An Roinn Iompair
Department of Transport

Tionscadal Éireann
Project Ireland
2040

Comhairle Contae Chill Dara
Kildare County Council

M4 Eastbound Bus Priority Measures Pilot Project

KCC Planning Reference:
P82022.20

AA Screening Report

October 2022

Comhairle Contae Átha Cliath Theas
South Dublin County Council

NTA
Údarás Náisiúnta Iompair
National Transport Authority

TII
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

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ARUP

Appropriate Assessment Screening Report

prepared for ARUP

on behalf of Kildare County Council

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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

1 This report, which contains information required for the competent authority (in this instance Kildare County Council) to undertake a screening for Appropriate Assessment (AA), has been prepared by Scott Cawley Ltd. on behalf of the applicant. It provides information on, and assesses the potential for, the proposed development to impact on the Natura 2000 network (hereafter referred to as European sites)[1]. The proposed development consists of the provision of a non-physically segregated permanent bus facility within the eastbound hard shoulder of the M4/N4 road, that can be used by buses and coaches (primarily long distance point to point services) to avoid congested traffic lanes eastbound between Junction 5 and Junction 7 of the M4/N4 road (See Figure 2, and Section 3.1 and Appendix III for further detail). The proposed development also includes for the construction of a number of Emergency Refuge Areas (ERAs) for vehicles which require to leave the road in the event of an emergency.

2 An AA is required if significant effects on European sites arising from a proposed development cannot be ruled out at the screening stage, either alone or in combination with other plans or projects. It is the responsibility of the competent authority to make a decision as to whether or not the proposed development is likely to have significant effects on European sites, either individually or in combination with other plans or projects.

For the reasons set out in detail in this AA Screening Report, an **Appropriate Assessment of the proposed development is not required in this instance** as it can be concluded, on the basis of objective information, that the proposed development, either individually or in combination with other plans or projects, will not have a significant effect on any European sites.

2 Methodology

2.1 Guidance

3 This Appropriate Assessment Screening Report has been prepared with regard to the following guidance documents, as relevant:

- *OPR Practice Note PN01. Appropriate Assessment Screening for Development Management* (Office of the Planning Regulator, 2021)
- *Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities*. (Department of Environment, Heritage and Local Government, 2010 revision)
- *Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities*. Circular NPW 1/10 & PSSP 2/10
- *Assessment of Plans and Projects Significantly Affecting Natura 2000 sites: Methodological Guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC* (European Commission, 2021)

[1] The Natura 2000 network is a European network of important ecological sites, as defined under Article 3 of the Habitats Directive 92/43/EEC, which comprises both special areas of conservation and special protection areas. Special conservation areas are sites hosting the natural habitat types listed in Annex I, and habitats of the species listed in Annex II, of the Habitats Directive, and are established under the Habitats Directive itself. Special protection areas are established under Article 4 of the Birds Directive 2009/147/EC for the protection of endangered species of wild birds. The aim of the network is to aid the long-term survival of Europe's most valuable and threatened species and habitats.

In Ireland these sites are designed as European sites - defined under the Planning Acts and/or the Birds and Habitats Regulations as (a) a candidate site of Community importance, (b) a site of Community importance, (c) a candidate special area of conservation, (d) a special area of conservation, (e) a candidate special protection area, or (f) a special protection area. They are commonly referred to in Ireland as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

- *Assessment of Plans and Projects Significantly Affecting Natura 2000 sites: Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC* (European Commission, 2001)
- *Communication from the Commission on the precautionary principle* (European Commission, 2000), and
- *Managing Natura 2000 Sites: The Provisions of Article 6 of the Habitat's Directive 92/43/EEC* (European Commission, 2019)

2.2 Assessment Methodology

4 The above referenced guidance sets out a staged process for carrying out Appropriate Assessment. To determine if an Appropriate Assessment is required, documented screening is required. Screening identifies the potential for effects on the conservation objectives of European sites, if any, which would arise from a proposed plan or project, either alone or in combination with other plans and projects (i.e. likely significant effects).

5 Significant effects on a European site are those that would undermine the conservation objectives supporting the favourable conservation condition of the Qualifying Interest (QI) habitats and / or the QI / Special Conservation Interest (SCI) species of a European site(s).

6 Screening for Appropriate Assessment involves the following steps:

7 If the conclusions at the end of screening are that there is no likelihood of significant effects occurring on any European sites as a result of the proposed plan or project, either alone or in combination with other plans and projects, then there is no requirement to undertake an Appropriate Assessment.

8 In establishing which European sites are potentially at risk (in the absence of mitigation) from the proposed development, a source-pathway-receptor approach was applied. In order for an impact to occur, there must be a risk enabled by having a source (e.g. water abstraction or construction works), a receptor (e.g. a European site or its QI(s) or SCI(s)[2]), and a pathway between the source and the receptor (e.g. pathway by air for airborne pollution, or a pathway by a watercourse for mobilisation of pollution). For an impact to occur, all three elements must exist; the absence or removal of one of the elements means there is no possibility for the impact to occur.

9 The identification of source-pathway-receptor connection(s) between the proposed development and European sites essentially is the process of identifying which European sites are within the Zone of Influence (ZoI) of the proposed development, and therefore potentially at risk of significant effects. The ZoI is the area over which the proposed development could affect the receiving environment such that it could potentially have significant effects on the QI habitats or QI / SCI species of a European site, or on the achievement of their conservation objectives[3].

10 The identification of a source-pathway-receptor link does not automatically mean that significant effects will arise. The likelihood for significant effects will depend upon the characteristics of the source (e.g. extent and duration of construction works), the characteristics of the pathway (e.g. direction and strength of prevailing winds for airborne pollution) and the characteristics of the receptor (e.g. the sensitivities of the European site and its QIs / SCIs). Where uncertainty exists, the precautionary principle[4] is applied.

11 The 'likely significant effects' test is based on the precautionary principle[4]. The precautionary principle means that, based on the most reliable available information, where there is uncertainty or doubt as to the absence of significant effects, the project cannot be screened out and an appropriate assessment must be carried out.

2.3 Desktop Data Review

12 The desktop data sources used to inform the assessment presented in this report are as follows (accessed on the 22/10/2021) and rechecked 18/11/2021:

- Online data available on European sites and protected habitats/species as held by the National Parks and Wildlife Service (NPWS) from www.npws.ie[5], including conservation objectives documents

[2] The term qualifying interest is used when referring to the habitats or species for which an SAC is designated; the term special conservation interest is used when referring to the bird species (or wetland habitats) for which an SPA is designated.

[3] As defined in the *Guidelines for Ecological Impact Assessment in the UK and Ireland* (CIEEM, 2018)

[4] The precautionary principle is a guiding principle that derives from Article 191 of the Treaty on the Functioning of the European Union and has been developed in the case law of the European Court of Justice (e.g. ECJ case C-127/02 – Waddenzee, Netherlands).

The guidance document *Communication from the Commission on the Precautionary Principle* (European Commission, 2000) notes that the precautionary principle "*covers those specific circumstances where scientific evidence is insufficient, inconclusive or uncertain and there are indications through preliminary objective scientific evaluation that there are reasonable grounds for concern that the potentially dangerous effects on the environment, human, animal or plant health may be inconsistent with the chosen level of protection*".

Applying the precautionary principle in the context of screening for appropriate assessment requires that where there is uncertainty or doubt about the risk of significant effects on a European site(s), it should be assumed that significant effects are possible and AA must be carried out.

[5] The following SAC and SPA GIS boundary datasets are the most recently available at the time of writing: SAC_ITM_2019_12 and SPA_ITM_2019_12.

- Online data available on protected species as held by the National Biodiversity Data Centre (NBDC) from www.biodiversityireland.ie
- Information on the surface water network and surface water quality in the area available from www.epa.ie
- Information on groundwater resources and groundwater quality in the area available from www.epa.ie and www.gsi.ie
- Ordnance Survey of Ireland mapping and aerial photography available from www.osi.ie
- Information on the location, nature and design of the proposed development supplied by the applicant's design team[6],[7]
- Local Area Plans – Maynooth Local Area Plan 2013[8], Celbridge Local Area Plan 2017[9], Leixlip Local Area Plan 2020[10]
- County Kildare Biodiversity Action Plan 2009-2014[11]
- Ancient and Long established Woodland dataset[12]

2.4 Consultations

13 The following organisations, with relevance to collating information on biodiversity constraints were consulted as part of the earlier feasibility study: NPWS and Inland Fisheries Ireland (IFI). Cognisance of the responses received in respect of that consultation has been considered as part of the assessment for the proposed development.

14 A data request was issued to NPWS and an email response was received on 26th January 2021, providing shapefile data for designated sites as well as a spreadsheet of protected species records.

15 A consultation letter was sent to IFI on the 19th of January 2021, with a response received on the 25th of January 2021. This response outlined numerous measures that must be undertaken for the sections of the works that involve river crossings. All of the below measures may not all be relevant in this instance as the river crossings are already in existence and thus any works required will not be a new build.

16 These measures include:

- any in-stream works can only be carried out during the open season for works in salmonid systems (July – September) of each year;
- river crossings should be planned and executed in an environmentally sensitive manner, preferably using tunnelling or boring techniques;
- the maintenance of habitat integrity (both in-stream and riparian) is essential in safeguarding the ecological value of these important systems; and
- any works directly affecting watercourses or riparian habitats must first be submitted for assessment and approval in the form of a detailed method statement.

[6] Technical Note 272691-16 – Characteristics of the Proposed Development included in Appendix III of this Report
[7] Technical Note 272691-ARUP—05-ER-FN-YEBIO-000002-S3-P01- Drainage, Hydrology and Hydrogeology Assessment for Appropriate Assessment Screening included in Appendix IV of this report
[8] Available at https://kildare.ie/CountyCouncil/AllServices/Planning/LocalAreaPlans/LocalAreaPlans/MaynoothLAP2013-2019incorporatingAmendmentNo1/
[9] Available at https://kildare.ie/CountyCouncil/AllServices/Planning/LocalAreaPlans/LocalAreaPlans/CelbridgeLocalAreaPlan2017-2023/
[10] Available at: https://kildare.ie/CountyCouncil/AllServices/Planning/LocalAreaPlans/LocalAreaPlans/LeixlipLocalAreaPlan2020-2023/
[11] Available at: https://kildare.ie/CountyCouncil/AllServices/Heritage/BiodiversityandNaturalHeritage/KildareBiodiversityActionPlan/County%20Kildare%20Biodiversity%20Plan.pdf
[12] NPWS (2012) GIS Dataset for Ancient and Long-Established Woodland. Available from: https://www.npws.ie/maps-and-data/habitat-and-species-data [Accessed 20th October 2021, rechecked 8th December 2021]

17 Data on bat roosts was received from BCI and reviewed by Scott Cawley Ltd. Given the absence of Annex II bat species on the eastern half of Ireland, they are not considered further in this assessment.

2.5 Baseline Surveys

18 No detailed biodiversity surveys were undertaken in respect of the proposed development. A walkover survey of the accessible ecological sites in respect of the bus priority measures options was undertaken by Scott Cawley Ltd. on the 1st 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.

19 Where access allowed, sites were visited, and notes taken on the habitats present. Given the nature of the proposed development, 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. 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.

2.5.1 Habitats and Flora

20 Habitat types were classified using *A Guide to Habitats in Ireland*[13]. 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*[14] 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. The nomenclature for Annex I habitats follows that of the *Interpretation manual of European Union Habitats EUR28*[14] with abbreviated names after those used in *The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview*[15]. A precautionary approach was adopted with regards to the identification of the potential presence of Annex I habitats within an ecological site.

2.5.2 Fauna (Mammals and Birds)

21 Detailed fauna surveys were not undertaken in support of this assessment, owing to the fact that survey accessibility is typically precluded along motorways. Areas of accessible lands were visited, but owing to their nature largely as made ground associated with the motorway junctions (overbridges), this is not considered a limitation, given the nature of the of the proposed development along an existing transport corridor.

3 Provision of Information for Screening for Appropriate Assessment

22 The following sections provide information to facilitate the Appropriate Assessment screening of the proposed development to be undertaken by the competent authority.

23 A description of the proposed development and the receiving environment is provided to identify the potential ecological impacts. The environmental baseline conditions are discussed, as relevant to the assessment of ecological impacts where they may highlight potential pathways for impacts associated with the proposed development to affect the receiving ecological environment (e.g. hydrogeological, hydrological and air quality data).

[13] Fossitt, J.A. (2000) A Guide to Habitats in Ireland. Heritage Council, Kilkenny.

[14] CEC. (Commission of the European Communities) (2013) Interpretation manual of European Union Habitats EUR28. European Commission, DG Environment.

[15] NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview. Available at: https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2019_Vol1_Summary_Article17.pdf

24 The potential impacts are examined in order to define the potential zone of influence of the proposed development on the receiving environment. This then informs the assessment of whether the proposed development will result in significant effects on any European sites; i.e. affect the conservation objectives supporting the favourable conservation condition of the European site's QIs or SCIs.

