

Kildare County Council

Maynooth to Leixlip Project

Options Report - Stage 2

Archaeological, Architectural and
Cultural Heritage Active Travel

Options Assessment

Draft 1 | 31 August 2023

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

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

Job number 272691-00

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Contents

	Page
Contents	1
1 Stage 2 Archaeological, Architectural and Cultural Heritage Active Travel Options Assessment	1
1.1 Introduction	1
1.2 Methodology	1
1.2.1 Scoring Procedure	5
1.3 Active Travel Options Assessment	6
1.3.1 R408 Newtown Overbridge	6
1.3.2 Junction 7 Maynooth	7
1.3.3 R405 Ballygoran Overbridge	8
1.3.4 Junction 6 Celbridge	9
1.3.5 R404 Celbridge Road Overbridge	10
1.3.6 Junction 5 Leixlip	11
1.4 Summary	12
1.5 References	13

Tables

Table 1.1: TII Project Appraisal Guidelines Scoring Criteria

Table 1.2: R408 Newtown Road Active Travel Options Assessment Matrix

Table 1.3: Junction 7 Maynooth Active Travel Options Assessment Matrix

Table 1.4: R405 Ballygoran Active Travel Options Assessment Matrix

Table 1.5: Junction 6 Celbridge Active Travel Options Assessment Matrix

Table 1.6: R404 Celbridge Active Travel Options Assessment Matrix

Table 1.7: Junction 5 Leixlip Active Travel Options Assessment Matrix

Table 1.8: Archaeological, Architectural and Cultural Heritage Assessment
Overall Summary

1 Stage 2 Archaeological, Architectural and Cultural Heritage Active Travel Options Assessment

1.1 Introduction

This section details the environmental assessment of the Stage 2 Active Travel Options for the Maynooth to Leixlip Project with respect to the Archaeological, Architectural and Cultural Heritage constraints identified in the Constraints Report. The methodology is contained in Section 1.2. Section 1.3 contains the options assessment. A summary is provided in Section 1.4 and references are provided in Section 1.5.

1.2 Methodology

As per the Stage 1 assessment, the Stage 2 assessment of active travel options has been carried out with reference to the NRA Guidelines for the Assessment of Archaeological Heritage Impacts of National Road Schemes (2005) and Assessment of Architectural Heritage Impacts of National Road Schemes (2005), although it should be noted that the guidelines themselves predate the establishment of an options assessment process.

In order to produce a meaningful assessment (in relation to the Archaeological, Architectural and Cultural Heritage resource), a study area of 200m from the edge of where interventions may be required has been used for the assessment of same. A preliminary design has been used to assess for potential direct and indirect impacts on the archaeological, architectural and cultural heritage constraints within a 200m study area within each option corridor.

Measurements are made from the edge of the intervention (where applicable) or indicative fenceline to the upstanding remains of the archaeological, architectural or cultural heritage constraint. If no remains are upstanding, the measurement is made to the centre of the site.

Each constraint included in and within 200m of each option is tabulated with measurements from the option included. The impact type is then defined (direct, indirect, no impact, positive, negative, neutral) based on whether the constraint would be physically affected or not by the option. Dependant on how the constraint would be affected defines the potential impact on the constraint (significant, very significant, profound).

Based on the above therefore, the assessment comprises the calculation and definition of the potential direct and indirect impacts upon the Archaeological, Architectural and Cultural Heritage resource associated with each option and the potential significance of those impacts. This results in the overall assessment of the options in terms of potential impacts and an overall ranking of the options in terms of potential impacts and order of preference.

The assessment included key Archaeological, Architectural and Cultural Heritage constraints, identified during the overall constraints study for the project, along with a desktop assessment carried out in order to identify previously unrecorded sites or structures of Archaeological, Architectural or Cultural Heritage significance.

The resources consulted consist of the following:

- Record of Monuments and Places (RMP) for Counties Kildare and Dublin;
- Sites and Monuments Record (SMR) for Counties Kildare and Dublin;
- Monuments in State Care Database Counties Kildare and Dublin;
- Preservation Orders Counties Kildare and Dublin;
- Topographical Files of the National Museum of Ireland- Counties Kildare and Dublin;
- Historic cartographic study area;
- National Inventory of Architectural Heritage Counties Kildare and Dublin (Architectural & Garden Survey);
- Excavations Bulletin (1970-2023);
- Kildare County Development Plan 2023-2029;
- South Dublin County Development Plan 2022-2028; and
- Aerial photographic coverage.

Record of Monuments and Places (RMP) Section 12 (1) of the National Monuments Act (1994 amendment) provides that the Minister for Arts, Heritage, Gaeltacht and the Islands (now the Minister for Housing, Local Government and Heritage) shall establish and maintain a record of monuments and places (RMP) where it is known that such monuments exist. The record comprises of a list of monuments and relevant places and mapping showing each monument and relevant place in respect of each county in the state. Sites recorded on the Record of Monuments and Places all receive statutory protection under the National Monuments Act. All recorded monuments are referred to as Archaeological Heritage (AH sites) within this assessment.

Sites and Monuments Record (SMR) holds documentary evidence and field inspections of all known archaeological sites and monuments. Some information is also held about archaeological sites and monuments whose precise location is not known e.g. only a site type and townland are recorded. These are known to the National Monuments Service as ‘un-located sites’ and cannot be afforded legal protection. As a result, these are omitted from the Record of Monuments and Places. SMR sites are also listed on a website maintained by the Housing, Local Government and Heritage (DoHLGH) – www.archaeology.ie. All SMR sites are referred to as Archaeological Heritage (AH sites) within this assessment.

National Monuments in the State Care Database is a list of all the National Monuments in the state guardianship or ownership. Each is assigned a National Monument number whether in guardianship or ownership and has a brief description of the remains of each Monument.

A national monument receives statutory protection and is described as ‘a monument or the remains of a monument the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic or archaeological interest attaching thereto’ (National Monuments Act, 1930, Section 2).

The Minister for the Department of Housing, Local Government and Heritage may acquire national monuments by agreement or by compulsory order. The state or local authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments (other than dwellings) may also appoint the Minister or the local authority as guardian of that monument if the state or local authority agrees. Once the site is in ownership or guardianship of the state, it may not be interfered with without the written consent of the Minister.

Preservation Orders List and/or Temporary Preservation Orders, can be assigned to a site or sites that are deemed to be in danger of injury or destruction. These are allocated under the 1930 Act.

Preservation Orders make any interference with the site illegal. Temporary Preservation Orders can be attached under the 1954 Act. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent, and at the discretion, of the Minister (DoHLGH).

Topographical files of the National Museum of Ireland are the national archive of all known finds recorded by the National Museum. This archive relates primarily to artefacts but also includes references to monuments and unique records of previous excavations. The find spots of artefacts are important sources of information on the discovery of sites of archaeological significance.

Historic cartographic sources are important in tracing land use development within the development area as well as providing important topographical information on areas of archaeological potential and the development of buildings. Cartographic analysis of the historic Ordnance Survey Maps has been made to identify any topographical anomalies or structures that no longer remain within the landscape. All sites of potential archaeological or architectural heritage merit identified during the map analysis are listed as Cultural Heritage (CH) sites within this assessment.

Aerial photographic coverage is an important source of information regarding the precise location of sites and their extent. It also provides initial information on the terrain and its likely potential for archaeology. Ordnance Survey aerial photographs (1995-2013), Google Earth coverage (2020) and Bing Maps were examined for this assessment. Any sites identified during cartographic or aerial photographic assessment as identified as Cultural Heritage (CH) sites within this assessment.

Development Plans contain a catalogue of all the Protected Structures, archaeological sites and Architectural Conservation Areas within each county.

The development plans for Counties Kildare and South Dublin were examined as part of this assessment, along with relevant local or town plans. All protected structures are referred to as Built Heritage sites (BH) as part of this assessment. Any designated Architectural Conservation Areas (ACAs) are also included, where applicable.

The National Inventory of Architectural Heritage (NIAH) is a government-based organisation tasked with making a nationwide record of significant local, regional, national and international structures, which in turn provides county councils with a guide as to what structures to list within the Record of Protected Structures. The NIAH have also conducted a nationwide desk-based survey of historic gardens, including demesnes that surround large houses. All NIAH structures are referred to as Built Heritage sites (BH) as part of this assessment.

Whilst the NIAH Garden Survey was utilised as part of this assessment, this was carried out in conjunction with detailed analysis of the historic Ordnance Survey maps in order to identify all designed landscapes (DL) within the corridor options.

Excavations Bulletin is a summary publication that has been produced every year since 1970. The hard copy publication summarises every archaeological excavation that has taken place in Ireland during that year up until 2010 and since 1987 has been edited by Isabel Bennett. This information is vital when examining the archaeological content of any area which may not have been recorded under the SMR and RMP files. This information is also available online (www.excavations.ie) from 1970-2023. It should be noted that in some instances, summaries are not lodged for excavations and as such the record cannot be considered to be entirely complete.

1.2.1 Scoring Procedure

Quantitative and qualitative assessments of impacts were undertaken for this assessment using the PAG scoring procedure. The PAG seven-point scale scoring procedure is shown in Table 1.1.

Table 1.1: TII Project Appraisal Guidelines Scoring Criteria

Assessment Score	Description
7	Major or highly positive
6	Moderately positive
5	Minor or slightly Positive
4	Not significant or neutral
3	Minor or slightly negative
2	Moderately negative
1	Major or highly negative

Using a combination of the impact scores and professional judgement, a determination as to the level of the impact of each Active Travel Option was provided. Using the impact scores and the professional judgement of the specialist, a determination is made as to whether each Active Travel Option that is assessed is either:

- Preferred; or
- Least Preferred.

1.3 Active Travel Options Assessment

1.3.1 R408 Newtown Overbridge

Option 1 – New overbridge parallel to existing on the western side

This proposed facility would be 4m wide. There are no recorded or previously unrecorded archaeological, architectural and cultural heritage sites located within 200m of the proposed overbridge and works would be wholly confined to the existing road footprint. As such, no direct or indirect impacts are predicted on the archaeological, architectural or cultural heritage resource.

Option 2 – New overbridge parallel to existing on the eastern side

This proposed facility would be 4m wide. South of the overbridge, the new facility continues parallel to the existing edge of pavement to tie into the Maynooth Town Football Club access. There are no recorded or previously unrecorded archaeological, architectural and cultural heritage sites located within 200m of the proposed overbridge and works would be wholly confined to the existing road footprint. As such, no direct or indirect impacts are predicted on the archaeological, architectural or cultural heritage resource.

Assessment Matrix of R408 Newtown Road Overbridge Options

Table 1.2: R408 Newtown Road Active Travel Options Assessment Matrix

Assessment Sub-Criteria	Option 1 (West)	Option 2 (East)
Potential direct or indirect negative impacts (imperceptible to profound)	This option would not result in any negative direct or indirect impacts upon the archaeological, architectural or cultural heritage resource.	This option would not result in any negative direct or indirect impacts upon the archaeological, architectural or cultural heritage resource.
Scoring		
Qualitative Assessment	Not Significant or Neutral	Not Significant or Neutral
Score/ Impact Level	4	4
Preference	Preferred	Preferred

1.3.2 Junction 7 Maynooth

Option 1 – New overbridge parallel to existing on the western side

This proposed facility would be 4m wide. There are no recorded or previously unrecorded archaeological, architectural and cultural heritage sites located within 200m of the proposed overbridge and works would be wholly confined to the existing road footprint. As such, no direct or indirect impacts are predicted on the archaeological, architectural or cultural heritage resource.

Option 2 – New overbridge parallel to existing on the eastern side

This proposed facility would be 4m wide. There are no recorded or previously unrecorded archaeological, architectural and cultural heritage sites located within 200m of the proposed overbridge and works would be wholly confined to the existing road footprint. As such, no direct or indirect impacts are predicted on the archaeological, architectural or cultural heritage resource.

Assessment Matrix of Junction 7 Maynooth

Table 1.3: Junction 7 Maynooth Active Travel Options Assessment Matrix

Assessment Sub-Criteria	Option 1 (West)	Option 2 (East)
Potential direct or indirect negative impacts (imperceptible to profound)	This option would not result in any negative direct or indirect impacts upon the archaeological, architectural or cultural heritage resource.	This option would not result in any negative direct or indirect impacts upon the archaeological, architectural or cultural heritage resource.
Scoring		
Qualitative Assessment	Not Significant or Neutral	Not Significant or Neutral
Score/ Impact Level	4	4
Preference	Preferred	Preferred

1.3.3 R405 Ballygoran Overbridge

Option 1 – New overbridge parallel to existing on the western side

This proposed facility would be 4m wide. There are no recorded or previously unrecorded archaeological, architectural and cultural heritage sites located within 200m of the proposed overbridge and works would be wholly confined to the existing road footprint. As such, no direct or indirect impacts are predicted on the archaeological, architectural or cultural heritage resource.

Option 2 – New overbridge parallel to existing on the eastern side

This proposed facility would be 4m wide. There are no recorded or previously unrecorded archaeological, architectural and cultural heritage sites located within 200m of the proposed overbridge and the majority of works would be wholly confined to the existing road footprint.

A very small area of greenfield, outside of the footprint of the existing road network may be required but given the very small size no direct or indirect impacts are predicted on the archaeological, architectural or cultural heritage resource.

Assessment Matrix of R405 Ballygoran Overbridge Options

Table 1.4: R405 Ballygoran Active Travel Options Assessment Matrix

Assessment Sub-Criteria	Option 1 (West)	Option 2 (East)
Potential direct or indirect negative impacts (imperceptible to profound)	This option would not result in any negative direct or indirect impacts upon the archaeological, architectural or cultural heritage resource.	This option would not result in any negative direct or indirect impacts upon the archaeological, architectural or cultural heritage resource.
Scoring		
Qualitative Assessment	Not Significant or Neutral	Not Significant or Neutral
Score/ Impact Level	4	4
Preference	Preferred	Preferred

1.3.4 Junction 6 Celbridge

Option 1 – New overbridge parallel to existing on the western side

This proposed facility would be 4m wide. The northern section of this option would run through greenfield to the north of the M4. AH13 (field system) is located c. 170m to the north-northwest and a number of excavated archaeological sites are located to the southeast, within the footprint of the road junction (AH18, 19, 20, 21, 22). The area of the overbridge crossing to the south of the M4 has been subject to ground disturbance. No impacts are predicted upon the archaeological resource.

This option would be located within the demesne landscape associated with Castletown House, but this section of the landscape has been isolated from the remainder, due to the construction of the M4 and R449. The potential impact would be direct and negative but of slight significance.

Option 2 – New overbridge parallel to existing on the eastern side

This proposed facility would be 4m wide. The northern section of this option would run through greenfield, adjacent to AH19 (burnt mound). The site was partially excavated in advance of the junction construction (EX15) but it is possible that associated features extend into the footprint of the proposed option. As such a direct, negative, significant impact may occur.

This option would also be located within the demesne landscape associated with Castletown House, albeit that this section of the landscape has been isolated from the remainder, due to the construction of the M4. The potential impact would be direct and negative but of slight significance.

Assessment Matrix of Junction 6 Celbridge Options

Table 1.5: Junction 6 Celbridge Active Travel Options Assessment Matrix

Assessment Sub-Criteria	Option 1 (West)	Option 2 (East)
Potential direct or indirect negative impacts (imperceptible to profound)	Direct, negative, slight impact on fragmented demesne landscape associated with Castletown House (DL2). Ground disturbances have the potential to impact on buried archaeological remains in greenfield areas.	Direct, negative, slight impact on fragmented demesne landscape associated with Castletown House (DL2). Ground disturbances have the potential to impact on buried archaeological remains in greenfield areas. Direct, negative, significant impact on remains of burnt mound (AH19) that may extend into the footprint of the option.
Scoring		
Qualitative Assessment	Minor or slightly negative	Moderately negative
Score/ Impact Level	3	2
Preference	Preferred	Least Preferred

1.3.5 R404 Celbridge Road Overbridge

Option 1 – New overbridge parallel to existing on the western side

This proposed facility would be 4m wide. There are no recorded or previously unrecorded archaeological, architectural and cultural heritage sites located within 200m of the proposed bridge, with the exception of DL4 located to the immediate east. The works would be wholly confined to the existing road footprint. As such, no direct or indirect impacts are predicted on the archaeological, architectural or cultural heritage resource.

Option 2 – New overbridge parallel to existing on the eastern side

This proposed facility would be 4m wide. The new overbridge would be located within the original extents of DL4, although this particular section has been removed by the construction of the M4. The works would be wholly confined to the existing road footprint. As such, no direct or indirect impacts are predicted on the archaeological, architectural or cultural heritage resource.

Assessment Matrix of R404 Celbridge Road Overbridge

Table 1.6: R404 Celbridge Active Travel Options Assessment Matrix

Assessment Sub-Criteria	Option 1 (West)	Option 2 (East)
Potential direct or indirect negative impacts (imperceptible to profound)	This option would not result in any negative direct or indirect impacts upon the archaeological, architectural or cultural heritage resource.	This option would not result in any negative direct or indirect impacts upon the archaeological, architectural or cultural heritage resource.
Scoring		
Qualitative Assessment	Not significant or neutral	Not significant or neutral
Score/ Impact Level	4	4
Preference	Preferred	Preferred

1.3.6 Junction 5 Leixlip

Option 1 – New overbridge parallel to existing on the western side

This proposed facility would be 4m wide. The edge of the demesne landscape DL7 is located c. 50m to the northeast and a post medieval house (CH 4) is located c. 56m to the northeast, but no other archaeological, architectural or cultural heritage sites are located within 200m of the option. The works would be wholly confined to the existing road footprint. As such, no direct or indirect impacts are predicted on the archaeological, architectural or cultural heritage resource.

Option 2 – New overbridge parallel to existing on the eastern side

This proposed facility would be 4m wide. The edge of the demesne landscape DL7 is located c. 50m to the northeast and a post medieval house (CH 4) is located c. 40m to the northeast but no other archaeological, architectural or cultural heritage sites are located within 200m of the option. The works would be wholly confined to the existing road footprint. As such, no direct or indirect impacts are predicted on the archaeological, architectural or cultural heritage resource.

Assessment Matrix of Junction 5 Leixlip Options

Table 1.7: Junction 5 Leixlip Active Travel Options Assessment Matrix

Assessment Sub-Criteria	Option 1 (West)	Option 2 (East)
Potential direct or indirect negative impacts (imperceptible to profound)	This option would not result in any negative direct or indirect impacts upon the archaeological, architectural or cultural heritage resource.	This option would not result in any negative direct or indirect impacts upon the archaeological, architectural or cultural heritage resource.
Scoring		
Qualitative Assessment	Not Significant or Neutral	Not Significant or Neutral
Score/ Impact Level	4	4
Preference	Preferred	Preferred

1.4 Summary

The overall ranking preferences for the Active Travel Options at the six different locations in terms of Archaeological, Architectural and Cultural Heritage are shown in Table 1.8.

Table 1.8: Archaeological, Architectural and Cultural Heritage Assessment Overall Summary

Location	Option 1 (West)	Option 2 (East)
R408 Newtown Road Overbridge	Preferred	Preferred
Junction 7 Maynooth	Preferred	Preferred
R405 Ballygoran Overbridge	Preferred	Preferred
Junction 6 Celbridge	Preferred	Least Preferred
R404 Celbridge Road Overbridge	Preferred	Preferred
Junction 5 Leixlip	Preferred	Preferred

1.5 References

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

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

Department of Culture, Heritage and the Gaeltacht. 2017. NIAH Handbook
Kildare County Development Plan 2023-2029

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

National Roads Authority. 2005a Guidelines for the Assessment of Archaeological Heritage Impacts of National Road Schemes

National Roads Authority. 2005b Guidelines for the Assessment of Architectural Heritage Impacts of National Road Schemes

South Dublin County Development Plan 2022-2028

www.excavations.ie – Summary of archaeological excavations from 1970-2023. (Accessed September 2023)

www.archaeology.ie – DoH/HLGH website listing all SMR/RMP, National Monuments, Preservation Orders (Accessed September 2023)

www.osiemaps.ie – Ordnance Survey aerial photographs dating to 1995-2013 and 6-inch/25-inch OS maps. (Accessed September 2023)

www.heritagemaps.ie – The Heritage Council web-based spatial data viewer which focuses on the built, cultural, and natural heritage. (Accessed September 2023)

www.bingmaps.com – Website containing aerial photographic datasets. (Accessed September 2023).

www.logainm.ie – Placenames Database of Ireland launched by Fiontar agus Scoil na Gaelige and the DoH/HLGH. (Accessed September 2023)

www.googleearth.com – Satellite imagery of the study area. (Accessed September 2023)

www.buildingsofireland.ie – Website listing the results of the NIAH building and garden survey for Dublin and Kildare (Accessed September 2023)

Kildare County Council

Maynooth to Leixlip Project

Options Report - Stage 2

Biodiversity Active Travel Options
Assessment

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Contents

	Page
Contents	1
1 Stage 2 Biodiversity Active Travel Options Assessment	3
1.1 Introduction	3
1.2 Methodology	3
1.2.1 Biodiversity Stage 2 Assessment Process	4
1.2.2 Key Ecological Receptors	4
1.2.3 Scoring Procedure	6
1.3 Summary of Stage 2 Survey Results	9
1.4 Active Travel Options Assessment	10
1.4.1 R408 Newtown Road Overbridge	10
1.4.2 Junction 7 Maynooth	13
1.4.3 R405 Ballygoran Overbridge	16
1.4.4 Junction 6 Celbridge	19
1.4.5 R404 Celbridge Road Overbridge	22
1.4.6 Junction 5 Leixlip	25
1.5 Summary	28
1.6 References	30

Tables

Table 1.1: TII PAG Scoring System

Table 1.2: Key Ecological Receptors located within, or partially within, the Active Travel Options for R408 Overbridge

Table 1.3: Biodiversity Assessment Matrix of Active Travel Options for R408 Overbridge

Table 1.4: Key Ecological Receptors located within, or partially within, the Active Travel Options for Junction 7 Maynooth

Table 1.5: Biodiversity Assessment Matrix of Active Travel Options for Junction 7 Maynooth

Table 1.6: Key Ecological Receptors located within, or partially within, the Active Travel Options for the R405 Ballygoran Overbridge

Table 1.7: Biodiversity Assessment Matrix of Active Travel Options for the R405 Ballygoran Overbridge

Table 1.8: Key Ecological Receptors located within, or partially within, the Active Travel Options for Junction 6 Celbridge

Table 1.9: Biodiversity Assessment Matrix of Active Travel Options for Junction 7 Maynooth

Table 1.10: Key Ecological Receptors located within, or partially within, the Active Travel Options for the R405 Celbridge Road Overbridge

Table 1.11: Biodiversity Assessment Matrix of Active Travel Options for the R405 Celbridge Road Overbridge

Table 1.12: Key Ecological Receptors located within, or partially within, the Active Travel Options for Junction 5 Leixlip

Table 1.13: Biodiversity Assessment Matrix of Active Travel Options for Junction 5 Leixlip

Table 1.14: Summary of the Stage 2 Biodiversity Assessment Matrix for the Active Travel Options

1 Stage 2 Biodiversity Active Travel Options Assessment

1.1 Introduction

This section details the environmental assessment of the Stage 2 Active Travel Options for the Maynooth to Leixlip Project with respect to the Biodiversity constraints identified in the Constraints Report.

The methodology used in this assessment is outlined in Section 1.2. Section 1.3 includes a summary of the Stage 2 survey results. Section 1.4 contains the Active Travel Options assessment. A summary is provided in Section 1.5 and references are provided in Section 1.6.

1.2 Methodology

There are Active Travel Options at six different locations, with two options at each location.

The principal objectives of this assessment are to:

- Evaluate the Active Travel Options brought forward to Stage 2 assessment, based on ecological criteria, as per the National Road Authority (NRA) *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (NRA, 2009)¹ and Chartered Institute for Ecology and Environmental Management (CIEEM) *Guidelines for Ecological Impact Assessment in the UK and Ireland; Terrestrial, Freshwater, Coastal and Marine* (2018)².
- Assess the significance of the likely impacts on each of the biodiversity receptors potentially impacted by each Active Travel Option. As per the Transport Infrastructure Ireland (TII)¹ guidance, this step discounted biodiversity receptors or ecological sites where the risk of significant impacts is unlikely considering where the application of standard mitigation and best practice during construction is unambiguous and success is highly likely.
- To assess each option in accordance with Transport Infrastructure Ireland's *Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria Analysis* (TII, 2016)³.

¹ National Roads Authority (2009) Guidelines for Assessment of Ecological Impacts of National Road Schemes. Available from: <https://www.tii.ie/technical-services/environment/planning/Guidelines-for-Assessment-of-Ecological-Impacts-of-National-Road-Schemes.pdf> [Accessed: August 2023]

² Chartered Institute for Ecology and Environmental Management (CIEEM) (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland; Terrestrial, Freshwater, Coastal and Marine. Available from: <https://cieem.net/wp-content/uploads/2018/08/ECIA-Guidelines-2018-Terrestrial-Freshwater-Coastal-and-Marine-V1.1.pdf> [Accessed: August 2023]

³ Transport Infrastructure Ireland (2016) Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria Analysis Available from: <https://www.tiipublications.ie/library/PE-PAG-02031-01.pdf> [Accessed: August 2023]

To fulfil these objectives, an assessment of the likely or potential impacts of each Active Travel Option on ecological receptors is carried out, so that an informed comparison of the Active Travel Options can be made taking cognisance of the potential ecological consequences.

Biological diversity means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems. Alongside the term “biodiversity”, the terms “ecology” and “ecological” are also used throughout this section of the report as a broader term to refer to the relationships of biodiversity receptors to one another and to their environment.

1.2.1 Biodiversity Stage 2 Assessment Process

The Stage 2 junction options assessment process is as follows:

- The key ecological receptors within the study area were identified based on a combination of desktop data, consultation (i.e. relevant bodies/organisations) and field surveys;
- The key ecological receptors were assigned an ecological value based on a geographic frame of reference ranging from international to local importance;
- The likely impacts of each of the Junction Options on the key ecological receptors were identified and assessed, indicating which, if any, of these are likely to be significant, and at what geographical level;
- The impacts of each of the Junction Options on the key ecological receptors were scored in accordance with the TII approach⁴, on a seven-point scale ranging from ‘major or highly negative (1)’ to ‘major or highly positive (7)’;
- The overall cumulative impact of each Junction Options across all the key ecological receptors affected was also scored on the same seven-point scale; and
- The scores attributed to each of the Junction Options were assessed comparatively and assigned a preference ranking.

1.2.2 Key Ecological Receptors

Key ecological receptors are those biodiversity receptors confirmed, or likely to occur, within the study area with an ecological value of local importance (higher value) or greater and, therefore, likely to affect the scoring and ranking of the Junction Options. These include:

- Designated sites for nature conservation (e.g. SACs, SPAs, NHAs, pNHAs and Nature Reserves);

⁴ TII (2016). Project Appraisal Guidelines for National Roads Unit 7.0 – Multi Criteria Analysis Document PE-PAG-02031

- Sensitive habitats (e.g., non-Annex I semi-natural woodland habitats and watercourses⁵);
- Sensitive species (e.g. otter *Lutra lutra*); and
- Ecological sites (identified from a combination of desktop and field assessment).

The key ecological receptors were initially identified in the Constraints Report based on collation of available existing information from the desk study and consultations with relevant bodies/organisations and focussed on the known/potential ecological value for the habitats/species present. In the case of the ecological sites, the boundaries were initially defined based on interpretation of orthophotography and collation of available existing habitat information.

Walkover surveys of ecological sites within the wider constraints study area were undertaken in April 2021. This was further supplemented for the Stage 1 assessment with an additional field survey undertaken in December 2021. The purpose of the field surveys was to ground truth and verify the orthophotography interpretation and selection of ecological sites, refine site boundaries, assess the ecological evaluation of each of the identified ecological sites and to detect any additional ecological sites not identified during the desk study. Walkover surveys of ecological sites which were located in proximity to, or overlapped with, one or more of the Junction Options, were undertaken during the December survey.

Additional multidisciplinary surveys of the entire corridor between Junction 5 and Junction 7 were undertaken by Scott Cawley Ltd., in September 2022 to inform the Stage 2 assessments for the Maynooth to Leixlip Project. The purpose of these field surveys was to map all habitats within the proposed Junction Options Corridor boundary, record signs of terrestrial mammals, record trees and structures with potential roost features (PRFs) along the route, record any Third Schedule listed invasive plant species and to detect any additional ecological sites not identified during the desk study.

In some cases, certain sections of the ecological sites (especially those lining the existing M4) were viewed from a distance, owing to limited access or safety issues. However, earlier professional assumptions made on the value of those ecological sites based on local information gathered during previous constraints field surveys and desk study as necessary was supplemented by September 2022 survey work which was undertaken on the existing M4 carriageway verges under the auspices of the traffic safety.

⁵ Watercourses are referred to as per the names presented on the EPA's online Map Viewer. Available from: <https://gis.epa.ie/EPAMaps/> [Accessed August 2023]

Habitat types were classified using the *Guide to Habitats in Ireland* (Fossitt, 2000)⁶ and the likelihood/potential for Annex I habitat types was confirmed or inferred based on the professional judgement of the surveyor, with reference to the *Interpretation manual of European Union Habitats EUR 28* (CEC, 2013)⁷. Where it was not possible to confirm the presence of Annex I habitats, a precautionary approach was adopted with regards to the identification of the potential presence of Annex I habitats within an ecological site.

1.2.3 Scoring Procedure

Ecological Valuation

The key ecological receptors identified have been valued with regard to ecological valuation guidance set out in *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (NRA, 2009)¹ and *Guidelines for Ecological Impact Assessment in the UK and Ireland; Terrestrial, Freshwater, Coastal and Marine* (CIEEM, 2018)².

The following geographic frame of reference is used when valuing the key ecological receptors:

- International Importance;
- National Importance;
- County Importance; and
- Local Importance (higher value).

All Annex I habitats that lie outside of European sites, are valued as being of at least national importance, given that these habitats are of high conservation concern. Priority Annex I habitat types that lie outside of European sites may be valued as being of International Importance given that they are of the highest conservation concern at a European level (i.e., natural habitat types in danger of disappearance⁸). No Annex I habitats, priority or otherwise, have been recorded during the walkover surveys.

For individual sites (e.g., designated sites, watercourses or ecological sites identified during the Constraints Study), the overall ecological valuation for each of the key ecological receptors was based upon the highest value receptor known to be present, or potentially present, within the site.

⁶ Fossitt, J.A. (2000) *A Guide to Habitats in Ireland*. Heritage Council, Kilkenny. Available from: <https://www.npws.ie/sites/default/files/publications/pdf/A%20Guide%20to%20Habitats%20in%20Ireland%20-%20Fossitt.pdf> [Accessed: August 2023]

⁷ CEC. (Commission of the European Communities) (2013) *Interpretation manual of European Union Habitats EUR28*. European Commission, DG Environment. Available from: https://ec.europa.eu/environment/nature/legislation/habitatsdirective/docs/Int_Manual_EU28.pdf [Accessed: August 2023]

⁸ From the definition of “*priority natural habitat types*” in Article 1(d) of the Habitats Directive (Council Directive 92/43/EEC).

Assessment Criteria

The assessment of the proposed options for Junction 7 Maynooth included both a quantitative and qualitative assessment. Firstly, the impact on each key ecological receptor is assessed.

Although a given Junction Option may impact upon a particular key ecological receptor, the direct impact(s) on the site may not necessarily directly impact on the highest value receptor(s). This is accounted for in the assessment as much as possible, based on the level of ecological information available.

To assess the likely ecological impacts of each of the two Junction Options on individual key ecological receptors, the following criteria are applied, with the use of professional judgement as to the likelihood of significant effects occurring:

- Potential impacts on an ecological receptor of National / International Importance were assessed as being Major or highly negative;
- Potential impacts on an ecological receptor of County Importance were assessed as being Moderately negative; and
- Potential impacts on a receptor of Local Importance (Higher Value) were assessed as being Minor or slightly negative.

To assess the likely cumulative overall ecological impacts for each Junction Option, the following criteria were applied, in conjunction with the use of professional judgement as to the likelihood of significant effects occurring:

- Biodiversity impacts are major or highly negative) if:
 - The impact is directly on one or more designated sites valued as International or National Importance (i.e. SAC, SPA, pnha or NHA);or
 - The impacts associated with constructing the Junction Option within the or alongside the existing road would likely result in an adverse effect on the integrity of the SAC/SPA/pnha/NHA site (i.e. For SAC/SPA this could equate to the loss of Qualifying Interest (QI) habitat or undermining the conservation objectives and for pnha/NHA this could relate to the loss of features for which the site is designated).
- Biodiversity impacts are moderately negative if:
 - The impact is directly on one or more non-designated ecological sites valued as National or County importance, or numerous ecological sites valued as Local Importance (higher value);or
 - The impacts associated with constructing a road within the Junction Option would likely result in permanent/long-term effects on non-qualifying interest Annex I habitat or on a species population considered to be of National Importance.or

- Impacts associated with constructing a road within the Junction Option would likely have permanent/long-term effects on a habitat(s) or on a species population considered to be of County/Local (higher value) Importance.
- Biodiversity impacts are minor or slightly negative if:
 - The impact is directly on a small number of ecological sites valued as Local high importance;
 or
 - The impacts associated with constructing a road within the option corridor would likely have permanent/long-term effects on a habitat(s) or on a species population considered to be of Local (high) Importance.

Considering these cumulative impacts on the key ecological receptors identified, each Junction option was scored, based on the seven-point scale below and an integer was assigned according to the impact significance:

Table 1.1: TII PAG Scoring System

Assessment Score	Description
7	Major or highly positive
6	Moderately positive
5	Minor or slightly Positive
4	Not significant or neutral
3	Minor or slightly negative
2	Moderately negative
1	Major or highly negative

As the Active Travel Option is likely to have some level of a negative impact on biodiversity, neutral or positive impact scorings do not apply in this assessment, as in the absence of a design and /or mitigation there is no understanding that any option requiring construction could be assessed as neutral or positive.

Each of the Active Travel Options were also comparatively assessed in terms of the overall impact significance, to provide a preference ranking. The preference ranking was as follows:

- Preferred; or
- Least Preferred.

In accordance with the *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (NRA, 2009)¹, key ecological receptors within the study area were not assessed against the Junction Options where the risk of significant impacts is unlikely, considering where the delivery of standard mitigation and best practice during construction is unequivocal and success is highly likely. For example, with the application of standard pollution control measures during construction and an operational drainage and pollution control system designed to current standards, sensitive biodiversity receptors downstream of the Junction Options are not likely to be affected. However, the potential watercourse crossings were considered in this assessment, as it cannot be assumed that clear-span crossings will be possible at each crossing point. In addition, potential watercourse crossings will undoubtedly result in indirect impacts on the watercourse in question (e.g. disturbance to QI species, spread of non-native invasive species).

1.3 Summary of Stage 2 Survey Results

Following on from the multi-disciplinary survey undertaken in September 2022, the following habitats (all of which are valued as local importance (higher value) or below were recorded along the M4/N4:

Local Importance (Higher Value)

- GS2 - Dry meadows and grassy verges;
- WD1 - (Mixed) broadleaved woodland;
- WL1 – Hedgerows;
- WL2 – Treelines;
- WS1 – Scrub; and
- WS2 - Immature woodland.

Local Importance (Lower Value)

- BL3 – Buildings and artificial surfaces;
- WS3 - Ornamental/non-native shrub; and
- GA2 - Amenity grassland (improved).

No Annex II plant species and no records of plant species protected through their inclusion within the Flora (Protection) Order 2022, were recorded during the multi-disciplinary surveys. Additionally, no non-native invasive species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended) were recorded along the existing M4/N4 corridor.

A number of PRFs were recorded along the existing M4/N4 corridor, all Alder *Alnus glutinosa* located within the roadside planting between Junction 5 Leixlip and the River Liffey Bridge.

During the multi-disciplinary survey, 11 bird species were recorded within or adjacent to the existing M4/N4 corridor boundaries including 10 green listed species; blackbird, blackcap, blue tit, dunnock, great tit, long-tailed tit, pied wagtail, robin, wood pigeon, wren and one amber listed species goldcrest.

1.4 Active Travel Options Assessment

1.4.1 R408 Newtown Road Overbridge

Option 1 – New bridge parallel to existing on the western side

This option would include a new parallel active travel overbridge on the western side of the existing overbridge. This proposed facility would be 4m wide.

This option would interact with 4 key ecological receptors, namely EC13, EC 9, EC8 and EC12 (along its western side). There would be areas of vegetation loss on the northwestern side of the R408 overbridge. There would also be some interaction with both EC9 and EC8, which are M4 motorway planting on the western side of the R408 overbridge.

In terms of Biodiversity impacts, there is little to distinguish both Options as they interact with a similar number of key ecological receptors, all of which are valued as being of Local importance (higher value).

Given that the extent of the proposed vegetation loss, largely associated with existing footpath edge rather than new clearance, Option 1 is Preferred with respect to biodiversity.

Option 2 – New bridge parallel to existing on the eastern side

This option would include a new parallel active travel overbridge on the eastern side of the existing overbridge. This proposed facility would be 4m wide.

As noted previously, there is little quantitative distinction between the options as they both interact with a similar number of key ecological receptors, all of which are valued as being of Local importance (higher value). Option 2 would interact with 4 key ecological receptors, namely EC13, EC 12, EC15 and EC14. While the interaction with EC12 (east side) would be relatively shorter than that of EC 12 (west side for option 1), Option 2 would require loss of woodland EC13 (east side) along an area with no existing footpath and hence the proposed new vegetation loss could be more impactful based on potential floral assemblage loss than EC 13 (west side) for Option 1. There would also be some interaction with both EC14 and EC14, both of which are M4 motorway planting on the eastern side of the R408 Overbridge.

Given the extent of the proposed vegetation loss, largely associated with existing clearance alongside the Maynooth Town Football Club boundary, Option 2 is Least Preferred.

Assessment Matrix of R408 Newtown Road Overbridge Options

The key ecological receptors impacted by the proposed Active Travel Options for the R408 Newtown Road Overbridge are outlined in Table 1.2.

Table 1.2: Key Ecological Receptors located within, or partially within, the Active Travel Options for R408 Overbridge

Site Name	Description	Present/Adjacent to Option 1	Present/Adjacent to Option 2	Ecological Value
EC13	Narrow woodland band/ Treeline- Both side of R408 Newtown Road	Yes – West side	Yes – East side	Local Importance (higher value)
EC9	Narrow woodland band/ Treeline – South side of M4 motorway	Yes	No	Local Importance (higher value)
EC8	Narrow woodland band/ Treeline – North side of M4 motorway	Yes	No	Local Importance (higher value)
EC12	Narrow woodland band/ Treeline – Both side of R408 Newtown Road	Yes – West side	Yes – East side	Local Importance (higher value)
EC15	Narrow woodland band/ Treeline – South side of M4 motorway	No	Yes	Local Importance (higher value)
EC14	Narrow woodland band/ Treeline - – North side of M4 motorway	No	Yes	Local Importance (higher value)

Table 1.3: Biodiversity Assessment Matrix of Active Travel Options for R408 Overbridge

Assessment Criteria	Option 1 (West)	Option 2 (East)
Significant impact on sites of International Importance (major or highly negative)	0 major or highly negative impacts	0 major or highly negative impacts
Significant impact on sites of National Importance	0 major or highly negative impacts	0 major or highly negative impacts
Significant impact on sites of County Importance	0 moderately negative impact	0 moderately negative impact
Significant impact on sites of Local Importance (Higher Value)	4 minor or slightly negative	4 minor or slightly negative
Overall Assessment	There are 4 'minor or slightly negative' impacts associated with this Active Travel Option	There are 4 'minor or slightly negative' impacts associated with this Active Travel Option
Scoring		
Qualitative Assessment	Impacts on 4 areas of wooded vegetation, some motorway planting and established embankment wooded area. The proposed vegetation for this option appears to be less impactful in terms of potential extent. Minor Negative	Impacts on 4 areas of wooded vegetation, some motorway planting and established embankment wooded area. The proposed vegetation loss would likely result in greater overall loss of established screening vegetation. Minor Negative
Score / Impact Level	3	3
Preference	Preferred	Least Preferred

1.4.2 Junction 7 Maynooth

Option 1 – New bridge parallel to existing on the western side

This option would include a new parallel active travel overbridge on the western side of the existing Junction 7 overbridge. This proposed facility would be 4m wide.

This option would interact with 4 key ecological receptors, namely EC15, EC 19 (western side of Junction 7 Overbridge, EC18 (western side of Junction 7 Overbridge) and EC14, all along the western side of the existing Junction 7 overbridge western side. Proposed areas of narrow woodland screening loss would be required at all four key ecological receptors to facilitate the proposed bridge.

In terms of Biodiversity impacts, Option 1 would impact directly on 4 key ecological receptors, which is an extra key ecological receptors over Option 2. The 4 key ecological receptors are all valued as being of Local importance (higher value).

Qualitatively, the impacts to the 4 key ecological receptors comprised of smaller parcels of habitat loss, would be discrete loss of narrow roadside planting. For this reason, Option 1 is Preferred with respect to biodiversity.

Option 2 – New bridge parallel to existing on the eastern side

This option would include a new parallel active travel overbridge on the eastern side of the existing Junction 7 overbridge. This proposed facility would be 4m wide.

Although there is 1 less key ecological receptors being intersected by the proposed options, these key ecological receptors are larger in extent, affording greater potential for the development of “semi-natural” ground flora development, than the narrower sections of roadside screening from Option 1.

This option would interact with 3 key ecological receptors, namely EC19 (eastern side of Junction 7 Overbridge, EC18 (eastern side of Junction 7 Overbridge) and EC20, which extends from the R406 and continues alongside the eastern merge in the direction of Dublin.

