 11: All waste material (both soils and other) generated will be temporarily stored in secure bunded areas thereby preventing the migration of leachate or contaminating substances from impacting on the surrounding environment.

HYDROLOGY CONST 12: Adequate security measures shall be installed on the construction site the design of the construction site layout and security measures required will take account of the sensitivity of the project and potential locations at risk. Security measures will include secure fencing, secure site access, securing site plant and equipment, secure storage of materials, sufficient warning signage, and security lighting.

HYDROLOGY CONST 13: All construction vehicles, plant and machinery shall be maintained on a weekly basis and checked daily to ensure any damage or leakages are corrected. Precautions shall be taken to avoid spillages, including:

- Supervision of deliveries and refuelling activities;
- Use of secondary containment e.g. bunds around oil storage tanks;
- Use of drip trays around mobile plant; and
- Designating and using specific impermeable refuelling areas isolated from surface water drains.

18.3.5 Air Quality & Climate

AIR QLTY & C CONST 1 - Dust mitigation measures appropriate for sites with a medium risk of dust impacts shall be implemented during the construction phase of the proposed development. The dust mitigation measures have been developed in the form of a Dust Management Plan which is detailed within Appendix 10.1. The Dust Management Plan as detailed in Appendix 10.1 shall be agreed with the planning authority prior to construction and the measures implemented throughout the construction phase of the proposed development.

AIR QLTY & C CONST 2 - The following best practice measures shall be implemented on site to prevent significant GHG emissions and reduce impacts to climate:

- Prevention of on-site or delivery vehicles from leaving engines idling, even over short periods.
- Ensure all plant and machinery are well maintained and inspected regularly.
- Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site.
- Sourcing materials locally where possible to reduce transport related CO2 emissions.

18.3.6 Noise & Vibration

N & V CONST 1: Construction site hoarding will be constructed around the site boundaries as standard. The hoarding will be constructed of a suitable material in order to provide a good level of sound insulation. The placement of site buildings such as offices and stores will be used, where feasible, to provide noise screening when placed between the source and the receiver.

N & V CONST 2 : Static plant such as compressors and generators shall be supplied with manufacturers' proprietary acoustic enclosures. The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. Should a particular item of plant already on the site be found to generate high noise levels, the first action should be to identify whether or not said item can be replaced with a quieter alternative.

N & V CONST 3: The phasing programme will be arranged so as to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity.

N & V CONST 4: The contract documents will clearly specify the construction noise criteria included in Chapter 11.0 which the construction works must operate within. The Contractor undertaking the construction of the works will be obliged to take specific noise abatement measures and comply with the recommendations of *BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Noise* and the European Communities (Noise Emission by Equipment for Use Outdoors) Regulations, 2001.

N & V CONST 5: If replacing a noisy item of plant is not a viable or practical option, consideration will be given to noise control "at source". Referring to the potential noise generating sources for the works under consideration, the following best practice migration measures should be considered:

- For mobile plant items such as dump trucks, excavators and loaders, the installation of an acoustic exhaust and or maintaining enclosure panels closed during operation can reduce noise levels by up to 10dB. Mobile plant should be switched off when not in use and not left idling. For all materials handling ensure that materials are not dropped from excessive heights, lining drops chutes and dump trucks with resilient materials.
- For compressors, generators and pumps, these can be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation.
- Demountable enclosures can also be used to screen operatives using hand tools and will be moved around site as necessary.
- All items of plant should be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

N & V CONST 6: A designated environmental liaison officer will be appointed to site during construction works. Any noise complaints should be logged and followed up in a prompt fashion by the liaison officer.

18.3.7 Material Assets – Traffic & Transport

T & T CONST 1: A Construction Traffic Management Plan (CTMP) is to be prepared in consultation with Limerick City and County Council. The CTMP will mitigate traffic impact through:

- programming deliveries outside of peak periods
- ensuring construction vehicles route to site via agreed routes and junctions
- ensuring the construction compound accommodate all construction staff, parking, deliveries and safe vehicle turning
- ensuring construction vehicles will be covered during dry weather to prevent dust emissions
- ensuring wheel washers provided to ensure debris and mud are not taken onto the local road
- ensuring trained banksmen will marshal delivery vehicles within the site & access/exit.

18.3.8 Material Assets – Built Services

BUILT SERV CONST 1 - Provision of Utilities shall be carried out and monitored in accordance with the recommendations and requirements of the relevant statutory bodies (ESB, Gas Networks Ireland, Irish Water, EIR, Limerick City and County Council etc.) and to ensure compliance with health & safety legislation.

BUILT SERV CONST 2 - Prior to the commencement of excavations in public areas, all utilities and public services are to be identified and checked; to ensure that adequate protection measures are implemented to minimise the risk of service disruption.