3.1 Description of the Proposed Development

25 The proposed development, which is being proposed as a Part 8 development sponsored by the local authority will provide a non-physically segregated permanent bus facility that can be used by buses and coaches (primarily accommodating long-distance point-to-point coach services to avoid congested traffic lanes, extending from Junction 7 Maynooth to Junction 5 Leixlip (Figure 1) The proposed development will utilise the existing hard shoulder of the existing cross section in the eastbound direction (in as far as is possible). Traffic lanes will be reduced to 3.5m in width in addition to a 3.5m bus facility. A 0.5m buffer will separate the bus facility from the traffic lanes.

26 In addition to incorporating a bus facility within the hard shoulder, emergency refuge areas (ERAs) are proposed at a spacing of approximately 500m, depending on site constraints, along the length of the proposed development. The purpose of these ERA's is to provide a safe refuge for vehicles which may become disabled or required to leave the mainline in an emergency. Figure 2 illustrates the proposed changes to the eastbound carriageway.

27 The existing M4/N4 horizontal and vertical geometry will be largely retained, with widening occurring as an extension of crossfall. There will be some widening of the central reserve where necessary to accommodate the bus facility. Where this cannot be accommodated, widening into the nearside verge is proposed. The treatment of junctions will require specific treatment to ensure through junction running to eliminate potentially hazardous weaving manoeuvres between cars merging onto the motorway and buses wishing to leave the bus facility to stay on the mainline.

28 In terms of drainage, some of the existing drainage will be reused and enhanced, but the relocation of carrier/filters drains as described in Section 3.2.1 of the technical note (Appendix IV of this report) will be required. Flow control will also be incorporated in accordance with design standards and overall it is predicted that 10% increase in impermeable surface will occur. Flow control will include a sediment pond with oil separator and another proposed oil separator at Ch. 1 + 875 alongside an ERA.

29 In respect of the proposed development, all of the works will be undertaken in a phased manner, the bulk of which will be centred on the existing M4/N4 carriageway. Advance works will involve the set-up of the construction compound. Thereafter, the construction methodology will likely follow the following phased sequencing:

- Temporary traffic management – for the duration of works and on a rolling basis in different areas as works progress;
- Site clearance – removal of existing vehicle restraints on carriageway, signage and other obstacles including discrete areas of road side landscaping to accommodate widening or construction of new ERA's;
- Drainage and earthworks – removal of existing filter drains and verge removal as necessary and installation of newly specified drainage infrastructure as necessary, as well as utility infrastructure works including relocation as necessary of existing road lighting;
- Pavement works – planning and excavation as necessary, followed by road widening and full road construction where necessary;
- Remarking of the road surface; and
- Reopening of the completed sections.

30 The proposed development will take approximately nine to twelve months to construct. A construction compound is proposed and will be located immediately east of Junction 6. This will include stores, offices, welfare facilities and plant storage.

31 A full description of the proposed development is included in Appendix III of this assessment, whilst a technical note on the proposed drainage infrastructure and assessment of impact is included in Appendix IV.

Figure 1: Location of the proposed development and its redline boundary

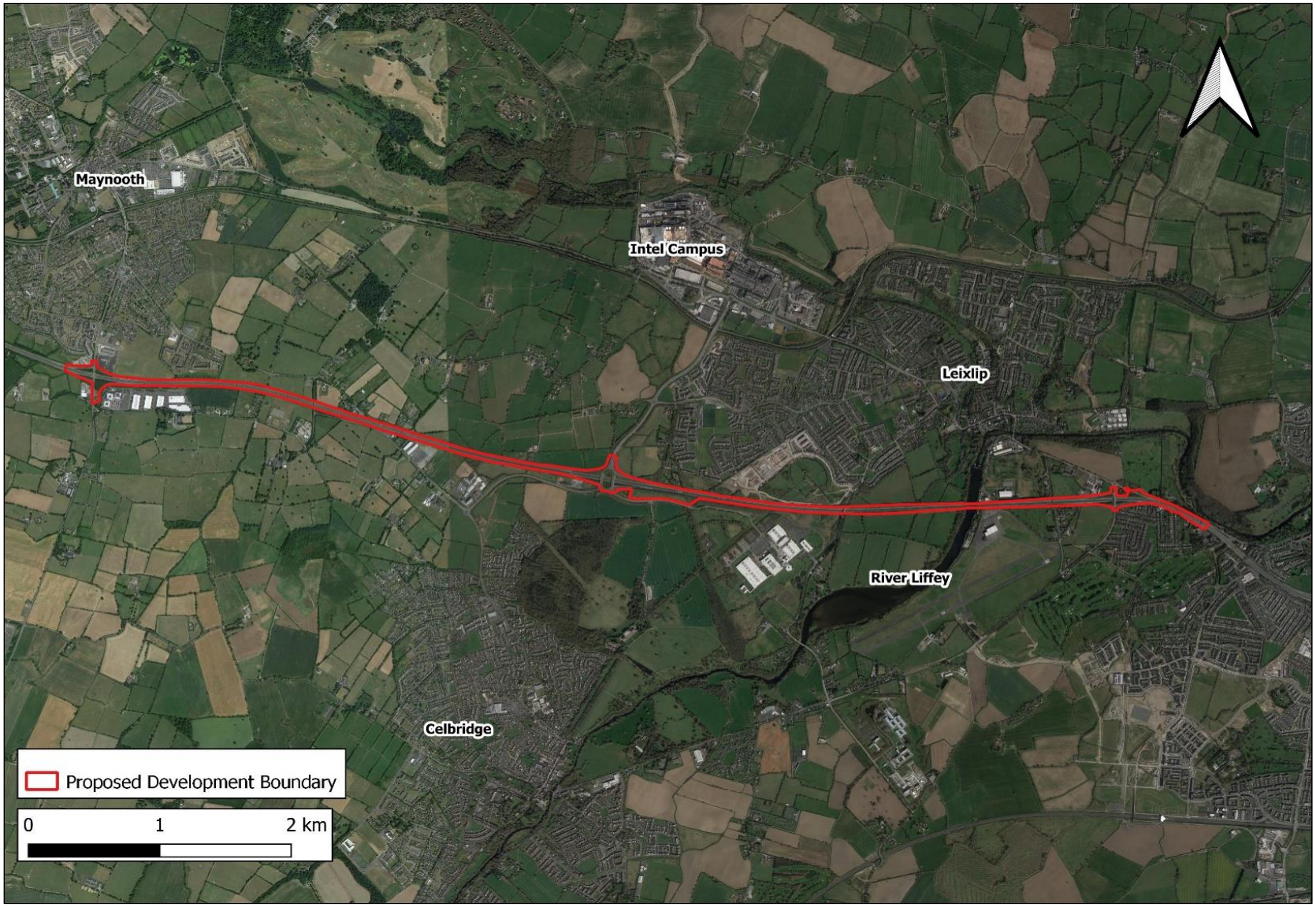
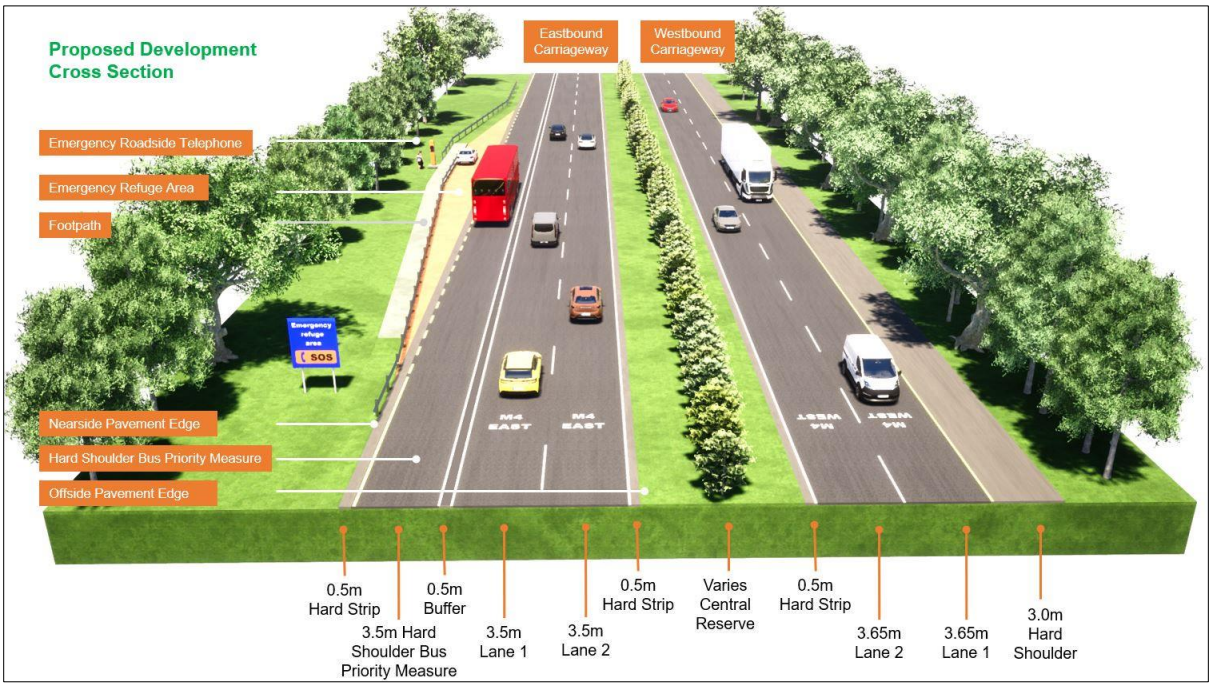


Figure 2: Graphical example of proposed cross section (illustration courtesy ARUP 2021)



3.2 Overview of the Receiving Environment

3.2.1 European sites

32 All of the European sites present in the vicinity of the proposed development are shown on Figure 3. The QIs / SCIs of the European sites in the vicinity of the proposed development are provided in Appendix I.

33 There are no European sites located within the footprint of the proposed development. However a single Special Area of Conservation (Rye Water Valley/ Carton SAC) is located approximately 500m to the north of the proposed development and potential pathways in the form of surface water connectivity via roads drainage outfalling to local watercourses, as well as groundwater connectivity has been identified (See Technical Note in Appendix IV). A further four European sites have been included owing to the hydrological Linkage between them and the proposed development, at great distances downstream of the proposed development in Dublin Bay, namely: South Dublin Bay SAC and North Dublin Bay SAC and the overlapping Special Protection Areas (SPAs) of North Bull Island and South Dublin Bay and River Tolka Estuary SPA.

34 All other European sites identified as being within the vicinity of the proposed development (Appendix I and Figure 3 and 4) are excluded from further assessment owing to the absence of source pathway receptor as noted in Appendix I.

3.2.2 Habitats

35 The footprint of the proposed development is characterised by made ground of the existing M4/N4 roadway, the central median 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[16] Classification scheme correspond with Buildings and artificial surfaces (BL3), a heavily managed central median 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/N4, areas of mixed broadleaf woodland (WD1) outside of the proposed development boundary and a small section where the existing roadway traverses the river Liffey (FW2).

36 Based on a review of available desktop data, specifically Article 17 reporting data regarding the national distribution of Annex I habitats, and the summary observation from the February 2021 site visit, no designated or non-designated Annex I habitats occur within the proposed development boundary. There is however little up to date data in terms of its current distribution within or adjacent to the SAC from this area from NPWS shapefile, while the Environmental Sensitivity mapping database[17] does not show any Annex I habitat from the surrounding area. Scott Cawley Ltd are aware of the presence of petrifying springs along sections of the Rye Water River and these are well documented[18].

37 However, it is recognised that the groundwater dependant Petrifying springs with tufa formation (Cratoneurion) [7220], a priority annex I habitat, is a qualifying interest of the proximal Rye Water Valley / Carton SAC and as such could be impacted by the proposed development.

38 The Rye Water River is a tributary of the River Liffey.

3.2.3 Flora and Fauna Species

39 No records of any Annex II plant species were recorded within the footprint of the proposed development during walkover surveys in February 2021.

40 There were no areas of non-native invasive plant species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended) identified along or adjacent to the proposed development during field survey. However, the desktop study returned records of seven species listed on the Third Schedule within 1km of the proposed development. These records include giant hogweed *Heracleum mantegazzianum*, Spanish Bluebell *Hyacinthoides hispanica*, Indian Balsam *Impatiens glandulifera*, Japanese knotweed *Reynoutria japonica, Rhododendron ponticum* and three-cornered garlic *Allium triquetrum*.

Otter

41 No signs of otter, an Annex II species, were recorded during the walkover survey within the footprint of the proposed development, although it is acknowledged that access to watercourses intersected by the existing road was limited.

42 A desktop review found that otter are known to occur within the vicinity of the proposed development. The nearest European site for which this species is designated is the Wicklow Mountains SAC, which is located approximately 14.7km south of the proposed development. Otter territories are within the range of c. 7.5km for females and can reach up to 21 km for males via hydrological pathways (O' Neill *et al*., 2009). Wicklow Mountains SAC is located within a different sub-catchment (Dodder_SC_010) to the proposed development (across the Lyreen-SC-010, the Liffey-SC-080 and the Liffey-SC-090). As such,

[16] Fossitt, J. (2000). A guide to Habitats in Ireland. The Heritage Council, Kilkenny.