In terms of potential Biodiversity impacts, Option 2 is Least Preferred. Whilst it has 1 less key ecological receptor being impacted upon, qualitatively, Option 2 is considered more impactful given the apparent greater impact on the integrity of this established copse associated with key ecological receptor EC19, along the south eastern side of the existing Junction 7 crossing.

Assessment Matrix of Junction 7 Maynooth Options

The key ecological receptors impacted by the proposed Active Travel Options for Junction 7 Maynooth are outlined in Table 1.4.

Table 1.4: Key Ecological Receptors located within, or partially within, the Active Travel Options for Junction 7 Maynooth

Site Name	Description	Present/Adjacent to Option 1	Present/Adjacent to Option 2	Ecological Value
EC15	Narrow woodland band/ Treeline - South-Western side of R408 overbridge	Yes	No	Local Importance (higher value)
EC19	Narrow woodland band/ Treeline South-Western side of overbridge (Option 1) and South-Eastern side of overbridge (Option 2)	Yes	Yes	Local Importance (higher value)
EC18	Narrow woodland band/ Treeline - North-Western side of overbridge (Option 1) and North-Eastern side of overbridge (Option 2)	Yes	Yes	Local Importance (higher value)
EC14	Narrow woodland band/ Treeline – North-Western side of overbridge	Yes	No	Local Importance (higher value)
EC20	Narrow woodland band/ Treeline – North Eastern side of overbridge	No	Yes	Local Importance (higher value)

Table 1.5: Biodiversity Assessment Matrix of Active Travel Options for Junction 7
Maynooth

Assessment Criteria	Option 1 (West)	Option 2 (East)
Significant impact on sites of International Importance (major or highly negative)	0 major or highly negative impacts	0 major or highly negative impacts
Significant impact on sites of National Importance	0 major or highly negative impacts	0 major or highly negative impacts
Significant impact on sites of County Importance	0 moderately negative impact	0 moderately negative impact
Significant impact on sites of Local Importance (Higher Value)	4 minor or slightly negative	3 minor or slightly negative
Overall Assessment	There are 4 'minor or slightly negative' impacts associated with this Active Travel Option	There are 3 'minor or slightly negative' impacts associated with this Active Travel Option
Scoring		
Qualitative Assessment	<p>Impacts on 4 areas of wooded vegetation, mostly established Junction embankment wooded area, some of which extends north and south along Straffan Road. Qualitatively, whilst Option 1 has 1 extra KER over Option 2, it is nonetheless comprised of smaller parcels of habitat loss and hence floristic diversity.</p> <p>Minor Negative</p>	<p>Impacts on 3 areas of wooded vegetation, mostly established Junction embankment wooded area, some of which extends north and south along Straffan Road. While Option 2 would interact with 1 less KER than Option 1, qualitatively, the loss of edge vegetation along the eastern parcel of EC19 is considered more impactful, given the apparent greater impact on the integrity of this established copse.</p> <p>Minor Negative</p>
Score / Impact Level	3	3
Preference	Preferred	Least Preferred

1.4.3 R405 Ballygoran Overbridge

Option 1 – New bridge parallel to existing on the western side

This option would include a new parallel overbridge on the western side of the existing bridge to accommodate vulnerable road users. This proposed facility would be 4m wide.

This option would interact with 2 key ecological receptors, namely EC21 and EC20. The proposed bridge would result in the loss of some of narrow woodland screening.

In terms of Biodiversity impacts, there is little to distinguish both options as they interact with a similar number of key ecological receptors, all of which are valued as being of Local importance (higher value).

Given that the extent of the proposed vegetation loss, largely associated with the tie-in at either end of the proposed overbridge, Option 1 is Preferred with respect to biodiversity.

Option 2 – New bridge parallel to existing on the eastern side

This option would include a new parallel overbridge on the eastern side of the existing bridge to accommodate vulnerable road users. This proposed facility would be 4m wide.

This option would interact with 2 key ecological receptors, namely EC23 and EC22. The proposed bridge would require the loss of woodland screening (likely greater in extent than Option 1), and at present there is little onward active travel connectivity with this option.

In terms of Biodiversity impacts, there is little to distinguish both Options as they interact with similar number of key ecological receptors, all of which are valued as being of Local importance (higher value).

Given the greater extent of the proposed vegetation loss, particularly associated with EC23, Option 2 is Least Preferred with respect to biodiversity.

Assessment Matrix of the R405 Ballygoran Overbridge

The key ecological receptors impacted by the proposed Active Travel Options for the R405 Ballygoran Overbridge are outlined in Table 1.6.

Table 1.6: Key Ecological Receptors located within, or partially within, the Active Travel Options for the R405 Ballygoran Overbridge

Site Name	Description	Present/Adjacent to Option 1	Present/Adjacent to Option 2	Ecological Value
EC21	Narrow woodland band/ Treeline and some motorway grassland verge – southern boundary of existing M4 and continuing south alongside the R405 towards Ballygoran View.	Yes	No	Local Importance (higher value)
EC20	Narrow woodland band/ Treeline and some motorway grassland verge – northern boundary of existing M4 and continuing north alongside the R405 towards Obelisk Lane.	Yes	No	Local Importance (higher value)
EC23	Woodland band/ Treeline and some motorway grassland verge - southern boundary of existing M4.	No	Yes	Local Importance (higher value)
EC22	Narrow woodland band/ Treeline and some motorway grassland verge - northern boundary of existing M4 and continuing north alongside the R405 towards Obelisk Lane.	No	Yes	Local Importance (higher value)

Table 1.7: Biodiversity Assessment Matrix of Active Travel Options for the R405 Ballygoran Overbridge

Assessment Criteria	Option 1 (West)	Option 2 (East)
Significant impact on sites of International Importance (major or highly negative)	0 major or highly negative impacts	0 major or highly negative impacts
Significant impact on sites of National Importance	0 major or highly negative impacts	0 major or highly negative impacts
Significant impact on sites of County Importance	0 moderately negative impact	0 moderately negative impact
Significant impact on sites of Local Importance (Higher Value)	2 minor or slightly negative	2 minor or slightly negative
Overall Assessment	There are 2 'minor or slightly negative' impacts associated with this Active Travel Option	There are 2 'minor or slightly negative' impacts associated with this Active Travel Option
Scoring		
Qualitative Assessment	<p>Impacts on 2 areas of wooded vegetation, mostly established Junction embankment wooded area as well as some motorway verge grassland.</p> <p>Qualitatively, it would appear that Option 1 is less impactful in terms of overall extent of disturbance and wooded vegetation loss.</p> <p>Minor Negative</p>	<p>Impacts on 2 areas of wooded vegetation, mostly established Junction embankment wooded area as well as some motorway verge grassland.</p> <p>Qualitatively, EC23 is a large, more established parcel of wooded vegetation. In addition, option 2 also has a great loss of woodland vegetation.</p> <p>Minor Negative</p>
Score / Impact Level	3	3
Preference	Preferred	Least Preferred

1.4.4 Junction 6 Celbridge

Option 1 – New bridge parallel to existing on the western side

This option would include a new overbridge on the western side of the existing Junction 6 Celbridge to accommodate vulnerable road users. This proposed facility would be 4m wide.

This option would interact with 2 key ecological receptors, namely EC23 and EC22 (at two different locations, although the proposed routing would follow alongside the Leixlip side of the M4 motorway planting for approximately 245metres), both of which are roadside planting, and are ranked as being of Local Importance (higher value).

In terms of Biodiversity impacts, there is little to distinguish both Options other than the difference in the number of key ecological receptors intersected and the visible area of potential disturbance/loss of habitat associated with Option 2. For this reason, Option 1 is the Preferred with respect to biodiversity.

Option 2 – New bridge parallel to existing on the eastern side

This option would include a new overbridge on the eastern side of the existing Junction 6 Celbridge to accommodate vulnerable road users. This proposed facility would be 4m wide.

This option would interact with 3 key ecological receptors, namely EC30, EC29 and EC28, all of which are characterised by roadside woodland planting around the eastern side of the motorway planning and continue around the R449 existing junction overbridge. They are all ranked as being of Local Importance (higher value).

EC28 would be intersected by this option twice, as well as being immediately adjacent to it for approximately 250m. In addition, the northern access point of the proposed overbridge which intersects EC29 before veering in a westerly direction, is adjacent to but not directly interfered with EC31. This is a band of well-established woodland.

In terms of Biodiversity impacts, there is little to distinguish both options other than the difference in the number of key ecological receptors intersected and the area of potential disturbance/loss of habitat associated with Options 2. For this reason, Option 1 is the Preferred with respect to biodiversity.

Assessment Matrix of Junction 7 Maynooth Options

The key ecological receptors impacted by the proposed Active Travel Options for Junction 6 Celbridge are outlined in Table 1.8.

Table 1.8: Key Ecological Receptors located within, or partially within, the Active Travel Options for Junction 6 Celbridge

Site Name	Description	Present/Adjacent to Option 1	Present/Adjacent to Option 2	Ecological Value
EC23	Narrow woodland band/ Treeline and some motorway grassland verge – southern boundary of M4	Yes	No	Local Importance (higher value)
EC22	Narrow woodland band/ Treeline and some motorway grassland verge – northern boundary of M4 motorway, which continues northwards towards the R429 – The proposed options intersects this KER at least 2 times	Yes	No	Local Importance (higher value)
EC30	Narrow woodland band/ Treeline and some slipway verge grassland - southern boundary of M4	No	Yes	Local Importance (higher value)
EC29	Narrow woodland band/ Treeline and some motorway verge grassland - northern boundary of M4	No	Yes	Local Importance (higher value)
EC31	Narrow woodland band/ Treeline – Well established woodland around Leixlip Gate roadway	No	Not directly impacted	Local Importance (higher value)
EC28	Narrow woodland band/ Treeline - Narrow woodland band/ Treeline. The proposed options appears to intersect this KER 2 times.	No	Yes	Local Importance (higher value)

Table 1.9: Biodiversity Assessment Matrix of Active Travel Options for Junction 7
Maynooth

Assessment Criteria	Option 1 (West)	Option 2 (East)
Significant impact on sites of International Importance (major or highly negative)	0 major or highly negative impacts	0 major or highly negative impacts
Significant impact on sites of National Importance	0 major or highly negative impacts	0 major or highly negative impacts
Significant impact on sites of County Importance	0 moderately negative impact	0 moderately negative impact
Significant impact on sites of Local Importance (Higher Value)	2 minor or slightly negative	3 minor or slightly negative
Overall Assessment	There are 2 'minor or slightly negative' impacts associated with this Active Travel Option	There are 3 'minor or slightly negative' impacts associated with this Active Travel Option
Scoring		
Qualitative Assessment	<p>Impacts on 2 areas of wooded vegetation, mostly established junction embankment wooded area as well as some motorway verge grassland.</p> <p>Qualitatively, there is little to distinguish the two options in terms of understanding the extent of potential habitat loss. However, Option 1 would, in terms of direct KER interactions and quality and extent of proposed habitat loss, be preferred.</p> <p>Minor Negative</p>	<p>Impacts on 3 areas of wooded vegetation, mostly established junction embankment wooded area as well as some motorway verge grassland.</p> <p>Qualitatively, there is little to distinguish the two options in terms of understanding the extent of potential habitat loss.</p> <p>However, the proximity to EC31 which could provide a supporting habitat to local fauna and the potential fragmentation of adjoining territory is from a biodiversity perspective considered more impactful.</p> <p>Moderate Negative</p>
Score / Impact Level	3	2
Preference	Preferred	Least Preferred

1.4.5 R404 Celbridge Road Overbridge

Option 1 – New bridge parallel to existing on the western side

This option would include a new overbridge on the western side of the existing R404 Celbridge Road overbridge. This proposed facility would be 4m wide.

This option would interact with 2 key ecological receptors, namely EC30 and EC29 - both of which are characterised by relatively narrow band of motor screening planting but increase in width alongside both ends of the R404 Overbridge roadside planting. They are ranked as being of Local Importance (higher value).

In terms of Biodiversity impacts, there is little to distinguish both options other than the difference in the number of key ecological receptors intersected and the area of potential disturbance/loss of habitat associated with Options 2. For this reason, Option 1 is Least Preferred with respect to biodiversity.

Option 2 – New bridge parallel to existing on the eastern side

This option would include a new overbridge on the eastern side of the existing R404 Celbridge Road overbridge. This proposed facility would be 4m wide.

This option would interact with 2 key ecological receptors, namely EC41 and EC40, both of which are standard motorway/roadside screening planting. However, EC40 does extend inland in terms of tying in with pre-existing/established planting (none of which is being impacted).

In terms of Biodiversity impacts, there is little to distinguish both Options other than the slightly greater area of potential habitat loss associated with Options 1. For this reason, Option 2 is Preferred with respect to biodiversity.

Assessment Matrix of Junction 7 Maynooth Options

The key ecological receptors impacted by the proposed Active Travel Options for the R405 Celbridge Road Overbridge are outlined in Table 1.10.

Table 1.10: Key Ecological Receptors located within, or partially within, the Active Travel Options for the R405 Celbridge Road Overbridge

Site Name	Description	Present/Adjacent to Option 1	Present/Adjacent to Option 2	Ecological Value
EC30	Narrow woodland band/ Treeline and motorway grassland verge – Southern side of M4 and extending southwards along the R404.	Yes	No	Local Importance (higher value)
EC29	Narrow woodland band/ Treeline and motorway grassland verge – Northern side of M4 and extending northwards along the R404.	Yes	No	Local Importance (higher value)
EC41	Narrow woodland band/ Treeline and motorway grassland verge – Southern side of the M4 and extending southwards along the R404.	No	Yes	Local Importance (higher value)
EC40	Narrow woodland band/ Treeline and motorway grassland verge – Northern side of the M4, and extending northwards along the R404, as well into open ground removed from the overbridge crossing.	No	Yes	Local Importance (higher value)

Table 1.11: Biodiversity Assessment Matrix of Active Travel Options for the R405 Celbridge Road Overbridge

Assessment Criteria	Option 1 (West)	Option 2 (East)
Significant impact on sites of International Importance (major or highly negative)	0 major or highly negative impacts	0 major or highly negative impacts
Significant impact on sites of National Importance	0 major or highly negative impacts	0 major or highly negative impacts
Significant impact on sites of County Importance	0 moderately negative impact	0 moderately negative impact
Significant impact on sites of Local Importance (Higher Value)	2 minor or slightly negative	2 minor or slightly negative
Overall Assessment	There are 2 'minor or slightly negative' impacts associated with this Active Travel Option	There are 2 'minor or slightly negative' impacts associated with this Active Travel Option
Scoring		
Qualitative Assessment	<p>Quantitatively there is little to distinguish either Option.</p> <p>Option 1 would impact on 2 areas of wooded vegetation, mostly established junction embankment wooded area as well as some motorway verge grassland.</p> <p>Qualitatively, Option 1 would require a greater loss of existing wooded vegetation to facilitate its construction.</p> <p>Minor Negative</p>	<p>Quantitatively there is little to distinguish either Option.</p> <p>Option 2 would impact on 2 areas of wooded vegetation, mostly established Junction embankment wooded area as well as some motorway verge grassland.</p> <p>Qualitatively, Option 2 is Preferred as it is shorter in distance resulting in less loss of vegetation at either side of the existing M4.</p> <p>Minor Negative</p>
Score / Impact Level	3	3
Preference	Least Preferred	Preferred

1.4.6 Junction 5 Leixlip

Option 1 – New bridge parallel to existing on the western side

This option would include a new overbridge on the western side of the existing overbridge at Junction 5 Leixlip. This proposed facility would be 4m wide.

This option would interact with 4 key ecological receptors, namely EC45 (western side of the existing R403 Overbridge), EC48 (western side of the existing R403 Overbridge), EC47 (western side of the of the existing R403 Overbridge and the eastern end of EC44. All key ecological receptors are ranked as being of Local Importance (higher value), as they are typically characterised largely by narrow planted woodland vegetation of varying age and condition.

Option 1 would intersect 4 key ecological receptors, while Option 2 would intersect only 3 key ecological receptors. Option 1 is nonetheless ranked as Preferred with respect to biodiversity, owing to the maturity and condition and extent of established vegetation in the north-eastern quadrant of the existing R403 (EC47).

Option 2 – New bridge parallel to existing on the eastern side

This option would include a new overbridge on the eastern side of the existing overbridge at Junction 5 Leixlip. This proposed facility would be 4m wide.

This option would interact with 3 key ecological receptors, namely EC 45 (eastern side of the existing R403 Overbridge), EC48 (eastern side of the existing R403 Overbridge), EC47 (eastern side of the of the existing R403 Overbridge. All key ecological receptors are ranked as being of Local Importance (higher value), as they are typically characterised largely by narrow planted woodland vegetation of varying age and condition, particularly the mature vegetation encompassed by the M4 in the direction of Dublin, the northern extension of the R403 and the R148 which ties back into the N4.

While Option 2 would intersect only 3 key ecological receptors, Option 2 is nonetheless Least Preferred with respect to biodiversity, owing to the maturity and condition and extent of established vegetation in the north-eastern quadrant of the existing R403 (EC47).

Assessment Matrix of Junction 7 Maynooth Options

The key ecological receptors impacted by the proposed Active Travel Options for Junction 5 Leixlip are outlined in Table 1.12.

Table 1.12: Key Ecological Receptors located within, or partially within, the Active Travel Options for Junction 5 Leixlip

Site Name	Description	Present/Adjacent to Option 1	Present/Adjacent to Option 2	Ecological Value
EC45	Narrow woodland band/ Treeline – southern side of motorway slip road, continuing onto the M4. Also small extension along southwest edge of R403 (For Option 1). KER also found on southeastern slip road.	Yes	Yes	Local Importance (higher value)
EC48	Narrow woodland band/ Treeline copse – KER occurs off southern side of slip roads from the N4/M4 to R405.	Yes	Yes	Local Importance (higher value)
EC47	Narrow woodland band/ Treeline - KER occurs along northern side of slip road from M4 to R405 (Option 1) and is also on the northeastern side of the R405 Overbridge (Option 2).	Yes	Yes	Local Importance (higher value)
EC44 (eastern tip of KER)	Narrow woodland band/ Treeline and some motorway grassland verge – northwestern side of the M4.	Yes	No	Local Importance (higher value)

Table 1.13: Biodiversity Assessment Matrix of Active Travel Options for Junction 5 Leixlip

Assessment Criteria	Option 1 (West)	Option 2 (East)
Significant impact on sites of International Importance (major or highly negative)	0 major or highly negative impacts	0 major or highly negative impacts
Significant impact on sites of National Importance	0 major or highly negative impacts	0 major or highly negative impacts
Significant impact on sites of County Importance	0 moderately negative impact	0 moderately negative impact
Significant impact on sites of Local Importance (Higher Value)	4 minor or slightly negative	3 minor or slightly negative
Overall Assessment	There are 4 'minor or slightly negative' impacts associated with this Active Travel Option	There are 3 'minor or slightly negative' impacts associated with this Active Travel Option
Scoring		
Qualitative Assessment	<p>Option 1 would impact on 4 areas of wooded vegetation, mostly established junction embankment wooded area as well as some motorway verge grassland.</p> <p>Qualitatively there is little to distinguish either option as the overall area of loss is similar.</p> <p>Notwithstanding the greater number of KERs impacts and the apparent similar area of habitat loss, Option 1 is Preferred as the quality and maturity of vegetation loss for this option is potentially less impactful than Option 2</p> <p>Minor Negative</p>	<p>Option 2 would impact on 3 areas of wooded vegetation, mostly established junction embankment wooded area as well as some motorway verge grassland.</p> <p>Qualitatively there is little to distinguish either option as the overall area of loss is similar.</p> <p>Option 2 would interact with less KERs and would be subject to similar area of habitat loss. However, owing to the proximity of Option 2 and potential interaction with EC47 and adjacent mature privately owned trees, this potential impacts is considered to outweigh the number of KERs impacted by Option 1.</p> <p>Minor Negative</p>
Score / Impact Level	3	3
Preference	Preferred	Least Preferred

1.5 Summary

Key ecological receptors within the study area were identified and assigned an ecological value based on a geographic frame of reference ranging from National to Local Importance (higher value). The likely impacts of each of the Active Travel Options on the key ecological receptors at six locations were identified and assessed, indicating which, if any, of these are likely to be significant, and at what geographical level.

The impacts of each of the Active Travel Options at the six locations on the key ecological receptors were identified and assigned an impact rating. The overall cumulative impact of each Active Travel Option across all the key ecological receptors affected was then scored in accordance with the TII approach³, on a seven-point Likert scale ranging from 'major or highly negative (1)' to 'major or highly positive (7)'. The scores attributed to each of the Active Travel Options were assessed comparatively and assigned a preference ranking.

The active travel options at six different locations is outlined in Table 1.14.

Table 1.14: Summary of the Stage 2 Biodiversity Assessment Matrix for the Active Travel Options

Assessment Summary	R408 Newtown Road Overbridge		Junction 7 Maynooth		R405 Ballygoran Overbridge		Junction 6 Celbridge		R404 Celbridge Road Overbridge		Junction 5 Leixlip	
	Option 1 (West)	Option 2 (East)	Option 1 (West)	Option 2 (East)	Option 1 (West)	Option 2 (East)	Option 1 (West)	Option 2 (East)	Option 1 (West)	Option 2 (East)	Option 1 (West)	Option 2 (East)
Qualitative Assessment	Minor Negative	Minor Negative	Minor Negative	Minor Negative	Minor Negative	Minor Negative	Minor Negative	Moderate Negative	Minor Negative	Minor Negative	Minor Negative	Minor Negative
Score / Impact Level	3	3	3	3	3	3	3	2	3	3	3	3
Preference	Preferred	Least Preferred	Preferred	Least Preferred	Preferred	Least Preferred	Preferred	Least Preferred	Least Preferred	Preferred	Preferred	Least Preferred

1.6 References

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Kildare County Council

Maynooth to Leixlip Project

Options Report – Stage 2 Climate
Active Travel Options Assessment

Draft 1 | 31 August 2023

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

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

Job number 272691-00

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Contents

	Page
Contents	1
1 Stage 2 Climate Active Travel Options Assessment	1
1.1 Introduction	1
1.2 Methodology	1
1.2.1 Scoring Procedure	1
1.3 Active Travel Options Assessment	2
1.3.1 R408 Newtown Road Overbridge	2
1.3.2 Junction 7 Maynooth	4
1.3.3 R405 Ballygoran Overbridge	5
1.3.4 Junction 6 Celbridge	6
1.3.5 R404 Celbridge Road Overbridge	7
1.3.6 Junction 5 Leixlip	8
1.4 Summary	9
1.5 References	9

Tables

Table 1.1: PAG Scoring System used in Ranking

Table 1.2: Assessment Matrix of R408 Newtown Road Overbridge Active Travel Options

Table 1.3: Assessment Matrix of Junction 7 Maynooth Active Travel Options

Table 1.4: Assessment Matrix of R405 Ballygoran Overbridge Active Travel Options

Table 1.5: Assessment Matrix of Junction 6 Celbridge Active Travel Options

Table 1.6: Assessment Matrix of R404 Celbridge Road Overbridge Active Travel Options

Table 1.7: Assessment Matrix of Junction 5 Leixlip

1 Stage 2 Climate Active Travel Options Assessment

1.1 Introduction

This section details the environmental assessment of the Stage 2 Active Travel Options for the Maynooth to Leixlip Project with respect to the Climate constraints identified in the Constraints Report.

The methodology used in this assessment is outlined in Section 1.2. Section 1.3 contains the options assessment. A summary is provided in Section 1.4 and references are provided in Section 1.5.

1.2 Methodology

1.2.1 Scoring Procedure

As per the Stage 1 environmental assessment, each specialist is required to define their assessment methodology and assessment sub-criteria based on their expert opinion and best practice. Guidance on what to include as sub-criteria is given in Chapter 3 of the PAG Unit 7. Following this the potential impacts and their magnitude are to be identified for each of the Active Travel Options. The impacts for each sub-criteria shall be scored based on the seven-point scale below and an integer shall be assigned according to the impact level included in Table 1.1.

Table 1.1: PAG Scoring System used in Ranking

Assessment Score	Description
7	Major or highly positive
6	Moderately positive
5	Minor or slightly Positive
4	Not significant or neutral
3	Minor or slightly negative
2	Moderately negative
1	Major or highly negative

Using the impact scores and the professional judgement of the specialist, a determination shall be made as to whether each Active Travel Option is either Preferred or Least Preferred.

A separate table is included comparing both options for each of the six locations outlined below:

- R408 Newtown Road Overbridge;
- Junction 7 Maynooth;
- R405 Ballygoran Overbridge;
- Junction 6 Celbridge;
- R404 Celbridge Road Overbridge; and
- Junction 5 Leixlip.

1.3 Active Travel Options Assessment

1.3.1 R408 Newtown Road Overbridge

Option 1 – New bridge parallel to existing on the western side

This option would include a new parallel active travel overbridge on the western side of the existing overbridge. This proposed bridge would be 4m wide.

This option is assessed by two sub-criteria, from a climate perspective: embodied carbon from construction materials and likely changes to traffic volumes.

There may be a slight reduction in traffic volumes as a result of the proposed overbridge, due to the possible modal shift from private cars to more active modes of travel.

Option 2 – New bridge parallel to existing on the eastern side

This option would include a new parallel active travel overbridge on the eastern side of the existing overbridge. This proposed bridge would be 4m wide.

This option is assessed by two sub-criteria, from a climate perspective: embodied carbon from construction materials and likely changes to traffic volumes.

There may be a slight reduction in traffic volumes as a result of the proposed overbridge, due to the possible modal shift from private cars to more active modes of travel.

Assessment Matrix of R408 Newtown Road Overbridge Options

Table 1.2: Assessment Matrix of R408 Newtown Road Overbridge Active Travel Options

Assessment Criteria	Option 1 (West)	Option 2 (East)
Embodied Carbon	This option would include construction of a new 4m wide active travel overbridge and widening of the existing footway.	This option would include construction of a new 4m wide active travel overbridge and a new pedestrian crossing point.
Traffic volume	Possible slight reduction in traffic volumes due to modal shift from private car to active modes	Possible slight reduction in traffic volumes due to modal shift from private car to active modes
Scoring		
Qualitative Assessment	Minor or slightly positive	Minor or slightly positive
Score/ Impact Level	5	5
Preference	Preferred	Preferred

Both options are expected to have a minor or slight positive impact on climate due to the likely modal shift from private car to more active modes (less carbon emissions).

Both options are Preferred as a similar amount of embodied carbon is likely to be produced during the construction phase and any operational phase carbon reductions are likely to be similar.

1.3.2 Junction 7 Maynooth

Option 1 – New bridge parallel to existing on the western side

This option would include a new parallel active travel overbridge on the western side of the existing overbridge. This proposed facility would be 4m wide.

This option is assessed by two sub-criteria, from a climate perspective: embodied carbon from construction materials and likely changes to traffic volumes.

There may be a slight reduction in traffic volumes as a result of the proposed overbridge, due to the possible modal shift from private cars to more active modes of travel.

Option 2 – New bridge parallel to existing on the eastern side

This option would include a new parallel active travel overbridge on the eastern side of the existing overbridge. This proposed facility would be 4m wide.

This option is assessed by two sub-criteria, from a climate perspective: embodied carbon from construction materials and likely changes to traffic volumes.

There may be a slight reduction in traffic volumes as a result of the proposed overbridge, due to the possible modal shift from private cars to more active modes of travel.

Assessment Matrix of Junction 7 Maynooth Options

Table 1.3: Assessment Matrix of Junction 7 Maynooth Active Travel Options

Assessment Criteria	Option 1 (West)	Option 2 (East)
Embodied Carbon	This option would include construction of a new 4m wide active travel overbridge.	This option would include construction of a new 4m wide active travel overbridge.
Traffic volume	Possible slight reduction in traffic volumes due to modal shift from private car to active modes	Possible slight reduction in traffic volumes due to modal shift from private car to active modes
Scoring		
Qualitative Assessment	Minor or slightly positive	Minor or slightly positive
Score/ Impact Level	5	5
Preference	Preferred	Preferred

Both options are expected to have a minor or slight positive impact on climate due to the likely modal shift from private car to more active modes (less carbon emissions).

Both options are Preferred as a similar amount of embodied carbon is likely to be produced during the construction phase and any operational phase carbon reductions are likely to be similar.

1.3.3 R405 Ballygoran Overbridge

Option 1 – New bridge parallel to existing on the western side

This option would include a new parallel active travel overbridge on the western side of the existing overbridge. This proposed bridge would be 4m wide.

This option is assessed by two sub-criteria, from a climate perspective: embodied carbon from construction materials and likely changes to traffic volumes.

There may be a slight reduction in traffic volumes as a result of the proposed overbridge, due to the possible modal shift from private cars to more active modes of travel.

Option 2 – New bridge parallel to existing on the eastern side

This option would include a new parallel active travel overbridge on the eastern side of the existing overbridge. This proposed bridge would be 4m wide.

This option is assessed by two sub-criteria, from a climate perspective: embodied carbon from construction materials and likely changes to traffic volumes.

There may be a slight reduction in traffic volumes as a result of the proposed overbridge, due to the possible modal shift from private cars to more active modes of travel.

Assessment Matrix of R405 Ballygoran Overbridge Options

Table 1.4: Assessment Matrix of R405 Ballygoran Overbridge Active Travel Options

Assessment Criteria	Option 1 (West)	Option 2 (East)
Embodied Carbon	This option would include construction of a new 4m wide overbridge.	This option would include construction of a new 4m wide overbridge.
Traffic volume	Possible slight reduction in traffic volumes due to modal shift from private car to active modes	Possible slight reduction in traffic volumes due to modal shift from private car to active modes
Scoring		
Qualitative Assessment	Minor or slightly positive	Minor or slightly positive
Score/ Impact Level	5	5
Preference	Preferred	Preferred

Both options are expected to have a minor or slight positive impact on climate due to the likely modal shift from private car to more active modes (less carbon emissions).

Both options are Preferred as a similar amount of embodied carbon is likely to be produced during the construction phase and any operational phase carbon reductions are likely to be similar.

1.3.4 Junction 6 Celbridge

Option 1 – New bridge parallel to existing on the western side

This option would include a new parallel active travel overbridge on the western side of the existing overbridge. This proposed bridge would be 4m wide.

This option is assessed by two sub-criteria, from a climate perspective: embodied carbon from construction materials and likely changes to traffic volumes.

There may be a slight reduction in traffic volumes as a result of the proposed overbridge, due to the possible modal shift from private cars to more active modes of travel.

Option 2 – New bridge parallel to existing on the eastern side

This option would include a new parallel active travel overbridge on the eastern side of the existing overbridge. This proposed bridge would be 4m wide.

This option is assessed by two sub-criteria, from a climate perspective: embodied carbon from construction materials and likely changes to traffic volumes.

There may be a slight reduction in traffic volumes as a result of the proposed overbridge, due to the possible modal shift from private cars to more active modes of travel.

Assessment Matrix of Junction 6 Celbridge

Table 1.5: Assessment Matrix of Junction 6 Celbridge Active Travel Options

Assessment Criteria	Option 1 (West)	Option 2 (East)
Embodied Carbon	This option would include construction of a new 4m wide overbridge.	This option would include construction of a new 4m wide overbridge .
Traffic volume	Possible slight reduction in traffic volumes due to modal shift to active modes	Possible slight reduction in traffic volumes due to modal shift to active modes
Scoring		
Qualitative Assessment	Minor or slightly positive	Minor or slightly positive
Score/ Impact Level	5	5
Preference	Preferred	Least Preferred

Option 1 is Preferred due to the slightly less construction materials required resulting in a lower level of embodied carbon being produced during the construction phase.

Both options are expected to have a minor or slight positive impact on climate due to the likely modal shift from private car to more active modes (less carbon emissions).

1.3.5 R404 Celbridge Road Overbridge

Option 1 – New bridge parallel to existing on the western side

This option would include a new parallel active travel overbridge on the western side of the existing overbridge. This proposed bridge would be 4m wide.

This option is assessed by two sub-criteria, from a climate perspective: embodied carbon from construction materials and likely changes to traffic volumes.

There may be a slight reduction in traffic volumes as a result of the proposed overbridge, due to the possible modal shift from private cars to more active modes of travel.

Option 2 – New bridge parallel to existing on the eastern side

This option would include a new parallel active travel overbridge on the eastern side of the existing overbridge. This proposed bridge would be 4m wide.

This option is assessed by two sub-criteria, from a climate perspective: embodied carbon from construction materials and likely changes to traffic volumes.

There may be a slight reduction in traffic volumes as a result of the proposed overbridge, due to the possible modal shift from private cars to more active modes of travel.

Assessment Matrix of R404 Celbridge Road Overbridge

Table 1.6: Assessment Matrix of R404 Celbridge Road Overbridge Active Travel Options

Assessment Criteria	Option 1 (West)	Option 2 (East)
Embodied Carbon	This option would include construction of a new 4m wide overbridge and widening of the existing footway.	This option would include construction of a new 4m wide overbridge and widening of the existing footway.
Traffic Volume	Possible slight reduction in traffic volumes due to modal shift from private car to active modes	Possible slight reduction in traffic volumes due to modal shift from private car to active modes
Scoring		
Qualitative Assessment	Minor or slightly positive	Minor or slightly positive
Score/ Impact Level	5	5
Preference	Preferred	Preferred

Both options are expected to have a minor or slight positive impact on climate due to the likely modal shift from private car to more active modes (less carbon emissions). Both options are Preferred as a similar amount of embodied carbon is likely to be produced during the construction phase and any operational phase carbon reductions are likely to be similar.

1.3.6 Junction 5 Leixlip

Option 1 – New bridge parallel to existing on the western side

This option would include a new parallel active travel overbridge on the western side of the existing overbridge. This proposed bridge would be 4m wide.

This option is assessed by two sub-criteria, from a climate perspective: embodied carbon from construction materials and likely changes to traffic volumes.

There may be a slight reduction in traffic volumes as a result of the proposed overbridge, due to the possible modal shift from private cars to more active modes of travel.

Option 2 – New bridge parallel to existing on the eastern side

This option would include a new parallel active travel overbridge on the eastern side of the existing overbridge. This proposed bridge would be 4m wide.

This option is assessed by two sub-criteria, from a climate perspective: embodied carbon from construction materials and likely changes to traffic volumes.

There may be a slight reduction in traffic volumes as a result of the proposed overbridge, due to the possible modal shift from private cars to more active modes of travel.

Assessment Matrix of Junction 5 Leixlip Options

Table 1.7: Assessment Matrix of Junction 5 Leixlip

Assessment Criteria	Option 1 (West)	Option 2 (East)
Embodied Carbon	This option would include construction of a new 4m wide overbridge, widening of the existing footway.	This option would include construction of a new 4m wide overbridge and widening of the existing footway.
Traffic volume	Possible slight reduction in traffic volumes due to modal shift from private car to active modes	Possible slight reduction in traffic volumes due to modal shift from private car to active modes
Scoring		
Qualitative Assessment	Minor or slightly positive	Minor or slightly positive
Score/ Impact Level	5	5
Preference	Preferred	Preferred

Both options are expected to have a minor or slight positive impact on climate due to the likely modal shift from private car to more active modes (less carbon emissions). Both options are Preferred as a similar amount of embodied carbon is likely to be produced during the construction phase and any operational phase carbon reductions are likely to be similar.

1.4 Summary

In general, all options are expected to have a minor to slightly positive impact on climate due to the likely modal shift from private car to more active modes resulting in a reduction in carbon emissions.

All options would result in the generation of embodied carbon, with the options requiring the least amount of construction materials rated as preferred.

1.5 References

TII Climate Assessment of Proposed National Roads – Standard, TII 2022

Kildare County Council

Maynooth to Leixlip Project

Options Report - Stage 2

Hydrogeology Active Travel Options
Assessment

Draft 1 | 31 August 2023

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

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

Job number 272691-00

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Contents

	Page
Contents	1
1 Stage 2 Hydrogeology Active Travel Options Assessment	1
1.1 Introduction	1
1.2 Methodology	1
1.2.1 Scoring Procedure	1
1.2.2 Assessment Criteria	4
1.3 Active Travel Options Assessment	6
1.3.1 R408 Newtown Road Overbridge	6
1.3.2 Junction 7 Maynooth	8
1.3.3 R405 Ballygoran Overbridge	10
1.3.4 Junction 6 Celbridge	12
1.3.5 R404 Celbridge Road Overbridge	14
1.3.6 Junction 5 Leixlip	15
1.4 Summary	18
1.5 References	18

Tables

Table 1.1: Rating of Significant Environmental Impacts (Box 4.4 of the NRA Guidelines)

Table 1.2: Assessment Score

Table 1.3: Correlation of NRA Guidelines Significance Rating to an equivalent TII PAG Score

Table 1.4: Hydrogeology Assessment Criteria Summary

Table 1.5: Summary Assessment of R408 Newtown Road Overbridge Active Travel Options

Table 1.6: Summary Assessment of Junction 7 Maynooth Active Travel Options

Table 1.7: Summary Assessment of R405 Ballygoran Overbridge Active Travel Options

Table 1.8: Summary Assessment of Junction 6 Celbridge Active Travel Options

Table 1.9: Summary Assessment of R404 Celbridge Road Overbridge Active Travel Options

Table 1.10: Summary Assessment of Junction 5 Leixlip Active Travel Options

1 Stage 2 Hydrogeology Active Travel Options Assessment

1.1 Introduction

This section details the environmental assessment of the Stage 2 Active Travel Options for the M4 Maynooth to Leixlip Project with respect to the Hydrogeology constraints identified in the Constraints Report.

The methodology used in this assessment is outlined in Section 1.2. Section 1.3 contains the options assessment. A summary is provided in Section 1.4 and references are provided in Section 1.5.

1.2 Methodology

This assessment was prepared in accordance with the requirements of the National Roads Authority (NRA) Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (hereafter referred to as the NRA Guidelines)¹.

In line with the NRA Guidelines, the study area for this Stage 2 Option Assessment extends 250m from the centre line of the proposed options.

1.2.1 Scoring Procedure

The NRA Guidelines provide criteria for ranking of the identified hydrogeological constraints within the assessment study area that are presented in the Constraints Report. Criteria for rating an impact significance that may arise at each hydrogeological constraint are provided within Box 4.4 of the NRA Guidelines and in Table 1.1. The impact significance assessment considers the attribute importance and the predicted scale and duration of the likely impacts.

¹ NRA (2009) Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes. Available from: <https://www.tii.ie/technical-services/environment/planning/Guidelines-on-Procedures-for-Assessment-and-Treatment-of-Geology-Hydrology-and-Hydrogeology-for-National-Road-Schemes.pdf>

Table 1.1: Rating of Significant Environmental Impacts (Box 4.4 of the NRA Guidelines)

Impact Level	Attribute Importance				
	Extremely High*	Very High	High	Medium	Low
Profound	Any permanent impact on attribute	Permanent impact on significant proportion of attribute			
Significant	Temporary impact on significant proportion of attribute	Permanent impact on small proportion of attribute	Permanent impact on Significant proportion of attribute		
Moderate	Temporary impact on small proportion of attribute	Temporary impact on significant proportion of attribute	Permanent impact on small proportion of attribute	Permanent impact on significant proportion of attribute	
Slight		Temporary impact on small proportion of attribute	Temporary impact on significant proportion of attribute	Permanent impact on small proportion of attribute	Permanent impact on significant proportion of attribute
Imperceptible			Temporary impact on small proportion of attribute	Temporary impact on significant proportion of attribute	Permanent impact on small proportion of attribute

**In rating impacts on an 'European site' account must be taken of Article 6(3) and 6(4) of the Habitats Directive (Council Directive 92/43/EEC). Also see guidance contained within Guidelines for Assessment of Ecological Impacts of National Road Schemes (Rev 2, National Roads Authority, 2008)*

The NRA Guidelines qualitative significant rating of environmental impacts have been correlated with the equivalent qualitative and quantitative assessment scores from the TII Project Appraisal Guidelines for National Roads (PAG) Unit 7.0 - Multi-Criteria Analysis², as shown in Table 1.2 and Table 1.3. It should be noted that only negative potential hydrogeological impacts are considered in the NRA Guidelines whereas the TII PAG multi-criteria assessment is based on the seven-point scale.

² TII (2016) Project Appraisal Guidelines for National Roads Unit 7.0 Multi Criteria Analysis. Available from: <https://www.tiipublications.ie/library/PE-PAG-02031-01.pdf>

Table 1.2: Assessment Score

Assessment Score	Description
7	Major or highly positive
6	Moderately positive
5	Minor or slightly Positive
4	Not significant or neutral
3	Minor or slightly negative
2	Moderately negative
1	Major or highly negative

Table 1.3: Correlation of NRA Guidelines Significance Rating to an equivalent TII PAG Score

Significance Rating (NRA Guidelines)	Equivalent PAG (Description)	Impact	Score
Profound	Major or highly negative	Results in loss of attribute and /or quality and integrity of attribute	1
Significant	Major or highly negative	Results in loss of attribute and /or quality and integrity of attribute	1
Moderate	Moderately negative	Results in impact on integrity of attribute or loss of part of attribute	2
Slight	Minor or slightly negative	Results in minor impact on integrity of attribute or loss of small part of attribute	3
Imperceptible	Not significant or neutral	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	4

The final stage of the assessment methodology ensures that the requirements of TII PAG Unit 7.0 - Multi-Criteria Analysis, are met by assigning a score to each option based on the scoring procedure within these Guidelines. Using the impact scores and professional judgement, Preferred or Least Preferred rankings are assigned to each option.

This assessment was based on a desk study collating hydrogeological information available.

Other low importance hydrogeological features were gathered during the desk study phase of the constraints study to provide the wider context of the project.

The options are assessed separately in their own right as stand-alone entities. In line with NRA Guidelines, the hydrogeological attributes which are considered in the assessment of the Options are presented in Table 1.4. This table also outlines the assessment criteria that will be applied to each of these features.

