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Department of Transport

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Comhairle Contae Chill Dara  
Kildare County Council

# M4 Eastbound Bus Priority Measures Pilot Project

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EIA Screening Report  
*October 2022*



Kildare County Council

**M4 Eastbound Bus Priority  
Measures Pilot Project**

**Environmental Impact Assessment  
Screening Report**

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A1-C01 | 1 October 2022

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 272691-00

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**ARUP**

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## Glossary of Terms

The terms below are in the context of the M4 Eastbound Bus Priority Measures Pilot Project.

Term	Description
Hard Shoulder Bus Priority Measure	Where buses and coaches utilise the hard shoulder of the eastbound direction. It will be 3.5m wide with a 0.5m wide buffer separating it from the two eastbound traffic lanes and a 0.5m wide hard strip beside the verge. The hard shoulder will remain at all times and be accessible to vehicles which may become disabled or required to leave the traffic lanes in an emergency. It is not a dedicated bus lane (an area of road cross-section given over to sole use of buses, on a full time or part-time basis).
Emergency Refuge Area (ERA)	An Emergency Refuge Area (ERA) provides safe refuge for a vehicle in an emergency. They are provided as part of the proposed development at a spacing of 500m. There are eight ERA's as part of the proposed development.
M4/N4 Corridor	This incorporates all elements between the boundaries including carriageways, the central reserve, separation zones, hard shoulders, hard strips, verges including any footway and cycleways.
Nearside	Left-hand side of a vehicle when viewing a forward moving vehicle from behind: typically the front-seat passenger side of the vehicle in Ireland.

# 1 Introduction

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## 1.1 EIA Screening Report

This report is the Environmental Impact Assessment (EIA) Screening Report for the M4 Eastbound Bus Priority Measures Pilot Project (hereafter referred to as the proposed development). This report has been prepared in accordance with the applicable provisions of the Environmental Impact Assessment Directive.<sup>1</sup> This EIA Screening Report has been prepared so as to enable Kildare County Council to consider whether the proposed development is to be subject to an environmental impact assessment, in accordance with the provisions of the EIA Directive.

Certain projects, listed in Annex I to the EIA Directive require mandatory EIA, due to those projects always having the potential for significant environmental effects. Other projects which fall below the relevant thresholds for mandatory EIA (i.e., “sub-threshold development”) may require EIA if it is considered that the development is likely to have a significant effect on the environment. Significant effects may arise due to the nature of the development, its scale or extent and its location in relation to the characteristics of the receiving area, particularly, sensitive environments.

This report documents the methodology used to prepare this EIA Screening, having regard to, and applying the relevant legislation and guidance documents, including:

- Ministerial Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning and Local Government, 2018);
- Implementation of the EIA Directive 2014/52/EU (European Commission 2018);
- Environmental Impact Assessment of Projects - Guidance on Screening (European Commission, 2017); and
- OPR Practice Note (PN02) Environmental Impact Assessment Screening (Office of the Planning Regulator, 2021).

As set out in the “*Ministerial Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment*”, screening is the initial stage in the EIA process and determines whether or not specified public or private developments are likely to have significant effects on the environment and, as such, require EIA to be carried out prior to a decision on a development consent application being made.

A screening determination is a matter of professional judgement, based on objective information relating to the proposed project and its receiving environment.

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<sup>1</sup> Directive (2011/92/EU) of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment as amended by Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014.



Environmental effects can, in principle, be either positive or negative. For the proposed development, the EIA Screening stage involved the following:

- Review of the proposed development against the classes of project set out in Annex I of the EIA Directive. Annex I projects that meet or exceed the thresholds set out therein require mandatory EIA and, as such, there is no screening determination required; and
- Review of the proposed development against the thresholds for road development as identified in section 50 of the Roads Act 1993, as amended (“the Roads Act”). Where those thresholds are met or exceeded, once again, EIA is mandatory, and no screening determination is required. However, for “sub-threshold” road development, a screening determination is required to be undertaken in order to ascertain whether by virtue, inter alia, of its nature, size or location, road development should be subject to Environmental Impact Assessment (EIA).

The proposed development does not fall under the list of projects identified in Annex I of the EIA Directive. Moreover, the proposed development does not meet or exceed the thresholds under section 50 of the Roads Act, such that it would automatically trigger the requirement for an EIA. The purpose of this EIA Screening Report, in accordance with section 50(1)(c) of the Roads Act, is to consider whether the proposed development would be likely to have significant effects on the environment.

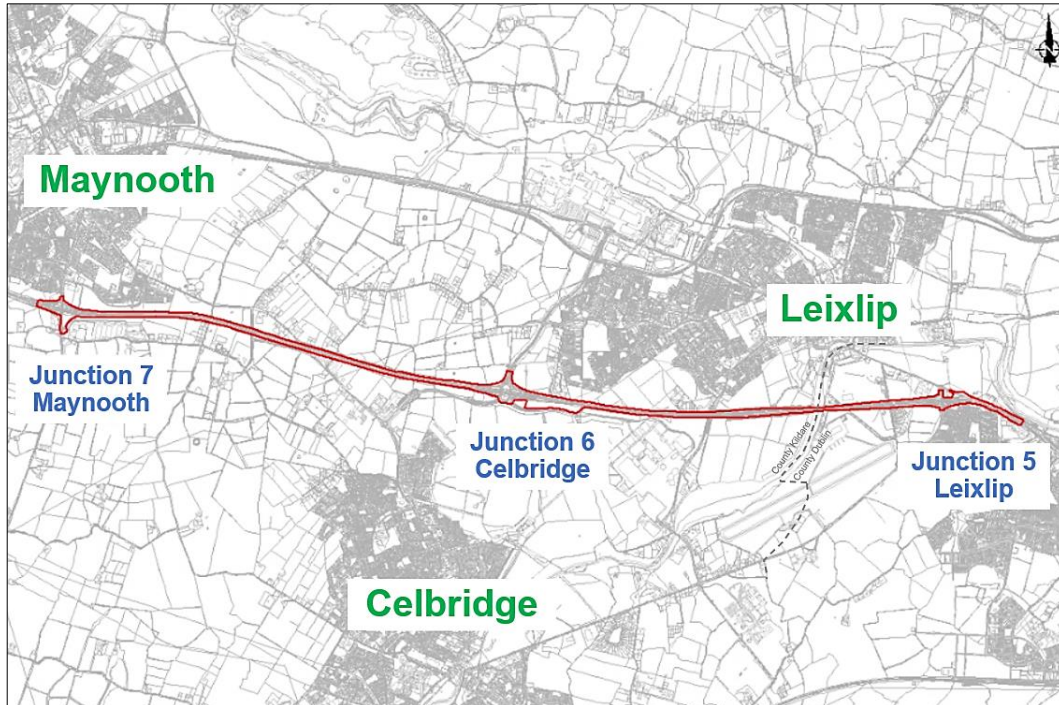
## 1.2 Overview

The proposed M4 Eastbound Bus Priority Measures Pilot Project will be located within the M4/N4 corridor. The proposed development traverses two local authority boundaries, Kildare County Council and South Dublin County Council. A Section 85 Agreement has been entered into by both local authorities, which appoints Kildare County Council as the Lead Local Authority and Sponsoring Agency of the project. TII, acting as the Approving Authority, have appointed Kildare National Roads Office to project manage the delivery of the project. It targets bus priority delivered via the provision of a bus priority measure within the hard shoulder.

The proposed development extends from Junction 7 Maynooth to Junction 5 Leixlip in the eastbound direction over a length of approximately 7.84km. Refer to Figure 1.1 for the proposed development boundary. The proposed development aims to deliver enhanced accessibility via a more bus friendly M4/N4 route, prioritising person throughput over vehicle throughput, with multi-agency coordination approach.

The proposed development will utilise the hard shoulder in the eastbound direction to accommodate a 3.5m wide hard shoulder bus priority measure. Traffic lanes are reduced to 3.5m in width. A 0.5m buffer separates the hard shoulder bus priority measure from the traffic lanes. The hard shoulder bus priority measure will operate at a lower speed limit to that of the traffic lanes.

In addition to incorporating a bus priority measure within the existing hard shoulder, emergency refuge areas (ERA's) are proposed at a spacing of circa 500m, depending on site constraints, along the length of the proposed development. The purpose of these ERA's is to provide an additional safe refuge for vehicles which may become disabled or required to leave the mainline in an emergency. The hard shoulder will also remain accessible for all vehicles which may become disabled or required to leave the mainline in an emergency.



**Figure 1.1:** Proposed Development Boundary (© Google Map Data ©2021 Tele Atlas)

### 1.3 Objectives

The objectives of the proposed development can be divided into:

- Scheme Objectives; and
- Pilot Objectives.

#### 1.3.1 Scheme Objectives

The Scheme Objectives include the following:

- Deliver a practicable solution to support the *GDA Transport Strategy* in the provision of continuous bus priority between Junction 7 and Junction 5;
- Encourage modal shift to more sustainable transport modes;
- Increase the people carrying capacity of the M4/N4;
- The M4/N4 currently serves both strategic traffic and also local GDA traffic which is impacting on the M4/N4 capacity to act as a strategic route. Mitigating the local GDA traffic by providing quality bus services will assist in the M4/N4 performing its primary function as a strategic route; and

- Support reduced journey times for buses, more reliability for timetables and schedules, opportunities for schedule improvements and associated environmental benefits.

### 1.3.2 Pilot Objectives

Deliver effective bus priority measures from a safety and operational perspective in a motorway environment.

The objectives can be further sub-divided:

#### 1.3.2.1 Safety

- Deliver measures which are clearly delineated and understood by general road users and bus drivers in a motorway environment; and
- Deliver measures which cater for the safe use of the motorway and merges/diverges by general traffic and buses.

#### 1.3.2.2 Operational

- Continuous bus priority designed to cater for relevant private and public bus operators and strategic and local bus services;
- Continuous bus priority measures designed to support reduced journey times for buses, more reliability for timetables and schedules, opportunities for schedule improvements and associated environmental benefits; and
- Provision of a transport solution that allows public transport to move more efficiently during peak times.

## 2 Legislative Context

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### 2.1 EIA Directive

Directive (2011/92/EU) of the European Parliament and of the Council of the 13<sup>th</sup> of December 2011 on the assessment of the effects of certain public and private projects on the environment was amended by Directive 2014/52/EU of the European Parliament and of the Council of the 16<sup>th</sup> of April 2014 (hereinafter referred to as “the EIA Directive”). The EIA Directive requires that projects likely to have significant effects on the environment are made subject to an assessment with regard to their effects on the environment before development consent is given for such projects.

Annex I of the EIA Directive (as amended) lists the projects that must be subject to environmental impact assessment. For projects listed in Annex II of the EIA Directive (as amended), these projects should be subject to environmental impact assessment where it is determined that they are likely to have significant effects on the environment.

Where EIA Screening is required, the developer is required to provide information on the characteristics of the project and its likely significant effects on the environment. A detailed list of information to be provided is specified in Annex IIA of the EIA Directive. The relevant selection criteria to be considered when determining whether an EIAR is required is contained in Annex III to the EIA Directive.

### 2.2 Roads Act 1993, as amended

#### 2.2.1 Relevant Definitions

A “road” is defined under Section 2 of Roads Act (1993), as amended as:

*“(a) any street, lane, footpath, square, court, alley or passage,*

*(b) any bridge, viaduct, underpass, subway, tunnel, overpass, overbridge, flyover, carriageway (whether single or multiple), pavement or footway,*

*(c) any weighbridge or other facility for the weighing or inspection of vehicles, toll plaza or other facility for the collection of tolls, service area, emergency telephone, first aid post, culvert, arch, gully, railing, fence, wall, barrier, guardrail, margin, kerb, lay-by, hard shoulder, island, pedestrian, refuge, median, central reserve, channeliser, roundabout, gantry, pole, ramp, bollard, pipe, wire, cable, sign, signal or lighting forming part of the road and*

*(d) any other structure or thing forming part of the road and (i) necessary for the safety, convenience or amenity of road users or for the construction, maintenance, operation or management of the road or for the protection of the environment, or (ii) prescribed by the Minister”.*

A road authority is defined under Section 2 of Roads Act (1993), as amended as:

*““road authority”, except in Part V, means the council of a county, the corporation of a county or other borough, or the council of an urban district”.*

A “public road” is defined under Section 2 of Roads Act (1993), as amended as:

*““public road” means a road over which a public right of way exists and the responsibility for the maintenance of which lies on a road authority.”*

It is the view of Arup that the proposed hard shoulder bus priority measures could be interpreted to be a “road” development as defined under Section 2 (a) of Roads Act (1993), as amended. Similarly, Kildare County Council (KCC) is interpreted to be a “road authority” and the proposed development is interpreted as works to a “public road” as defined under Section 2 of Roads Act (1993), as amended. Therefore, it is considered appropriate to screen the project for EIA under the Roads Act 1993, as amended.

## 2.2.2 Requirement for EIA under the Roads Act 1993, as amended

Section 50 (1) of the Roads Act (1993) (as amended by Statutory Instrument No. 279 of 2019) relates to road developments subject to Environmental Impact Assessment. The thresholds for mandatory EIA of road development are set out in Section 50(1)(a) which states:

*“50. (1) (a) A road development that is proposed that comprises of any of the following shall be subject to an environmental impact assessment:*

- i. The construction of a motorway;*
- ii. The construction of a busway;*
- iii. The construction of a service area; and*
- iv. Any prescribed type of road development consisting of the construction of a proposed public road or the improvement of an existing public road.”*

The proposed development does not include the construction of a motorway nor service area. Based on review of the Road Act 1993, it has been interpreted that the proposed development does not fall under the category of “busway” as defined in the Roads Act (1993), as amended.

The ‘prescribed types of road development’ Section 50(1)(a)(iv) are set out in Part V Environmental Impact Assessment of the Road Regulations 1994 (S.I. No. 119 of 1994) (as amended) which states the following:

*“(8). The prescribed types of proposed road development for the purpose of subsection (1)(a)(iv) of section 50 of the Act shall be –*

*(a) the construction of a new road of four or more lanes, or the realignment or widening of an existing road so as to provide four or more lanes, where such new, realigned or widened road would be eight kilometres or more in length in a rural area, or 500 metres or more in length in an urban area;*

*(b) the construction of a new bridge or tunnel which would be 100 metres or more in length”.*

The proposed development does not involve the construction of a new road of four or more lanes nor a new bridge or tunnel.

The interpretation of “*realignment or widening of an existing road so as to provide four or more lanes, where such new, realigned or widened road would be eight kilometres or more in length in a rural area, or 500 metres or more in length in an urban area;*”. The proposed development involves the realignment of sections of an existing four lane road in a rural area, whereby a bus priority measure will utilise the hard shoulder on the eastbound carriageway. While this will result in the realignment of an existing road so as to provide a hard shoulder bus priority measure, it will not exceed eight kilometres in length.

The proposed development does not meet the mandatory thresholds detailed in Section 50 (1) of the Roads Act (1993), as amended, nor the Roads Regulations 1994, as amended, (8a) or (8b) above. Therefore, a mandatory EIA is not required.

Thus, EIA screening is required to determine the potential for the proposed development to have significant effects on the environment.

## **2.3 Content of EIA Screening under the Roads Act 1993, as amended**

Under Section 50(1)(c) of the Roads Act, where consideration is being given as to whether a road development would be likely to have significant effects on the environment, the relevant selection criteria specified in Annex III to the EIA Directive must be taken into account. The relevant selection criteria set out in Annex III of the EIA Directive (as amended) are as follows:

### 1. Characteristics of the project:

The characteristics of the project must be considered, with particular regard to:

- (a) the size and design of the whole project;
- (b) cumulation with other existing and/or approved projects;
- (c) the use of natural resources, in particular land, soil, water and biodiversity;
- (d) the production of waste;
- (e) pollution and nuisances;
- (f) the risk of major accidents and/or disasters which are relevant to the project concerned, including those caused by climate change, in accordance with scientific knowledge; and
- (g) the risks to human health (for example due to water contamination or air pollution).

## 2. Location of the project:

The environmental sensitivity of geographical areas likely to be affected by projects must be considered, with particular regard to: (a) the existing and approved land use; (b) the relative abundance, availability, quality and regenerative capacity of natural resources (including soil, land, water and biodiversity) in the area and its underground; (c) the absorption capacity of the natural environment, paying particular attention to the following areas:

- (i) wetlands, riparian areas, river mouths;
- (ii) coastal zones and the marine environment;
- (iii) mountain and forest areas;
- (iv) nature reserves and parks;
- (v) areas classified or protected under national legislation; Natura 2000 areas designated by Member States pursuant to Directive 92/43/EEC and Directive 2009/147/EC;
- (vi) areas in which there has already been a failure to meet the environmental quality standards, laid down in Union legislation and relevant to the project, or in which it is considered that there is such a failure;
- (vii) densely populated areas; and
- (viii) landscapes and sites of historical, cultural or archaeological significance.

## 3. Type and characteristics of the potential impact

The likely significant effects of the project on the environment must be considered in relation to criteria set out in points 1 and 2 of this Annex, with regard to the impact of the project on the factors specified in Article 3(1), taking into account:

- (a) the magnitude and spatial extent of the impact (for example geographical area and size of the population likely to be affected);
- (b) the nature of the impact;
- (c) the transboundary nature of the impact;
- (d) the intensity and complexity of the impact;
- (e) the probability of the impact;
- (f) the expected onset, duration, frequency and reversibility of the impact;
- (g) the cumulation of the impact with the impact of other existing and/or approved projects; and
- (h) the possibility of effectively reducing the impact.

Annex IIA of the EIA Directive (as amended) sets out a detailed list of information to be contained in an EIA Screening Report. Contained in the left-hand column of Table 2.1 is the list of the information set out in Annex IIA of the EIA Directive (as amended) to be contained in an EIA Screening Report and in the right-hand column where that information can be located in this EIA Screening Report. This EIA Screening Report meets the requirements of Annex IIA of the EIA Directive (as amended), as identified in Table 2.1.

Annex IIA of EIA Directive (as amended)	EIA Screening Report Section
A description of the project, including in particular: <ul style="list-style-type: none"> <li>• a description of the physical characteristics of the whole project and, where relevant, of demolition works; and</li> <li>• a description of the location of the project, with particular regard to the environmental sensitivity of geographical areas likely to be affected.</li> </ul>	Section 3 and 4
A description of the aspects of the environment likely to be significantly affected by the project.	Section 5
A description of any likely significant effects, to the extent of the information available on such effects, of the project on the environment resulting from: <ul style="list-style-type: none"> <li>• the expected residues and emissions and the production of waste, where relevant; and</li> <li>• the use of natural resources, in particular soil, land, water and biodiversity.</li> </ul>	Section 3.5, 3.6 and 3.7
The criteria of Annex III shall be considered, where relevant, when compiling the information in accordance with points 1 to 3.	Section 3, Section 4 and Section 5

**Table 2.1:** List of information to be contained in the EIA Screening Report



## 3 Characteristics of the Proposed Development

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### 3.1 Introduction

Paragraph 1 of Annex III of the EIA Directive sets out the criteria relating to the characteristics of projects which should be considered. This includes the following:

- The size and design of the whole project;
- Cumulation with other existing and/or approved projects;
- The use of natural resources, in particular land, soil, water and biodiversity;
- The production of waste;
- Pollution and nuisances;
- The risk of major accidents having regard in particular to substances or technologies used and/or disasters which are relevant to the project concerned, including those caused by climate change, in accordance with scientific knowledge; and
- The risks to human health (for example due to water contamination or air pollution).

The following sections describe the characteristics of the proposed development with reference to the criteria listed in Annex III.

### 3.2 Description of the Proposed Development (Operational Phase)

#### 3.2.1 Overview

The proposed development will provide a non-physically segregated permanent hard shoulder bus priority measure that can be used by buses and coaches to avoid congested traffic lanes. The hard shoulder bus priority measure will primarily accommodate long-distance point-to-point services, primarily coaches, commensurate with the delivery of a core bus corridor as envisaged within the GDA Strategy.

The proposed development utilises the hard shoulder in the eastbound direction to accommodate a 3.5m wide hard shoulder bus priority measure. Both the eastbound traffic lanes (lane 1 and lane 2) are reduced to 3.5m in width. A 0.5m buffer separates the hard shoulder bus priority measure from the traffic lanes.

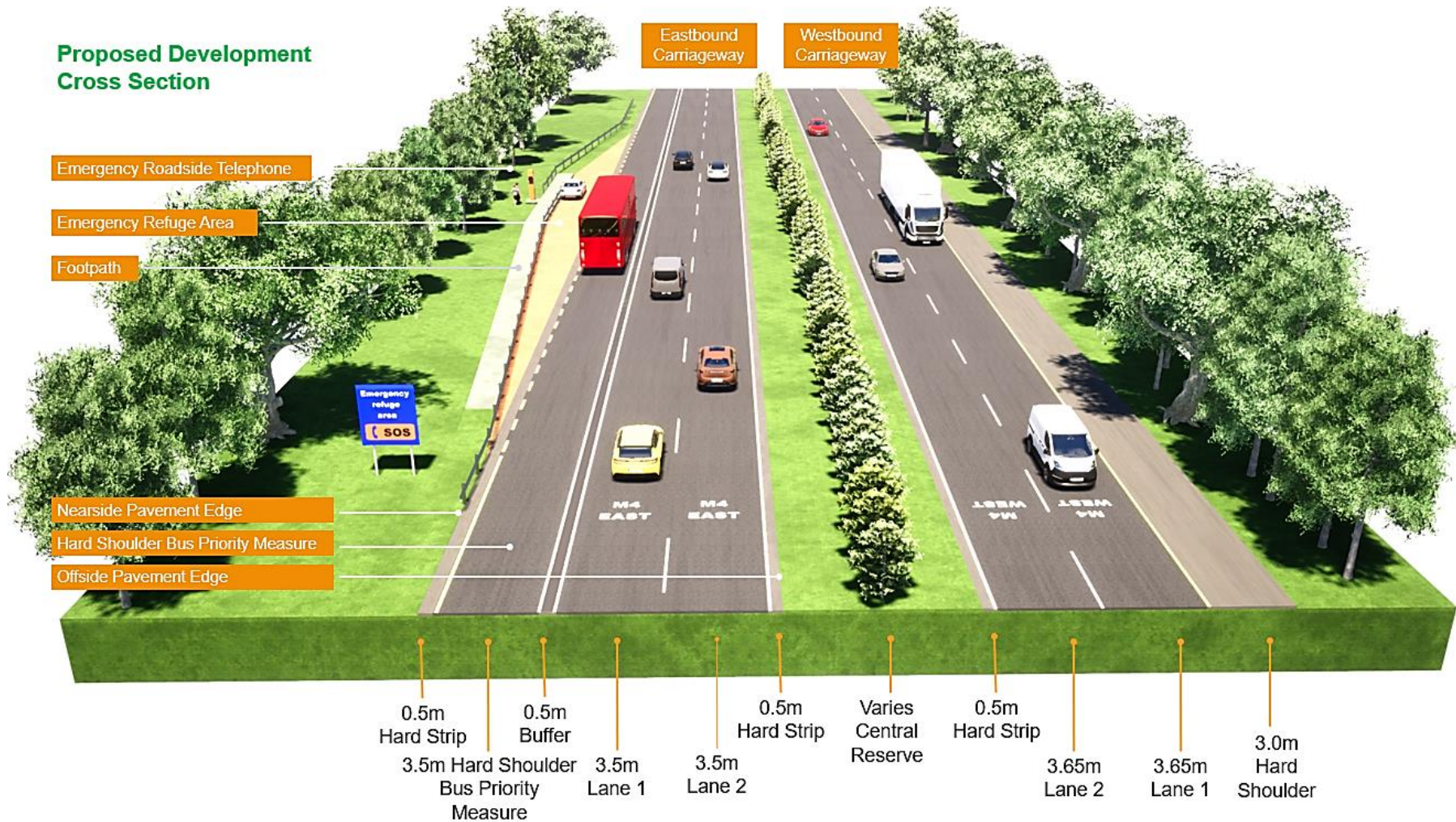
In addition to incorporating a bus priority measure within the hard shoulder, emergency refuge areas (ERA's) are proposed at a spacing of circa 500m, depending on site constraints, along the length of the proposed development.

The purpose of these ERA's is to provide an additional safe refuge for vehicles which may become disabled or required to leave the mainline in an emergency. The hard shoulder will also remain accessible for all vehicles which may become disabled or required to leave the mainline in an emergency.

General Layout drawings are included in **Appendix B**.

### 3.2.2 Cross Section

The proposed development cross section is illustrated in Figure 3.1.



**Figure 3.1:** Proposed Development Cross Section (©Arup)

### 3.2.3 Alignment

The existing hard shoulder on the nearside of the M4/N4 eastbound carriageway will incorporate a hard shoulder bus priority measure. The existing M4 horizontal and vertical geometry will be largely retained, with widening occurring as an extension of crossfall.

In addition, the existing access and route provision would also be retained. The widening required to accommodate the hard shoulder bus priority measure is provided as follows:

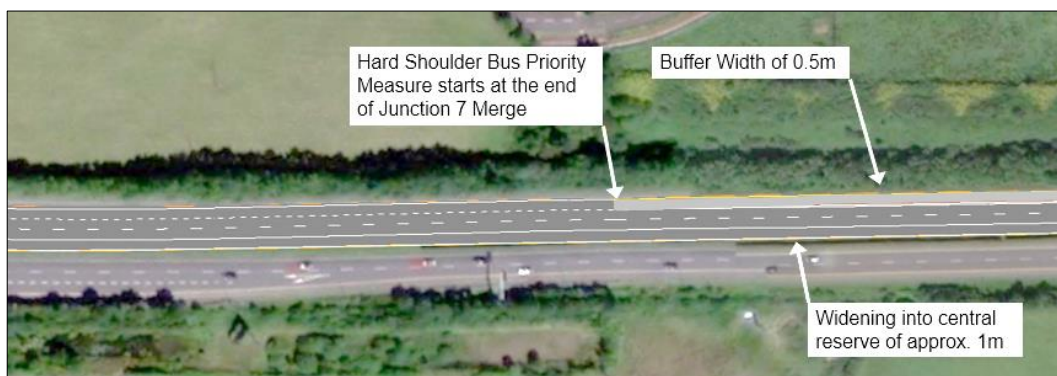
- Widening into the central reserve where possible, with the design to match the existing nearside pavement edge. This is due to the generally wide existing median of circa 7m, and constrained corridor on the nearside of the existing M4/N4. It also has the potential to minimise the extent of works at junctions / accesses.
- Central reserve widening will not always be achievable as there are instances where widening beyond the nearside pavement edge is required due to visibility requirements and other localised constraints.
- Widening into both the central reserve and nearside verge of the existing eastbound carriageway. This occurs at junction merges and diverges or areas where widening is transitioning to/from being on the median side to/from the nearside.

### 3.2.4 Junction Treatment

The form of junction arrangement for the proposed development is Through Junction Running (TJR). This approach involves transitioning the hard shoulder bus priority measure into the merge/diverge running lane and extending the facility ‘through’ the junctions. TJR avoids the need for the bus to exit and re-enter the mainline at the junction and reduces potentially hazardous weaving manoeuvres.

#### 3.2.4.1 Junction 7 Maynooth Eastbound Merge

The proposed development commences immediately east of the Junction 7 Maynooth eastbound merge.

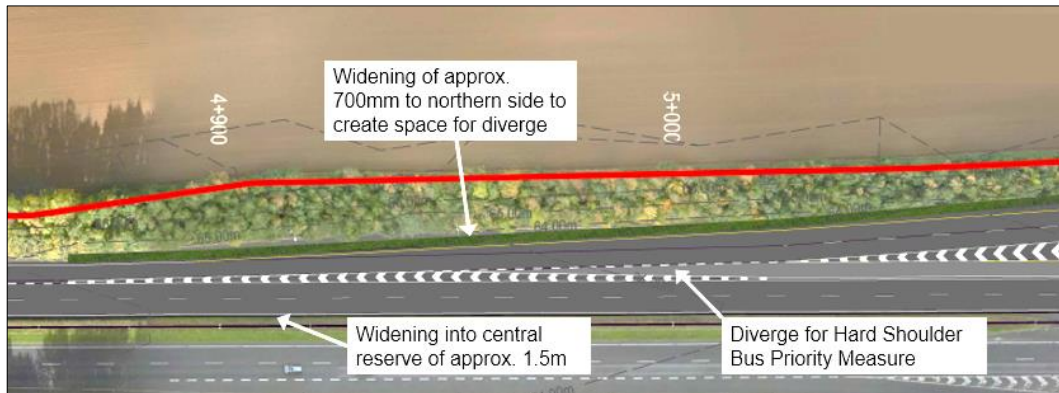


**Figure 3.2:** Junction 7 Eastbound Merge

### 3.2.4.2 Junction 6 Celbridge Eastbound Diverge

The proposed development includes the following:

- 150m auxiliary lane length and 55m taper length;
- 70m nose length; and
- 160m tapered ghost island length and 80m taper length for bus diverge.



**Figure 3.3:** Junction 6 Celbridge Eastbound Diverge

### 3.2.4.3 Junction 6 Celbridge Eastbound Merge

The proposed development includes the following:

- 50m nose length; and
- 130m auxiliary lane length and 40m taper length – This arrangement provides the opportunity for slip road traffic to find a gap and have a smooth transition into the hard shoulder bus priority measure relative to the direct taper. Subsequently, slip road traffic can use the hard shoulder bus priority measure to undertake a parallel merge on to the nearside mainline lane.

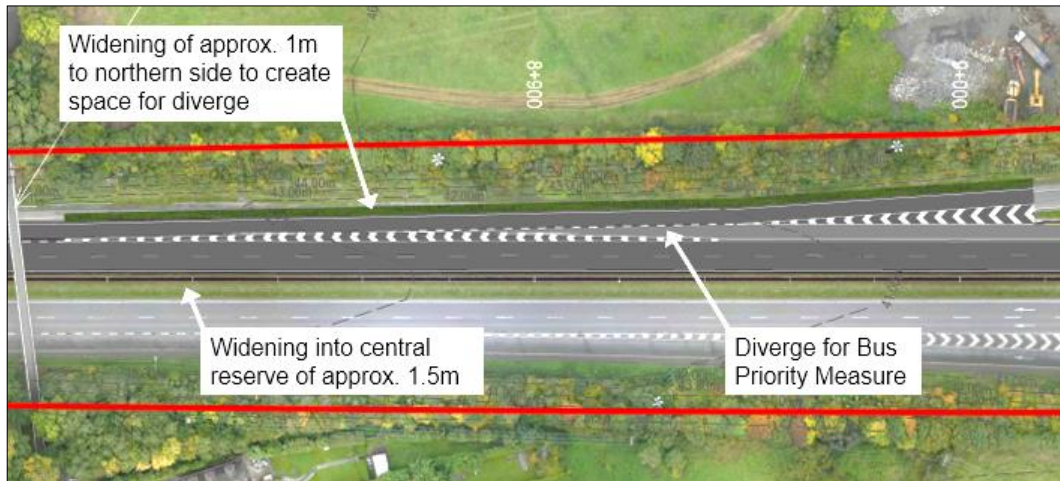


**Figure 3.4:** Junction 6 Celbridge Eastbound Merge

### 3.2.4.4 Junction 5 Leixlip Eastbound Diverge

The proposed development includes the following:

- 150m auxiliary lane length;
- 70m nose length; and
- 160m tapered ghost island length and 80m taper length for bus diverge.

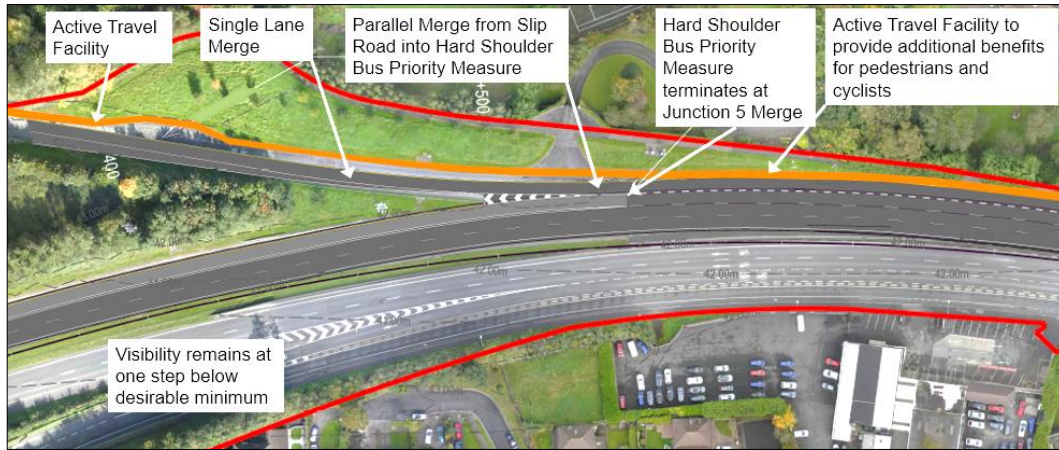


**Figure 3.5:** Junction 5 Leixlip Eastbound Diverge

### 3.2.4.5 Junction 5 Leixlip Eastbound Merge

The proposed development includes the following:

- The hard shoulder bus priority measure to terminate in advance of Junction 5 merge with buses continuing within the same lane, which is a lane gain as part of Junction 5 merge;
- The existing bus lane located on the Junction 5 slip road and onwards towards Junction 4A is to be removed. The slip road geometry is to be re-aligned, utilising this existing pavement area which is currently allowed for the slip road bus lane;
- The re-alignment outlined above allows for an extended auxiliary lane from Junction 5 merge to Junction 4A diverge; and
- Given the proximity of Junction 5 and Junction 4A, they will be treated as one single junction (Through Junction Running) with bus priority recommencing east of Junction 4A.