[17] https://airomaps.geohive.ie/ESM/

[18] Lyons M.L. (2009). Leixlip SPA Vegetation Map, Louisa Bridge, Leixlip Co. Dublin (Unpublished report). Denyer Ecology (2011) Leixlip Spa Bryophyte Survey (Unpublished report).

populations of otter within the footprint of the proposed development are deemed not to be connected to the SAC population.

Invertebrates

43 The walkover surveys in February 2021 did not include a detailed assessment of aquatic systems owing to accessibility from the motorway. However, Freshwater Crayfish (*Austropotambius pallipes*) is known from the Rye Water River. The desktop review noted that the EPA River Biologists' database has recorded its presence at a number of locations within the wider environs of the proposed development. The nearest European site for which it is designated as a QI species is the River Barrow and River Nore SAC (002162) which is in a different catchment and not connected by intersecting watercourses. It is not considered to be associated with SAC populations.

Marine mammals

44 The proposed development is hydrologically connected to Dublin Bay via the River Liffey. Harbour seal, grey seal, and harbour porpoise are known to be present in Dublin Bay. Both seal species are listed on Annex II of the habitats directive and harbour porpoise are listed on Annex IV of the Habitats Directive. The nearest European site for which harbour seal and grey seal have been designated is Lambay Island SAC located approximately 32.2km from the proposed development. The nearest European site for which harbour porpoise has been designated is Rockabill to Dalkey Island SAC located approximately 25.2km from the proposed development.

Kingfisher

45 Kingfisher were not recorded during surveys within the footprint of the proposed development.

46 A desktop review found that kingfisher *Alcedo atthis*, an Annex I species, are known to occur within the vicinity of the proposed development. The nearest European site for which this species is designated is River Boyne and River Blackwater SPA, which is located approximately 37.8km north of the proposed development.

Birds

47 The desk study returned records of a number of wintering bird species in the vicinity of the proposed development (i.e., Grid Squares O03 and N93) including Whooper Swan (*Cygnus cygnus*) and Little Egret (*Egretta garzetta*) as well as Gulls e.g. Black headed Gull (*Chroicocephalus ridibiundus*) and Oystercatcher (*Haematopus ostralegus*). The majority of wintering birds identified in the desk-based review are typically found in coastal, estuarine and intertidal habitats including the Tolka Estuary, North Bull Island transitional water body, and Dublin Bay.

48 A number of SPAs have on a precautionary basis been included for assessment as it cannot with certainty be confirmed that their Special Conservation Interest species do not use areas in the vicinity of the proposed development as *ex-situ* habitat.

3.2.4 Hydrology

49 According to the EPA data[19], several rivers, and their associated tributaries, are located within or immediately adjacent to the proposed development. All watercourses intersected by the proposed development or for which a hydrological connectivity exists, by virtue of tie-in from existing road drainage are located within the Liffey and Dublin Bay_09 catchment.

[19] Environmental Protection Agency (2020) Data available for download at http://gis.epa.ie/GetData/Download

50 The principal watercourse is the River Liffey, which flows in a north-easterly direction at the eastern end of the proposed development boundary. The river has been dammed at this location to form the Leixlip Reservoir. A bridge of the M4 motorway passes over the downstream end of the reservoir.

51 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.

52 Other watercourses include:

- The Taghadoe (or Meadowbrook)
- The Lyreen
- Lucan Stream
- Rye Water

Table 1: Water Quality of Watercourses / Waterbodies in the vicinity of the proposed development

Watercourse	Location in relation to the Proposed Development	EPA Q-Values (Monitoring Station) and Water Framework Directive Water Quality Status / Risk Score	Name of and Distance to Downstream Waterbodies along with their associated Water Quality
River Liffey	Intersected by the proposed development at its eastern end	Q-Value Score 4 (downstream of R148 Bridge) WFD status 2013-2018 "*Good*" *WFD waterbodies risk - 'Not at risk'*	It flows into the Liffey Estuary Lower transitional waterbody (classified as "*Unpolluted*"), which ultimately drains to Dublin Bay
Kilmacredock Upper	Intersected by the proposed development at its eastern end	Q-Value Score – Not applicable WFD status 2013-2018 "*Good*" *WFD waterbodies risk - 'Not at risk'*	It flows into the River Liffey via a culvert beneath the Liffey Business Park. The River Liffey then discharges to Dublin Bay
Taghadoe (Meadowbrook)	Located approximately 270m west (and upstream) of the proposed development	Q-Value Score 3* (Bridge Ne of Treadstown – downstream of M4), 2-3 (Connollys Bridge - upstream of M4) WFD status 2013-2018 "*Good*" *WFD waterbodies risk - 'Not at risk'*	The Taghadoe is a tributary of the Lyreen which ultimately drains into Dublin Bay via the Rye Water and River Liffey
Lucan stream	Located approximately	Q-Value Score not	It flows directly into

Watercourse	Location in relation to the Proposed Development	EPA Q-Values (Monitoring Station) and Water Framework Directive Water Quality Status / Risk Score	Name of and Distance to Downstream Waterbodies along with their associated Water Quality
	350m south (and upstream) of the proposed development	applicable WFD status 2013-2018 "*Good*" *WFD waterbodies risk - 'Not at risk'*	the River Liffey which ultimately discharges to Dublin Bay coastal waterbody
Lyreen_10	Located approximately 1.5km north-west (and upstream) of the proposed development	Q-Value Score not applicable WFD status 2013-2018 "*Good*" *WFD waterbodies risk - 'Not at risk'*	It flows into the Rye Water, then into the River Liffey, which ultimately drains to Dublin Bay
Rye Water	Located approximately 1.5km north-west (and upstream) of the proposed development. Drainage connectivity via the Taghadoe and Lyreen	Q-Value Score - 3-4 (at Leixlip Main Street) WFD status 2013-2018 "*Good*" *WFD waterbodies risk - 'Not at risk'*	It drains into the River Liffey at Leixlip, which ultimately drains into Dublin Bay
Dublin Bay	Located approximately 22.8km west (and downstream) of the proposed development. Drainage connectivity via the River Liffey	Q-Value Score not applicable WFD status 2013-2018 "*Good*" *WFD waterbodies risk - 'Not at risk'*	N/A

3.2.5 Hydrogeology

Dublin Groundwater Body – Good for period 2013-2018

53 The proposed development is located within the Dublin groundwater body, which extends across the Greater Dublin City area and much of County Kildare. The groundwater body is bordered to the south by the Dublin Mountains and to the north by areas of higher elevation, southwest of Dunshaughlin.

The groundwater body comprises of both Locally Important Aquifer, which is Moderately Productive only in Local Zones (Ll) and Poor Aquifer, which is Generally Unproductive except for Local Zones (Pl).

Dublin Groundwater Body

- The groundwater body it is ranked as being of "*Good*" Ground Waterbody WFD Status (2013-2018) and "*not at risk*" of failing the WFD groundwater quality objectives for the majority of its area; and,
- The aquifers located within this ground waterbody and where the proposed development transverses are classified as "*locally important aquifer - moderately productive only in local zones*".

The vulnerability of the Dublin ground waterbody to human activities largely ranges from "*Rock at or Near Surface*" and "*Extreme*" at Junction 5 Leixlip and transitions between "*High*" and "*Moderate*" as the route progresses westwards towards Junction 7 Maynooth.

3.2.6 Soils and Geology

54 Most of the groundwater body comprises Dinantian Upper Impure Limestones. Dinantian Pure Unbedded Limestones and Dinantian Lower Impure Limestones are located to the east and south of Maynooth as well as in the north east of the groundwater body. In the northwest of the groundwater body, the area is underlain by Namurian Undifferentiated rock.

3.3 Assessment of Effects on European Sites

55 This section identifies all the potential impacts associated with the proposed development, examines whether there are any European sites within the Zone of Influence (ZoI) of effects from the proposed development, and assesses whether there is any risk of the proposed development resulting in a significant effect on any European site, either alone or in combination with other plans or projects.

56 In assessing the potential for the proposed development to result in a significant effect on any European sites, any measures intended to avoid or reduce the harmful effects of the project on European sites are not taken into account.

57 Based on the baseline ecological environment and the extent and characteristics of the proposed development, the following potential impacts have been identified:

- Habitat loss and fragmentation during construction;
- Habitat degradation / effects on QI / SCI species as a result of hydrological impacts during construction and operation;
- Habitat degradation as a result of hydrogeological impacts during construction and operation;
- Habitat degradation as a result of introducing/spreading non-native invasive species during construction and operation;
- Habitat degradation as a result of air quality impacts during construction and operation; and,
- Disturbance and displacement impacts during construction and operation.

3.3.1 Habitat loss and Fragmentation

58 The proposed development does not overlap with the boundary of any European site. Therefore, there are no European sites at risk of direct habitat loss impacts.

59 As the proposed development does not traverse any European sites there is no potential for habitat fragmentation to occur.

60 While the River Liffey and other tributaries are known to support Otter, a species listed on Annex II of the EU Habitats Directive, the population in the river does not form part of the QI population of any European sites. The closest European site for which Otter is a QI is Wicklow Mountains SAC, located approximately 17km south of the proposed route. No part of the River Liffey or its tributaries is located within the Wicklow Mountains SAC, and there is therefore no direct link between the otter population at

along the River Liffey sections intersected by the proposed development, and that of the Wicklow Mountains SAC. No other fauna species which are QIs/SCIs of European sites were recorded along the proposed development. Therefore, the proposed development does not support any populations of any fauna species linked with the QI / SCI populations of any European site(s).

Figure 3: European sites in the vicinity of the proposed development

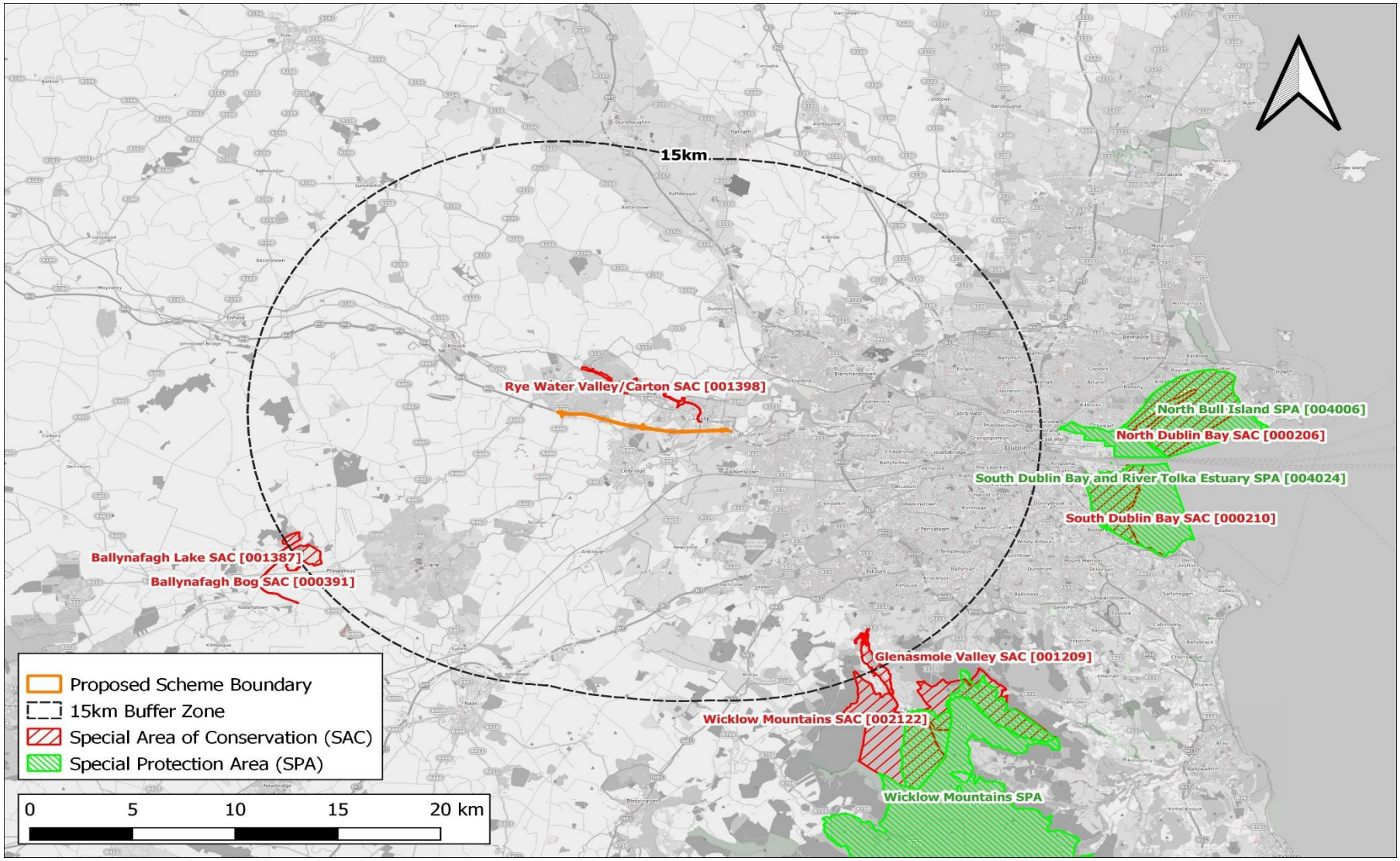


Figure 4: Rye Water Valley / Carton SAC in relation to the proposed development

61 As the proposed development will not result in habitat loss or habitat fragmentation within any European site, there is no potential for any in combination effects to occur in that regard.