1.2.2 Assessment Criteria

The hydrogeological attributes which are considered in the assessment of the options are presented in Table 1.4. This table also outlines the assessment criteria applied to each of these features.

Table 1.4: Hydrogeology Assessment Criteria Summary

Hydrogeological Features to be assessed	Means of assessment of potential impacts	Options Assessment Description
<p>Groundwater Flow, Levels and Aquifer Vulnerability</p> <p>The classification and extent of aquifers underlying each Option and increased risk presented to them by each Option.</p>	<p>Aquifer classification.</p> <p>Extent of aquifer – assessed as the extent underlain by a particular aquifer classification.</p> <p>Aquifer vulnerability – assessed as the extent underlain by aquifer which is classified as extreme or high vulnerability.</p> <p>Removal of subsoil cover or part of aquifer (cuttings associated with an Option) which may give rise to changes in groundwater level and change in aquifer vulnerability.</p>	<p>Excavations can impact groundwater by causing dewatering of the groundwater in the vicinity. The deeper the excavation, the more significant and more extensive is the impact. In addition, the removal of the soil and bedrock in the excavation will increase the vulnerability of the aquifer at that location, as vulnerability is largely dependent on the depth and permeability of subsoil above the aquifer.</p> <p>In this assessment the potential impact on groundwater for each depth of cutting is assessed in the context of the underlying aquifer extent and classification. Cuttings between 5 and 10m in depth are considered to be a permanent impact on a small proportion of the attribute. Cuttings greater than 10m in depth are considered to be a permanent impact on a significant proportion of the attribute. Cuttings that are shallower than 5m may not intercept groundwater and where they do the potential impact is expected to be negligible.</p>
<p>Karst</p> <p>Karst features and the risk presented to them by each Option.</p>	<p>The proximity to the feature.</p> <p>The extents of the Option within feature protection zone or zone of contribution.</p>	<p>Karst features located within an Option fenceline have the potential to be impacted by removal of the feature or modification of the flow to or from the feature. Where a karst feature is located within an Option fenceline it is considered to be a permanent impact on a significant proportion of the attribute.</p>

Hydrogeological Features to be assessed	Means of assessment of potential impacts	Options Assessment Description
<p>Groundwater Sources</p> <p>High yielding water supply wells and springs and increased risk presented by each Option.</p>	<p>The proximity to the feature.</p> <p>The extent of the Option within protection zone or zones of contribution.</p>	<p>Where an abstraction is located within an Option fenceline there is potential for the quantity or quality of the water supplying the abstraction to be altered. This is considered to be a permanent impact on a significant proportion of the attribute.</p> <p>However, the NRA Guidelines states that little or no weighting should be given to the number of wells within the study area when assessing relative impacts. It also states that it is almost inevitable that any large national road scheme will result in at least a small number of low-yielding water supply wells having to be abandoned. In the case of low yielding water supply wells, the ranking of the level of potential impact is unnecessary, as wells will either have to be replaced or removed.</p>
<p>Groundwater Contamination</p> <p>Groundwater discharges and emissions have the potential to impact groundwater quality.</p>	<p>The proximity to the feature.</p> <p>The extent of the Option within protection zone or zones of contribution.</p>	<p>Groundwater discharges and emissions have the potential to impact groundwater quality, which result in a potential risk to groundwater receptors including aquifers and groundwater dependent habitats where there may be interaction within the Option Corridors. The importance of the potential contamination site is dictated by the potential extent of contamination and the likely contaminant types based on the historical or current site usage The potential impact is assessed in accordance with consideration of the Source-Pathway-Receptor framework.</p>
<p>Groundwater Flooding</p> <p>Historic groundwater flooding located within a fenceline or junction have a potential to be impacted.</p>	<p>The proximity to the feature.</p> <p>The extent of the Option within protection zone or zones of contribution.</p>	<p>The impacts of the historical groundwater flooding are analysed considering the proximity to the indicative fenceline for each Option. It is assumed that where historic groundwater flooding is located within an indicative fenceline there is a potential impact.</p>

Hydrogeological Features to be assessed	Means of assessment of potential impacts	Options Assessment Description
<p>Hydro-Ecology Groundwater dependent habitats and the risk presented to them by each Option.</p>	<p>The proximity and the position (upgradient or downgradient) to the feature. Removal of subsoil cover or part of aquifer (cuttings) which may give rise to changes in groundwater level. Removal of part of the habitat by an Option.</p>	<p>Deep cuttings and habitat removal are considered the primary potential impacts to groundwater dependent habitats and the local groundwater regime. Where a groundwater dependent habitat is located within the indicative fenceline but there are no cuttings proposed, the potential permanent impact will be relative to the proportion of the feature within the indicative fenceline. Where a groundwater dependent habitat is located within the indicative fenceline or within 100m from the indicative fenceline and there are cuttings that are less than 5m in depth, this is considered to be a potential permanent impact on a small proportion of the attribute. Where a groundwater dependent habitat is located within the indicative fenceline or within 100m from the indicative fenceline and there are cuttings greater than 5m, this is considered to be a potential permanent impact on a significant proportion of the attribute.</p>

1.3 Active Travel Options Assessment

1.3.1 R408 Newtown Road Overbridge

Option 1 – New Active Travel Bridge to the West of Existing Overbridge

Option 1 includes a new parallel active travel overbridge on the western side of the existing overbridge. This proposed facility would be 4m wide. The vertical alignment of the new overbridge generally follows the existing road alignment.

Earthworks associated with Option 1 include shallow cuts less than 5m in depth and foundations associated with the bridge construction. The earthworks have the potential to encounter the underlying aquifer which is considered to have permanent impact on a small proportion of the attribute. Therefore, as the aquifer is considered to be of medium importance the impact is considered to be minor or slightly negative resulting in a PAG score of 3.

No karst features were identified within the study area.

There are no groundwater sources, including industrial or public supply boreholes, or source of protection areas within the study area.

There are no sites of potential groundwater contamination associated with licensed facilities identified within the study area.

According to the GSI Groundwater Flood Data Maps there are no areas of potential groundwater flooding within the study area.

There are no hydro-ecology sites identified within the study area.

Option 2 – New Active Travel Bridge to the East of Existing Overbridge

Option 2 includes a new parallel active travel overbridge on the eastern side of the existing overbridge. This proposed facility would be 4m wide. The vertical alignment of the new overbridge generally follows the existing road alignment.

Earthworks associated with Option 2 include shallow cuts less than 5m in depth and foundations associated with the bridge construction. The earthworks have the potential to encounter the underlying aquifer which is considered to have permanent impact on a small proportion of the attribute. Therefore, as the aquifer is considered to be of medium importance the impact is considered to be minor or slightly negative resulting in a PAG score of 3.

No karst features were identified within the study area.

There are no groundwater sources including industrial or public supply boreholes or source of protection areas within the study area.

There are no sites of potential groundwater contamination associated with licensed facilities identified within the study area.

According to the GSI Groundwater Flood Data Maps³ there are no areas of potential groundwater flooding within the study area.

There are no hydro-ecology sites identified within the study area.

Assessment Matrix of R408 Newtown Road Overbridge Options

A summary of the Stage 2 assessment of the R408 Newtown Road Overbridge Options is provided in Table 1.5.

Table 1.5: Summary Assessment of R408 Newtown Road Overbridge Active Travel Options

Assessment Criteria	Option 1 (West)	Option 2 (East)
Groundwater Flow, Levels and Aquifer Vulnerability	Cuttings <5m and bridge foundations Minor or slight negative PAG: 3	Cuttings<5m and bridge foundations Minor or slight negative PAG: 3
Karst	No karst features Not significant or neutral PAG: 4	No karst features Not significant or neutral PAG: 4

³ Groundwater Flood Data

<https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228> [Accessed: 18/08/2023]

Assessment Criteria	Option 1 (West)	Option 2 (East)
Groundwater Sources	No industrial and public supply groundwater abstractions Not significant or neutral PAG: 4	No industrial and public supply groundwater abstractions Not significant or neutral PAG: 4
Groundwater Contamination	No contaminated sites Not significant or neutral PAG: 4	No contaminated sites Not significant or neutral PAG: 4
Groundwater Flooding	No groundwater flooding areas PAG: 4	No groundwater flooding areas PAG: 4
Hydro-ecology	No groundwater dependent habitats Not significant or neutral PAG: 4	No groundwater dependent habitats Not significant or neutral PAG: 4
Scoring		
Qualitative Assessment	Minor or slightly negative	Minor or slightly negative
Score/ Impact Level	3	3
Preference	Preferred	Preferred

1.3.2 Junction 7 Maynooth

Option 1 – New Active Travel Bridge to the West of Existing Overbridge

Option 1 includes a new parallel active travel overbridge on the western side of the existing overbridge. This proposed facility would be 4m wide. The vertical alignment of the new overbridge generally follows the existing road alignment.

Earthworks associated with Option 1 include shallow cuts less than 5m in depth and foundations associated with the bridge construction. The earthworks would have the potential to encounter the underlying aquifer which is considered to have permanent impact on a small proportion of the attribute. Therefore, as the aquifer is considered to be of medium importance the impact is considered to be minor or slightly negative resulting in a PAG score of 3.

No karst features were identified within the study area.

There are no groundwater sources including industrial or public supply boreholes or source of protection areas within the study area.

There are no sites of potential groundwater contamination associated with licensed facilities identified within the study area.

According to the GSI Groundwater Flood Data Maps there are no areas of potential groundwater flooding within the study area.

There are no hydro-ecology sites identified within the study area.

Option 2 – New Active Travel Bridge to the East of Existing Overbridge

Option 2 includes a new parallel active travel overbridge on the eastern side of the existing overbridge. This proposed facility would be 4m wide. The vertical alignment of the new overbridge generally follows the existing road alignment.

Earthworks associated with Option 2 include shallow cuts less than 5m in depth and foundations associated with the bridge construction. The earthworks would have the potential to encounter the underlying aquifer which is considered to have permanent impact on a small proportion of the attribute. Therefore, as the aquifer is considered to be of medium importance the impact is considered to be minor or slightly negative resulting in a PAG score of 3.

No karst features were identified within the study area.

There are no groundwater sources including industrial or public supply boreholes or source of protection areas within the study area.

There are no sites of potential groundwater contamination associated with licensed facilities identified within the study area.

According to the GSI Groundwater Flood Data Maps there are no areas of potential groundwater flooding within the study area.

There are no hydro-ecology sites identified within the study area

Assessment Matrix of Junction 7 Maynooth

A summary of the Stage 2 assessment of Junction 7 Maynooth Options is provided in Table 1.6.

Table 1.6: Summary Assessment of Junction 7 Maynooth Active Travel Options

Assessment Criteria	Option 1 (West)	Option 2 (East)
Groundwater Flow, Levels and Aquifer Vulnerability	Cuttings <5m and bridge foundations Minor or slight negative PAG: 3	Cuttings<5m and bridge foundations Minor or slight negative PAG: 3
Karst	No karst features Not significant or neutral PAG: 4	No karst features Not significant or neutral PAG: 4
Groundwater Sources	No industrial and public supply groundwater abstractions Not significant or neutral PAG: 4	No industrial and public supply groundwater abstractions Not significant or neutral PAG: 4
Groundwater Contamination	No contaminated sites Not significant or neutral PAG: 4	No contaminated sites Not significant or neutral PAG: 4
Groundwater Flooding	No groundwater flooding areas PAG: 4	2 areas of groundwater flooding app. 250m PAG: 4

Assessment Criteria	Option 1 (West)	Option 2 (East)
Hydro-ecology	No groundwater dependent habitats Not significant or neutral PAG: 4	No groundwater dependent habitats Not significant or neutral PAG: 4
Scoring		
Qualitative Assessment	Minor or slightly negative	Minor or slightly negative
Score/ Impact Level	3	3
Preference	Preferred	Preferred

1.3.3 R405 Ballygoran Overbridge

Option 1 – New Active Travel Bridge to the West of Existing Overbridge

Option 1 includes a new parallel active travel overbridge on the western side of the existing overbridge. This proposed facility would be 4m wide. The vertical alignment of the new overbridge generally follows the existing road alignment.

Earthworks associated with Option 1 include shallow cuts less than 5m depth and foundations associated with the bridge construction. The earthworks have the potential to encounter the underlying aquifer which is considered to have permanent impact on a small proportion of the attribute. Therefore, as the aquifer is considered to be of medium importance the impact is considered to be minor or slightly negative resulting in a PAG score of 3.

No karst features were identified within the study area.

There are no groundwater sources including industrial or public supply boreholes or source of protection areas within the study area.

There are no sites of potential groundwater contamination associated with licensed facilities identified within the study area.

According to the GSI Groundwater Flood Data Maps there are no areas of potential groundwater flooding within the study area.

There are no hydro-ecology sites identified within the study area

Option 2 – New Active Travel Bridge to the East of Existing Overbridge

The proposal for Option 2 includes a new parallel active travel overbridge on the eastern side of the existing overbridge. The vertical alignment of the new overbridge generally follows the existing road alignment..

Earthworks associated with Option 2 include shallow cuts less than 5m depth and foundations associated with the bridge construction. The earthworks have the potential to encounter the underlying aquifer which is considered to have permanent impact on a small proportion of the attribute. Therefore, as the aquifer is considered to be of medium importance the impact is considered to be minor or slightly negative resulting in a PAG score of 3.

No karst features were identified within the study area.

There are no groundwater sources including industrial or public supply boreholes or source of protection areas within the study area.

There are no sites of potential groundwater contamination associated with licensed facilities identified within the study area.

According to the GSI Groundwater Flood Data Maps there are no areas of potential groundwater flooding within the study area.

There are no hydro-ecology sites identified within the study area.

Assessment Matrix of R405 Ballygoran Overbridge Options

A summary of the Stage 2 assessment of the R405 Ballygoran Overbridge Options is provided in Table 1.7.

Table 1.7: Summary Assessment of R405 Ballygoran Overbridge Active Travel Options

Assessment Criteria	Option 1 (West)	Option 2 (East)
Groundwater Flow, Levels and Aquifer Vulnerability	Cuttings <5m and bridge foundations Minor or slight negative PAG: 3	Cuttings<5m and bridge foundations Minor or slight negative PAG: 3
Karst	No karst features Not significant or neutral PAG: 4	No karst features Not significant or neutral PAG: 4
Groundwater Sources	No industrial and public supply groundwater abstractions Not significant or neutral PAG: 4	No industrial and public supply groundwater abstractions Not significant or neutral PAG: 4
Groundwater Contamination	No contaminated sites Not significant or neutral PAG: 4	No contaminated sites Not significant or neutral PAG: 4
Groundwater Flooding	No groundwater flooding areas PAG: 4	No groundwater flooding areas PAG: 4
Hydro-ecology	No groundwater dependent habitats Not significant or neutral PAG: 4	No groundwater dependent habitats Not significant or neutral PAG: 4z

Scoring		
Qualitative Assessment	Minor or slightly negative	Minor or slightly negative
Score/ Impact Level	3	3
Preference	Preferred	Preferred

1.3.4 Junction 6 Celbridge

Option 1 – New bridge parallel to existing on the western side

The proposal for Option 1 includes a new parallel active travel overbridge on the western side of the existing overbridge. This proposed facility would be 4m wide. The vertical alignment of the new overbridge generally follows the existing road alignment.

Earthworks associated with Option 1 include shallow cuts less than 5m depth and foundations associated with the bridge construction. The earthworks have the potential to encounter the underlying aquifer which is considered to have permanent impact on a small proportion of the attribute. Therefore, as the aquifer is considered to be of medium importance the impact is considered to be minor or slightly negative resulting in a PAG score of 3.

No karst features were identified within the study area.

There are no groundwater sources including industrial or public supply boreholes or source of protection areas within the study area.

There are no sites of potential groundwater contamination associated with licensed facilities identified within the study area.

According to the GSI Groundwater Flood Data Maps there are no areas of potential groundwater flooding within the study area.

There are no hydro-ecology sites identified within the study area.

Option 2 – New Bridge parallel to existing on the eastern side

The proposal for Option 2 includes a new parallel active travel overbridge on the eastern side of the existing overbridge. The vertical alignment of the new overbridge generally follows the existing road alignment.

Earthworks associated with Option 2 include shallow cuts less than 5m depth and foundations associated with the bridge construction. The earthworks have the potential to encounter the underlying aquifer which is considered to have permanent impact on a small proportion of the attribute. Therefore, as the aquifer is considered to be of medium importance the impact is considered to be minor or slightly negative resulting in a PAG score of 3.

No karst features were identified within the study area.

There are no groundwater sources including industrial or public supply boreholes or source of protection areas within the study area.

There are no sites of potential groundwater contamination associated with licensed facilities identified within the study area.

According to the GSI Groundwater Flood Data Maps there are no areas of potential groundwater flooding within the study area.

There are no hydro-ecology sites identified within the study area.

Assessment Matrix of Junction 6 Celbridge Options

A summary of the Stage 2 assessment of Junction 6 Celbridge Options is provided in Table 1.8.

Table 1.8: Summary Assessment of Junction 6 Celbridge Active Travel Options

Assessment Criteria	Option 1 (West)	Option 2 (East)
Groundwater Flow, Levels and Aquifer Vulnerability	Cuttings <5m and bridge foundations Minor or slight negative PAG: 3	Cuttings <5m and bridge foundations Minor or slight negative PAG: 3
Karst	No karst features Not significant or neutral PAG: 4	No karst features Not significant or neutral PAG: 4
Groundwater Sources	No industrial and public supply groundwater abstractions Not significant or neutral PAG: 4	No industrial and public supply groundwater abstractions Not significant or neutral PAG: 4
Groundwater Contamination	No contaminated sites Not significant or neutral PAG: 4	No contaminated sites Not significant or neutral PAG: 4
Groundwater Flooding	No groundwater flooding areas PAG: 4	No groundwater flooding areas PAG: 4
Hydro-ecology	No groundwater dependent habitats Not significant or neutral PAG: 4	No groundwater dependent habitats Not significant or neutral PAG: 4
Scoring		
Qualitative Assessment	Minor or slightly negative	Minor or slightly negative
Score/ Impact Level	3	3
Preference	Preferred	Preferred

1.3.5 R404 Celbridge Road Overbridge

Option 1 – New Active Travel Bridge to the West of Existing Overbridge

Option 1 would include a new overbridge on the western side of the existing overbridge to accommodate vulnerable road users. This proposed facility would be 4m wide.

Earthworks associated with Option 1 include shallow cuts less than 5m depth and foundations associated with the bridge construction. The earthworks have the potential to encounter the underlying aquifer which is considered to have permanent impact on a small proportion of the attribute. Therefore, as the aquifer is considered to be of medium importance the impact is considered to be minor or slightly negative resulting in a PAG score of 3.

No karst features were identified within the study area.

There are no groundwater sources including industrial or public supply boreholes or source of protection areas within the study area.

There are no sites of potential groundwater contamination associated with licensed facilities identified within the study area.

According to the GSI Groundwater Flood Data Maps there are no areas of potential groundwater flooding within the study area.

There are no hydro-ecology sites identified within the study area.

Option 2 – New Active Travel Bridge to the East of Existing Overbridge

Option 2 includes a new overbridge on the eastern side of the existing overbridge to accommodate vulnerable road users. This proposed facility would be 4m wide and would tie into the existing footway both to the south and north of the existing overbridge. The existing facility is 2.5m wide, and therefore may require widening at the tie in points to accommodate linkage with the proposed overbridge.

Earthworks associated with Option 2 include shallow cuts less than 5m depth and foundations associated with the bridge construction. The earthworks have the potential to encounter the underlying aquifer which is considered to have permanent impact on a small proportion of the attribute. Therefore, as the aquifer is considered to be of medium importance the impact is considered to be minor or slightly negative resulting in a PAG score of 3.

No karst features were identified within the study area.

There are no groundwater sources including industrial or public supply boreholes or source of protection areas within the study area.

There are no sites of potential groundwater contamination associated with licensed facilities identified within the study area.

According to the GSI Groundwater Flood Data Maps there are no areas of potential groundwater flooding within the study area.

There are no hydro-ecology sites identified within the study area.

Assessment Matrix of R404 Celbridge Road Overbridge

A summary of the Stage 2 assessment of the R404 Celbridge Road Overbridge Options is provided in Table 1.9.

Table 1.9: Summary Assessment of R404 Celbridge Road Overbridge Active Travel Options

Assessment Criteria	Option 1 (West)	Option 2 (East)
Groundwater Flow, Levels and Aquifer Vulnerability	Cuttings <5m and bridge foundations Minor or slight negative PAG: 3	Cuttings<5m and bridge foundations Minor or slight negative PAG: 3
Karst	No karst features Not significant or neutral PAG: 4	No karst features Not significant or neutral PAG: 4
Groundwater Sources	No industrial and public supply groundwater abstractions Not significant or neutral PAG: 4	No industrial and public supply groundwater abstractions Not significant or neutral PAG: 4
Groundwater Contamination	No contaminated sites Not significant or neutral PAG: 4	No contaminated sites Not significant or neutral PAG: 4
Groundwater Flooding	No groundwater flooding areas Not significant or neutral PAG: 4	No groundwater flooding areas Not significant or neutral PAG: 4
Hydro-ecology	No groundwater dependent habitats Not significant or neutral PAG: 4	No groundwater dependent habitats Not significant or neutral PAG: 4
Scoring		
Qualitative Assessment	Minor or slightly negative	Minor or slightly negative
Score/ Impact Level	3	3
Preference	Preferred	Preferred

1.3.6 Junction 5 Leixlip

Option 1 – New Active Travel Bridge to the West of Existing Overbridge

Option 1 includes a new overbridge on the western side of the existing overbridge to accommodate vulnerable road users. This proposed facility would be 4m wide.

Earthworks associated with Option 1 include shallow cuts less than 5m depth and foundations associated with the bridge construction. The earthworks have the potential to encounter the underlying aquifer which is considered to have permanent impact on a small proportion of the attribute.

Therefore, as the aquifer is considered to be of medium importance the impact is considered to be minor or slightly negative resulting in a PAG score of 3.

No karst features were identified within the study area.

There are no groundwater sources including industrial or public supply boreholes or source of protection areas within the study area.

There are no sites of potential groundwater contamination associated with licensed facilities identified within the study area.

According to the GSI Groundwater Flood Data Maps there are no areas of potential groundwater flooding within the study area.

The Liffey Valley pNHA (Site 000128) is located approximately 300m to the north and east of the Junction 5 Leixlip – Option 1. Although the site is outside the study area (250 m from the centre line), the habitat is included as it is located downgradient of Junction 5 Leixlip. The proximity of the habitat to Option 1 is considered with regard to increased pollution risk from untreated surface water run-off or accidental spillage of fuel from the road affecting groundwater quality. However, as per Section 4.4 of the NRA Guidelines, the assessment has considered the application of standard mitigation and best practice during construction is unambiguous and success is highly likely. Therefore, it is assumed that standard drainage measures will be put in place to reduce the risk of run-off from the road affecting groundwater quality. Therefore, as the potential for contamination is not considered as part of this assessment criteria, the pNHA is not located within 100m of the indicative fenceline of Option 1 and the cuttings are minimal, no temporary or permanent impacts are anticipated on the habitat.

Option 2 – New Active Travel Bridge to the East of Existing Overbridge

Option 2 comprises a new overbridge on the eastern side of the existing overbridge to accommodate vulnerable road users. This proposed facility would be 4m wide. To the north, it would tie into the existing footway of approximately 3m in width, which would require widening to accommodate the linkage to the proposed cross section. At the southern end, the tie in would be located at the existing signalised crossing of the westbound diverge.

Earthworks associated with Option 2 include shallow cuts less than 5m depth and foundations associated with the bridge construction. The earthworks have the potential to encounter the underlying aquifer which is considered to have permanent impact on a small proportion of the attribute. Therefore, as the aquifer is considered to be of medium importance the impact is considered to be minor or slightly negative resulting in a PAG score of 3.

No karst features were identified within the study area.

There are no groundwater sources including industrial or public supply boreholes or source of protection areas within the study area.

There are no sites of potential groundwater contamination associated with licensed facilities identified within the study area.

According to the GSI Groundwater Flood Data Maps there are no areas of potential groundwater flooding within the study area.

The Liffey Valley pNHA (Site 000128) is located approximately 300m to the north and east of the Junction 5 Leixlip – Option 1. Although the site is outside the study area (250 m from the centre line), the habitat is included as it is located downgradient of Junction 5 Leixlip. The proximity of the habitat to Option 1 is considered with regard to increased pollution risk from untreated surface water run-off or accidental spillage of fuel from the road affecting groundwater quality. However, as per Section 4.4 of the NRA Guidelines, the assessment has considered the application of standard mitigation and best practice during construction is unambiguous and success is highly likely. Therefore, it is assumed that standard drainage measures will be put in place to reduce the risk of run-off from the road affecting groundwater quality. Therefore, as the potential for contamination is not considered as part of this assessment criteria, the pNHA is not located within 100m of the indicative fenceline of Option 1 and the cuttings are minimal, no temporary or permanent impacts are anticipated on the habitat.

Assessment Matrix of Junction 5 Leixlip

A summary of the Stage 2 assessment of Junction 5 Leixlip Options is provided in Table 1.10.

Table 1.10: Summary Assessment of Junction 5 Leixlip Active Travel Options

Assessment Criteria	Option 1 (West)	Option 2 (East)
Groundwater Flow, Levels and Aquifer Vulnerability	Cuttings <5m and bridge foundations Minor or slight negative PAG: 3	Cuttings<5m and bridge foundations Minor or slight negative PAG: 3
Karst	No karst features Not significant or neutral PAG: 4	No karst features Not significant or neutral PAG: 4
Groundwater Sources	No industrial and public supply groundwater abstractions Not significant or neutral PAG: 4	No industrial and public supply groundwater abstractions Not significant or neutral PAG: 4
Groundwater Contamination	No contaminated sites Not significant or neutral PAG: 4	No contaminated sites Not significant or neutral PAG: 4
Groundwater Flooding	No groundwater flooding areas Not significant or neutral PAG: 4	No groundwater flooding areas Not significant or neutral PAG: 4
Hydro-ecology	Liffey Valley pNHA (Site 000128) Not significant or neutral PAG: 4	Liffey Valley pNHA (Site 000128) Not significant or neutral PAG: 4

Scoring		
Qualitative Assessment	Minor or slightly negative	Minor or slightly negative
Score/ Impact Level	3	3
Preference	Preferred	Preferred

1.4 Summary

The Phase 2 Stage 2 active travel options assessment for the Maynooth to Leixlip Project has been assessed against the hydrogeological constraints.

The impacts were classified as minor or slightly negative with a PAG ranking of (3), due to the potential to encounter the underlying aquifer during excavation for bridge foundations construction.

Based on the hydrogeological assessment, there is no preference between Option 1 or 2 for the active travel option at the different locations.

Therefore, both Option 1 and Option 2 are Preferred.

1.5 References

NRA (2009) Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes. Available from: <https://www.tii.ie/technical-services/environment/planning/Guidelines-on-Procedures-for-Assessment-and-Treatment-of-Geology-Hydrology-and-Hydrogeology-for-National-Road-Schemes.pdf>

TII (2016) Project Appraisal Guidelines for National Roads Unit 7.0 Multi Criteria Analysis. Available from: <https://www.tiipublications.ie/library/PE-PAG-02031-01.pdf>

Groundwater Flood Data

<https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228> [Accessed: 18/08/2023]

Kildare County Council

Maynooth to Leixlip Project

Options Report - Stage 2 Hydrology
Active Travel Options Assessment

Draft 1 | 31 August 2023

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

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

Job number 272691-00

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Contents

	Page
Contents	1
1 Stage 2 Hydrology Active Travel Options Assessment	1
1.1 Introduction	1
1.2 Methodology	1
1.2.1 Scoring Procedure	2
1.3 Active Travel Options Assessment	4
1.3.1 R408 Newtown Road Overbridge	4
1.3.2 Junction 7 Maynooth	5
1.3.3 R405 Ballygoran Overbridge	6
1.3.4 Junction 6 Celbridge	7
1.3.5 R404 Celbridge Road Overbridge	8
1.3.6 Junction 5 Leixlip	9
1.4 Summary	10
1.5 References	10

Tables

Table 1.1: Rating of Significant Environmental Effects from the EPA Guidelines

Table 1.2: Scoring System

Table 1.3: Correlation of ERA Guidelines Significance Rating to an equivalent TII PAG Score

Table 1.4: R408 Newtown Road - Active Travel Option 1 Assessment

Table 1.5: R408 Newtown Road Active Travel Option 2 Assessment

Table 1.6: R408 Active Travel Option Assessment Matrix

Table 1.7: Junction 7 Active Travel Option 1 Assessment

Table 1.8: Junction 7 Active Travel Option 2 Assessment

Table 1.9: Junction 7 Active Travel Option Assessment Matrix

Table 1.10: R405 Active Travel Option 1 Assessment

Table 1.11: R405 Active Travel Option 2 Assessment

Table 1.12: R405 Active Travel Option Assessment Matrix

Table 1.13: Junction 6 Active Travel Option 1 Assessment

Table 1.14: Junction 6 Active Travel Option 2 Assessment

Table 1.15: Junction 6 Active Travel Option Assessment Matrix

Table 1.16: R404 Celbridge Road Overbridge Active Travel Option 1 Assessment

Table 1.17: R404 Celbridge Road Overbridge Active Travel Option 2 Assessment

Table 1.18: R404 Active Travel Option Assessment Matrix

Table 1.19: Junction 5 Active Travel Option 1 Assessment

Table 1.20: Junction 5 Active Travel Option 2 Assessment

Table 1.21: Junction 5 Active Travel Option Assessment Matrix

1 Stage 2 Hydrology Active Travel Options Assessment

1.1 Introduction

This section details the environmental assessment of the Stage 2 Active Travel Options for the Maynooth to Leixlip Project with respect to the Hydrology constraints identified in the Constraints Report.

The methodology used in this assessment is outlined in Section 1.2. Section 1.3 contains the options assessment. A summary is provided in Section 1.4 and references are provided in Section 1.5.

1.2 Methodology

The Active Travel Options were assessed in accordance with Project Appraisal Guidelines for National Roads Unit 7.0 -Multi Criteria Analysis (TII, 2016). The potential effects were assessed in accordance with the EPA's Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (2022). In determining the preferred option from a hydrology perspective, consideration was given to the following:

- The number of river/stream crossings with hydrologic connection to protected areas and to drinking water abstraction points with a potential to impact on water quality; and
- The risk of flooding to the works and elsewhere.

Data Sources

Data used for the assessment was obtained from the following online sources:

- EPA Water Online map: <https://gis.epa.ie/EPAMaps/Water>; and
- OPW online flood map: <https://www.floodinfo.ie/map/floodmaps/>.

These sources were accessed in August 2023.

The EPA Guidelines provide criteria for ranking hydrology effects within the study area. These criteria are presented in Section 3.7 (Assessment of Effects) of the Guidelines. Criteria for rating the significance of effects is contained within Table 3.4 of the Guidelines and are reproduced here in Table 1.1. The significance of the effect considers the attribute's importance and the predicted scale and duration of the likely effects.

Table 1.1: Rating of Significant Environmental Effects from the EPA Guidelines

Significance of Effects	Description of Effects
Imperceptible	An effect capable of measurement but without significant consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight Effects	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate Effects	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends
Significant Effects	An effect which, by its character, magnitude, duration or intensity, alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity, significantly alters most of a sensitive aspect of the environment
Profound Effects	An effect which obliterates sensitive characteristics

1.2.1 Scoring Procedure

The TII Project Appraisal Guidelines for National Roads (PAG) Unit 7.0 - Multi-Criteria Analysis provide a qualitative and quantitative procedure for scoring each option against the assessment criteria, as shown in Table 1.2.

Table 1.2: Scoring System

Assessment Score	Description
7	Major or highly positive
6	Moderately positive
5	Minor or slightly Positive
4	Not significant or neutral
3	Minor or slightly negative
2	Moderately negative
1	Major or highly negative

The significance rating of environmental impacts from the EPA Guidelines have been correlated with the equivalent qualitative and quantitative assessment scores from the TII Project Appraisal Guidelines, as shown in Table 1.3.

Table 1.3: Correlation of ERA Guidelines Significance Rating to an equivalent TII PAG Score

Significance Rating (EPA Guidelines)	Equivalent PAG (Description)	EPA Description of Effects	Score
Imperceptible	Not significant or neutral	An effect capable of measurement but without significant consequences.	4
Not Significant	Minor or slightly negative	An effect which causes noticeable changes in the character of the environment but without significant consequences.	3
Slight Effects	Minor or slightly negative	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.	3
Moderate Effects	Moderately negative	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends	2
Significant Effects	Major or highly negative	An effect which, by its character, magnitude, duration or intensity, alters a sensitive aspect of the environment.	1
Very Significant	Major or highly negative	An effect which, by its character, magnitude, duration or intensity, significantly alters most of a sensitive aspect of the environment	1
Profound Effects	Major or highly negative	An effect which obliterates sensitive characteristics	1

The final stage of the assessment methodology was to ensure that the requirements of the TII PAG were met by assigning a score to each Active Travel option based on the scoring procedure within these Guidelines. Using the effect scores and professional judgement, Preferred or Least Preferred rankings were assigned to each of the Active Travel options.

1.3 Active Travel Options Assessment

1.3.1 R408 Newtown Road Overbridge

Option 1 – New Active Travel Overbridge to the West

Table 1.4: R408 Newtown Road - Active Travel Option 1 Assessment

Description of Attribute	Attribute Importance	Magnitude of Effect	Score
The M4 floods at this location for a 1% AEP fluvial flood event.	High Possible hydrological connection to the Rye Water Valley/Carton SAC via the Lyreen River during floods. The WFD Status (2016-21) of the Lyreen River is “At Risk”	Imperceptible The proposed overbridge is at higher level than the M4. No noticeable risk of serious pollution during construction and operation expected. Negligible increase in predicted peak flood level.	4

Option 2 – New Active Travel Overbridge Bridge to the East

Table 1.5: R408 Newtown Road Active Travel Option 2 Assessment

Description of Attribute	Attribute Importance	Magnitude of Effect	Score
The M4 floods at this location for a 1% AEP fluvial flood event.	High Possible hydrological connection to the Rye Water Valley/Carton SAC via the Lyreen River during floods. The WFD Status (2016-21) of the Lyreen River is “At Risk”	Imperceptible The proposed overbridge is at higher level than the M4. No noticeable risk of serious pollution during construction and operation expected. Negligible increase in predicted peak flood level.	4

Assessment Matrix of R408 Newtown Road Overbridge Options

Table 1.6: R408 Active Travel Option Assessment Matrix

Sub-criteria	Option 1	Option 2
Hydrology	Possible hydrological connection to the Rye Water Valley SAC. Imperceptible pollution risk expected during construction or operation because of the M4 (flood level) and proposed overbridge.	Possible hydrological connected to the Rye Water Valley SAC. Imperceptible pollution risk expected during construction or operation because of the M4 (flood level) and proposed overbridge.
Flood Risk	Imperceptible increase in flood risk to the works.	Imperceptible increase in flood risk to the works.
Scoring		
Qualitative Assessment	Not significant or neutral	Not significant or neutral
Score/Impact Level	4	4
Preference	Preferred	Preferred

1.3.2 Junction 7 Maynooth

Option 1 – New Active Travel Overbridge to the West

Table 1.7: Junction 7 Active Travel Option 1 Assessment

Description of Attribute	Attribute Importance	Magnitude of Effect	Score
Encroachment of the 0.1% AEP fluvial flood at on M4 at Junction 7 on the western side.	High Possible hydrological connection to the Rye Water Valley/Carton SAC via the Lyreen River during floods. The WFD Status (2016-21) of the Lyreen River is “At Risk”.	Imperceptible The proposed overbridge is at higher level than the M4. No noticeable risk of serious pollution during construction and operation expected. Negligible increase in predicted peak flood level.	4

Option 2 – New Active Travel Overbridge to the East

Table 1.8: Junction 7 Active Travel Option 2 Assessment

Description of Attribute	Attribute Importance	Magnitude of Effect	Score
Outside of the 0.1% AEP flood zone. Slightly greater impervious surface	High Low risk of impacting the Rye Water Valley/Carton SAC via the Lyreen River during floods. The WFD Status (2016-21) of the Lyreen River is “At Risk”.	Imperceptible The proposed overbridge is at higher level than the M4. No noticeable risk of serious pollution during construction and operation expected. Negligible increase in predicted peak flood level.	4

Assessment Matrix of Junction 7 Maynooth Options

Table 1.9: Junction 7 Active Travel Option Assessment Matrix

Sub-criteria	Option 1	Option 2
Hydrology	Possible hydrological connection to the Rye Water Valley SAC. Imperceptible pollution risk expected during construction or operation because of the M4 level and proposed overbridge.	Low risk of impacting the Rye Water Valley SAC. Imperceptible pollution risk expected during construction or operation because of the M4 (flood level) and proposed overbridge.
Flood Risk	Imperceptible increase in flood risk to the works.	Imperceptible increase in flood risk to the works.
Scoring		
Qualitative Assessment	Not significant or neutral	Not significant or neutral
Score/Impact Level	4	4
Preference	Preferred	Preferred

1.3.3 R405 Ballygoran Overbridge

Option 1 – New Active Travel Overbridge to the West

Table 1.10: R405 Active Travel Option 1 Assessment

Description of Attribute	Attribute Importance	Magnitude of Effect	Score
Low risk of flooding.	High No hydrological connection to the Rye Water Valley SAC	Imperceptible The proposed overbridge is at higher level than the M4. No noticeable risk of serious pollution during construction and operation expected. Imperceptible increase in predicted peak flood level.	4

Option 2 – New Active Travel Overbridge to the East

Table 1.11: R405 Active Travel Option 2 Assessment

Description of Attribute	Attribute Importance	Magnitude of Effect	Score
Low risk of flooding	High Low risk of impacting the Rye Water Valley/Cartron SAC the Lyreen River during floods.	Imperceptible The proposed overbridge is at higher level than the M4. No noticeable risk of serious pollution during construction and operation expected. Imperceptible increase in predicted peak flood level.	4

Assessment Matrix of R405 Ballygoran Overbridge Options

Table 1.12: R405 Active Travel Option Assessment Matrix

Sub-criteria	Option 1	Option 2
Hydrology	No connection to the Rye Water Valley SAC. Imperceptible pollution risk expected during construction or operation because of the M4 level and proposed overbridge.	Low risk of impacting the Rye Water Valley SAC. Imperceptible pollution risk expected during construction or operation because of the M4 (flood level) and proposed overbridge.
Flood Risk	Imperceptible increase in flood risk to the works.	Imperceptible increase in flood risk to the works.
Scoring		
Qualitative Assessment	Not significant or neutral	Not significant or neutral
Score/Impact Level	4	4
Preference	Preferred	Preferred

1.3.4 Junction 6 Celbridge

Option 1 – New Active Travel Overbridge to the West

Table 1.13: Junction 6 Active Travel Option 1 Assessment

Description of Attribute	Attribute Importance	Magnitude of Effect	Score
Low risk of flooding	High No hydrological connection to the Rye Water Valley SAC	Imperceptible The proposed overbridge is at higher level than the M4. No noticeable risk of serious pollution during construction and operation expected. Imperceptible increase in predicted peak flood level.	4

Option 2 – New Active Travel Overbridge to the East

Table 1.14: Junction 6 Active Travel Option 2 Assessment

Description of Attribute	Attribute Importance	Magnitude of Effect	Score
Low risk of flooding	High Low risk of impacting the Rye Water Valley/Carton SAC via the Lyreen River during floods.	Imperceptible The proposed overbridge is at higher level than the M4. No noticeable risk of serious pollution during construction and operation expected. Imperceptible increase in predicted peak flood level.	4

Assessment Matrix of Junction 6 Celbridge Options

Table 1.15: Junction 6 Active Travel Option Assessment Matrix

Sub-criteria	Option 1	Option 2
Hydrology	No connection to the Rye Water Valley SAC. Imperceptible pollution risk expected during construction or operation because of the M4 level and proposed overbridge.	Low risk of impacting the Rye Water Valley SAC. Imperceptible pollution risk expected during construction or operation because of the M4 (flood level) and proposed overbridge.
Flood Risk	Imperceptible increase in flood risk to the works.	Imperceptible increase in flood risk to the works.
Scoring		
Qualitative Assessment	Not significant or neutral	Not significant or neutral
Score/Impact Level	4	4
Preference	Preferred	Preferred

1.3.5 R404 Celbridge Road Overbridge

Option 1 – New Active Travel Overbridge to the West

Table 1.16: R404 Celbridge Road Overbridge Active Travel Option 1 Assessment

Description of Attribute	Attribute Importance	Magnitude of Effect	Score
Low risk of flooding	High No hydrological connection to the Rye Water Valley SAC	Imperceptible The proposed overbridge is at higher level than the M4. No noticeable risk of serious pollution during construction and operation expected. Imperceptible increase in predicted peak flood level.	4

Option 2 – New Active Travel Overbridge to the East

Table 1.17: R404 Celbridge Road Overbridge Active Travel Option 2 Assessment

Description of Attribute	Attribute Importance	Magnitude of Effect	Score
Low risk of flooding	High Low risk of impacting the Rye Water Valley/Carton SAC via the Lyreen River during floods.	Imperceptible The proposed overbridge is at higher level than the M4. No noticeable risk of serious pollution during construction and operation expected. Imperceptible increase in predicted peak flood level.	4

Assessment Matrix of R404 Celbridge Road Overbridge

Table 1.18: R404 Active Travel Option Assessment Matrix

Sub-criteria	Option 1	Option 2
Hydrology	No connection to the Rye Water Valley SAC. Imperceptible pollution risk expected during construction or operation because of the M4 level and proposed overbridge.	Low risk of impacting the Rye Water Valley SAC. Imperceptible pollution risk expected during construction or operation because of the M4 (flood level) and proposed overbridge.
Flood Risk	Imperceptible increase in flood risk to the works.	Imperceptible increase in flood risk to the works.
Scoring		
Qualitative Assessment	Not significant or neutral	Not significant or neutral
Score/Impact Level	4	4
Preference	Preferred	Preferred

1.3.6 Junction 5 Leixlip

Option 1 – New Active Travel Overbridge to the West

Table 1.19: Junction 5 Active Travel Option 1 Assessment

Description of Attribute	Attribute Importance	Magnitude of Effect	Score
Low risk of flooding	Medium No hydrological connection to the Liffey	Imperceptible The proposed overbridge is at higher level than the M4. No noticeable risk of serious pollution during construction and operation expected. Imperceptible increase in predicted peak flood level.	4

Option 2 – New Active Travel Overbridge to the East

Table 1.20: Junction 5 Active Travel Option 2 Assessment

Description of Attribute	Attribute Importance	Magnitude of Effect	Score
Low risk of flooding	Medium Low risk of impacting the Liffey River.	Imperceptible The proposed overbridge is at higher level than the M4. No noticeable risk of serious pollution during construction and operation expected. Imperceptible increase in predicted peak flood level.	4

Assessment Matrix of Junction 5 Leixlip Options

Table 1.21: Junction 5 Active Travel Option Assessment Matrix

Sub-criteria	Option 1	Option 2
Hydrology	No connection to the Liffey River. Imperceptible pollution risk expected during construction or operation because of the M4 level and proposed overbridge.	Low risk of impacting the Liffey. Imperceptible pollution risk expected during construction or operation because of the M4 (flood level) and proposed overbridge.
Flood Risk	Imperceptible increase in flood risk to the works.	Imperceptible increase in flood risk to the works.
Scoring		
Qualitative Assessment	Not significant or neutral	Not significant or neutral
Score/Impact Level	4	4
Preference	Preferred	Preferred

1.4 Summary

The active travel options were assessed in terms of their hydrological (water quality impact) and flood risk.