BUILT SERV CONST 3 - All proposed connections to existing services shall be constructed at off-peak times to minimise disruption to neighbouring properties.

BUILT SERV CONST 4 - Water metering shall be included to record consumption to ensure there are no leaks as a result of the project.

18.3.9 Material Assets – Waste Management

WM CONST 1 - Cut and fill on the site has been minimised through the design process. . The quantum of fill required on site shall be reduced by reusing bedrock as Class 1 material any other existing site won materials as appropriate.

WM CONST 2 - Prior to commencement, the appointed Contractor(s) will be required to prepare a Resource Waste Management Plan (RWMP) in agreement with LCCC, 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 RWMP throughout the duration of the proposed construction phase.

WM CONST 3 - A Resource 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.

WM CONST 4 - Building materials will be chosen with an aim 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.

WM CONST 5 - A quantity of soil, stone, gravel and clay will need to be excavated to facilitate the proposed development. 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.

WM CONST 6 - 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; (alternatively, the waste will be sorted for recycling, recovery or disposal).

WM CONST 7 - 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).

WM CONST 8 - All waste leaving site will be reused, recycled or recovered, where possible, to avoid material designated for disposal and will be transported by suitably permitted contractors and taken to suitably registered, permitted or licenced facilities.

WM CONST 9 - All waste leaving the site will be recorded and copies of relevant documentation maintained. 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.

18.3.10 Cultural Heritage

CH CONST 1: The children's burial ground (LI005-007---) located within the Masterplan area will be preserved *in situ* as an undeveloped greenspace and is outside the Phase 3 area. A 20m buffer from the outer edge of the monument will be established prior to any construction works commencing within the site.

CH CONST 2: The 20m buffer around the children's burial ground (LI005-007---) will be fenced-off with Harris fencing prior to the commencement of construction to protect the site during the course of works. This fence shall remain in place until all development works have been completed. The fencing will be erected under archaeological supervision and no construction related activities, such as machine movements, dumping of spoil or storage of materials will occur within the fenced-off area.

CH CONST 3: Previously unrecorded features of potential archaeological origin shall be preserved by record through a programme of archaeological excavation and recording under licence from the National Monuments Service (NMS) in the Department of Housing, Local Government and Heritage.The archaeological excavations will be undertaken in advance of the main construction works in the relevant areas in order to allocate adequate time to appropriately excavate and record the archaeological deposits/features.

CH CONST 4: A post-excavation phase of works, involving analysis, reporting and dissemination to the relevant authorities will be undertaken off site. The level of the post-excavation analysis and reporting will be commensurate with the level of archaeology excavated on site.

18.3.11 The Landscape

LVA CONST 1 – A site planning design strategy to retain boundary hedgerows and tree protection measures was designed and is to be implemented on site as detailed in the Landscape and Mitigation Diagram in Chapter 16.

LVA CONST 2 – Site hoarding shall be erected to screen views of construction activities.

LVA CONST 3 - Tree protection measures shall be installed to ensure vegetation to be retained is fully protected during the construction process.

18.4 OPERATIONAL PHASE MITIGATION

18.4.1 Population & Human Health

No mitigation proposed.

18.4.2 Biodiversity

BIO OPER 1: The SUDs strategy as designed shall be implemented on site as it will reduce the impact of the flow of surface water and storm water on the adjacent aquatic environments (drainage ditches).

BIO OPER 2: The habitats to be retained outside of the development shall be fenced off from the public so that they remain undisturbed for wildlife. These habitats include the proposed new pond, new and existing wet grassland and drainage ditches (the latter will be separated from the development by a boundary wall).

18.4.3 Land & Soils, Geology & Hydrogeology

L & S OPER 1: An appropriately designed drainage system has been incorporated into the design of the proposed development. The system has been designed in accordance with accordance with the Greater Dublin Strategic Drainage Study (GDSDS), the CIRIA SUDS Manual 2015 and Recommendations for Site Development Works for Housing Areas published by the Department of the Environment and Local Government. It involves ensuring that suitable protection measures of runoff infiltration to ground including permeable paving, gullies and catch pits, lined attenuation structures and oil-water interceptors are provided. The design takes into consideration the groundwater vulnerability rating and all surface water SUDS features within 1m of the bedrock will be wrapped with impermeable geotextile to prevent potentially contaminated water entering the aquifer.

18.4.4 Hydrology – Surface Water & Flooding

HYDROLOGY OPER 1: An appropriately designed drainage system has been incorporated into the design of the proposed development. The system has been designed in accordance with accordance with the Greater Dublin Strategic Drainage Study (GDSDS), the CIRIA SUDS Manual 2015 and Recommendations for Site Development Works for Housing Areas published by the Department of the Environment and Local Government. It involves ensuring that suitable protection measures of runoff to surface water including permeable paving, gullies and catch pits, lined attenuation structures and oil-water interceptors are provided.