**Figure 3.6:** Junction 5 Eastbound Merge

### 3.2.5 Structures

#### 3.2.5.1 R405 Ballygoran Road Overbridge

The existing structure is a two-span concrete overbridge with an overall deck length of 53m. The span configuration comprises two equal 26.5m spans crossing both the eastbound and westbound carriageways, with the central pier located within the median. Refer to Figure 3.7.



**Figure 3.7:** Ballygoran Overbridge (©2021 Google)

The proposed development will result in a revised dimensional offset as shown in Table 3.1.

Lane Offset	Existing	Proposed
Edge of nearside traffic/bus priority measure to toe of embankment	5.05m	2.35m
Edge of nearside traffic/bus priority measure to kerb line	3.15m	0.5m
Edge of offside traffic lane to face of pier	4.04m	2.75m

**Table 3.1:** R405 Ballygoran Road Overbridge

### 3.2.5.2 Junction 6 Overbridges

The existing bridges at Junction 6 comprise single span twin bridges, each with an overall deck length of 43m spanning both eastbound and westbound carriageways. Refer to Figure 3.8.



**Figure 3.8:** Junction 6 Overbridges (West Bridge) (©2021 Google)

The proposed development will result in a revised dimensional offset as shown in Table 3.2.

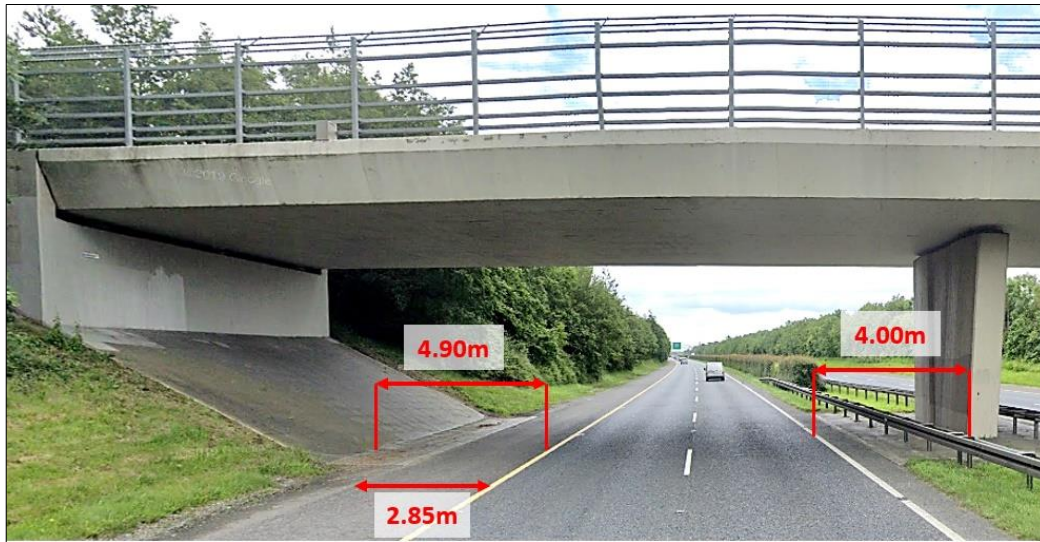
Lane Offset	Existing	Proposed
Edge of nearside traffic/bus priority measure to edge of pavement	2.95m (West Bridge) 2.95m (East Bridge)	0.50m (West Bridge) 0.50m (East Bridge)
Edge of nearside traffic/bus priority measure to bottom of bridge abutment	10.30m (West Bridge) 10.30m (East Bridge)	7.65m (West Bridge) 7.65m (East Bridge)

**Table 3.2:** Junction 6 Overbridges

### 3.2.5.3 R404 Celbridge Road Overbridge

The existing structure is a two-span concrete overbridge with an overall deck length of 49m. The span configuration comprises two equal 24.5m spans crossing both the eastbound and westbound carriageways, with the central pier located within the median. Refer to Figure 3.9.





**Figure 3.9:** R404 Celbridge Road Overbridge (©2021 Google)

The proposed development will result in a revised dimensional offset as shown in Table 3.3.

Lane Offset	Existing	Proposed
Edge of nearside traffic/bus priority measure to toe of embankment	4.9m	2.45m
Edge of nearside traffic/bus priority measure to kerb line	2.85m	0.5m
Edge of offside traffic lane to face of pier	4m	2.9m

**Table 3.3:** R404 Celbridge Road Overbridge

### 3.2.5.4 Liffey River Bridge

The existing structure comprises independent twin bridges carrying each of the eastbound and westbound carriageways of the M4 over the River Liffey. The bridges comprise three-span structures. The bridge has an overall deck length of 113m, with a span between bearings of 82m. The carriageway over the bridge is approximately 12m wide between kerb upstands. Road surfacing, with a constant thickness of approximately 100mm, overlays the structural deck slab on this bridge. A raised concrete verge is present both sides of the carriageway, comprising of unreinforced concrete. Service and drainage ducts are contained within the raised verges. Refer to Figure 3.10.



**Figure 3.10:** Liffey River Bridge – (©2021 Google)

The proposed development does not include widening of the trafficable areas.

The bridge parapets comprise concrete upstands with a steel rail on top, measuring 1250mm high. They are structurally connected directly to the deck slab below.

The proposed development will introduce an additional marked hard shoulder bus priority measure to the carriageway over this bridge. While this will potentially introduce additional traffic loading compared to the existing situation, the bridge would have been designed for at least three design lanes as part of its original design.

### 3.2.5.5 Cooldrinagh Lane Footbridge

The existing structure is a three-span concrete pedestrian bridge with an overall deck length of 62m. The central span is 40m long and spans both eastbound and westbound carriageways of the M4 below. Refer to Figure 3.11.



**Figure 3.11:** Cooldrinagh Lane Footbridge – Existing Offsets to adjacent Bridge Elements on Eastbound Carriageway (©2021 Google)

The proposed development will result in a revised dimensional offset as shown in Table 3.4.

Lane Offset	Existing	Proposed
Edge of nearside traffic/bus priority measure to face of pier	4.15m	5.4m
Edge of nearside traffic/bus priority measure to kerb line	1.8m	3.2m

**Table 3.4:** Cooldrinagh Lane Footbridge

### 3.2.6 Vehicle Restraint Systems

The majority of the vehicle restraint systems (safety barriers and bridge parapets) in-situ on the existing M4/N4 are non-compliant with current TII standards. The existing steel barriers provided within the median underneath the overbridges will be replaced with compliant barrier systems.

The nearside verge arrangement in-situ along the majority of the eastbound M4/N4 are sloped. Where flattening of the nearside verge cannot be accommodated, the proposed development will include the installation of vehicle restraint systems.

### 3.2.7 Signage and Road Markings

The proposed development will include signage, including gantries and cantilevers, required at junction merges and diverges. Existing road markings will be removed as part of the works and replaced with new road markings over the length of the proposed development.

### 3.2.8 Road Lighting

There is existing road lighting at Junction 5, Junction 6 and Junction 7 and the surrounding environs. There is high mast lighting at Junction 5 and Junction 7 and standard lighting columns at Junction 6. Road lighting assets impacted by the proposed development will be reinstalled and relocated.

### 3.2.9 Transportation

#### 3.2.9.1 Context

It should be noted that public transport is more heavily influenced by human behaviour (as opposed to private vehicle usage), which is more difficult to account for in transport modelling. These limitations of transport modelling should be considered when interpreting results herein.

#### 3.2.9.2 Overview

Currently this section of the M4/N4 consists of two-lanes of general traffic and a hard shoulder in each direction plus a generally wide central reserve of approximately 7m to 9m.

A transportation assessment, using the NTA’s Eastern Regional Model (ERM), has been undertaken to assess the inclusion of an eastbound hard shoulder bus priority measure on this section of the M4/N4 while maintaining two lanes of general traffic.

Prior to carrying out the ERM full model runs, the bus services which use this section of the M4/N4 were reviewed to ensure all existing services were represented correctly. The services identified are shown in Table 3.5.

Bus Provider	Route Description
Bus Eireann	115: Kilcock_ Abbeyfield Estate to Custom House Quay (Jurys Inn)
Bus Eireann	115: Mullingar_ Outside Train Station to Custom House Quay (Jurys Inn)
Bus Eireann	120: Clane (Esso Garage) to Dublin (St Stephens Green)
Bus Eireann	20: Eyre Square_ Galway Bus Station to Dublin Airport
Bus Eireann	22: Ballina_ Ballina Bus Station to Dublin Airport
Bus Eireann	23: Sligo_ Sligo Bus Station to Busáras
Bus Eireann	845: Birr_ Birr Square to Leeson St. Lr. Stephens Hall Hotel
Kearns Transport	845: Enfield_ Main Street to Leeson St. Lr. Stephens Hall Hotel
Go Bus	Galway Bus Station to Dublin Airport
Citylink	Galway Bus Station to Dublin Airport

**Table 3.5:** Bus Services utilising the M4/N4

To assess the proposals, a reference case (2020) “Do-Minimum Scenario” model was developed to represent the existing scenario. Building on this, a Do-Something Scenario was developed which involved adding an eastbound hard shoulder bus priority measure to the M4/N4 between Junction 7 Maynooth and Junction 5 Leixlip/Junction 4A and maintaining two lanes of general traffic.

### 3.2.9.3 Existing Constraints

No constraints were identified following the assessment undertaken.

### 3.2.9.4 Assessment of Proposed Development

#### Overview

The proposed development is intended to form part of a wider series of public transport infrastructure and service enhancements throughout the Greater Dublin Area. Central to these are the Bus Connects proposals which are currently under development.

BusConnects is the National Transport Authority’s programme to greatly improve bus services in Irish cities. It is a key part of the Government’s policy to improve public transport and address climate change in Dublin and other cities across Ireland. BusConnects Dublin includes the Network Redesign and the Core Bus Corridors.

BusConnects is included within a number of Government policy strategies including the National Development Plan 2018 – 2027, Transport Strategy for the Greater Dublin Area 2016 – 2035 and the Climate Action Plan 2019. The full programme for BusConnects Dublin includes a range of interlinked and compulsory proposals including:

- **Management Elements:** Redesigning the network to increase the number of homes, jobs and services with coverage, improving orbital accessibility and restructuring radial routes into spines;
- **Technological Elements:** Introducing new ticketing systems to improve convenience and reduce dwell time at bus stops;
- **Fleet Elements:** Replacing the bus fleet with low emission vehicles, introducing branding and livery to give a new “look and feel”;
- **Policy Elements:** Introducing a 90-minute ticket to remove the financial penalty for interchanging between buses or changing mode during trips; and
- **Infrastructure Elements:** Creating infrastructure to separate buses and cyclists from other traffic to make sustainable travel a faster, safer and more reliable choice. Developing interchange hubs. Improving pedestrian facilities around bus stops.

A Future Year (2030) modelling assessment of the proposed development has been undertaken to determine the cumulative impacts of the overall bus priority measures (Bus Connects plus the M4 Eastbound Bus Priority Measures Pilot) on the M4/N4 corridor.

To assess the proposals, a future year (2030) reference case, “Do-Minimum”, Scenario model was developed to represent the likely demand and transport network scenario in 2030.

Building on this, a 2030 Do-Something Scenario was developed which involved adding eastbound bus priority measures to the M4/N4 between Junction 7 Maynooth and Junction 5 Leixlip as well as the Bus Connects proposals summarised above.

## Results

Results from the future year model runs carried out indicated the following:

- **Bus Speeds**

The proposals will result in improved bus speeds on this section of the M4/N4, with eastbound bus speeds in the Do-Something Scenario 34% faster than the Do-Minimum Scenario in the AM peak.

- **Mode Share**

The Do-Minimum and Do-Something AM peak mode share for Maynooth, Leixlip, Kilcock and Celbridge are shown in Table 3.6.

This shows that, following the implementation of the Bus Connects proposals in conjunction with the eastbound bus priority measures on the M4/N4, car use in these towns is reduced by between 1 and 3%. With Leixlip experiencing the largest decrease in car usage of 3.4%. In absolute terms, this analysis indicates:

- A total reduction of circa 70 car trips from Kilcock during the AM peak;
- A total reduction of circa 130 car trips from Maynooth during the AM peak;
- A total reduction of circa 230 car trips from Celbridge during the AM peak; and
- A total reduction of circa 330 car trips from Leixlip during the AM peak.

Area	Do-Minimum			Do-Something		
	Car	PT	Active	Car	PT	Active
Kilcock	76.2%	6.4%	17.4%	74.9%	7.7%	17.4%
Maynooth	73.4%	9.9%	16.6%	72.1%	11.5%	16.4%
Leixlip	74.4%	12.2%	13.4%	71.0%	15.9%	13.2%
Celbridge	76.5%	8.3%	15.1%	75.0%	10.2%	14.8%

**Table 3.6:** Future Year (2030) Do-Minimum and Do-Something AM Peak Mode Share

### Bus Patronage

On average, the Do-Something proposals will result in an increase of circa 12% in the number of passengers using the bus services on this section of the M4/N4 which include:

- Bus Eireann Route 115;
- Bus Eireann Route 120;
- Bus Eireann Route 20;
- Bus Eireann Route 22;
- Bus Eireann Route 23; and
- Kearns Transport Route 845.

### Forecast Traffic Flows

As a result of the shift to public transport highlighted above, traffic flows along this section of the M4/N4 are reduced in the Do-Something Scenario. Forecast AADT values for the Do-Minimum and Do-Something Scenarios are shown in Table 3.7. These indicate that the proposals will result in a circa 5% reduction in traffic on this section of the M4/N4 in the Do-Something Scenario.

Location	Do-Minimum		Do-Something	
	AADT	HGV %	AADT	HGV %
Between Junction 7 & Junction 6	72,522	10%	69,187	10%
Between Junction 6 & Junction 5	84,693	8%	81,603	9%

**Table 3.7:** Future Year (2030) Forecast AADT values for the Do-Minimum and Do-Something Scenarios

### 3.2.9.5 Conclusion

The Future Year (2030) modelling analysis which assessed the cumulative impact of the proposed development, in conjunction with the BusConnects proposals, found that the proposals would:

- Increase bus speeds along this section by up to 34%;
- Reduce car mode share by 1 to 3% in towns located close to this section of the M4/N4;
- Reduce car traffic between Junction 5 and Junction 7 of the M4/N4 by up to 5%; and
- Lead to a 12% increase in bus passengers on existing routes that use this section of the M4/N4.

## 3.3 Construction Stage

### 3.3.1 Construction Duration and Phasing

The proposed development will take circa nine to twelve months to construct. The design of the project lends itself to staged construction in the following sections:

- Junction 7 Maynooth to Junction 6 Celbridge; and
- Junction 6 Celbridge to Junction 5 Leixlip/Junction 4A.

### 3.3.2 Construction Methodology

The proposed development will involve works under the following headings; site clearance, pavement, drainage, earthworks, vehicle restraint systems, utilities, traffic signs, road markings and road lighting.

Initially, a construction compound will be established (refer to Section 3.3.6 for details). This will be located immediately east of Junction 6. The works will be carried out in a phased manner. Firstly, temporary traffic management will be installed. Initial works will consist of site clearance, which will include removal of the existing vehicle restraint systems, signage, and other obstacles. Drainage and earthworks will then be carried out whereby existing drainage filter drain stone will be removed and the existing verge will be removed to enable the pavement widening to take place. Works on utility infrastructure, if required, will also be carried out.



Pavement works will then take place, with the removal of the existing surface being carried out initially. Then full road construction will be carried out for the widening sections, the existing hard shoulder and the emergency refuge areas. Pavement overlay works for lane 1 and lane 2 will also be carried out.

Cut and fill earthworks quantities have been extracted from the design 3D model. The extent of earthworks on the project is limited and predominantly involves cutting into existing cut slopes to allow for the widened cross section and the emergency refuge areas. The total cut will be circa 8,100m<sup>3</sup> and total fill will be circa 480m<sup>3</sup>.



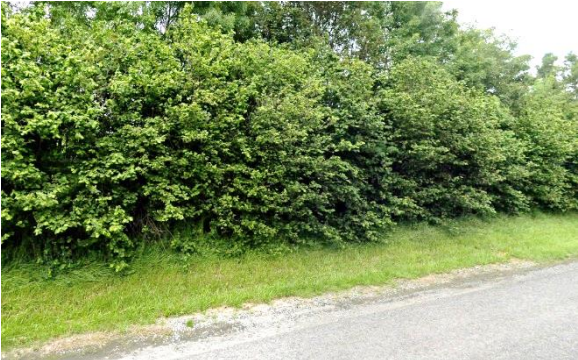

All pavement widening areas, including emergency refuge areas will require new full depth pavement construction (sub-base, base, binder, and surface course). Pavement widening areas have been defined as areas where the proposed pavement edge extends beyond the existing pavement edge. The existing hard shoulder area will also require full depth pavement construction. In addition to areas of new pavement construction in widening areas, the existing pavement in non-widening areas of the eastbound carriageway will be overlaid. This includes removal and replacement of the surface and binder courses.



Approximately 5,500m<sup>3</sup> of Granular Type B to Clause 804 sub-base will be utilised, followed by 37,000m<sup>3</sup> of AC 32 Dense 40/60 base, 103,000m<sup>3</sup> of AC 20 Dense bin binder (55mm) and 103,000m<sup>3</sup> of SMA 40mm surface course in the new pavement construction. As part of the rehabilitative works on existing non full depth pavement areas, milling and disposal of approximately 70,000m<sup>3</sup> of existing pavement will be required. The extent of regulating course required will be minimal.

The details of the proposed ERA’s can be seen in Table 3.8:

ERA No.	Chainage	Cut/ Fill	Verge at ERA Location
1	2+292	Fill	
2	2+950	Cut	



ERA No.	Chainage	Cut/ Fill	Verge at ERA Location
3	3+537	Fill	
4	4+071	Fill	
5	6+275	Cut	
6	6+980	Cut	

ERA No.	Chainage	Cut/ Fill	Verge at ERA Location
7	7+475	Cut	
8	7+950	Cut	

**Table 3.8:** Emergency Refuge Areas (ERA) Earthworks Requirements

New drainage infrastructure will be installed, including at each of the emergency refuge areas. This will include attenuation, pollution control measures and replacement of defective infrastructure. Thereafter, new vehicle restraint systems will be installed. Traffic signs and road lighting will then be installed. New road markings over the full length of the proposed development will be installed when other works are complete.

Finally, the temporary traffic management will be removed.

### 3.3.3 Construction Materials

Construction materials including pavement, quarry materials, concrete, vehicle restraint systems, steel reinforcement, subsoil, topsoil, signage gantry and cantilever steel and signage will need to be imported onto the site.

### 3.3.4 Construction Traffic

The proposed development will be divided into the sections noted above. Construction will be carried out on a six-day working week. Construction traffic will utilise the existing M4/N4 and the regional road network.

### 3.3.5 Traffic Management During Construction

Temporary traffic management (TTM) will be required to implement the proposed development.

A Preliminary TTM Plan will be prepared at tender design phase which will set out the constraints and parameters to which the TTM will be designed. This Preliminary TTM Plan will then be utilised to develop the Construction Stage TTM Plan.

The implemented Construction Stage TTM Plan will include the following information; geometric design, extents, working areas, locations and width of alternative traffic lanes, safety zones, duration, construction traffic access, emergency services provisions, timing of operations, road lighting, road signage, cones and temporary markings.

Traffic flow will need to be maintained throughout the duration of the project construction. It is envisaged that a Narrow Lane System in conjunction with a Roadworks Speed Limit Order of 80km/h will be required to implement the proposals on site. The project will aim to maintain two number M4/N4 eastbound traffic lanes during peak times. This will only be reduced during off-peak times to facilitate critical works. The construction process will be planned to accommodate existing traffic flows and the daily operations adjacent to the project.

Signs erected for traffic safety and control purposes will be manufactured, installed, and maintained in accordance with the Traffic Signs Manual and associated documents.

### **3.3.6 Construction Compound**

A construction compound will be established and is proposed to be located immediately east of Junction 6. The works involved will be minimal. The construction compound will include stores, offices, welfare facilities and plant storage. Following completion of construction, these areas will be cleared and reinstated.

### **3.3.7 Construction Waste**

The main waste types generated by the proposed development will include pavement material, excavation material arising from new road construction, soil, and concrete from excavations for structures.

Quantities of general construction and demolition wastes such as wood, packaging, metals, bricks, blocks, and residual wastes would be generated during the construction phase.

Any materials to be recovered off site will be transported and disposed of in accordance with the requirements of relevant legislation i.e. Waste Management Act 1996 and Amendments and Waste Collection Permit Regulations.

## **3.4 Cumulative Effects**

The potential for significant cumulative environmental effects as a result of the construction and operation of the proposed development in relation to other existing or permitted developments in the vicinity of the proposed development were assessed.

The following sources were considered in order to identify potential projects which may give rise to likely significant environmental effects:

- Kildare County Council – (<http://webgeo.kildarecoco.ie/planningenquiry>) for local planning applications
- South Dublin County Council - (<https://sdcc.ie/en/services/planning/planning-applications/planning-applications.html>) for local planning applications
- National Planning Application Database (<https://data.gov.ie/dataset/national-planning-applications>) – for downloadable list of planning applications sent from Local Authorities
- National Transport Authority website (<https://www.nationaltransport.ie/planning-and-investment/transport-investment/projects/>) for details of major transport programmes
- An Bord Pleanála website (<http://www.pleanala.ie/index.htm>) for details of strategic infrastructure developments and strategic housing developments; and
- The EIA Portal (<https://www.housing.gov.ie/planning/environmental-assessment/environmental-impact-assessment-eia/eia-portal>) maintained by the Department of Housing, Planning and Local Government – for applications for development consent accompanied by an EIAR.

No planned or permitted projects were identified which could have the potential to overlap (either temporarily and/or spatially) or give rise to significant cumulative effects.

### 3.5 Use of Natural Resources, in particular Land, Soil, Water and Biodiversity

Construction of the proposed development will require the use of natural resources such as soil and land and water. The proposed development will aim to re-use site-won material where possible. However, there will be a need for resources and materials (e.g. aggregate, concrete etc) to be imported for the construction and maintenance of the proposed development. The proposed development will be connected to the existing drainage infrastructure, which will be enhanced as part of the proposed development. Further consideration of the effects on the water environment is provided in Section 5.9.

### 3.6 Production of Waste

Construction activities will include minor excavations of materials within the existing road boundary, central reserve and the verge. These construction activities are likely to generate waste from excavated material (asphalt, concrete, made ground and topsoil) and road resurfacing. Through the design development process, the proposed development will aim to avoid or minimise waste generation of waste through reuse of site-won material where feasible (subject to meeting the appropriate engineering standard). Further consideration of likely significant effects is provided in Section 5.

### 3.7 Pollution and Nuisances

As with any infrastructure project of this type, there is the potential for pollution and disturbance during the construction phase. Potential effects during construction and operation include effects on the local water environment (i.e. as a result of run-off), air quality, traffic and nuisances and disruption caused by construction such as noise, vibration and dust. Further consideration of the likely significant effects is provided in Section 5.

### 3.8 Risk of Major Accidents and Disasters

The EIA Directive introduced the requirement to assess the ‘*expected effects deriving from the vulnerability of the projects to risks of major accidents and/or disasters that are relevant to the project concerned*’.

Currently no clear definition of the term ‘major accident and/or disaster’ has been outlined in the context of the EIA Directive. The Institute of Environmental Management and Assessment (IEMA) Major Accidents and Disasters in EIA: A Primer (hereafter referred to as the IEMA Primer) (IEMA 2020) includes the following definitions:

- Disaster – a natural hazard (e.g. earthquake) or a man-made/external hazard (e.g. act of terrorism) with the potential to cause an event or situation that meets the definition of a major accident;
- Major Accident – events that threaten immediate or delayed serious environment effects to human health, welfare and/or the environment and require the use of resources beyond those of the client or its appointed representatives to manage. Whilst malicious intent is not accidental, the outcome (e.g. train derailment) may be the same and therefore many mitigation measures will apply to both deliberate and accidental events; and
- Significant environmental effects (in relation to a major accident and/or disaster assessment) – includes the loss of life, permanent injury and temporary or permanent destruction of an environmental receptor which cannot be restored through minor clean-up and restoration.

Construction activities to be undertaken are well understood and are commonly undertaken in the Kildare/Dublin region. During operation, the proposed development is likely to result in an increase in modal shift towards public transport and public transport services.

It is not considered likely that there are major accidents and/or disasters risk events which would occur as a result of the proposed development that present a sufficient combination of risk and consequence that would lead to significant residual environmental effects. The proposed development does not fall within the consultation zone for any Seveso site (i.e. a site subject to Directive 2012/18/EU of the European Parliament and of the Council of 4 July 2012 on the control of major-accident hazards). The proposed development will not interact with any licenced facilities. A Construction Traffic Management Plan (refer to Section 3.3.5) will be implemented during the construction stage.

In addition, during the construction phase, there will be additional appropriate management plans implemented to manage and minimise risk, for example a Construction Environmental Management Plan and an Incident Response Plan.

Therefore, in the context of major accidents and disasters, significant environmental effects are considered unlikely at EIA Screening Stage and not considered further in Section 5.

### 3.9 Impacts on Population and Human Health

The 2014 EIA Directive has introduced the requirement to consider the '*direct and indirect significant effects of a project on....population and human health*'. The proposed development has the potential to impact on health due to the direct and indirect effects associated with construction activities such as noise, vibration and air quality. Potential operational effects that have been considered include direct effects on air quality or noise and indirect impacts on access to public facilities and community services and positive effects on population and human health. Further consideration of the likely significant effects on population and human health are considered in Section 5.8.

## 4 Location of the Proposed Development

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### 4.1 Introduction

Paragraph 2 of Annex III of the EIA Directive sets out the criteria with regard to the location of the proposed development to be taken into account in determining whether an EIA is required. This section considers the environmental sensitivity of geographical areas likely to be affected by the proposed development with particular regard to the following:

- (a) ‘the existing and approved land use;
- (b) the relative abundance, availability, quality and regenerative capacity of natural resources (including soil, land, water and biodiversity) in the area and its underground; and
- (c) the absorption capacity of the natural environment, paying particular attention to the following areas:
  - (i) wetlands, riparian areas, river mouths;
  - (ii) coastal zones and the marine environment;
  - (iii) mountain and forest areas;
  - (iv) nature reserves and parks;
  - (v) areas classified or protected under national legislation; Natura 2000 areas designated by Member States pursuant to Directive 92/43/EEC and Directive 2009/147/EC;
  - (vi) areas in which there has already been a failure to meet the environmental quality standards, laid down in Union legislation and relevant to the project, or in which it is considered that there is such a failure;
  - (vii) densely populated areas;
  - (viii) landscapes and sites of historical, cultural or archaeological significance’.

The following section describes the relevant details of the location of the development by reference to the criteria set out in paragraph 2 of Annex III. The proposed development and its location have previously been described in Section 3 and Section 4.

## 4.2 Existing and Approved Land Use

There are no community or recreational receptors within the proposed development boundary. The proposed development area is currently in use as the existing M4/N4 corridor.

In terms of existing and approved land use, the proposed development will represent a continuation of the immediate land use as a transport corridor which currently passes in close proximity to a number of receptors, namely residential, industrial, commercial/employment centres and tourist amenities. These receptors are listed below (all distances are approximate from the proposed development boundary).

### Junction 7

- Northwest: yard (unknown ownership);
- Northeast: Barton's Transport (Straffan Road);
- Southwest: Barretts Maynooth and Earthridge (nearest slip). Both with access from roundabout; and
- Southeast: A security office at entrance (nearest slip at 50m) and Maynooth Business Campus of which access road is at 40m from M4 and for which three buildings are near westbound slip at >60m, namely Block A: housing Schneider Electric, The Teaching Council and possibly other businesses, Block B various businesses including Digital Office Centre, Glenveagh Properties and SHINE, and Unit F: Truway Accounting, SHINE and Besafe.

### From Junction 7

- Southside: Residential house at end of Ballygoran View (at 40m);
- Southside: Ballygoran Reservoir grounds (at 10m);
- Northside: Kildare County Council yard (at 20m), Barrogstown Lane;
- Northside: two private properties including Ballygoran B&B (at >60m) and Gardens (at 20m), Barrogstown Lane;
- Northside: three private properties (50-60m) and gardens (at 30m), Barrogstown Lane;
- Southside: Ray Crofton Motors, car wash, main showroom and display space (at 15m to M4 and 0m to proposed development area) on R405;
- Southside: Private house (at 50m) and garden (at 15m), one of two off R405;
- Southside: Levelling Equipment Services (at 15m), R405;
- Southside: CREO Interiors (at 20m), R405;
- Southside: Maynooth Fireplaces and Stoves;
- Southside: Base Entertainment Centre; and
- Southside: Kildare County Council yard (at 10m from slip), R449.



## From Junction 6

- Northside: two private properties (at 30m) and gardens (at 5m);
- Northside: The Wonderful Barn Allotments (at 20m) and public green space to west;
- Southside: Liffey Business Campus grounds and parking (at >20m);
- Southside: (east of Liffey): private property (at 25m) and yard (at 5m);
- Southside: Weston Airport (light aircraft parking and fuel/gas at 60m);
- Northside: Leixlip Water Treatment Plant (at 15m);
- Northside: Becketts Hotel (at >100m);
- Southside: Private house (at 60m) and garden (at 15m); and
- Southside: Private house (at 30m) and garden (at 25m).

## Junction 5

- Northside: Tara Park: Industrial Park (nearest business at 10m to slip and 0m to proposed development area);
- Northside: three private properties: one at 35m from R403, one at 20m from M4 and the R148 eastbound slip and one north of the eastbound slip;
- Northside: Entrance to Liffey Valley golf course;
- Northside: one private property beside golf course;
- Northside: one private property/business including entrance from N4;
- Southside: one private house on Weston Crescent (30m from end westbound slip), one on Weston Close (at 15m from Leixlip Road parallel lane), three facing Leixlip Road on Weston Close (at >30m from westbound parallel lane); and
- Southside: McCoy Motors with car parking at 5m from Leixlip Road.

## 4.3 Abundance, Quality and Regenerative Capacity of Natural Resources

Natural resources are considered to include soil, land, water and biodiversity. The proposed development will be located along an existing transport corridor which is currently connected with natural resources via existing infrastructure. The proposed development will be connected to existing drainage infrastructure, which will be enhanced as part of the proposed development.

The existing transport corridor and thus the proposed development is located in close proximity to and traverses the River Liffey via an existing bridge. Further to the west, a small stream known as the Kilmacredock Upper, is culverted under the motorway flowing in a northwest to southeast direction. This stream is a tributary of the River Liffey, with its confluence at the Leixlip Reservoir. The Rye Water Valley/Carton SAC is also located in close proximity to the proposed development. The River Liffey is also hydrologically connected with downstream waterbodies such as South Dublin Bay and the River Tolka Estuary Special Protection Area (SPA). Details of the status of these waterbodies is provided in Section 4.4.1.

## 4.4 Absorption Capacity of Natural Resources

This section considers the natural environment as outlined in Paragraph 2(c) of Annex III of the EIA Directive (as amended) and identified in Section 4.1 above.

### 4.4.1 Water Features

The proposed development is located along the existing M4/N4 transport corridor between Junction 7 Maynooth and Junction 5 Leixlip. There is both a historical and predicted fluvial flood risk to the M4 motorway at Junction 7 Maynooth emanating from the Lyreen River and its tributary, the Meadowbrook Stream. Preliminary Flood Risk Assessment (PFRA) mapping shows predicted fluvial flooding where the Kilmacredock Upper stream is culverted beneath the M4 carriageway. In addition, there is a risk of pluvial flooding to the M4 carriageway in extreme rainfall events.

There are two primary surface water features located within the proposed development area. The principal watercourse is the River Liffey, which flows in a north-easterly direction at the eastern end of the proposed development area. The river has been dammed at this location to form the Leixlip Reservoir. A bridge of the M4 passes over the downstream end of the reservoir.

Further to the west, a small stream known as the Kilmacredock Upper, is culverted under the motorway flowing in a northwest to southeast direction. This stream is a tributary of the River Liffey, with its confluence at the Leixlip Reservoir.

Furthermore, there are two watercourses that cross the M4 to the west of the proposed development area that flow in a north-easterly direction. The Meadowbrook (or Tagahdoe) Stream and the River Lyreen. Although they are not located within the proposed development area, the flood extents from these watercourses extend to the proposed development area.

Within the proposed development area, water quality is monitored in the River Liffey. Water quality is not monitored in the Kilmacredock Upper. No data was available on the Meadowbrook Stream. Q values are given at two locations upstream and downstream of the proposed development area for the River Liffey and at one location for the River Lyreen. The water quality at these locations are summarised in Table 4.1.

Associated River	Station ID:	Easting /Northing	Year Q-Value recorded:	Latest River Q-Score	Latest River Q-Value Status	River Waterbody Risk
River Liffey	RS09L011700	297359 232864	2019	4	Good	Under review
River Liffey	RS09L011900	300826 235806	2019	4	Good	Under review
Lyreen River	RS09L020035	291529.95 237251.08	2019	3	Poor	At Risk

**Table 4.1:** Water Quality

#### 4.4.2 Designated Sites

The proposed development is located in close proximity to the Rye Water Valley/Cartron SAC (3km via watercourses) and upstream of a number of designated sites in Dublin Bay. Refer to Section 5.2 for further details.