3.3.2 Habitat degradation as a result of hydrological impacts

62 Surface water water run-off and discharges from the proposed development will drain to the existing local surface water drainage network, which ultimately drains to the River Liffey, directly or via other watercourses that drain into the Rye Water Valley Carton SAC, which itself flows into the Liffey at Leixlip. Therefore, the Zone of Influence (ZoI) of potential effects on water quality from the proposed development could extend to Dublin Bay.

Surface water

63 The technical note contained in Appendix IV of this report contains a hydrological assessment of the potential impacts to surface water dependant habitats. The impact of the proposed development on surface waters is influenced by the following factors:

- Hydraulic connectivity between the proposed development and the waterbody supporting the habitats or species reliant on the habitat conditions;
- The proximity of the proposed development to a waterbody that flows to the habitat;
- The direction of flow of the waterbody within the habitat;
- The quality of the water at the habitat location; and
- The construction and operational activities of the proposed development that have the potential to alter the volume of water and /or the quality of the water that would be released to the downstream habitat.

64 While it is acknowledged that there is some possibility of construction-related run-off, including sediments and hydrocarbons, entering the surface water network and thereafter travelling downstream to the Rye Water Valley/Carton SAC and downstream European sites in Dublin Bay hydrologically connected by the River Liffey, there is no possibility of any perceptible effects on water quality in the River Liffey, or on the European sites, downstream of the proposed development during either construction or operation for the reasons listed below. Notwithstanding the design inclusion of a sediment pond and petrol interceptors, which are separately required as part of the design from separate guidance e.g. TII Standard DN-DNG-0322[20] and statutory requirements, these have not been considered in this assessment.

65 The hydrological assessment provided in Appendix IV concludes that there will be no perceptible change to the run-off characteristics both quantity and quality as a result of the construction and operation of the proposed development. This is due to the distance (measured at 3km) between the proposed development discharge points and the nearest European site (Rye Water Valley /Carton SAC) and a 10% increase in impermeable surfaces which is predicted to result in imperceptible surface water run-off or discharge events relative to the receiving surface water and distal marine environments.

66 In addition, the relative duration and nature of the proposed development and the reuse in part of existing drainage infrastructure as part of the operational phase of the proposed development; as well as the level of dilution and dispersion of any surface water run-off/discharges from the proposed works site in the receiving watercourses, having no perceivable impact on water quality to downstream European sites and supported QI habitats/species.

[20] TII (2015) Standard DN-DNG-0322 Drainage systems for National Roads (including amendment No.1)

67 Therefore there is no possibility of the proposed works undermining the conservation objectives of any of the qualifying interests or special conservation interests of downstream European sites as a result of surface water run-off or discharges.

In-combination

68 There is potential for "in-combination" effects on water quality to the River Liffey, from any other projects carried out within the catchment, and in particular the Maynooth to Leixlip Project, although this project will not be undertaken at the same time, as it currently at Phase 2 Options Selection. All Local Authority-sponsored developments are required to be consented under the auspices of objectives such as AA Screening etc. and the protection of water quality, which would address potential future in-combination effects should they arise.

3.3.3 Habitat degradation as a result of hydrogeological impacts

69 The proposed development traverses one ground water body, namely: the Dublin Groundwater Body (GWB). There are five European sites within the vicinity of the proposed works, but of these the proximal Rye Water/ Carton SAC is the only European site within the ZoI of the proposed development designated for groundwater dependant habitats and/or species. All of the qualifying interests of the Rye Water Valley/Carton SAC, the priority Annex I habitat Petrifying springs and the two whorl snail species, are dependent upon the existing condition and functioning of the groundwater regime. Based on information published by Geological Survey Ireland (GSI) on the Dublin GWB[21], 'The general groundwater flow direction in this aquifer is towards the coast and also towards the River Liffey and Dublin City'.

70 Based on the hydrogeological assessment, which is presented in Appendix IV the following was noted:

- The local groundwater flow direction is predicted to be towards the northwest (following topographical gradients, with groundwater locally discharging to the Meadowbrook Stream;
- No direct pathway is predicted between groundwater from the proposed development, and;
- The groundwater dependant habitats further east.

71 In respect of drawdown and potential impacts to the wider recharge zone for the Petrifying springs, the proposed excavations at the site (already made land for the existing road) are considered too shallow to result in any significant groundwater level drawdown at the construction site and certainly no perceptible drawdown is expected at the groundwater dependant habitat sites.

72 As the proposed development will not interact with the underlying groundwater body and is spatially separated from the underlying groundwater body that influences the conditions that support the QI habitat and species at this European sites, there can be no Likely significant effect on the European site.

73 As the proposed development will not result in any hydrogeological impacts to European sites, there is no potential for any in-combination effects to occur in this regard.

3.3.4 Habitat degradation as a result of introducing/spreading non-native invasive species

74 No species of non-native invasive plant species, listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended), was recorded within the proposed development boundary.

75 Given that there are no European sites within the area of the proposed development and its current operational management, there is no possibility of the proposed development undermining the conservation objectives of the qualifying interests or special conservation interests of the European site as a result of accidentally spreading or introducing non-native invasive species.

[21] https://secure.dccae.gov.ie/GSI_DOWNLOAD/Groundwater/Reports/GWB/DublinGWB.pdf

3.3.5 Disturbance and Displacement

76 Construction-related disturbance and displacement of fauna species could potentially occur within the vicinity of the proposed development. For mammal species such as otter, disturbance effects would not be expected to extend beyond 150m[22]. For birds, disturbance effects would not be expected to extend beyond a distance of approximately 300m, as noise levels associated with general construction activities would attenuate to close to background levels at that distance.[23] There are no European sites within the disturbance ZoI; the next nearest European site to the proposed works, with SCI/QI species sensitive to disturbance is approximately 16km away. As the proposed works will be small in scale and will be carried out over a very brief timeframe (approximately nine to twelve months) and within an existing road corridor), there is no potential for any associated brief disturbance events to result in any long-term effects on any fauna species.

77 As the proposed works will not result in the disturbance/displacement of the qualifying/special conservation interest species of any European site, there is no potential for any in combination effects to occur in that regard.

3.3.6 Changes to Air Quality

78 A reduction in air quality within the immediate vicinity of the construction works may occur as a consequence of dust deposition associated with these construction activities. This includes reduction in photosynthesis due to smothering from dust on the plants and chemical changes such as acidity to soils. Furthermore, emissions from car exhausts, and the deposition of particulate matter and heavy metals produced by engine, brake and tyre wear, can contribute to increased deposition of pollutants such as oxides of nitrogen (NOx, NOs), volatile organic compounds (VOCs), particulate matter (PM), heavy metals (HM) and ammonia (NH4) in the vicinity of a road carriageway. This can affect the ecosystems and vegetation present, influencing plant growth rates and species composition, diversity, and abundance.

79 The unmitigated ZoI for air quality effects arising from the proposed development has the potential to extend 50m from the proposed development boundary, and 500m from construction compounds during the construction phase, and up to 200m from the proposed development boundary during the operational phase. There are no European sites present within these distances.

80 As the proposed development does not have the potential to result in habitat degradation of the qualifying/special conservation interest species of any European site as the result of air quality impacts, either during the construction phase or the operational phase, there is no potential for in combination effects to occur in that regard.

3.3.7 Summary

81 The potential impacts associated with the proposed development do not have the potential to affect the receiving environment and, consequently, do not have the potential to affect the conservation objectives supporting the qualifying interest/special conservation interests of any European sites. Therefore, the proposed development is not likely to have significant effects on any European sites.

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[22] This is consistent with Transport Infrastructure Ireland (TII) guidance (Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes (2008) and Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes(2005)) documents. This is a precautionary distance, and likely to be moderated by the screening effect provided by surrounding vegetation and buildings, with the actual ZoI of construction related disturbance likely to be much less in reality.

[23] The disturbance zone of influence for waterbirds is based on the relationship between the noise levels generated by general construction traffic/works (BS 5228:2009 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1 Noise) and the proximity of those noise levels to birds – as assessed in Cutts, N. Phelps, A. & Burdon, D. (2009) *Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance*, and Wright, M., Goodman, P & Cameron, T. (2010) Exploring Behavioural Responses of Shorebirds to Impulsive Noise. *Wildfowl* (2010) 60: 150–167. At 300m, noise levels are below 60dB or, in most cases, are approaching the 50dB threshold below which no disturbance or displacement effects would arise.

82 As the proposed development itself will not have any effects on the QIs/SCIs or conservation objectives of any European sites, and taking into account the policies and objectives of the statutory plans referred to above, it is concluded that there is no potential for any other plan or project to act in combination with the proposed development that could result in significant effects on any European sites.

83 The potential impacts of the proposed development on the receiving environment, their ZoI, and the European sites at risk of significant effects are summarised in Table 2. In assessing the potential for the proposed development to result in a significant effect on any European sites, any measures intended to avoid or reduce the harmful effects of the project on European sites are not taken into account.

Table 2: Summary of Analysis of Likely Significant Effects on European sites

Potential Direct, Indirect In Combination Effects and the ZoI of the Potential Effects	Are there any European sites within the ZoI of the proposed development?
Habitat loss Habitat loss will be confined to the lands within the proposed development boundary.	No There are no European sites within the proposed development boundary
Habitat degradation as a result of hydrological impacts Habitats and species downstream of the proposed development site and the associated surface water drainage discharge points.	Yes. The Rye Water Valley/Carton is located approximately 3km downstream and outside the proposed development boundary, while distal downstream connectivity via the River Liffey and tributaries exists to European sites in Dublin Bay. There will be a 10% increase in impermeable surface within the made ground of the existing road. However, the hydrological assessment presented in Appendix IV predicted that, based on the distance between the proposed development and receiving watercourses leading to European sites, that no perceptible change to the run-off characteristics both in terms of quality (e.g. pollution, sediment etc) and quantity (e.g. flow) is predicted as a result of the proposed development. This hydrological assessment discounted design features including petrol interceptors and a sediment pond which are required from TII Standards etc.
Habitat degradation as a result of hydrogeological impacts Groundwater-dependant habitats, and the species those habitats support, in the local area that lie downgradient of the proposed development site.	Yes. The Rye Water Valley / Carton SAC supports Petrifying springs. While the proposed development lies within the groundwater body, the groundwater flow is to a local watercourse (Meadowbrook). Thus no impacts on groundwater dependant habitats with respect to groundwater quality are predicted. Given the nature of the proposed development and the limited nature of excavations and their relative shallow depth, it is predicted that no significant groundwater level drawdown will occur, and certainly no perceptible drawdown is predicted at ground water dependant habitat sites.

Potential Direct, Indirect In Combination Effects and the ZoI of the Potential Effects	Are there any European sites within the ZoI of the proposed development?
Habitat degradation as a result of introducing / spreading non-native invasive species Habitat areas within, adjacent to, and potentially downstream of the proposed development site.	No There are no non-native invasive species present on the proposed development site and, therefore, no risk associated with the proposed development to any European sites from the spread/introduction of non-native invasive species
Disturbance and displacement impacts Potentially up to several hundred metres from the proposed development boundary, dependent upon the predicted levels of noise, vibration and visual disturbance associated with the proposed development, taking into account the sensitivity of the qualifying interest species to disturbance effects	No There are no European sites within the potential zone of influence of disturbance effects associated with the construction or operation of the proposed route
Air quality impacts Potentially up to 200m from the proposed development boundary.	No There are no European sites at risk of air quality effects associated with the proposed development

4 Conclusions of Screening Assessment Process

84 Following an examination, analysis and evaluation of the best available information, and applying the precautionary principle, it can be concluded that the possibility of any significant effects on any European sites, whether arising from the proposed development alone or in combination with other plans and projects, can be excluded, for the reasons set out in Section 3.3 above. In reaching this conclusion, the nature of the proposed development and its potential relationship with all European sites within the zone of influence, and their conservation objectives, have been fully considered.

85 Therefore, it is the professional opinion of the authors of this report that the application for consent for the proposed development does not require an Appropriate Assessment or the preparation of a Natura Impact Statement (NIS).