18.4.5 Air Quality & Climate

AIR QLTY & C OPER 1 - The development shall be Nearly Zero Energy Building (NZEB) compliant in accordance with the 2021 Part L requirements. Each building shall have a Building Energy Rating (BER) to comply with the NZEB requirements.

AIR QLTY & C OPER 2 - Renewable technologies in the form of air to water heat pumps shall be fitted to each unit. Passive design measures include the use of the building fabric to take advantage of the site constraints/orientation to maximise the daylight factors, natural ventilation and solar benefits. Natural daylight factors in accordance with BRE and CIBSE recommendations have been targeted.

18.4.6 Noise & Vibration

No mitigation proposed.

18.4.7 Material Assets – Traffic & Transport

No mitigation proposed.

18.4.8 Material Assets – Built Services

No mitigation proposed.

18.4.9 Material Assets – Waste Management

RES & WM OPER 1: 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.

RES & WM OPER 2: All waste collected from the development will be reused, recycled or recovered where possible, with the exception of those waste streams where appropriate facilities are currently not available.

RES & WM OPER 3: All waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities.

18.4.10 Cultural Heritage

CH OPER1: An Archaeological Management Plan for the Phase 1 area (Planning Ref. 21/1800) was submitted to Limerick City and County Council. This included mitigation measures to manage and protect the children's burial ground (LI005-007----) during the operational phase which will also apply for the operational phase of the proposed development.

- A policy of minimal change shall be adopted with regard to the existing features of the archaeological monument. The existing site is surrounded by bushes and thick bramble and these shall be retained to define the perimeter of the monument. Any non-woody shrubs around the perimeter of the monument shall be pruned/removed by hand during routine maintenance. Maintenance involving minimal chance will help the site to retain its current character, ensure that the archaeological monument remains inviolate and that the plant and animal ecosystems that have developed naturally on the monument are not unnecessarily disturbed.
- The site will be framed by a buffer of wildflower meadow around its periphery, which will be subject to bi-annual maintenance, which will include strimming/cutting of vegetation using hand tools. Material will be removed from the site to a designated dumping site located outside the 20m buffer around the monument. Any wind-blown modern plastics or other debris identified within the site during routine maintenance shall be collected and removed to an appropriate facility. No burning of materials shall occur.
- Routine bi-annual maintenance shall include monitoring the condition of the monument and its surrounds and the identification of evidence of inappropriate usage or anti-social behaviour.
- Interpretive signage shall be erected approximately 20m from the exterior edge of the feature (outside the buffer surrounding the monument). The signage shall include a description of the

site as provided by the Archaeological Survey of Ireland and a generic explanation of the monument type.

18.4.11 The Landscape

LVA OPER 1 - The architectural design of the buildings as proposed shall be delivered as per the planning drawings as they aim to reduce the visual mass through its form and choice of materials.

LVA OPER 2 - The retention of existing native hedgerows as detailed in the Landscape and Visual Mitigation Diagram shall assist the visual integration of the building into the landscape and mitigate the visual impact.

LVA OPER 3 - The landscape proposals as detailed on the Landscaping Plan inclusive of green links, trees, hedgerows, wetlands, SUDS features, woodland blocks and wildflower meadow shall be implemented in full. These elements will assist the visual integration of the building into the landscape and mitigate the visual impact.

LVA OPER 4 - The visual screening provided by the proposed hedgerows and tree belts indicated on the KFLA Landscape and Visual Mitigation Diagram shall be implemented during the first planting season following construction of the houses.

LVA OPER 5 - Periodic tree surveys and implementation of a tree management plan for the mature trees on site to ensure their continued sustainability shall be undertaken.

LVA OPER 6 - The implementation and monitoring of the landscape management plan shall be undertaken for the full duration of the defects liability period to ensure successful establishment of the proposed planting scheme and trees.

18.5 MONITORING

18.5.1 Population and Human Health

- No monitoring proposed.

18.5.2 Biodiversity

- Prior to construction water testing should be conducted to provide baseline information on water quality for the two water courses (drainage ditches) adjacent to the overall site.

- Suitably qualified personnel will be appointed by the contractor to monitor the construction process and a daily environmental record will be kept of any accidents, leaks or spills and how they were addressed. The appointed personnel will also monitor the removal of any of the trees and hedgerows and should any nests or bat roosts be identified then work will cease and the ecologist contacted. Similarly if any of the Qualifying Interest species for the European Sites should occupy the site during construction (as detailed in the Stage 2 Appropriate Assessment for NIS Report), then works will cease immediately and the relevant authority (NPWS) will be contacted for advice on proceeding.