#### 4.4.3 Archaeological and Architectural Heritage

##### 4.4.3.1 Record of Monument and Places (RMP)

There are a total of five individual or groups of archaeological sites recorded within the proposed development area. There are three archaeological sites located to the immediate south of the proposed development area (AH 1). The Sites and Monuments Record (SMR) sites exist as a record of previous archaeological investigations and the relevant cross references are given in the Table 4.2.

Of the nine sites, listed under the ‘SMR Ref’ column in Table 4.2, two are proposed for inclusion in the next revision of the RMP and seven are listed in the SMR only and do not receive statutory protection.

None of the sites are further protected as National Monuments in State Care or Guardianship and none are subject to Preservation Orders.

AH No	SMR Ref	Classification	Townland	RMP Status	EX No
AH 1	KD011-042001	Kiln - corn-drying	Castletown	SMR	EX 2
	KD011-042002	Enclosure	Castletown	Proposed RMP	
	KD011-042	Ring-ditch	Castletown	SMR	
AH 2	KD011-059	Metalworking site	Kilmacredock Upper	SMR	EX 3
	KD011-058	Habitation site	Kilmacredock Upper	SMR	
AH 3	KD011-050	Kiln - corn-drying	Kilmacredock Upper	SMR	EX 4

AH No	SMR Ref	Classification	Townland	RMP Status	EX No
AH 4	KD011-043	Habitation site	Kilmacredock Upper	SMR	EX 5
	KD011-044	Habitation site	Kilmacredock Upper	SMR	
AH 5	KD011-045	Burnt mound	Kilmacredock Upper	Proposed RMP	EX 6

**Table 4.2:** Archaeological Heritage Sites within the Proposed Development Boundary

#### 4.4.3.2 Protected Structures/NIAH

The Record of Protected Structures (RPS) (Kildare County Development Plan 2017 – 2023 and South Dublin County Council Development Plan 2016 – 2022) and the lists of structures compiled by the National Inventory of Architectural Heritage (NIAH) were consulted.

There are no recorded architectural sites within the proposed development area of the Bus Priority Measures or within 50m of the existing M4/N4 corridor.

In addition, there are no Architectural Conservation Areas located within the area under assessment.

#### 4.4.3.3 Designed Landscapes

The first edition six-inch OS maps of Counties Kildare (1839) and Dublin (1843) shows the extent of demesne landscapes as shaded portions of land within the scheme proposed development area. These were established as a naturalised landscaped setting for the large houses of the landed gentry. Later OS mapping (c. 1906-9) can also indicate demesne extent, although they are not shaded. Not all demesne landscapes are subject to statutory protection. However, where a demesne exists in association with a protected structure (dependant on the preservation of the landscape), this can be considered to be attendant grounds and as such falls within the remit of the Planning and Development Act 2000 (as amended).

A total of six designed landscapes have been identified from the desktop resource, five within the proposed development area of the proposed project and one further to the immediate south. These are listed in Table 4.3. The NIAH have carried out a desk-based survey of identifiable demesnes within Counties Kildare and Dublin and all five of the designed landscapes within the proposed development area are included in this survey.

Refer to Section 5.4.4 for further details on Designed Landscapes.

DL No.	NIAH Garden	Description	Condition	Townland	Statutory Protection
DL 1	1911	Dowdstown House	Principal building extant, boundary defined, with areas of parkland. Subsequent expansion of buildings within the demesne.	Dowdstown	None
DL 2	1924	Castletown	Woodland indicated, site footprint visible, boundaries defined. Major road runs through the former demesne.	Castletown	Principal structure is RPS
DL 3	1931	Leixlip Castle	The principal building survives along with multiple associated outbuildings and demesne features. A major road bisects the parklands.	Leixlip Demesne	Principal structure is RPS
DL 4	2205	Westonpark House	Building indicated, area labelled Backweston Park, Weston Aerodrome now in northern parkland area.	Backweston Park	None
DL 5	2207	Cooldrinagh Lodge	Buildings and associated architectural features present. Large industrial building on north of site, parkland split by major road.	Cooldrinagh	Principal structure is RPS
DL 6	2217	Lucan Demesne	Site footprint visible and boundaries defined. Part of the former demesne is now landscaped as a golf course.	Lucan Demesne	Principal structure is RPS

**Table 4.3:** Designed Landscapes

The existing M4/N4 passes through DL 2, 3, 4 and 5 and has impacted on the edge of DL6. DL 1 lies to the immediate south of the existing M4/N4.

## 4.5 Summary of Natural Environmental Aspects

Natural resources aspects are summarised in Table 4.4 and potential effects are discussed in Section 5.

EIA Directive Annex III (2c)	Summary
Wetlands, riparian areas, river mouths	The proposed development is located in close proximity to the Rye Water Valley/Carlton SAC and is located upstream of a number of designated sites. Both the River Liffey and Kilmacredock Stream are located within the proposed development area while the Lyreen River and Meadowbrook Stream are located to the west of the proposed development area.
Coastal zones and the marine environment	Dublin Bay is the nearest marine environment which is located approximately 17km east of the proposed development.
Mountain and forest areas	Crodaun Forest is located approximately 1km to the south of the proposed development.
Nature reserves and parks	There are no designated sites located within the proposed development
Areas in which there has already been a failure to meet the environmental quality standards, laid down in Union legislation and relevant to the project, or in which it is considered that there is such a failure	The following waterbody is At Risk of achieving Good status by 2027: Lyreen_010
Densely populated areas	The proposed development is located to the south of both Maynooth and Leixlip and to the north of Celbridge.
Landscapes and sites of historical, cultural or archaeological significance	There are a number of archaeological and architectural assets located within the proposed development area including designed landscapes and sites listed in the Records of Monuments and Places (RMP) and Sites and Monuments Records (SMR).

**Table 4.4:** Summary of Natural Environmental Aspects

## 5 Description of Likely Significant Effects

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### 5.1 Introduction

This section of the EIA Screening Report provides a description of the potential significant effects of the proposed development during construction and operation. The likely significant effects identified in this section have taken into account, where relevant, the available results of other relevant assessments of effects on the environment, including AA. In addition, Section 3.4 considered the likely significant cumulative effects during construction and operation in combination with other development projects.

### 5.2 Biodiversity

#### 5.2.1 Baseline Environment

##### 5.2.1.1 Field Surveys

No detailed biodiversity surveys have thus far been undertaken in respect of the proposed development. A walkover survey of the accessible ecological sites that lie within or overlap with the proposed development was undertaken by Scott Cawley Ltd. on the 1<sup>st</sup> of February 2021 to verify the orthophotography interpretation and selection of ecological sites, refine site boundaries and to capture any additional ecological information not identified during the desk study.

Where access allowed, the sites were visited, and notes taken on the habitats present. Given the nature of the existing proposed development area, for health and safety reasons, no direct surveys along the road corridor were undertaken, except in areas with pedestrian accessible routes. Where access was limited, ecological sites were viewed from the nearest accessible vantage point using binoculars. In some cases, due to the local topography or limited access, views of ecological sites were restricted due to the local topography. However, assumptions have been made on the value of those ecological sites based on orthophotography interpretation and local information gathered during the field surveys and desk study.

Habitat types were classified using *A Guide to Habitats in Ireland*<sup>2</sup>.

The likelihood/potential for Annex I habitat types was inferred where possible based on the professional judgement of the surveyor, with reference to the *Interpretation manual of European Union Habitats EUR 28*<sup>3</sup> and definitions of Annex I habitat types published in the corresponding national habitat survey reports, NPWS wildlife manuals and NPWS online mapping resources, as applicable.

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<sup>2</sup> Fossitt, J.A. (2000) *A Guide to Habitats in Ireland*. Heritage Council, Kilkenny.

<sup>3</sup> CEC. (Commission of the European Communities) (2013) *Interpretation manual of European Union Habitats EUR28*. European Commission, DG Environment.

The nomenclature for Annex I habitats follows that of the *Interpretation manual of European Union Habitats EUR28*<sup>3</sup> with abbreviated names after those used in *The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview*<sup>4</sup>. A precautionary approach was adopted with regards to the identification of the potential presence of Annex I habitats within an ecological site.

### 5.2.1.2 Designated Sites

#### European and Nationally Designated Sites

Special Areas of Conservation (SACs) are designated under the EC Habitats Directive (92/43/EEC) for the protection of habitats listed on Annex I and/or species listed on Annex II of the Directive.

Special Protection Areas (SPAs) are designated under the Birds Directive (2009/147/EC) for the protection of bird species listed on Annex I of the Directive, regularly occurring populations of migratory species (such as ducks, geese or waders), and areas of international importance for migratory birds.

Natural Heritage Areas (NHAs) are designated under the Wildlife Act 1976 (as amended) to protect habitats, species or geology of national importance. In addition to NHAs, there are proposed NHAs (referred to as pNHAs), which are also sites of significance for wildlife and habitats and were published on a non-statutory basis in 1995 but have not since been statutorily proposed or designated. Proposed NHAs are offered protection in the interim period under county or city development plans which requires that planning authorities give due regard to their protection in planning policies and decisions<sup>5</sup>.

European sites such as SACs and SPAs are of international importance from a biodiversity perspective, whilst NHAs and pNHAs are regarded as being of national importance.

Several designated sites, including those protected at a European and national level, are located adjacent to or downstream of (in the case of Liffey Valley pNHA), the proposed development area.

These designated sites are listed in Table 5.1 along with a brief description of the features for which the sites are designated.

There are no SPA's or NHA's sites located within, or in the immediate vicinity of, the proposed development area. There is one SAC site located in the vicinity of the proposed development and three pNHA sites adjacent to the proposed development area.

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<sup>4</sup> NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview. Accessible at:  
[https://www.npws.ie/sites/default/files/publications/pdf/NPWS\\_2019\\_Vol1\\_Summary\\_Article17.pdf](https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2019_Vol1_Summary_Article17.pdf)

<sup>5</sup> For example, policy NH10 of the Kildare County Development Plan 2017-2023 states 'It is the policy of the Council to *'Restrict development within a proposed Natural Heritage Area to development that is directly related to the area's amenity potential subject to the protection and enhancement of natural heritage and visual amenities including biodiversity and landscapes'*.



The nearest SAC site to the proposed development is Rye Water Valley/ Carton SAC which is located *circa.* 500m north of the proposed development. There are two SAC sites, which have been included due to a hydrological linkage between them and the proposed development, at circa 27km further downstream of the proposed development in Dublin Bay: South Dublin Bay SAC and North Dublin Bay SAC.

The nearest SPA sites to the proposed development, which are hydrologically connected to the proposed development via the local surface water network and the River Liffey, are South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA, both of which lie c.27km downstream.

The nearest NHA site to the proposed development is Hodgestown Bog NHA which is located c.11.5km to the southwest of the proposed development. There are three pNHA sites located in the vicinity of the proposed development: Royal Canal pNHA, Rye Water Valley/Carton pNHA and Liffey Valley pNHA. There are also three pNHA sites downstream of the proposed development in Dublin Bay: South Dublin Bay pNHA, North Dublin Bay pNHA and Booterstown Marsh pNHA.

There are other sites of international importance e.g. RAMSAR sites<sup>6</sup> such as North Bull Island, Sandymount Strand and Tolka Estuary. These overlap in part with the identified European sites and as such are captured by the assessment.

Site Name [Code]	Ecological Features for which the Sites are Designated (*=Priority Annex I Habitat)	Location
<b>Special Areas of Conservation (SACs)</b>		
Rye Water Valley/Carton SAC [001398]	Petrifying springs with tufa formation (Cratoneurion) [7220]* <i>Vertigo angustior</i> (Narrow-mouthed Whorl Snail) [1014] <i>Vertigo moulinsiana</i> (Desmoulin's Whorl Snail) [1016]  <i>S.I. No. 494/2018 - European Union Habitats (Conservation of Wild Birds (Rye Water Valley/Carton Special Area of Conservation 001398)) Regulations 2018.</i>  NPWS (2021) Conservation objectives for Rye Water Valley/Carton SAC [001398]. Generic Version 8.0. Department of Housing, Local Government and Heritage.	c. 509m north of the proposed development
Glenasmole Valley SAC [001209]	Semi-natural dry grasslands and scrubland facies on calcareous substrates ( <i>Festuco-Brometalia</i> ) (* important orchid sites) [6210]	c.12.8km south-east of the proposed development

<sup>6</sup> A wetland site designated to be of international importance under the Ramsar Convention (1971) for Birds. The Ramsar Convention on Wetlands of International Importance Especially as Waterflow Habitat is an international treaty for the conservation and sustainable use of wetlands. It is also known as the Convention on Wetlands. It is named after the city of Ramsar in Iran, where the convention was signed in 1971.

Site Name [Code]	Ecological Features for which the Sites are Designated (*=Priority Annex I Habitat)	Location
	<p><i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) [6410]</p> <p>Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220]*</p> <p>NPWS (2021) Conservation objectives for Glenasmole Valley SAC [001209]. Generic Version 8.0. Department of Housing, Local Government and Heritage</p>	
Ballynafagh Bog SAC [000391]	<p>Active raised bogs [7110]</p> <p>Degraded raised bogs still capable of natural regeneration [7120]</p> <p>Depressions on peat substrates of the <i>Rhynchosporion</i> [7150]</p> <p><i>S.I. No. 141/2017 - European Union Habitats (Conservation of Wild Birds (Ballynafagh Bog Special Area of Conservation 001398)) Regulations 2017</i></p> <p>NPWS (2015) <i>Conservation Objectives: Ballynafagh Bog SAC 000391. Version 1.</i> National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.</p>	c.13.7km south-west of the proposed development
Ballynafagh Lake SAC [001387]	<p>Alkaline fens [7230]</p> <p><i>Vertigo moulinsiana</i> (Desmoulin's Whorl Snail) [1016]</p> <p><i>Euphydrias aurinia</i> (Marsh Fritillary) [1065]</p> <p><i>S.I. No. 493/2018 - European Union Habitats (Conservation of Wild Birds (Ballynafagh Lake Special Area of Conservation 001398)) Regulations 2018</i></p> <p>NPWS (2021) Conservation objectives for Ballynafagh Lake SAC [001387]. Generic Version 8.0. Department of Housing, Local Government and Heritage</p>	c.14.2km south-west of the proposed development
Wicklow Mountains SAC [002122]	<p>Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>) [3110]</p> <p>Natural dystrophic lakes and ponds [3160]</p> <p>Northern Atlantic wet heaths with <i>Erica tetralix</i> [4010]</p> <p>European dry heaths [4030]</p> <p>Alpine and Boreal heaths [4060]</p> <p>Calaminarian grasslands of the <i>Violetalia calaminariae</i> [6130]</p> <p>Species-rich <i>Nardus</i> grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230]</p> <p>Blanket bogs (* if active bog) [7130]</p>	c.14.7km south-east of the proposed development

Site Name [Code]	Ecological Features for which the Sites are Designated (*=Priority Annex I Habitat)	Location
	<p>Siliceous scree of the montane to snow levels (<i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladani</i>) [8110]</p> <p>Calcareous rocky slopes with chasmophytic vegetation [8210]</p> <p>Siliceous rocky slopes with chasmophytic vegetation [8220]</p> <p>Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]</p> <p><i>Lutra</i> (Otter) [1355]</p> <p>NPWS (2017) <i>Conservation Objectives: Wicklow Mountains SAC 002122. Version 1.</i> National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.</p>	
South Dublin Bay SAC [000210]	<p>Mudflats and sandflats not covered by seawater at low tide [1140]</p> <p>Annual vegetation of drift lines [1210]</p> <p><i>Salicornia</i> and other annuals colonising mud and sand [1310]</p> <p>Embryonic shifting dunes [2110]</p> <p><i>S.I. No. 525/2019 - European Union Habitats (South Dublin Bay Special Area of Conservation 000210) Regulations 2019</i></p> <p>NPWS (2013) <i>Conservation Objectives: South Dublin Bay SAC 000210. Version 1.</i> National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.</p>	c.17.1km east of the proposed development or c. 27km downstream
North Dublin Bay SAC [000206]	<p>Mudflats and sandflats not covered by seawater at low tide [1140]</p> <p>Annual vegetation of drift lines [1210]</p> <p><i>Salicornia</i> and other annuals colonising mud and sand [1310]</p> <p>Atlantic salt meadows (<i>Glaucopuccinellietalia maritima</i>) [1330]</p> <p>Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]</p> <p>Embryonic shifting dunes [2110]</p> <p>Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120]</p> <p>Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]*</p> <p>Humid dune slacks [2190]</p> <p><i>Petalophyllum ralfsii</i> (Petalwort) [1395]</p> <p><i>S.I. No. 524/2019 - European Union Habitats (North Dublin Bay Special Area of Conservation 000206) Regulations 2019</i></p> <p>NPWS (2013) <i>Conservation Objectives: North Dublin Bay SAC 000206. Version 1.</i> National Parks and</p>	c.19km east of the proposed development or c. 27km downstream

Site Name [Code]	Ecological Features for which the Sites are Designated (*=Priority Annex I Habitat)	Location
	Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	
<b>Special Protection Areas (SPAs)</b>		
South Dublin Bay and River Tolka Estuary SPA [004024]	<p>Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046]  Oystercatcher (<i>Haematopus ostralegus</i>) [A130]  Ringed Plover (<i>Charadrius hiaticula</i>) [A137]  Grey Plover (<i>Pluvialis squatarola</i>) [A141]  Knot (<i>Calidris canutus</i>) [A143]  Sanderling (<i>Calidris alba</i>) [A144]  Dunlin (<i>Calidris alpina</i>) [A149]  Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157]  Redshank (<i>Tringa totanus</i>) [A162]  Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179]  Roseate Tern (<i>Sterna dougallii</i>) [A192]  Common Tern (<i>Sterna hirundo</i>) [A193]  Arctic Tern (<i>Sterna paradisaea</i>) [A194]  Wetland and Waterbirds [A999]</p> <p><i>S.I. No. 212/2010 - European Communities (Conservation of Wild Birds (South Dublin Bay and River Tolka Estuary Special Protection Area 004024)) Regulations 2010.</i></p> <p>NPWS (2015) <i>Conservation Objectives: South Dublin Bay and River Tolka Estuary SPA 004024. Version 1.</i> National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.</p>	c.15.9km east of the proposed development or c. 27km downstream
North Bull Island SPA [004006]	<p>Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046]  Shelduck (<i>Tadorna tadorna</i>) [A048]  Teal (<i>Anas crecca</i>) [A052]  Pintail (<i>Anas acuta</i>) [A054]  Shoveler (<i>Anas clypeata</i>) [A056]  Oystercatcher (<i>Haematopus ostralegus</i>) [A130]  Golden Plover (<i>Pluvialis apricaria</i>) [A140]  Grey Plover (<i>Pluvialis squatarola</i>) [A141]  Knot (<i>Calidris canutus</i>) [A143]  Sanderling (<i>Calidris alba</i>) [A144]  Dunlin (<i>Calidris alpina</i>) [A149]  Black-tailed Godwit (<i>Limosa limosa</i>) [A156]  Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157]  Curlew (<i>Numenius arquata</i>) [A160]</p>	c.19km east of the proposed development or c. 27km downstream

Site Name [Code]	Ecological Features for which the Sites are Designated (*=Priority Annex I Habitat)	Location
	<p>Redshank (<i>Tringa totanus</i>) [A162]            Turnstone (<i>Arenaria interpres</i>) [A169]            Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179]            Wetland and Waterbirds [A999]</p> <p><i>S.I. No. 211/2010 - European Communities (Conservation of Wild Birds (North Bull Island Special Protection Area 004006)) Regulations 2010.</i></p> <p>NPWS (2015) <i>Conservation Objectives: North Bull Island SPA 004006. Version 1.</i> National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.</p>	
<b>Proposed Natural Heritage Areas (pNHAs)</b>		
Liffey Valley pNHA [000128]	<p>This site is part of the Liffey Valley Special Amenity Area Order 1990. The site is important because of the diversity of the habitats within the site, ranging from aquatic to terrestrial. A number of rare and threatened plant species have been recorded from the site.</p> <p>NPWS (2009) <i>Site Synopsis Liffey Valley pNHA</i></p>	c. 88m east of the proposed development
Rye Water Valley/Cartron pNHA [001398]	<p>[Site synopsis not available]            See also Rye Water Valley/Cartron SAC above</p>	c. 502m north of the proposed development
Royal Canal pNHA [002103]	<p>Man-made waterway linking the River Liffey at Dublin to the River Shannon near Tarmonbarry. Diversity of species and linear habitats.</p> <p>NPWS (2009) <i>Site Synopsis Royal Canal pNHA</i></p>	c. 953m north of the proposed development
Grand Canal pNHA [002104]	<p>Man-made waterway linking the River Liffey at Dublin with the Shannon at Shannon Harbour and the Barrow at Athy. Noted for its diversity of species and linear habitats.</p> <p>NPWS (2009) <i>Site Synopsis Grand Canal pNHA</i></p>	c.3.1km south of the proposed development
Donadea Wood pNHA [001391]	<p>This site is of scientific interest as, although highly managed, it has a significant proportion of deciduous trees and parts of the site have been wooded for a long period. Also, the site is notable for the presence of two rare species of Myxomycete fungus, namely <i>Diderma chondrioderma</i> and <i>Licea testudinacea</i>, the latter in one of only two known Irish sites.</p> <p>NPWS (2009) <i>Site Synopsis Donadea Wood pNHA</i></p>	c.9.2km south-west of the proposed development

Site Name [Code]	Ecological Features for which the Sites are Designated (*=Priority Annex I Habitat)	Location
Slade Of Saggart And Crooksling Glen pNHA [000211]	The site includes a good example of a wooded river valley and a small wetland system. The presence of a rare plant, a rare invertebrate and a variety of wildfowl species adds to the interest of the site.  NPWS (2009) <i>Site Synopsis Slade of Saggart and Crooksling Glen pNHA</i>	c.10.4km south of the proposed development
Lugmore Glen pNHA [001212]	A fine example of a wooded glen with a good representation of woodland plants. This type of semi natural habitat is now scarce in Co. Dublin. The presence of a rare plant species adds to the interest of the site.  NPWS (2009) <i>Site Synopsis Lugmore Glen pNHA</i>	c.10.4km south-east of the proposed development
Dodder Valley pNHA [000991]	The site represents the last remaining stretch of natural river-bank vegetation on the River Dodder in the built-up Greater Dublin Area.  NPWS (2009) <i>Site Synopsis Dodder Valley pNHA</i>	c.11.6km south-east of the proposed development
Glenasmole Valley pNHA [001209]	[Site synopsis not available] See also Glenasmole Valley SAC above	c.12.9km south-east of the proposed development
Kilteel Wood pNHA [001394]	This site is a fine example of a largely deciduous wood. Its elevated position gives it scenic value.  NPWS (2009) <i>Site Synopsis Kilteel Wood pNHA</i>	c.13.4km south of the proposed development
Ballynafagh Bog pNHA [000391]	[Site synopsis not available] Overlaps with Ballynafagh Bog SAC above	c.13.9km south-west of the proposed development
Ballynafagh Lake pNHA [001387]	[Site synopsis not available] See also Ballynafagh Lake SAC above	c.14.2km east of the proposed development
Santry Demesne pNHA [000178]	The primary importance of this site is that it contains a legally protected plant species Hairy St. John's-wort <i>Hypericum hirsutum</i> .  NPWS (2009) <i>Site Synopsis Santry Demesne pNHA</i>	c.15km north-east of the proposed development
North Dublin Bay pNHA [000206]	[Site synopsis not available] See also North Dublin Bay SAC above	c.15.6km east of the proposed development or c. 27km downstream
South Dublin Bay pNHA [000210]	[Site synopsis not available] See also South Dublin Bay SAC above	c.17.1km east of the proposed development or c. 27km downstream
Rathmoylan Esker pNHA [000557]	One of the few remnants of wooded esker, this site is of high ecological and geomorphological interest.	c.17.6km north-west of the proposed development

Site Name [Code]	Ecological Features for which the Sites are Designated (*=Priority Annex I Habitat)	Location
	Rathmoylan is also one of the most easterly wooded eskers in Ireland.  NPWS (2009) <i>Site Synopsis Rathmoylan Esker pNHA</i>	
Boosterstown Marsh pNHA [001205]	Boosterstown Marsh is the only saltmarsh in south Dublin and, despite some concerns about the increasing salinity of the site, it remains a valuable habitat for many birds as well as containing a diverse flora including the protected plant Borrer's Saltmarsh grass <i>Puccinellia fasciculata</i> . The marsh is a subsite of South Dublin Bay and River Tolka Estuary SPA See above.  NPWS (2009) <i>Site Synopsis Boosterstown Marsh pNHA</i>	c.18.5km east of the proposed development or c. 27km downstream
<b>Natural Heritage Areas (NHAs)</b>		
Hodgestown Bog NHA [001393]	Raised bog  NPWS (2002) <i>Site Synopsis Hodgestown Bog NHA</i>	c.14.3km south-west of the proposed development

**Table 5.1:** Designated Sites in the vicinity<sup>7</sup> or in the downstream receiving Environment of the Proposed Development

### 5.2.1.3 Habitats

The proposed development consists of a stretch of the existing M4/N4 roadway, central reserve hedgerow, the roadside verges and adjacent linear vegetation between Junction 7 Maynooth and Junction 5 Leixlip.

Based on an examination of aerial photography and a site survey carried out in February 2021, the proposed development is characterised by made ground with some roadside landscaping. The main habitats include hardstanding and artificial surfaces in the form of the existing M4/N4 which in the Heritage Council's<sup>8</sup> Classification scheme correspond with Buildings and artificial surfaces (BL3), a heavily managed central reserve hedgerow running the length of the M4/N4 roadway between Leixlip and Maynooth with potential for amenity grassland (GA2), dry meadows and grassy verges (GS2), hedgerows (WL1), treelines (WL2) and narrow woodland bands ascribable to a number of habitats depending on floristic assemblages and cover (WD1, WD2 and WS1) lining the northern and southern side of the M4, areas of mixed broadleaf woodland (WD1) outside of the study area and a small section where the existing roadway traverses the river Liffey (FW2).

<sup>7</sup> In this instance any sites within 15km of the study area have been considered within the vicinity.

<sup>8</sup> Fossitt, J. (2000). A guide to Habitats in Ireland. The Heritage Council, Kilkenny.

## Non-Designated Areas of Annex I Habitat

Based on a review of available desktop data, specifically Article 17 reporting data regarding the national distribution of Annex I habitats, no designated or non-designated Annex I habitats occur within the proposed development area.

Annex I habitats are of national importance from a biodiversity perspective, whilst priority Annex I habitats are regarded as being of international importance. In addition, *ex-situ* Annex I habitats (i.e. Annex I habitats not contained within designated sites) may act as supporting features to habitats contained within Designated Sites (e.g. by acting as ecological stepping-stones or corridors, providing connectivity for protected species, ensuring viable commuting and foraging routes, and providing habitats for supporting populations).

It should be noted that although no records of Annex I habitats were returned from the desk study, it is possible (although unlikely, given the habitats observed within the study area) that areas of Annex I habitats, not currently recorded or mapped, may be present within the proposed development area.

## Non-Annex I Woodland Habitats

A review of databases available from the NPWS, specifically data relating to the Ancient and Long-Established Woodland survey and the National Survey of Native Woodlands 2003 - 2008, confirmed that there are no areas of ancient or long-established native woodland within the proposed development area.

However, the following woodland habitat types are present in close proximity to, the proposed development area:

- Native woodlands of oak-ash-hazel woodland (WN2) at Castletown and Coldblow. The woodland at Castletown is described as corresponding with, *Fraxinus excelsior - Hedera helix* woodland group and of a *Geum urbanum - Veronica montana* vegetation type, while the woodland at Coldblow is described as corresponding with *Fraxinus excelsior - Hedera helix* woodland group and of an *Acer pseudoplatanus - Crataegus monogyna* vegetation type; and,
- Possible ancient woodland sites at Castletown and Coldblow (shared boundary as native woodland sites described above) comprised of oak-ash-hazel woodland (WN2).

Both these areas are within the Liffey Valley pNHA boundary and occur outside of the extent of the proposed development (c. 88m east).

Other areas of woodland exist within the proposed development area and these have been captured within the ecological sites described in Section 5.2.1.7.

Woodlands are of ecological value, due to the relative scarcity of large tracts of woodland in Ireland, and the high degree of biodiversity that they can support. In addition, woodlands provide habitats and foraging resources for a range of protected fauna species e.g. badger, red squirrel, pine marten, birds and bats. Woodlands can also provide ecological connectivity across the wider landscape and environment, including in some cases providing habitat links between designated sites.



In general, the ecological value of areas of non-Annex I woodland Habitats ranges from local to national importance, depending on their vegetative composition, extent and age.

In addition to the above, the Leixlip Local Area Plan outlined numerous habitats of ecological importance, many of which occur within and directly adjacent to the proposed development namely, woodland, hedgerows, treelines and watercourses.

### 5.2.1.4 Flora

Desktop records of protected, rare or other notable plant species are listed in Table 5.2. To note, this includes all records of protected flora species within grid references N93 and O03. Although numerous protected flora species were returned from the desktop study, given the nature of the proposed development area (i.e. predominantly hardstanding of the existing M4/N4) these are unlikely to be directly affected by the proposed development.

Common Name/ Scientific Name	Legal Status <sup>9</sup>	Red List Status <sup>10</sup>	Source	Known Locations/ Habitat Preferences
Green Figwort <i>Scrophularia umbrosa</i>	N/A	Endangered	NBDC online database N93	Sites for the species are on the margins of rivers and lakes and occurring in damp shady places. It has been recorded in 6 sites along a stretch of the river Liffey on the Kildare-Dublin border <sup>10</sup>
Fountain Feather-moss <i>Amblystegium tenax</i>	N/A	Near threatened	NBDC online database N93	[not available]
Sausage Beard-moss <i>Didymodon tomaculosus</i>	N/A	Vulnerable	NBDC online database N93	[not available]
Cornflower <i>Centaurea cyanus</i>	N/A	Regionally Extinct	NBDC online database O03	Previously a common arable weed. Now garden escape or sown as part of wildflower mixtures. Waste ground, roadsides <sup>11</sup>
Hairy St John's-wort <i>Hypericum hirsutum</i>	N/A	Endangered	NBDC online database O03	Occurs on riverbanks and shady places has been recorded from 5 counties in

<sup>9</sup> HDII/IV/V = Habitats Directive Annexes II/IV/V; FPO = Flora (Protection) Order, 2015; WA = Wildlife Acts

<sup>10</sup> Vascular Flora listed in threatened categories from the Irish Red List No. 10 Vascular Plants (Wyse-Jackson *et al.*, 2016); Bryophytes from the Irish Red List No. 8 Bryophytes- Mosses, Liverworts & Hornworts (Lockhart *et al.*, 2012).

<sup>11</sup> Irish wildflowers website. Available from <http://www.irishwildflowers.ie/pages/654a.html> [Accessed 28/01/2021]

Common Name/ Scientific Name	Legal Status <sup>9</sup>	Red List Status <sup>10</sup>	Source	Known Locations/ Habitat Preferences
				eastern Ireland, concentrated in the river Liffey valley <sup>10</sup>
[NBDC lists no common names for this subspecies] <i>Lamiastrum galeobdolon</i> subsp. <i>montanum</i>	N/A	Vulnerable	NBDC online database O03	Occurring on moist woodlands, hedges, roadsides and grikes of limestone pavement, usually on heavy soils. It is often associated with ancient woods <sup>12</sup>
Meadow Barley <i>Hordeum secalinum</i>	N/A	Endangered	NBDC online database O03	Occurring on lowland coastal and inland meadows and pastures, mostly on damp heavy soils <sup>10</sup>
Opposite-leaved Pondweed <i>Groenlandia densa</i>	N/A	Endangered	NBDC online database O03	Occurs in ditches, streams, ponds and canals and on marginal muds in estuaries. <sup>10</sup>
Spring Vetch <i>Vicia lathyroides</i>	N/A	Vulnerable	NBDC online database O03	Occurs on sandy ground near the sea <sup>10</sup>
Chalk Screw-moss <i>Tortula vahliana</i>	N/A	Regionally Extinct	NBDC online database O03	Used to grow on mud-capped walls, although some of these could recolonise in chalk or gravel pits <sup>10</sup>
Hook-beak Tufa-moss <i>Hymenostylium recurvirostrum</i>	N/A	Near threatened	NBDC online database O03	[not available]
Lance-leaved Pottia <i>Tortula lanceola</i>	N/A	Critically Endangered	NBDC online database O03	[not available]
Rigid Aloe-moss <i>Aloina rigida</i>	N/A	Regionally Extinct	NBDC online database O03	Used to grow on mud-capped walls, although some of these could recolonise in chalk or gravel pits <sup>10</sup>
Spiral Chalk-moss <i>Pterygoneurum lamellatum</i>	N/A	Regionally Extinct	NBDC online database O03	Used to grow on mud-capped walls, although some of these could recolonise in chalk or gravel pits <sup>10</sup>
Starke's Pottia <i>Microbryum starckeanum</i>	N/A	Regionally Extinct	NBDC online database O03	[not available]

<sup>12</sup> Online Atlas of the British and Irish Flora. Available at <https://www.brc.ac.uk/plantatlas/>  
[Accessed 28/01/2021]

Common Name/ Scientific Name	Legal Status <sup>9</sup>	Red List Status <sup>10</sup>	Source	Known Locations/ Habitat Preferences
Twisting Thread-moss <i>Bryum torquescens</i>	N/A	Vulnerable	NBDC online database O03	Typically grows on calcareous soil in open sunny places, especially on free-draining substrates on banks, in open patches in grassland, on roadsides, about old quarries, and on thin soil overlying rocks, especially limestone but also hard metamorphic rocks and concrete

**Table 5.2:** Records of protected, rare or notable flora recorded from the desk study within the wider surrounds of the proposed development

Planting, dispersing, or allowing/ causing the dispersal, spread or growth of certain non-native invasive plant species is controlled under Article 49 of the European Communities (Birds and Natural Habitats) Regulations, 2011; and refers to plant or animal species listed on the Third Schedule of those regulations. Invasive species are species that have been introduced (deliberately or accidentally) by humans and have a potential negative impact on the economy, wildlife and habitats.