Appendix I

The Qualifying Interests (QIs) and Special Conservation Interests (SCIs) of the European sites in the vicinity of the proposed development (see Figure 1)

European Site Name [Code] and its Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Development
Special Area of Conservation (SAC)	
Rye Water Valley/Carton SAC [001398] 7220 Petrifying springs with tufa formation (Cratoneurion)* 1014 Narrow-mouthed Whorl Snail *Vertigo angustior* 1016 Desmoulin's Whorl Snail *Vertigo moulinsiana* *S.I. No. 494/2018 - European Union Habitats (Conservation of Wild Birds (Rye Water Valley/Carton Special Area of Conservation 001398)) Regulations 2018.* NPWS (2021) *Conservation objectives for Rye Water Valley/Carton SAC [001398].* Generic Version 8.0. Department of Housing, Local Government and Heritage.[24]	The proposed development lies adjacent, approximately 509m south of the European site boundary
North Dublin Bay SAC [000206] 1140 Mudflats and sandflats not covered by seawater at low tide 1210 Annual vegetation of drift lines 1310 *Salicornia* and other annuals colonising mud and sand 1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae) 1395 Petalwort *Petalophyllum ralfsii* 1410 Mediterranean salt meadows (Juncetalia maritimi) 2110 Embryonic shifting dunes 2120 Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)* 2190 Humid dune slacks *S.I. No. 524/2019 - European Union Habitats (North Dublin Bay Special Area of Conservation 000206) Regulations 2019* NPWS (2013) *Conservation Objectives: North Dublin Bay SAC 000206.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	The proposed development lies approximately 19km from the European site and approximately 26km upstream (via the River Liffey) of the European site boundary
South Dublin Bay SAC [000210] 1140 Mudflats and sandflats not covered by seawater at low tide 1210 Annual vegetation of drift lines 1310 *Salicornia* and other annuals colonising mud and sand 2110 Embryonic shifting dunes *S.I. No. 525/2019 - European Union Habitats (South Dublin Bay Special Area of Conservation 000210) Regulations 2019*	The proposed development lies approximately 17.1km from the European site and approximately 26km upstream (via the River Liffey) of the European site boundary

[24] The versions of the conservation objectives documents referenced in this table are the most recent published versions at the time of writing

European Site Name [Code] and its Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Development
NPWS (2013) *Conservation Objectives: South Dublin Bay SAC 000210.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	
Ballynafagh Bog SAC [000391] 7110 Active Raised Bogs* 7120 Degraded raised bogs still capable of natural regeneration 7150 Depressions on peat substrates of the Rhynchosporion *S.I. No. 141/2017 – European Union Habitats (Ballynafagh Bog Special Area of Conservation 000391) Regulations 2017.* NPWS (2015) *Conservation Objectives: Ballnafagh Bog SAC 000391.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	The proposed development lies approximately 13.7km from the European site boundary
Ballynafagh Lake SAC [001387] 7230 Alkaline fens 1016 Desmoulins's Whorl Snail *Vertigo moulinsiana* 1065 Marsh Fritillary *Euphydryas aurinia* *S.I. No. 493/2018– European Union Habitats (Ballynafagh Lake Special Area of Conservation 001387) Regulations 2018.* NPWS (2021) *Conservation objectives for Ballynafagh Lake SAC [001387].* Generic Version 8.0. Department of Housing, Local Government and Heritage.	The proposed development lies approximately 14.2km from the European site boundary
Glenasmole Valley SAC [001209] 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia) (* important orchid sites) 6410 *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) 7220 Petrifying springs with tufa formation (Cratoneurion)* *S.I. No. 345/2021 - European Union Habitats (Glenasmole Valley Special Area of Conservation 001209) Regulations 2021* NPWS (2021) *Conservation objectives for Glenasmole Valley SAC [001209].* Generic Version 8.0. Department of Housing, Local Government and Heritage.	The proposed development lies approximately 12.9km from the European site boundary
Wicklow Mountains SAC [002122] 3110 Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) 3160 Natural dystrophic lakes and ponds 4010 Northern Atlantic wet heaths with *Erica tetralix* 4030 European dry heaths 4060 Alpine and Boreal heaths 6130 Calaminarian grasslands of the Violetalia calaminariae 6230 Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) 7130 Blanket bogs (* if active bog) 8110 Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani) 8210 Calcareous rocky slopes with chasmophytic vegetation	The proposed development lies approximately 14.7km north west of the European site boundary

European Site Name [Code] and its Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Development
8220 Siliceous rocky slopes with chasmophytic vegetation 91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles 1355 *Lutra lutra* (Otter) NPWS (2017) Conservation Objectives: Wicklow Mountains SAC 002122. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.	
Special Protection Area (SPA)	
North Bull Island SPA [004006] A046 Light-bellied Brent Goose *Branta bernicla hrota* A048 Shelduck *Tadorna tadorna* A052 Teal *Anas crecca* A054 Pintail *Anas acuta* A056 Shoveler *Anas clypeata* A130 Oystercatcher *Haematopus ostralegus* A140 Golden Plover *Pluvialis apricaria* A141 Grey Plover *Pluvialis squatarola* A143 Knot *Calidris canutus* A144 Sanderling *Calidris alba* A149 Dunlin *Calidris alpina* A156 Black-tailed Godwit *Limosa limosa* A157 Bar-tailed Godwit *Limosa lapponica* A160 Curlew *Numenius arquata* A162 Redshank *Tringa totanus* A169 Turnstone *Arenaria interpres* A179 Black-headed Gull *Chroicocephalus ridibundus* A999 Wetlands & Waterbirds *S.I. No. 211/2010 - European Communities (Conservation of Wild Birds (North Bull Island Special Protection Area 004006)) Regulations 2010.* NPWS (2015) *Conservation Objectives: North Bull Island SPA 004006.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and Gaeltacht Affairs.	The proposed development lies approximately 19km west or 27km upstream (via the River Liffey) to the European site boundary
South Dublin Bay and River Tolka Estuary SPA [004024] A046 Light-bellied Brent Goose *Branta bernicla hrota* A130 Oystercatcher *Haematopus ostralegus* A137 Ringed Plover *Charadrius hiaticula* A141 Grey Plover *Pluvialis squatarola* A143 Knot *Calidris canutus* A144 Sanderling *Calidris alba* A149 Dunlin *Calidris alpina* A157 Bar-tailed Godwit *Limosa lapponica* A162 Redshank *Tringa totanus*	The proposed development lies approximately 15.9km west or approximately 27km upstream (via the River Liffey) to the European site boundary

European Site Name [Code] and its Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Development
A179 Black-headed Gull *Chroicocephalus ridibundus* A192 Roseate Tern *Sterna dougallii* A193 Common Tern *Sterna hirundo* A194 Arctic Tern *Sterna paradisaea* A999 Wetland and Waterbirds *S.I. No. 212/2010 - European Communities (Conservation of Wild Birds (South Dublin Bay and River Tolka Estuary Special Protection Area 004024)) Regulations 2010.* NPWS (2015) *Conservation Objectives: South Dublin Bay and River Tolka Estuary SPA 004024*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	
Wicklow Mountains SAC [004040] A098 Merlin *Falco columbarius* A103 Peregrine *Falco peregrinus* *S.I. No. 586/2012 - European Communities (Conservation of Wild Birds (Wicklow Mountains Special Protection Area 004040)) Regulations 2012* *NPWS (2021) Conservation objectives for Wicklow Mountains SPA [004040]. Generic Version 8.0. Department of Housing, Local Government and Heritage.*	The proposed development lies approximately 17.4km north west of the European site boundary

Appendix II

Planning polices/objectives relating to the protection of European sites and water quality

Eastern & Midland Regional Assembly, Regional Spatial & Economic Strategy 2019-2031
Regional Policy Objective 3.4 Ensure that all plans, projects and activities requiring consent arising from the Regional Spatial and Economic Strategy are subject to the relevant environmental assessment requirements including SEA, EIA and AA as appropriate. In addition the future strategic development of settlements throughout the Region will have full cognisance of the legal requirements pertaining to sites of International Nature Conservation Interest. **Regional Policy Objective 7.2** To achieve and maintain 'Good Environmental Status' for marine waters and to ensure the sustainable use of shared marine resources in the Region, and to promote the development of a cross-boundary and cross-border strategic management and stakeholder engagement framework to protect the marine environment. **Regional Policy Objective 7.10** Support the implementation of the Water Framework Directive in achieving and maintaining at least good environmental status for all water bodies in the Region and to ensure alignment between the core objectives of the Water Framework Directive and other relevant Directives, River Basin Management plans and local authority land use plans. **Regional Policy Objective 7.11** For water bodies with 'high ecological status' objectives in the Region, local authorities shall incorporate measures for both their continued protection and to restore those water bodies that have fallen below high ecological status and areas 'At Risk' into the development of local planning policy and decision making any measures for the continued protection of areas with high ecological status in the Region and for mitigation of threats to waterbodies identified as 'At Risk' as part of a catchment based approach in consultation with the relevant agencies. This shall include recognition of the need to deliver efficient wastewater facilities with sufficient capacity and thus contribute to improved water quality in the Region. **Regional Policy Objective 7.12** Future statutory land use plans shall include Strategic Flood Risk Assessment (SFRA) and seek to avoid inappropriate land use zonings and development in areas at risk of flooding and to integrate sustainable water management solutions (such as SuDS, nonporous surfacing and green roofs) to create safe places in accordance with the Planning System and Flood Risk Assessment Guidelines for Local Authorities. **Regional Policy Objective 7.15** Local authorities shall take opportunities to enhance biodiversity and amenities and to ensure the protection of environmentally sensitive sites and habitats, including where flood risk management measures are planned. **Regional Policy Objective 7.16** Support the implementation of the Habitats Directives in achieving an improvement in the conservation status of protected species and habitats in the Region and to ensure alignment between the core objectives of the EU Birds and Habitats Directives and local authority development plans. **Regional Policy Objective 7.22** Local authority development plan and local area plans, shall identify, protect, enhance, provide and manage Green Infrastructure in an integrated and coherent manner and should also have regard to the required targets in relation to the conservation of European sites, other nature conservation sites, ecological networks and protected species. **Regional Policy Objective 10.6** Delivery and phasing of services shall be subject to the required appraisal, planning and environmental assessment processes and shall avoid adverse impacts on the integrity of the Natura 2000 network. **Regional Policy Objective 10.7** Local authority core strategies shall demonstrate compliance with DHPLG Water Services Guidelines for local authorities and demonstrate phased infrastructure – led growth that is commensurate with the

carrying capacity of water services and prevent adverse impacts on the integrity of water dependent habitats and species within the Natura 2000 network.

Regional Policy Objective 10.10

Support Irish Water and the relevant local authorities in the Region to eliminate untreated discharges from settlements in the short term, while planning strategically for long term growth in tandem with Project Ireland 2040 and in increasing compliance with the requirements of the Urban Waste Water Treatment Directive from 39% today to 90% by the end of 2021, to 99% by 2027 and to 100% by 2040.

Regional Policy Objective 10.11

EMRA supports the delivery of the waste water infrastructure set out in Table 10.2, subject to appropriate environmental assessment and the planning process.[25]

Regional Policy Objective 10.12

Development plans shall support strategic wastewater treatment infrastructure investment and provide for the separation of foul and surface water networks to accommodate the future growth of the Region.

Regional Policy Objective 10.15

Support the relevant local authorities (and Irish Water where relevant) in the Region to improve storm water infrastructure to improve sustainable drainage and reduce the risk of flooding in the urban environment and in the development and provision at a local level of Sustainable Urban Drainage solutions.

Regional Policy Objective 10.16

Implement policies contained in the Greater Dublin Strategic Drainage Study (GDSDS), including SuDS.

Regional Policy Objective 10.18

Local authorities shall ensure adequate surface water drainage systems are in place which meet the requirements of the Water Framework Directive and the associated River Basin Management Plans.

South Dublin County Council Development Plan 2016-2022[26]

HCL12 Objective 1

To prevent development that would adversely affect the integrity of any Natura 2000 site located within and immediately adjacent to the County and promote favourable conservation status of habitats and protected species including those listed under the Birds Directive, the Wildlife Acts and the Habitats Directive.

HCL12 Objective 2

To ensure that projects that give rise to significant direct, indirect or secondary impacts on Natura 2000 sites, either individually or in combination with other plans or projects, will not be permitted unless the following is robustly demonstrated in accordance with Article 6(4) of the Habitats Directive and S.177AA of the Planning and Development Act (2000 – 2010) or any superseding legislation:

1. There are no less damaging alternative solutions available; and
2. There are imperative reasons of overriding public interest (as defined in the Habitats Directive) requiring the project to proceed; and
3. Adequate compensatory measures have been identified that can be put in place.

IE Policy 1 Water & Wastewater

It is the policy of the Council to work in conjunction with Irish Water to protect existing water and drainage infrastructure and to promote investment in the water and drainage network to support environmental protection and facilitate the sustainable growth of the County.

[25] The Greater Dublin Drainage Project, the Ringsend Wastewater Treatment Plant Project, the Athlone Main Drainage Project and the Upper Liffey Valley Sewerage Scheme

[26] The draft South Dublin County Development 2022-2028 is currently nearing completion. It is probable that similar protective objectives included in the 2016-2022 Plan would be included in a new plan once adopted.

IE1 Objective 1

To work in conjunction with Irish Water to protect, manage and optimise water supply and foul drainage networks in the County.

IE1 Objective 2

To work in conjunction with Irish Water to facilitate the timely delivery of ongoing upgrades and the expansion of water supply and wastewater services to meet the future needs of the County and the Region.

IE Policy 2 Surface Water & Groundwater

It is the policy of the Council to manage surface water and to protect and enhance ground and surface water quality to meet the requirements of the EU Water Framework Directive.

IE2 Objective 1

To maintain, improve and enhance the environmental and ecological quality of our surface waters and groundwater by implementing the programme of measures set out in the Eastern River Basin District River Basin Management Plan.