In all cases, both options have similar hydrological and flood risk impact.

Preference is therefore given to both options at each location.

1.5 References

N/A

Kildare County Council

Maynooth to Leixlip Project

Stage 2 Landscape and Visual –
Active Travel Options Assessment

Draft 1 | 31 August 2023

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

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

Job number 272691-00

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Contents

	Page
Contents	1
1 Stage 2 Landscape and Visual Active Travel Options Assessment	1
1.1 Introduction	1
1.2 Methodology	1
1.2.1 Scoring Procedure	3
1.3 Active Travel Options Assessment	4
1.3.1 R408 Newtown Road Overbridge	4
1.3.2 Junction 7 Maynooth	6
1.3.3 R405 Ballygoran Overbridge	7
1.3.4 Junction 6 Celbridge	10
1.3.5 R404 Celbridge Road Overbridge	12
1.3.6 Junction 5 Leixlip	14
1.4 Summary	16
1.5 References	17

Tables

Table 1.1: Sensitivity Weighting

Table 1.2: TII Project Appraisal Guidelines Scoring Criteria

Table 1.3: R408 Newton Road Overbridge Active Travel Options Matrix

Table 1.4: Junction 7 Active Travel Options Assessment Matrix

Table 1.5: R405 Ballygoran Overbridge Active Travel Options Assessment Matrix

Table 1.6: Junction 6 Celbridge Active Travel Options Assessment Matrix

Table 1.7: R404 Celbridge Road Overbridge Active Travel Options Assessment Matrix

Table 1.8: Junction 5 Leixlip Active Travel Options Assessment Matrix

Table 1.9: Summary of Active Travel Options Assessment

1 Stage 2 Landscape and Visual Active Travel Options Assessment

1.1 Introduction

This section details the environmental assessment of the Stage 2 Active Travel Options for the Maynooth to Leixlip Project with respect to the Landscape and Visual constraints identified in the Constraints Report.

The methodology used in this assessment is outlined in Section 1.2. Section 1.3 contains the options assessment. A summary is provided in Section 1.4 and references are provided in Section 1.5.

1.2 Methodology

The Landscape and Visual Stage 2 assessment is primarily desktop, based on understanding the character of the existing landscape with specific reference to Landscape and Visual references in the Kildare County Development Plan 2023 – 2029.

The assessment has had regard to the following documents:

- Landscape Character Assessment (LCA) and Landscape and Visual Impact Assessment (LVIA) of Specified Infrastructure Projects – Overarching Technical Document (PE-ENV-01101), December 2020 TII;
- Landscape Character Assessment (LCA) and Landscape and Visual Impact Assessment (LVIA) of Proposed National Roads - Standard (PE-ENV-01102), December 2020 TII;
- Guidelines on the information to be contained in Environmental Impact Assessment Reports, 2022 EPA;
- Guidelines for Landscape and Visual Impact Assessment, 3ed. April 2013 Landscape Institute & Institute of Environmental Management and Assessment;
- Project Appraisal Guidelines for National Roads Unit 7.0 – Multi Criteria Analysis (PE-PAG-02031), October 2016 TII¹; and
- Kildare County Development Plan 2023-2029, Kildare County Council, 2022.

For the purposes of the assessment, the plan and profiles for each active travel option were analysed along with any associated structures and anticipated changes to the landscape fabric.

¹ PE-PAG-02031, TII (2016). Available from: <https://www.tiipublications.ie/library/PE-PAG-02031-01.pdf>

Due to the magnitude of the proposed road infrastructure any option within this landscape would result in significant landscape/townscape and visual impacts. The nature, extent and duration of such impacts would depend on the intensity of the proposed development, the proximity of residential and related amenity uses, the magnitude of direct impact, the degree and duration of disruption, the sensitivity of the resource and the rarity and/or uniqueness of the landscape. Impacts on the Landscape and Visual environment are also influenced by the interaction with other effects such as community/human beings, heritage, noise and air quality.

In assessing the active travel options, the following main elements of each were considered as to whether they have the potential for Landscape and Visual impact:

- During construction:
 - Removal of existing vegetation;
 - Demolition of existing residential properties;
 - Landtake and severance;
 - General construction disturbance including excavations, earthworks, construction activity and traffic, lighting and relating noise, dust etc.; and
 - Planting of mitigation vegetation.
- During operation:
 - Significant, elevated structures such as earth retaining walls and bridges;
 - Significant road cutting slopes and embankments;
 - Potential Junctions;
 - Noise barriers and gantry signage;
 - Moving traffic; and
 - Night time lighting effects.

Other elements such as low-level signage, median barriers, culverts, fencing etc. are an integral part of most roads and would have little or no landscape impact due to their small scale in relation to the wider development, and limited off-scheme visibility.

For the purpose of this assessment the details such as signage, lighting and noise barriers are deemed similar for each option. The main elements which would differ between the option geometry and therefore the focus of the assessment include:

- The location and direction through the landscape and what physical impact that would involve;
- The size and height of the embankments, cuttings or elevated structures required for the option which would affect the visual impact;
- The proximity to receptors with clear views, in particular residential receptors; and

- The potential a particular active travel option has for mitigation.

1.2.1 Scoring Procedure

Using site knowledge and digital data (GIS/CAD mapping) the number of landscape features, designation and visual receptors within the baseline/receiving environment were analysed and quantified for each option within a separate criteria including:

- Landscape - designated landscapes/amenity/recreation features, designated archaeological features, natural landscape features, demesne/designated landscape features; and
- Visual – residential properties, designated views, designated routes, amenity users, designated visual units.

A sensitivity rating (defined in Section 3.1.9 of TII PE-PAG-02031) was then applied to each landscape criteria giving a score rating for each option. The sensitivity weightings applied are shown in Table 1.1.

The primary visual receptors applicable to this assessment are users of residential properties. These are allocated a sensitivity rating of ‘high’ as “*viewers with a proprietary interest and prolonged viewing opportunities such as residents*” - Section 3.1.9 of TII PE-PAG-02031 and this corresponds to a weighting of 3 per receptor. For the purposes of the quantification, one receptor is counted per residential property, given that it is not within the scope of this assessment to determine the number of residents present per property. Every receptor with potential to experience a significant effect was counted and multiplied by the weighting to provide the score rating for each option.

Table 1.1: Sensitivity Weighting

Weighting	Landscape Sensitivity
1	Low
2	Medium
3	High
4	Very High

It is not intended that the sum of each of the individual scores be used in selecting a preferred option. The overall impact would depend on the sensitivity, context and strength of the individual impacts and a professional judgement by the landscape specialist has been used to weigh up the individual impacts and form a view as to the likely overall impact of the option.

For each option a qualitative assessment based on professional judgement was then undertaken with an impact rating for each option using the scoring procedure set out in Section 2.4 of TII PE-PAG-02031, this is listed below.

Table 1.2: TII Project Appraisal Guidelines Scoring Criteria

Assessment Score	Description
7	Major or highly positive
6	Moderately positive
5	Minor or slightly Positive
4	Not significant or neutral
3	Minor or slightly negative
2	Moderately negative
1	Major or highly negative

Thereafter, a ranking of preference based on likely significant Landscape and Visual impacts is provided for the options.

1.3 Active Travel Options Assessment

1.3.1 R408 Newtown Road Overbridge

Option 1 – New Overbridge parallel to existing on western side

There would be an impact on roadside planting but no other notable impacts on landscape fabric. Given that the proposed bridge would be adjacent to an existing road overbridge and in the context of the M4 motorway corridor, there would be no perceivable impact on landscape character. There would be likely impacts on nearby residential properties to the southwest and northwest due to construction activity and loss of embankment planting to the west side of the R408 which would increase visibility of traffic on the road. These effects may be significant in the construction phase. Replacement planting to the proposed embankments would restore the screening effect and neutralise any negative effects over the short to medium-term.

Option 2 – New Overbridge parallel to existing on the eastern side

There would be an impact on roadside planting but no other notable impacts on landscape fabric. Given that the proposed bridge would be adjacent to an existing road overbridge and in the context of the M4 motorway corridor, there would be no perceivable impact on landscape character. There would be likely impacts on Maynooth Town Football Club from loss of embankment planting from the east side of the R408 which would increase visibility of traffic on the road. There is also potential for significant construction phase impacts with temporary landtake from the grounds. No significant effects are expected on residential receptors. Replacement planting to the proposed embankments would restore the screening effect and neutralise any negative effects over the short to medium-term.

Assessment Matrix of R408 Newtown Road Overbridge Options

Table 1.3: R408 Newton Road Overbridge Active Travel Options Matrix

Assessment Criteria (Sensitivity Weighting in brackets)	Option 1 (West)	Option 2 (East)
Landscape Assessment		
Local Amenity Landscapes (2)	0 (0)	1 (2)
Archaeological Features (3)	0	0
Architectural Heritage Features (2)	0	0
Natural / Semi-Natural Landscape Features (2) – roadside planting.	4 (8)	4 (8)
Demesne Features (3)	0	0
Landscape Scoring	8	10
Landscape Assessment		
Residential Properties/ Receptors – Significant Effects (3)	2 (6)	0
Designated views/scenic routes/areas (3)	0	0
Visual Scoring	6	0
Qualitative Assessment	<p>Moderately Negative</p> <p>There would be impacts on a small number of nearby residential receptors. Significant effects expected to be only temporary construction effects on 2-3 properties due to the works and removal of roadside vegetation. These effects are expected to be neutralised following replacement planting.</p>	<p>Moderately Negative</p> <p>This option is not likely to notably impact on any residential receptors. The key impacts would be on Maynooth Town Football Club which is likely to experience significant construction effects. These effects are expected to be neutralised following reinstatement of any temporary land take areas and replacement of roadside planting.</p>
Score/ Impact Level	2	2
Preference	Preferred	Least Preferred

1.3.2 Junction 7 Maynooth

Option 1 – New Overbridge parallel to existing on western side

There would be an impact on roadside planting but no other notable impacts on landscape fabric. Given that the proposed bridge would be adjacent to an existing road overbridge and in the context of the M4 motorway corridor, there would be no perceivable impact on landscape character. Although roadside planting would be removed this would be a proportionally small amount of the wide bands present at this location and the screening effect of surrounding areas would be largely retained with no significant visual effects expected.

Option 2 – New Overbridge parallel to existing on the eastern side

Impacts would be similar to Option 1 with no perceivable impact on landscape character and no significant effects on visual receptors. This option would be slightly less preferable due to a greater loss of tree planting and also loss of some amenity grassland adjacent to the Straffan Road Roundabout to the south, but this is a low sensitivity area.

Assessment Matrix of Junction 7 Maynooth Options

Table 1.4: Junction 7 Active Travel Options Assessment Matrix

Assessment Criteria (Sensitivity Weighting in brackets)	Option 1 (West)	Option 2 (East)
Landscape Assessment		
Local Amenity Landscapes (2)	0	0
Archaeological Features (3)	0	0
Architectural Heritage Features (2)	0	0
Natural / Semi-Natural Landscape Features (2) – roadside planting.	3 (6)	4 (8)
Demesne Features (3)	0	0
Landscape Scoring	6	8
Landscape Assessment		
Residential Properties/ Receptors (3)	0	0
Designated views/scenic routes/areas (3)	0	0
Visual Scoring	0	0
Qualitative Assessment	Moderately Negative Impacts are limited to removal of roadside vegetation. These effects are expected to be reduced following replacement planting.	Moderately Negative Impacts are limited to loss of grassland and removal of roadside vegetation with a greater area of tree loss than for Option 1. These effects are expected to be reduced following replacement planting.
Score/ Impact Level	2	2
Preference	Preferred	Least Preferred

1.3.3 R405 Ballygoran Overbridge

Option 1 – New Overbridge parallel to existing on western side

There would be an impact on roadside planting but no other notable impacts on landscape fabric. Given that the proposed bridge would be adjacent to an existing road overbridge and in the context of the M4 motorway corridor, there would be no perceivable impact on landscape character. Although roadside planting would be removed from the western embankment of the R405 there are no nearby sensitive visual receptors to the west of the road and no significant visual effects are expected. Replacement planting to the proposed embankments would restore the screening effect and neutralise any negative effects over the short to medium-term.

Option 2 – New Overbridge parallel to existing on the eastern side

Impacts would be similar to Option 1 with no perceivable impact on landscape character. The proposals on the north of the M4 would be visible from a single residential property to the northeast, and the construction works are likely to result in significant visual effects on receptors at the property. Given the removal of roadside planting to the east side of the R405 there is likely to also be a significant impact in the operational phase due to the increased visibility of traffic on the road. Less significant effects are also possible for other residential receptors to the northeast which are more distant (c.200m) and have some screening vegetation to their boundaries. Replacement planting to the proposed embankments would restore the screening effect and neutralise any negative effects over the short to medium-term.

Assessment Matrix of R405 Ballygoran Overbridge Options

Table 1.5: R405 Ballygoran Overbridge Active Travel Options Assessment Matrix

Assessment Criteria (Sensitivity Weighting in brackets)	Option 1 (West)	Option 2 (East)
Landscape Assessment		
Local Amenity Landscapes (2)	0	0
Archaeological Features (3)	0	0
Architectural Heritage Features (2)	0	0
Natural / Semi-Natural Landscape Features (2) – roadside planting.	2 (4)	2 (4)
Demesne Features (3)	0	0
Landscape Scoring	4	4
Landscape Assessment		
Residential Properties/ Receptors – Significant Effects (3)	0	1 (3)
Designated views/scenic routes/areas (3)	0	0
Visual Scoring	0	3
Qualitative Assessment	<p>Minor Negative</p> <p>There would be an impact on roadside planting to the west of the R405 but no other notable impacts on landscape fabric and there would be no impact on character. There are no nearby sensitive visual receptors to the west of the road and no significant visual effects are expected</p>	<p>Moderately Negative</p> <p>There would be an impact on roadside planting to the east of the R405 but no other notable impacts on landscape fabric and there would be no impact on character. There is likely to be an indirect impact on a single nearby residential property to the northeast and the effect could be significant particularly during construction. Replacement planting to the proposed embankments is likely to reduce or neutralise the effects over time.</p>
Score/ Impact Level	3	2
Preference	Preferred	Least Preferred

1.3.4 Junction 6 Celbridge

Option 1 – New Overbridge parallel to existing on western side

There would be an impact on roadside planting and a section of hedgerows but no other notable impacts on landscape fabric. Given that the proposed bridge would be nearby to a substantial motorway junction including overbridges and other major road infrastructure and in the context of the M4 motorway corridor, there would be no perceivable impact on landscape character. There would be some loss of roadside planting but there are no sensitive visual receptors in the vicinity. No significant landscape or visual effects are expected and replacement planting to the proposed embankments would neutralise negative effects on trees and vegetation in the medium-term.

Option 2 – New Overbridge parallel to existing on the eastern side

The landscape impacts of this option would be similar to Option 1. The main variation of impacts for Option 2 is the proximity to newly constructed residential properties to the north at Harpur Lane which has potential to significantly effect some residential receptors in the closest properties particularly during construction. Replacement planting to the proposed embankments would restore the screening effect and neutralise any negative effects over the short to medium-term.

Assessment Matrix of Junction 6 Celbridge Options

Table 1.6: Junction 6 Celbridge Active Travel Options Assessment Matrix

Assessment Criteria (Sensitivity – Weighting in brackets)	Option 1 (West)	Option 2 (East)
Landscape Assessment		
Local Amenity Landscapes (2)	0	0
Archaeological Features (3)	0	0
Architectural Heritage Features (2)	0	0
Natural / Semi-Natural Landscape Features (2) – roadside planting.	3 (6)	4 (8)
Demesne Features (3)	0	0
Landscape Scoring	6	8
Landscape Assessment		
Residential Properties/ Receptors – Significant Effects (3)	0	10 [estimation] (30)
Designated views/scenic routes/areas (3)	0	0
Visual Scoring	0	30
Qualitative Assessment	<p>Minor Negative</p> <p>There would be an impact on roadside planting to the west of the junction but no other notable impacts on landscape fabric and there would be no impact on character. There are no nearby sensitive visual receptors to the west of the junction and no significant visual effects are expected</p>	<p>Moderately Negative</p> <p>There would be an impact on roadside planting to the east of the junction but no other notable impacts on landscape fabric and there would be no impact on character. Indirect impacts expected on nearby sensitive visual receptors at Harpur Lane with potential significant visual effects particularly during construction. Replacement planting to the proposed embankments is likely to reduce or neutralise the effects over time.</p>
Score/ Impact Level	3	2
Preference	Preferred	Least Preferred

1.3.5 R404 Celbridge Road Overbridge

Option 1 – New Overbridge parallel to existing on western side

There would be an impact on roadside planting but no other notable impacts on landscape fabric. Given that the proposed bridge would be adjacent to an existing road overbridge and in the context of the M4 motorway corridor, there would be no perceivable impact on landscape character. There would be likely impacts on nearby residential properties to the north at Barnhall Meadows due to construction activity and loss of embankment planting to the west side of the R404 which would increase visibility of traffic on the road. The effect on these has potential to be significant during construction. There is also potential for visual impacts on the Wonderful Barn and its context, although this is not expected to be significant due to distance and the presence of some screening trees in the intervening area. The works may also be visible from the eastern edge of the Wonderful Barn Allotments but effects are not expected to be significant.

Replacement planting to the proposed embankments would restore the screening effect and neutralise any negative effects over the short to medium-term.

Option 2 – New Overbridge parallel to existing on the eastern side

Landscape impacts would be similar to Option 1 with no perceivable effect due to proximity to existing overbridge and the motorway context. The area to the east of the existing R404 is rural with no sensitive visual receptors and therefore there would be no notable visual effects. Replacement planting to the proposed embankments would aid in neutralising effects on trees and vegetation over the short to medium-term.

Assessment Matrix of R404 Celbridge Road Overbridge

Table 1.7: R404 Celbridge Road Overbridge Active Travel Options Assessment Matrix

Assessment Criteria (Sensitivity Weighting in brackets)	Option 1 (West)	Option 2 (East)
Landscape Assessment		
Local Amenity Landscapes (2)	0	0
Archaeological Features (3)	0	0
Architectural Heritage Features (2)	0	0
Natural / Semi-Natural Landscape Features (2) – roadside planting.	2 (4)	2 (4)
Demesne Features (3)	0	0
Landscape Scoring	4	4
Landscape Assessment		
Residential Properties/ Receptors – Significant Effects (3)	10 (30)	0
Designated views/scenic routes/areas (3)	0	0
Visual Scoring	30	0
Qualitative Assessment	<p>Moderately Negative</p> <p>There would be an impact on roadside planting to the west of the junction but no other notable impacts on landscape fabric and there would be no impact on character. There would be likely impacts on nearby residential properties to the north at Barnhall Meadows which have potential to be significant during construction. No significant effects are expected for the Wonderful Barn or allotments. Replacement planting to the proposed embankments is likely to reduce or neutralise the effects over time.</p>	<p>Minor Negative</p> <p>There would be an impact on roadside planting to the east of the junction but no other notable impacts on landscape fabric and there would be no impact on character. No significant visual effects expected due to lack of receptors to the east of the junction.</p>
Score/ Impact Level	2	3

Assessment Criteria (Sensitivity Weighting in brackets)	Option 1 (West)	Option 2 (East)
Landscape Assessment		
Preference	Least Preferred	Preferred

1.3.6 Junction 5 Leixlip

Option 1 – New Overbridge parallel to existing on western side

There would be an impact on roadside planting but no other notable impacts on landscape fabric. Given that the proposed bridge would be adjacent to an existing road overbridge and in the context of the M4 motorway corridor, there would be no perceivable impact on landscape character. There may be some visibility of the works from relatively distant residential properties to the west at Cooldrinagh Lane and there may be a slight increase in visibility of traffic on the R403. These effects are expected to be slight or less due to minor extents of the visible proposals, distance and the presence of some screening trees in the intervening area. Replacement planting to the proposed embankments would restore the screening effect and neutralise any negative effects over the short to medium-term.

Option 2 – New Overbridge parallel to existing on the eastern side

The landscape impacts of this option would be similar to Option 1. The main variation of impacts for Option 2 is the proximity to residential properties at Leixlip Road which has potential to effect residential receptors in these properties particularly during construction. Given the presence of dense screening vegetation at these property boundaries the visual effects are not expected to be significant but may be moderate during construction. If replacement planting could be provided (given the limited space available) this would restore any lost screening effect and neutralise any negative effects over the short to medium-term.

Assessment Matrix of Junction 5 Leixlip Options

Table 1.8: Junction 5 Leixlip Active Travel Options Assessment Matrix

Assessment Criteria (Sensitivity Weighting in brackets)	Option 1 (West)	Option 2 (East)
Landscape Assessment		
Local Amenity Landscapes (2)	0	0
Archaeological Features (3)	0	0
Architectural Heritage Features (2)	0	0
Natural / Semi-Natural Landscape Features (2) – roadside planting.	4 (8)	2 (4)
Demesne Features (3)	0	0
Landscape Scoring	8	4
Landscape Assessment		
Residential Properties/ Receptors – Significant Effects (3)	0	0
Designated views/scenic routes/areas (3)	0	0
Visual Scoring	0	0
Qualitative Assessment	<p>Minor Negative</p> <p>There would be an impact on roadside planting to the west of the junction but no other notable impacts on landscape fabric and there would be no impact on character. No significant visual effects expected due to lack of nearby receptors to the west of the junction.</p>	<p>Minor Negative</p> <p>There would be an impact on roadside planting to the east of the junction but no other notable impacts on landscape fabric and there would be no impact on character. Effects on nearby residential receptors expected to be moderate at most due to screening.</p> <p>Preferred option due to slightly less impact on vegetation.</p>
Score/ Impact Level	3	3
Preference	Least Preferred	Preferred

1.4 Summary

The options would range from minor to moderately negative with none of the options being considered major or highly negative. There are no anticipated significant impacts on built heritage features, or archaeology for any of the options. There may be a significant construction effect on Maynooth Town Football club but significant operational effects are not considered likely. Where other significant effects are expected these are on nearby residential receptors and are most likely to occur during construction. Generally, the provision of replacement woodland/tree planting to the proposed embankments would restore the screening effect and neutralise any negative effects over the short to medium term, depending on the maturity of removed vegetation that requires replacement. A summary of the active travel option assessments is shown in Table 1.9.

Table 1.9: Summary of Active Travel Options Assessment

Assessment Criteria	Option 1 (West)	Option 2 (East)
R408 Newtown Road		
Qualitative Assessment	Moderately Negative	Moderately Negative
Score/ Impact Level	2	2
Preference	Preferred	Least Preferred
Junction 7 Maynooth		
Qualitative Assessment	Moderately Negative	Moderately Negative
Score/ Impact Level	2	2
Preference	Preferred	Least Preferred
R405 Ballygoran Overbridge		
Qualitative Assessment	Minor Negative	Moderate Negative
Score/ Impact Level	3	2
Preference	Preferred	Least Preferred
Junction 6 Celbridge		
Qualitative Assessment	Minor Negative	Moderately Negative
Score/ Impact Level	3	2
Preference	Preferred	Least Preferred
R404 Celbridge Road		
Qualitative Assessment	Moderately Negative	Minor Negative
Score/ Impact Level	2	2
Preference	Least Preferred	Preferred
Junction 5 Leixlip		
Qualitative Assessment	Minor Negative	Minor Negative
Score/ Impact Level	3	3
Preference	Least Preferred	Preferred

1.5 References

Kildare County Council (2023) Kildare County Development Plan 2023 -2029

EPA (2022). Guidelines on the Information to be contained in Environmental Impact Assessment Reports.

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TII (2020). Landscape Character Assessment (LCA) and Landscape and Visual Impact Assessment (LVIA) of Proposed National Roads - Standard (PE-ENV-01102).

EPA (2022). Guidelines on the information to be contained in Environmental Impact Assessment Reports.

Landscape Institute & Institute of Environmental Management and Assessment (2013). Guidelines for Landscape and Visual Impact Assessment, 3rd edition.

TII (2016). Project Appraisal Guidelines for National Roads Unit 7.0 – Multi Criteria Analysis (PE-PAG-02031).

Kildare County Council (2022) Kildare County Development Plan 2023-2029.

Kildare County Council

Maynooth to Leixlip Project

Options Report - Stage 2 Material
Assets – Non-Agriculture Active
Travel Options Assessment

Draft 1 | 31 August 2023

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

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

Job number 272691-00

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Contents

	Page
Contents	1
1 Stage 2 Material Assets – Non-Agriculture – Active Travel Options Assessment	1
1.1 Introduction	1
1.2 Methodology	1
1.2.1 Scoring Procedure	1
1.2.2 Assessment Criteria Overview	2
1.2.3 Assessment Criteria for Properties and Land Use	2
1.2.4 Assessment Criteria for Utilities and Services	3
1.3 Active Travel Options Assessment	5
1.3.1 R408 Newtown Road Overbridge	5
1.3.2 Junction 7 Maynooth	8
1.3.3 R405 Ballygoran Overbridge	11
1.3.4 Junction 6 Celbridge	14
1.3.5 R404 Celbridge Road Overbridge	17
1.3.6 Junction 5 Leixlip	20
1.4 Summary	23
1.5 References	23

Tables

Table 1.1: TII Project Appraisal Guidelines Scoring Criteria

Table 1.2: Criteria for Assessing the Significance of Impact on Properties and Land Use

Table 1.3: Criteria for Assessing the Significance of Impact on Utilities and Services

Table 1.4: Properties and Land Use Assessment

Table 1.5: Utilities and Services Assessment

Table 1.6: Material Assets Summary Assessment Matrix

Table 1.7: Properties and Land Use Assessment

Table 1.8: Utilities and Services Assessment

Table 1.9: Material Assets Summary Assessment Matrix

Table 1.10: Properties and Land Use Assessment

Table 1.11: Utilities and Services Assessment

Table 1.12: Material Assets Summary Assessment Matrix

Table 1.13: Properties and Land Use Assessment

Table 1.14: Utilities and Services Assessment

Table 1.15: Material Assets Summary Assessment Matrix

Table 1.16: Properties and Land Use Assessment

Table 1.17: Utilities and Services Assessment

Table 1.18: Material Assets Summary Assessment Matrix

Table 1.19: Properties and Land Use Assessment

Table 1.20: Utilities and Services Assessment

Table 1.21: Material Assets Summary Assessment Matrix

Table 1.22: Material Assets Overall Summary

1 Stage 2 Material Assets – Non-Agriculture – Active Travel Options Assessment

1.1 Introduction

This section details the environmental assessment of the Stage 2 Active Travel Options for the Maynooth to Leixlip Project with respect to the Material Assets Non-Agricultural constraints identified in the Constraints Report.

The methodology used in this assessment is outlined in Section 1.2. Section 1.3 contains the options assessment. A summary is provided in Section 1.4.

1.2 Methodology

The following guidelines and legislation were referred to when undertaking this assessment:

- European Union (2018) (Planning and Development) (Environmental Impact Assessment) Regulations. (SI 296 of 2018);
- Environmental Protection Agency (EPA) (May 2022) Guidelines on the Information to be contained in Environmental Impact Assessment Reports¹; and
- Transport Infrastructure Ireland (TII) (2016) Project Appraisal Guidelines Unit 7.0 - Multi Criteria Analysis, PE-PAG-02031².

This assessment is a desktop assessment of available data sources. The desktop study considered the following sources of information i.e., aerial mapping / photography³, Property Registration Authority of Ireland (PRAI)⁴ database.

1.2.1 Scoring Procedure

Quantitative and qualitative assessments of impacts were undertaken for this assessment using the PAG scoring procedure. The PAG seven-point scale scoring procedure is shown in Table 1.1.

¹ Environmental Protection Agency (EPA) (May 2022) Guidelines on the Information to be contained in Environmental Impact Assessment Report. Available from: https://www.epa.ie/publications/monitoring--assessment/assessment/EIAR_Guidelines_2022_Web.pdf [Accessed 4th September 2023]

² Transport Infrastructure Ireland (2016) Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria Analysis Available from: <https://www.tiipublications.ie/library/PE-PAG-02031-01.pdf> [Accessed: 4th September 2023]

³ Google Aerial Mapping (2023). Available from: <https://www.google.com/maps> [Accessed: September 2023]

⁴ Property Registration Authority (2023). Available from <https://www.landdirect.ie/index> [Accessed in 2023]

Table 1.1: TII Project Appraisal Guidelines Scoring Criteria

Assessment Score	Description
7	Major or highly positive
6	Moderately positive
5	Minor or slightly Positive
4	Not significant or neutral
3	Minor or slightly negative
2	Moderately negative
1	Major or highly negative

In the first instance, individual assessments were carried out on each criterion followed by an overall assessment. A score was assigned to each Active Travel Option based on the TII PAG seven-point scale, and the overall preference for each Active Travel Option of Preferred or Least Preferred was assigned using a combination of the assessment criteria results and professional judgement.

1.2.2 Assessment Criteria Overview

Active Travel facilities are proposed at six different locations, with two options at each of the six locations. The location of the Active Travel facilities is the primary differentiator between the options.

1.2.3 Assessment Criteria for Properties and Land Use

For the purposes of assessing direct impacts on properties, the extent of both Active Travel Options is considered to include all lands required for the construction and operation of new infrastructure.

There is minimal impact on the properties as the proposed locations are adjacent to existing road infrastructure. The R408 Newtown Road Overbridge Active Travel Option 2 site includes land from Maynooth Town Football Club while Junction 7 Maynooth Active Travel Option 2 extends into the Maynooth Business Campus.

The potential impact of the Active Travel Options on properties is assessed according to the significance criteria detailed in Table 1.2.

Table 1.2: Criteria for Assessing the Significance of Impact on Properties and Land Use

Significance Level/ Degree of Impact	Definition
Major or Highly Negative Profound	A non-agricultural property of national or regional importance is fully within the option extent and will be removed by the proposed option
Moderately Negative	A non-agricultural property or other material asset is fully within the option extent and may result in the demolition or acquisition of a dwelling or, or where acquisition of a property results in loss of employment and total or partial loss of the business
Minor or Slightly Negative	Part of a non-agricultural property or other material asset is within the option extent
Not Significant or Neutral	An impact on a property which is currently occupied by a public right-of-way, e.g., a road or the non-agricultural property or other material asset is in the vicinity of the option but outside the option extent

1.2.4 Assessment Criteria for Utilities and Services

The locations of existing utilities were requested from relevant utility service providers. Key utilities and services have been identified and used to inform this assessment.

Various utility services are located with the extents of the options. While the services would not be greatly impacted, care must be taken not to damage underground services during the construction of the Active Travel facilities.

In summary, at Stage 2 in the assessment and comparison of the Active Travel Options, impacts on larger utilities and services were considered as high impact and differentiating factors. The following utilities and services were considered:

- ESB High Voltage (i.e., 38kV, 110kV and 220kV) Overhead Lines;
- ESB High Voltage Underground Lines;
- ESB Medium Voltage (i.e., 10kV, 20kV) Overhead Lines;
- ESB Substations;
- Gas Networks Ireland Infrastructure;
- Irish Water watermains;
- Irish Water foul and combined sewers;
- Water/wastewater treatment plants;
- Telecoms Antennas;
- Eir underground services; and
- E-Net services.

The potential impact of both Active Travel Options on services and utilities is assessed according to the significance criteria detailed in Table 1.3.

Table 1.3: Criteria for Assessing the Significance of Impact on Utilities and Services

Significance Level/ Degree of Impact	Definition
Major or Highly Negative Profound	Removal of a service or utility that is of national or regional importance
Moderately Negative	Major diversion of High Voltage ESB lines (38kV, 110kV or 220kV) or fibre optic telecoms
Minor or Slightly Negative	Minor diversion of High Voltage ESB lines (38kV, 110kV or 220kV) or fibre optic telecoms
Not Significant or Neutral	The diversion of low and medium voltage ESB network, telecommunications or water supply or foul sewer services

1.3 Active Travel Options Assessment

1.3.1 R408 Newtown Road Overbridge

1.3.1.1 Properties and Land Use

Maynooth University Town F.C is the key amenity located within the extent of the R408 Active Travel Options. There are no residential or commercial properties located within the extent of the options. The Properties and Land Use assessment is summarised in Table 1.4.

Table 1.4: Properties and Land Use Assessment

Assessment Criteria	Option 1 (West)	Option 2 (East)
Residential	No residential properties would be impacted	
Commercial/Industrial	No commercial properties would be impacted	
Amenity	No impact on amenities	Impact on Town F.C. lands
Other	N/A	
Qualitative Assessment	Not Significant or Neutral	Minor or Slightly Negative
Score/Impact Level	4	3
Preference	Preferred	Least Preferred

1.3.1.2 Utilities and Services

ESB HV overhead lines are located to the south of the M4 within the extents of both options. MV/LV ESB overhead lines are located to the west of Option 1 and also parallel to the M4, therefore interacting with both Option 1 and Option 2. There are no ESB underground services or ESB sub-stations in the vicinity of the options. There is no gas infrastructure in the vicinity of the options.

A stormwater drain is located in the vicinity of communications mast within the extents Option 1. A watermain is located to the west of the R408 within the extents of Option 1. There are no Irish Water foul and sewers services or wastewater treatment plants in the vicinity of the options.

A telecoms antenna is located to the west of the R408 in the vicinity of Option 1. Eir services are located to the east of the R408 in the vicinity of Option 2. There is no UPC Virgin media infrastructure or BT infrastructure in the vicinity of the options.

The Utilities and Services assessment is summarised in Table 1.5.

Table 1.5: Utilities and Services Assessment

Assessment Criteria	Option 1 (West)	Option 2 (East)
ESB High Voltage (i.e., 38kV, 110kV and 220kV) Overhead Lines (HV OH)	ESB lines located to the south	
ESB High Voltage Underground Lines (HV UG)	N/A	
ESB Medium Voltage (i.e., 10kV, 20kV) Overhead Lines (MV OH)	ESB lines located to the west of Option 1 and parallel to the M4. Communications tower located to the west of the R408	ESB lines located parallel to the M4
ESB Substations	N/A	
Gas Networks Ireland MP gas mains	N/A	
Gas Networks Ireland LP gas mains	N/A	
Irish Water watermains	Underground watermain located to the west of the R408	N/A
Irish Water foul or combined sewers	N/A	
Water/wastewater treatment plants	N/A	
Eir underground services	N/A	Eir underground services located to the east of the R408
Other	N/A	
Qualitative Assessment	Moderately Negative	Not Significant or Neutral
Score/Impact Level	2	4
Preference	Least Preferred	Preferred

The overall ranking preferences for the Active Travel Options in terms of material assets are shown in Table 1.6.

Table 1.6: Material Assets Summary Assessment Matrix

Assessment Criteria	Option 1 (West)	Option 2 (East)
Properties	No impact on properties	The sports amenity may be negatively impacted
Utilities	A communications tower would be negatively impacted	No significant impact on utilities
Qualitative Assessment	Moderately negative	Minor or slightly negative
Score/Impact Level	2	3
Preference	Least Preferred	Preferred

1.3.2 Junction 7 Maynooth

1.3.2.1 Properties and Land Use

There are no amenities located within the extents of the options. There are no residential or commercial properties located within the extents of Option 1 while Option 2 would extend on to the boundary of Maynooth Business Campus. The Properties and Land Use assessment is summarised in Table 1.7.

Table 1.7: Properties and Land Use Assessment

Assessment Criteria	Option 1 (West)	Option 2 (East)
Residential	No residential properties would be impacted	
Commercial/Industrial	No commercial properties would be impacted	There would minimal impact with Option 2 extending on to the Maynooth Business Campus site. However, it would have improve access to the campus.
Amenity	No amenities would be impacted	
Other	N/A	
Qualitative Assessment	Not Significant or Neutral	Not Significant or Neutral
Score/Impact Level	4	4
Preference	Least Preferred	Preferred

1.3.2.2 Utilities and Services

ESB HV overhead lines are located at the northern extent of Option 2. However, there would only be a minimal impact on these overhead lines. ESB MV/LV overhead lines are located within the general extents of Option 2, however, there would only be a minimal impact on these overhead lines. There are ESB MV/LV underground services located on the southern extents of both Option 1 and Option 2. There would be minimal impact on these services. There are no ESB sub-stations or gas infrastructure in the vicinity of the options.

Two watermains are located to the west of the R406 within the extents of Option 1. One of the watermains has been abandoned while the other watermain is still in use. A gravity sewer is located along the R406 within the extents of Option 2. There are no wastewater treatment plants in the vicinity of the options.

Eir services are located on the western side of the R406 within the extents of Option 1. UPC Virgin media services are located in the Maynooth Business Campus, that would be within the extents of Option 2. There would be minimal impact on the UPC services. There is no BT infrastructure or telecoms antennas in the vicinity of the options.

The Utilities and Services assessment is summarised in Table 1.8.

Table 1.8: Utilities and Services Assessment

Assessment Criteria	Option 1 (West)	Option 2 (East)
ESB High Voltage (i.e., 38kV, 110kV and 220kV) Overhead Lines (HV OH)	N/A	HV infrastructure within the option extents – however, minimal impact
ESB Underground Lines (MV/LV UG)	MV/LV infrastructure within the option extents – however, minimal impact	
ESB Medium Voltage (i.e., 10kV, 20kV) Overhead Lines (MV OH)	N/A	MV/LV infrastructure within the option extents – however, minimal impact
ESB Substations	N/A	
Gas Networks Ireland MP gas mains	N/A	
Gas Networks Ireland LP gas mains	N/A	
Irish Water watermains	Watermains located to the west of the R406 – minimal impact	N/A
Irish Water foul or combined sewers	N/A	Sewer located to the east of the R406 – minimal impact
Water/wastewater treatment plants	N/A	
Eir underground services	Eir services located to the west of the R406 – minimal impact	N/A
UPC underground services	UPC services located to the west of the R406 – minimal impact	N/A
Other	N/A	N/A
Qualitative Assessment	Minor or slightly negative	Minor or slightly negative
Score/Impact Level	3	3
Preference	Preferred	Least Preferred

The overall ranking preferences for the Active Travel Options in terms of material assets are shown in Table 1.9.

Table 1.9: Material Assets Summary Assessment Matrix

Assessment Criteria	Option 1 (West)	Option 2 (East)
Properties	No impact on properties	Option 2 may impact on Maynooth Business Campus lands
Utilities	Minimal impact on utilities	Minimal impact on utilities
Qualitative Assessment	Minor or Slightly Negative	Minor or Slightly Negative
Score/Impact Level	3	3
Preference	Preferred	Least Preferred

1.3.3 R405 Ballygoran Overbridge

1.3.3.1 Properties and Land Use

There are no amenities, or residential or commercial properties located within the extent of the options. The Properties and Land Use assessment is summarised in Table 1.10.

Table 1.10: Properties and Land Use Assessment

Assessment Criteria	Option 1 (West)	Option 2 (East)
Residential	No residential properties would be impacted	
Commercial/Industrial	No commercial properties would be impacted	
Amenity	No amenities would be impacted	
Other	N/A	
Qualitative Assessment	Not Significant or Neutral	Not Significant or Neutral
Score/Impact Level	4	4
Preference	Preferred	Preferred

1.3.3.2 Utilities and Services

There are no ESB HV, MV/LV overhead lines, underground services or substations in the vicinity of the options.

A medium pressure gas pipeline is located on the R405 within the extents of Option 2. This gas pipeline extends onto Ballygoran View. There are no watermains, Irish Water foul and sewers services or Water/wastewater treatment plants in the vicinity of the options.

UPC Virgin media services are located on the western side of the R405 Overbridge within the extents of Option 1. There are no telecoms antennas, Eir services or BT infrastructure in the vicinity of the options.

The Utilities and Services assessment is summarised in Table 1.11.