The accidental spread of non-native invasive plant species (third schedule species as well as species of concern identified by TII<sup>13</sup>) as a result of construction works has the potential to impact upon terrestrial habitats within and immediately adjacent to the proposed development boundary; potentially affecting plant species composition, diversity and abundance over the long-term. The effects of introducing such non-native invasive plant species to highly sensitive and ecologically important habitat areas (e.g. designated area for nature conservation or areas of Annex I habitat) have the potential to result in a likely significant negative effect, at geographic scales ranging from local to international.

There are several non-native invasive plant species which have been returned from the desk study within the wider surrounds of the proposed development. These are summarised in Table 5.3. Only those non-native plant species subject to restrictions under Regulations 49 or included within the recently published TII guidance on the management of invasive plant species<sup>14</sup> are included in the table below. No non-native invasive plant species listed on Schedule 3, including Japanese knotweed, were recorded within the wider surrounds of the proposed development during the site survey in February 2021. However, this survey was merely a high-level truthing exercise and carried out outside of the optimum season for flowering plants. Therefore, although no 3<sup>rd</sup> schedule non-native invasive plant species or other species of concern as noted by TII guidance were recorded it does not necessarily mean that they are not present within the proposed development.

<sup>13</sup> TII Publications (2020) The Management of Invasive Alien Plant Species on National Roads – Technical Guidance

<sup>14</sup> TII Publications (2020) The Management of Invasive Alien Plant Species on National Roads – Technical Guidance

Common Name / Scientific Name	Invasive Categorisation	Third Schedule (SI 477 of 2011)	Species of European Concern (EU regulation 1143/2014 & amendments 1263/2017, 1262/2019)	TII Species of Concern	Source
Canadian Waterweed ( <i>Eloдея canadensis</i> )	High Impact	Yes	No	No	NBDC online database N93, O03
Giant Hogweed ( <i>Heracleum mantegazzianum</i> )	High Impact Phytotoxic species	Yes	Yes	Yes	NBDC online database N93, O03
Indian Balsam ( <i>Impatiens glandulifera</i> )	High Impact	Yes	Yes	Yes	NBDC online database N93, O03
Japanese Knotweed ( <i>Reynoutria japonica</i> )	High Impact	Yes	No	Yes	NBDC online database N93, O03
Nuttall's Waterweed ( <i>Eloдея nuttallii</i> )	High Impact	Yes	Yes	No	NBDC online database O03
Rhododendron ( <i>Rhododendron ponticum</i> )	High Impact	Yes	No	Yes	NBDC online database N93, O03
Spanish Bluebell ( <i>Hyacinthoides hispanica</i> )	N/A	Yes	No	Yes	NBDC online database O03
Three-cornered Garlic ( <i>Allium triquetrum</i> )	Medium Impact Invasive Species	Yes	No	Yes	NBDC online database N93, O03
Montbretia ( <i>Crocsmia x crocosmiiflora</i> )	N/A	No	No	Yes	NBDC online database N93, O03
Winter heliotrope ( <i>Petasites fragrans</i> )	N/A	No	No	Yes	NBDC online database N93, O03
Butterfly-bush ( <i>Buddleja davidii</i> )	Medium Impact Invasive Species	No	No	Yes	NBDC online database N93, O03
Himalayan honeysuckle ( <i>Leyesteria Formosa</i> )	Medium Impact Invasive Species	No	No	Yes	NBDC online database O03

Common Name / Scientific Name	Invasive Categorisation	Third Schedule (SI 477 of 2011)	Species of European Concern (EU regulation 1143/2014 & amendments 1263/2017, 1262/2019)	TII Species of Concern	Source
Russian vine ( <i>Fallopia baldschuanica</i> )	Medium Impact Invasive Species	No	No	Yes	NBDC online database O03

**Table 5.3:** Records of non-native invasive plant species recorded from the desk study within the wider surrounds of the proposed development

### 5.2.1.5 Fauna

There are several European and nationally protected mammal, bird, fish, amphibian, reptile and invertebrate species which have been recorded within the vicinity of proposed development. This includes all records of protected species within grid references N93 and O03.

Although numerous protected fauna species were returned from the desktop study, given the nature of the proposed development (i.e. predominantly hardstanding of the existing M4) these are unlikely to be directly affected by the proposed development. These are summarised in Table 5.4.

A variety of wintering and breeding red and amber listed bird species were returned from the desk study of the proposed development including whooper swan, tufted duck and barn owl. In the case of bird species, only those species listed in Annex I of the Birds Directive or on the Birds of Conservation Concern in Ireland (BoCCI)<sup>15</sup> Red List are included in the table below.

With regards to bat species, the following habitat features/areas, present within the proposed development area, are likely to be important for local populations; areas of woodland, river corridors, agricultural lands with well-developed hedgerow/treeline network, old buildings, bridges and underground structures if present (e.g. ice-houses, souterrains etc). Bats, and their breeding and resting places, are wholly protected under the Wildlife Act 1976 (as amended). All bat species are also listed on Annex IV of the EU Habitats Directive and are afforded strict protection under the Habitats Directive and the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended). The National Biodiversity Data Centre (NBDC) database returned records of the following bat species within the vicinity of the proposed development: Daubenton's bat *Myotis daubentonii*, Leisler's bat *Nyctalus leisleri*, brown long-eared bat *Plecotus auritus*, Natterer's bat *Myotis nattereri*, soprano pipistrelle bat *Pipistrellus pygmaeus*, common pipistrelle bat *Pipistrellus*, Nathusius pipistrelle bat *Pipistrellus nathusii*, and whiskered bat *Myotis mystacinus*.

<sup>15</sup> Birdwatch Ireland website. Available from <https://birdwatchireland.ie/birds-of-conservation-concern-in-ireland-2014-2019/>. [Accessed 28/02/2021]

Additionally, a search of the Bat Conservation Ireland database returned records of zero known roosts from within the proposed development area, however there are records of nine known roosts within 2km of the proposed development.

There are records for the Annex II Marsh fritillary butterfly *Euphydryas aurinia* returned during the desk study from within the proposed development area. Devil's-bit scabious, *Succisa pratensis*, the main food plant and an essential component of suitable marsh fritillary habitat, was also returned from the desk study with the closest records from along the banks of the Royal Canal and the Rye Water River at Louisa Bridge.

Common Name / Scientific Name	Legal Status <sup>16</sup>	Red List Status <sup>17</sup>	Source
<b>Amphibians</b>			
Common frog ( <i>Rana temporaria</i> )	HD V; WA	Least Concern	NBDC online database N93, O03
Smooth newt ( <i>Lissotriton vulgaris</i> )	WA	Least Concern	NBDC online database N93, O03
<b>Invertebrates</b>			
Freshwater White-clawed Crayfish ( <i>Austropotamobius pallipes</i> )	HD II, V; WA	Not Evaluated	NBDC online database N93, O03
<i>Andrena (Andrena) praecox</i>	N/A	Vulnerable	NBDC online database N93, O03
<i>Andrena (Melandrena) nigroaenea</i>	N/A	Vulnerable	NBDC online database N93, O03
Barbut's Cuckoo Bee ( <i>Bombus (Psithyrus) barbutellus</i> )	N/A	Endangered	NBDC online database N93, O03
Dark Nomad Bee ( <i>Nomada sheppardana</i> )	N/A	Regionally Extinct	NBDC online database N93, O03
<i>Ephemerella notata</i>	N/A	Endangered	NBDC online database N93, O03
Hill Cuckoo Bee ( <i>Bombus (Psithyrus) rupestris</i> )	N/A	Endangered	NBDC online database N93, O03
<i>Hylaeus (Prosopis) brevicornis</i>	N/A	Endangered	NBDC online database N93, O03

<sup>16</sup> HDII/IV/V = Habitats Directive Annexes II/IV/V; FPO = Flora (Protection) Order, 2015; WA = Wildlife Acts; BD I/II/III= Birds Directive Annexes I/II/III

<sup>17</sup> Fauna species listed in threatened Red List categories: from Butterflies from the Irish Red List No. 4 Butterflies (Regan *et al.*, 2010); Amphibians, Reptiles & Fish from the Irish Red List No. 5 Amphibians, Reptiles & Freshwater Fish (King *et al.*, 2011); Terrestrial Mammals from the Irish Red List No.3 Terrestrial Mammals (Marnell *et al.*, 2009); Cartilaginous Fish from the Irish Red List no. 11 Cartilaginous Fish (Sharks, Skates, Rays & Chimaeras) (Clarke *et al.*, 2016); Birds from Birds of Conservation Concern in Ireland 2014-2019 (Colhoun & Cummins, 2013); Non-Marine Molluscs from Irish Red List No. 2 Non-Marine Molluscs (Byrne *et al.*, 2009); Water Beetles from Irish Red List No. 1 Water Beetles (Foster *et al.*, 2009); Mayflies from Irish Red List No.7 Mayflies (Ephemeroptera) (Kelly-Quinn & Regan, 2012); Bees from Regional Red List of Irish Bees (Fitzpatrick *et al.*, 2006).

Common Name / Scientific Name	Legal Status <sup>16</sup>	Red List Status <sup>17</sup>	Source
Marsh Fritillary ( <i>Euphydryas aurinia</i> )	HD II	Vulnerable	NBDC online database N93, O03
Minutest Diving Beetle ( <i>Bidessus minutissimus</i> )	N/A	Regionally Extinct	NBDC online database N93, O03
Neat Mining Bee ( <i>Lasioglossum (Evyllaesus) nitidiusculum</i> )	N/A	Vulnerable	NBDC online database N93, O03
<i>Procloeon bifidum</i>	N/A	Vulnerable	NBDC online database N93, O03
<i>Rhithrogena germanica</i>	N/A	Vulnerable	NBDC online database N93, O03
Small Blue Butterfly ( <i>Cupido minimus</i> )	N/A	Endangered	NBDC online database N93, O03
Trimmer's Mining Bee ( <i>Andrena (Hoplandrena) trimmerana</i> )	N/A	Critically Endangered	NBDC online database N93, O03
Wall brown Butterfly ( <i>Lasiommata megera</i> )	N/A	Endangered	NBDC online database N93, O03
Brown Snail ( <i>Zenobiella subrufescens</i> )	N/A	Vulnerable	NBDC online database N93, O03
Common Oyster ( <i>Ostrea edulis</i> )	N/A	OSPAR Convention	NBDC online database N93, O03
Desmoulin's Whorl Snail ( <i>Vertigo (Vertigo) moulinsiana</i> )	HD II; WA	Endangered	NBDC online database N93, O03
Duck Mussel ( <i>Anodonta (Anodonta) anatina</i> )	N/A	Vulnerable	NBDC online database N93, O03
Ear Pond Snail ( <i>Radix auricularia</i> )	N/A	Vulnerable	NBDC online database N93, O03
English Chrysalis Snail ( <i>Leiostryla (Leiostryla) anglica</i> )	N/A	Vulnerable	NBDC online database N93, O03
Glutinous Snail ( <i>Myxas glutinosa</i> )	N/A	Endangered	NBDC online database N93, O03
Lake Orb Mussel ( <i>Musculium lacustre</i> )	N/A	Vulnerable	NBDC online database N93, O03
Lesser Bulin ( <i>Merdigera obscura</i> )	N/A	Endangered	NBDC online database N93, O03
<i>Pisidium pseudosphaerium</i>	N/A	Endangered	NBDC online database N93, O03
<i>Pisidium pulchellum</i>	N/A	Endangered	NBDC online database N93, O03
Plated Snail ( <i>Spermodea lamellata</i> )	N/A	Endangered	NBDC online database N93, O03

Common Name / Scientific Name	Legal Status <sup>16</sup>	Red List Status <sup>17</sup>	Source
Point Snail ( <i>Acicula fusca</i> )	N/A	Vulnerable	NBDC online database N93, O03
Swan Mussel ( <i>Anodonta (Anodonta) cygnea</i> )	N/A	Vulnerable	NBDC online database N93, O03
<b>Fish</b>			
Atlantic salmon ( <i>Salmo salar</i> )	OSPAR Convention; HD II, V	Vulnerable	NBDC online database N93, O03; IFI Consultation
European eel ( <i>Anguilla Anguilla</i> )	OSPAR Convention	Critically Endangered	NBDC online database N93, O03
<b>Terrestrial Mammals</b>			
Eurasian badger ( <i>Meles meles</i> )	WA	Least Concern	NBDC online database N93, O03
Eurasian pygmy shrew ( <i>Sorex minutus</i> )	WA	Least Concern	NBDC online database N93, O03
Eurasian red squirrel ( <i>Sciurus vulgaris</i> )	WA	Near Threatened	NBDC online database N93, O03
European otter ( <i>Lutra lutra</i> )	HD II, IV; WA	Near Threatened	NBDC online database N93, O03
Red deer ( <i>Cervus elaphus</i> )	WA	Least Concern	NBDC online database N93, O03
West european hedgehog ( <i>Erinaceus europaeus</i> )	WA	Least Concern	NBDC online database N93, O03
Pine marten ( <i>Martes martes</i> )	HD V; WA	Least Concern	NBDC online database N93, O03
Irish hare ( <i>Lepus timidus</i> subsp. <i>hibernicus</i> )	WA	Least Concern	NBDC online database N93, O03
Irish stoat ( <i>Mustela erminea</i> subsp. <i>hibernica</i> )	WA	Least Concern	NBDC online database N93, O03
Brown long-eared bat ( <i>Plecotus auritus</i> )	HD IV; WA	Least Concern	NBDC online database N93, O03
Daubenton's bat ( <i>Myotis daubentonii</i> )	HD IV; WA	Least Concern	NBDC online database N93, O03
Leisler's bat ( <i>Nyctalus leisleri</i> )	HD IV; WA	Near Threatened	NBDC online database N93, O03
Nathusius's pipistrelle ( <i>Pipistrellus nathusii</i> )	HD IV; WA	Least Concern	NBDC online database N93, O03
Natterer's bat ( <i>Myotis nattereri</i> )	HD IV; WA	Least Concern	NBDC online database N93, O03
Common pipistrelle ( <i>Pipistrellus pipistrellus</i> )	HD IV; WA	Least Concern	NBDC online database N93, O03
Soprano pipistrelle ( <i>Pipistrellus pygmaeus</i> )	HD IV; WA	Least Concern	NBDC online database N93, O03



Common Name / Scientific Name	Legal Status <sup>16</sup>	Red List Status <sup>17</sup>	Source
Whiskered bat ( <i>Myotis mystacinus</i> )	HD IV; WA	Least Concern	NBDC online database N93, O03
<b>Birds</b>			
Barn Owl ( <i>Tyto alba</i> )	WA	Red List	NBDC online database N93, O03
Black-headed Gull ( <i>Chroicocephalus ridibundus</i> )	WA	Red List	NBDC online database N93, O03
Common Kingfisher ( <i>Alcedo atthis</i> )	BD I; WA	Amber List	NBDC online database N93, O03
Common Pochard ( <i>Aythya ferina</i> )	BD II, III; WA	Red List	NBDC online database N93, O03
Common Redshank ( <i>Tringa totanus</i> )	WA	Red List	NBDC online database N93, O03
Corn Crake ( <i>Crex crex</i> )	BD I; WA	Red List	NBDC online database N93, O03
Eurasian Curlew ( <i>Numenius arquata</i> )	BD II; WA	Red List	NBDC online database N93, O03
Eurasian Wigeon ( <i>Anas penelope</i> )	BD II, III; WA	Red List	NBDC online database N93, O03
Eurasian Woodcock ( <i>Scolopax rusticola</i> )	BD II, III; WA	Red List	NBDC online database N93, O03
European Golden Plover ( <i>Pluvialis apricaria</i> )	BD I, II, III; WA	Red List	NBDC online database N93, O03
Grey Partridge ( <i>Perdix perdix</i> )	BD II, III; WA	Red List	NBDC online database N93, O03
Herring Gull ( <i>Larus argentatus</i> )	WA	Red List	NBDC online database N93, O03
Little Egret ( <i>Egretta garzetta</i> )	BD I; WA	Green List	NBDC online database N93, O03
Merlin ( <i>Falco columbarius</i> )	BD I; WA	Amber List	NBDC online database N93, O03
Northern Lapwing ( <i>Vanellus vanellus</i> )	BD II; WA	Red List	NBDC online database N93, O03
Northern Pintail ( <i>Anas acuta</i> )	BD II, III; WA	Red List	NBDC online database N93, O03
Peregrine Falcon ( <i>Falco peregrinus</i> )	BD I; WA	Green List	NBDC online database N93, O03
Red Grouse ( <i>Lagopus lagopus</i> )	BD II, III; WA	Red List	NBDC online database N93, O03
Tufted Duck ( <i>Aythya fuligula</i> )	BD II, III; WA	Red List	NBDC online database N93, O03
Whooper Swan ( <i>Cygnus cygnus</i> )	BD I; WA	Amber List	NBDC online database N93, O03

Common Name / Scientific Name	Legal Status <sup>16</sup>	Red List Status <sup>17</sup>	Source
Yellowhammer ( <i>Emberiza citrinella</i> )	WA	Red List	NBDC online database N93, O03

**Table 5.4:** Records of protected, rare or notable fauna within the wider surrounds of the proposed development

### 5.2.1.6 Rivers, Fisheries and the Aquatic Environment

According to the Environmental Protection Agency (EPA) data<sup>18</sup>, several rivers, and their associated tributaries, are located within or immediately adjacent to the proposed development. The main rivers and their associated sub-catchments are displayed in Table 5.5. However, the proposed development only crosses two watercourses: the River Liffey and the Kilmacredock Upper (which flows directly into the river Liffey).

A consultation letter was sent to Inland Fisheries Ireland (IFI) on the 19<sup>th</sup> of January 2021, requesting desktop information regarding the watercourses listed in Table 5.5 (named as per EPA mapping), including any records of rare/protected species and any data regarding the fishery potential of relevant watercourses. A response was received on the 25<sup>th</sup> of January 2021, which outlined the following sensitive species as being present within the adjacent watercourses and the downstream receiving environment within the River Liffey: Atlantic salmon, brown trout and eel. The River Rye Water also supports populations of freshwater crayfish and lamprey.

The Rye Water is located adjacent to the proposed development, circa 3km downstream on the Meadowbrook Stream and Lyreen River which hydrologically connects it to the Rye Water Valley/Cartron SAC.

Sub-catchment	River / Stream Name	Location relative to Study Area
Liffey and Dublin Bay_09 catchment	Taghadoe	Located outside and upstream of the study area boundary (c. 270m west)
	Lucan Stream	Located outside and upstream of the study area boundary (c. 350m south)
	Liffey	Located within the study area boundary
	Kilmacredock_Upper	Located within the study area boundary
	Lyreen	Located outside and upstream of the study area boundary (c. 1.5km northwest)
	Rye Water	Located outside and upstream of the study area boundary (c. 1.3km north at the closest point)

**Table 5.5:** Main Watercourses and their associated sub-catchments located in the vicinity of the proposed development

<sup>18</sup> Environmental Protection Agency (2020) Data available for download at <http://gis.epa.ie/GetData/Download>

### 5.2.1.7 Ecological Sites

Following a review of orthophotography and collation of available existing habitat information, 30 ecological sites were identified within the vicinity of the proposed development. Ecological sites are sites of ecological value: i.e. those likely or determined to be at least of a local importance (higher value). These are primarily defined based on the habitat types present or likely to be present but may also include important flora and fauna sites or populations.

A ground truthing exercise was subsequently undertaken to verify the orthophotography interpretation and refine the boundaries of the ecological sites, where they were in close proximity to, or overlapped with the proposed development. The description and evaluation of the ecological sites are presented in **Table 5.6**. All of the ecological sites listed below are likely to be of local importance (higher value).

Ecological Site Number	Location	Description	Ecological Valuation
EC01	Northern side of M4 roadway	Narrow woodland band/ Treeline	Local importance (higher value)
EC02	Northern side of M4 roadway (island)	Narrow woodland band/ Treeline	Local importance (higher value)
EC03	Southern side of M4 roadway (island)	Narrow woodland band/ Treeline	Local importance (higher value)
EC04	Southern side of M4 roadway	Narrow woodland band/ Treeline	Local importance (higher value)
EC05	Northern side of M4 roadway	Narrow woodland band/ Treeline	Local importance (higher value)
EC06	Southern side of M4 roadway	Narrow woodland band/ Treeline	Local importance (higher value)
EC07	Northern side of M4 roadway	Narrow woodland band/ Treeline	Local importance (higher value)
EC08	Southern side of M4 roadway	Narrow woodland band/Treeline	Local importance (higher value)
EC09	Southern side of M4 roadway	Narrow woodland band/ Treeline	Local importance (higher value)
EC10	Moortown	Mixed broadleaf woodland	Local importance (higher value)
EC11	Northern side of M4 roadway	Narrow woodland band/ Treeline	Local importance (higher value)
EC12	Southern side of M4 roadway	Narrow woodland band/ Treeline	Local importance (higher value)
EC13	Treeline lining Leixlip Gate roadway	Narrow woodland band/ Treeline	Local importance (higher value)
EC14	Northern side of M4 roadway	Narrow woodland band/ Treeline	Local importance (higher value)

Ecological Site Number	Location	Description	Ecological Valuation
EC15	Southern side of M4 roadway	Narrow woodland band/ Treeline	Local importance (higher value)
EC16	Northern side of M4 roadway	Mixed broadleaf woodland	Local importance (higher value)
EC17	Rinawade Upper	Mixed broadleaf woodland	Local importance (higher value)
EC18	Southern side of M4 roadway within boundary of HP site	Narrow woodland band/ Treeline	Local importance (higher value)
EC19	Southern side of M4 roadway	Narrow woodland band/ Treeline	Local importance (higher value)
EC20	Northern side of M4 roadway	Narrow woodland band/ Treeline	Local importance (higher value)
EC21	Southern side of M4 roadway	Narrow woodland band/ Treeline	Local importance (higher value)
EC22	Leixlip Demesne	Narrow woodland band/ Treeline	Local importance (higher value)
EC23	Leixlip Demesne	Narrow woodland band/ Treeline	Local importance (higher value)
EC24	Northern side of M4 roadway	Narrow woodland band/ Treeline	Local importance (higher value)
EC25	Southern side of M4 roadway	Narrow woodland band/ Treeline	Local importance (higher value)
EC26	Northern side of M4 roadway (island)	Narrow woodland band/ Treeline	Local importance (higher value)
EC27	Southern side of M4 roadway (island)	Narrow woodland band/ Treeline	Local importance (higher value)
EC28	Southern side of M4 roadway	Narrow woodland band/ Treeline	Local importance (higher value)
EC29	Southern border of Lucan Demesne	Mixed broadleaf woodland/ Treeline	Local importance (higher value)
EC30	Along River Liffey adjacent to pNHA	Narrow woodland band/ Treeline	Local importance (higher value)

**Table 5.6:** Ecological Sites identified relevant to the proposed development

## 5.2.2 Assessment of Effects

The proposed development will involve some widening into the central reserve, which will be excavated, and a new impermeable surface constructed to accommodate the proposed hard shoulder bus priority measure. There will also be some remodelling of the verge. In some areas widening will only occur into the central reserve. However, in other areas it will be necessary to widen into both the central reserve and the verge. The construction of the ERA's will require additional vegetation clearance.

The earthworks will result in removal of topsoil under the footprint of widened embankments. If alluvial soils are present, these would likely need to be removed also.

Increasing the paved surface area of the M4/N4 will impact the surface water runoff characteristics of the catchment by decreasing the infiltration potential for direct rainfall and increasing runoff to the drainage network.

This has the potential to increase the fluvial flood risk to the M4/N4 and downstream areas, due to the increased volume of runoff draining to adjacent waterbodies during construction and operation.

The Rye Water Valley/Carton SAC lies circa 3km downstream on the Meadowbrook Stream and Lyreen River which hydrologically connects it to the Rye Water Valley/Carton SAC. On the eastern side, the drainage outfalls into the River Liffey. The overall increase in impermeable area is circa 10%. Given the distance between the project boundary and circa 10% increase in the impervious area, there will be no perceptible change to the run-off characteristics (quantity and quality) as a result of the proposed development.

The proposed development will result in the loss of some localised linear treeline/narrow woodland band in the central reserve, central reserve grassland and hedgerow habitats with replacement of impermeable hardstanding surfaces. However, no significant impacts on protected flora and fauna are predicted given the nature and location of the proposed development along the existing M4/N4.

In addition, a Screening for Appropriate Assessment Report was prepared to accompany the planning application. It concluded that the possibility of any significant effects on any European sites, whether arising from the project alone or in combination with other plans and projects, could be excluded, and that the professional opinion of the authors of the report is that the proposed development did not require an Appropriate Assessment or the preparation of a Natura Impact Statement (NIS).

## 5.3 Archaeology, Architecture and Cultural Heritage

### 5.3.1 Archaeological Heritage

#### 5.3.1.1 Record of Monuments and Places

For details on the record of Monuments and Places, refer to Section 4.4.3.1.

#### Previous Archaeological Investigations

A review of the Excavations Bulletin (1970–2020) has revealed that a number of archaeological investigations have been carried out within the proposed development area. These are detailed in Table 5.7. Many of the sites excavated were later added to the SMR and represent sites listed above in Table 4.2 (refer to Section 4.4.3.1). EX 1 and EX 7 were found to be of no archaeological significance upon investigation. EX 2 was carried out to the immediate south of the proposed development area. The location given for EX 7 represents the location given in the excavation summary provided in the Excavation Bulletin (1970-2020).

EX No	Licence	Reference	Description	Townland
EX 1	13E0249	Bennett 2013:210	Archaeological monitoring as part of a water pipeline scheme failed to identify any features of deposits of archaeological potential.	Ballygoran & Donaghmore
EX 2 (AH 1)	01E0669	Bennett 2001:609	Archaeological monitoring of topsoil-stripping on the Celbridge Interchange and subsequent excavation of Site 4 uncovered a stone-built kiln feature (KD011-042001-) set into one of the ditches of an enclosure (KD011-042002-) which also contained a ring ditch (KD011-042----).	Castletown
EX 3 (AH 2)	01E0306	Bennett 2001:651	Site 5 of the Celbridge Interchange comprised three bowl furnaces and two associated burnt deposits. The area was truncated by one of the townland boundaries between Castletown and Kilmacredock Upper.	Kilmacredock Upper
	01E0306	Bennett 2001:651	Site 3 of the Celbridge Interchange Scheme comprised two pits and a shallow spread of material.	Kilmacredock Upper
EX 4 (AH 3)	01E0547	Bennett 2001:652	Site 7 of the Celbridge Interchange consisted of a corn-drying kiln incorporated into an earlier ditch.	Kilmacredock Upper

EX No	Licence	Reference	Description	Townland
EX 5 (AH 4)	01E0596	Bennett 2001:651	Investigation of Site 6 of the Celbridge Interchange Scheme revealed seven possible post-holes and a linear feature with charcoal and burnt stone fills.	Kilmacredock Upper
	01E0596 ext.	Bennett 2001:651	Site 8 of the Celbridge Interchange Scheme comprised three pits and one trench or oval pit. Some charcoal and burnt bone were visible in the fills. Two small fragments of prehistoric pottery and a piece of flint were recovered from the site.	Kilmacredock Upper
EX 6 (AH 5)	01E0998	Bennett 2001:653	Site 9 of the Celbridge Interchange represents a burnt mound. The burnt mound material was not associated with a trough or hearth; however, the archaeological material extends north out of the excavated area. Two large postholes may have formed part of a structure. A quern stone was also present on site, and it has been suggested that the site had some industrial purpose.	Kilmacredock Upper
EX 7	97E0167	Bennett 1997:275	Archaeological monitoring of a drainage scheme failed to identify anything of archaeological significance.	Leixlip Demesne

**Table 5.7:** Previous Investigations<sup>19</sup>

The M4 was constructed prior to 1995 and there is no evidence that it was subject to archaeological investigation, either prior to or during construction works. It is highly unlikely that any archaeological remains survive beneath the road, following ground disturbances associated with its construction.

### 5.3.1.2 Areas of Archaeological Potential

Areas of Archaeological Potential (AAPs) can be defined as parts of the landscape that possess the potential to contain archaeological remains due to the presence of topographic features such as rivers, lakes, turloughs, high defendable ground and bog. Rivers and lakes are a focus for human habitation due to the obvious transport and food resources.

<sup>19</sup> Heritage Maps.ie <https://www.heritagemaps.ie/WebApps/HeritageMaps/index.html>

Given that the proposed development area is defined by the existing footprint of the M4, no areas of archaeological potential have been identified during the course of this assessment. This is due to the highly developed nature of the existing road and the associated disturbance during its construction.

## **5.3.2 Architectural Heritage**

### **5.3.2.1 Protected Structures/NIAH**

Details on protected structures are provided in Section 4.4.3.2 above.

### **5.3.2.2 Designed Landscapes**

Details on designed landscapes are provided in Section 4.4.3.3 above.

## **5.3.3 Cultural Heritage**

All archaeological and architectural heritage sites can also be considered to represent cultural heritage. No specific sites of cultural heritage significance have been identified in or within the immediate vicinity of the proposed development area.

## **5.3.4 Assessment of Effects**

The proposed development lies within the corridor of the existing M4/N4.

There are a total of five individual or groups of archaeological sites recorded within the proposed development area. There are three sites are located immediately adjacent to the proposed development.

Of the nine sites, listed under the ‘SMR Ref’ column in Table 4.2, two are proposed for inclusion in the next revision of the RMP and seven are listed in the SMR only and do not receive statutory protection.

These sites were identified during archaeological investigations prior to the Celbridge Interchange Road Scheme and have been resolved of archaeology within the footprint of the existing M4.

There are no specific built heritage constraints within the proposed development.

Five designed landscapes have been identified from the desktop resource, which are located within the proposed development area. These have already been subject to impacts due to the construction of the existing M4. There is one further designed landscape which lies to the immediate south of the proposed development.

The proposed development will not impact on the archaeological, architectural or cultural heritage of the area due to the low impact nature of the works and the fact that the footprint of the existing corridor has been disturbed by the construction of the roadway.



Any archaeological sites located within the footprint of the road represent a record of sites that were previously excavated prior to construction of the existing motorway. Therefore, no significant negative effects on the archaeology, architecture and cultural heritage are predicted.

### 5.3.5 References

Bennett, I. (ed.) 1987-2010 Excavations: Summary Accounts of Archaeological Excavations in Ireland. Bray. Wordwell.

Department of Arts, Heritage, Gaeltacht and the Islands. 1999a. Framework and Principles for the Protection of the Archaeological Heritage. Government Publications Office, Dublin.

Department of Arts, Heritage, Gaeltacht and the Islands. 1999b. Policy and Guidelines on Archaeological Excavation. Government Publications Office, Dublin.

Department of Culture, Heritage and the Gaeltacht. 2017. NIAH Handbook.

Kildare County Development Plan 2017–2023

National Monument Service, Department of Housing, Local Government and Heritage. Sites and Monuments Record, Counties Kildare and Dublin.

South Dublin County Council Development Plan 2016–2022

#### Electronic Sources

[www.excavations.ie](http://www.excavations.ie) – Summary of archaeological excavation from 1970–2020.

[www.archaeology.ie](http://www.archaeology.ie) – DoH/LGH website listing all SMR/RMP sites.

[www.heritagemaps.ie](http://www.heritagemaps.ie) – The Heritage Council web-based spatial data viewer which focuses on the built, cultural and natural heritage.

[www.bingmaps.com](http://www.bingmaps.com) – Website containing aerial photographic datasets.

[www.logainm.ie](http://www.logainm.ie) – Placenames Database of Ireland launched by Fiontar agus Scoil na Gaelige and the DoCHG.

[www.googleearth.com](http://www.googleearth.com) – Satellite imagery of the proposed development area.

## 5.4 Landscape and Visual

### 5.4.1 Landscape Fabric and Character

The landscape fabric of the proposed development area is composed of a road corridor with associated junctions, bridges, roundabouts and short sections of connecting roads. Existing landscaping includes substantial young/semi-mature bands of trees, hedgerows and grassland which were established as part of the road development. The vegetation effectively integrates the road corridor into the landscape and the screening effect of the existing vegetation minimises visibility of much of the road corridor and junctions within the wider area. Vegetation forms the primary feature of landscape value within the road corridor.

The character beyond the proposed development area is mainly flat lowland composed of pasture or arable fields with well-treed margins and frequent pockets of woodland or copses. Designed landscapes are common in the wider environment around the proposed development boundary, the closest being Castletown Demesne to the south, these are described in Section 4.4.3, and are potentially sensitive to infrastructural development which can affect their legibility and coherence.

The proposed development area passes along the southern extents of Maynooth and Leixlip, through the western extents of Lucan and is located near to the northern extents of Celbridge. These urban areas contain visual receptors which have the potential to be affected by development along the M4/N4 corridor, but the likelihood of this is much reduced by the presence of substantial screening vegetation along the edges of the road corridor and around junctions.