IE2 Objective 3

To maintain and enhance existing surface water drainage systems in the County and promote and facilitate the development of Sustainable Urban Drainage Systems (SUDS), including integrated constructed wetlands, at a local, district and County level, to control surface water outfall and protect water quality.

IE2 Objective 4

To incorporate Sustainable Urban Drainage Systems (SUDS) as part of Local Area Plans, Planning Schemes, Framework Plans and Design Statements to address the potential for Sustainable Urban Drainage at a site and/or district scale, including the potential for wetland facilities.

IE2 Objective 5

To limit surface water run-off from new developments through the use of Sustainable Urban Drainage Systems (SUDS) and avoid the use of underground attenuation and storage tanks.

IE2 Objective 6

To promote and support the retrofitting of Sustainable Urban Drainage Systems (SUDS) in established urban areas, including integrated constructed wetlands.

Kildare County Development Plan 2017-2023

NH 4

Support the conservation and enhancement of Natura 2000 Sites including any additional sites that may be proposed for designation during the period of this Plan and to protect the Natura 2000 network from any plans and projects that are likely to have a significant effect on the coherence or integrity of a Natura 2000 Site.

NH 5

Prevent development that would adversely affect the integrity of any Natura 2000 site located within and immediately adjacent to the county and promote favourable conservation status of habitats and protected species including those listed under the Birds Directive, the Wildlife Acts and the Habitats Directive.

NH 6

Ensure an Appropriate Assessment, in accordance with Article 6(3) and Article 6(4) of the Habitats Directive and with DEHLG guidance (2009), is carried out in respect of any plan or project not directly connected with or necessary to the management of a Natura 2000 site to determine the likelihood of the plan or project having a significant effect on a Natura 2000 site, either individually or in combination with other plans or projects and to ensure that projects which may give rise to significant cumulative, direct, indirect or secondary impacts on Natura 2000 sites will not be permitted (either individually or in combination with other plans or projects) unless for reasons of overriding public interest.

WQ 1

Co-operate with the EPA and other authorities in the continued implementation of the EU Water Framework Directive and assist and co-operate with the lead authority for the River Basin Management Plan(s).

WQ 2

Ensure, through the implementation of the River Basin Management Plan(s) and the associated Programmes of Measures and any other associated legislation, the protection and improvement of all drinking water, surface water and ground waters throughout the county.

WQ 6

Protect recognised salmonid water courses in conjunction with Inland Fisheries Ireland such as the Liffey catchment, which are recognised to be exceptional in supporting salmonid fish species.

WW 4

Ensure that adequate wastewater services will be available to service development prior to the granting of planning permission. Applicants who are proposing to connect to the public wastewater network should consult with Irish Water regarding available capacity prior to applying for planning permission.

WW 12

Ensure that existing and permitted private wastewater treatment plants are operated in compliance with their wastewater discharge license, in order to protect water quality.

Appendix III

Technical Note (ARUP document Reference: 272691-16) – Characteristics of the Proposed Development (ARUP 2021)

3 Characteristics of the Proposed Development

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, 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.

3.2.2 Cross Section

The proposed development cross section is illustrated in Figure 3.1.

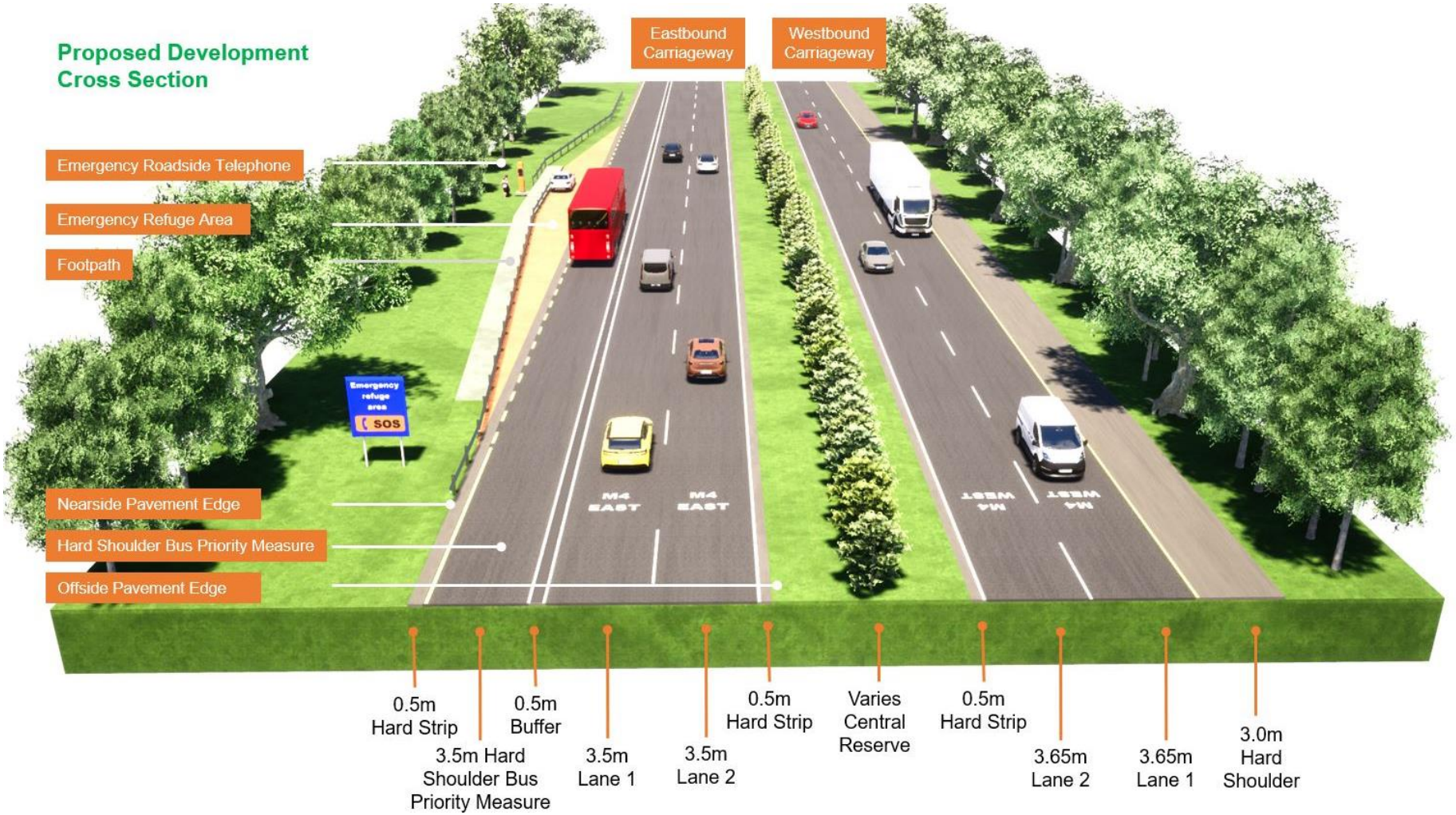


Figure 3.1: Proposed Development Cross Section (©Arup)

3.2.3 Alignment

The existing hard shoulder on the nearside of the M4/N4 eastbound carriageway will incorporate a bus priority measure. The existing M4/N4 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 Eastbound Merge