Table 1.11: Utilities and Services Assessment

Assessment Criteria	Option 1 (West)	Option 2 (East)
ESB High Voltage (i.e., 38kV, 110kV and 220kV) Overhead Lines (HV OH)	N/A	
ESB High Voltage Underground Lines (HV UG)	N/A	
ESB Medium Voltage (i.e., 10kV, 20kV) Overhead Lines (MV OH)	N/A	
ESB Substations	N/A	
Gas Networks Ireland MP gas mains	N/A	Gas pipeline located at the R405/Ballygoran View junction
Gas Networks Ireland LP gas mains	N/A	
Irish Water watermains	N/A	
Irish Water foul or combined sewers	N/A	
Water/wastewater treatment plants	N/A	
Eir underground services	N/A	
UPC underground services	UPC services located parallel to the R405	N/A
Other	N/A	
Qualitative Assessment	Minor or slightly negative	Minor or slightly negative
Score/Impact Level	3	3
Preference	Preferred	Least Preferred

The overall ranking preferences for the Active Travel Options in terms of material assets are shown in Table 1.12.

Table 1.12: Material Assets Summary Assessment Matrix

Assessment Criteria	Option 1 (West)	Option 2 (East)
Properties	No impact on properties	
Utilities	UPC services located within extents	Gas pipeline located within extents
Qualitative Assessment	Minor or Slightly Negative	Minor or Slightly Negative
Score/Impact Level	3	3
Preference	Preferred	Least Preferred

1.3.4 Junction 6 Celbridge

1.3.4.1 Properties and Land Use

There are no amenities or residential commercial properties located within the extent of the options. The Properties and Land Use assessment is summarised in Table 1.13.

Table 1.13: Properties and Land Use Assessment

Assessment Criteria	Option 1 (West)	Option 2 (East)
Residential	No residential properties would be impacted	
Commercial/Industrial	No commercial properties would be impacted	No commercial properties would be impacted
Amenity	No amenities would be impacted	
Other	N/A	
Qualitative Assessment	Not Significant or Neutral	Not Significant or Neutral
Score/Impact Level	4	4
Preference	Preferred	Preferred

1.3.4.2 Utilities and Services

There are no ESB HV, MV/LV overhead lines, underground services or ESB substations in the vicinity of the options.

A medium pressure gas pipeline and a watermain are both located adjacent to the R449, which would be impacted by Option 2. There are no Irish Water foul and sewers services or water/wastewater treatment plants in the vicinity of the options.

BT infrastructure is located to the northwest of the site located adjacent to the R449, which may be impacted by Option 1. UPC- Virgin media services are located adjacent to the R449, which would be impacted by Option 2. There are no telecoms antennas or Eir services in the vicinity of the options.

The Utilities and Services assessment is summarised in Table 1.14.

Table 1.14: Utilities and Services Assessment

Assessment Criteria	Option 1 (West)	Option 2 (East)
ESB High Voltage (i.e., 38kV, 110kV and 220kV) Overhead Lines (HV OH)	N/A	
ESB Underground Lines (MV/LV UG)	N/A	
ESB Medium Voltage (i.e., 10kV, 20kV) Overhead Lines (MV OH)	N/A	
ESB Substations	N/A	
Gas Networks Ireland MP gas mains	N/A	Medium pressure gas pipeline located at the tie-in of Option 2 and the R449
Gas Networks Ireland LP gas mains	N/A	
Irish Water watermains	N/A	Watermains located at the tie-in of Option 2 and the R449
Irish Water foul or combined sewers	N/A	
Water/wastewater treatment plants	N/A	
Eir underground services	N/A	
UPC underground services	N/A	UPC services located at the tie-in of Option 2 and the R449
Other	BT services adjacent to the R449 to the north of the site - may be impacted	N/A
Qualitative Assessment	Minor or slightly negative	Minor or slightly negative
Score/Impact Level	3	3
Preference	Preferred	Least Preferred

The overall ranking preferences for the Active Travel Options in terms of material assets are shown in Table 1.15.

Table 1.15: Material Assets Summary Assessment Matrix

Assessment Criteria	Option 1 (West)	Option 2 (East)
Properties	No impact on properties	No impact on properties
Utilities	Minimal impact	Minimal impact
Qualitative Assessment	Minor or slightly Negative	Minor or Slightly Negative
Score/Impact Level	3	3
Preference	Preferred	Least Preferred

1.3.5 R404 Celbridge Road Overbridge

1.3.5.1 Properties and Land Use

There are no residential or commercial properties or amenities located within the extents of the options. The Properties and Land Use assessment is summarised in Table 1.16.

Table 1.16: Properties and Land Use Assessment

Assessment Criteria	Option 1 (West)	Option 2 (East)
Residential	No residential properties would be impacted	
Commercial/Industrial	No commercial properties would be impacted	
Amenity	No amenities would be impacted	
Other	N/A	
Qualitative Assessment	Not Significant or Neutral	Not Significant or Neutral
Score/Impact Level	4	4
Preference	Preferred	Preferred

1.3.5.2 Utilities and Services

MV/LV ESB underground services are located on the western side of the R404 but outside the extents of Option 1. There are no ESB HV, MV/LV overhead lines or substations in the vicinity of the options. Lighting columns are located to the west of the R404 within the extents of Option 1. These would be required to be relocated.

A watermain is located to the west of the R404 within the extents of Option 1. A medium pressure gas pipeline and gravity sewers services are located to the east of the R404 within the extents of Option 2. There are no water/wastewater treatment plants in the vicinity of the options.

Eir and UPC - Virgin media services are located to the west of the R404 within the extents of the Option 1. BT infrastructure is located to the east of the R404 within the extents of Option 2. There are no telecoms antennas in the vicinity of the options.

The Utilities and Services assessment is summarised in Table 1.17.

Table 1.17: Utilities and Services Assessment

Assessment Criteria	Option 1 (West)	Option 2 (East)
ESB High Voltage (i.e., 38kV, 110kV and 220kV) Overhead Lines (HV OH)	N/A	
ESB Underground Lines (MV/LV UG)	MV/LV lines located in the southwest corner Option 1	N/A
ESB Medium Voltage (i.e., 10kV, 20kV) Overhead Lines (MV OH)	N/A	
ESB Substations	N/A	
Gas Networks Ireland MP gas mains	N/A	Gas pipeline adjacent to the R404
Gas Networks Ireland LP gas mains	N/A	
Irish Water watermains	Watermains adjacent to the R404 crossing the M4	N/A
Irish Water foul or combined sewers	N/A	Gravity sewer adjacent to the R404
Water/wastewater treatment plants	N/A	
Eir underground services	Eir services adjacent to the R404 crossing the M4	N/A
UPC underground services	UPC services parallel to the R405	N/A
Other	N/A	BT infrastructure adjacent to the R404
Qualitative Assessment	Minor or slightly negative	Minor or slightly negative
Score/Impact Level	3	3
Preference	Least Preferred	Preferred

The overall ranking preferences for the Active Travel Options in terms of material assets are shown in Table 1.18.

Table 1.18: Material Assets Summary Assessment Matrix

Assessment Criteria	Option 1 (West)	Option 2 (East)
Properties	No impact on properties	
Utilities	Minimal impact	Minimal impact
Qualitative Assessment	Minor or Slightly Negative	Minor or Slightly Negative
Score/Impact Level	3	3
Preference	Least Preferred	Preferred

1.3.6 Junction 5 Leixlip

1.3.6.1 Properties and Land Use

There are no residential or commercial properties or amenities located within the extents of the options. The Properties and Land Use assessment is summarised in Table 1.19.

Table 1.19: Properties and Land Use Assessment

Assessment Criteria	Option 1 (West)	Option 2 (East)
Residential	No residential properties would be impacted	
Commercial/Industrial	No commercial properties would be impacted	
Amenity	No amenities would be impacted	
Other	N/A	
Qualitative Assessment	Not Significant or Neutral	Not Significant or Neutral
Score/Impact Level	4	4
Preference	Preferred	Preferred

1.3.6.2 Utilities and Services

There are no ESB HV, MV/LV overhead lines, ESB underground services or ESB substation in the vicinity of the options. Lighting columns are located within the extents of Option 1. These may be impacted by the options.

A foul sewer is located at the southern side of the junction. There would be minimal impact on the foul sewer from the options. There is no gas infrastructure, watermains or water/wastewater treatment plants in the vicinity of the options.

Eir and UPC- Virgin media services are located to the east of the R403 within the extents of Option 2. These may be impacted by Option 2. There are no telecoms antennas or BT infrastructure in the vicinity of the options.

The Utilities and Services assessment is summarised in Table 1.20.

Table 1.20: Utilities and Services Assessment

Assessment Criteria	Option 1 (West)	Option 2 (East)
ESB High Voltage (i.e., 38kV, 110kV and 220kV) Overhead Lines (HV OH)	N/A	
ESB Underground Lines (MV/LV UG)	N/A	
ESB Medium Voltage (i.e., 10kV, 20kV) Overhead Lines (MV OH)	N/A	
ESB Substations	N/A	
Gas Networks Ireland MP gas mains	N/A	
Gas Networks Ireland LP gas mains	N/A	
Irish Water watermains	N/A	
Irish Water foul or combined sewers	A foul sewer crosses both options – options would have a minimal impact	
Water/wastewater treatment plants	N/A	
Eir underground services	N/A	Eir services adjacent to the R403
UPC underground services	N/A	UPC services adjacent to the R403
Other	N/A	
Qualitative Assessment	Minor or slightly negative	Minor or slightly negative
Score/Impact Level	3	3
Preference	Preferred	Least Preferred

The overall ranking preferences for the Active Travel Options in terms of material assets are shown in Table 1.21.

Table 1.21: Material Assets Summary Assessment Matrix

Assessment Criteria	Option 1 (West)	Option 2 (East)
Properties	No impact on amenities, residential or commercial properties	
Utilities	Minimal impact	Minimal impact
Qualitative Assessment	Minor or Slightly Negative	Minor or Slightly Negative
Score/Impact Level	3	3
Preference	Preferred	Least Preferred

1.4 Summary

The overall ranking preferences for the Active Travel Options at the six different locations in terms of material assets – non agriculture are shown in Table 1.22.

Table 1.22: Material Assets Overall Summary

Location	Option 1 (West)	Option 2 (East)
R408 Newtown Road Overbridge	Least Preferred	Preferred
Junction 7 Maynooth	Preferred	Least Preferred
R405 Ballygoran Overbridge	Preferred	Least Preferred
Junction 6 Celbridge	Preferred	Least Preferred
R404 Celbridge Road Overbridge	Least Preferred	Preferred
Junction 5 Leixlip	Preferred	Preferred

1.5 References

Environmental Protection Agency (EPA) (September 2023) Guidelines on the Information to be contained in Environmental Impact Assessment Report. Available from: https://www.epa.ie/publications/monitoring--assessment/assessment/EIAR_Guidelines_2022_Web.pdf [Accessed 4th September 2023]

Transport Infrastructure Ireland (2016) Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria Analysis Available from: <https://www.tiipublications.ie/library/PE-PAG-02031-01.pdf> [Accessed: 4th September 2023]

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Kildare County Council

Maynooth to Leixlip Project

Options Report – Stage 2 Noise and
Vibration Active Travel Options
Assessment

Draft 1 | 31 August 2023

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

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

Job number 272691-00

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Contents

	Page
Contents	1
1 Stage 2 Noise and Vibration – Active Travel Options Assessment	1
1.1 Introduction	1
1.2 Methodology	1
1.2.1 Scoring Procedure	2
1.3 Active Travel Options Assessment	3
1.3.1 R408 Newtown Road Overbridge	3
1.3.2 Junction 7 Maynooth	4
1.3.3 R405 Ballygoran Overbridge	5
1.3.4 Junction 6 Celbridge	6
1.3.5 R404 Celbridge Road Overbridge	7
1.3.6 Junction 5 Leixlip	8
1.4 Summary	9
1.5 References	9

Tables

Table 1.1: TII PAG Impact Scoring Criteria

Table 1.2: Assessment Matrix of R408 Newtown Road Overbridge Active Travel Options

Table 1.3: Assessment Matrix of Junction 7 Maynooth Active Travel Options

Table 1.4: Assessment Matrix of R405 Ballygoran Overbridge Active Travel Options

Table 1.5: Assessment Matrix of Junction 6 Celbridge Active Travel Options

Table 1.6: Assessment Matrix of R404 Celbridge Road Overbridge Active Travel Options

Table 1.7: Assessment Matrix of Junction 5 Leixlip Active Travel Options

1 Stage 2 Noise and Vibration – Active Travel Options Assessment

1.1 Introduction

This section details the environmental assessment of the Stage 2 Active Travel Options for the Maynooth to Leixlip Project with respect to the Noise and Vibration constraints identified in the Constraints Report.

The methodology used in this assessment is outlined in Section 1.2. Section 1.3 contains the active travel options assessment. A summary is provided in Section 1.4 and references are provided in Section 1.5.

1.2 Methodology

The noise environment in the vicinity of all active travel options is dominated by road traffic along the M4/N4 mainline and junction slip roads. All active travel options would have a negligible noise or vibration impact on the surrounding environment once operational and the noise environment would continue to be dominated by road traffic. Whilst there is potential for a marginal reduction in traffic flow in the study area as a result of a portion of modal shift towards active travel, this will be significantly less than a reduction of 25% in traffic flows. A reduction in traffic flows of less than 25% would not result in any perceptible change in the prevailing traffic noise environment. The long-term noise and vibration effects of all options is therefore neutral and not significant.

The main differencing factor between the active travel options would therefore relate to the potential temporary to short-term effects associated with the construction of new overbridges and associated tie in works. This would typically involve site clearance which would include removal of existing obstacles. Drainage and limited earthworks would then be carried out, followed by the main bridge sub-structure and superstructure works and any utility works required. The active travel pavement works would then take place including and any minor pavement works to the traffic lanes may also be required at the tie-in locations.

Form a noise point of view, all phases of the construction works would have potential to result in elevated noise levels at Noise Sensitive Receptors (NSRs) in proximity to the works. For site plant and machinery associated with the active travel construction works listed above, noise levels beyond 50m will typically be within the TII construction noise thresholds of 70 dB L_{Aeq1hr} . Potential vibration impacts are limited to sub-structure works for bridge works where excavation into hard ground and/or piling is required in addition to potential minor excavation works for utility diversions, where required. Vibration levels would, however, be orders of magnitudes below the thresholds for construction works set out in the TII guidelines at buildings and structures in the vicinity of the construction activities due to the nature of works involved.

1.2.1 Scoring Procedure

The comparative evaluation of the active travel options has been assisted by scoring of impacts for each active travel option using a summary assessment matrix broadly based on Table 7.1.2 of the Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria Analysis (TII PAG).

Each impact is scored based on the PAG seven-point Likert scale (listed below) and a number assigned according to the level of significance of the impacts.

Table 1.1: TII PAG Impact Scoring Criteria

Assessment Score	Description
7	Major or highly positive
6	Moderately positive
5	Minor or slightly Positive
4	Not significant or neutral
3	Minor or slightly negative
2	Moderately negative
1	Major or highly negative

Following the assessment methodology process outlined in this section, a determination is made as to whether each active travel option is either Preferred or Least Preferred based on the potential impacts associated with each.

1.3 Active Travel Options Assessment

1.3.1 R408 Newtown Road Overbridge

Option 1 – New bridge parallel to existing on the western side

This option would include a new parallel active travel overbridge on the western side of the existing overbridge. This proposed overbridge would be 4m. This option is assessed by the number of Noise Sensitive Receptors (NSRs) within 50m of the new overbridges and footpaths. There is the potential for temporary to short-term noise and vibration impacts at these receptors due to construction works.

There are 6 NSRs within 50m proximity of Option 1 which may be impacted by the construction phase works.

Option 2 – New bridge parallel to existing on the eastern side

This option would include a new parallel active travel overbridge on the eastern side of the existing overbridge. This proposed overbridge would be 4m. This option is assessed by the number of Noise Sensitive Receptors (NSRs) within 50m of the new overbridge and footpaths. There is the potential for temporary to short-term noise and vibration impacts at these receptors due to construction works.

There is one sensitive receptor within 50m proximity of Option 2 which may be impacted by the construction phase works.

Assessment Matrix of R408 Newtown Road Overbridge Options

Table 1.2: Assessment Matrix of R408 Newtown Road Overbridge Active Travel Options

Assessment Criteria	Option 1 (West)	Option 2 (East)
Sensitive Receptors within 50m	6 sensitive receptors	1 sensitive receptor
Construction impacts	Temporary to short-term negative, moderate noise impacts at higher number of NSRs compared to Option 2	Temporary to short-term negative, moderate noise impacts at low number of NSRs
Operational Impacts	Long-term neutral impacts	Long-term neutral impacts
Scoring		
Construction Phase - Qualitative Assessment	Minor or slightly negative	Not significant or neutral
Construction Phase - Score/ Impact Level	3	4
Construction Phase - Preference	Least Preferred	Preferred
Operational Phase - Qualitative Assessment	Not significant or neutral	Not significant or neutral
Operational Phase - Score/ Impact Level	4	4
Operational Phase - Preference	Preferred	Preferred
Overall Preference	Least Preferred	Preferred

1.3.2 Junction 7 Maynooth

Option 1 - New bridge parallel to the existing on the western side

This option would include a new parallel active travel overbridge on the western side of the existing overbridge. This proposed facility would be 4m wide. This option is assessed by the number of Noise Sensitive Receptors (NSRs) within 50m of the new overbridges and footpaths. There is the potential for temporary to short-term noise and vibration impacts at these receptors due to construction works.

There are 0 sensitive receptors in a 50m proximity of Option 1 which may be impacted by the construction phase works.

Option 2 – New bridge parallel to the existing on the eastern side

This option would include a new parallel active travel overbridge on the eastern side of the existing overbridge. This proposed facility would be 4m wide. This option is assessed by the number of Noise Sensitive Receptors (NSRs) within 50m of the new overbridges and footpaths. There is the potential for temporary to short-term noise and vibration impacts at these receptors due to construction works.

There are 0 sensitive receptors in a 50m proximity of Option 2 which may be impacted by the construction phase works.

Assessment Matrix of Junction 7 Maynooth Options

Table 1.3: Assessment Matrix of Junction 7 Maynooth Active Travel Options

Assessment Criteria	Option 1 (West)	Option 2 (East)
Sensitive Receptors within 50m	0 sensitive receptors	0 sensitive receptors
Construction impacts	Comparable impacts compared to Option 2 within 50m	Comparable impacts compared to Option 1 within 50m
Operational Impacts	Long-term neutral impacts	Long-term neutral impacts
Scoring		
Construction Phase - Qualitative Assessment	Not significant or neutral	Not significant or neutral
Construction Phase - Score/ Impact Level	4	4
Construction Phase - Preference	Preferred	Preferred
Operational Phase - Qualitative Assessment	Not significant or neutral	Not significant or neutral
Operational Phase - Score/ Impact Level	4	4
Operational Phase - Preference	Preferred	Preferred
Overall Preference	Preferred	Preferred

1.3.3 R405 Ballygoran Overbridge

Option 1 – New bridge parallel to the existing on the western side

This option would include a new parallel active travel overbridge on the western side of the existing overbridge. This proposed facility would be 4m wide. This option is assessed by the number of Noise Sensitive Receptors (NSRs) within 50m of the new overbridges and footpaths. There is the potential for temporary to short-term noise and vibration impacts at these receptors due to construction works.

There are 0 sensitive receptors in a 50m proximity of Option 1 which may be impacted by the construction phase works.

Option 2 – New bridge parallel to the existing on the eastern side

This option would include a new parallel active travel overbridge on the eastern side of the existing overbridge. This proposed facility would be 4m wide. This option is assessed by the number of Noise Sensitive Receptors (NSRs) within 50m of the new overbridges and footpaths. There is the potential for temporary to short-term noise and vibration impacts at these receptors due to construction works.

There are 0 sensitive receptors in a 50m proximity of Option 2 which may be impacted by the construction phase works.

Assessment Matrix of R405 Ballygoran Overbridge Options

Table 1.4: Assessment Matrix of R405 Ballygoran Overbridge Active Travel Options

Assessment Criteria	Option 1 (West)	Option 2 (East)
Sensitive Receptors within 50m	0 sensitive receptors	0 sensitive receptors
Construction impacts	Comparable impacts compared to Option 2 within 50m	Comparable impacts compared to Option 1 within 50m
Operational Impacts	Long-term neutral impacts	Long-term neutral impacts
Scoring		
Construction Phase - Qualitative Assessment	Not significant or neutral	Not significant or neutral
Construction Phase - Score/ Impact Level	4	4
Construction Phase - Preference	Preferred	Preferred
Operational Phase - Qualitative Assessment	Not significant or neutral	Not significant or neutral
Operational Phase - Score/ Impact Level	4	4
Operational Phase - Preference	Preferred	Preferred
Overall Preference	Preferred	Preferred

1.3.4 Junction 6 Celbridge

Option 1 – New bridge on the western side

This option would include a new parallel active travel overbridge on the western side of the existing overbridge. This proposed facility would be 4m wide. This option is assessed by the number of Noise Sensitive Receptors (NSRs) within 50m of the new overbridges and footpaths. There is the potential for temporary to short-term noise and vibration impacts at these receptors due to construction works.

There are 0 sensitive receptors in a 50m proximity of Option 1 which may be impacted by the construction phase works.

Option 2 – New bridge on the eastern side

This option would include a new parallel active travel overbridge on the eastern side of the existing overbridge. This proposed facility would be 4m wide. This option is assessed by the number of Noise Sensitive Receptors (NSRs) within 50m of the new overbridges and footpaths. There is the potential for temporary to short-term noise and vibration impacts at these receptors due to construction works.

There are 0 sensitive receptors in a 50m proximity of Option 2 which may be impacted by the construction phase works.

Assessment Matrix of Junction 6 Celbridge Options

Table 1.5: Assessment Matrix of Junction 6 Celbridge Active Travel Options

Assessment Criteria	Option 1 (West)	Option 2 (East)
Sensitive Receptors within 50m	0 sensitive receptors	0 sensitive receptors
Construction impacts	Comparable impacts compared to Option 2 within 50m	Comparable impacts compared to Option 1 within 50m
Operational Impacts	Long-term neutral impacts	Long-term neutral impacts
Scoring		
Construction Phase - Qualitative Assessment	Not significant or neutral	Not significant or neutral
Construction Phase - Score/ Impact Level	4	4
Construction Phase - Preference	Preferred	Preferred
Operational Phase - Qualitative Assessment	Not significant or neutral	Not significant or neutral
Operational Phase - Score/ Impact Level	4	4
Operational Phase - Preference	Preferred	Preferred
Overall Preference	Preferred	Preferred

1.3.5 R404 Celbridge Road Overbridge

Option 1 – New bridge on the western side

This option would include a new parallel active travel overbridge on the western side of the existing overbridge. This proposed facility would be 4m. This option is assessed by the number of Noise Sensitive Receptors (NSRs) within 50m of the new overbridges and footpaths. There is the potential for temporary to short-term noise and vibration impacts at these receptors due to construction works.

There are 0 sensitive receptors in a 50m proximity of Option 1 which may be impacted by the construction phase works.

Option 2 – New bridge on the eastern side

This option would include a new parallel active travel overbridge on the eastern side of the existing overbridge. This proposed facility will be 4m wide. This option is assessed by the number of Noise Sensitive Receptors (NSRs) within 50m of the new overbridges and footpaths. There is the potential for temporary to short-term noise and vibration impacts at these receptors due to construction works.

There are 0 sensitive receptors in a 50m proximity of Option 2 which may be impacted by the construction phase works.

Assessment Matrix of R404 Celbridge Road Overbridge

Table 1.6: Assessment Matrix of R404 Celbridge Road Overbridge Active Travel Options

Assessment Criteria	Option 1 (West)	Option 2 (East)
Sensitive Receptors within 50m	0 sensitive receptors	0 sensitive receptors
Construction impacts	Comparable impacts compared to Option 2 within 50m	Comparable impacts compared to Option 1 within 50m
Operational Impacts	Long-term neutral impacts	Long-term neutral impacts
Scoring		
Construction Phase - Qualitative Assessment	Not significant or neutral	Not significant or neutral
Construction Phase - Score/ Impact Level	4	4
Construction Phase - Preference	Preferred	Preferred
Operational Phase - Qualitative Assessment	Not significant or neutral	Not significant or neutral
Operational Phase - Score/ Impact Level	4	4
Operational Phase - Preference	Preferred	Preferred
Overall Preference	Preferred	Preferred

1.3.6 Junction 5 Leixlip

Option 1 - New bridge on the western side

This option would include a new parallel active travel overbridge on the western side of the existing overbridge. This proposed facility would be 4m. This option is assessed by the number of Noise Sensitive Receptors (NSRs) within 50m of the new overbridges and footpaths. There is the potential for temporary to short-term noise and vibration impacts at these receptors due to construction works.

There are 2 sensitive receptors in a 50m proximity of Option 1 which may be impacted by the construction phase works. All NSRs are to the east of the existing R403 Overbridge and hence the existing overbridge may provide an element of screening of construction activities to properties to the north and south east.

Option 2 – New bridge on the eastern side

This option would include a new parallel active travel overbridge on the eastern side of the existing overbridge. This proposed facility would be 4m. This option is assessed by the number of Noise Sensitive Receptors (NSRs) within 50m of the new overbridges and footpaths. There is the potential for temporary to short-term noise and vibration impacts at these receptors due to construction works.

There are 3 sensitive receptors in a 50m proximity of Option 2 which may be impacted by the construction phase works. There are also a number of NSLs within 100m of Option 2 which have a direct line of site to the new overbridge which will experience elevated noise due to the construction phase, albeit at lower noise levels.

Assessment Matrix of Junction 5 Leixlip Options

Table 1.7: Assessment Matrix of Junction 5 Leixlip Active Travel Options

Assessment Criteria	Option 1 (West)	Option 2 (East)
Sensitive Receptors within 50m	2 sensitive receptors	3 sensitive receptors
Construction impacts	Marginally lower construction noise impacts compared to Option 1 within 50 to 100m	Marginally higher construction noise impacts compared to Option 1 within 50 to 100m
Operational Impacts	Long-term neutral impacts	Long-term neutral impacts
Scoring		
Construction Phase - Qualitative Assessment	Not significant or neutral	Minor or slightly negative
Construction Phase - Score/ Impact Level	4	3
Construction Phase - Preference	Preferred	Least Preferred
Operational Phase - Qualitative Assessment	Not significant or neutral	Not significant or neutral
Operational Phase - Score/ Impact Level	4	4
Operational Phase - Preference	Preferred	Preferred
Overall Preference	Preferred	Least Preferred

1.4 Summary

All active travel options have been assessed in terms of the number of NSRs within 50m of each to determine the potential highest construction impacts.

With the exception of the R408 Newtown Road Overbridge and Junction 5 Leixlip, all options are Preferred due to the absence of NSRs within 50m and the negligible change in traffic noise levels during their operational phase.

At the R408 Newtown Road, Option 1 has the highest number of NRSs within 50m of the overbridge and hence is least preferred during the temporary to short-term construction phase. Both active travel options have a neutral to not significant impact during the operational phase. Option 1 is ranked overall as Least Preferred and Option 2 as Preferred.

At Junction 5 Leixlip, Option 2 has the highest number of NRSs within 50m of the overbridge and hence is Least Preferred during the temporary to short-term construction phase. Both active travel options have a neutral to not significant impact during the operational phase. Option 2 is ranked overall as Least Preferred and Option 1 as Preferred.

1.5 References

- Transport Infrastructure Ireland, Guidelines for the Treatment of Noise and Vibration in National Road Schemes, 2004.
- Transport Infrastructure Ireland, Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes, 2014.
- UK Highways Agency (UKHA) Design Manual for Roads and Bridges (DMRB) LA 111 Sustainability and Environmental Appraisal LA 111 Noise and Vibration Revision 2 (UKHA 2020);
- Transport Infrastructure Ireland, Project Management Guidelines PE-PMG-02041, 2020.
- Transport Infrastructure Ireland, Project Appraisal Guidelines for National Road Schemes Unit 7.0 – Multi Criteria Analysis, October 2016.

Kildare County Council

Maynooth to Leixlip Project

Options Report - Stage 2 Population
Active Travel Options Assessment

Draft | 31 August 2023

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

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Contents

	Page
Contents	1
1 Stage 2 Population Active Travel Options Assessment	1
1.1 Introduction	1
1.2 Methodology	1
1.2.1 Scoring Procedure	1
1.3 Active Travel Options Assessment	2
1.3.1 R408 Newtown Overbridge	2
1.3.2 Junction 7 Maynooth	3
1.3.3 R405 Ballygoran Overbridge	4
1.3.4 Junction 6 Celbridge	6
1.3.5 R404 Celbridge Road Overbridge	7
1.3.6 Junction 5 Leixlip	8
1.4 Summary	10
1.5 References	10

Tables

Table 1.1: Active Travel Options Population Assessment Matrix

Table 1.2: Active Travel Options Population Assessment Matrix

Table 1.3: Active Travel Options Population Assessment Matrix

Table 1.4: Active Travel Options Population Assessment Matrix

Table 1.5: Active Travel Options Population Assessment Matrix

Table 1.6: Active Travel Options Population Assessment Matrix

Table 1.7: Population Overall Summary

1 Stage 2 Population Active Travel Options Assessment

1.1 Introduction

This section details the environmental assessment of the Stage 2 Active Travel Options for the Maynooth to Leixlip Project with respect to the Population constraints identified in the Constraints Report.

The methodology used in this assessment is outlined in Section 1.2. Section 1.3 contains the options assessment. A summary is provided in Section 1.4 and references are provided in Section 1.5.

1.2 Methodology

1.2.1 Scoring Procedure

Scores have been applied to the Active Travel Options Assessment in accordance with the Project Appraisal Guidelines for National Roads Unit 7.0 – Multi-Criteria Analysis (PAG, 2016). Five principal assessment criteria are being used for the assessment of the Maynooth to Leixlip Project, namely Journey Characteristics, Journey Amenity, General Amenity, Community Severance and Economic. Each of these criteria is weighted equally for the purposes of the MCA scoring.

However, for the assessment of the active travel options in this particular project, only two of the criteria are relevant to the comparison of active travel options. The introduction of active travel facilities can provide for relief from existing severance, but in this instance this effect is captured within the assessment of journey amenity to avoid double counting.

Journey Characteristics and Connectivity

This criterion takes account of journey patterns based on the nature of the transport network and observed or projected journeys to key destinations, workplaces and community facilities. Sub-criteria may include journey time, journey time reliability, accessibility, and journey connectivity (the availability of connections between desired origins and destinations).

Journey Amenity

Relevant effects arise from the proximity to vehicle traffic and to the volume, speed or movement of traffic as it affects the ambience of journeys, and the actual or perceived safety of pedestrians and cyclists. Journey amenity will also be affected by the nature of the active travel facilities proposed, physical separation of vehicular traffic from pedestrians, the proportion of HGVs, and the nature of any junctions or crossings that still need to be made by pedestrians or cyclists. Particular consideration is given to road users who may be vulnerable due to age (children, young people or older adults) or disability of any kind.

1.3 Active Travel Options Assessment

1.3.1 R408 Newtown Overbridge

Option 1 – New bridge parallel to existing on the western side

Journey Characteristics

The proposed facility would provide for a dedicated active travel crossing of the M4 parallel to the R408. It would include improved connectivity to Maynooth Town Football Club.

Journey Amenity

The new bridge would provide for improved journey amenity, including for young people as a vulnerable population subset who may not have access to private transport. This would follow from the greater separation from vehicular traffic given that only a narrow footpath is available on the west side of the road, north and south of the existing overbridge. A new zebra crossing facility would be provided from the active travel facility on the west of Newtown Road to the football club.

Option 2 – New bridge parallel to existing on the eastern side

Journey Characteristics

The proposed facility would provide for a dedicated active travel crossing of the M4 parallel to the R408. It would include improved connectivity to Maynooth Town Football Club.

Journey Amenity

The new bridge would provide for improved journey amenity, including for young people as a vulnerable population subset who may not have access to private transport. This would follow from the greater separation from vehicular traffic given that only a narrow footpath is available on the road and the (far) west side of the bridge. A new zebra crossing facility would be provided to the active travel facility from the east of Newtown Road to the football club. It is more likely that this crossing to Option 2 would be used by cyclists if they are commencing their journey from Maynooth Town Football Club.

Assessment Matrix of R408 Newtown Road Overbridge Options

Table 1.1: Active Travel Options Population Assessment Matrix

Assessment Sub-Criteria	Option 1 (West)	Option 2 (East)
Journey Characteristics	Provides for active travel, including for more vulnerable population subsets.	Provides for active travel, including for more vulnerable population subsets.
Journey Amenity	Provides for improved journey amenity due to separation from traffic, especially on bridge. Use is less likely for people cycling to football club.	Provides for improved journey amenity due to separation from traffic, especially on bridge. Use is more given absence of footpath on the east side of the existing bridge and for people cycling to football club.
Scoring		
Qualitative Assessment	Not Significant or Neutral	Minor or Slightly Positive
Score/ Impact Level	4	5
Preference	Least Preferred	Preferred

1.3.2 Junction 7 Maynooth

Option 1 – New bridge parallel to existing on the western side

Journey Characteristics

The proposed facility would provide for a dedicated active travel crossing of the M4, including a connection to the Maynooth Business Campus and other businesses to the south of the M4.

Journey Amenity

The new bridge would provide for improved journey amenity for pedestrians and cyclists. This would be because of the greater separation from vehicular traffic. However, as it would be necessary to cross the busy Straffan Road to access the facility, it is less likely that Option 1 would be used by cyclists in the morning for journeys to Maynooth Business Campus.

Option 2 – New bridge parallel to existing on the eastern side

Journey Characteristics

The proposed facility would provide for a dedicated active travel crossing of the M4, including a connection to the Maynooth Business Campus and other businesses to the south of the M4.

Journey Amenity

The new bridge would provide for improved journey amenity for pedestrians and cyclists. This would be because of the greater separation from vehicular traffic. It is more likely that Option 2 would be used by cyclists in the morning for journeys to Maynooth Business Campus, especially given that a crossing is provided of the eastbound merge to the M4. Use of the facility is correspondingly less likely for people accessing Barretts or Earthridge businesses, but these destinations account for fewer journeys than to the Maynooth Business Campus.

Assessment Matrix of Junction 7 Maynooth

Table 1.2: Active Travel Options Population Assessment Matrix

Assessment Sub-Criteria	Option 1 (West)	Option 2 (East)
Journey Characteristics	Provides an active travel alternative to a busy road.	Provides an active travel alternative to a busy road.
Journey Amenity	Provides for improved journey amenity due to separation from traffic. Use is less likely for people cycling to the business campus in the morning.	Provides for improved journey amenity due to separation from traffic. Use is more likely for people travelling to the business campus in the morning.
Scoring		
Qualitative Assessment	Moderately Positive	Major or Highly Positive
Score/ Impact Level	6	7
Preference	Least Preferred	Preferred

1.3.3 R405 Ballygoran Overbridge

Option 1 – New bridge parallel to existing on the western side

Journey Characteristics

The proposed facility would provide for a dedicated active travel crossing of the M4, including for journeys to Maynooth Business Campus from the east and other businesses and a school and colleges to the south side of the M4 via the R405.

Journey Amenity

The new bridge would provide for improved journey amenity for pedestrians and cyclists. The improved journey amenity would follow from the greater separation from vehicular traffic, although traffic volumes on this bridge are lower than for some of the other crossings which are the subject of this assessment.

Option 2 – New bridge parallel to existing on the eastern side

Journey Characteristics

The proposed facility would provide for a dedicated active travel crossing of the M4, including for journeys to Maynooth Business Campus from the east and other businesses and a school and colleges on the south side of the M4 via the R405.

Journey Amenity

The new bridge would provide for improved journey amenity for pedestrians and cyclists. The improved journey amenity would follow from the greater separation from vehicular traffic, although traffic volumes on this bridge are lower than for other crossings. It is more likely that Option 2 would be used by people accessing businesses and the education facilities during the morning, but it provides no facility for onward journeys west to the Maynooth Business Campus.

Assessment Matrix of R405 Ballygoran Overbridge Options

Table 1.3: Active Travel Options Population Assessment Matrix

Assessment Sub-Criteria	Option 1 (West)	Option 2 (East)
Journey Characteristics	Provides an active travel alternative to a busy road.	Provides an active travel alternative to a busy road.
Journey Amenity	Provides for improved journey amenity due to separation from traffic. Use is less likely for people cycling to businesses and education facilities in the morning.	Provides for improved journey amenity due to separation from traffic. Use is more likely for people travelling to businesses and education facilities in the morning, but the Option provides for no connection for journeys west.
Scoring		
Qualitative Assessment	Not Significant or Neutral	Not Significant or Neutral
Score/ Impact Level	4	4
Preference	Preferred	Preferred

1.3.4 Junction 6 Celbridge

Option 1 – New bridge parallel to existing on the western side

Journey Characteristics

There are existing pedestrian and cycle facilities at Junction 6 with uncontrolled crossing facilities. The proposed facility would provide for a dedicated active travel crossing of the M4, including a connection into Celbridge from the east and to a school and colleges on the south side of the M4, and indirectly to the Liffey Business Campus. The use of the active travel facility for journeys to this destination would be discouraged by the relative extension of journey time, albeit short, and/or the need to cross the R449 to connect with the existing pedestrian and cycle paths to the campus.

Journey Amenity

The new dedicated bridge would provide for improved journey amenity for pedestrians and cyclists. The improved journey amenity would follow from the greater separation from vehicular traffic. However, it would be necessary that crossing facilities are provided of the R449 north of the M4. Similarly, a signalised crossing of the R449 south of the M4 would be needed to encourage use by employees of the Liffey Business Campus, and for amenity journeys onto of Castletown Demesne.

Option 2 – New bridge parallel to existing on the eastern side

Journey Characteristics

The proposed facility would provide for a dedicated active travel crossing of the M4, including a connection into Celbridge from the east and to a school and colleges on the south side of the M4, and directly to the Liffey Business Campus. There may be an increase in journey time to Celbridge.

Journey Amenity

The new dedicated bridge would provide for improved journey amenity for pedestrians and cyclists. The improved journey amenity would follow from the greater separation from vehicular traffic. However, it would be necessary that crossing facilities are provided of the Liffey Business Campus access road and on the R449 south of the M4.

Assessment Matrix of Junction 6 Celbridge Options

Table 1.4: Active Travel Options Population Assessment Matrix

Assessment Sub-Criteria	Option 1 (West)	Option 1 (East)
Journey Characteristics	Provides for active travel alternative avoiding a busy junction	Provides for active travel alternative avoiding a busy junction
Journey Amenity	Provides for improved journey amenity due to separation from traffic.	Provides for improved journey amenity due to separation from traffic. The journey amenity gain is greater for people employed at the Liffey Business Campus.
Scoring		
Qualitative Assessment	Moderately Positive	Major or Highly Positive
Score/ Impact Level	6	7
Preference	Least Preferred	Preferred

1.3.5 R404 Celbridge Road Overbridge

Option 1 – New bridge parallel to existing on the western side

Journey Characteristics

The proposed facility would provide for a dedicated active travel crossing of the M4, including to the Hewlett Package campus and MU Barnhall Rugby Club and other community facilities near to Dublin Road between Celbridge and Lucan.

Journey Amenity

The new bridge would provide for only a minor improvement in journey amenity for pedestrians and cyclists as the existing road is bordered by pavements that could potentially be used by cyclist too. The incentive to use the new facility may not be sufficient to encourage pedestrians and cyclists to cross the road.

Option 2 – New bridge parallel to existing on the eastern side

Journey Characteristics

Impacts are as for Option 1.

Journey Amenity

Impacts are as for Option 1.

Assessment Matrix of R404 Celbridge Road Overbridge

Table 1.5: Active Travel Options Population Assessment Matrix

Assessment Sub-Criteria	Option 1 (West)	Option 1 (East)
Journey characteristics	Provides for active travel alternative	Provides for active travel alternative
Journey Amenity	Does not provide for a significant journey amenity benefit	Does not provide for a significant journey amenity benefit
Scoring		
Qualitative Assessment	Not Significant or Neutral	Not Significant or Neutral
Score/ Impact Level	4	4
Preference	Preferred	Preferred

1.3.6 Junction 5 Leixlip

Option 1 – New bridge parallel to existing on the western side

Journey Characteristics

The proposed facility would provide for a dedicated active travel crossing of the M4 to the west of the existing overbridge, including to the Weston area of Lucan.

Journey Amenity

The new overbridge would provide for an improvement in journey amenity for pedestrians and cyclists as the road bridge and junctions are used by high volumes of traffic, particularly at peak times. The westbound diverges to the R403 and the exit to M4 are already signalised which provides for improved journey amenity, but the eastbound diverge is not. The greater hazard for cyclists is presented by the roundabout junction with the R148 to the north for journeys into Lucan or the city for which there is no cycle provision beside the N4. The alternative of the less trafficked R835 south of the N4 is already used by cyclists.

Option 2 – New bridge parallel to existing on the eastern side

Journey Characteristics

The proposed facility would provide for a dedicated active travel crossing of the M4 to the east of the existing overbridge, including to the Weston area of Lucan.

Journey Amenity

The new overbridge would provide for an improvement in journey amenity for pedestrians and cyclists as the road bridge and junctions are used by high volumes of traffic, particularly at peak times. The signalisation of the westbound diverge to the R403 means that the existing situation provides for reasonable journey amenity to Weston which is in line with the proposed active travel facility on the east side of Dublin Road. Only a slight hazard would be avoided from vehicles joining the southbound lane of the R403 from the eastbound motorway diverge. The greater hazard for cyclists is presented by the roundabout junction with the eastbound exit to the N4 to the north and the absence of pedestrian crossing facility at this location.