The eastern end of the proposed development boundary passes through the Liffey Valley. This is designated in the South County Dublin and Fingal County Development Plans as an area of sensitive landscape character which includes areas of High Amenity. To the east of the proposed development area, a section of the Liffey Valley is designated as a Special Amenity Area (SAA), an area of outstanding natural beauty and special recreational value.

County landscape character assessments cover the proposed development area and the surrounding areas, these are discussed in Section 5.4.3.

### 5.4.2 Landscape Policy

The following legislation and policies relating to landscape and visual are considered relevant:

#### International/National Legislation

- Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the EIA Directive);
- Planning and Development Act 2000, as amended;
- Planning and Development Regulations 2001, as amended; and
- European Landscape Convention 2000.

## Kildare County Development Plan

The following policies from the Kildare County Development Plan 2017-2023 are relevant to the proposed works:

**LA 1:** *Ensure that consideration of landscape sensitivity is an important factor in determining development uses. In areas of high landscape sensitivity, the design, type and the choice of location of proposed development in the landscape will also be critical considerations.*

**LA 2:** *Protect and enhance the county's landscape, by ensuring that development retains, protects and, where necessary, enhances the appearance and character of the existing local landscape.*

**LA 3:** *Require a Landscape/Visual Impact Assessment to accompany significant proposals that are likely to significantly affect:*

- *Landscape Sensitivity Factors*
- *A Class 4 or 5 Sensitivity Landscape (i.e. within 500m of the boundary)*
- *A route or view identified in maps 14.2 and 14.3 (i.e. within 500m of the boundary)*

**LA 4:** *Seek to ensure that local landscape features, including historic features and buildings, hedgerows, shelter belts and stone walls are retained, protected and enhanced where appropriate, so as to preserve the local landscape and character of an area, whilst providing for future development.*

**LA 7:** *Be informed by consideration of the County Landscape Character Appraisal*

## South Dublin Development Plan

The following policies from the South Dublin County Development Plan 2016-2022 are relevant to the proposed works:

**Objective HA (LV, DV, DM):** *To protect and enhance the outstanding natural character and amenity of the Liffey Valley, Dodder Valley and Dublin Mountains areas*

**Objective RU:** *To protect and improve rural amenity and to provide for the development of agriculture.*

**HCL8 Objective 1:** *To protect, preserve and improve Views and Prospects of special amenity, historic or cultural value or interest including rural, river valley, mountain, hill, coastal, upland and urban views and prospects that are visible from prominent public places.*

## Celbridge Local Area Plan

**EDO2.1:** *To support the development of tourism infrastructure, attractions and facilities at appropriate locations subject to the protection of architectural heritage and natural amenities.*

**EDO2.2:** *To support the ongoing development of Castletown House and Demesne for leisure and tourism purposes, subject to the protection of architectural heritage and natural amenities.*

**EDO2.3:** *To support and facilitate the development of an integrated network of Greenways and Heritage Trails along suitable corridors in Celbridge, including pathways along the River Liffey corridor, subject to relevant environmental assessments.*

**EDO2.4:** *To support the development of outdoor leisure activities on lands that are designated as open space, subject to the protection of landscape character and natural heritage.*

**EDO2.10:** *To support the development of linkages between historical sites within and around Celbridge.*

**HLA1- Historic Landscapes Areas:** *It is the policy of the Council to preserve the special landscape character of historic landscapes within Celbridge as set out on Map 13.1 Land Use Zoning.*

It is an objective of the Council:

**HLAO1.1:** *To protect the special landscape character of historic landscape areas and ensure that new development enhances the special character and visual setting of the historic landscapes outlined on Map 13.17 and to prevent development that would have a negative impact on the character of the lands within the Historic Landscape Areas.*

**HLAO1.2:** *To support the preparation of Woodland Conservation and Management Plans for lands within the Historic Landscape Areas.*

### Maynooth Local Area Plan

**NH 5:** *To prohibit development where it is likely that damage would be caused either to trees protected by a Tree Preservation Order or, to those which have a particular local amenity or nature conservation value. Development that requires the felling of mature trees of amenity value, conservation value or special interest notwithstanding the fact that they may not be listed in this Plan, will be discouraged.*

### Leixlip Local Area Plan

**NH1.3:** *To ensure that any proposal for development within or adjacent to the Royal Canal (pNHA) and Liffey Valley (pNHA) is located and designed to minimise its impact on the biodiversity, geological, water and landscape value of the pNHA.*

**GI 1:** *It is the policy of the Council to protect, enhance and further develop the green infrastructure network in Leixlip to provide a shared space for amenity, recreation and biodiversity.*

Objective MT1.11 seeks “*To support the delivery of a pedestrian and cycle overpass of the M4 to link The Wonderful Barn at Leixlip to Castletown Demesne in Celbridge in consultation with Transport Infrastructure Ireland (TII).*”

**BH1.3:** *To protect the landscape character, values, sensitivities, focal points and views in Leixlip, including those identified in the Kildare County Development Plan. This will include, inter alia, the following:*

*a) the requirement of a Visual Impact Assessment for developments with potential to impact on areas of significant landscape character, value or sensitivity, including both urban and natural features, significant townscapes and historic buildings, as appropriate.*

*b) prohibit development that will block or interfere with a significant focal point or a view. Where it is considered that a development may impact on focal points or views, proposals must have regard to the significance of any such impact and any appropriate mitigation measures that should be incorporated.*

**BH1.6:** *To promote The Wonderful Barn as an integrated tourism attraction including the restoration of the main features of the complex and its historical landscape:*

- (i) The re-arrangement of the existing access way.*
- (ii) The integration of car parking facilities,*
- (iii) The consolidation and eventual restoration of the historic buildings.*
- (iv) The reinstatement of the walled garden and rear courtyard;*
- (v) The insertion of complementary commercial uses to ensure a sustainable future for the project. The feasibility of a Discovery Park including play facilities and a picnic area shall be investigated.*

**GI1.7:** *To seek to protect trees with a particular local amenity or conservation value.*

**GI1.8:** *To promote appropriate tree planting within public open spaces along transport networks and in the public realm*

### 5.4.3 Landscape Character Assessments

A landscape character assessment is the process of identifying and describing variations in the character of the landscape and identifying the features that give a locality its ‘sense of place’. The process identifies, documents and explains the unique combination of elements and features that make landscapes distinctive.

There is no national landscape character assessment available for Ireland, however, assessments are available for the Local Authorities of relevance to this project: Kildare, South Dublin, Meath and Fingal. The landscape character assessments for these counties provide a good level of detail and are relatively consistent in description where there are contiguous areas of similar landscape character. The assessments are of a sufficient standard to facilitate a landscape and visual impact assessment and no further landscape character assessment is needed for this process.

#### Kildare Landscape Character Assessment

In 2004, a landscape character assessment of Kildare was undertaken and has been incorporated into the latest Kildare County Development Plan 2017-2023. The assessment focuses on characterisation i.e. the discernment of the character of the landscape based on its land cover and landform, but also on its values, such as historical, cultural, religious and other understandings of the landscape.

The proposed development boundary is located mainly within the ‘Northern Lowlands’ character area. Table 14.1 of the Development Plan indicates the dominant sensitivity of each Landscape Character Area with the accompanying note (Section 14.4, Development Plan) which states “It is important to note that within each of these areas there can be a wide variety of local conditions that can significantly increase or decrease sensitivity”. Within this context, the Northern Lowlands has been classified as having a ‘Low Sensitivity’ rating (Class 1). Landscape areas of low sensitivity are described as ‘Areas with the capacity to generally accommodate a wide range of uses without significant adverse effects on the appearance or character of the area’. Within Chapter 14, Section 14.4.2 of the Development Plan examines the impacts of development types on different landscape areas. A table is provided for “guidance on the likely compatibility between a range of land-use classes and the principal landscape areas of the county classified by sensitivity”. Road projects are not listed as a land-use within this table; however, Northern Lowlands character area is defined as having ‘high’ or ‘most’ capacity for all listed development types.

An approximately 150m section of the proposed development boundary passes through the ‘River Liffey’ character area, The character area has been classified as having a ‘Special Sensitivity’ rating (Class 4) which is defined as an area with ‘low capacity to accommodate uses without significant adverse effects on the appearance or character of the landscape having regard to special sensitivity factors’.

In addition to Landscape Character Areas and the sensitivity of these areas to development, there are certain special landscape areas within the county, some of which overlap with sensitive landscapes. These are defined in the Development Plan as Areas of High Amenity. They are classified because of their outstanding natural beauty and/or unique interest value and are generally sensitive to the impacts of development. The proposed development boundary passes through the ‘The River Liffey and the River Barrow Valleys’ area of high amenity. It is noted (Section 14.5.3 of Development Plan) that these valleys are “of significance in terms of landscape and amenity value and as such are sensitive to development.” It is also noted that:

“Shelter vegetation exists along some stretches of the valleys with the presence of natural and native woodland that grows on the floodplains of the rivers, as well as by conifer plantation in adjacent lands. This vegetation has a shielding and absorbing quality in landscape terms. It can provide a natural visual barrier as well as adding to the complexity of a vista, breaking it up to provide scale and containment for built forms.”

### **South Dublin Landscape Character Assessment**

The Landscape Character Assessment for South Dublin was completed in 2015 and is incorporated into South Dublin County Council Development Plan 2016 -2022. It divides South Dublin into five Landscape Character Areas (LCA).

The proposed development boundary passes through LCA 5 Suburban South Dublin and along the edge of LCA 1 Liffey Valley. LCA 5, covering the urbanised areas of South Dublin, was not assessed in detail in the character assessment as it requires a finer scale townscape character assessment.

The overall sensitivity and key characteristics of most relevance to the proposed development are shown in Table 5.8.



Name	Relevant Key Characteristics	Overall Sensitivity
LCA 1 Liffey Valley	<ul style="list-style-type: none"> <li>• River valley of significant historical importance</li> <li>• Incised valley for much of its journey through South Dublin County, the wooded and pasture slopes combined with riparian vegetation create an attractive landscape setting</li> <li>• Enclosed and intimate with views to river from the Strawberry Beds and at river crossings</li> <li>• Ridgelines of low hills adjoining valley form attractive setting to settlements</li> <li>• Settlements of Lucan and Palmerstown with important built heritage and attractive townscapes present</li> <li>• Major transport corridors of M4/N4 and M50</li> <li>• Visual and landscape quality reflected in designation as Special Area Amenity Order</li> <li>• On-going urban infrastructure developments notably road improvements generate increasing volumes of traffic and detract from opportunities to create or maintain tranquil settings</li> <li>• Traffic pressures</li> </ul>	Medium/high to high sensitivity
LCA 5 Suburban South Dublin	<ul style="list-style-type: none"> <li>• Built – up urban area with extensive housing estates and industrial /commercial parks. Variety of house styles and layouts dating from the late 19th century to late 20th century</li> <li>• Major traffic corridors with M50 traversing north- south through the area, and LUAS line travelling north from Tallaght, parallel to the M50, to city centre</li> <li>• Grass open spaces in gardens, industrial parks, golf courses, school playing fields, and miscellaneous spaces in housing areas</li> <li>• Recreational facilities – public parks and golf courses - provide amenities and ecological resources</li> </ul>	Not described

**Table 5.8:** Designed Landscapes

## Fingal Landscape Character Assessment

The proposed development does not pass through Fingal; however the boundary is located close by, approximately 150m away. Character areas are not clearly delineated by their boundaries and edges are often gradated into adjacent character areas; therefore, it is important to consider character areas which are close to the proposed development boundary which may experience impacts from the project.

Fingal Development Plan 2017-2023 Landscape Character Assessment provides for the classification of Fingal's landscapes into six Landscape Character Types (LCT) representing generic areas of distinctive character that makes one landscape different from another, such as uplands or the coast. The assessment places a value on each landscape character type ranging from exceptional to low. Subsequent to the type and value being identified, the sensitivity of each character type is defined as its overall ability to sustain its character in the face of change. Sensitivity is evaluated using criteria ranging from high to low. A highly sensitive landscape is likely to be vulnerable to change whereas a landscape with a low sensitivity is likely to be less at risk from change. It is important to note that it does not necessarily follow that an exceptional value landscape will be highly sensitive to change or similarly a low value landscape will have a low sensitivity to change.

The closest LCT to the proposed development area is River Valleys and Canal Character Type. This is described as follows:

*“The Tolka and Liffey valleys together with the Royal Canal Corridor are the main landscape features in this area. The Tolka and Liffey valleys are characterised by areas of grassland along meandering river valleys which, especially in the case of the Liffey, are well wooded at the edge of the floodplain and along the valley slopes. Areas of both valleys support recreational facilities along their corridors. A number of institutional and private demesnes along the valley edges maintain a rural and wooded character to the areas. However, housing estates are beginning to encroach into corridor areas. In recognition of the special amenity value of this area a Special Amenity Area Order (SAAO) was made for the Liffey Valley between Lucan and Chapelizod in 1990. This designation includes specific controls over development. ... This Character Type is categorised as having a high value, due to the visual and recreation qualities contained therein. This is evident by virtue of the High Amenity zoning and SAA designation in the area in addition to the dense tree belts and steep river valley”*

## Meath Landscape Character Assessment

The proposed development boundary is located three kilometres away from County Meath. The Meath Landscape Character Assessment was prepared as part of the Meath County Development Plan 2013-2019 and carried through to the Development Plan 2020-2026. The assessment notes that

*“Transport corridors, i.e. roads and railways, may be improved or created. The most likely impacts of this type of development are noise and visual intrusion, which are often exacerbated by the loss of existing boundary hedgerows, walls and trees associated with this type of development. Other potential impacts on archaeology and drainage are also likely”*

The assessment divides Meath into five landscape character types, broad scale landscape areas of similar character, and 20 landscape character areas of unique character.

The nearest landscape character type is Lowland Landscapes which is described as having “*an enclosed character with well-treed road corridors, dense hedgerows, parkland and areas of woodland.*” It is noted as “*crucial that future development of this LCT is carried out sensitively and with particular reference to the rural nature of the landscape*”

The nearest landscape character area is Southeast Lowlands LCA, the key characteristics of most relevance are as follows:

- Complex drumlin landform created by glacial movement. Limestone is overlain by a variety of rocks and soils – boulder clay, kames and eskers - most of which have been deposited by melting glaciers;
- Mix of small pasture fields with some large arable fields in the south; and
- Extensive estate landscapes.

#### 5.4.4 Designed Landscapes

The proposed development area passes through or close to six designed landscapes or demesne landscapes, details of which are provided in Section 4.4.3.3. These landscapes were designed and established around historic buildings which may or may not be extant and protected. These designed landscapes have importance for maintaining the setting of associated historic buildings as well as having value in their own right as attractive large-scale landscape compositions with scenic, artistic or horticultural interest.

Not all demesne landscapes are subject to statutory protection. However, where a demesne exists in association with a protected structure (dependant on the preservation of the landscape), this can be considered to be attendant grounds and as such falls within the remit of the Planning and Development Act 2000.

The completeness and coherence of a designed landscape influences their perceived value as well as their susceptibility to changes resulting from road development. The existing M4 road corridor passes through four historic demesnes/designed landscapes. These are Castletown, Leixlip Castle, Westonpark House, Cooldrinagh Lodge, and the route has also impacted on the edge of Lucan Demesne.

#### 5.4.5 Protected Views

Scenic routes and protected views consist of important and valued views and prospects within the landscape.

#### Kildare Development Plan

There are no Protected Views within 500m of the proposed development boundary. There are five Protected Views within 1000m of the proposed development boundary which are as follows:

- RC3 – Louisa Bridge Easton/Leixlip;
- RC4 – Deey Bridge Collinstown;
- RC6 – Mullen Bridge Railpark;
- RC7 – Bond Bridge Maynooth; and
- RL2 – New Bridge, Coneyburrow, Leixlip.

Views RC3 – Seven are vistas along the Royal Canal corridor to/from bridges which cross the canal and do not intersect with the proposed development boundary.

RL2 is located on New Bridge which crosses the River Liffey, and the view is focused on the river and does not intersect with the proposed development boundary.

### Celbridge Local Area Plan

The Celbridge Local Area Plan 2017-2023 (Kildare County Council) includes two protected views which cross the proposed development boundary:

- View between Castletown House and Connolly's Folly to the north-west which crosses the M4 near to M4 Interchange Business Park; and
- View between Castletown House and the Wonderful Barn, which crosses the M4 north of Liffey Business Park.

These views follow designed prospects through Castletown demesne towards historic 18<sup>th</sup> century structures designed to be focal points in the landscape. These structures were placed at the end of long vistas demarcated by avenues cut through woodland, avenue planting or landscape boundaries some of which are still in evidence. The existing M4 corridor cuts across these vistas and bands of tree planting along the road edges is likely to at least partially screen views and impact on intervisibility between the house and the structures.

### Maynooth Local Area Plan

The Maynooth Local Area Plan 2013-2019 includes several '*Views and Prospects to be Preserved*'. These are located within the town or on the R148 and are at a considerable distance from, and do not cross the proposed development boundary.

### Leixlip Local Area Plan

Leixlip Local Area Plan 2020 – 2023 includes several '*Views and Prospects to be Preserved*'. Two of these cross the proposed development area:

- View along tree lined avenue within Castletown demesne towards the Wonderful Barn, along the edge of Liffey Business Park; and
- View from the grounds of the Wonderful Barn towards Castletown House.

### South County Development Plan

South Dublin County Council Development Plan 2016 -2022 includes protected Views and Prospects, one of which is within the vicinity of the eastern end of the proposed development boundary. This view looks out from a public open space adjacent to Leixlip Road out over the Liffey Valley to the north. This view looks away from and does not cross the proposed development area.

## 5.4.6 Scenic Routes

### Kildare County Development Plan

There are three Scenic Routes designated in the Kildare Development Plan which are within the vicinity of the proposed development boundary. These are as follows:

- 31 Views within Castletown - Donaghcumper Rural Area; Views to the South and North from Castletown House, including axial views to the Obelisk and the Wonderful Barn.

Views within Castletown Demesne have a high scenic value as a result of the landscape quality of the demesne lands. The open green areas and existing mature vegetation add to the visual amenity value. Views onto the River Liffey are also available; and

- 32 Views of the River Liffey from the main avenue of Castletown House Castletown. Views towards the River Liffey are available from the main road within Castletown Demesne. Although the river corridor itself is not visible due to the mature vegetation growing along its banks, the quality of the vistas is of significance.

## 5.4.7 Other Designations

### Maynooth Local Area Plan

The Maynooth Local Area Plan 2013-2019 indicates areas of hedgerows/treelines between the M4 and the Maynooth Business Campus as forming part of the green infrastructure within the plan area. An area of amenity grassland is also identified to the north of the M4 and to the south of the town adjacent to Griffin Rath Hall.

### Celbridge Local Area Plan

The Celbridge Local Area Plan 2017-2023 designates a Historic Landscape Area containing the historic demesnes of Castletown, St. Wolstan's and Donaghcumper to the east of the town centre comprised of designed landscapes made up of parklands, river walks, ruins and structures which collectively form the landscape setting of Castletown House and its grounds, and to the west of the town centre, the gardens and pleasure grounds of Celbridge Abbey and Oakley Park define the landscape setting of the River Liffey and the western edge of the town centre. The LAP notes that this is a "single landscape of heritage value" and that the LAP supports the preservation of the composite landscape. It states:

*"While it is not intended to preclude development within the historic landscape areas, the LAP will seek to ensure that the landscape features, including the views and prospects that define the character of these areas, are preserved."*

### Liffey Valley Designations

The Liffey Valley is recognised as an area of sensitive landscape character in the landscape character assessments of Fingal and South Dublin County Development plans, this is described in Section 5.4.3. In addition, certain areas are defined as having a high amenity value. South Dublin County Development Plan lists areas adjacent to the proposed development boundary under Zoning Objective HA-LV which aims 'to protect and enhance the outstanding character of the Liffey Valley'. This designation is contiguous with areas to the north within Fingal County that are designated as Zoning Objective HA, which aims to 'Protect and Enhance High Amenity Areas'.

## 5.4.8 Assessment of Effects

The proposed development will result in the loss of some grassland, hedgerows and shrubs as a result of widening into both the verge and the central reserve. This would have a slight negative effect on the landscape amenity of the road corridor in the operational phase. Trees will be removed during the construction of the proposed development to facilitate the construction of the ERA's. Any increase in visibility of the road has the potential to reduce the amount of screening between the road and the surrounding landscape. Any increase in visibility of the road has the potential to have a negative effect on sensitive receptors such as the Liffey Valley LCA, areas of High Amenity/Outstanding Character and Amenity within the Liffey Valley and nearby protected views and designed landscapes.

The provision of the ERA's has the potential to result in negative effects on visual receptors. The removal of vegetation associated with the construction of the ERA's may result in a loss of screening and increased visual impact on adjacent residential receptors. However, these impacts will be localised, and planting is proposed at each of the eight ERA locations, and therefore, it is not expected that there will be significant impacts on protected views, scenic routes, designed landscapes, designated areas of high/outstanding amenity, surrounding landscape character areas or sensitive visual receptors to the north of the proposed development. There will be no perceivable effects on landscape or visual receptors to the south of the proposed development.

The proposed development also includes the provision of a number of noise barriers located along both the eastbound and westbound carriageways. The noise barriers will range from two to three and a half metres in height. While there is the potential for significant effects on visual amenity/landscape to occur as a result of the implementation of the noise barriers, these will be mitigated by minimising the amount of vegetation to be removed and replanting in areas where vegetation removal is necessary. As such, no significant effects on landscape and visual are predicted.

## 5.4.9 References

Fingal County Council (2017) Fingal Development Plan 2017-2023

Kildare County Council (2017) Celbridge Local Area Plan 2017-2023

Kildare County Council (2020) Leixlip Local Area Plan 2020-2023

Kildare County Council (2013) Maynooth County Council 2013-2019

Kildare County Council (2017) Kildare County Council Development Plan 2017-2023

South Dublin County Council (2016) South Dublin County Council Plan 2016-2022

## 5.5 Air Quality

### 5.5.1 Air Quality Standards and Limit Values

In order to reduce the risk of poor air quality, national and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values are set for the protection of human health and ecosystems.

On the 12<sup>th</sup> of April 2011 the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011) came into force and transposed Directive 2008/50/EC of the European Parliament and of the Council of the 21st of May 2008 on ambient air quality and cleaner air for Europe into Irish law.

The purpose of the Air Quality Standards Regulations 2011 are to:

- Establish limit values and alert thresholds for concentrations of certain pollutants;
- Provide for the assessment of certain pollutants using methods and criteria common to member states;
- Ensure that adequate information on certain pollutant concentrations is obtained and made publicly available; and
- Provide for the maintenance and improvement of ambient air quality where necessary.

The limit values established by these regulations are included in Table 5.9 and the United Nations Economic Commission for Europe (UNECE) Critical Loads for Nitrogen as presented in the guidance are also included in Table 5.9.

Pollutant	Limit Value for the protection of:	Averaging Period	Limit Value ( $\mu\text{g}/\text{m}^3$ )	Basis of application of Limit Value
Nitrogen Dioxide ( $\text{NO}_2$ )	Human Health	1-hour	200	$\leq 18$ exceedances p.a. (99.79 %ile)
		Calendar year	40	Annual mean
Nitrogen Oxides ( $\text{NO}_x$ )	Vegetation	Calendar year	30	Annual mean
Particulate Matter ( $\text{PM}_{10}$ )	Human Health	24-hours	50	$\leq 35$ exceedances p.a. (98.1%ile)
		Calendar year	40	Annual mean
Particulate Matter ( $\text{PM}_{2.5}$ )	Human Health	Calendar year	20	Annual mean
Carbon Monoxide ( $\text{CO}$ )	Human Health	8-hour Annual Average	10,000	8-hour Average
Benzene	Human Health	Calendar year	5	Annual mean

**Table 5.9:** Air Quality Standards (AQS) from Regulations 2011 (S.I No. 180 of 2011)



## 5.5.2 Existing Environment

This section describes the existing local air quality conditions within the proposed development area. Any non-road sources that may significantly affect air quality within the proposed development area are also described.

### 5.5.2.1 Existing Local Air Quality Conditions within the Proposed Development Area

The existing air quality is determined from air quality data recorded by the EPA. The Air Quality Standards divides Ireland into four zones, with air quality data recorded by the EPA for each zone:

- Zone A includes Dublin City and its environs;
- Zone B includes Cork City and its environs;
- Zone C is defined by the EPA as 21 large towns in Ireland with a population greater than 15,000; and
- Zone D includes Rural Ireland, i.e. the remainder of the State excluding Zones A, B and C.

Pollutants that are of concern in relation to road scheme developments have been identified in Section 5.5.1. They are NO<sub>2</sub>, NO<sub>x</sub>, CO, PM and benzene. As the proposed development area for the Bus Priority Measures is included in Zone A, Zone C and Zone D, each of these zones are considered. Baseline values are compared to the limit values from the Air Quality Standards.

The average background concentrations for each pollutant of concern during the period 2017 – 2019 are outlined in Table 5.10. These averaged values will be used as the baseline for the air quality assessment undertaken.

Zone	Pollutant	Average background concentration (µg/m <sup>3</sup> ) 2017-2019	Air Quality Standard Limit (µg/m <sup>3</sup> )	% of Air Quality Standard Limit
Zone A	NO <sub>2</sub>	22.3	40	55.8%
	PM <sub>10</sub>	13.5	40	33.8%
	PM <sub>2.5</sub>	8.1	25	32.4%
	NO <sub>x</sub>	39.2	30	130.7%
	CO	213.3	10,000	2.1%
	Benzene	0.4	5	8.0%
Zone C	NO <sub>2</sub>	8.6	40	21.5%
	PM <sub>10</sub>	13.9	40	34.8%
	PM <sub>2.5</sub>	10.1	25	40.4%
	NO <sub>x</sub>	12.4	30	41.3%
	CO	150	10,000	1.5%
	Benzene	0.15	5	3.0%

Zone	Pollutant	Average background concentration ( $\mu\text{g}/\text{m}^3$ ) 2017-2019	Air Quality Standard Limit ( $\mu\text{g}/\text{m}^3$ )	% of Air Quality Standard Limit
Zone D	NO <sub>2</sub>	4.9	40	12.3%
	PM <sub>10</sub>	11.2	40	28.0%
	PM <sub>2.5</sub>	8.4	25	33.6%
	NO <sub>x</sub>	6.7	30	22.3%
	CO	500	10,000	5.0%
	Benzene	0.1	5	2.0%

**Table 5.10:** Averaged Pollutant Background Concentrations 2017-2019

The majority of the measured pollutant concentrations are within air quality standards with the exception of NO<sub>x</sub> in Zone A.

### 5.5.2.2 Ecologically Sensitive Areas

Nitrogen emissions will be of critical importance in instances where elevated pollution concentrations occur in close proximity to an ecologically sensitive area due to their harmful effect on vegetation. Refer to Section 5.2 for details of ecological sensitive areas relevant to the proposed development area.

### 5.5.2.3 Road Emissions

The emissions to air from existing vehicles and road networks are assumed to form part of the baseline concentration levels as presented in Table 5.100.

The M4/N4 is the only major road network located in the proposed development area. Annual average daily traffic (AADT) volumes were obtained from the TII Traffic Counter Data Website<sup>20</sup> and are presented in Table 5.11.

Road	Year	Location	AADT
M4/N4	2019	Between Junction 6 Celbridge and Junction 7 Maynooth, Maynooth, Co. Kildare	59,000

**Table 5.11:** AADT for Major Roads within the proposed development area

The data presented in the table above shows the current volumes of traffic within the proposed development area.

### 5.5.2.4 Non-Road Emission Sources

There are no industrial facilities licenced by the EPA within the proposed development area with Industrial Emissions Directive (IED) or Integrated Pollution Control (IPC) licences in place.

<sup>20</sup> Transport infrastructure Ireland (TII), Traffic Counter Data Website. Available at [https://www.nrtrafficedata.ie/c2/gmapbasic.asp?sgid=ZvyVmXU8jBt9PJE\\$c7UXt6](https://www.nrtrafficedata.ie/c2/gmapbasic.asp?sgid=ZvyVmXU8jBt9PJE$c7UXt6)

While no industrial facilities are located within the proposed development area, there are a number of facilities in the wider vicinity, including Intel Ireland Limited (P0207-04) which is located approximately 1.5km to the north of the proposed development. However, the effect of the emissions from these sources are likely to be reflected in Table 5.10 above.

No significant additional new sources have been determined through a review of planning permissions and draft EPA licences in the proposed development area.

### 5.5.3 Assessment of Effects

The air quality concentrations recorded by the EPA is shown to be within the air quality standards with the exception of NO<sub>x</sub> in Zone A. The air quality standard for NO<sub>x</sub> is developed for the protection of vegetation. Elevated concentrations of NO<sub>x</sub> are measured in heavily trafficked locations in Dublin City Centre and are not likely to occur in proximity to the proposed development.

During the construction phase of the proposed development, air emissions will arise due to excavation works and road resurfacing works which may be exacerbated by winds and dry weathers. Air emissions will also be generated as a result of construction plant and machinery. However, following the implementation of appropriate mitigation measures, no significant negative effects on air quality are predicted.

During the operational phase of the proposed development, there will be a slight decrease in the volume of traffic due to the provision of a hard shoulder bus priority measure, refer to Section 3.2.9 for further details. In addition, a slight increase in bus speeds will have the effect of reducing air emissions.

The proposed development utilises the hard shoulder of the existing cross section in the eastbound direction to accommodate a 3.5m wide hard shoulder bus priority measure. At some locations, this will result in a decrease in the separation of bus traffic from the nearest sensitive receptors. However, due to the low number of buses accessing the new lane relative to private cars accessing the main lanes and the ongoing replacement of bus fleet with low emission vehicles, no significant increase in pollution concentrations is expected.

## 5.5.4 References

Environmental Protection Agency (2019) Air Quality Reports. Available from: <http://www.epa.ie/pubs/reports/air/quality/>

Environmental Protection Agency (2018) Air Quality Reports. Available from: <http://www.epa.ie/pubs/reports/air/quality/>

Environmental Protection Agency (2017) Air Quality Reports. Available from: <http://www.epa.ie/pubs/reports/air/quality/>

Environmental Protection Agency, EPA Maps. Available from: <https://gis.epa.ie/EPAMaps/>

Transport Infrastructure Ireland (2011) Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes. Available from: <https://www.tii.ie/technical-services/environment/planning/Guidelines-for-the-Treatment-of-Air-Quality-during-the-Planning-and-Construction-of-National-Road-Schemes.pdf>

## 5.6 Climate

### 5.6.1 Methodology and Sources of Information

#### 5.6.1.1 Climate Commitments

The Government of Ireland's Climate Action Plan 2021<sup>21</sup> was published in November 2021. The plan sets out a detailed sectoral roadmap to deliver a cumulative reduction in emissions.

The Climate Action and Low Carbon Development (Amendment) Act 2021<sup>22</sup> was published by government in July 2021. The Act sets out the national objective of transitioning to a low carbon, climate resilient and environmentally sustainable economy in the period up to 2050. The Act provides for the preparation of Sectoral Plans which will specify policies to reduce greenhouse gas emissions for each sector.

On the 14<sup>th</sup> of July 2021, the European Commission adopted a series of legislative proposals setting out how it intends to achieve climate neutrality in the EU by 2050, including the intermediate target of at least, a 55% net reduction in greenhouse gas emissions by 2030. The package of proposals includes revisions to the legislation put forward as part of the Climate and Energy Framework 2021-2030. Ireland's new 2030 target is to achieve a 40% reduction of non-Emissions Trading Scheme (ETS) sector emissions on 2005 levels with annual binding limits set for each year over the period 2021-2030.

The proposed development area lies within both the South Dublin County Council and Kildare County Council administrative areas.

The South Dublin County Council Climate Change Action Plan 2019-2024<sup>23</sup> was adopted in 2019. The plan is now published, and South Dublin County Council is working towards achieving its four main targets:

- A 33% improvement in the Council's energy efficiency by 2020;
- A 40% reduction in the Council's greenhouse gas emissions by 2030;
- To make Dublin a climate resilient region, by reducing the impacts of future climate change-related events; and
- To actively engage and inform citizens on climate change.

A Climate Change Team is working with Action Teams across the five main action areas to ensure the plan is delivered effectively.

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<sup>21</sup> Climate Action Plan, Government of Ireland 2021

<sup>22</sup> Climate Action and Low Carbon Development (Amendment) Act 2021.

<sup>23</sup> South Dublin County Council Climate Action Plan, 2019 -2024

Kildare County Council has prepared a Local Authority Climate Change Adaptation Strategy<sup>24</sup>. The Kildare County Council Climate Change Adaptation Strategy takes on the role as the primary instrument at local level to:

- Ensure a proper comprehension of the key risks and vulnerabilities of climate change;
- Bring forward the implementation of climate resilient actions in a planned and proactive manner; and
- Ensure that climate adaptation considerations are mainstreamed into all plans and policies and integrated into all operations and functions of Kildare County Council.

## 5.6.2 Existing Environment

### 5.6.2.1 Climate

Analysis of the meteorological records shows that Ireland's climate is changing in line with global patterns. The clearest trend is evident in the temperature records which show a mean temperature increase of 0.7° C between 1890 and 2008, i.e. an increase of 0.06° C per decade. The increase was 0.4° C during the period 1980-2008, i.e. equivalent to 0.14° C per decade.