- On completion of the construction phase water monitoring of surface water must be completed to determine any changes to water quality as a result of the construction process.

- All onsite environmental record sheets will be collated and an environmental report compiled on completion of the construction phase. This report will be made available to LC&CC.

- A qualified ecologist will complete a walkover survey of the development site on completion to ensure that all SuDs measures and landscaping measures have been implemented. A report of this survey will be made available to LC&CC.

18.5.3 Land & Soils, Geology & Hydrogeology

- Soil removed during the construction phase is to be monitored to maximise potential for re-use on site. Monitoring of any hazardous material stored on-site will form part of the proposed Construction & Waste Management Plan. A dust management/monitoring programme should be implemented during the construction phase of the development. The quantities of topsoil and subsoil removed off site will be recorded.

- The ongoing monitoring and maintenance of surface water treatment features such as petrol interceptors, gullies, and catch pit manholes

18.5.4 Hydrology – Surface Water & Flooding

- Monitoring prior to, during and post construction works of surface water and groundwater quality shall be undertaken to ensure minimum disturbance of water quality in the general vicinity of the site. During the construction phase, the monitoring programme will include daily checks, weekly inspections and monthly audits to ensure compliance with the Construction Environmental Management Plan. This will be undertaken in consultation with the wishes of Limerick City & County Council.
- Monitoring of any hazardous material stored on-site will form part of the proposed Construction & Waste Management Plan.

- The ongoing monitoring and maintenance of surface water treatment features such as petrol interceptors, gullies, and catch pit manholes

18.5.5 Air Quality & Climate

- Monitoring of construction dust deposition along the site boundary to nearby sensitive receptors during the construction phase, particularly during the ground works phases, of the proposed development is recommended to ensure mitigation measures are working satisfactorily. This can be carried out using the Bergerhoff method in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting vessel is secured to the stand with the opening of the collecting vessel located approximately 2m above ground level. The TA Luft limit value is 350 mg/m²/day during the monitoring period of 30 days (+/- 2 days).

18.5.6 Noise & Vibration

- No monitoring proposed.

18.5.7 Material Assets – Traffic & Transport

- The appointed contractor will be obliged to appoint a traffic liaison officer/traffic manager who will be involved in preparing the CTMP and to monitor the performance of the CTMP. The traffic liaison officer will be available to receive complaints, comments and queries about the traffic generated by the construction site and traffic issues associated with the site.

- Regular meetings will be held on-site to which with all relevant stakeholders will be invited. The traffic liaison officer/traffic manager will liaise with:
    - Limerick City and County Council (LCCC) including Elected Members
    - An Garda Siochana
    - Other relevant statutory bodies
    - Members of the community.
    - Adjacent contractors

18.5.8 Material Assets –Built Services

- Water consumption will be monitored for the development during construction through the use of water meters. This will ensure that any potential leaks as a result of construction are addressed promptly.
- All water mains to be pressure tested and cleaned in accordance with the Irish Water code of practice prior to connecting to the existing potable water supply network. This will ensure that the watermain is leak free, clean and ready to receive water before the development is operational.
- All foul sewers to be pressure tested and cleaned in accordance with the Irish Water code of practice prior to connecting to the existing foul sewer network. This will ensure that the foul sewer is leak free, clean and ready to receive foul effluent before the development is operational.
- All new infrastructure, which is to serve the proposed development, is to be routinely inspected with any maintenance carried out, as required.
- Any monitoring of the built services required during the operational phase of the proposed project will be as advised by the relevant services providers.

18.5.9 Material Assets – Waste Management

- A Resource Manager shall be appointed, who will have responsibility for monitoring the actual waste volumes being generated and ensuring that contractors and sub-contractors are segregating waste as required. Where targets are not being met, the Resource Manager will identify the reasons for this and work to resolve any issues. Recording of waste generation during the construction phase of the proposed development will enable better management of waste contractor requirements and identify trends. The data should be maintained to advise on future developments.

18.5.10 Cultural Heritage

Following the completion of all required post-excavation analyses, including environmental, artefact studies and dating, a final report on the excavations will be submitted to the statutory and relevant bodies.

18.5.11 The Landscape

- All tree protection measures will be monitored by a qualified Arborist throughout the construction period.
- A landscape management plan will form part of the works contract and include for ongoing maintenance of the planting scheme. A qualified landscape architect will monitor the post installation management and maintenance of the scheme by a suitable qualified landscape contractor. The landscape works and maintenance contracts will include a requirement for replacement planting to ensure the full design intent is realised.