Assessment Matrix of Junction 5 Leixlip Options

Table 1.6: Active Travel Options Population Assessment Matrix

Assessment Sub-Criteria	Option 1 (West)	Option 1 (East)
Journey Characteristics	Provides an active travel alternative.	Provides an active travel alternative.
Journey Amenity	Provides for crossing of the eastbound diverge from the M50, although this could be facilitated by just the alternative of a signalised crossing. Journey amenity would be improved by active travel facilities to the north.	Provide only for a slight journey amenity benefit due to separation from road traffic, noting that the existing junction is already signalised. Journey amenity would be improved by active travel facilities to the north.
Scoring		
Qualitative Assessment	Moderate positive	Slight positive
Score/ Impact Level	6	5
Preference	Preferred	Least Preferred

1.4 Summary

The overall ranking preferences for the Active Travel Options at the six different locations in terms of Population are shown in Table 1.7.

Table 1.7: Population Overall Summary

Location	Option 1 (West)	Option 2 (East)
R408 Newtown Road Overbridge	Least Preferred	Preferred
Junction 7 Maynooth	Least Preferred	Preferred
R405 Ballygoran Overbridge	Preferred	Preferred
Junction 6 Celbridge	Least Preferred	Preferred
R404 Celbridge Road Overbridge	Preferred	Preferred
Junction 5 Leixlip	Preferred	Least Preferred

1.5 References

Transport Infrastructure Ireland (TII, 2016) Project Appraisal Guidelines for National Roads Unit 13.0 Pedestrian and Cyclist Facilities PE-PAG-02036.

Kildare County Council

Maynooth to Leixlip Project

Options Report - Stage 2 Soils and
Geology Active Travel Options
Assessment

Draft 1 | 31 August 2023

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

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

Job number 272691-00

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Contents

	Page
Contents	1
1 Stage 2 Soils and Geology Active Travel Options Assessment	1
1.1 Introduction	1
1.2 Methodology	1
1.2.1 Scoring Procedure	1
1.2.2 Assessment Criteria	4
1.3 Active Travel Options Assessment	5
1.3.1 R408 Newtown Overbridge	5
1.3.2 Junction 7 Maynooth	8
1.3.3 R405 Ballygoran Overbridge	11
1.3.4 Junction 6 Celbridge	14
1.3.5 R404 Celbridge Road Overbridge	17
1.3.6 Junction 5 Leixlip	20
1.4 Summary	23
1.5 References	23

Tables

Table 1.1: Rating of Significant Environmental Impacts

Table 1.2: PAG Scoring System used in Ranking

Table 1.3: PAG Scoring System used in Ranking Correlation of TII Guidelines impact level to an Equivalent TII PAG Score

Table 1.4: Soils and Geology Assessment for the R408 Newtown Road Overbridge - Option 1

Table 1.5: Soils and Geology Assessment for the R408 Newtown Road Overbridge - Option 2

Table 1.6: Soils and Geology Assessment Matrix of Active Travel Options for the R408 Newtown Road Overbridge

Table 1.7: Assessment of the Soils and Geology criteria for the Active Travel Enhancement at Junction 7 Maynooth Option 1 (West)

Table 1.8: Assessment of the Soils and Geology criteria for the Active Travel Enhancement at Junction 7 Maynooth Option 2 (East)

Table 1.9: Soils and Geology Assessment Matrix of Active Travel Options for Junction 7 Maynooth

Table 1.10: Assessment of the Soils and Geology criteria for the Active Travel Enhancement at R405 Ballygoran Overbridge Option 1 (West)

Table 1.11: Assessment of the Soils and Geology criteria for the Active Travel Enhancement at R405 Ballygoran Overbridge - Option 2 (East)

Table 1.12: Soils and Geology Assessment Matrix of Active Travel Options for the R405 Ballygoran Overbridge

- Table 1.13:** Assessment of the Soils and Geology criteria for the Active Travel Enhancement at Junction 6 Celbridge - Option 1 (West)
- Table 1.14:** Assessment of the Soils and Geology criteria for the Active Travel Enhancement at Junction 6 Celbridge - Option 2 (East)
- Table 1.15:** Soils and Geology Assessment Matrix of Active Travel Options for Junction 6 Celbridge
- Table 1.16:** Assessment of the Soils and Geology criteria for the Active Travel Enhancement at R404 Celbridge Road Overbridge - Option 1 (West)
- Table 1.17:** Assessment of the Soils and Geology criteria for the Active Travel Enhancement at R404 Celbridge Road Overbridge - Option 2 (East)
- Table 1.18:** Soils and Geology Assessment Matrix of Active Travel Options for the R404 Celbridge Road Overbridge
- Table 1.19:** Assessment of the Soils and Geology criteria for the Active Travel Enhancement at Junction 5 Leixlip - Option 1 (West)
- Table 1.20:** Assessment of the Soils and Geology criteria for the Active Travel Enhancement at Junction 5 Leixlip - Option 2 (East)
- Table 1.21:** Soils and Geology Assessment Matrix of Active Travel Options at Junction 5 Leixlip
- Table 1.22:** Summary of Preferred Active Travel Enhancement Options

1 Stage 2 Soils and Geology Active Travel Options Assessment

1.1 Introduction

This section details the environmental assessment of the Stage 2 Active Travel Options for the Maynooth to Leixlip Project with respect to the Soils and Geology constraints identified in the Constraints Report.

The methodology used in this assessment is outlined in Section 1.2. The assessment criteria are outlined in Section 1.3. The options assessment is contained in Section 1.3. A summary is provided in Section 1.4.

1.2 Methodology

1.2.1 Scoring Procedure

This assessment has been prepared taking cognisance of the requirements of the following guidance:

- Transport Infrastructure Ireland (TII) guidance, formally National Roads Authority (NRA) guidance, Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology, and Hydrogeology on National Road Schemes¹ (herein referred to as TII Guidelines).

With additional reference made to:

- The Environmental Protection Agency (EPA) Guidelines on the information to be contained in Environmental Impact Assessment Reports²; and
- Transport Infrastructure Ireland (TII) guidance, formally National Roads Authority (NRA). Environmental Impact Assessment of National Road Schemes – a Practical Guide³.

¹ National Roads Authority Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology, and Hydrogeology for National Road Schemes, NRA, 2009. Available from: <https://www.tii.ie/technical-services/environment/planning/Guidelines-on-Procedures-for-Assessment-and-Treatment-of-Geology-Hydrology-and-Hydrogeology-for-National-Road-Schemes.pdf>

² Environmental Protection Agency (EPA), Guidelines on the information to be contained in Environmental Impact Assessment Reports, EPA 2022. Available from: <https://www.epa.ie/publications/monitoring--assessment/assessment/guidelines-on-the-information-to-be-contained-in-environmental-impact-assessment.php> [Accessed 09 August 2023]

³ National Roads Authority Environmental Impact Assessment of National Road Schemes – a Practical Guide, NRA 2008. Available from: <https://www.tii.ie/technical-services/environment/planning/Environmental-Impact-Assessment-of-National-Road-Schemes-Practical-Guide.pdf>

The first step in the assessment procedure is to define the assessment study area for each Active Travel Option. The TII Guidelines set this at 250 m from the centre line of the corridor, i.e., 500 m wide in total. For the purposes of this soils and geology assessment, the footprint of the proposed Active Travel Options design is being considered as the proposed area of works, including ancillaries and drainage, etc. A 250m wide buffer is applied around each area of works in all directions.

The second step in the assessment procedure is to identify the soils and geology attributes. The attributes consist of geological features identified in the soils and geology constraints study and the Preliminary Sources Study Report (PSSR) that lie within the assessment study area. The soils and geology attributes considered as part of this assessment are presented in Section 1.3.

Box 4.1 of the TII Guidelines¹ provides criteria for estimating the importance of the identified soils and geological attributes. Each attribute is assigned an ‘Attribute Importance’ based on the TII Guidance criteria. The importance rating is presented in Table 1.1.

Table 1.1: Rating of Significant Environmental Impacts

Importance of Attribute	Magnitude of Impact			
	Negligible	Small Adverse	Moderate Adverse	Large Adverse
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant / Moderate	Profound / Significant	Profound
High	Imperceptible	Moderate / Slight	Significant / Moderate	Severe / Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight / Moderate

The impact level or significance is rated based on criteria presented in Box 4.4 of the TII Guidance¹. This rating is a function of (a) the attribute importance, and (b) the nature and timeframe of the project.

A ‘Rating of Significant Impacts’ has been determined from Table 1.2 based on the importance of an attribute and the potential impacts. The description of the significance of an impact is based on Box 5.4 from the TII Guidance. The attribute importance is defined within the Constraints Report. However, following on from the Constraints Report, the importance of the attributes has been re-assessed for any updates or alterations in Active Travel Options.

These criteria only consider negative potential impacts, however, the potential for positive impacts will also be considered. The language used in the summary tables in Section 1.4 to Section 1.9 to describe the significance of an impact is that used in Box 5.1, not Box 4.4, of the TII Guidance as it is more succinct and easier to present in tabular format.

Once an impact level has been determined for each attribute, the overall impact rating was assigned to that feature type. For the assessment to meet the requirements of the TII Project Appraisal Guidelines for National Roads Unit 7.0 – Multi-Criteria Analysis (MCA)⁴, the two scoring systems needed to be correlated.

The TII MCA scoring criteria from Section 2.4 of the Project Appraisal Guidelines⁴ is summarised in Table 1.2.

Table 1.2: PAG Scoring System used in Ranking

Assessment Score	Description
7	Major or highly positive
6	Moderately positive
5	Minor or slightly Positive
4	Not significant or neutral
3	Minor or slightly negative
2	Moderately negative
1	Major or highly negative

Table 1.3 summarises how the two Guidelines^{1 4} have been correlated for the purpose of the Active Travel Options assessment. It should be noted that the PAG Guidelines⁴ deal with both positive and negative impacts whereas the TII Guidance¹ deal with only negative impacts for soils and geology.

Table 1.3: PAG Scoring System used in Ranking Correlation of TII Guidelines impact level to an Equivalent TII PAG Score

Impact Level (TII Guidelines ¹)	Equivalent PAG (Description)	Equivalent PAG (Value)
Profound	Major or highly negative	1
Significant	Major or highly negative	1
Moderate	Moderately negative	2
Slight	Minor or slightly negative	3
Imperceptible	Not significant or neutral	4

⁴ Transport Infrastructure Ireland (TII) Project Appraisal Guidelines for National Roads Unit 7.0 – Multi-Criteria Analysis, TII 2016. Available from: <https://www.tiipublications.ie/library/PE-PAG-02031-01.pdf>

1.2.2 Assessment Criteria

The soils and geology criteria which have been considered as part of this assessment include the following:

- Soil deposits comprising well drained soil types which are important for agriculture;
- Contaminated sites which comprise the horizontal extent of made ground;
- Bedrock geology comprising areas where bedrock outcrops and sub crops are recorded; and
- Earthworks comprising bulk cut and fill volumes and the cut/fill balance.

Each of these criteria are impacted by the active travel options and are considered to be differentiators in the assessment of options.

The following constraints identified in the Constraints Report have been excluded from this Stage 2 assessment for the following reasons:

- **Glacial Till:** Glacial till is widespread and consistent throughout the study area at each active travel option location and so it is not considered a differentiator between option and was eliminated from the assessment under the Subsoil criterion.
- **Bedrock Karst:** There are no karst features identified within the study area.
- **Landslide Susceptibility:** No areas of moderately high to high landslide susceptibility are noted within the study area.
- **Historical industrial sites, pits, quarries, and mines:** These features are not impacted by the active travel options.
- **Industrial facilities:** There are no industrial facilities impacted by the active travel options.
- **Prospecting Licences:** There are two prospecting licences within the study area that are consistent across all active travel options and so are not considered a differentiator between active travel options.
- **Economic Geology:** It is unlikely that the high to very high crushed rock aggregate potential that has been identified within the study area surrounding the active travel option locations will be a viable economic resource due to the location. For this reason, economic geology has been excluded from the Stage 2 assessment.
- **Soft soils** comprising alluvium deposits (soft ground): There are no soft soils comprising alluvium deposits (soft ground).

1.3 Active Travel Options Assessment

1.3.1 R408 Newtown Overbridge

The proposed works at the R408 Newtown Road Overbridge include Active Travel enhancements. The Active Travel location is located approximately 1.6 km west of Junction 7 on the M4 motorway, to the south of Maynooth, Co. Kildare. The Active Travel location is surrounded primarily by agricultural land. The grounds of the Maynooth Town Football Club are located on the southeastern side of the current R408 Newtown Road Overbridge. The proposed development includes a new Active Travel overbridge parallel to the existing overbridge. Two Active Travel overbridge options are assessed, one on the western side of the existing overbridge, and the other on the eastern side.

The Geological Survey Ireland (GSI) / Teagasc soil mapping indicates that the R408 Newtown Road Overbridge Active Travel location is underlain by poorly drained mainly basic mineral soil. Made ground is indicated along the northern side of the M4 motorway. The GSI Quaternary sediments mapping indicates that the Active Travel location is underlain by till derived from limestones. The west of the R408 is underlain by the Lucan Formation bedrock geological formation, which is typically described as dark limestone and shale. The east of the R408 is underlain by the Tober Colleen Formation geological formation, which is typically described as calcareous shale, limestone conglomerates.

Option 1 – New Overbridge Parallel to the Existing (West)

Table 1.4: Soils and Geology Assessment for the R408 Newtown Road Overbridge - Option 1

Criterion	Criterion Attributes	Description	Importance of Attribute	Magnitude of Impact	Significance of Impact	Overall Qualitative Assessment
Soil deposits	EPA National Soils Important for Agriculture	Soils important for agriculture	High	Moderate Adverse	Significant / Moderate	Moderately negative
Contaminated sites	Made ground	Extent of impact on made ground deposits	High	Negligible	Imperceptible	Not Significant or Neutral
Bedrock geology	GSI shallow bedrock	Shallow bedrock 0 to 5m below ground level	High	Negligible	Imperceptible	Not Significant or Neutral
Earthworks	Bulk earthworks	Cut and fill volumes required	Medium	Small Adverse	Moderate / Slight	Minor or Slightly Negative

Option 2 – New Overbridge Parallel to the Existing (East)

Table 1.5: Soils and Geology Assessment for the R408 Newtown Road Overbridge - Option 2

Criterion	Criterion Attributes	Description	Importance of Attribute	Magnitude of Impact	Significance of Impact	Overall Qualitative Assessment
Soil deposits	EPA National Soils Important for Agriculture	Soils important for agriculture	High	Small Adverse	Moderate / Slight	Minor or Slightly Negative
Contaminated sites	Made ground	Extent of impact on made ground deposits	High	Negligible	Imperceptible	Not Significant or Neutral
Bedrock geology	GSI shallow bedrock	Shallow bedrock 0 to 5m below ground level	High	Negligible	Imperceptible	Not Significant or Neutral
Earthworks	Bulk earthworks	Cut and fill volumes required	Medium	Small Adverse	Moderate / Slight	Minor or Slightly Negative

Active Travel Options Assessment Matrix for the R408 Newtown Road Overbridge

Table 1.6: Soils and Geology Assessment Matrix of Active Travel Options for the R408 Newtown Road Overbridge

Assessment Criteria	Option 1 (West)	Option 2 (East)
Soil Deposits	Moderately Negative	Minor or Slightly Negative
Contaminated Site	Minor or Slightly Negative	Not Significant or Neutral
Bedrock Geology	Not Significant or Neutral	Not Significant or Neutral
Earthworks	Minor or Slightly Negative	Minor or Slightly Negative
Overall Qualitative Assessment	Moderately Negative	Minor or Slightly Negative
Score/ Impact Level	2	3
Preference	Least Preferred	Preferred

1.3.2 Junction 7 Maynooth

The works proposed at Junction 7 Maynooth include Active Travel enhancements. Junction 7 Maynooth is located to the south of Maynooth, Co. Kildare. The proposed works consist of a parallel Active Travel overbridge which would tie into the existing the facility. Two Active Travel options are assessed, one on the western side of the existing overbridge, and the other on the eastern side.

The GSI/Teagasc soil mapping indicates that Junction 7 Maynooth is underlain by poorly drained mainly basic mineral soil. Made ground associated with Maynooth is located to the north of the junction. Deep well drained mainly basic mineral soil deposits are widespread to the east of Junction 7 Maynooth. The GSI Quaternary sediments mapping indicates that Junction 7 Maynooth is underlain by till derived from limestones. The GSI bedrock geology (1:100k) mapping indicates that Junction 7 Maynooth is underlain primarily by the Waulsortian Limestone geological formation. The northern portion of the junction is underlain by the Tober Colleen geological formation.

Option 1 – New Overbridge Parallel to the Existing (West)

Table 1.7: Assessment of the Soils and Geology criteria for the Active Travel Enhancement at Junction 7 Maynooth Option 1 (West)

Criterion	Criterion Attributes	Description	Importance of Attribute	Magnitude of Impact	Significance of Impact	Overall Qualitative Assessment
Soil deposits	EPA National Soils Important for Agriculture	Soils important for agriculture	High	Negligible	Imperceptible	Not Significant or Neutral
Contaminated sites	Made ground	Extent of impact on made ground deposits	High	Negligible	Imperceptible	Not Significant or Neutral
Bedrock geology	GSI shallow bedrock	Shallow bedrock 0 to 5m below ground level	High	Negligible	Imperceptible	Not Significant or Neutral
Earthworks	Bulk earthworks	Cut and fill volumes required	Medium	Small Adverse	Moderate / Slight	Minor or Slightly Negative

Option 2 – New Overbridge Parallel to the Existing (East)

Table 1.8: Assessment of the Soils and Geology criteria for the Active Travel Enhancement at Junction 7 Maynooth Option 2 (East)

Criterion	Criterion Attributes	Description	Importance of Attribute	Magnitude of Impact	Significance of Impact	Overall Qualitative Assessment
Soil deposits	EPA National Soils Important for Agriculture	Soils important for agriculture	High	Negligible	Imperceptible	Not Significant or Neutral
Contaminated sites	Made ground	Extent of impact on made ground deposits	High	Negligible	Imperceptible	Not Significant or Neutral
Bedrock geology	GSI shallow bedrock	Shallow bedrock 0 to 5m below ground level	High	Negligible	Imperceptible	Not Significant or Neutral
Earthworks	Bulk earthworks	Cut and fill volumes required	Medium	Small Adverse	Moderate / Slight	Minor or Slightly Negative

Active Travel Options Assessment Matrix for Junction 7 Maynooth

Table 1.9: Soils and Geology Assessment Matrix of Active Travel Options for Junction 7 Maynooth

Assessment Criteria	Option 1 (West)	Option 2 (East)
Soil Deposits	Not Significant or Neutral	Not Significant or Neutral
Contaminated Site	Not Significant or Neutral	Not Significant or Neutral
Bedrock Geology	Not Significant or Neutral	Not Significant or Neutral
Earthworks	Minor or Slightly Negative	Minor or Slightly Negative
Overall Qualitative Assessment	Minor or Slightly Negative	Minor or Slightly Negative
Score/ Impact Level	3	3
Preference	Preferred	Preferred

1.3.3 R405 Ballygoran Overbridge

The works proposed at the R405 Ballygoran Overbridge include Active Travel enhancement. The R405 Ballygoran Overbridge is located approximately 1.6km east of Junction 7 on the M4 motorway. The Active Travel option location is surrounded by agricultural land. Two options are assessed for this Active Travel overbridge, one on the western side of the existing overbridge, and the other on the eastern side.

The GSI/Teagasc soil mapping indicates that the R405 Ballygoran Overbridge is underlain by shallow, well drained mainly basic mineral soil. The overbridge location is surrounded by deep, well drained mainly basic mineral soils. The GSI Quaternary sediments indicates that the overbridge location is underlain by bedrock outcrop or sub crop. The surrounding area is dominated by till derived from limestone subsoils. The GSI bedrock geology (1:100k) mapping indicates that the proposed site is underlain by the Tober Colleen Formation, which is typically described as calcareous shale and limestone conglomerate. Bedrock outcrops or sub crops are recorded to the west of the overbridge location. The hinge of an anticlinal fold is located approximately 900 m to the west of the overbridge location.

Option 1 – New Overbridge Parallel to the Existing (West)

Table 1.10: Assessment of the Soils and Geology criteria for the Active Travel Enhancement at R405 Ballygoran Overbridge Option 1 (West)

Criterion	Criterion Attributes	Description	Importance of Attribute	Magnitude of Impact	Significance of Impact	Overall Qualitative Assessment
Soil deposits	EPA National Soils Important for Agriculture	Soils important for agriculture	High	Negligible	Imperceptible	Not Significant or Neutral
Contaminated sites	Made ground	Extent of impact on made ground deposits	High	Negligible	Imperceptible	Not Significant or Neutral
Bedrock geology	GSI shallow bedrock	Shallow bedrock 0 to 5m below ground level	High	Moderate Adverse	Significant / Moderate	Moderately negative
Earthworks	Bulk earthworks	Cut and fill volumes required	Medium	Small Adverse	Moderate / Slight	Minor or Slightly Negative

Option 2 – New Overbridge Parallel to the Existing (East)

Table 1.11: Assessment of the Soils and Geology criteria for the Active Travel Enhancement at R405 Ballygoran Overbridge - Option 2 (East)

Criterion	Criterion Attributes	Description	Importance of Attribute	Magnitude of Impact	Significance of Impact	Overall Qualitative Assessment
Soil deposits	EPA National Soils Important for Agriculture	Soils important for agriculture	High	Small Adverse	Moderate / Slight	Minor or Slightly Negative
Contaminated sites	Made ground	Extent of impact on made ground deposits	High	Negligible	Imperceptible	Not Significant or Neutral
Bedrock geology	GSI shallow bedrock	Shallow bedrock 0 to 5m below ground level	High	Moderate Adverse	Significant / Moderate	Moderately negative
Earthworks	Bulk earthworks	Cut and fill volumes required	Medium	Small Adverse	Significant / Moderate	Minor or Slightly Negative

Active Travel Options Assessment Matrix for the R405 Ballygoran Overbridge

Table 1.12: Soils and Geology Assessment Matrix of Active Travel Options for the R405 Ballygoran Overbridge

Assessment Criteria	Option 1 (West)	Option 2 (East)
Soil Deposits	Not Significant or Neutral	Minor or Slightly Negative
Contaminated Site	Not Significant or Neutral	Not Significant or Neutral
Bedrock Geology	Moderately negative	Moderately negative
Earthworks	Minor or Slightly Negative	Moderately negative
Overall Qualitative Assessment	Moderately negative	Moderately negative
Score/ Impact Level	2	2
Preference	Preferred	Least Preferred

1.3.4 Junction 6 Celbridge

The proposed works at this location include Active Travel enhancement around Junction 6 Celbridge. The Active Travel enhancements will not interact with the junction. The proposed facility would cross over the existing slip roads. Two options are assessed for this Active Travel overbridge, one on the western side of the existing Junction 6 structure, and the other on the eastern side.

The GSI/Teagasc soil mapping indicates that Junction 6 Celbridge is underlain entirely by poorly drained, mainly basic mineral soils. The GSI Quaternary sediments mapping indicates that Junction 6 Celbridge and the surrounding area is underlain by till derived from limestone subsoils. The GSI bedrock geology (1:100k) mapping indicates that Junction 6 Celbridge and the surrounding area is underlain by the Lucan Formation, which is typically described as dark limestone and shale.

Option 1 – New Overbridge Parallel to the Existing (West)

Table 1.13: Assessment of the Soils and Geology criteria for the Active Travel Enhancement at Junction 6 Celbridge - Option 1 (West)

Criterion	Criterion Attributes	Description	Importance of Attribute	Magnitude of Impact	Significance of Impact	Overall Qualitative Assessment
Soil deposits	EPA National Soils Important for Agriculture	Soils important for agriculture	High	Moderate Adverse	Significant / Moderate	Moderately negative
Contaminated sites	Made ground	Extent of impact on made ground deposits	High	Small Adverse	Moderate / Slight	Minor or Slightly Negative
Bedrock geology	GSI shallow bedrock	Shallow bedrock 0 to 5m below ground level	High	Negligible	Imperceptible	Not Significant or Neutral
Earthworks	Bulk earthworks	Cut and fill volumes required	Medium	Moderate Adverse	Significant / Moderate	Moderately negative

Option 2 – New Overbridge Parallel to the Existing (East)

Table 1.14: Assessment of the Soils and Geology criteria for the Active Travel Enhancement at Junction 6 Celbridge - Option 2 (East)

Criterion	Criterion Attributes	Description	Importance of Attribute	Magnitude of Impact	Significance of Impact	Overall Qualitative Assessment
Soil deposits	EPA National Soils Important for Agriculture	Soils important for agriculture	High	Small Adverse	Moderate / Slight	Minor or Slightly Negative
Contaminated sites	Made ground	Extent of impact on made ground deposits	High	Negligible	Imperceptible	Not Significant or Neutral
Bedrock geology	GSI shallow bedrock	Shallow bedrock 0 to 5m below ground level	High	Negligible	Imperceptible	Not Significant or Neutral
Earthworks	Bulk earthworks	Cut and fill volumes required	Medium	Moderate Adverse	Significant / Moderate	Moderately negative

Active Travel Options Assessment Matrix for Junction 6 Celbridge

Table 1.15: Soils and Geology Assessment Matrix of Active Travel Options for Junction 6 Celbridge

Assessment Criteria	Option 1 (West)	Option 2 (East)
Soil Deposits	Moderately negative	Minor or Slightly Negative
Contaminated Site	Minor or Slightly Negative	Not Significant or Neutral
Bedrock Geology	Not Significant or Neutral	Not Significant or Neutral
Earthworks	Moderately negative	Moderately negative
Overall Qualitative Assessment	Moderately negative	Moderately negative
Score/ Impact Level	2	2
Preference	Least Preferred	Preferred

1.3.5 R404 Celbridge Road Overbridge

The proposed works at this location include Active Travel enhancement at the R404 Celbridge Road Overbridge. The R404 Celbridge Road Overbridge is located approximately 1.8 km east of Junction 6 of the M4 motorway. Two options are assessed for this Active Travel overbridge, one on the western side of the existing overbridge, and the other on the eastern side.

The GSI/Teagasc soil mapping indicates that the R404 Celbridge Road Overbridge is underlain by deep well drained mainly basic mineral soil. There is widespread made ground to the north of the overbridge associated with the Leixlip urban centre. There is a deposit of poorly drained mainly basic mineral soil to the south of the overbridge. The GSI Quaternary sediments mapping indicates that the overbridge is underlain by till derived from limestone subsoil. There is made ground associated with the Leixlip urban centre to the north of the overbridge. The GSI bedrock geology (1:100k) mapping indicates that the overbridge and surrounding area is underlain by the Lucan Formation, which is typically described as dark limestone and shale.

The bedrock geology is the same under both active travel route options, and so is not considered a differentiator in this assessment.

Option 1 – New Overbridge Parallel to the Existing (West)

Table 1.16: Assessment of the Soils and Geology criteria for the Active Travel Enhancement at R404 Celbridge Road Overbridge - Option 1 (West)

Criterion	Criterion Attributes	Description	Importance of Attribute	Magnitude of Impact	Significance of Impact	Overall Qualitative Assessment
Soil deposits	EPA National Soils Important for Agriculture	Soils important for agriculture	High	Small Adverse	Moderate / Slight	Minor or Slightly Negative
Contaminated sites	Made ground	Extent of impact on made ground deposits	High	Negligible	Imperceptible	Not Significant or Neutral
Earthworks	Bulk earthworks	Cut and fill volumes required	Medium	Small Adverse	Moderate / Slight	Minor or Slightly Negative

Option 2 – New Overbridge Parallel to the Existing (East)

Table 1.17: Assessment of the Soils and Geology criteria for the Active Travel Enhancement at R404 Celbridge Road Overbridge - Option 2 (East)

Criterion	Criterion Attributes	Description	Importance of Attribute	Magnitude of Impact	Significance of Impact	Overall Qualitative Assessment
Soil deposits	EPA National Soils Important for Agriculture	Soils important for agriculture	High	Small Adverse	Moderate / Slight	Minor or Slightly Negative
Contaminated sites	Made ground	Extent of impact on made ground deposits	High	Negligible	Imperceptible	Not Significant or Neutral
Earthworks	Bulk earthworks	Cut and fill volumes required	Medium	Small Adverse	Moderate / Slight	Minor or Slightly Negative

Active Travel Options Assessment Matrix for the R404 Celbridge Road Overbridge

Table 1.18: Soils and Geology Assessment Matrix of Active Travel Options for the R404 Celbridge Road Overbridge

Assessment Criteria	Option 1 (West)	Option 2 (East)
Soil Deposits	Minor or Slightly Negative	Minor or Slightly Negative
Contaminated Site	Not Significant or Neutral	Not Significant or Neutral
Earthworks	Minor or Slightly Negative	Minor or Slightly Negative
Overall Qualitative Assessment	Minor or Slightly Negative	Minor or Slightly Negative
Score/ Impact Level	3	3
Preference	Preferred	Preferred

1.3.6 Junction 5 Leixlip

The proposed works at this location include Active Travel enhancement around Junction 5 Leixlip. The Active Travel enhancement consists of new bridge construction parallel to the current junction structure. Two options are assessed for this Active Travel overbridge, one on the western side of the existing junction structure, and the other on the eastern side.

The GSI/Teagasc soil mapping indicates that Junction 5 Leixlip is underlain by made ground associated with the western limits of Lucan urban centre. There is deep well drained mainly basic mineral soils and poorly drained mainly basic mineral soils located to the southwest of the overbridge. The GSI Quaternary sediments mapping indicates that the overbridge is underlain by till derived from limestone subsoils. The GSI bedrock geology (1:100k) mapping indicates that the overbridge is underlain by the Lucan Formation, which is typically described as dark limestone and shale. There are small bedrock outcrops or sub crops indicated to the south of the overbridge.

The bedrock geology is the same under both active travel route options, and so is not considered a differentiator in this assessment.

Option 1 – New Overbridge Parallel to the Existing (West)

Table 1.19: Assessment of the Soils and Geology criteria for the Active Travel Enhancement at Junction 5 Leixlip - Option 1 (West)

Criterion	Criterion Attributes	Description	Importance of Attribute	Magnitude of Impact	Significance of Impact	Overall Qualitative Assessment
Soil deposits	EPA National Soils Important for Agriculture	Soils important for agriculture	High	Small Adverse	Moderate / Slight	Minor or Slightly Negative
Contaminated sites	Made ground	Extent of impact on made ground deposits	High	Negligible	Imperceptible	Not Significant or Neutral
Earthworks	Bulk earthworks	Cut and fill volumes required	Medium	Small Adverse	Moderate / Slight	Minor or Slightly Negative

Option 2 – New Overbridge Parallel to the Existing (East)

Table 1.20: Assessment of the Soils and Geology criteria for the Active Travel Enhancement at Junction 5 Leixlip - Option 2 (East)

Criterion	Criterion Attributes	Description	Importance of Attribute	Magnitude of Impact	Significance of Impact	Overall Qualitative Assessment
Soil deposits	EPA National Soils Important for Agriculture	Soils important for agriculture	High	Negligible	Imperceptible	Not Significant or Neutral
Contaminated sites	Made ground	Extent of impact on made ground deposits	High	Negligible	Imperceptible	Not Significant or Neutral
Earthworks	Bulk earthworks	Cut and fill volumes required	Medium	Small Adverse	Moderate / Slight	Minor or Slightly Negative

Active Travel Options Assessment Matrix for Junction 5 Leixlip

Table 1.21: Soils and Geology Assessment Matrix of Active Travel Options at Junction 5 Leixlip

Assessment Criteria	Option 1 (West)	Option 2 (East)
Soil Deposits	Minor or Slightly Negative	Not Significant or Neutral
Contaminated Site	Not Significant or Neutral	Not Significant or Neutral
Earthworks	Minor or Slightly Negative	Minor or Slightly Negative
Overall Qualitative Assessment	Minor or Slightly Negative	Minor or Slightly Negative
Score/ Impact Level	3	3
Preference	Least Preferred	Preferred

1.4 Summary

The Active Travel enhancement options have been assessed for six locations in terms of the impact on Soils and Geology. All preferred options have an impact on the Soils and Geology of locality, ranging from Minor or Slightly Negative to Moderately Negative.

A summary of the preferred Active Travel enhancement option for each location is presented in Table 1.22 below.

Table 1.22: Summary of Preferred Active Travel Enhancement Options

Location	Preference
R408 Newtown Road Overbridge	Option 2 (East)
Junction 7 Maynooth	Both Option 1 (West) and Option 2 (East) are Preferred
R405 Ballygoran Overbridge	Option 1 (West)
Junction 6 Celbridge	Option 2 (East)
R404 Celbridge Road Overbridge	Both Option 1 (West) and Option 2 (East) are Preferred
Junction 5 Leixlip	Option 2 (East)

1.5 References

N/A



MAYNOOTH TO LEIXLIP PROJECT

Appendix 6.4A

Stage 2 PAM

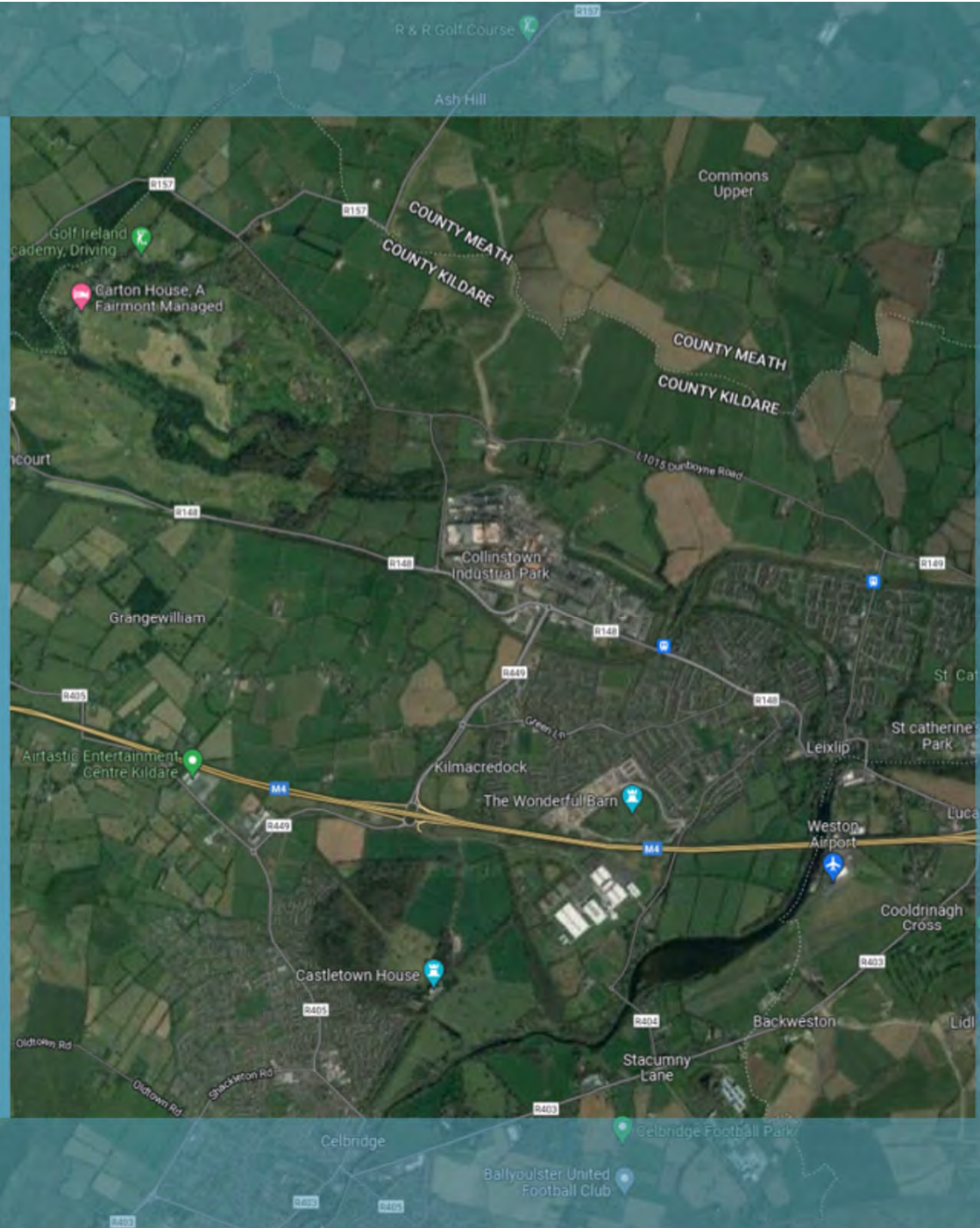
Transport Analysis – Junction 5, 6 and 7

M4/N4

Stage 2 PAM Transport Analysis

22/11/2022

SYSTRA



Overview

1. Junction 7

- Flows
- Delays
- Business Park Select Links
- Straffan Road Junction
- Local/Motorway Flows

2. Junction 6

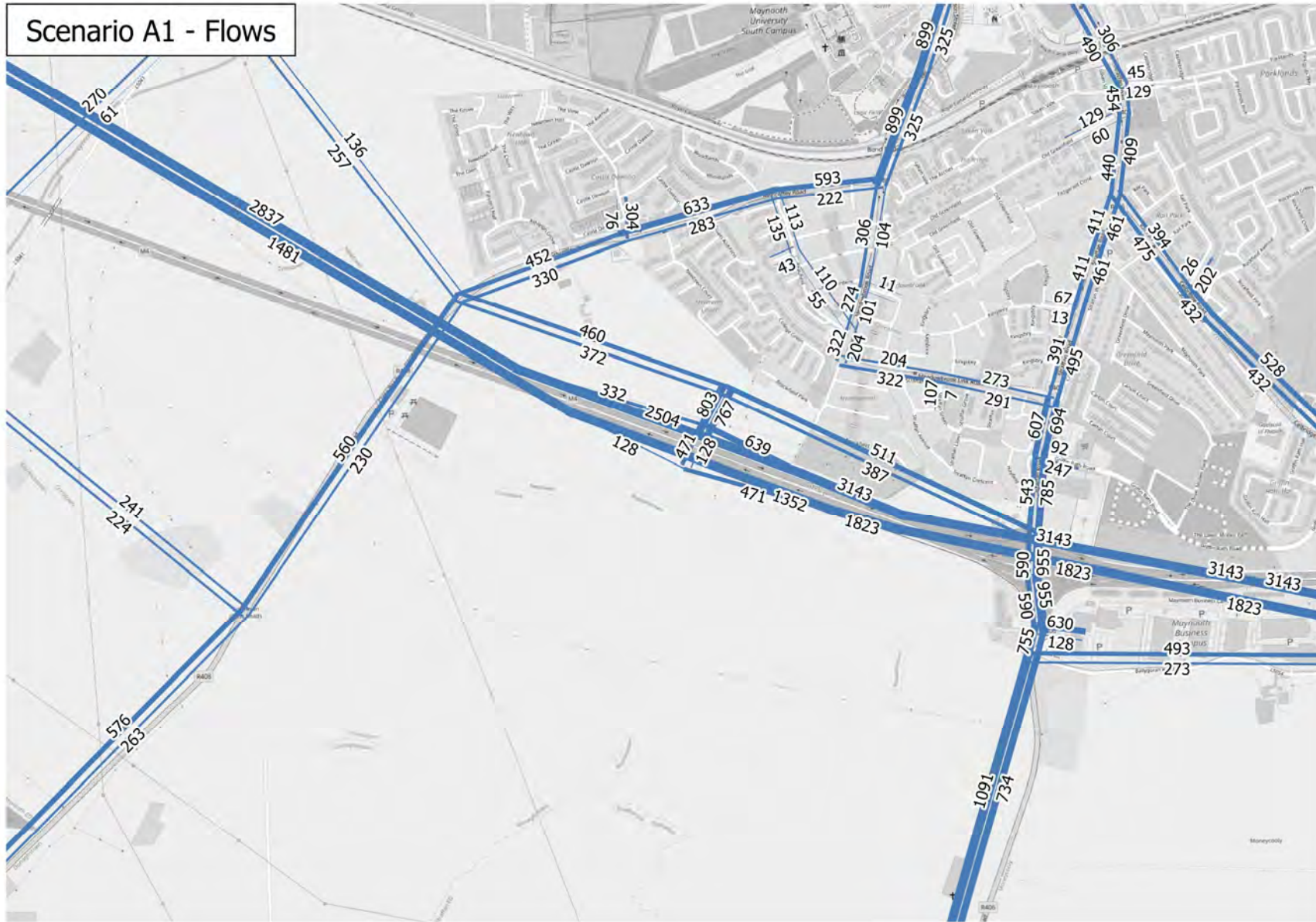
- Pedestrian LOS

3. Junction 5

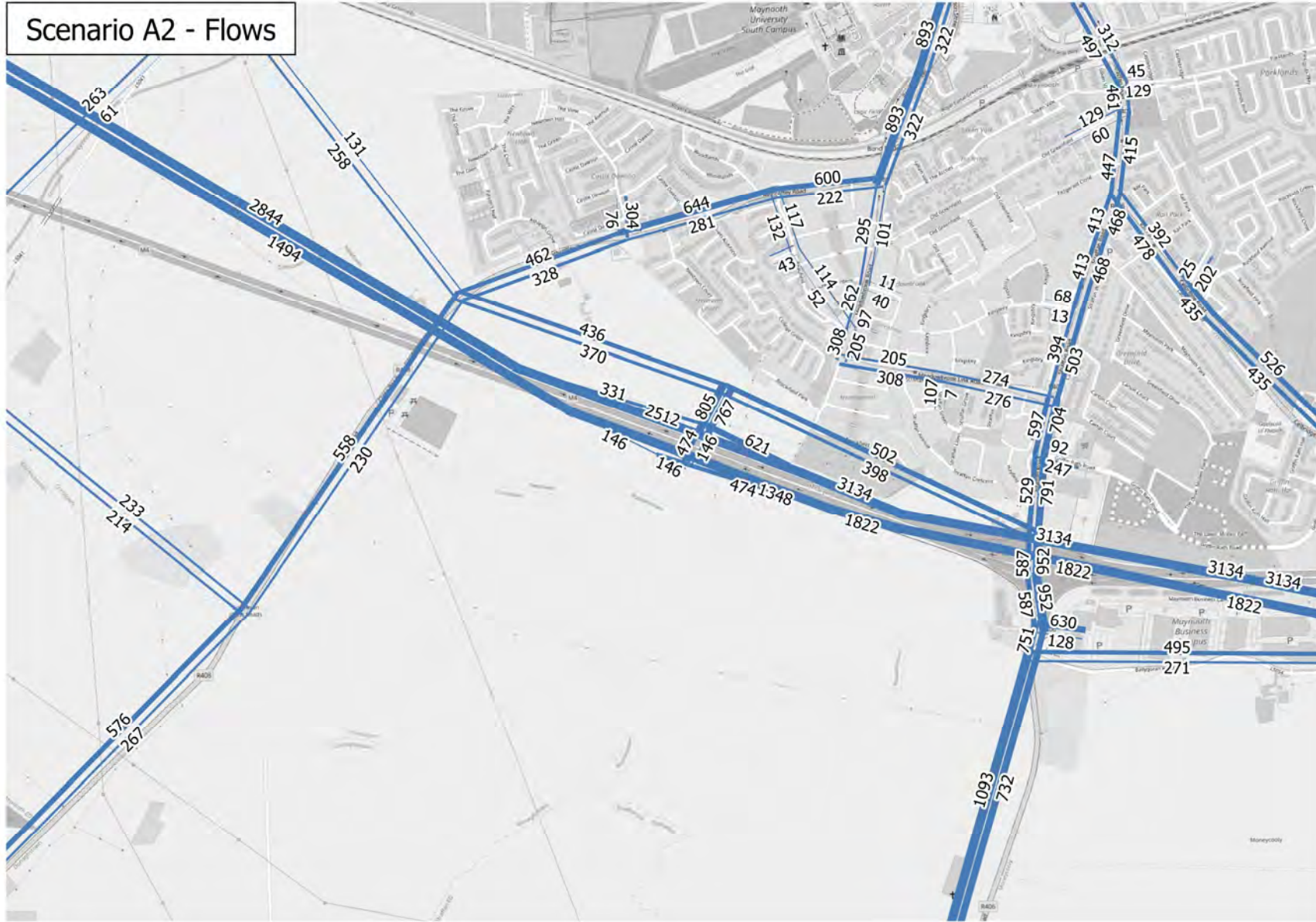
- Pedestrian LOS
- Junction Flows
- Select Link Analysis