### 5.6.2.2 Greenhouse Gas Emissions

EU greenhouse gas emission reduction targets and reduction obligations for Ireland are split into two broad categories. The first category covers the large energy and power (i.e. energy intensive) industry which have their emissions controlled under the EU Emissions Trading Scheme (ETS). The second category deals with the non-Emissions Trading Scheme (non-ETS) sectors such as agriculture, transport, residential, commercial, waste and non-energy intensive industry.

In June 2021, the EPA released the report Ireland's Greenhouse Gas Emissions Projections 2020-2040<sup>25</sup>. This report states that the With Additional Measures scenario (which includes the impact of the 2019 Climate Action Plan) Ireland can deliver the required emission savings over the period 2021-2030.

The projected emissions in 2025 and 2030 for the With Existing Measures and With Additional Measures scenarios for the non- ETS sectors (which includes transport) are outlined in Table 5.12.

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<sup>24</sup> Kildare County Council Climate Change Adaptation Strategy, 2019-2024

<sup>25</sup> EPA, 2021. Ireland's Greenhouse Gas Emissions Projections 2020 – 2040.

Scenarios	Projected Emissions for non-ETS sector in 2025 (Mt CO <sub>2</sub> eq.)	Projected Emissions for non-ETS sector in 2030 (Mt CO <sub>2</sub> eq.)
Projections (with existing measures) <sup>26</sup>	45.82	44.3
Projections (with additional measures) <sup>27</sup>	42.3	36.6

**Table 5.12:** Projected Emissions for the non-ETS Sectors (EPA, 2020)

Ireland is projected to meet non-ETS EU targets over the period 2021 to 2030. This assumes full implementation of the 2019 Climate Action Plan and the use of flexibilities in relation to land use, land use change and forestry.

### 5.6.3 Assessment of Effects

During the construction of the proposed development, there is the potential for an increase in carbon emissions due to the embodied carbon associated with materials required for its construction. However, this is not considered significant and existing materials will be used wherever possible to minimise this potential impact.

During the operation of the proposed development there will be a slight decrease in the volume of traffic due to the provision of the hard shoulder bus priority measure. As such, no significant negative effects are predicted as a result of traffic emissions.

<sup>26</sup> The *With Existing Measures* scenario assumes that no additional policies and measures, beyond those already in place by the end of 2018 (latest national greenhouse gas emission inventory), are implemented. (EPA, 2020)

<sup>27</sup> The *With Additional Measures* scenario assumes implementation of the *With Existing Measures* scenario in addition to, based on current progress, further implementation of Government renewable and energy efficiency policies and measures including those set out in the National Renewable Energy Action Plan (NREAP) and the National Energy Efficiency Action Plan (NEEAP) and more recently Ireland's National Development Plan 2018 - 2027 (EPA, 2020).

## 5.6.4 References

Climate Action Plan, Government of Ireland 2019

Climate Action and Low Carbon Development Bill 2020.

European Commission, 2013. 2030 Climate & Energy Framework

Kildare County Council Climate Change Adaptation Strategy, 2019-2024

South Dublin County Council Climate Action Plan, 2019 -2024

EPA, 2020. Ireland's Provisional Greenhouse Gas Emissions 2019 – 2040.  
[https://www.epa.ie/pubs/reports/air/airemissions/ghgprojections2019-2040/2020-EPA-Greenhouse-Gas-Emissions-Projections\\_final.pdf](https://www.epa.ie/pubs/reports/air/airemissions/ghgprojections2019-2040/2020-EPA-Greenhouse-Gas-Emissions-Projections_final.pdf)



## 5.7 Noise and Vibration

### 5.7.1 Baseline Noise

The proposed development area includes the M4 motorway corridor and a short section the N4 dual carriageway corridor from Junction 7 Maynooth to Junction 5 Leixlip. The closest noise sensitive locations to the proposed development are residential properties within 50m from the boundary of the proposed development which are identified at the following locations (all distances are approximate from the proposed development boundary):

- Ballygoran – residential properties within 30m of the M4 westbound carriageway edge;
- Residential properties along the L5057 at Ballygoran/Barrogstown within 40m north of the M4 eastbound carriageway edge;
- R405 Ballygoran Road – residential properties within 40m south of the M4 westbound carriageway edge;
- Leixlip Gate – Residential properties within 30m north of the N4 eastbound carriageway edge;
- Cooldrinagh Lane South– residential properties within 30m south of the M4 westbound carriageway edge;
- Weston Lawn and Weston Close - residential estate within 10m of the south of M4 westbound carriageway edge; and
- Cooldrinagh/Leixlip Road - residential properties within 10 to 40m of the north and west of M4 eastbound carriageway edge and R403 Celbridge Road.

Traffic from the M4/N4 are the dominant source of noise at these properties.

The Round 3 Road Traffic Noise Maps published by the EPA as part of the Environmental Noise Regulations<sup>28</sup> have been reviewed to determine the range of modelled traffic noise in the vicinity of the proposed development. As part of the noise mapping requirements, all roads with traffic flows greater than 3 million vehicle trips per annum (approximately 8,200 Annual Average Daily Traffic (AADT)) were required to be mapped. Within the proposed development area, the following sections of roads have been mapped and noise contours produced:

- M4 and N4: full extent of the proposed development area;
- R406: north and south of Junction 7 Maynooth;
- R449: north and south of Junction 6 Celbridge; and
- R403: south of Junction 5 Leixlip.

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<sup>28</sup> S.I. No. 140/2006 – Environmental Noise Regulations 2006

Noise levels due to traffic along these sections of road were modelled and the relevant noise maps prepared. The maps are presented in noise contour bands in increments of 5 decibels starting at 55 dB  $L_{den}$  and 50 dB  $L_{night}$ .

The results of the mapping indicate that noise levels at the closest residential properties to the proposed development area, discussed above, fall within the 65 to 69 dB  $L_{den}$  noise contour bands. A small number of individual residential properties closest to the M4/N4 are mapped within the 70 to 74 dB  $L_{den}$  noise contour band, discussed below.

Properties within 70 to 74 dB  $L_{den}$  Contour Band - North of the M4:

- Ballygoran / Barrogstown: One property located approximately 35m north of the M4 eastbound carriageway edge, and
- Leixlip Gate: Two properties located at approximately 30m north of the from the M4 eastbound carriageway edge.

Properties within 70 to 74dB  $L_{den}$  Contour Band - south of the M4:

- Ballygoran/ Moneycooly: One property located approximately 30m south of the M4 westbound carriageway edge, off Ballygoran Road;
- Ballygoran: Two properties located between 35 and 40m south of the M4 westbound carriageway edge, off R405 Maynooth Road;
- Cooldrinagh / Backwestonpark: One property located approximately 35m south of the M4 westbound carriageway edge crossing the River Liffey, and;
- Cooldrinagh Lane South: One property located approximately 40m south of the M4 westbound carriageway edge.

Road traffic noise levels at the closest noise sensitive locations to the proposed development area are dominated by existing traffic volumes along the M4/N4.

The Kildare County Council Third Noise Action Plan 2019 to 2023 <sup>29</sup> (Hereafter referred to as the Kildare Co. Co. NAP 2019) includes the following threshold noise levels, above which areas may require noise mitigation or management. The proposed onset levels for the consideration of noise mitigation measures are:

- Day-Evening Night-time Noise Value: 70 dB (A)  $L_{den}$
- Night-time Noise Value: 57 dB (A)  $L_{night}$

Road traffic noise levels at the closest noise sensitive locations to the proposed development area within Kildare County Council are, for the majority, just below the  $L_{den}$  noise threshold value of 70dB  $L_{den}$ . A small number of properties are, however, exposed to noise levels above this threshold value as discussed above. These locations are also identified within the existing Kildare Co. Co NAP 2019. The approach for review and management of areas mapped above the threshold noise levels is set out in the relevant sections of the Kildare Co. Co. NAP 2019.

<sup>29</sup> Kildare County Council (2019) Third Noise Action Plan 2019 to 2023

The Dublin Agglomeration Environmental Noise Action Plan – Volume 4: South Dublin County Council 2018 - 2023<sup>30</sup> (Hereafter referred to as the SDCC NAP 2018) includes the following threshold noise levels, above which areas may require noise mitigation or management. These threshold values differ from those included within the Kildare Co. Co NAP 2019. The SDCC NAP 2018 notes the following target values for desirable low and undesirable high sound levels:

Desirable Low Sound levels:

- < 50 dB(A)  $L_{\text{night}}$
- < 55 dB(A)  $L_{\text{day}}$

Undesirable High Sound levels

- > 55 dB(A)  $L_{\text{night}}$
- > 70 dB(A)  $L_{\text{day}}$

The SDCC NAP 2018 uses the  $L_{\text{day}}$  parameter as a threshold value as opposed to the  $L_{\text{den}}$  parameter discussed above as part of the noise mapping and included within the Kildare Co. Co NAP 2019. For road traffic noise along a national road, the  $L_{\text{den}}$  parameter is typically 2 to 3dB higher than the  $L_{\text{day}}$  parameter.

Road traffic noise levels at the closest noise sensitive locations to the proposed development area within South Dublin County Council are all above the ‘Desirable Low’ sound level value of 55 dB  $L_{\text{day}}$  and are at or just below the Undesirable High threshold value of 70dB  $L_{\text{day}}$ . A small number of individual properties are however exposed to traffic noise levels above this threshold value along the existing road edge south of the M4 and N4 as identified above. These locations are identified within the existing SDCC NAP 2018. The approach for review and management of areas mapped above the threshold noise levels are set out in the relevant sections of the SDCC NAP 2018.

## 5.7.2 Baseline Vibration

Road traffic along normal maintained surfaces is not a source of any significant levels of vibration in terms of human perception, vibration sensitive equipment or structural integrity of vulnerable structures.

There are no vibration sensitive buildings or areas identified within the proposed development area where road traffic would pose any significant perceptible impact.

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<sup>30</sup> Dublin Local Authorities including Dublin City Council (DCC), Fingal County Council (FCC), South Dublin County Council (SDCC) and Dún Laoghaire Rathdown County Council (DLRCC) Dublin Agglomeration Third Environmental Noise Action Plan December 2018 – July 2023 – Volume 4: South Dublin County Council

## 5.7.3 Assessment of Effects

### 5.7.3.1 Operational Phase

#### Traffic Flows

The difference in traffic flow between the Do-Minimum and Do-Something scenarios is summarised in Table 5.13 and Table 5.14. There is no appreciable difference in overall Annual Average Daily Traffic flows (AADT) between the Do-Minimum and Do-Something scenarios.

Location	Do-Minimum			Do-Something		
	AADT	% HGV	% Bus	AADT	% HGV	% Bus
Between J7 & J6	63,428	7%	< 1%	63,442	7%	< 1%
Between J6 & J5	75,060	6%	< 1%	75,085	6%	< 1%

**Table 5.13:** 2020 Forecast Traffic Flow associated with the proposed development

Location	Do-Minimum			Do-Something		
	AADT	% HGV	% Bus	AADT	% HGV	% Bus
Between J7 & J6	72,522	10%	1%	69,187	10%	1%
Between J6 & J5	84,693	8%	1%	81,603	9%	1%

**Table 5.14:** 2030 Future Year Forecast Traffic Flow associated with the proposed development

Due to the negligible difference between the Do-Minimum and Do-Something scenarios, traffic flows associated with the proposed development will not result in significant negative effects as a result of noise emissions during the operational phase.

#### Cross Section / Road Alignment

The operation of a bus priority measure within the existing hard shoulder will move bus traffic approximately 3m closer to noise sensitive properties. Reference to the traffic data discussed in Table 5.13 and Table 5.14 confirms the percentage of bus traffic during either the Do-Minimum or Do-Something scenario is circa 1% of the total AADT. The contribution of traffic from cars, LGV's and HGV's along the eastbound and westbound carriageways will continue to dominate the noise environment at the road edge within the proposed development arrangement. The proposed bus priority measure within the existing hard shoulder will be approximately 3m closer than the existing scenario. However, this will have a negligible effect on overall noise levels (increase of <0.5 dB which is not perceptible) resulting in a likely negative imperceptible effect during the operational phase.

The presence of the proposed ERAs within the proposed development area at the eight identified locations will have a neutral effect in terms of noise and vibration. The areas will be used in the event of vehicles requiring a safe location off the mainline.

As vehicles will be stationary at these locations, existing traffic noise from the mainline carriageways will continue to dominate the noise environment with or without the presence of the proposed ERAs. Where pavement widening into the verge is required to facilitate these areas, any existing boundary treatments in proximity to noise sensitive locations (e.g. earth bunds or acoustic barriers), will be retained or replaced to ensure the same or enhanced level of acoustic separation is provided between the road and the noise sensitive location.

## Noise Barriers

Noise barriers will be incorporated as part of the proposed development and are summarised in Table 5.15.

Location	Carriageway	Chainage Start (m)	Chainage End (m)	Length (m)	Height (m)
Griffin Rath	Eastbound	1880	2400	590	2.5
Ballygoran Vale	Westbound	2500	2800	300	3.0
Ballygoran Road	Eastbound	3075	3960	885	3.0
Ballygoran	Westbound	3660	3900	240	3.5
Beechpark	Eastbound	5590	6060	470	3.5
Cooldrinagh/ River Liffey Bridge	Westbound	8000	8200	200	2.0
Cooldrinagh	Westbound	8200	8340	140	3.5
Cooldrinagh Lane South	Westbound	8540	8775	235	3.5
Cooldrinagh Lane South	Westbound	8785	8900	115	3.0
Cooldrinagh North	Eastbound	8600	8770	170	2.5
Junction 5 North	Eastbound	9250	9500	250	3.5
Weston Close / Weston Crescent	Westbound	9260	9440	180	3.5

**Table 5.15:** Noise Barrier Details

A total length of 2.4km of noise barriers is proposed for the eastbound carriageway (to the north of the M4/N4). A total length of 1.4km of noise barriers is proposed for the westbound carriageway (to the south of the M4/N4). The total combined length of proposed noise barriers is 3.8km.

Noise barriers are not required as a mitigation measure for the proposed development as there is no perceptible increase in noise levels as a result of the operation of the proposed development.

However, the implementation of these noise barriers will reduce noise levels at a number of receptors in the vicinity of the proposed development which will result in a positive impact. More information on these noise barriers is provided in the standalone report compiled by AWN Consulting which forms part of this planning application documentation.

## Vibration

In terms of vibration, the negligible baseline conditions in addition to the negligible difference in road traffic between the Do-Minimum and Do-Something scenarios will ensure that there will be no vibration impacts to nearby residential properties during the operational phase of the proposed development.

### 5.7.3.2 Construction Phase

Temporary construction noise and vibration impacts will occur to facilitate the proposed development. The greatest impacts are associated with pavement widening into the nearside verge. However, appropriate mitigation measures will be employed to ensure there are no significant negative effects as a result of noise emissions.

During the construction phase, there is potential for minor vibration levels to be generated depending on the works involved. Any construction activities will be controlled through strict vibration limits. Therefore, no significant effects are predicted.

## 5.8 Population and Human Health

### 5.8.1 Population

The baseline environment is one of high traffic movement given the population density and the proximity of businesses and commercial premises to Junction 5 Leixlip and, particularly Junction 7 Maynooth. Vulnerable road users, namely cyclists and pedestrians (some possibly alighting from buses) use footways and cycleways at these junctions to access workplaces or other destinations.

A small number of businesses have accesses which fall within, or in the vicinity of the proposed development. These include Maynooth Business Campus, Barretts Maynooth Limited and Earthridge International Limited as well as three private properties at Junction 7.

There are no community facilities or businesses whose built premises fall within the proposed development boundary, but there are others which are located in close proximity, or which are adjacent to the footprint of the M4/N4.

At Junction 7, there is one business to the southwest, a yard to the northwest, Bartons Transport to the northeast, and Maynooth Business Campus to the southeast. The Maynooth Business Campus security/access building is located closest to the proposed development boundary along with an access road and car parking. Block B of the business campus is the closest to the proposed development area, being located nearest to the Junction 7 westbound diverge slip.

There are no businesses in close proximity to Junction 6. Tara Park, a small industrial estate, is located at Junction 5 and is approximately 10m from the boundary of the eastbound diverge.

None of these businesses would appear to be of a nature that makes them especially sensitive to environmental effects as a result of construction works such as noise, vibration or air quality emissions. Beckett's Hotel is located approximately 100m from the M4 footprint and has a degree of sensitivity to construction noise or lighting given the nature of the business. The Springfield Hotel is located approximately 250m away on the R148. There is also a B&B at Barrogstown Lane which is located approximately 60m from the M4 footprint.

The only community facilities that are adjacent to the M4/N4 and proposed development area are The Wonderful Barn Allotments for which the nearest plots are at a distance of approximately 20m from the M4, a neighbouring public green space to the west, and the Liffey Valley Par 3 Golf Course located north of Junction 5. The River Liffey is crossed by the M4 and would be regularly used by kayakers.

There are also sites owned or used by Kildare County Council, a covered reservoir and a water treatment works.

This section specifically addresses community facilities, but there are, in addition, three properties near Junction 5 where the garden boundary edge is immediately adjacent to the proposed development area on the eastbound slip road. Section 5.7 Noise & Vibration lists residences that would be sensitive to noise arising from construction works.

There are a further seven private residences adjacent to the footprint of the M4 westbound carriageway, the nearest being approximately 25m away, although the property boundaries and gardens of several of these houses border the proposed development area. There are an additional nine private properties adjacent to the eastbound lane.

### 5.8.2 Assessment of Effects

No businesses/community facilities are located within the proposed development area and no businesses/community facilities will be directly affected. As mentioned above, there are a number of businesses/community facilities in the vicinity. However, the businesses themselves do not appear to be especially sensitive to construction works as, indeed, would be expected of businesses that are presently located beside a road with high traffic volumes.

Therefore, no significant negative effects are predicted.

### 5.8.3 Human Health

In human health terms the important receptors are human beings. All human beings are considered to be sensitive receptors. The most important emissions in relation to human health are air quality emissions and noise emissions. There are no residences or other sensitive receptors in human health terms within the proposed development boundary. The closest noise sensitive locations are residential properties within 50m of the proposed development area. Refer to Section 5.7.1 for details of these receptors.

Road traffic from the M4/N4 is the dominant source of noise and emissions to air at these properties.

The proposed development is located within the existing M4/N4 corridor. Traffic flows are predicted to remain nominally unchanged when compared to the existing scenario. No significant air or noise emissions have been identified as part of the proposed development. Refer to Section 5.5 and Section 5.7 for further details.

Therefore, no significant negative effects on human health are predicted.

## 5.9 Hydrology

### 5.9.1 Baseline

The following section provides an overview of the hydrological environment in the proposed development area. This includes identifying the primary surface water features, their respective water quality, and summarising the flood risk in the proposed development area.

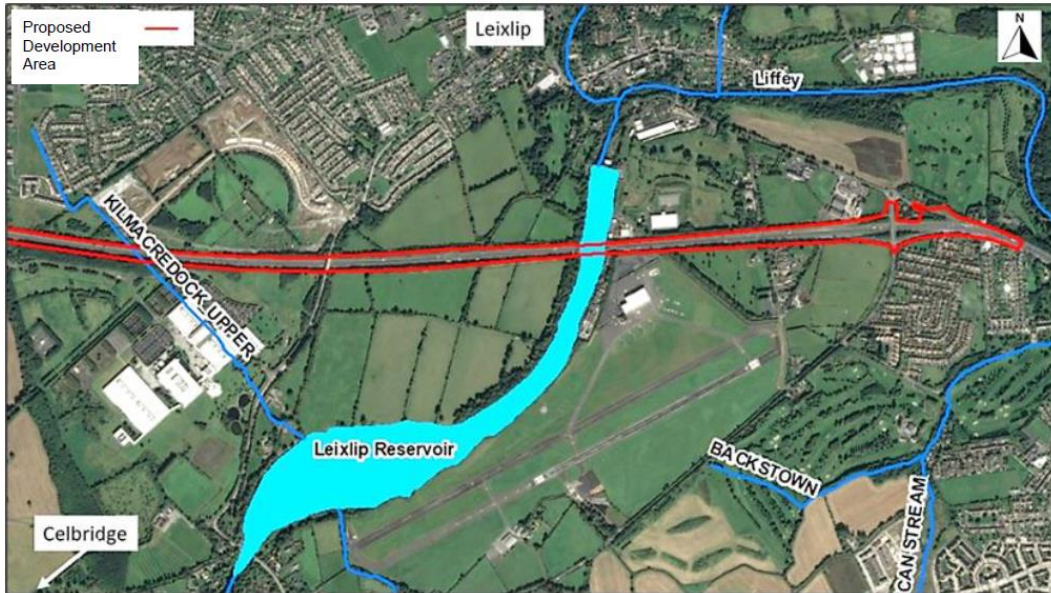
#### 5.9.1.1 Surface Water Features

The proposed development area lies entirely within Hydrometric Area 9, which is the Liffey and Dublin Bay catchment. There are two primary surface water features located in the proposed development area. The principal watercourse is the River Liffey, which flows from in a north-easterly direction at the eastern end of the proposed development area. The river has been dammed at this location to form the Leixlip Reservoir. A bridge of the M4 passes over the downstream end of the reservoir.

Further to the west, a small stream known as the Kilmacredock Upper, is culverted under the motorway flowing in a northwest to southeast direction. This stream is a tributary of the River Liffey, with its confluence at the Leixlip Reservoir. Both watercourses can be seen in Figure 5.1.

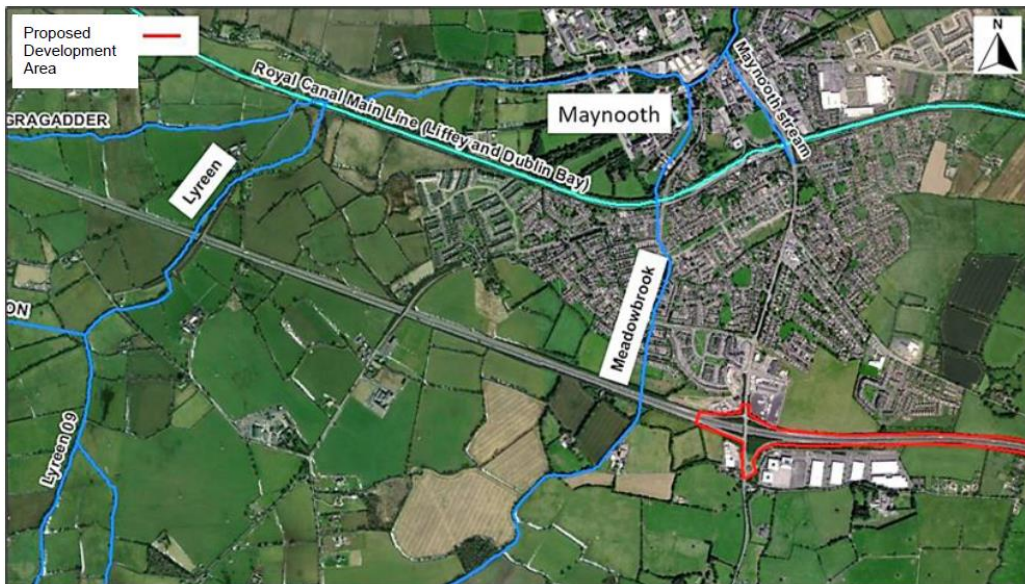
A proposed Natural Heritage Area known as the Liffey Valley pNHA exists on the River Liffey approximately 800m downstream of the proposed development. The River Liffey ultimately discharges into Dublin, c.27km downstream of the proposed development, where there are two SAC and two SPA sites. Therefore, there exists a hydrological connectivity between the River Liffey within the proposed development area and the aforementioned protected sites. Please refer to the Biodiversity baseline description (Section 5.2) for further information.





**Figure 5.1:** Surface Water Features at the eastern extent on the proposed development | Source: EPA, available from <https://gis.epa.ie/EPAMaps/>

There are two watercourses that cross the M4 to the west of the proposed development that flow in a north-easterly direction. The Meadowbrook (or Tagahdoe) Stream and the Lyreen. Refer to Figure 5.2. Although they are not located within the proposed development area, the flood extents from these watercourses extend to the proposed development area.



**Figure 5.2:** Surface Water Features at the western extent of the proposed development | Source: EPA, available from: <https://gis.epa.ie/EPAMaps/>

Smaller scale surface water features which are not publicly mapped, but which may hold resource or amenity value if they are used for drinking water, fishing etc may exist. No such features have been identified within the proposed development area.

### 5.9.1.2 Surface Water Quality

Water quality in Ireland is monitored by the EPA. Using the water quality data, the River Quality Class (Q-value) system has been used to assess the watercourses within the proposed development area. For each watercourse, the most recent data available was used. The Q-value system describes the relationship between water quality and the macroinvertebrate community in numerical terms. Q5 waters have high diversity of macroinvertebrates and good water quality, while Q1 have little or no macroinvertebrate diversity and is therefore indicative of bad water quality. Intermediate values, Q1-2, 2-3, 3-4 denote transitional conditions. The EPA scheme of Quality (Q) values and its relationship to water quality is set out in Table 5.16.

Q Value	Water Framework Directive (WFD) Status	Pollution Status	Condition	EPA Quality Class
Q5, Q4-5	High	Unpolluted	Satisfactory	Class A
Q4	Good	Unpolluted	Satisfactory	Class B
Q3-4	Moderate	Slightly polluted	Unsatisfactory	Class C
Q3, Q2-3	Poor	Moderately polluted	Unsatisfactory	Class D
Q2, Q1-2, Q1	Bad	Seriously polluted	Unsatisfactory	Class E

**Table 5.16:** Quality (Q) Values and its relationship to Water Quality (EPA)

The most recent Q values for the River Liffey for upstream and downstream of the Leixlip Reservoir indicate a score of 4. This equates to “Good” status and is classified as unpolluted and of satisfactory condition. The waterbody risk classification is currently under review. A proportion of the motorway surface water drainage outfalls to the Leixlip Reservoir.

Water is abstracted from the Leixlip Reservoir at a location just north of the M4 bridge to be treated for drinking water purposes.

The Leixlip Reservoir is classified as a lake, its waterbody risk classification is currently under review. For the previous risk classification period (2013-2018) it was not assigned a status.

No Q value was available for Kilmacredock Upper.

### 5.9.1.3 Flooding

#### Historical Flood Risk

Historical flooding has been assessed by examining reports and maps from the OPW’s National Flood Hazard mapping<sup>31</sup>.

One historic flood event has been identified adjacent to Junction 7.

<sup>31</sup> Office of Public Works Historic Flood Mapping, available from: <http://www.floodinfo.ie> [Accessed: 22 Jan 2021]

In November 2000, the Lyreen River and Meadowbrook Stream (which both cross the M4 west of the proposed development) overtopped their banks resulting in flooding of the motorway. Figure 5.3 is an aerial photograph of the event which shows that a large section of the motorway was inundated as far east as Junction 7. Hydrometric gauges were not in place for the Lyreen catchment at the time, however the nearby Leixlip Daily Station recorded 102.6mm of rain between the 5<sup>th</sup> and 6<sup>th</sup> of November 2000, equating to a rainfall event of approximately 1.3-1.7% AEP<sup>32</sup>.



**Figure 5.3:** Aerial from November 2000 Lyreen River Flood Event (source: floodinfo.ie)

It is noted that although there are no additional records of past flooding, it is still possible that unreported flooding might have occurred in the proposed development area in the past.

### Predicted Flood Risk

#### Tidal Flood Risk

Given the distance of the proposed development from the sea and its elevation above sea level, there is no risk of coastal flooding.

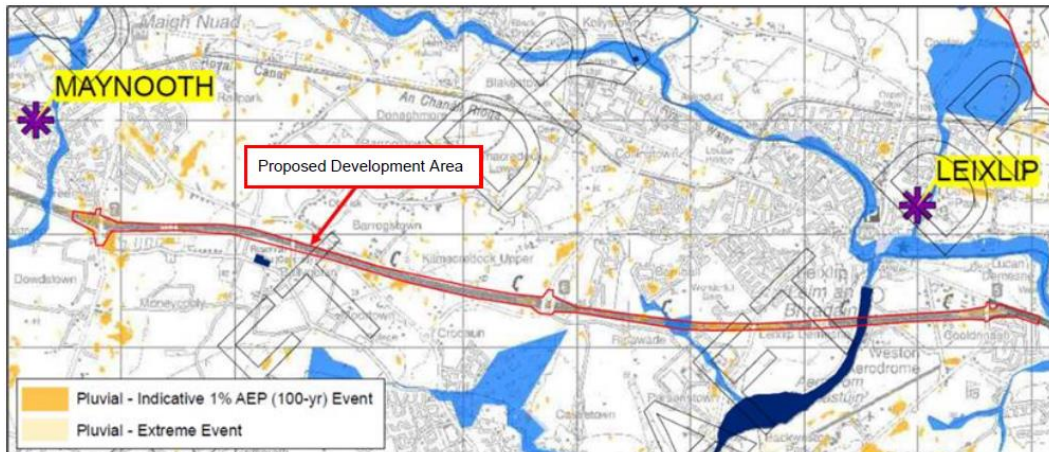
#### Pluvial Flood Risk

Pluvial flooding occurs when extreme rainfall overwhelms drainage systems or soil infiltration capacity, causing excess rainwater to pond above ground at low points in the topography.

<sup>32</sup> Office of Public Works Eastern CFRAM HA09 Hydraulics Report, available from <http://www.floodinfo.ie> [Accessed: 21 Jan 2021]

To assess the risk of pluvial flooding in the proposed development area, the Office of Public Works (OPW) PFRA pluvial flood mapping<sup>33</sup> was reviewed.

Figure 5.4 indicates that sections of the proposed development area would be at risk of pluvial flooding in a 1 in 100-year rainfall event. Most pluvial flood risk areas are indicated to be relatively small and localised. It is noted that this mapping was carried out at a national scale, is indicative, and does not take local drainage into account.



**Figure 5.4:** PRFA Pluvial Flood Extents - Office of Public Works Preliminary Flood Risk Assessment (PFRA) Mapping | Source: Available from <https://www.floodinfo.ie/aboutfrm/pfra/>

The pluvial flood risk will need to be verified during the detailed design phase. Pluvial flooding can typically be managed with appropriate design detailing e.g. provision of appropriate surface water drainage and grading.

### Fluvial Flood Risk

Fluvial flooding occurs when, after periods of heavy rainfall, the water level rises in a watercourse to the extent that it overtops its banks and floods adjacent lands.

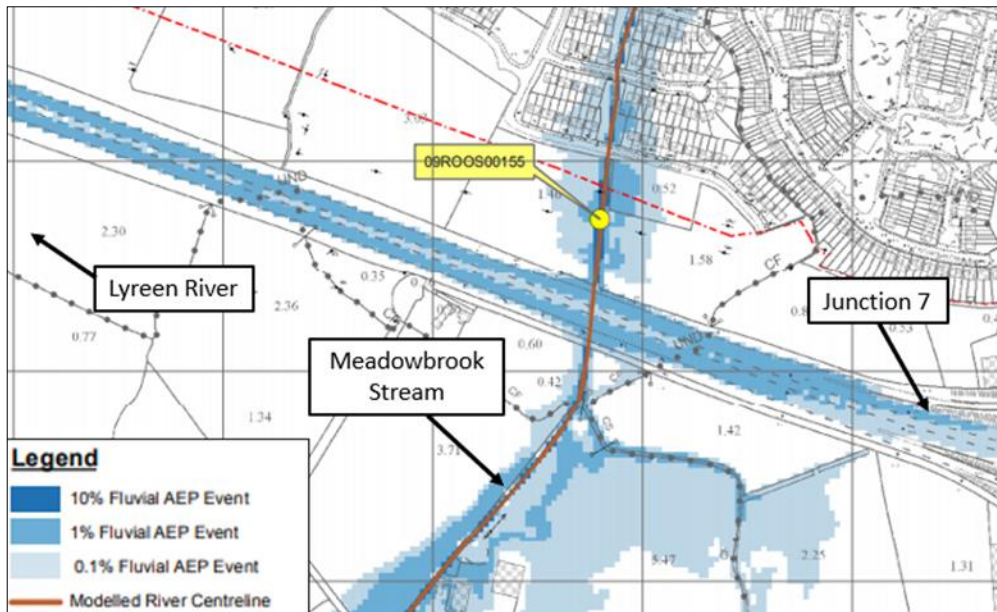
Predicted fluvial flood risk data was obtained from the following sources:

- Office of Public Works Catchment Flood Risk Assessment and Management (CFRAM), Available from: <https://www.floodinfo.ie/map/floodmaps/>; and
- Preliminary Flood Risk Assessment (PFRA).

The flood extents from the above studies are addressed now by watercourse from west to east.

The Meadowbrook stream crosses the M4 just west of the proposed development. It is a tributary of the Lyreen River, which itself crosses the M4 adjacent to the L5041 overbridge further west. Both the Lyreen River and Meadowbrook Stream were modelled and mapped as part of the CFRAM study. The mapping shows predicted fluvial flooding at Junction 7 of the M4 motorway for the 100-year and 1000-year return period events.

This is as a result of the Lyreen River overtopping its banks. The 1% AEP flood extent shown is similar to the recorded flood extent from the November 2000 event.



**Figure 5.5:** Extract from CFRAM Fluvial Flood Map E09MAY\_EXFCD\_F3\_06

The Kilmacredock Stream was not mapped as part of the CFRAM Study, it was however mapped under the PFRA programme. The PFRA fluvial flood extent is shown in Figure 5.6. The PFRA mapping is a national scale, high-level exercise which did not take structures such as culverts into account. The Kilmacredock Stream is culverted beneath the M4 and therefore the predicted PFRA flood extent shown on the M4 at this location is not realistic. Fluvial flood risk at this location may still exist. This needs to be verified during the detailed design phase.