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

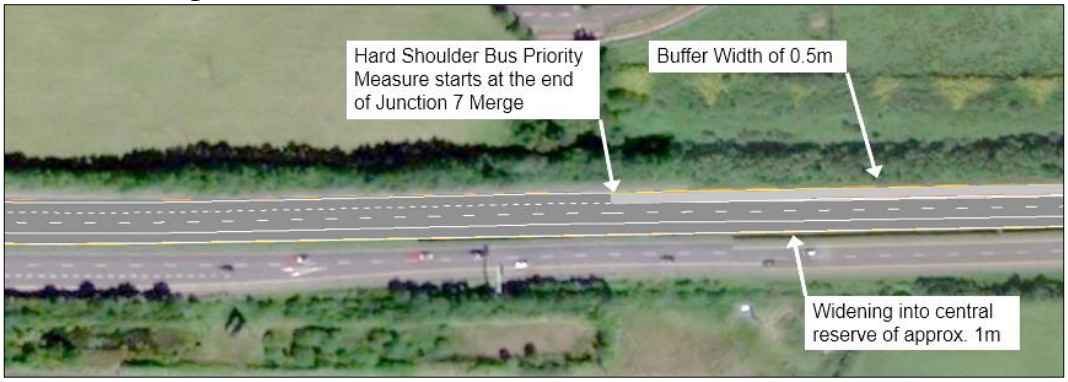


Figure 3.2: Junction 7 Eastbound Merge

3.2.4.2 Junction 6 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.

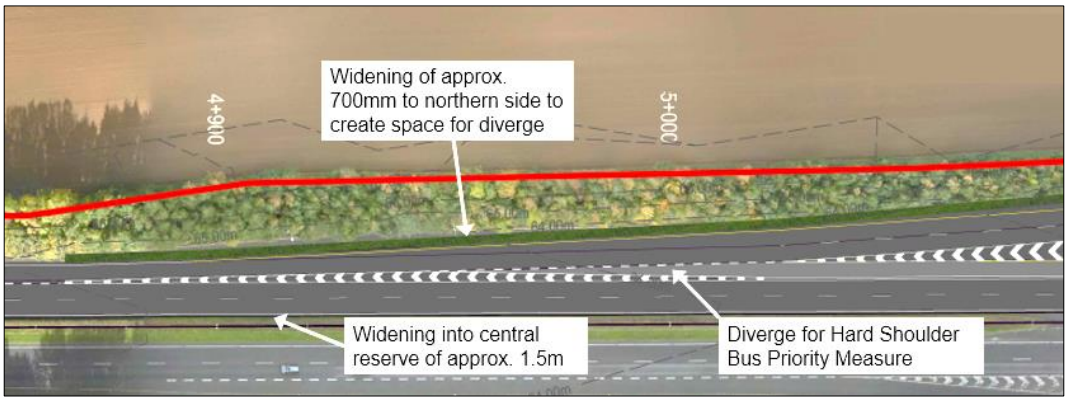


Figure 3.3: Junction 6 Eastbound Diverge

3.2.4.3 Junction 6 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.

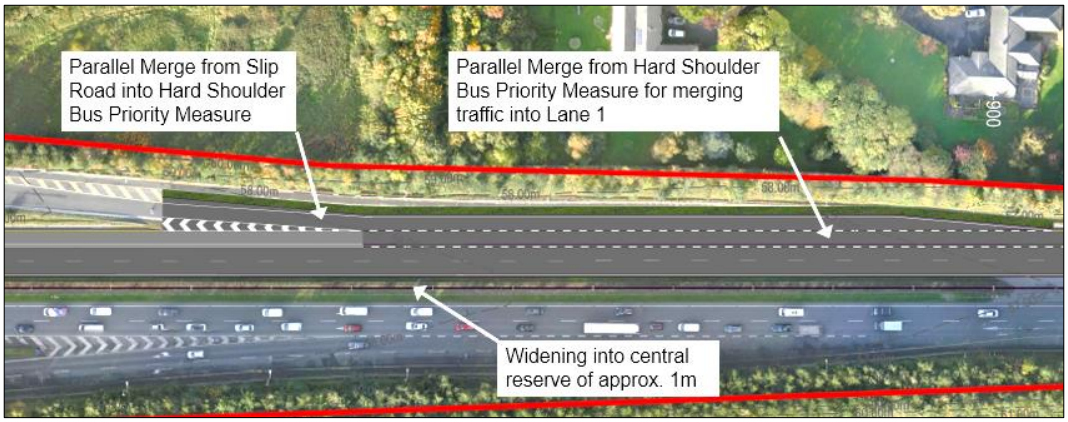


Figure 3.4: Junction 6 Eastbound Merge

3.2.4.4 Junction 5 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.

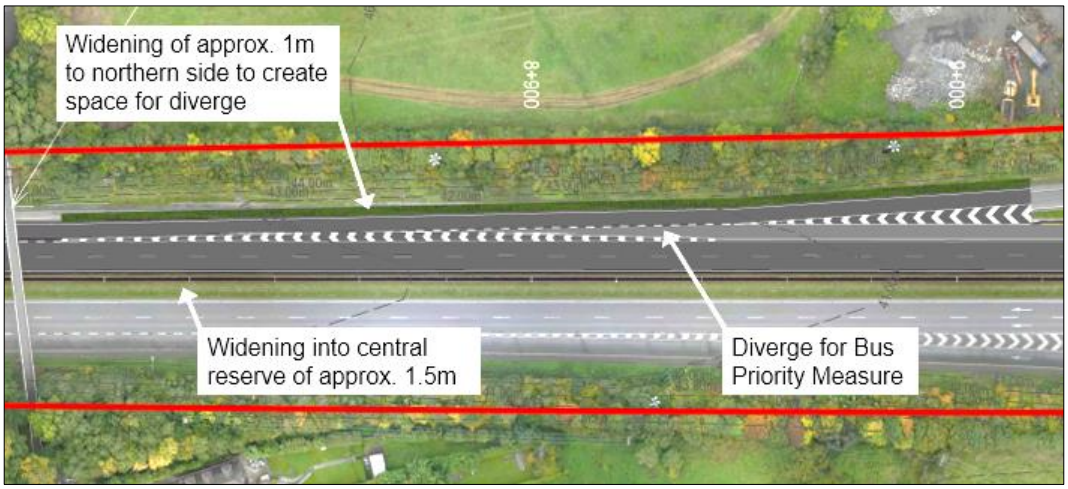


Figure 3.5: Junction 5 Eastbound Diverge

3.2.4.5 Junction 5 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.

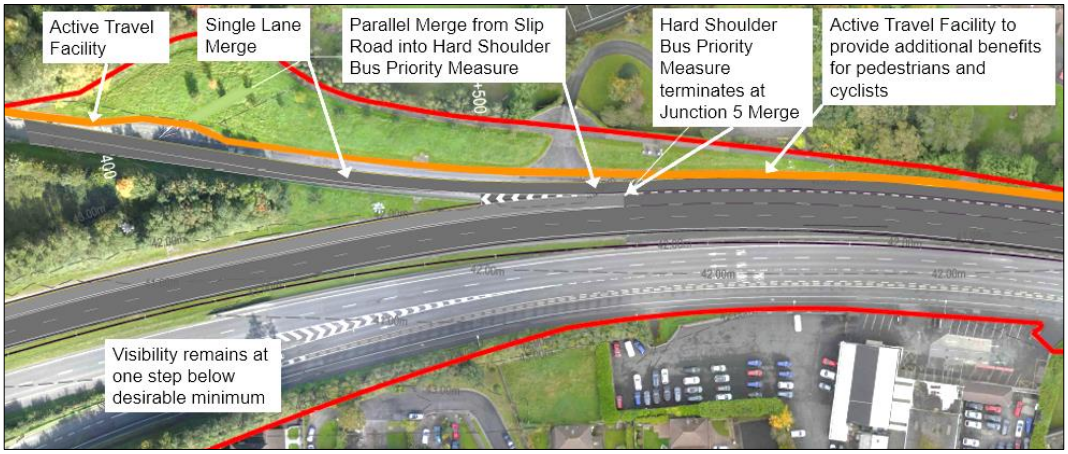


Figure 3.6: Junction 5 Eastbound Merge

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.

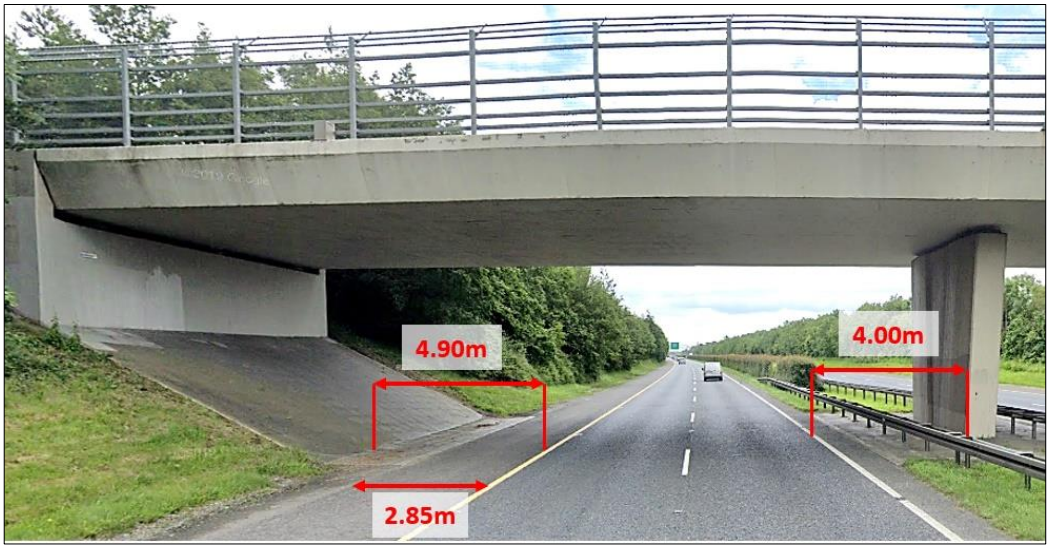


Figure 3.9: R404 Celbridge Road Overbridge (©2021 Google)

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	5.9m
Edge of nearside traffic/bus priority measure to kerb line	1.8m	3.55m

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 (BusConnects 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 BusConnects 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 3.7.

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 3.8. 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.

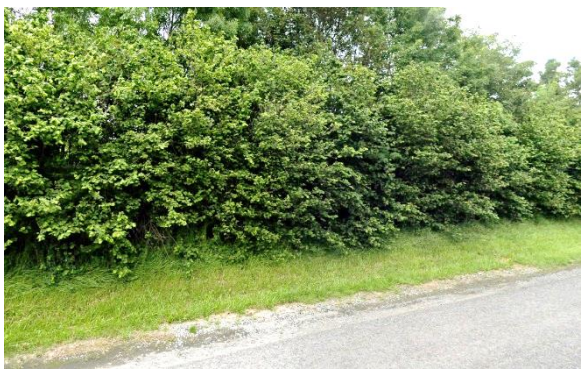
Cut and fill earthworks quantities have been extracted from the design 3D model. The extent of earthworks on the project is limited and predominantly involves cutting into existing cut slopes to allow for the widened cross section and the emergency refuge areas. The total cut will be circa 8,100m^3 and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

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 overlayed. This includes removal and replacement of the surface and binder courses.

Approximately 5,500m^3 of Granular Type B to Clause 804 sub-base will be utilised, followed by 37,000m^3 of AC 32 Dense 40/60 base, 103,000m^3 of AC 20 Dense bin binder (55mm) and 103,000m^3 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^3 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 3.9 below:

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+900	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, this area 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 accompanies 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.

Appendix IV

Technical Note (ARUP document Reference: 272691-ARUP—05-ER-FN-YEBIO-000002-S3-P03) - Drainage, Hydrology and Hydrogeology Assessment for Appropriate Assessment Screening

Technical Note

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Project title	M4 Eastbound Bus Priority Measures Pilot Project	Job number	272691
cc	Tim Ryle, Shea O'Driscoll (Scott Cawley), Stephen Cummins, Angela McCormack, Kevin Tynon (KNRO), Stephen Barry, Zita Langenbach, Fiona Patterson, Debbie Flynn, Aisling Mooney, Ger Hall (Arup)	File reference	272691-ARUP-05-ER-FN-YEBIO-000002-S3-P04
Prepared by	Attila Gazdag, Daniel Walsh, Mesfin Desta, Gerry Baker	Date	26 November 2021
Subject	Drainage, Hydrology and Hydrogeology Assessment for Appropriate Assessment Screening		

1 Introduction

This Technical Note has been prepared to document the potential impacts on drainage, hydrological and hydrogeological features as they relate to European sites due to the proposed M4 Eastbound Bus Priority Measures Pilot Project.

2 Proposed Development

The M4 Eastbound Bus Priority Measures Pilot project extends from Junction 7 Maynooth to Junction 5 Leixlip/Junction 4A in the eastbound direction. Refer to Figure 1. The Pilot commences at Junction 7 Maynooth as eastbound peak time congestion extends to this location. Additionally, the AADT between Junction 7 and Junction 5 is between 59,000 and 70,000 while the AADT west of Junction 7 is significantly lower at 46,000. The Pilot terminates at Junction 5 Leixlip/ Junction 4A because there is an existing eastbound bus lane from this location to the M50.

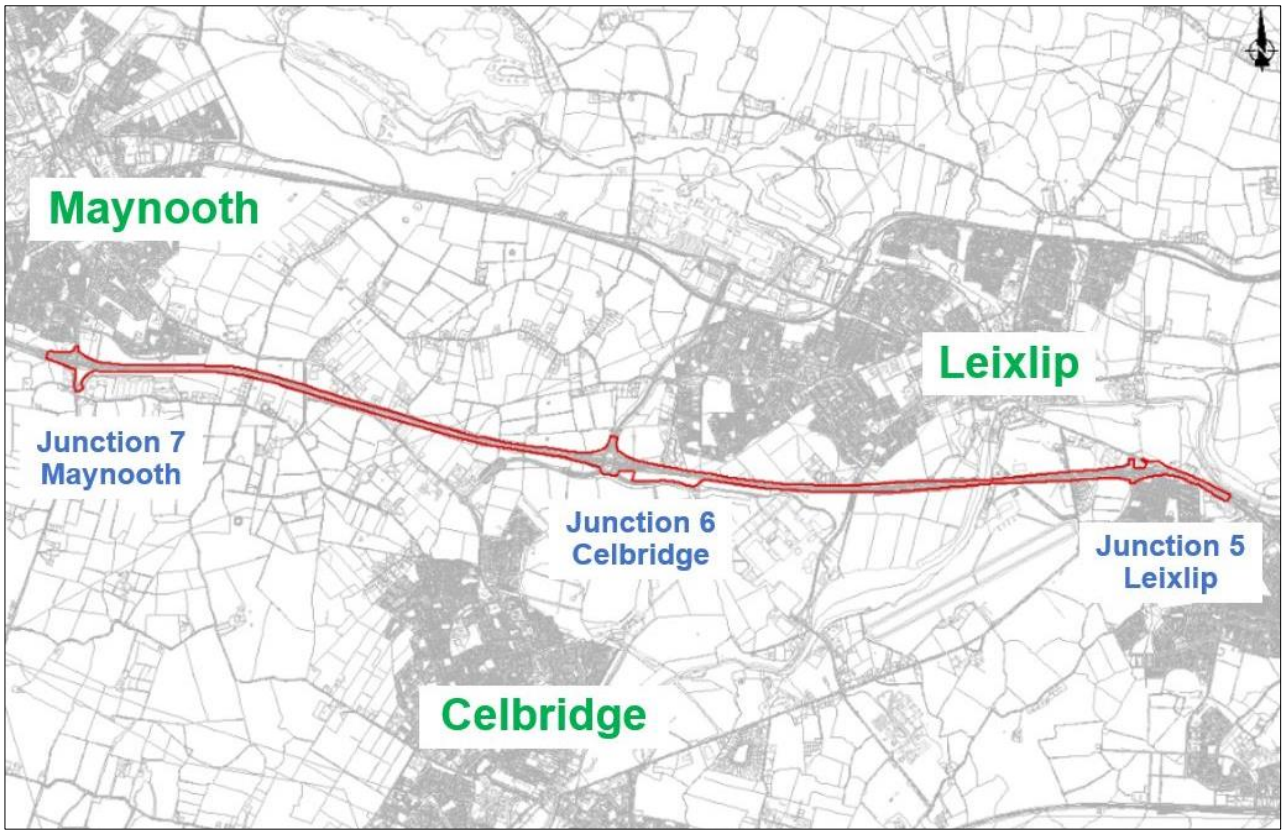

Figure 1: Proposed Development Boundary (© Google Map Data ©2021 Tele Atlas)

The Pilot is specifically focused on the existing M4/N4 as a basis for assessing bus priority measures. Engineering and environmental assessments will examine the viability of providing bus priority measures in the eastbound direction. In general, piloting eastbound bus priority measures would have the greater potential commuter benefits and ability to promote a modal shift in the first instance in comparison to a westbound only service. The bus priority measures will aim to identify a practicable and safe means of implementing priority for bus movement within the existing road constraints to the largest extent possible.

The Pilot aims to provide non-physically segregated permanent (full-time) bus priority measures that can be used by buses and coaches to avoid congested traffic lanes. It will primarily accommodate long-distance point-to-point services, rather than catering for local multi-stop services, commensurate with the delivery of a core bus corridor as envisaged within the GDA Strategy.

The Pilot will be non-segregated to allow it to function as a hard shoulder at all times and be accessible to any vehicle which becomes disabled or requires to leave the mainline in an emergency while taxis will also be allowed use the bus priority measures.

3 Drainage

3.1 Drainage Design Standards and Guidance

The following inputs sourced mainly from Met Éireann, DN-DNG-03022 Drainage Systems for National Roads (including Amendment No. 1 dated June 2015) and RE-CPI-07001 Drainage Design for National Road Schemes - Sustainable Drainage Options are used in the development of the drainage design. Table 1 below shows Rainfall Design Criteria Variables.

Variable	Value
Region	Scotland/Ireland
Return Period (DN-DNG-03022 Drainage Systems for National Roads (including Amendment No. 1 dated June 2015))	Drainage Network: 1 in 1 no surcharge Drainage System: 1 in 5 no flooding, surcharge up to the sub-base level Drainage Network: 1 in 50 no surcharge for transverse pipe only
M5-60 (Met Eireann. Return Period Rainfall Depths for sliding Durations. Irish Grid: Easting 300368, Northing: 235165. Values derived from a Depth Duration Frequency Model)	16.3
Ratio R (Met Eireann. Return Period Rainfall Depths for sliding Durations. Irish Grid: Easting 300368, Northing: 235165. Values derived from a Depth Duration Frequency Model)	0.277
Minimum Global Time of Entry	4 minutes
Max. Rainfall	50 mm/hr
Max. Time of Concentration (Wallingford Procedure States the Modified Rational Method has only been tested for time of concentration not greater than 30 minutes)	30 minutes
Climate Change (DN-DNG-03022 Drainage Systems for National Roads (including Amendment No. 1 dated June 2015))	20%

Table 1: Rainfall Design Criteria Variables

Table 2 below summarises the permeability factors to be used in the design.

