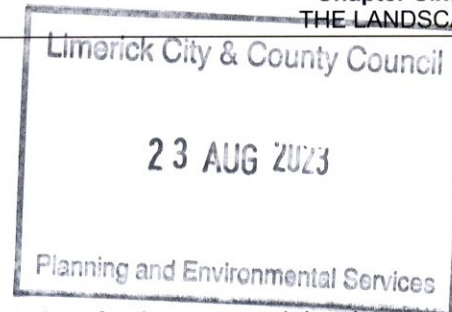


CHAPTER SIXTEEN THE LANDSCAPE



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 4 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 4 of an overall development. The indicative masterplan for the overall site covers 22.53 hectares, However, the proposed Phase 4 development comprises an application for 54 no. units only on a gross site area of 2.56 hectares in the northern section of the study area. The 'Receiving Environment' section of this study assesses the full study area which comprises the 14.1 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 4.

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 19.9 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 9.1ha 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 Rd (Map ref. C) and bounds the new link road to the east. This section is 1.79ha and in triangular form with its 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 its longest axes and measures approximately 0.25 ha. This section bounds the Country Club to the south.

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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 lower 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 of 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 scattered trees visible. Recently installed timber fence where roadside hedgerow has been removed.

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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 scattered individual and small groups of trees. This is due to the recent history of this area where it 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 of 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 regional level (Area of Outstanding Natural Beauty).
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 landscape character or facilitate appropriate, necessary change
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, repair, 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 development, repair, 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 Visual 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.

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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.

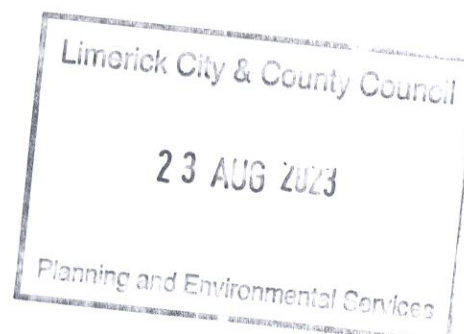


Figure 16.5 Location of Potential Sensitive Visual Receptors as listed in table 16.3.

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 regional ecological 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 significant vegetation screening	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 boundary.	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 boundary exists along this boundary.	Medium
VR 4	Line of 3 single storey houses on Old Cratloe Road with rear gardens separated by agricultural fields and hedgerows from the study lands.	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 4 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

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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 4 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.

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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 4,5 and 6. The visual impact on VR 5 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, 5, 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.

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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 of the overall masterplan 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	The development is not visible in views from this location
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 proposed development are barely visible above the horizon line. The visible elements do not cause any visual obstruction.		
Predicted impact of the development	An imperceptible and long-term negative visual impact.	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> Limerick City & County Council 23 AUG 2023 Planning and Environmental Services </div>
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 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	A significant and long-term negative visual impact.	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> Limerick City & County Council 23 AUG 2023 Planning and Environmental Services </div>
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 construction 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.	
Proposed 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

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Predicted impact of the full masterplan	A moderate and long-term negative visual impact.
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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	Limerick City & County Council 23 AUG 2013
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)

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 4 of an overall development. The indicative masterplan for the overall site covers 22.53 hectares, However, the proposed Phase 4 development comprises an application for 54 no. units only on a gross site area of 2.56 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 4. 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 the Landscape and Mitigation Diagram in Appendix 16.1

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 will be installed 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 building aims 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 include green links, trees, hedgerows, wetlands, SUDS features, woodland blocks and wildflower meadow. 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 6 - 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 7 - The implementation and monitoring of a landscape management plan 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.

16.7.1 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)

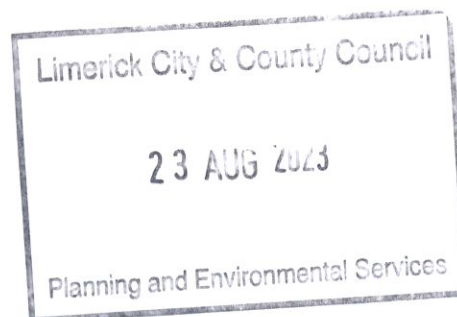
16.8. MONITORING

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.