**Figure 5.6:** PFRA Fluvial Flood Extent for the Kilmacredock Upper

The River Liffey and Leixlip Reservoir were modelled and mapped as part of the CFRAM study. The CFRAM mapping shows no predicted flood risk to the M4 at this location.

Strategic Flood Risk Assessments for the Kildare County Development Plan 2017-2023 and respective Local Area Plans for Maynooth, Celbridge and Leixlip were reviewed and no additional flood risks to the proposed development area were identified.

## 5.9.2 Assessment of Effects

Widening of the existing carriageway into the nearside verge and central medial has the potential to affect the hydrological regime in the vicinity of the proposed development.

A proportion of the existing M4/N4 carriageway runoff drains to the River Liffey. Increasing the paved area of the carriageway may increase the concentration of pollutants draining to this waterbody, during both the construction and operational phases. This has the potential to impact on the water quality status of the River Liffey which is monitored by the EPA and currently classified as 'Good', unpolluted. The same is also true for the other unmonitored minor streams that the M4 drainage network discharges to.

Flood Zone A is located west of Junction 7 Maynooth. The proposed development hard shoulder bus priority measure commences east of Junction 7 Maynooth at the eastbound merge.

Primary transport infrastructure is classified as Highly Vulnerable Development under the Flood Risk Management Guidelines, however given that the proposed hard shoulder bus priority measure commences east of Flood Zone A, a Justification Test will not be required. This item will be reviewed again during the detailed design phase.

Increasing the paved surface area of the motorway (i.e. the inclusion of the ERAs) will impact the surface water runoff characteristics of the catchment by decreasing the infiltration potential for direct rainfall and increasing runoff to the drainage network. This has the potential to increase the risk of pluvial flooding to the motorway itself. It could also increase the fluvial flood risk to the motorway and downstream areas, due to the increased volume of runoff draining to adjacent waterbodies.

While the proposed development will involve a small amount of increased paved areas, the design does not change the profile of the existing road and it is envisaged that with the proposed development in operation and better connectivity, a more efficient public transport system would reduce the AADT, thus reducing the risk of pollution for the current situation. The overall increase in impermeable area is circa 10%. Given the distance between the project boundary and circa 10% increase in the impervious area, there will be no perceptible change to the run-off characteristics (quantity and quality) as a result of the proposed development.

Similarly, the implementation of attenuation controls will prevent an increase in fluvial flood risk during the construction and operation phases. Therefore, no significant negative effects on hydrology during the construction and operational phases of the proposed development.

## 5.10 Land, Soils and Hydrogeology

### 5.10.1 Existing Environment

#### 5.10.1.1 Topography and Geomorphology

The topography of the proposed development area falls from west to east from 90m Ordnance Datum (OD) to 40mOD. The highest elevation along the proposed development area is at 90mOD to the west, near Maynooth while the lowest elevation, at 41mOD, is to the eastern end of the proposed development area, near Leixlip.

The River Liffey is towards the east of the proposed development area and flows in a north-easterly direction. The Kilmacredock Upper stream, which is a tributary of the River Liffey, crosses the proposed development area in the eastern section, just north of the Liffey Business Park. The Leixlip Reservoir is located to the south of the proposed development area in a section of the Liffey channel that has been generated from the Leixlip Hydroelectric Plant and associated Dam (River Liffey Hydro-Electric Stations, ESB).

### 5.10.1.2 Current Land Use

On the Corine Land Cover map 2018, the land use within the proposed development area is classified as road and railways network, which is the M4. There are two recorded discontinuous urban fabrics at the western end at Maynooth and at the eastern end of Leixlip.

Along the proposed development area between Maynooth and Leixlip, there is an area of pasture recorded on the Corine Land Cover. The Weston Airport is located to the south of the proposed development area, immediately west of the River Liffey Bridge.

Pasture-land surrounds the proposed development area with localised non-irrigated arable land to the south. An industrial and commercial unit, Liffey Business Park is directly to the south of the M4, near Leixlip outside the proposed development area. An area of mixed forests are located to the south of the proposed development area, north of Celbridge.

### 5.10.1.3 Historical Land Use

A review of historical maps and contemporary aerial photographs available from the OSI (Geohive) and Google Maps was completed to determine the location of historic industries or activities. Findings of this review are summarised in Table 5.17.

Year	Description
Historical Map 6" 1837-1842 (OSI)	<p><b>Overall Summary</b></p> <p>The proposed development area is shown to predominantly comprise agricultural land and localised wooded areas such as a large forest to the south of the proposed development area in Deerpark. Leixlip Demesne is to the eastern end of the proposed development area. There are some small settlements adjacent to the proposed development area, namely Barn Hall and a church north of the M4 and Moortown Farm and Ballygoran house south of the M4. The proposed development area cuts across the River Liffey at the eastern end. A Flour Mill (Salmon Leap Mills) is located to the south of the proposed development. Maynooth and Leixlip are both north of the proposed development, approximately 1km. All of these features are outside of the proposed development area.</p>
Historical Map 25" 1888-1913 (OSI)	<p>The proposed development area is shown to predominantly comprise of agricultural land and localised wooded areas such as a large forest to the south of the proposed development in Deerpark. Leixlip Demesne is to the eastern end of the proposed development. Further developments have occurred surrounding the proposed development, such as expansion of Barn Hall House, development of Greenfield house and Barrogstown house, all located to the north of the M4. Pumps are recorded as part of many of these houses, potentially as private wells for agricultural use given their surroundings. Ballygoran Park, to the southwest of the M4, records a covered reservoir and a windpump on the site. The church north of the M4 is now noted to be in ruins. A track from a nearby settlement, north of the proposed development in Kilmacredock Upper, cuts across the site as potential access into a field. An outcrop is noted to crosscut the middle of the proposed development area, just south of Kilmacredock Upper.</p>



Year	Description
	<p>There is a reservoir recorded to the northeast of the proposed development and south of Leixlip, called Leixlip Reservoir. A disused quarry is recorded along the eastern side of the River Liffey and south of Leixlip .</p> <p>All of these features are outside of the proposed development area.</p>
6" Cassini 1930s (OSI)	<p>The proposed development area is shown to predominantly comprise agricultural land and localised wooded areas such as a large forest to the south of the proposed development in Deerpark. Leixlip Demesne is to the eastern end of the proposed development. Ballygoran Reservoir, covered, appears to have expanded. The Leixlip Reservoir to the north of the proposed development is still there. The quarry to the eastern side of the River Liffey is no longer marked on the map. There are a number of overhead electricity wires that cross the proposed development area, in the east, middle and west.</p> <p>All of these features are outside of the proposed development area.</p>
Aerial 1995 (OSI)	<p>The proposed development area is being developed into a motorway (the M4) to by-pass Leixlip and Maynooth. It appears that the proposed route is in cut through Leixlip Demesne. Both Maynooth Town, to the west, and Leixlip Town, to the east, have expanded south towards the proposed development. A bridge crossing over the River Liffey has been developed, by-passing Leixlip and connecting the M4 with Lucan Town. Development of the Weston Airport has begun directly south of the eastern section of the proposed development. The Leixlip Hydro Plant appears to be developed to the south of Leixlip in the River Liffey, just north of the River Liffey Bridge. The dam associated with the plant impounds the water and forms a reservoir to the south of the M4 and Leixlip Town. It appears to have extended over some low-lying fields, expanding that section of the river, currently the Leixlip Reservoir ('River Liffey Hydro-Electric Stations', ESB).</p> <p>All of these features are outside of the proposed development area.</p> <p>The surrounding area is still predominately used for agricultural purposes with some housing and farming developments along the alignment of the M4. Celbridge has developed to the south of the proposed development.</p>
Aerial 2000 (OSI)	<p>The proposed development area is now predominately the M4. Further development of the M4 roadway is underway in the middle of the proposed development area, to construct exits off the motorway. Both Maynooth and Leixlip have expanded south towards the proposed development. Industrial developments such as Hewlett Business Park, Collinstown Industrial Park, Kildare and Maynooth Business Campus as well as Carton House Golf Club, have developed in the surrounding area to the M4. Celbridge is expanding north, with Crodaun Forest Park approximately &lt;1km south of the M4. All of these features are outside of the proposed development area.</p> <p>The surrounding area is still predominately used for agricultural purposes with some housing development along the alignment of the M4.</p>
Aerial 2005 (OSI)	<p>The proposed development area is predominately the M4 with a new junction, Junction 6 in the middle of the proposed development area. There is further development to the industrial sites mentioned in the Aerial 2000 maps, such as Hewlett Business Park, Collinstown Industrial Park, Carton House Golf Club, Maynooth Business Campus and Weston Airport. All of these features are outside of the proposed development area.</p>
Aerial 2020 (Google Maps)	<p>The proposed development area is predominately the M4.</p> <p>Some development occurring in the outskirts of the proposed development, such as Griffin Rath Manor Estate to the western end of the proposed development near Maynooth, Interchange Business Park near the centre of the proposed development and Weston Airport south of the proposed development. All of these features are outside of the proposed development area.</p>

**Table 5.17:** Review of Historical Maps and Aerial Photographs

### 5.10.1.4 Surface Soils Deposits

The most dominant soils within the proposed development area, in accordance with EPA National Soils dataset (SIS National Soils 2015) are the BminPD, a poorly drained basic mineral and BminDW, a deep well drained basic mineral. There is a localised area of shallow well drained mineral (BminSW) in the western section of the proposed development area, near Ballygoran. Along the alignment of the River Liffey, there are deposits of alluvial mineral (AlluvMIN). There are two Made Ground deposits within the proposed development area, one is located to the east of the River Liffey Bridge and the other is west of the proposed development area, south of Maynooth. Typically, Made Ground is comprised of variable materials of varying strengths and depths.

One area of cutover/cutaway peat is recorded approximately 0.9km outside and south of the proposed development area.

The five soil types throughout the proposed development area can be grouped into the following categories:

- BminPD is a poorly drained basic mineral that is of low importance for agriculture;
- BminDW is a deep well drained basic mineral that is of medium importance for agriculture;
- BminSW is a shallow well drained basic mineral that is of medium important for agriculture;
- Made ground is considered low importance for agriculture; and
- Alluvium is considered medium importance for agriculture.

Soils are also major components of ecosystems and a non-renewable resource. In accordance with the Environmental Impact Assessment Directive (2014/52/EU), threats to soil functions such as organic matter, erosion, compaction and sealing from increased land take needs to be limited and considered in the assessment of the project.

Soil Type	Description
BminPD	Poorly drained basic mineral
BminDW	Deep well drained basic mineral
BminSW	Shallow well drained basic minerals
AlluvMIN	Mineral alluvium
Urban	Made Ground

**Table 5.18:** List of Soils within proposed development area (EPA Classification)

### 5.10.1.5 Subsoil Deposits

Superficial deposits (subsoil) overlie the solid geology.

The subsoils mapping indicate that the proposed development area is dominated by Till derived from Limestone. Alluvial deposits are concentrated along the flood plains of the River Liffey.

Some of the Urban (Made Ground) from Maynooth crosses into the proposed development area, in the far western section.

The area of cutover/cutaway peat that is recorded in the soils section above also appears on the subsoils map at the same location, approximately 0.9km south, outside of the centre of the proposed development area.

A cluster of bedrock outcrops and subcrops are recorded within the western portion of the proposed development area north of Ballygoran and inside the proposed development area to the east along the River Liffey, south of Leixlip town.

The subsoil types as classified by the GSI Quaternary mapping within the proposed development area are listed in Table 5.19.

Soil Type	Description
A	Alluvium
Rck	Bedrock outcrop or subcrop
Soil Type	Description
TLs	Till derived from limestones
Urban	Made Ground

**Table 5.19:** List of Subsoils (Quaternary) within the proposed development area

### 5.10.1.6 Bedrock Geology

The bedrock geology underlying the proposed development area comprises the Carboniferous Lucan, Tober Colleen and Waulsortian Limestones formations. Refer to Table 5.20 for descriptions of each of these lithologies.

The Lucan formation underlies the majority of the proposed development area aside from a sequence of the Tober Colleen formation (a calcareous shale and limestone conglomerate) overlying the Waulsortian limestone in the anticlinal fold to the western end of the proposed development area. The anticline appears to be striking 65 degrees northwest with a dip of 35 degrees.

The outcrop and sub cropping features within the proposed development area are located to the western end north of Ballygoran. The outcrops and sub crops are in the Tober Colleen Formation, crossing into the Waulsortian Limestone formation. The shallow bedrock cuts across a fault running west to east. There is a cluster of shallow outcrops and subcrops to the eastern end of the proposed development area. These outcrops and sub crops follow the alignment of the River Liffey.

One outcrop cuts across the proposed development area, one is located outside the proposed development area to the south and the rest are clustered just north, outside of the proposed development area.

There is a cluster of outcrops and sub crops outside of the proposed development area in Maynooth. There is a cluster to the north of Maynooth and one to the south of Maynooth.

There is a cluster of outcrops and sub crops south of the M4/N4 near Leixlip, just outside of the proposed development area.

There is a northwest to southeast running fault to the northwest outside of the proposed development area. The fault cuts across the Lucan Formation and the Tober Colleen and Waulstorian anticline. A northeast to southwest running fault crosses the N4 immediately east of the proposed development area.

Geological Period	Formation	Description (Lithological Summary)
Middle Carboniferous	Lucan Formation	A dark limestone and calp shale. The Lucan formation is approximately equivalent to the Calp of Marchant and Sevastopulo (1980). The formation comprises dark-grey to black, fine-grained, occasionally cherty, micritic limestones that weather paler, usually to pale grey. There are rare dark coarser grained calcarenitic limestones, sometimes graded, and interbedded dark-grey calcar
Middle Carboniferous	Tober Colleen Formation	A calcareous shale, limestone conglomerate. The section is exposed in boreholes at Hunstown and Feltrim quarries. Dark-grey, calcareous, commonly bioturbated mudstones and subordinate thin micritic limestones.
Lower Carboniferous	Waulsortian Limestones	A massive, unbedded lime-mudstone. The name Waulsortian Limestones is taken from rocks of similar lithology and age in Belgium.

**Table 5.20:** Summary of Bedrock Geology

### 5.10.1.7 Karst Features

There are no karst features recorded within the proposed development area.

However, the underlying bedrock geology may be susceptible to karst as karst features were recorded in the same formations outside of the proposed development area. The three karst features recorded by the GSI outside the proposed development area are as follows:

- A spring titled St. Columbs well, within the Lucan Formation, located in the centre of the region, north of Leixlip in Newtown;
- A cave within the Tober Colleen Formation is located in the centre of the region, within the Carton Demesne; and
- A second cave within the Tober Colleen Formation is located in the centre of the region, within the Carton Demesne.

### 5.10.1.8 Aquifer Type and Classification

The majority of the proposed development area is underlain by bedrock classified as a Locally Important aquifer (LI) with a minor section (680m long) between Junction 7 and 6 being classified as a Poor Aquifer (PI).

### 5.10.1.9 Aquifer Vulnerability

The aquifer vulnerability in the proposed development area ranges from Extreme to Moderate. The extreme vulnerability areas, including sections where rock is close to surface, are located at Ballygoran, between Junction 7 and Junction 6 and also from the River Liffey crossing to the east of the proposed development area.

### 5.10.1.10 Groundwater Supplies

There are no Public or National Federation of Group Water Scheme groundwater supplies in the proposed development area.

### 5.10.1.11 Hydro-Ecology

There are no groundwater dependant terrestrial ecosystems in the proposed development area.

### 5.10.1.12 Slope Stability

The GSI has developed a landslide susceptibility map for the Republic of Ireland.

Generally, landslide susceptibility is correlated to the topography, so the areas with higher landslide susceptibility are in the higher, steeper elevations, coastal cliffs and valley sides. The majority of the proposed development area has a low and low inferred landslide susceptibility. There is a moderately low landslide susceptibility outside of the proposed development area south and north of the River Liffey and at Ballygoran. The surrounding area outside of the proposed development has a landslide susceptibility of low or low inferred.

There are no recorded landslides within the proposed development area, however there is one landslide recorded outside of the proposed development area in the northwest of Lucan in Laraghcon, on the banks of the River Liffey.

### 5.10.1.13 Contaminated Sites and Unsuitable Material

Potential sources of contamination within the proposed development area have been investigated and identified into the following four categories as described in the following sections:

- Landfills (licensed and historical);
- Pits, quarries and mines (historical);
- Industrial facilities (licensed and historical); and

- Historical land use contamination.

Publicly available records both online and within Kildare County Council and South Dublin County Council have been consulted to determine the type and location of sites that are possibly contaminated or could store unsuitable material. It is possible there are such facilities that are not officially recorded and therefore these are not reported in this document.

### Landfills

In 1996 the EPA began licensing certain activities in the waste sector. These include landfills, transfer stations, hazardous waste disposal and other significant waste disposal and recovery activities.

According to the EPA Licenced Waste Facility historical land fill records, waste permitted datasets, there are no licenced waste facilities, known historical (or 'legacy') landfill, no current or historical waste facility permits within the proposed development area.

According to the EPA there is no Water Framework Directive (WFD) Article 5 Landfill site recorded within the proposed development area which is classified as an Industrial Emissions site.

### Pits, Quarries and Mines

Historical pits and quarries are potential sources of ground contamination or unsuitable material as the nature of backfill material is generally highly variable and unregulated. According to the GSI records there are no pits or quarries within the proposed development area. There are 14 historical pits and 24 historical quarries adjacent and outside the proposed development area. There is a large cluster of historic pits and quarries to the eastern end outside the proposed development, surrounding Leixlip Town. There is one early to mid-20<sup>th</sup> century quarry directly outside the proposed development area, to the south towards the western end.

The Department of Communications, Energy and Natural Resources show no historic records within the proposed development area.

### Industrial Facilities

Existing industrial sites may potentially be a source of local contamination and/or restrictions due to site activities or licence controls. However, these sites operate within the EPA Industrial Emissions (IE) and Integrated Pollution Control (IPC) licence framework and due to the regulated nature of their activities, the risk of contamination is low. There are no IPC or IE sites within the proposed development area.

### Historic Land Use Contamination

Land contamination is related to site history and previous land use which can leave contaminants in the ground depending on historic site activities. The extent of soil contamination from historic land uses are typically localised. The NRA Guidelines (National Roads Authority, 2008) do not define specifically what is a heavy or light industry. The following categories are recommended:

Heavy industries include:

- Medium to large scale industries, such as power stations, gas works, wastewater treatment plants, other municipal facilities, etc.

According to the OSI review of 1830's and 1890's historic mapping, the EPA records and aerial photos, no light to medium to large-scale industries are located within the proposed development area. To the north outside the proposed development area a historic gas works is recorded in Maynooth, near Maynooth University (E69333, N73727).

- Industries that involve significant amounts of harmful chemicals or metals such as dry cleaning, soap works, smithy, foundry, lime kilns etc.

According to the OSI review of 1830's and 1890's historic mapping none are located within the proposed development area.

According to the EPA records, a historic rail tramway lies approximately 1.4km north of the proposed development area.

### 5.10.1.14 Economic Geology

The economic geological features within the proposed development area have been subdivided into the following categories:

- Crushed Rock Aggregate Potential;
- Granular Aggregate Potential;
- Active pits, mines and quarries;
- Mineral resource locations; and
- Subsoil deposits important for agriculture.

#### Granular Aggregate Potential

The GSI Granular Aggregate Potential Mapping categorises granular superficial deposits in terms of aggregate resource into five levels, from very high potential to very low potential not defined.

The proposed development area has very low granular aggregate potential along the western side of the River Liffey and has moderate granular aggregate potential between the M4/N4 and the River Liffey, in the eastern side of the proposed development area. The remaining proposed development area has no aggregate potential.

#### Crushed Rock Aggregate Potential

GSI carried out national crushed rock aggregate potential mapping between 2007 and 2013. The maps are compiled based on the lithology, as well as existing and historic quarry activity. The final scores have five bands ranging from very low potential (blue) to very high potential (red) and have been applied to the Republic of Ireland.

The crushed rock aggregate potential across the proposed development area is as follows: (GSI, 2019).

- An isolated strip of low to moderate potential cuts across the proposed development area in the eastern section, near Ballygoran;
- An isolated strip of low potential cuts across the proposed development area. This area of low potential follows the alignment of the River Liffey near Leixlip and along the M4/N4;
- Moderate potential occurs along the majority of the proposed development area, at Moneycooly and between Barrogstown and Leixlip;
- High to very high potential of crushed aggregate is located to the west of the proposed development area, along Ballygoran north, near Maynooth and Mooneycooley north; and
- High to very high potential is located to the east of the proposed development area, near Leixlip.

### Active Mines, Active Pits and Quarries

The GSI 2014 Quarry Directory was consulted. There are no recorded active mines, crushed rock quarries, dimensioned stone quarries or sand and gravel within the proposed development area.

The Department of Communications, Energy and Natural Resources show no active mines within the proposed development area.

### Mineral Resources Locations

There are no mineral resource locations within the proposed development area according to the GSI Mineral Localities database.

The Exploration and Mining Division website and the Geological Survey Ireland website has been reviewed to check on the status of mine licencing within the proposed development area.

The proposed development area is located within two prospecting licences. The western section of the proposed development area is prospecting licence 3329. In the centre of the proposed development area is prospecting licence 3614. Both licenses are held by Teck Ireland Limited. The target of the licenses is for base metals, barytes, gold, ores of silver and ores of platinum group elements. The start date for each license is the 26<sup>th</sup> of January 2012.

The GSI website has recorded a verified borehole that was historically used for mineral prospecting in the Waulsortian Reef Bedrock to the west of the site, just south of Maynooth. The borehole within the proposed development area, RN 3329-4, recorded 'coarsely crystalline dolomite'.

### 5.10.1.15 Geological Heritage

A database of geological heritage sites is maintained by the GSI in partnership with the National Parks and Wildlife Service (NPWS).



There are no geological heritage sites that are on a national scale or county scale within the proposed development area.

### 5.10.2 The Proposed Development

The proposed development involves some localised pavement widening works at Junction 5 and Junction 6 and at the emergency refuge areas (ERA) locations.

Widening comprises the following:

#### Junction 6 Celbridge

There is 700mm of widening proposed on the approach to the eastbound slip road which is in cut (<1m) and on the slip road embankment. This will impact the poorly drained basic mineral (BminPD) soil deposits and limestone glacial till sub soil deposits.

#### Junction 5 Leixlip

There is a 1m widening of the approach to the eastbound slip road which is in cut (<1m) and also on the embankment of the slip road. This will impact Made Ground soil deposits and also glacial till sub soil deposits.

#### River Liffey Bridge

There is no widening proposed at the encroaching embankments or on the River Liffey Bridge.

#### Emergency Refuge Areas

The widening at each of the ERA's comprises the following:

ERA No. 1, 3 and 4 require the existing embankment to be widened by a maximum of 6m with heights that range from 1.80m to 2.60m. The widening of the embankment will comprise the stripping of Surface and Subsoils to a competent bearing stratum and constructing a retained embankment with suitable granular engineering fill. These ERA's are located between Junction 7 and Junction 6 and are all located in the Deep well drained basic mineral (BminDW) Surface Soils and Limestone Glacial Till. Shallow bedrock is located at ERA No. 2 as outlined above.

ERA No. 2, 5, 6, 7 and 8 require the existing cut slope to be extended north with cut heights between approximately 1m and 3m. It is proposed to retain the cuts in ERA No. 2, 5, 6 and 7 using a suitable retention system to minimise the earthworks footprint and therefore the impact on the environment.

### 5.10.3 Assessment of Effects

The proposed development involves widening of the existing carriageway primarily into the central reserve. Widening into the nearside verge is proposed in the vicinity of Junction 5 and Junction 6. The eight Emergency Refuge Areas (ERA's) are each 90m in length. These ERA's are located to the north of the eastbound carriageway. There are no proposals to widen the existing River Liffey Bridge.

From the assessment of impacts above and using the impact rating criteria set out in Box 5.1 of the NRA, 2008 Environmental Impact Assessment of National Road Schemes – a Practical Guide, the following Land, Soils and Hydrogeology attributes are impacted by the proposed development:

- **Surface Soils**, Deep well drained basic mineral (BminDW) and Shallow well drained basic minerals (BminSW) which are important for agriculture will be impacted by the proposed ERA's. Where widening is proposed at Junction 6 and Junction 5, the poorly drained basic mineral (BminPD) and Made Ground deposits will be impacted. Widening at junctions and ERA's will result in Surface Soils being removed. The magnitude of the impact is considered small adverse as the footprint of the removal of Surface Soils is not extensive.
- **Subsoil** Deposits of till derived from limestone will be removed in areas where ERA's are in cut. Fill will be placed on the deposit in areas where the ERA's are in fill. This till is extensive throughout the site and region therefore the localised impact of the removal or filling on this deposit is considered small adverse.
- The presence of **shallow bedrock** in the Tober Colleen Formation to the north of Ballygoran, west and east of the R405 Ballygoran Overbridge and Junction 7 Maynooth, will require the excavation of the bedrock as the existing profile of the M4 at this location is in cut. The excavated bedrock may be suitable for reuse within the project during construction. This impacts any widening to be undertaken at the Ballygoran Overbridge and also the proposed ERA No. 2 to the west of this bridge. This impact is considered small adverse.
- Excavation of the **Bedrock Aquifer** to the north of Ballygoran, west and east of the R405 Ballygoran Overbridge associated with ERA No. 2 has the potential to impact on the groundwater flow regime and reduce its ability to provide baseflow to groundwater dependant habitats and or water supplies. The underlying limestone bedrock is defined as a locally important aquifer and there will be minimal excavation into the limestone rock. Therefore, this impact is considered imperceptible.
- The mobilisation of contaminants into the **Bedrock Aquifer** in areas associated with ERA No. 2 either through accidental spillage or disturbance of contaminated ground during excavation will reduce the quality of the groundwater within the aquifer. The impact is considered moderate adverse as it results in a temporary potential medium risk of pollution to groundwater from routine runoff during construction.
- There are no **Karst** features within the proposed development area however Karst features are recorded elsewhere in the bedrock types underlying this area. Excavation of existing rock slopes could encounter an unmapped Karst feature. This impacts excavations in bedrock which as described above are possibly in the vicinity of Ballygoran Bridge. This impact is considered small adverse.
- The proposed **Earthworks** at each of the junctions will require widening of the existing slip road embankments and where ERA's are in fill namely, ERA No. 1, 3 and 4, embankments will need to be constructed.

The bulk earthworks volumes for the project are 8,100m<sup>3</sup> of cut and 480m<sup>3</sup> of fill and are generally concentrated at the location of the ERA's. The earthworks are considered to have a small adverse impact. The cut material will be reused where the excavated material is suitable for reuse as engineering fill.

The attributes of slope stability, contaminated sites and unsuitable material, economic geology and geological heritage are not impacted by the proposed development and therefore the development has a negligible impact on these attributes during both construction and operation.

Taking the findings of the above assessment into consideration, the impact of the proposed development on the Land, Soils, Geology and Hydrogeology ranges from moderate adverse to negligible during construction and negligible during operation of the proposed development.

## 5.11 Material Assets

This section describes the material assets in the form of land use and utilities that could potentially be affected by the proposed development.

### 5.11.1 Land Use

#### 5.11.1.1 Amenities (Open Spaces, Recreation and Tourism and Leisure Related)

There are no amenities located within the proposed development area.

#### 5.11.1.2 Residential Properties

Residential properties located in the vicinity of the proposed development are discussed previously in Section 4.2.

#### 5.11.1.3 Industrial and Commercial Properties

Adjacent to the proposed development area there are a number of business parks including the M4 Business Park, the Maynooth Business Campus, and the Liffey Business Campus (former HP site).

### 5.11.2 Utilities and Services

#### 5.11.2.1 Irish Water (Water Supply and Foul Sewer Infrastructure)

Storm watermains are located in much of the existing M4/N4 mainline, from Maynooth to Leixlip.

Numerous watermains are evident throughout the proposed development area running adjacent to the M4/N4 mainline. Watermains cross the M4/N4 at various locations, usually utilising an existing overbridge although also traversing under the M4/N4 mainline at times. There is a reservoir located east of Junction 7 Maynooth with various watermain inlets and outlets.

Leixlip Hydro Station and Leixlip Drinking Water Treatment Plant are situated west of Junction 5 Leixlip.

Gravity fed foul wastewater network mainline crossings are evident at Junction 7 Maynooth, the R404 and west of the River Liffey Bridge. There is a combined sewer crossing at Junction 5 Leixlip.

#### 5.11.2.2 Electricity

There is one overhead HV ESB lines within the proposed development area. This is located east of Junction 7 Maynooth.

Underground HV lines are located adjacent to the Ballygoran Road and end at a sub-station also located on the Ballygoran Road.

There is a LV/MV overhead crossing located between Junction 6 Celbridge and Junction 5 Leixlip.

### 5.11.2.3 Gas Networks Ireland

Decommissioned gas infrastructure is evident west of Junction 6 Celbridge. Low pressure gas infrastructure is evident east of Junction 6 Celbridge. Medium pressure gas infrastructure is evident throughout the proposed development area with an underground mainline crossing east of the R405 Ballygoran Road Overbridge and a mainline crossing on the R404 Celbridge Road Overbridge.

### 5.11.2.4 Telecoms

Numerous EIR infrastructure is evident within the proposed development area with at-grade crossings at Junction 7 Maynooth and Junction 5 Leixlip.

Mainline crossings are also evident at the M4 Business Park, the R404 Celbridge Road Overbridge and east of Junction 5 Leixlip.

There is a small quantity of BT infrastructure located at Junction 6 Celbridge and adjacent to Barnhall Road. Further BT infrastructure crosses the mainline on the R404 Celbridge Road Overbridge.

UPC infrastructure is evident throughout the proposed development area with mainline crossings located at Junction 6 Celbridge, the R405 Ballygoran Road Overbridge, the R404 Celbridge Road Overbridge, Junction 5 Leixlip and east of Junction 5 Leixlip.

## 5.11.3 Assessment of Effects

In relation to land use, no third-party landtake is required as part of the proposed development. No amenities, residences or industrial or commercial facilities will be directly affected by the proposed development. There will be no change in land use as a result of the proposed development. Therefore, no significant effects on land use are predicted during construction or operation of the proposed development.

Gas services will not be affected during the construction or operation of the proposed development, as such no significant effects on these services are predicted. Telecom services will be affected during the construction of the proposed development. New telecom services will be installed as part of the proposed development. No significant effects on these services are predicted.

Works are proposed to relocate and protect (as necessary), the existing water and electricity services as part of the proposed development.

## 6 Conclusion

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The proposed development does not meet the criteria for mandatory EIA outlined in Section 50(1)(a) of the Roads Act 1993, as amended, nor in Article 8 of the Roads Regulations 1994 (S.I. No. 119 of 1994), as amended.

An EIA screening assessment is required, in accordance with the criteria specified in Annex III of the EIA Directive, to determine whether or not the proposed road development would be likely to have significant effects on the environment as per Section 50(1)(e) of the said Roads Act.

This EIA Screening Report provides the information necessary for the competent authority, Kildare County Council, to undertake the EIA Screening Assessment and to make an EIA Screening Determination.

Potential negative effects on the environment were identified throughout the course of this assessment however these were not considered to be significant negative effects.

For the reasons set out in detail in this EIA Screening Report, including the location of the proposed development along the existing M4/N4, the low value of the ecology within the proposed development area, the minor increase in impermeable area (and associated runoff), and the distance from designated sites, species and habitats, it is the opinion of Arup that the proposed development will not have significant effects on the environment and that an EIA is not required.

The final determination on EIA Screening will be made by the competent authority, Kildare County Council.

The EU Guidance on Screening (2017) contains an EIA Screening Checklist which has been completed for the proposed development. The completed EIA Screening Checklist (Appendix A) supports the conclusion by Arup that the proposed development is unlikely to have significant effects on the environment and, as such, an EIA for the proposed development is not required.

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Transport Infrastructure Ireland (2011) Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes. Available from: <https://www.tii.ie/technical-services/environment/planning/Guidelines-for-the-Treatment-of-Air-Quality-during-the-Planning-and-Construction-of-National-Road-Schemes.pdf>



## **Appendix A**

### **EIA Screening Checklist**

## A1 EIA Screening Checklist

Brief Project Description – Provision of a Bus Priority Measure - Checklist Criteria	Yes/No	Is this likely to result in a significant effect? Yes/No
1. Will construction, operation or decommissioning of the project involve actions which will cause physical changes in the locality (topography, land use, changes in waterbodies, etc.)?	Yes	No.  The proposed development represents a continuation of the existing land use as a transport corridor. The physical changes in the locality due to the construction and operation of the proposed development will be within the context of the existing transport corridor. Receptors include the immediate surrounding areas which consist of residential, commercial and agricultural land. Land acquisition will not be required as part of the proposed development and there will be no change to land use.
2. Will construction or operation of the project use natural resources such as land, water, materials or energy, especially any resources which are non-renewable or in short supply?	Yes	No  Construction of the proposed development will require the use of standard construction materials, such as aggregate, concrete etc. During operation, there will be road maintenance which will also consume natural resources. However, no significant use of these resources is predicted.
3. Will the project involve use, storage, transport, handling or production of substances or materials which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health?	Yes	No.  Storage, transport, handling or production of materials is not considered to give rise to likely significant environmental effects. All materials to be used, handled or generated will be typical construction/excavation materials and are not considered a risk to the environmental or human health.