Location	Value
Grassed Areas (Based on Dublin soil type 2)	0.3
Paved	1

Table 2: Runoff Permeability Factors

Table 3 below summarises soil Standard Percentage Runoff (SPR) values.

Soil	SPR Value
Type 1	0.1
Type 2	0.3
Type 3	0.37
Type 4	0.47
Type 5	0.53

Table 3: Soil SPR Values

Based on the location of the site and greenfield runoff rate estimation tools by HR Wallingford, Soil Type 2 has been used for the calculation of Q_{Bar}.

Table 4 below provides typical values of Q_{BAR} per hectare for the typical SAAR (Standard Average Annual Rainfall) value for the Greater Dublin region of 750mm for Soil Type 2.

	Soil Type 2
QBar/ha (l/s/ha)	2.0

Table 4: Q_{BAR} Values

The following parameters were set for initial drainage design:

- Maximum diameter of filter drain is 450mm diameter; and
- Roughness (ks) for Carrier drain is 0.6 and for filter drains is 1.5.

3.2 Proposed Drainage Network

The proposed outfall locations are as follows:

- Existing surface water manhole at Ch 1+638 Surveyed IL:60.39;
- Existing surface water manhole at Ch 8+015 Surveyed IL:45.27;
- Existing surface water manhole at Ch 9+234 Surveyed IL:36.74; and
- Existing surface water manhole at Ch 9+745 Surveyed IL:37.84.

Table 5 below provides the allowable discharge rate / outfall locations for the impermeable areas:

Chainage		Outfall	Allowable Discharge Rate (l/s)
From	To		
1+875	3+060	1+638	167.71
3+060	8+080	8+015	810.41
8+080	9+250	9+234	245.64
9+250	9+700	9+745	44.33

Table 5: Allowable Discharge Rate Impermeable Areas (l/s)

Table 6 below provides the allowable discharge rate / outfall locations for the permeable areas:

Chainage		Outfall	Allowable Discharge Rate (l/s)
From	To		
1+875	3+060	1+638	20.30
3+060	8+100	8+015	287.80
8+300	9+500	9+234	62.6
9+500	9+740	9+745	4.7

Table 6: Allowable Discharge Rate Permeable Areas (l/s)

3.2.1 Drainage Network:

Please note the bus priority measures commence at Ch 2+000.

- Proposed combined filter drains in the northern edge of the carriageway from Ch 3+050 to Ch 1+8750 discharge to a proposed sediment pond at Ch 1+875 north of carriageway which discharges to an existing surface water manhole at Ch 1+638. Flow control is included as part of the drainage design of the proposed development.
- Proposed concrete surface water channel on the northern side of the carriageway from Ch 3+050 to Ch 2+880 with a connection to the combined filter drains every 100m.
- Proposed filters drain on the southern side of the carriageway from Ch 2+120 to Ch 2+880 with cross connection to the combined filter drains every 200m.
- Proposed combined filter drains in the northern edge of the carriageway from Ch 3+090 to Ch 3+370. Proposed carrier drains to the north of the carriageway from Ch 3+370 to Ch 8+018 discharge to an existing manhole at Ch 8+018. Proposed pipe crossing under an existing culvert at Ch 6+482. Carrier drains potential oversize for attenuation proposes. Flow control is included as part of the drainage design of the proposed development.
- Proposed concrete surface water channel on the northern side of the carriageway from Ch 3+050 to Ch 8+080 with a connection to the combined filer drains / carrier drains every 100m.
- Proposed filter drains in the northern edge of the carriageway from Ch 4+280 to Ch 8+080 discharge to an existing surface water manhole at Ch 8+015. Proposed pipe crossing under an existing culvert at Ch 6+482.
- Proposed combined filter drains to the north of the carriageway from Ch 8+200 to Ch 9+260 discharge to an existing manhole at Ch 9+234. Combined filter drains potential oversize for attenuation proposes. Flow control is included as part of the drainage design of the proposed development.
- Proposed concrete surface water channel on the northern side of the carriageway from Ch 8+220 to Ch 9+320 with a connection to the carrier drains every 100m.
- Proposed combined filter drains in the north of carriageway from Ch 9+500 to Ch 9+260 discharging to an existing manhole at Ch 9+234. Combined filter drains potential oversize for

attenuation proposes. Flow control is included as part of the drainage design of the proposed development.

- Proposed filter drains on the southern side of the carriageway from Ch 9+540 to Ch 9+320 with cross connection to the combined filter drains.
- Proposed filter drains on the southern side of the carriageway from Ch 9+540 to Ch 9+720 discharge to an existing manhole at Ch 9+745.
- Natural valley line to the north of the carriageway at the foot of the embankment from Ch 3+500 to Ch 4+000 will be used as a swale for attenuation.
- Existing manhole at Ch 9+234 and downstream pipe (dia. 300mm) upgrade is proposed to accommodate additional flow from the proposed bus facility.

3.2.2 Pollution Control

TII Standard DN-DNG-03022 Drainage Systems for National Roads (including Amendment No. 1 dated June 2015) require the inclusion of the following as part of the proposed development:

- Proposed sediment pond with oil separator at Ch 1+875 north of carriageway. Proposed maintenance access from Straffan Road, Greenfield.
- Proposed oil separator at Ch 8+000 located in the ERA (Emergency Refuge Area) to provide access for maintenance proposes.

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4 Hydrology

This section considers the potential impacts on waterbodies as they relate to European sites due to the proposed development.

4.1 Existing Conditions

Surface water dependant habitats have the potential to be impacted as a result of changes in water levels, flows or quality through, for example, accidental spillages or alteration of flow to the habitat. This assessment considers water dependent European designated habitats downstream of the proposed development for which there exists a hydraulic connectivity.

The proposed development lies entirely within Hydrometric Area 9, which is the Liffey and Dublin Bay catchment. There are two primary surface water features located in the vicinity. The principal watercourse is the River Liffey, which flows in a north-easterly direction at the eastern end of the proposed development boundary. The river has been dammed at this location to form the Leixlip Reservoir. A bridge of the M4 motorway 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. The River Liffey ultimately discharges into Dublin Bay, c.25km downstream of the proposed development boundary, where there are a number of SAC and SPA sites. Therefore, a hydraulic connectivity exists between the River Liffey within the proposed development boundary and these sites.

The Meadowbrook (or Tagahdoe) Stream and the Lyreen are two watercourses that cross the M4 to the west of the proposed development boundary that flow in a north-easterly direction. Although they are not located within the proposed development boundary, were any runoff to drain to these watercourses or their tributaries, a hydraulic connectivity would exist between the proposed development boundary and the Rye Water Valley SAC circa 3km downstream.

4.2 Potential Impacts on Existing Conditions

The potential impacts to surface water dependant habitats from the proposed development include changes to the water level, flow and quality. The impact on the surface water dependant habitats is influenced by the following:

- Hydraulic connectivity between the proposed development and a waterbody supporting the habitat;
- The proximity of the proposed development to a waterbody that flows to the habitat;
- The direction of flow of the waterbody to the habitat;
- The quality of the water at the habitat location and upstream at the proposed development; and
- The activities during the construction and operational phases of the proposed road development that have the potential to alter the flow of or pollute a waterbody that is hydraulically connected to a habitat.

4.3 Summary

The European sites downstream of the watercourses in the vicinity of the proposed development boundary and a summary of their potential connection with the proposed development is included in Table 7 below.

Site Name	NPWS Site Code	Proximity	Screening	Result
Rye Water Valley/Carton SAC	001398	c.3km	Site 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.	Screened out
North Dublin Bay SAC	000206	c.26km	Negligible potential for impact on water quality due to distance from the proposed development and the potential for dilution/attenuation.	Screened out
South Dublin Bay SAC	000210	c.26km	Negligible potential for impact on water quality due to distance from the proposed development and the potential for dilution/attenuation.	Screened out
Howth Head SAC	000202	c.32km	Negligible potential for impact on water quality due to distance from the proposed development and the potential for dilution/attenuation.	Screened out
Rockabill to Dalkey Island SAC	003000	c.32km	Negligible potential for impact on water quality due to distance from the proposed development and the potential for dilution/attenuation.	Screened out
North Bull Island SPA	004006	c.26km	Negligible potential for impact on water quality due to distance from the proposed development and the potential for dilution/attenuation.	Screened out
South Dublin Bay and River Tolka Estuary SPA	004024	c.26km	Negligible potential for impact on water quality due to distance from the proposed development and the potential for dilution/attenuation.	Screened out

Table 7: Surface Water Dependant European Sites downstream of the Proposed Development Boundary

5 Hydrogeology

This section considers the potential impacts on groundwater bodies as they relate to European sites due to the proposed development.

5.1 Existing Conditions

Groundwater dependant habitats have the potential to be impacted as a result of deterioration in groundwater levels, flows or quality through, for instance, accidental spillages, dewatering causing alteration of baseflow to the habitat causing the area to dry out. A conservative approach was taken regarding water dependent habitats. All water dependant features have been included as if they are dependent on both surface water and groundwater.

This assessment considers water dependent habitats within the same groundwater body as the proposed development. The boundary for a groundwater body marks the catchment within which all recharge and groundwater flow is contained. Recharge and groundwater does not flow across the divide and in this regard, groundwater characteristics, such as water quality and seasonal groundwater level fluctuation, are isolated and specific to a particular groundwater body.

The proposed development is located within the Dublin groundwater body which extends across the Greater Dublin City area and much of County Kildare. The groundwater body is boarded to the south by the Dublin Mountains and to the north by areas of higher elevation southwest of Dunshaughlin. The groundwater body comprises both Locally Important Aquifer which is Moderately Productive only in Local Zones (Ll) and Poor Aquifer which is Generally Unproductive except for Local Zones (Pl). Most of the groundwater body comprises Dinantian Upper Impure Limestones. Dinantian Pure Unbedded Limestones and Dinantian Lower Impure Limestones are located to the east and south of Maynooth as well as in the north east of the groundwater body. In the northwest of the groundwater body, the area is underlain by Namurian Undifferentiated rock.

5.2 Potential Impacts on Existing Conditions

Potential impacts to groundwater dependant habitats can arise from changes to groundwater levels and groundwater quality. The potential impact on the groundwater dependant habitat is influenced by the following:

- The proximity to the groundwater body that supports the Groundwater Dependent Terrestrial Ecosystems (GWDTE) at the European site;
- Hydraulic connectivity between the proposed development and the groundwater bodies supporting the groundwater dependant habitat;
- The groundwater flow direction in the vicinity;
- The seasonal fluctuation in groundwater level;
- The water quality of the feature and the groundwater from which it receives its baseflow;
- The level of excavation of the proposed road development relative to the seasonal fluctuation in the groundwater table; and

- The activities during the construction and operational phases of the proposed road development that have the potential to pollute.

The assessment has considered these criteria in the context of the proposed development and the European sites within the study area.

5.3 Summary

The European sites within or downgradient of the Dublin Groundwater body and a summary of their potential connection with the proposed development is included in Table 8 below.

Site Name	NPWS Site Code	Proximity	Screening	Result
Rye Water Valley/Carton SAC	001398	c.500m	Site lies within the same very large Dublin groundwater body that the proposed development traverses. However, the local groundwater flow direction from the site is expected to be towards the northwest (following local topographic gradients) with groundwater locally discharging to the Meadowbrook Stream. Therefore there is no direct pathway expected between groundwater from the site and the groundwater dependant habitats further to the east, with respect to impacts on groundwater quality. The proposed excavations at the site are too shallow to result in any significant groundwater level drawdown at the construction site and certainly no perceptible drawdown is expected at the groundwater dependant habitat sites.	Screened Out
Mouds Bog SAC	002331	c.21km	Significant distance and upgradient from proposed development. Negligible potential for impact on groundwater level or quality from proposed development	Screened out
North Dublin Bay SAC	000206	c.19km	Significant distance from proposed development. Negligible potential for impact on flows or water quality due to proposed development due to distance and potential for dilution/attenuation.	Screened out
South Dublin Bay SAC	000210	c.17km	Significant distance from proposed development. Negligible potential for impact on flows or water quality due to proposed development due to distance and potential for dilution/attenuation.	Screened out
Baldoyle Bay SAC & SPA	000199 & 004016	c.22km	Significant distance from proposed development and not downgradient. Negligible potential for impact on flows or water quality.	Screened out
Malahide Estuary SAC & SPA	000205 & 004025	c.23km	Significant distance from proposed development and not downgradient. Negligible potential for impact on flows or water quality.	Screened out

Site Name	NPWS Site Code	Proximity	Screening	Result
North Bull Island SPA	004006	c.19km	Significant distance from proposed development. Negligible potential for impact on flows or water quality due to proposed development due to distance and potential for dilution/attenuation.	Screened out
South Dublin Bay and River Tolka Estuary SPA	004024	c.16km	Significant distance from proposed development. Negligible potential for impact on flows or water quality due to proposed development due to distance and potential for dilution/attenuation.	Screened out

Table 8: Water Dependant European Sites within the Dublin Groundwater Body

DOCUMENT CHECKING (not mandatory for File Note)

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