Junction 7

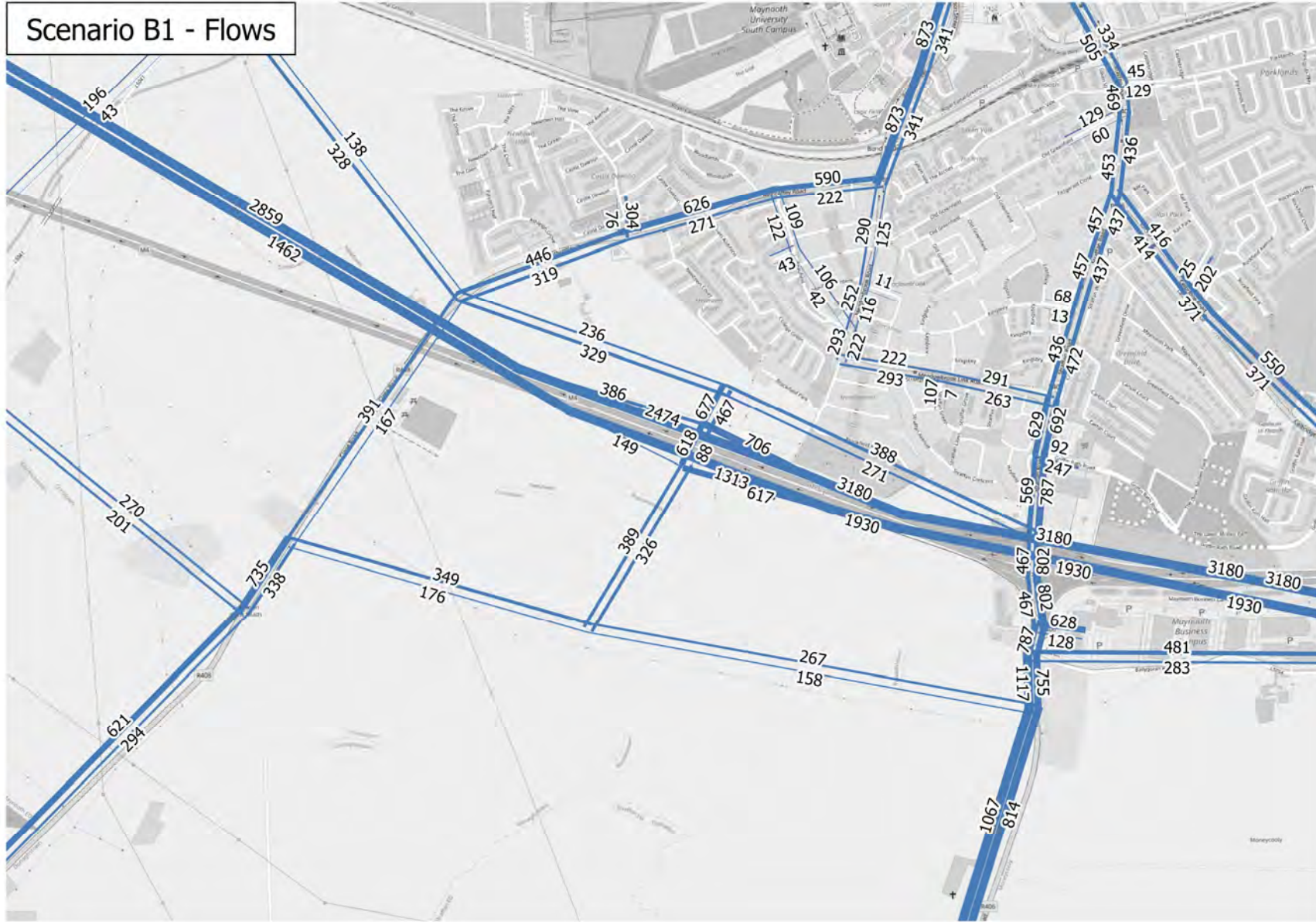
Scenario A1 - Flows



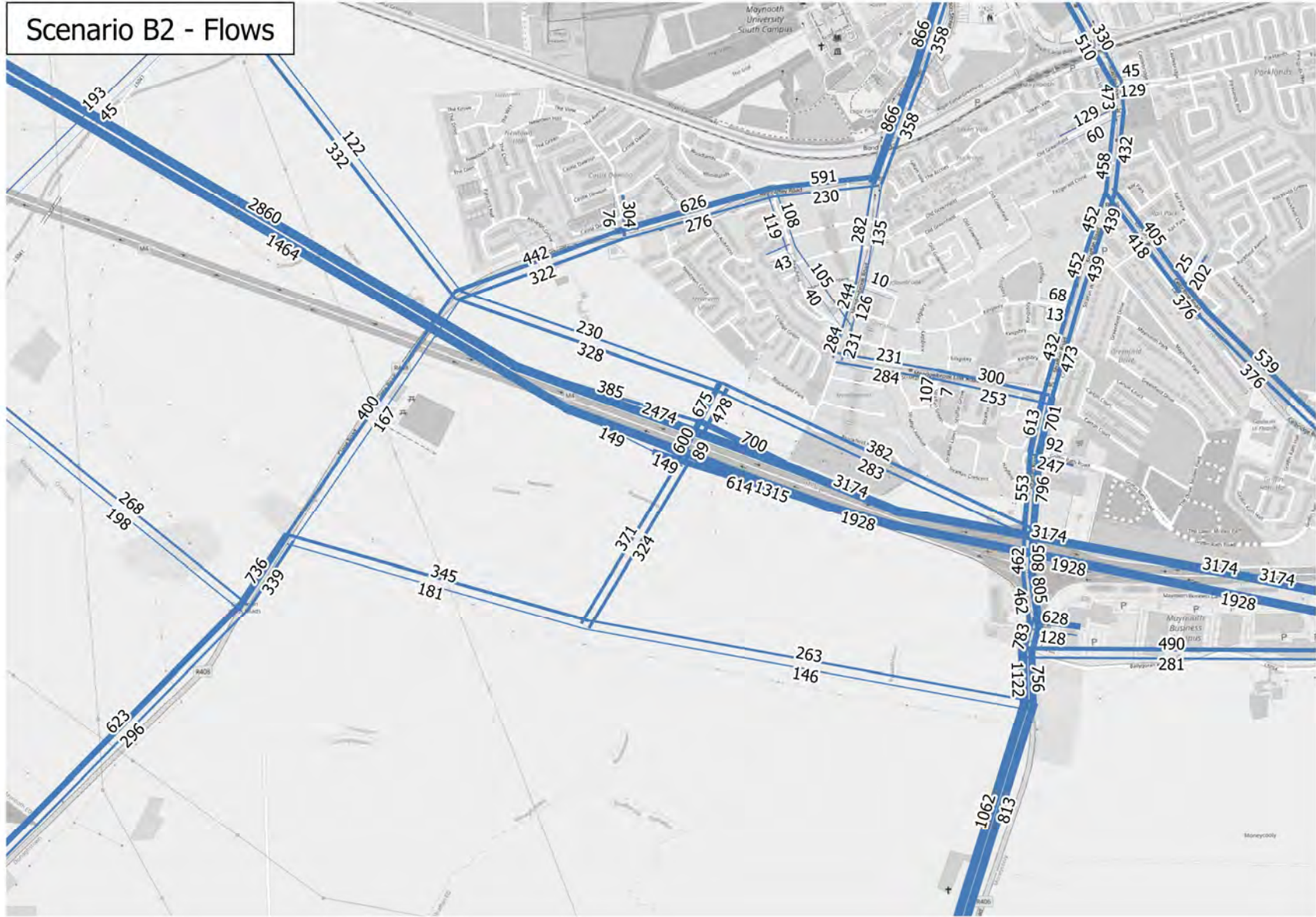
Scenario A2 - Flows



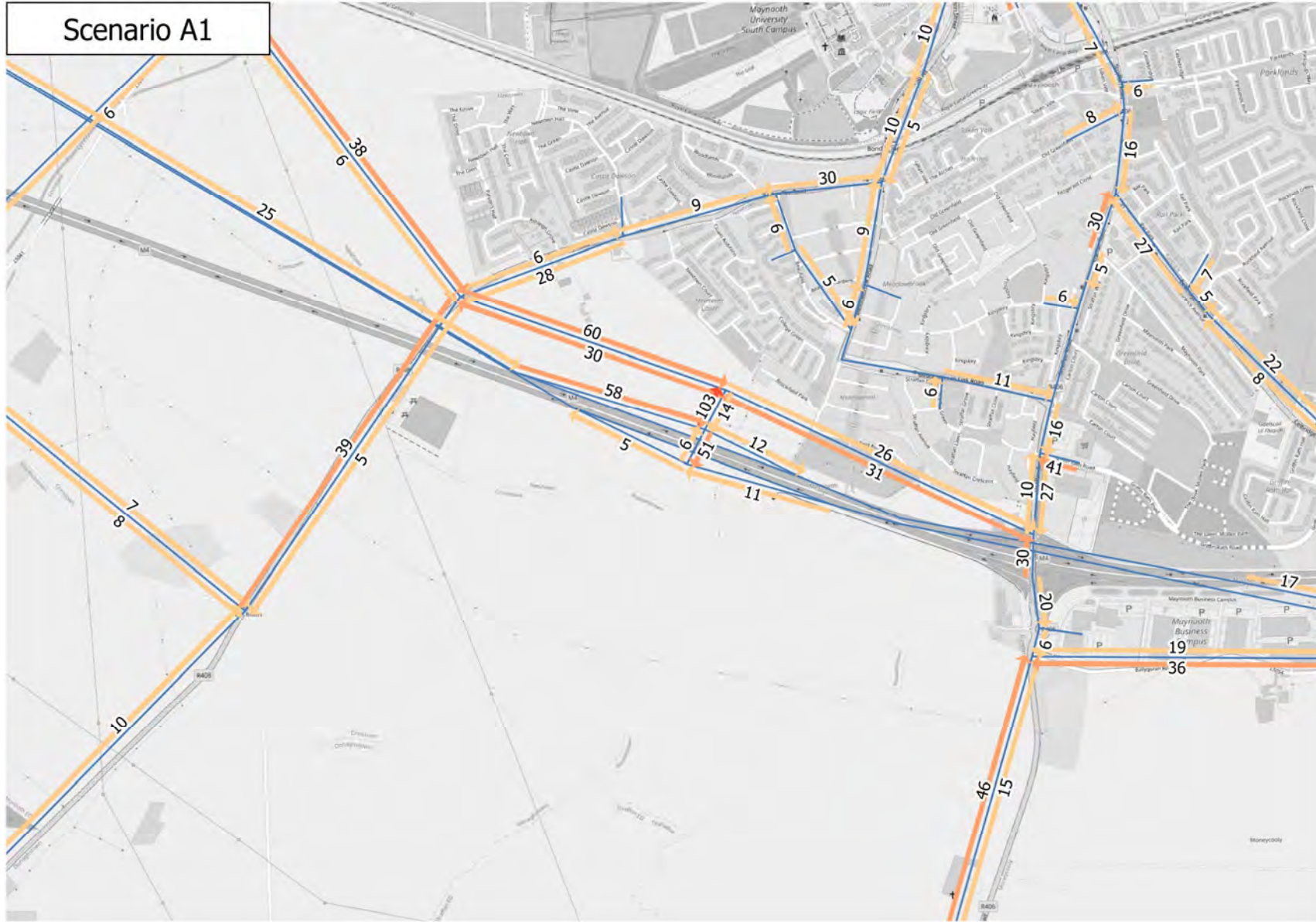
Scenario B1 - Flows



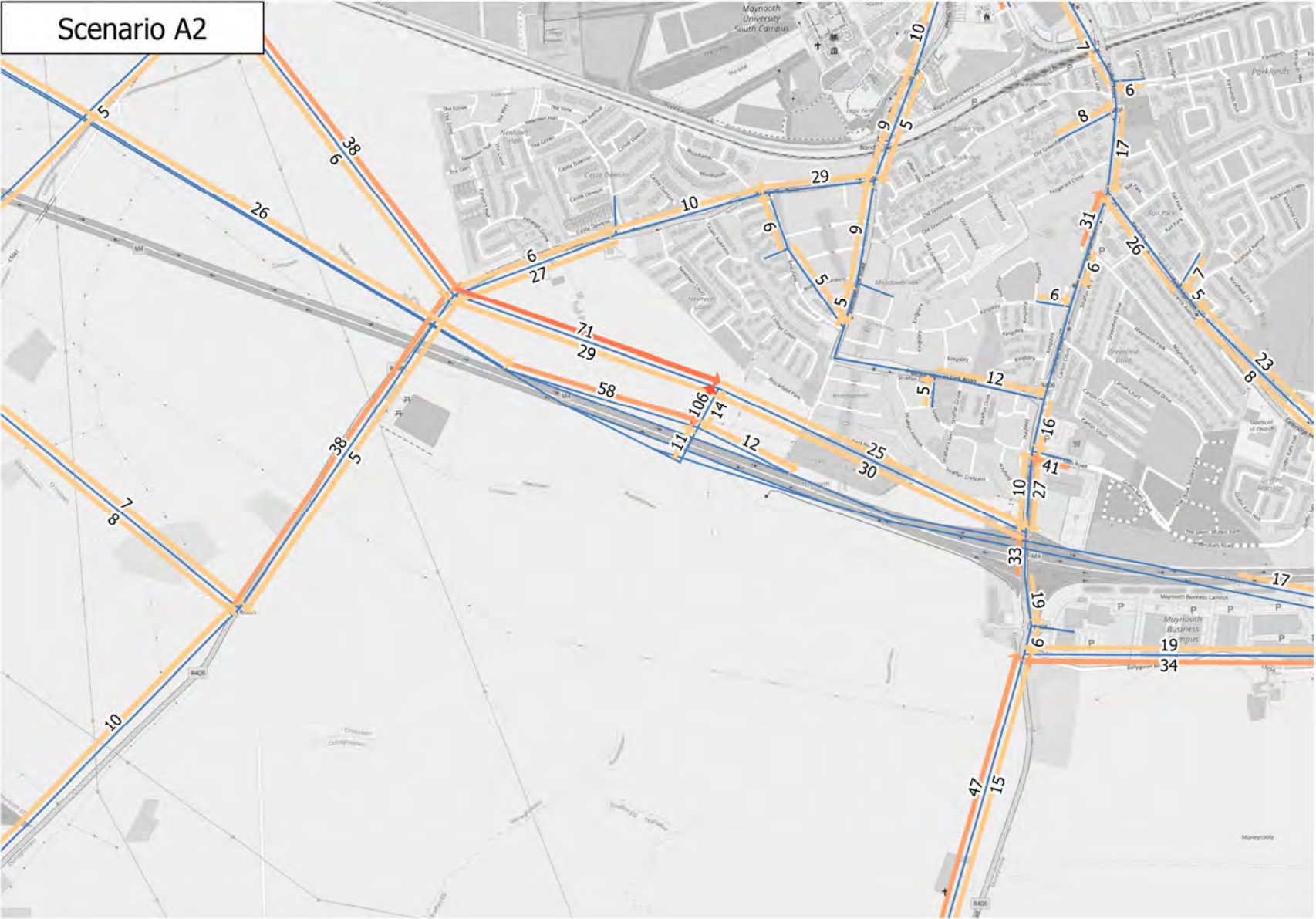
Scenario B2 - Flows



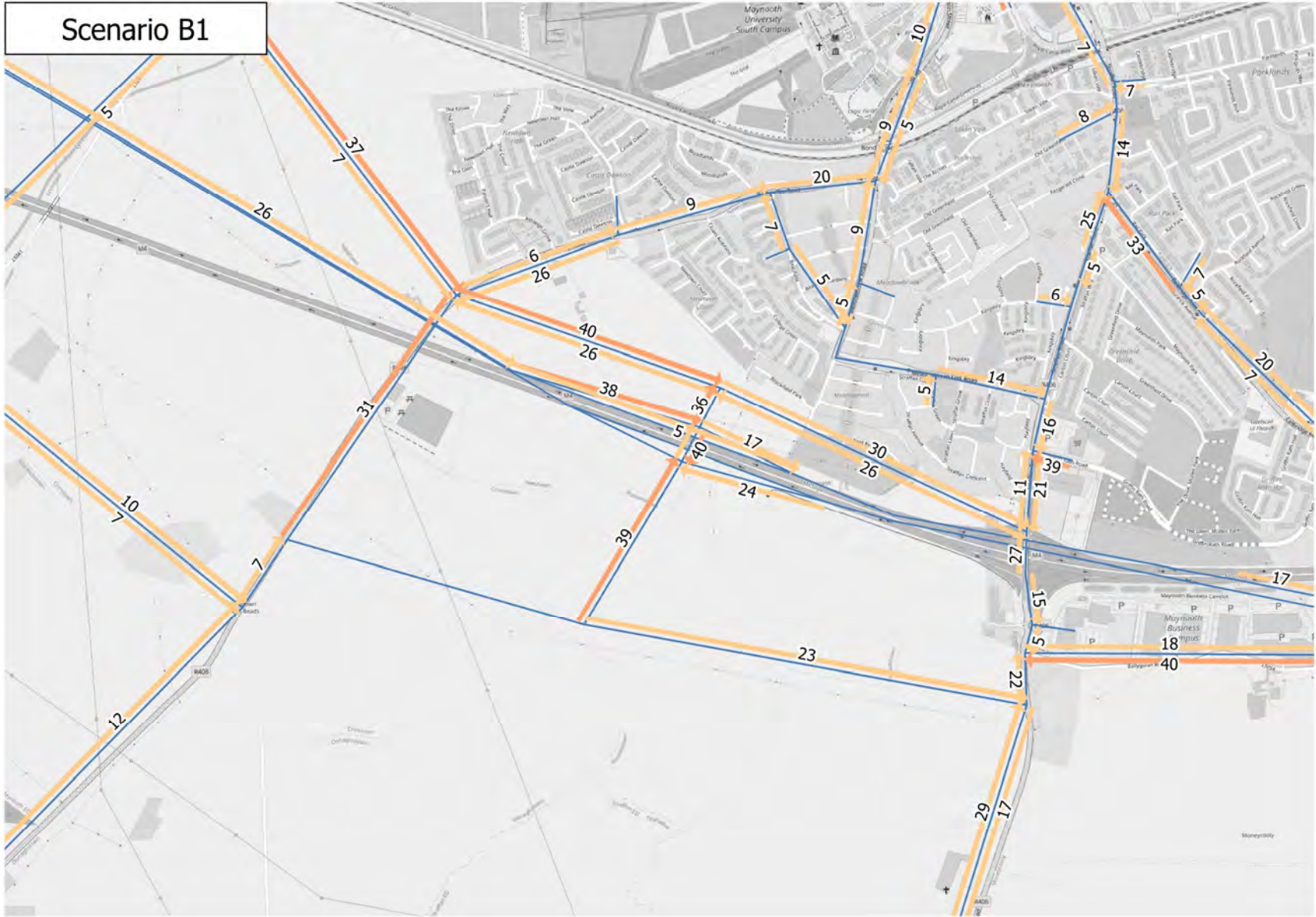
Delays (s)



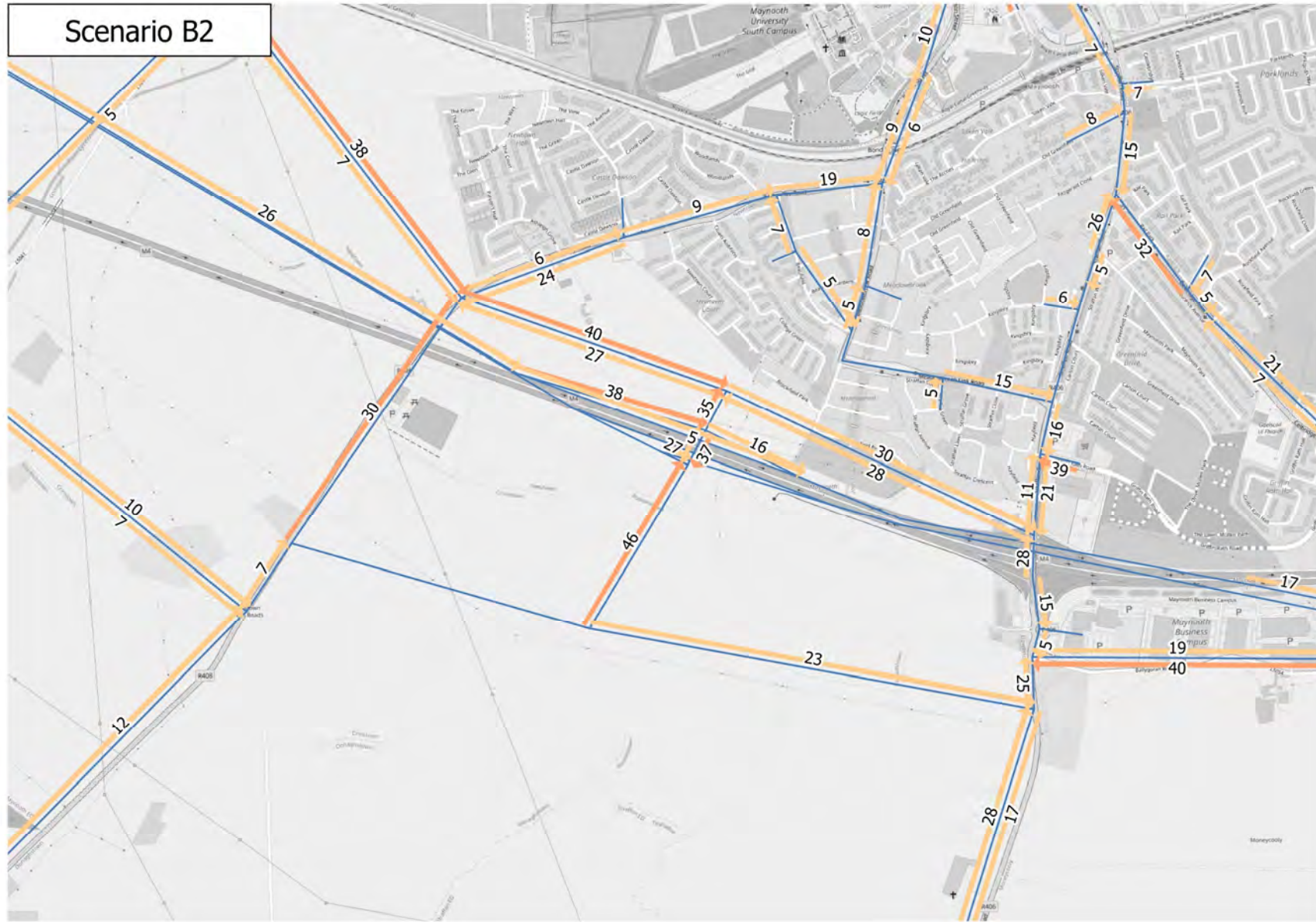
Delays (s)



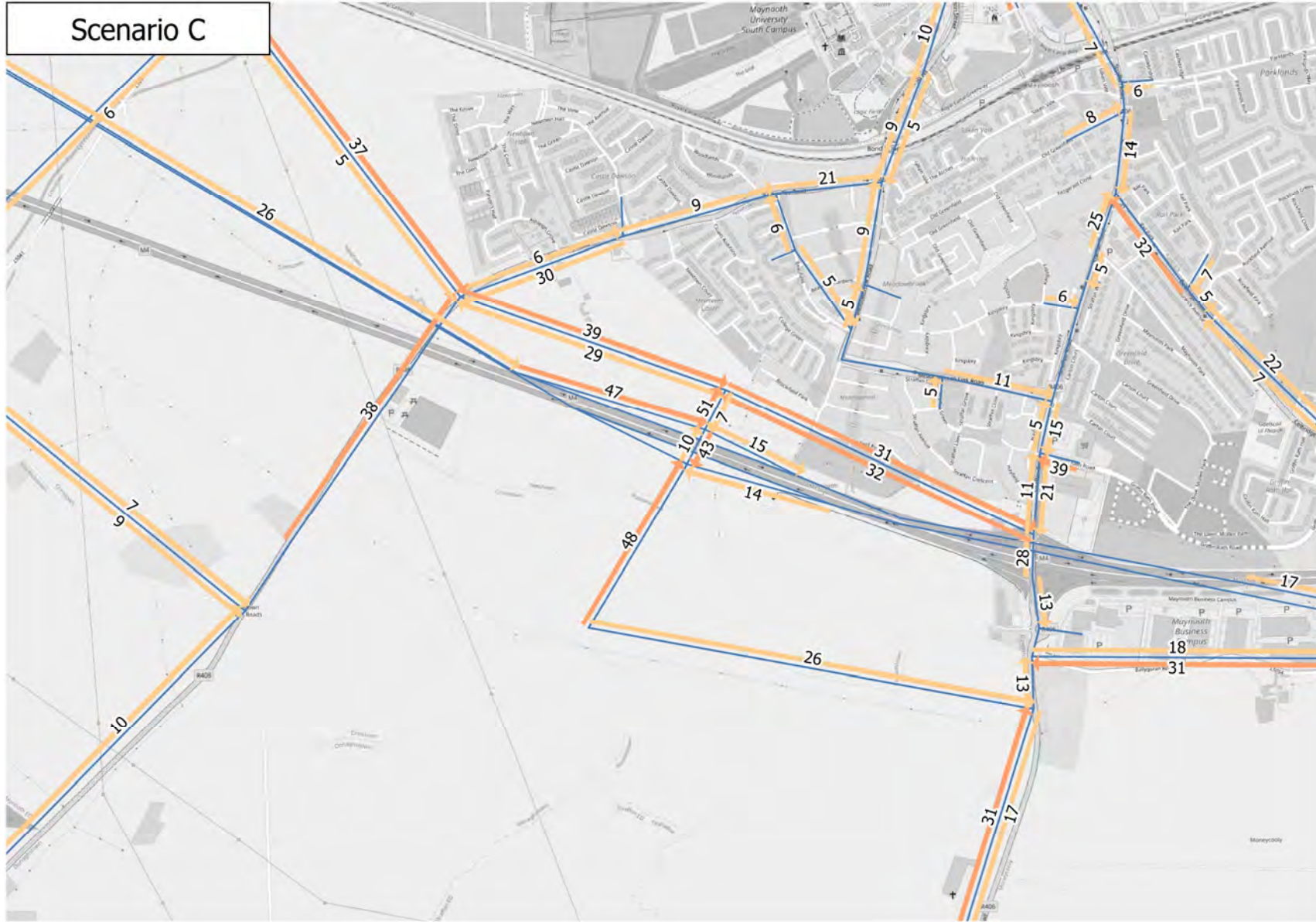
Delays (s)



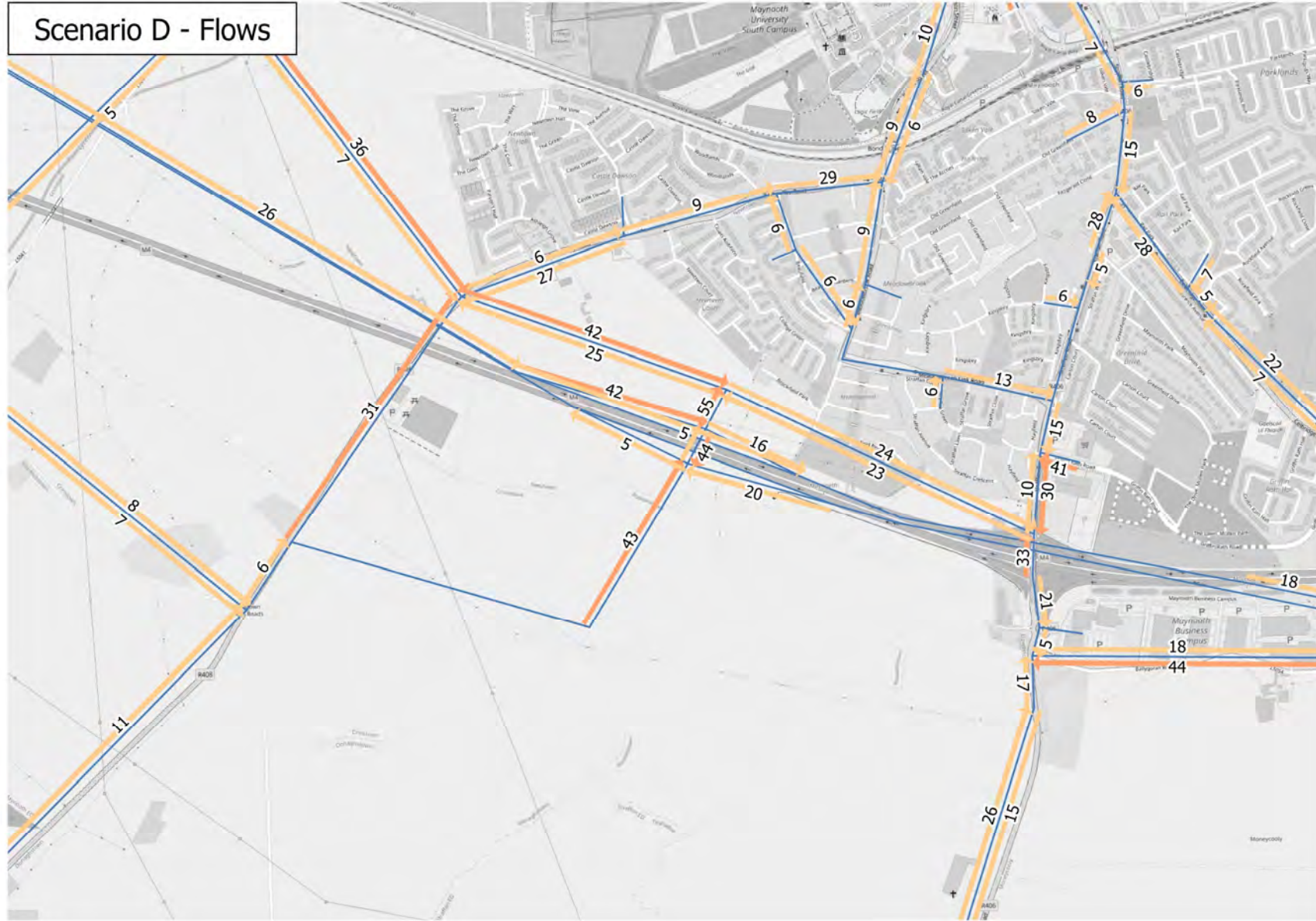
Delays (s)



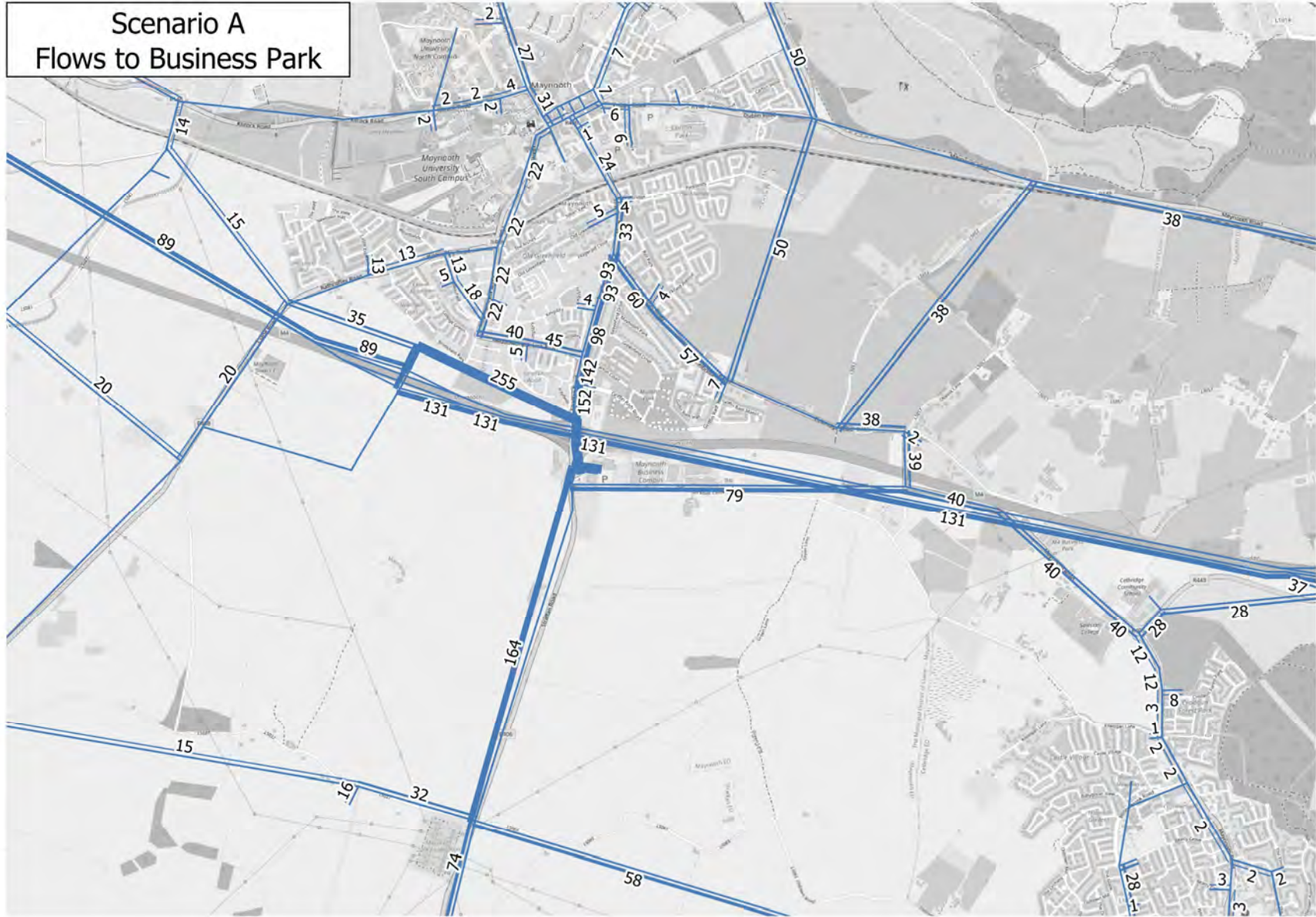
Delays (s)



Delays (s)