Brief Project Description – Provision of a Bus Priority Measure - Checklist Criteria	Yes/No	Is this likely to result in a significant effect? Yes/No
4. Will the project produce solid wastes during construction or operation or decommissioning?	Yes	<p>No</p> <p>Construction activities will include the excavation of materials within and adjacent to the existing road boundary. These construction activities are likely to generate waste/materials from excavated materials (concrete, made ground and topsoil). The proposed development will aim to avoid or minimise generation of waste through re-use of site-won material (subject to it meeting the appropriate engineering standard). However, spoil to be recovered off site will be transported and disposed of in accordance with the requirements of relevant legislation i.e. Waste Management Act 1996 and Amendments and Waste Collection Permit Regulations.</p>
5. Will the project release pollutants or any hazardous, toxic or noxious substances to air or lead to exceeding Ambient Air Quality standards in Directives 2008/50/EC and 2004/107/EC?	Yes	<p>No.</p> <p>Construction works may generate dust at a local level, but these works will be temporary and not at a scale that would have a significant effect on local air quality.</p> <p>During operation, there will be no appreciable change in existing traffic flows and as such, no significant negative effects are predicted.</p>
6. Will the project cause noise and vibration or release of light, heat energy or electromagnetic radiation?	Yes	<p>No.</p> <p>The construction works will likely generate noise during the works however the effects will be temporary and not significant.</p> <p>During operation, there will be no appreciable change in existing traffic flows. In addition, although the proposed bus priority measure within the existing hard shoulder and ERA's will be closer to sensitive receptors, potential effects are predicted to be negligible.</p> <p>Noise barriers will be included as part of the proposed development and will have a positive impact on receptors in the vicinity.</p>

Brief Project Description – Provision of a Bus Priority Measure - Checklist Criteria	Yes/No	Is this likely to result in a significant effect? Yes/No
7. Will the project lead to risks of contamination of land or water from releases of pollutants onto the ground or into surface waters, groundwater, coastal waters or the sea?	Yes	<p>No</p> <p>During the construction phase, there is a risk of potential pollutants entering the existing drainage network and entering the surrounding watercourses. However, given the distance between the project boundary and noting that there is circa 10% increase in the impervious area, there will be no perceptible change to the run-off characteristics (quantity and quality) as a result of the proposed development.</p> <p>During operation, there will be no appreciable change in existing traffic flows and therefore there will be no additional discharges to existing drainage system compared to the existing scenario.</p>
8. Will there be any risk of accidents during construction or operation of the project which could affect human health or the environment?	Yes	<p>No.</p> <p>Construction works are required to be carried out on an existing road however traffic management plans will be put in place to ensure the safety of those carrying out the works and road users.</p> <p>Traffic flow will need to be maintained throughout the duration of the project construction. It is envisaged that a Narrow Lane System in conjunction with a Roadworks Speed Limit Order of 80km/h will be required to implement the proposals on site. The project will aim to maintain two number M4/N4 eastbound traffic lanes during peak times. This will only be reduced during off-peak times to facilitate critical works. The construction process will be planned to accommodate existing traffic flows and the daily operations adjacent to the project.</p> <p>Signs erected for traffic safety and control purposes will be manufactured, installed, and maintained in accordance with the Traffic Signs Manual and associated documents.</p>
9. Will the Project result in social changes, for example, in demography, traditional lifestyles, employment?	Yes	<p>Yes</p> <p>The proposed development will facilitate improved public transport in the long term. It will allow for greater accessibility to sustainable transport modes.</p>

Brief Project Description – Provision of a Bus Priority Measure - Checklist Criteria	Yes/No	Is this likely to result in a significant effect? Yes/No
10. Are there any other factors which should be considered such as consequential development which could lead to environmental effects or the potential for cumulative impacts with other existing or planned activities in the locality?	Yes	No  No other permitted projects were identified which could give rise to significant negative effects.
11. Is the project located within or close to any areas which are protected under international, EU, or national or local legislation for their ecological, landscape, cultural or other value, which could be affected by the project?	Yes	No  The proposed development is located approximately 500m (at the closest point) from the Rye Water Valley/Carton SAC. The existing drainage system drains to the River Liffey which is located upstream of a number of designated sites. Given the distance between the project boundary and circa 10% increase in the impervious area, there will be no perceptible change to the run-off characteristics (quantity and quality) as a result of the proposed development.
12. Are there any other areas on or around the location which are important or sensitive for reasons of their ecology e.g. wetlands, watercourses or other waterbodies, the coastal zone, mountains, forests or woodlands, which could be affected by the project?	No	No
13. Are there any areas on or around the location which are used by protected, important or sensitive species of fauna or flora e.g. for breeding, nesting, foraging, resting, overwintering, migration, which could be affected by the project?	No	No

Brief Project Description – Provision of a Bus Priority Measure - Checklist Criteria	Yes/No	Is this likely to result in a significant effect? Yes/No
14. Are there any inland, coastal, marine or underground waters (or features of the marine environment) on or around the location that could be affected by the project?	Yes	No  The proposed development is within proximity of a number of watercourses (such as the River Liffey). There are a number of EU Designated sites downstream of the proposed development. Given the distance between the project boundary and circa 10% increase in the impervious area, there will be no perceptible change to the run-off characteristics (quantity and quality) as a result of the proposed development.
15. Are there any areas or features of high landscape or scenic value on or around the location which could be affected by the project?	Yes	No.  Refer to Section 5.4.8 above.
16. Are there any routes or facilities on or around the location which are used by the public for access to recreation or other facilities, which could be affected by the project?	Yes	No.  During construction there may be a need to divert traffic, however a Construction Traffic Management Plan will be implemented to ensure that no significant effects will occur.  During operation, there will be a bus priority measure within the existing hard shoulder which will enhance the use of public transport.
17. Are there any transport routes on or around the location which are susceptible to congestion, or which cause environmental problems, which could be affected by the project?	Yes	Congestion is one of the most significant challenges facing the Greater Dublin Area and needs to be addressed to safeguard the growth of the Greater Dublin Area. The intention for the proposed development is to enhance bus priority on the M4/N4 corridor to relieve congestion.  During operation, there will be a bus priority measure within the existing hard shoulder which will enhance the use of public transport.
18. Is the project in a location where it is likely to be highly visible to many people?	Yes	No  Significant effects are not predicted due to the proposed development being located within an existing transport corridor.  Refer to Section 5.4.8 for further details.

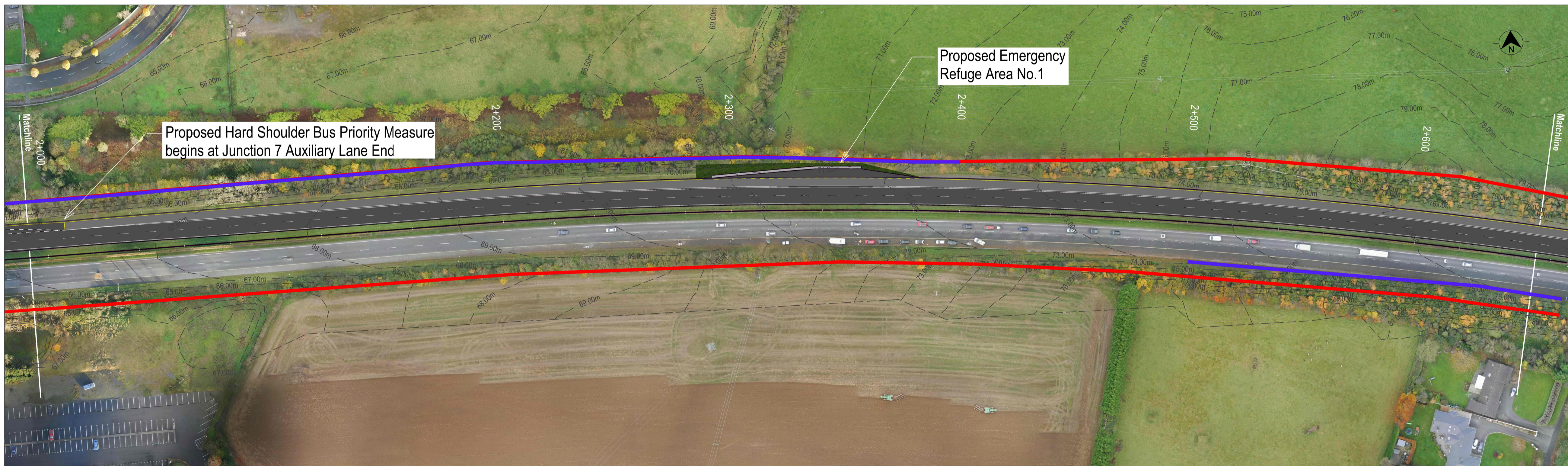
Brief Project Description – Provision of a Bus Priority Measure - Checklist Criteria	Yes/No	Is this likely to result in a significant effect? Yes/No
19. Are there any areas or features of historic or cultural importance on or around the location which could be affected by the project?	Yes	No.  The proposed development will not impact on the archaeological, architectural or cultural heritage of the area due to the low impact nature of the works and the fact that the footprint of the existing corridor has been disturbed by the construction of the existing road. Any archaeological sites located within the footprint of the road represent a record of sites that were previously excavated prior to construction of the existing motorway. Therefore, no significant negative effects on the archaeology, architecture and cultural heritage are predicted.
20. Is the project located in a previously undeveloped area where there will be loss of greenfield land?	Yes	No.  The proposed development will involve incorporating a bus priority measure within the existing hard shoulder on the eastbound carriageway of the M4/N4, however only small areas of land will be affected, and this land is not considered to be of a high value.
21. Are there existing land uses on or around the location e.g. homes, gardens, other private property, industry, commerce, recreation, public open space, community facilities, agriculture, forestry, tourism, mining or quarrying which could be affected by the project?	Yes	No.  No third party land acquisition is required as part of the proposed development.
22. Are there any plans for future land uses on or around the location which could be affected by the project?	No	No. There are no known or approved significant developments that may potentially be affected by the proposed road development. All works are localised and limited to the existing transport corridor.
23. Are there any areas on or around the location which are densely populated or built-up, which could be affected by the project?	Yes	No.  Both Maynooth and Leixlip are located to the north of the proposed development and Celbridge is located to the south. However, the proposed development does not pass through these towns.

Brief Project Description – Provision of a Bus Priority Measure - Checklist Criteria	Yes/No	Is this likely to result in a significant effect? Yes/No
24. Are there any areas on or around the location which are occupied by sensitive land uses e.g. hospitals, schools, places of worship, community facilities, which could be affected by the project?	No	No
25. Are there any areas on or around the location which contain important, high quality or scarce resources e.g. groundwater, surface waters, forestry, agriculture, fisheries, tourism, minerals, which could be affected by the project?	Yes	No.  Refer to Screening Checklist Item 11 for further information.
26. Are there any areas on or around the location which are already subject to pollution or environmental damage e.g. where existing legal environmental standards are exceeded, which could be affected by the project?	Yes	No.  The air quality concentrations recorded by the EPA is shown to be within the air quality standards with the exception of NO <sub>x</sub> in Zone A.  However, due to the negligible change in traffic flows during the operational phase, the temporary and minor nature of the construction works along with the implementation of appropriate mitigation measures, no significant negative effects are predicted. Refer to Section 5.5.3 for further details.
27. Is the project location susceptible to earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions e.g. temperature inversions, fogs, severe winds, which could cause the project to present environmental problems?	Yes	No.  Attenuation controls will be incorporated as part of the design to lower the risk of potential flooding. Refer to Section 5.9.2 for further details.






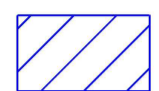

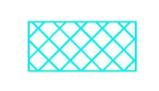


## **Appendix B**

### Drawings



**Part 8 Planning**

**LEGEND - PLAN**

-  Proposed Hard Shoulder Bus Priority Measure (surfaced in low noise surfacing)
-  Resurfaced with low noise surfacing
-  Proposed Development Boundary
-  Proposed Site Compound
-  Proposed Sediment Pond with Oil Separator
-  Proposed Oil Separator
-  Proposed Active Travel Facility
-  Proposed Noise Barrier. The height varies from 2m to 3.5m

**Notes**  
1. The proposed noise barrier locations shown are indicative only and are subject to change. Further detailed assessments, design and on-going studies may result in amendments to the location, length and height of the proposed noise barriers.

**Clients**



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1:1000

**Role**  
Civil - Highways

**Date**  
October 2022

C01	01/10/2022	AM	SB	SB
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P01	25/01/2022	AM	SB	SB
Issued For Information (Status S2)				
Issue	Date	By	Chkd	Appd

**Drawing Title**  
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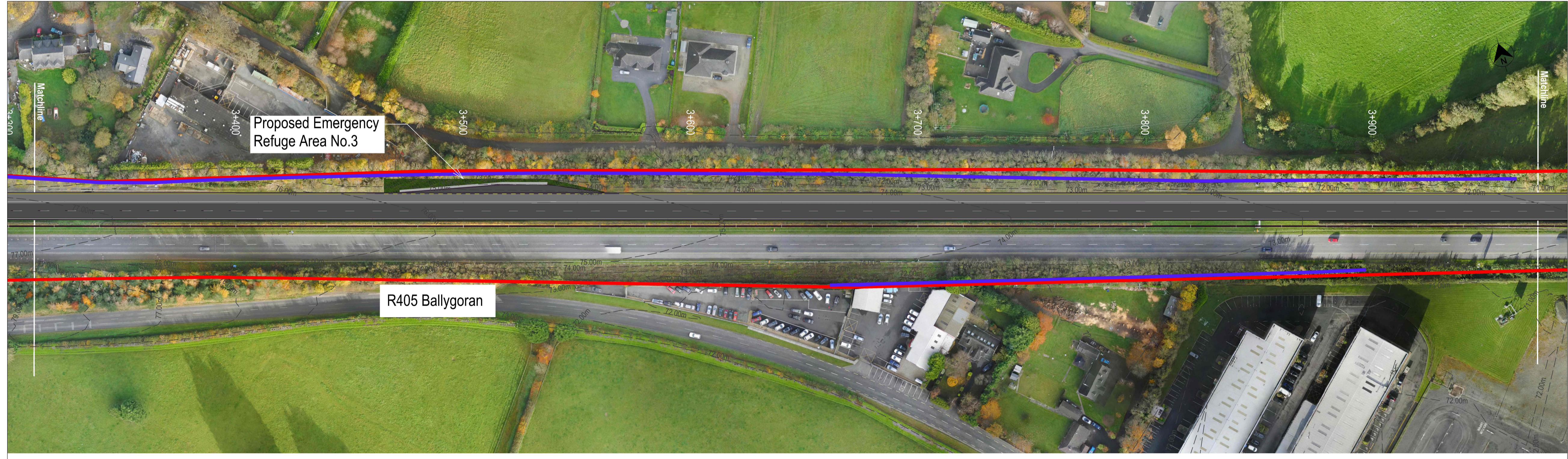
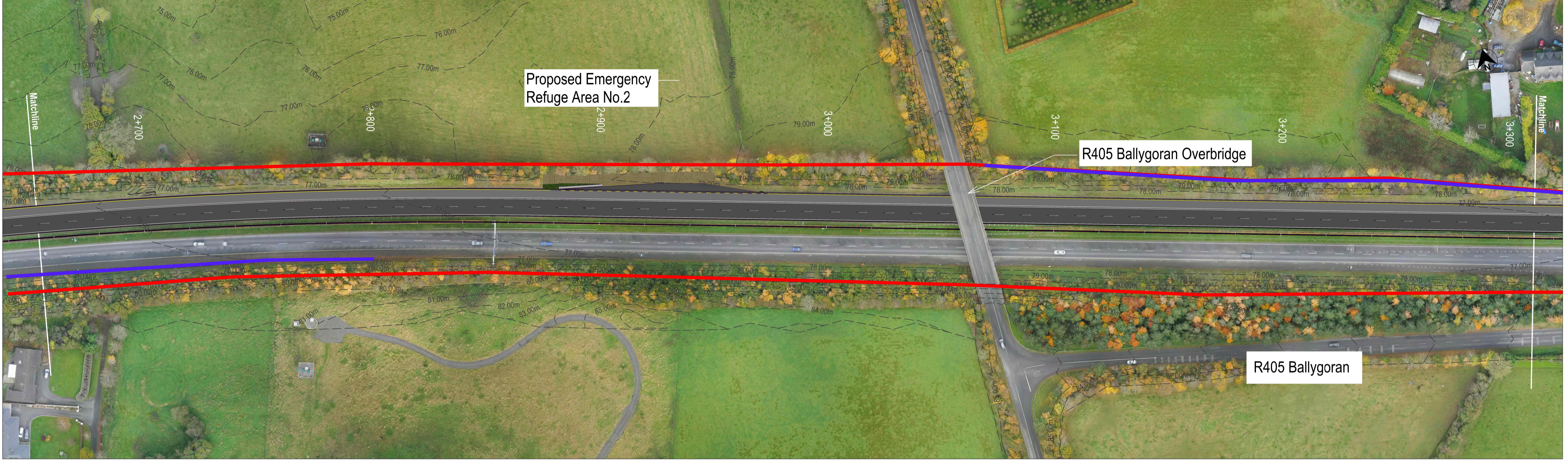
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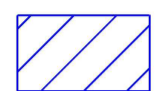
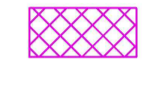
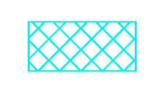


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**Part 8 Planning**

**LEGEND - PLAN**

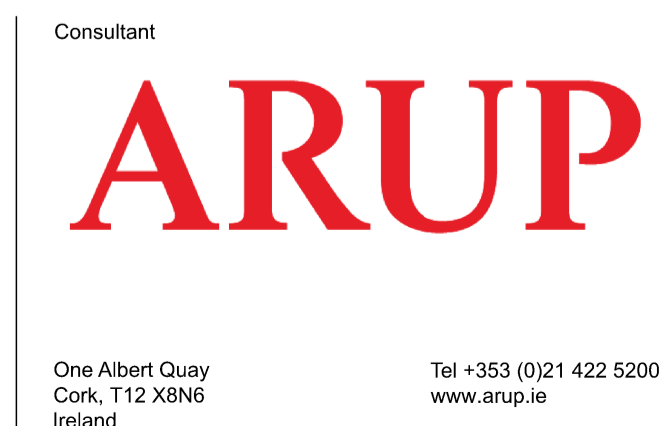
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**Role**  
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**Drawing Title**  
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**Sheet 2 of 7**

**Suitability**  
A1 - Suitable for Part 8 Planning

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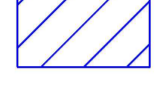




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**Part 8 Planning**

**LEGEND - PLAN**

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**Job Title**  
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1:1000

**Role**  
Civil - Highways

**Date**  
October 2022

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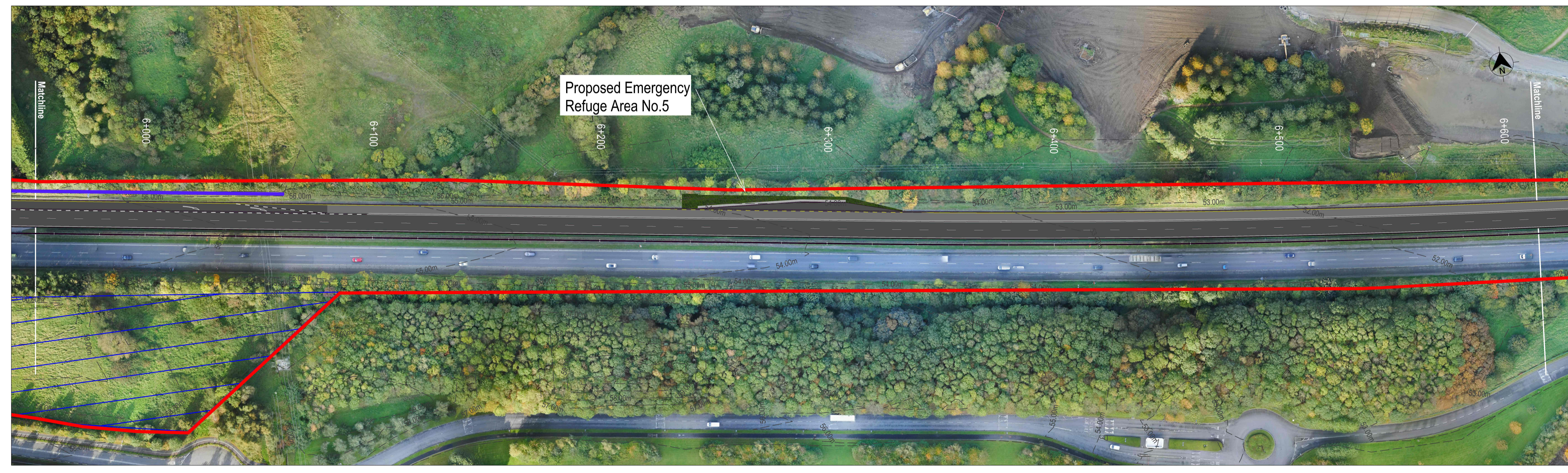
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**Suitability**  
A1 - Suitable for Part 8 Planning

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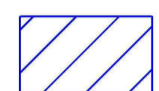
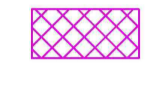



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**Part 8 Planning**

**LEGEND - PLAN**

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1:1000

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**Date**  
October 2022

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**Drawing Title**  
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**Sheet 4 of 7**

**Suitability**  
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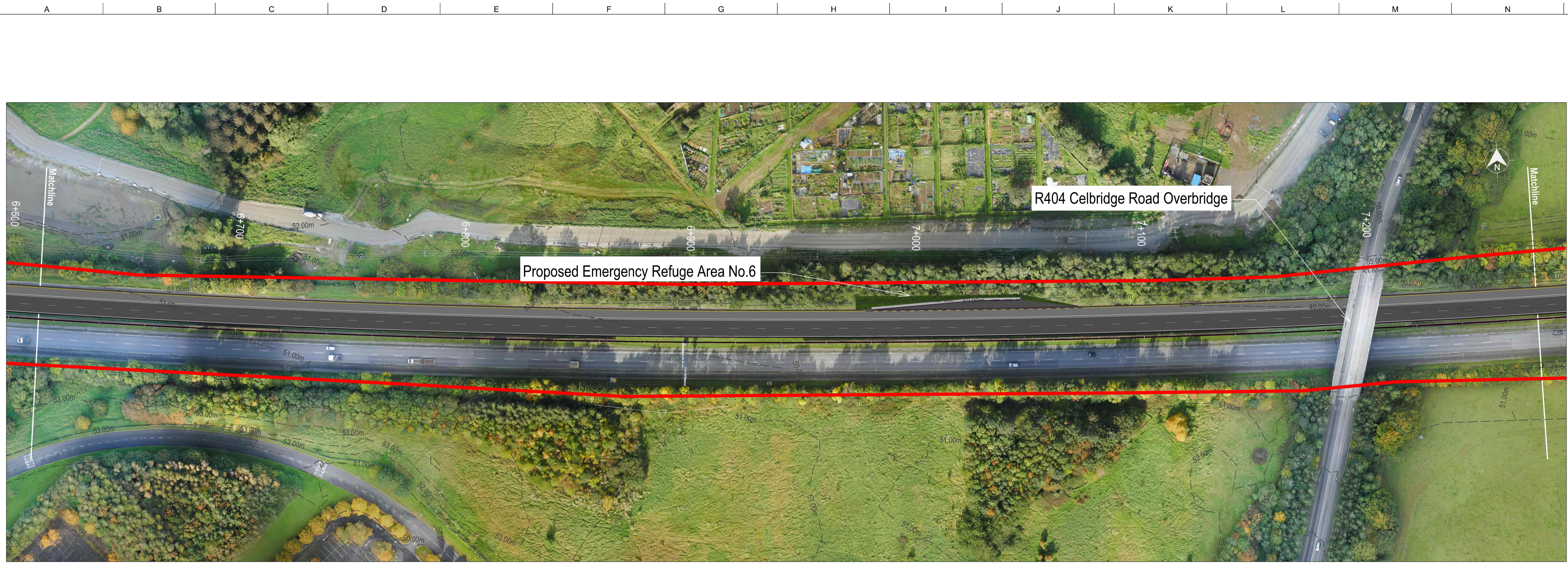
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**FOR INFORMATION**

**LEGEND - PLAN**

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Scale at A1  
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**Civil - Highways**

Date  
**October 2022**

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C01	01/10/2022	AM	SB	SB
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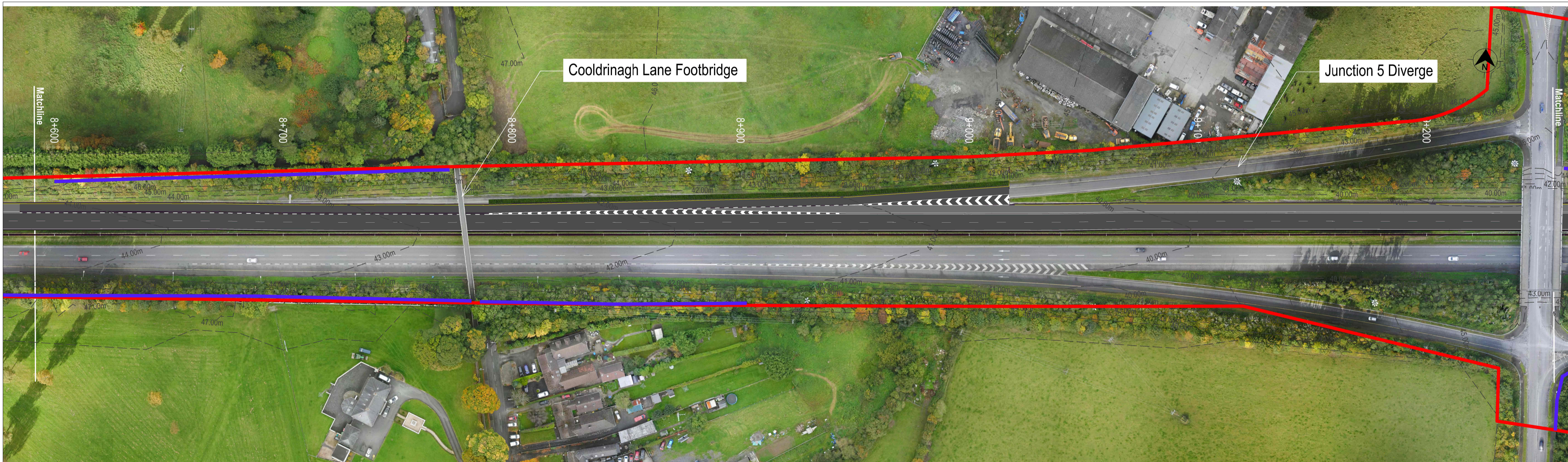
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Suitability  
**A1 - Suitable for Part 8 Planning**

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**Part 8 Planning**

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**Scale at A1**  
1:1000

**Role**  
Civil - Highways

**Date**  
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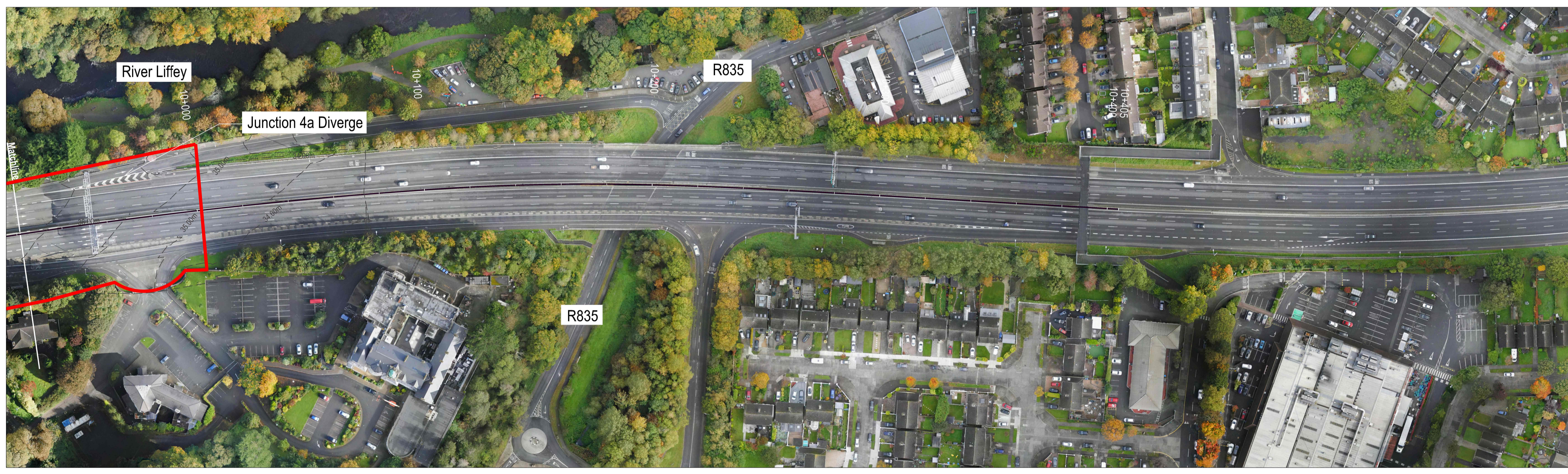
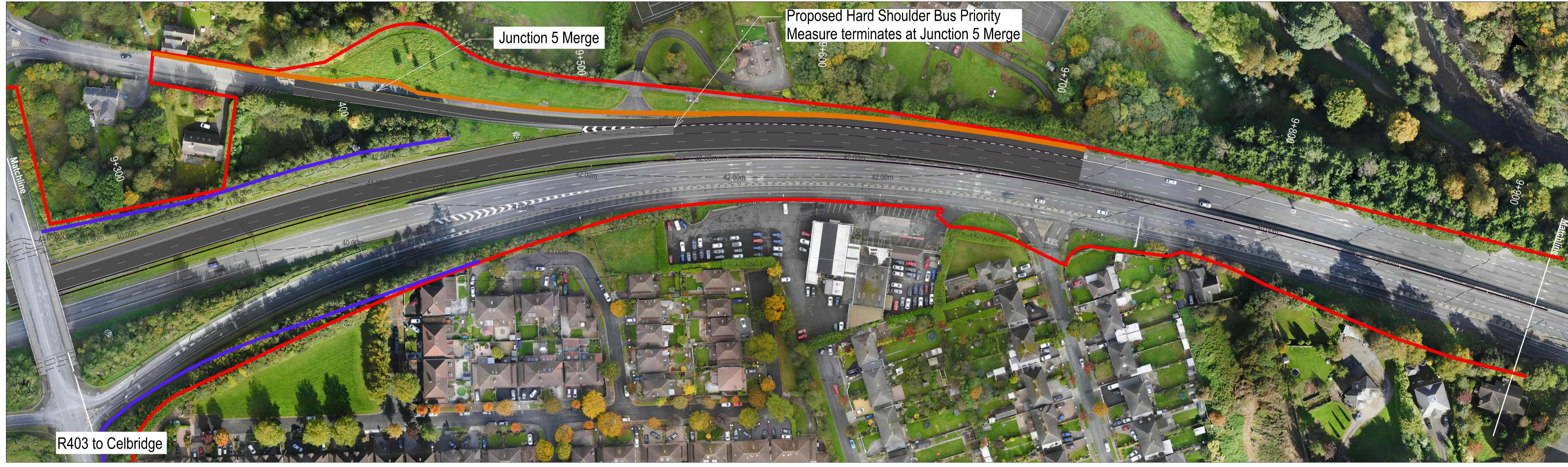
**Drawing Title**  
General Arrangement

**Sheet 6 of 7**

**Suitability**  
A1 - Suitable for Part 8 Planning




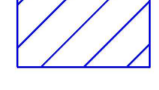




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**Part 8 Planning**

LEGEND - PLAN

-  Proposed Hard Shoulder Bus Priority Measure (surfaced in low noise surfacing)
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-  Proposed Sediment Pond with Oil Separator
-  Proposed Oil Separator
-  Proposed Active Travel Facility
-  Proposed Noise Barrier. The height varies from 2m to 3.5m



**Notes**  
1. The proposed noise barrier locations shown are indicative only and are subject to change. Further detailed assessments, design and on-going studies may result in amendments to the location, length and height of the proposed noise barriers.

**Clients**

  
 Udarás Náisiúnta Iompair  
 National Transport Authority

  
 Bonnagar Iompair Eireann  
 Transport Infrastructure Ireland


  
 An Roinn Iompair  
 Department of Transport

  
 Comhairle Contae  
 Átha Cliath Theas  
 South Dublin County Council

  
 KILDARE nro  
 NATIONAL ROADS OFFICE

  
 Kildare County Council  
 Comhairle Contae Chill Dara

**Key Plan**

  
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 One Albert Quay  
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**Job Title**  
M4 Eastbound Bus Priority Measures Pilot Project

**Scale at A1**  
1:1000

**Role**  
Civil - Highways

**Date**  
October 2022

Issue	Date	By	Chkd	Appd
C01	01/10/2022	AM	SB	SB
Issued For Part 8 Planning (Status A1)				
P01	25/01/2022	AM	SB	SB
Issued For Information (Status S2)				

**Drawing Title**  
General Arrangement

**Sheet 7 of 7**

**Suitability**  
A1 - Suitable for Part 8 Planning

Job No	Figure ID	Rev.
272691		C01

Drawing No  
272691-ARUP-07-CF-DR-CH-000066