Legend	
	Visual screening provided by existing hedgerows and tree groups retained and strengthened
	Visual Screening provided by proposed hedgerows and tree belts
	Proposed Development Boundary
	Overall Masterplan Boundary

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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.

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	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	-		-	CO	C	C	-	C	-	-	-
Archaeology & Cultural Heritage	-	-		CO	-	-	-	-	-	-	-
The Landscape	O	CO	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	-	-	-	

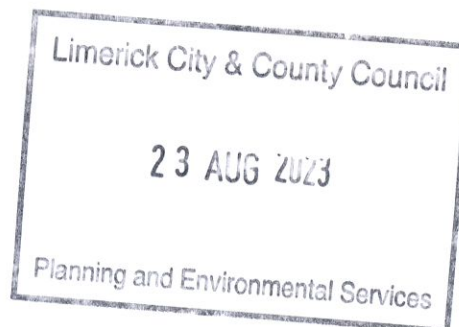
C- Construction O – Operation CO – Construction & Operation

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 public 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.

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	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.
<div style="border: 1px solid black; padding: 5px; display: inline-block; transform: rotate(-90deg); transform-origin: left top;"> Planning and Environmental Services 23 AUG 2023 Limerick City & County Council </div>	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.
<div style="border: 1px solid black; padding: 5px; display: inline-block; text-align: center;"> Limerick City & County Council 23 AUG 2023 Planning and Environmental Services </div>	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 practice construction methods shall be used to avoid potential impacts.
	Air Quality & Climate	Construction of the site services have a 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 public 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 public 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 & Climate 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;

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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.

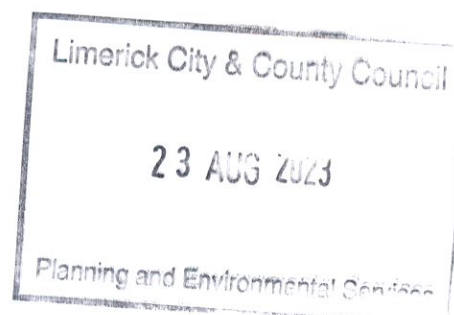
The proposed development does need to be considered in conjunction with the works currently underway, delivering the proposed Coonagh to Knockalisheen Distributor Project. This infrastructure project secured consent from An Bord Pleanála in 2021 and was subject to the preparation of an EIAR and Environmental 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.



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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 future 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.

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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)

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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.

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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.

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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.

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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.

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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.

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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

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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 4 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 Appendix 16.1.

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 the Greater Dublin Strategic Drainage Study (GSDSDS), 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 the Greater Dublin Strategic Drainage Study (GSDSDS), 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.

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18.4.6 Noise & Vibration

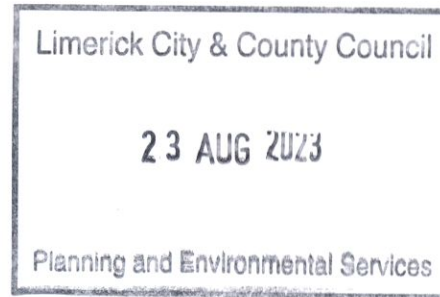
No mitigation proposed.

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 change 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.

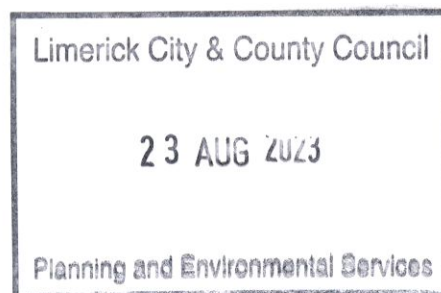
18.5 MONITORING

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)

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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 Síochána
 - 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.

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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.