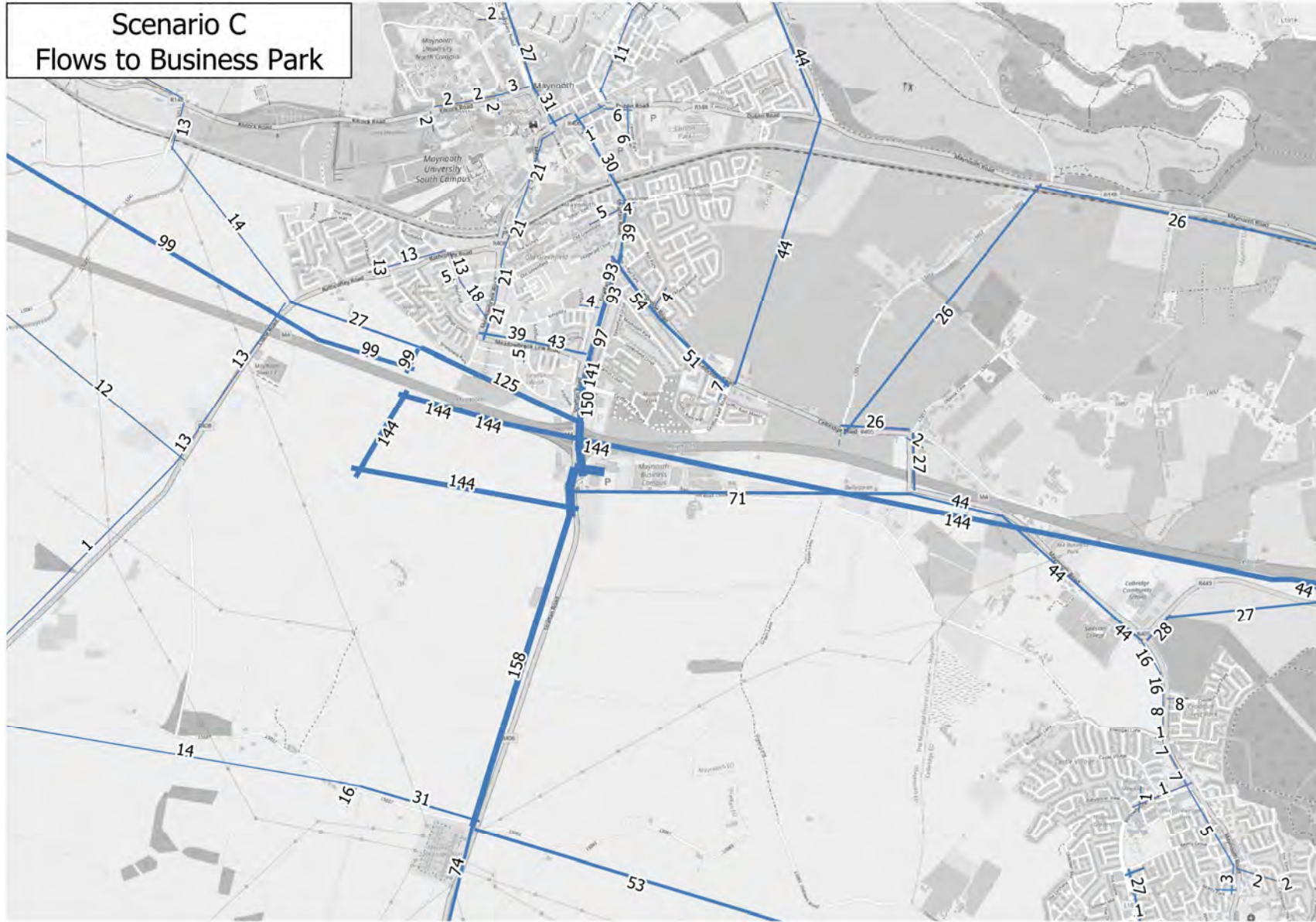
Scenario A
Flows to Business Park



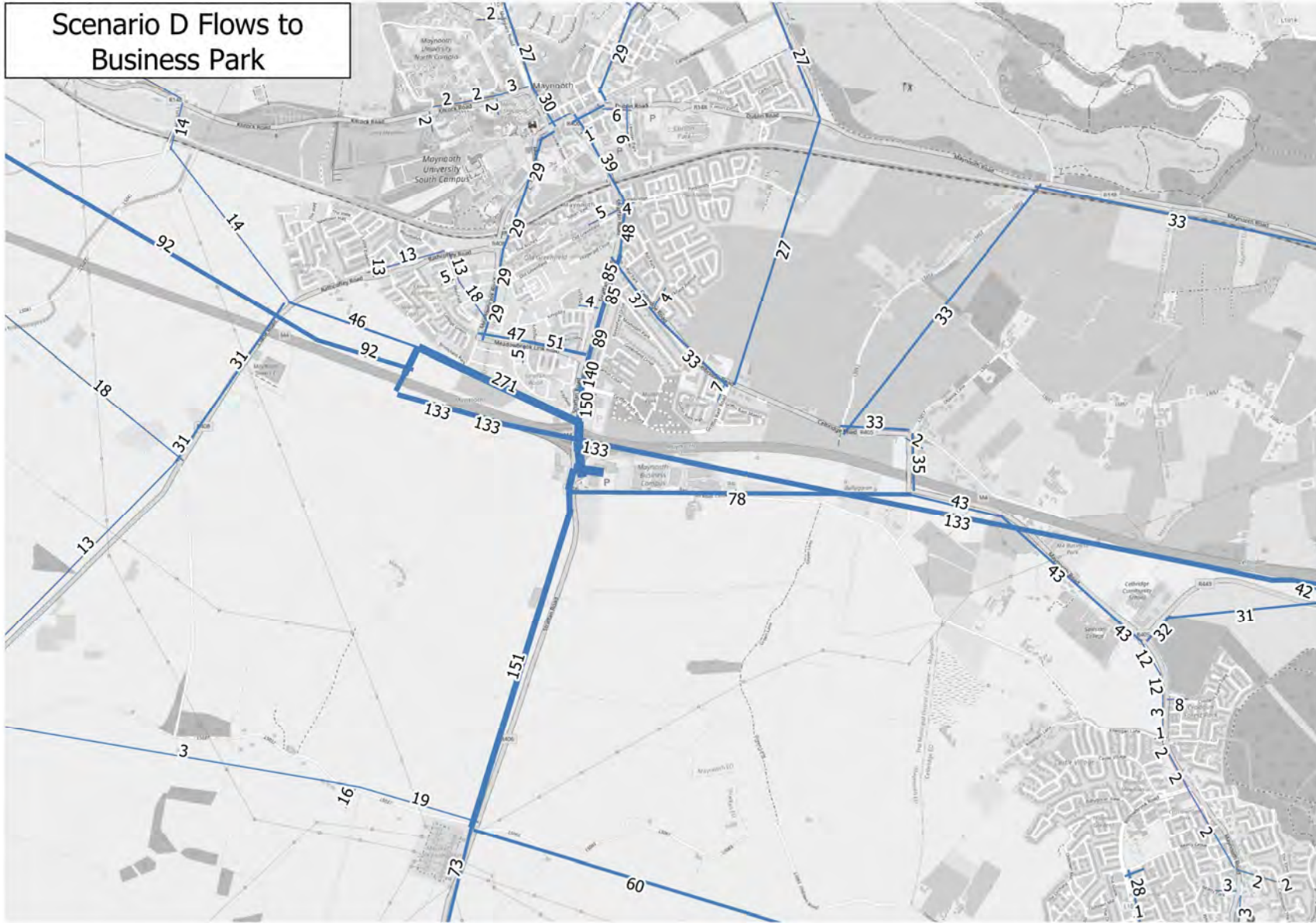
**Scenario B1
Flows to Business Park**

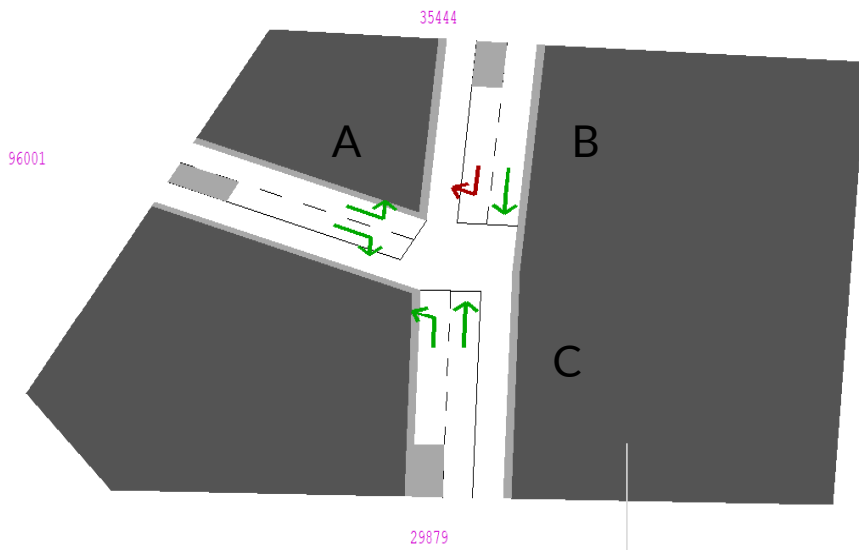


Scenario C Flows to Business Park



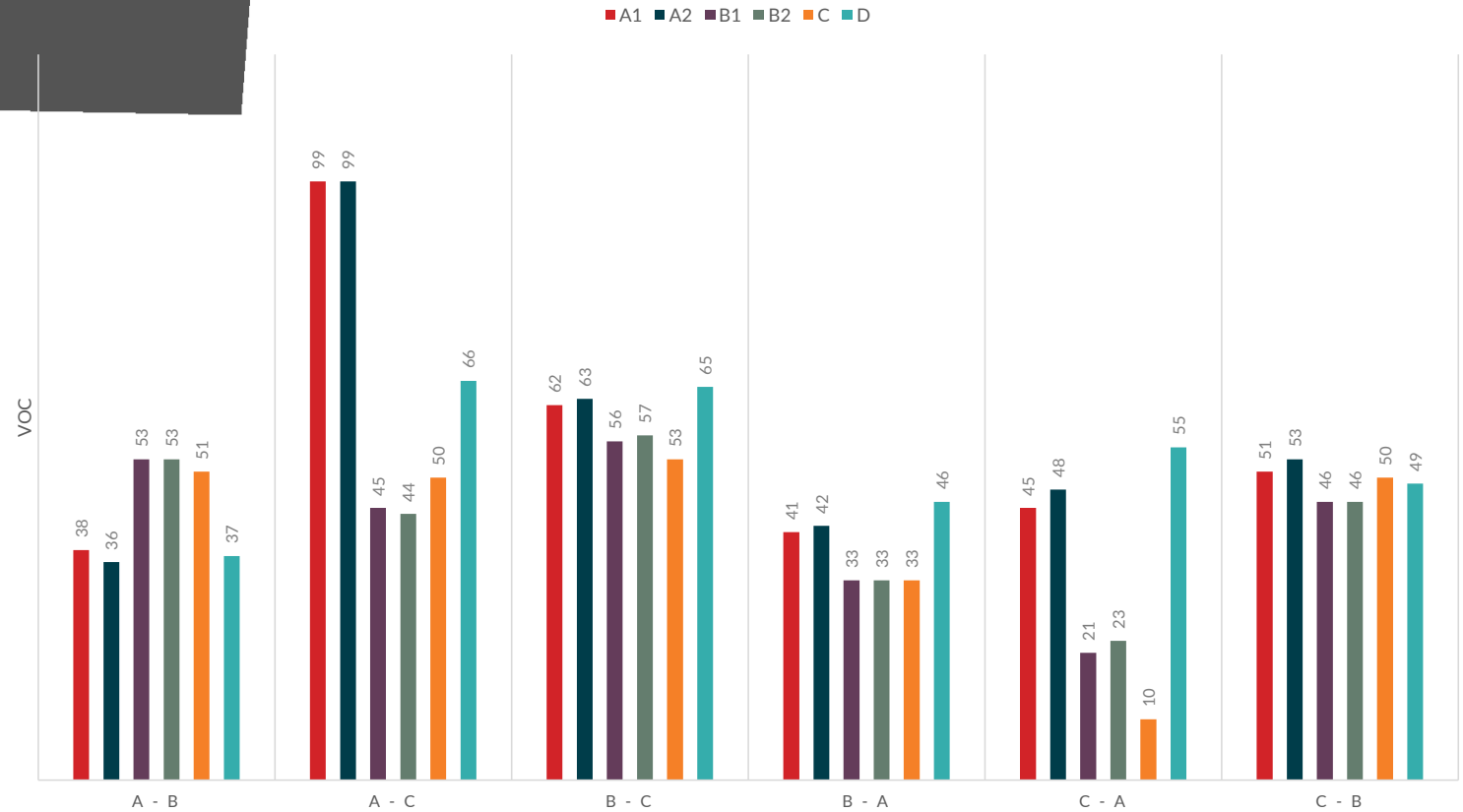
Scenario D Flows to Business Park





Question:
 Will the southern connector roads be needed? ie Scenarios C & D. This will be dependant on the proposed signalised junction at Straffan Road (in snip below) being able to take the additional traffic from the south from Clane/Straffan and wishing to access the junction.

STRAFFAN ROAD JUNCTION - AM VOC

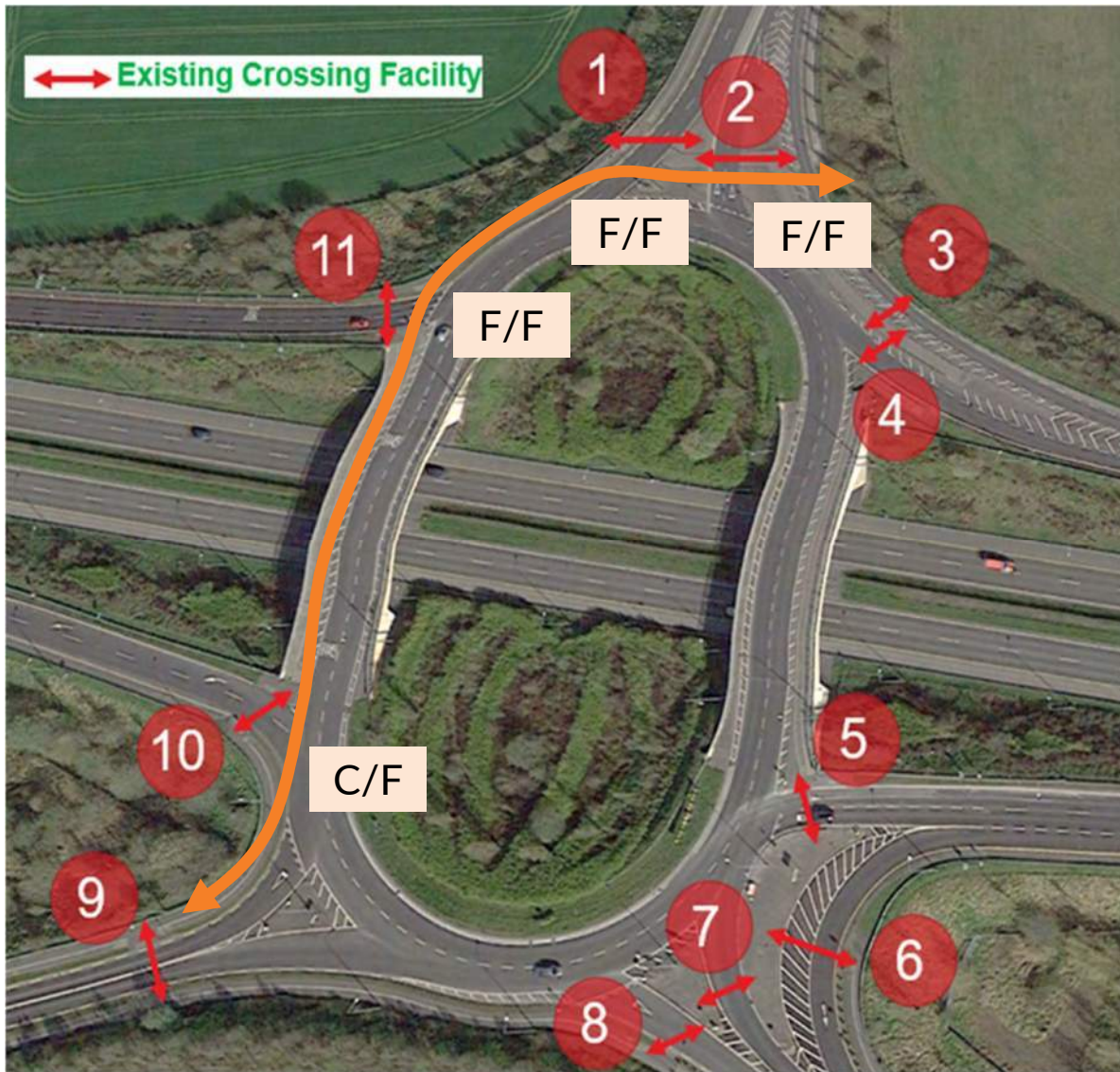


Local Traffic use of Northern Link Road Option

	A1	B1	C	D
1a	369	280	388	372
1b	20	9	24	25
2a	377	265	195	405
2b	416	211	475	177
3a	470	370	374	500
3b	62	25	58	81



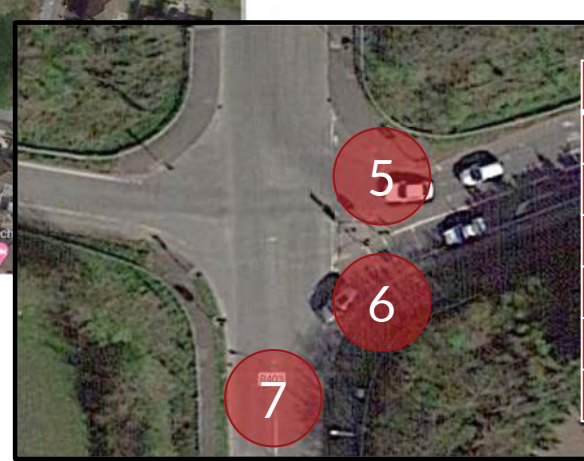
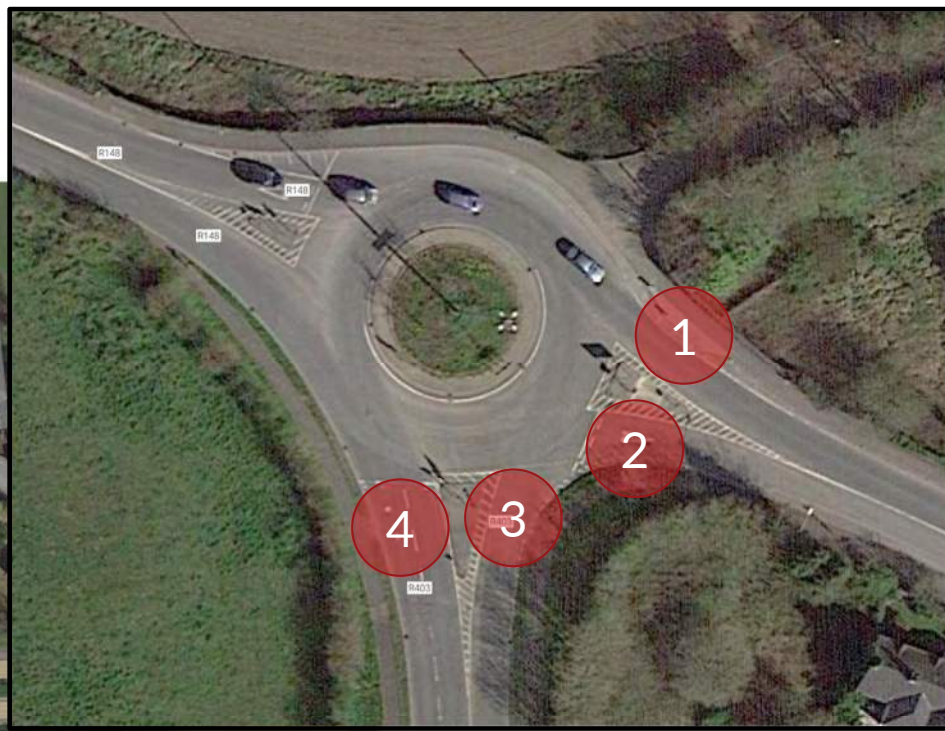
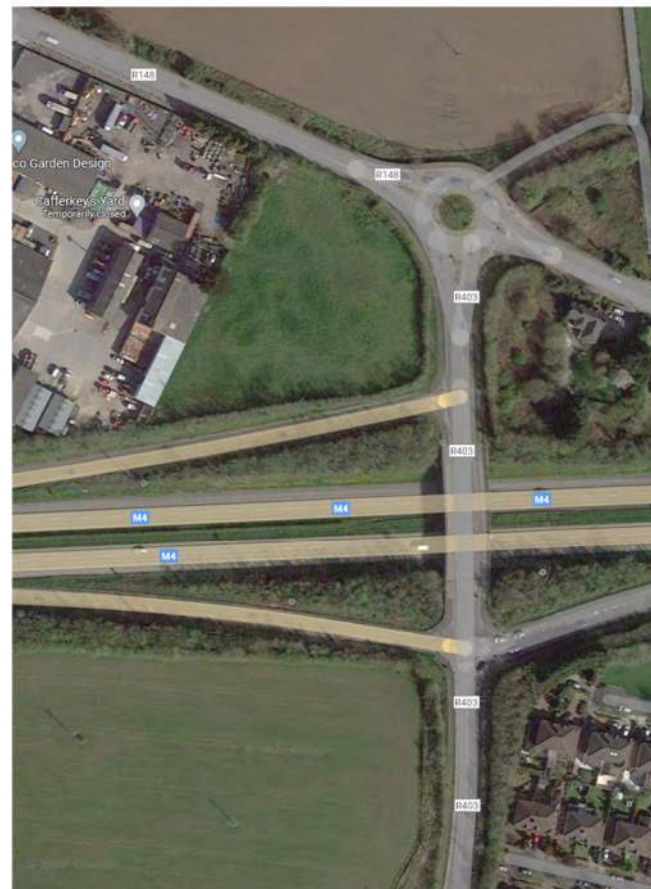
Junction 6



	AM Domin	PM Domin
1	F	F
2	F	F
3	F	F
4	F	E
5	F	F
6	B	A
7	F	F
8	E	A
9	F	F
10	C	F
11	F	F

LOS	COMMENT
A	Usually no conflicting traffic
B	Occasionally some delay due to conflicting traffic
C	Delay noticeable to pedestrians
D	Delay noticeable and irritating
E	Delay approaches tolerance level. Risk-taking behaviour likely.
F	Delay exceeds tolerance level. High likelihood of pedestrian risk taking.

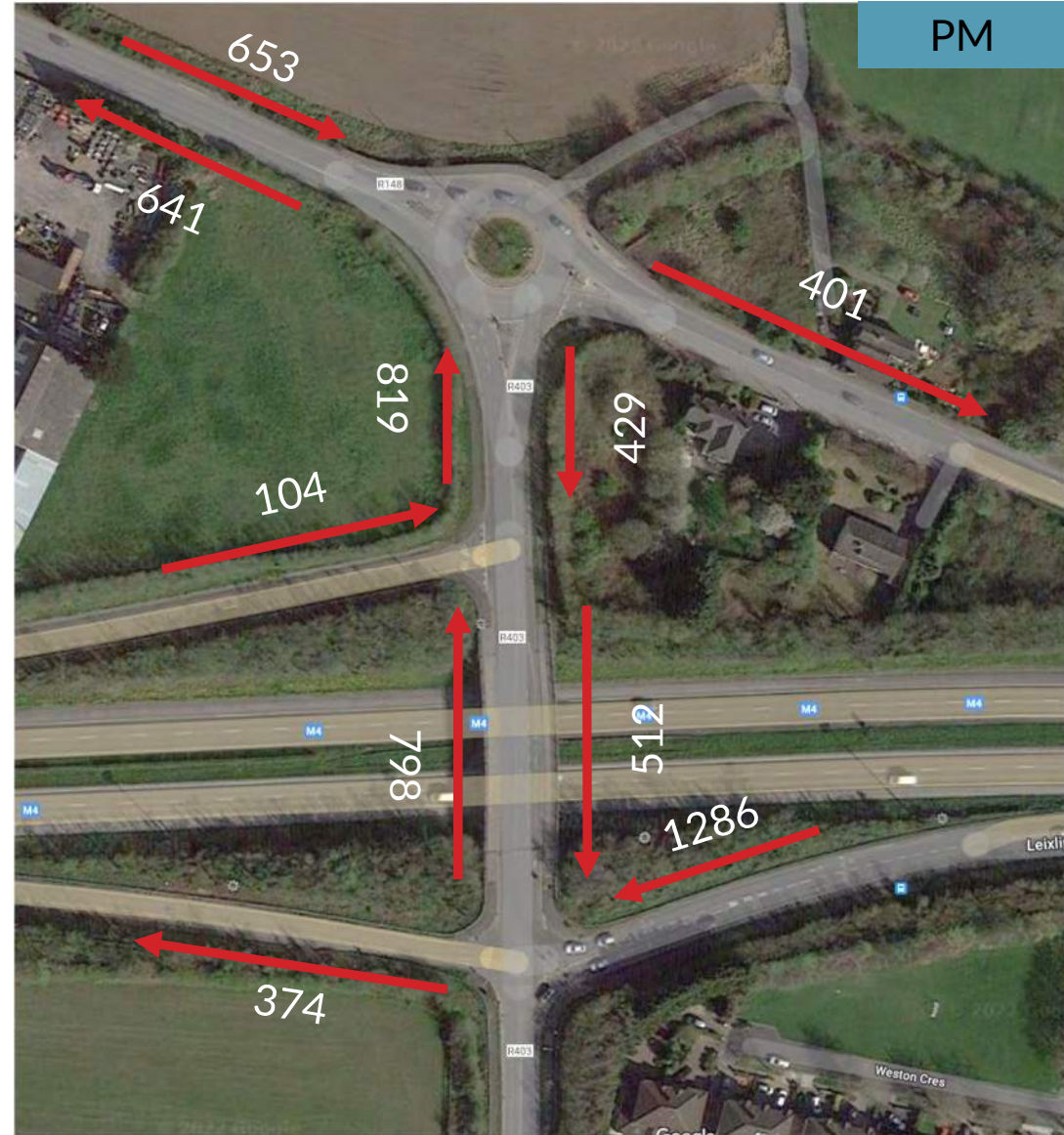
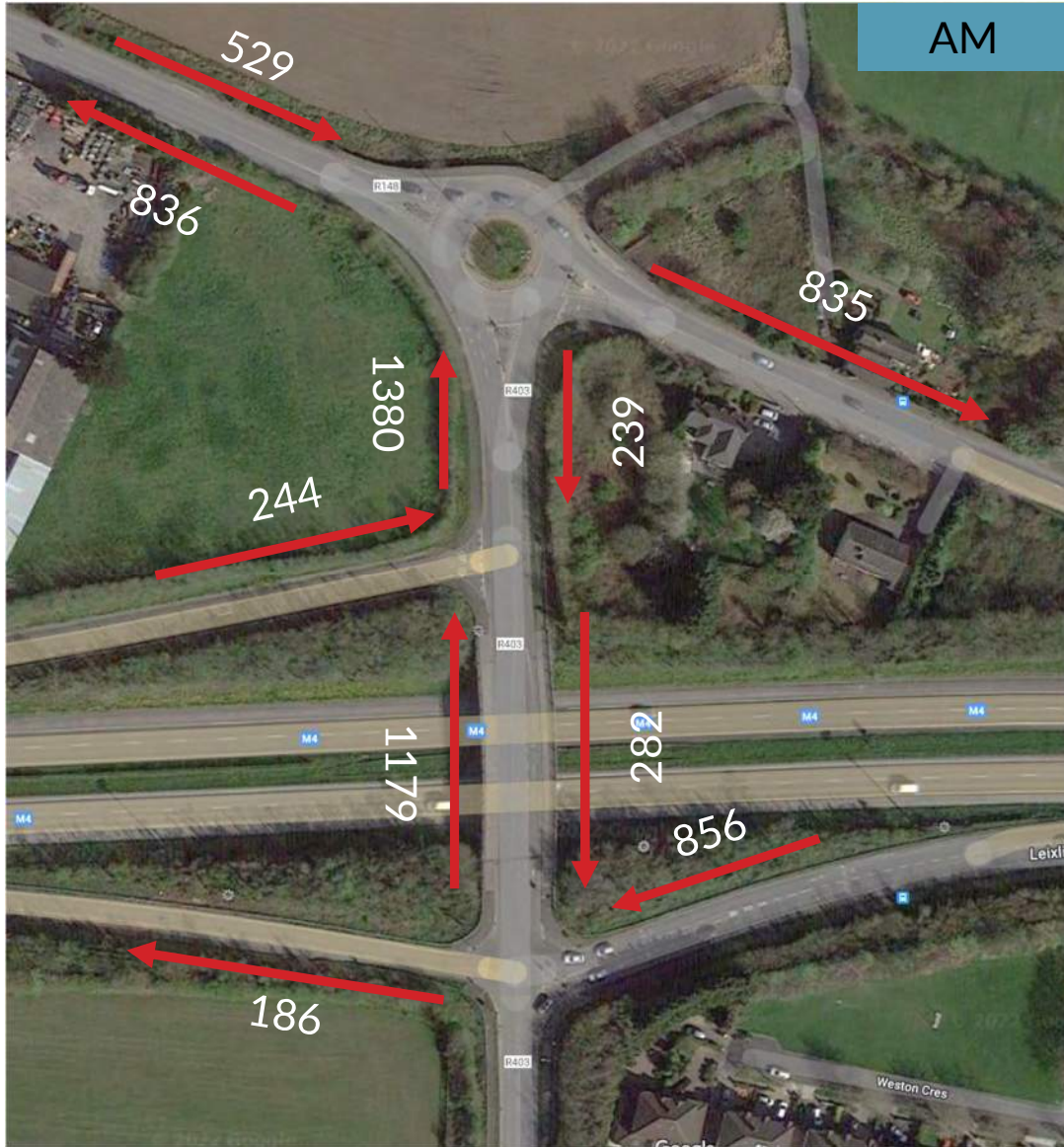
Junction 5



	AM Domin	PM Domin
1	F	F
2	N/A	N/A
3	B	C
4	F	F
5	F	F
6	B	C
7	F	F

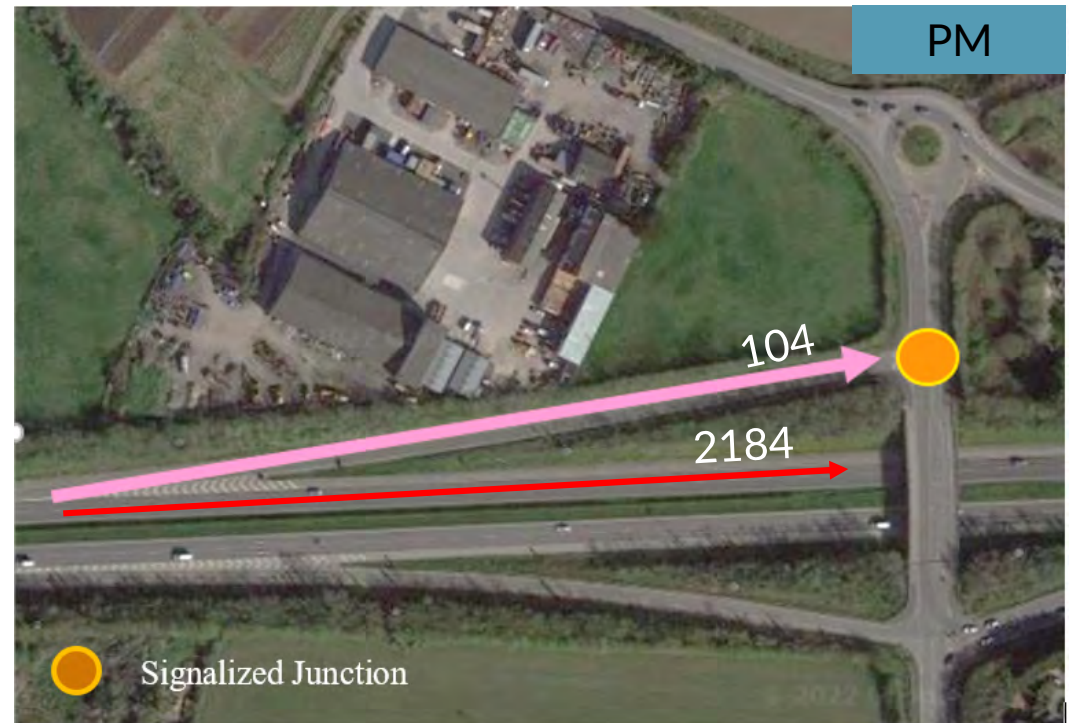
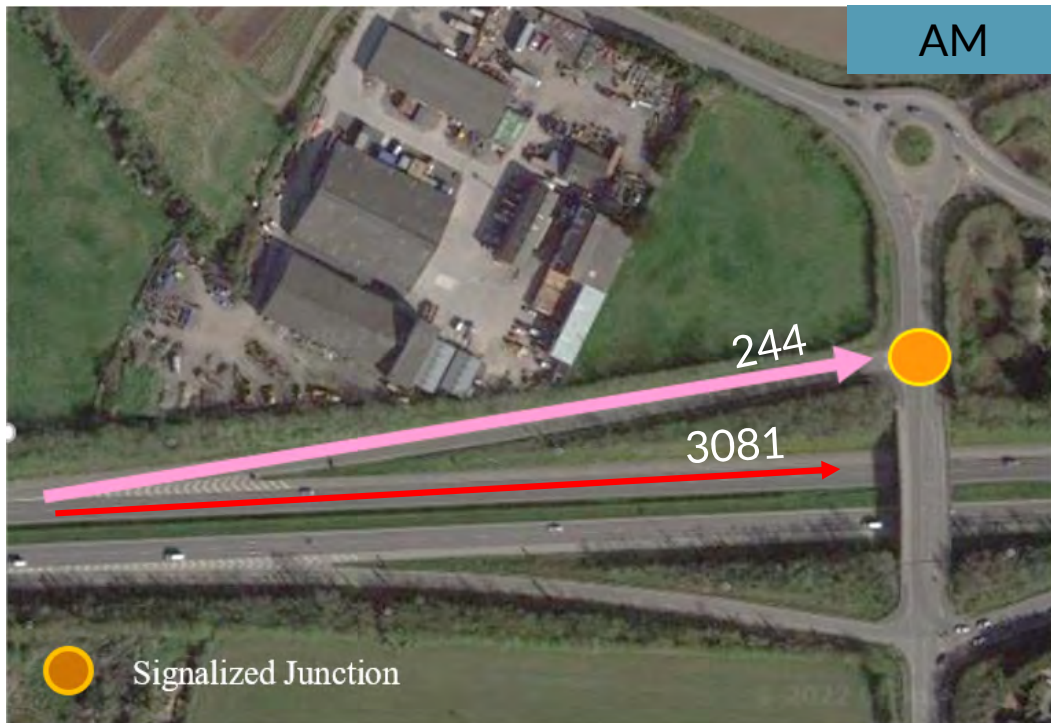
LOS	COMMENT
A	Usually no conflicting traffic
B	Occasionally some delay due to conflicting traffic
C	Delay noticeable to pedestrians
D	Delay noticeable and irritating
E	Delay approaches tolerance level. Risk-taking behaviour likely.
F	Delay exceeds tolerance level. High likelihood of pedestrian risk taking.

Question:
 What are the traffic volumes and movements at the junction in general?



Question:

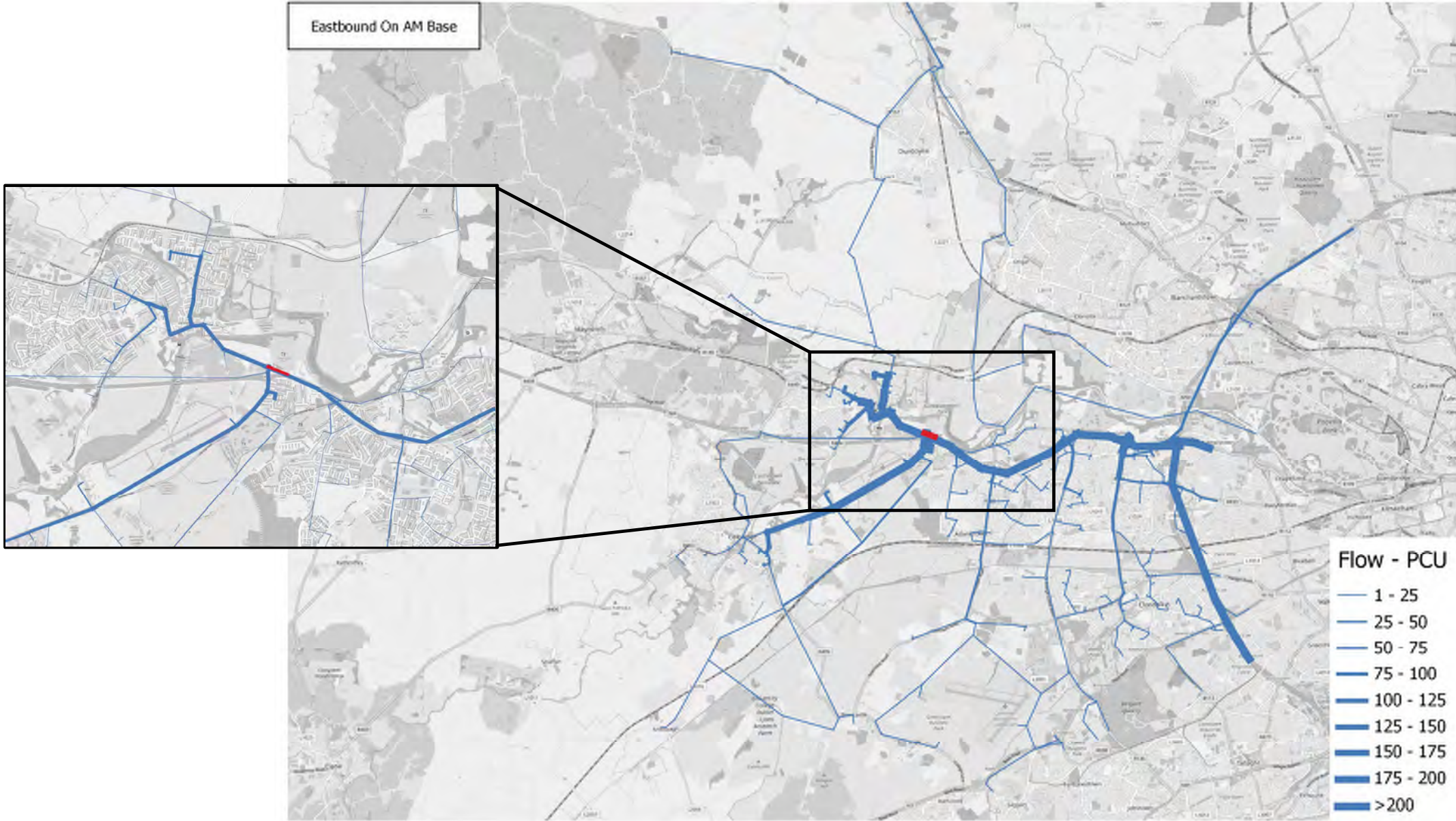
What are the traffic volumes and movements for the EB diverge ?



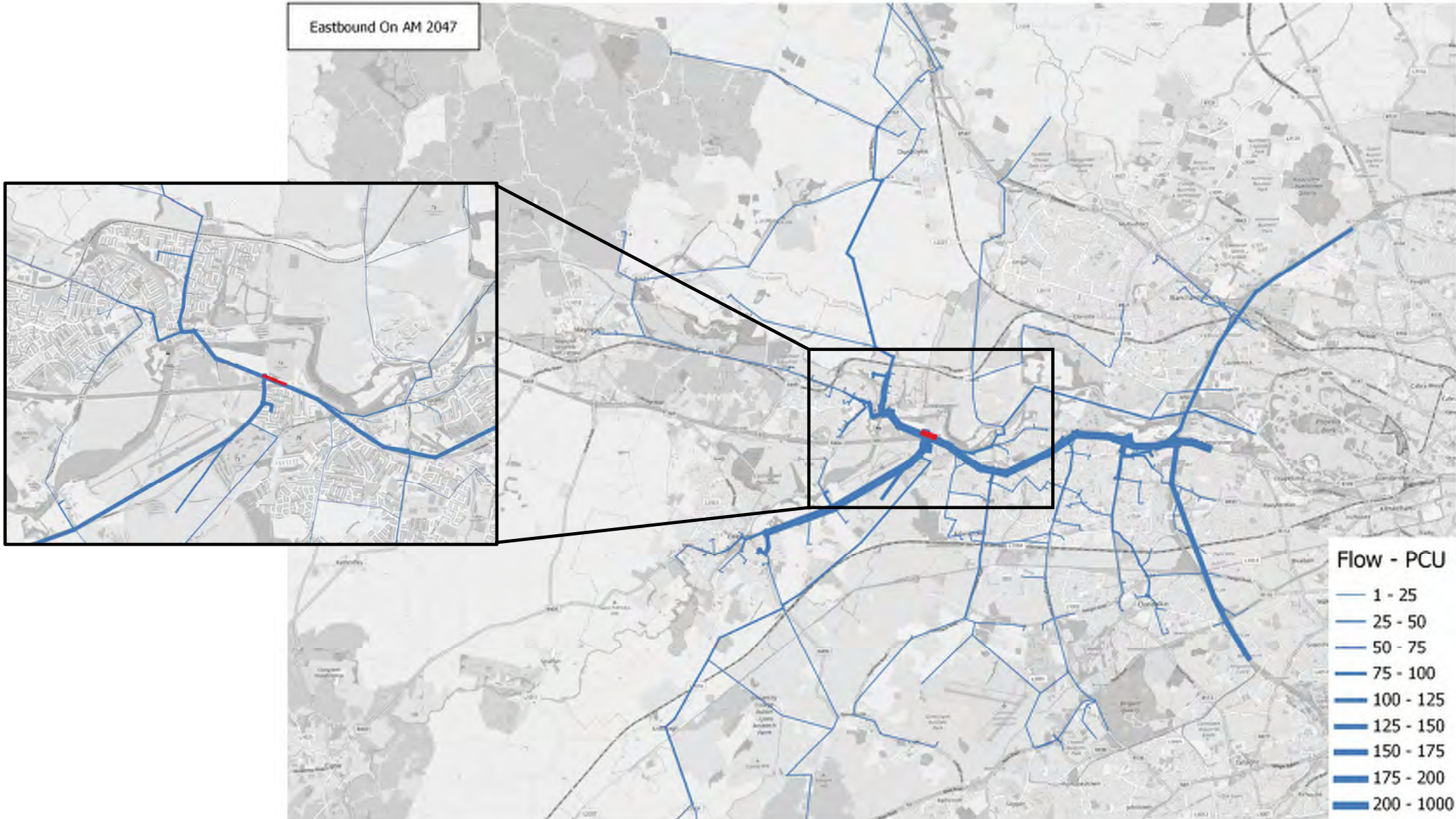
Question:

What are the junction movements - origin and destination?
Existing and future?

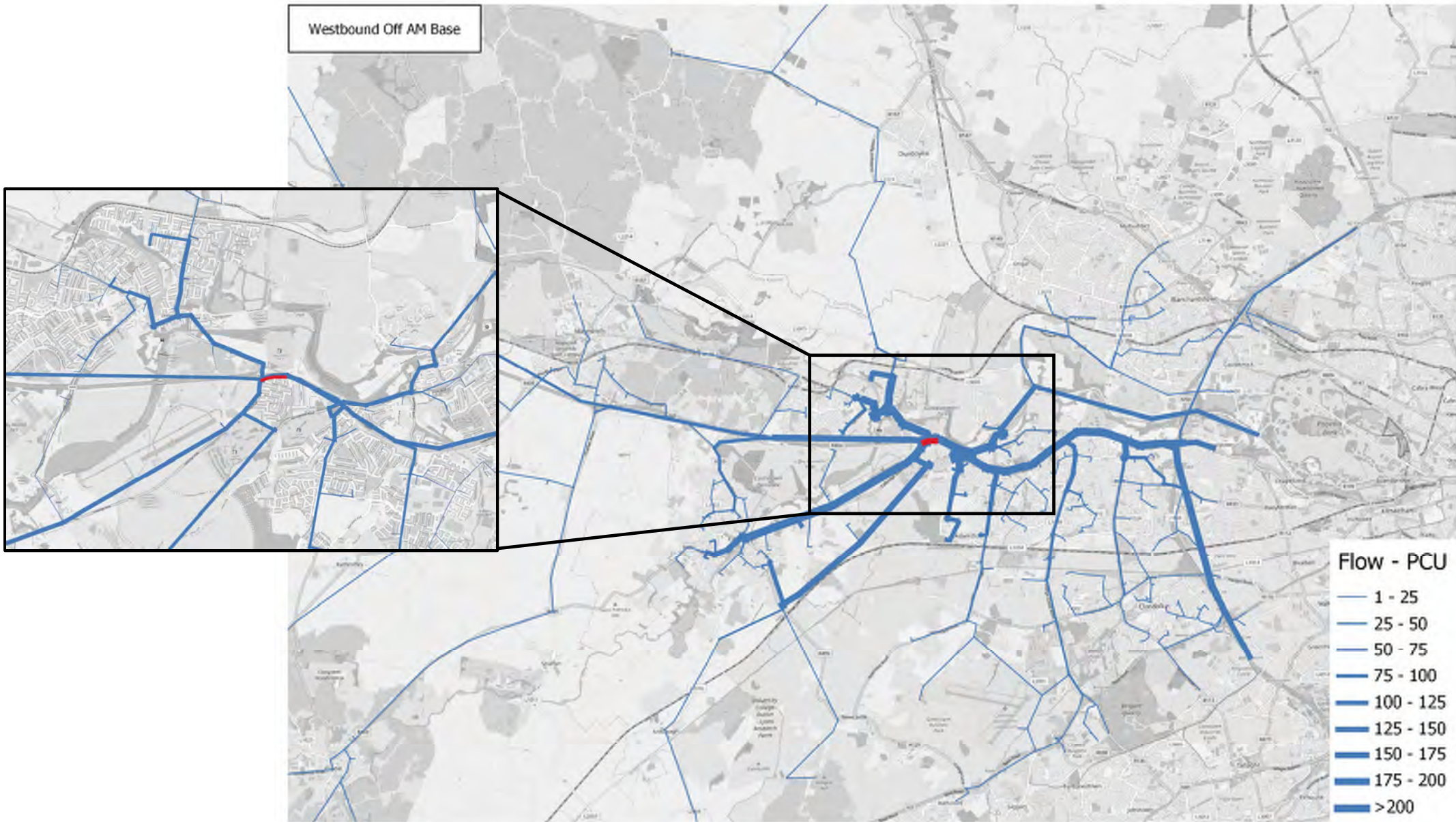
Eastbound On AM Base



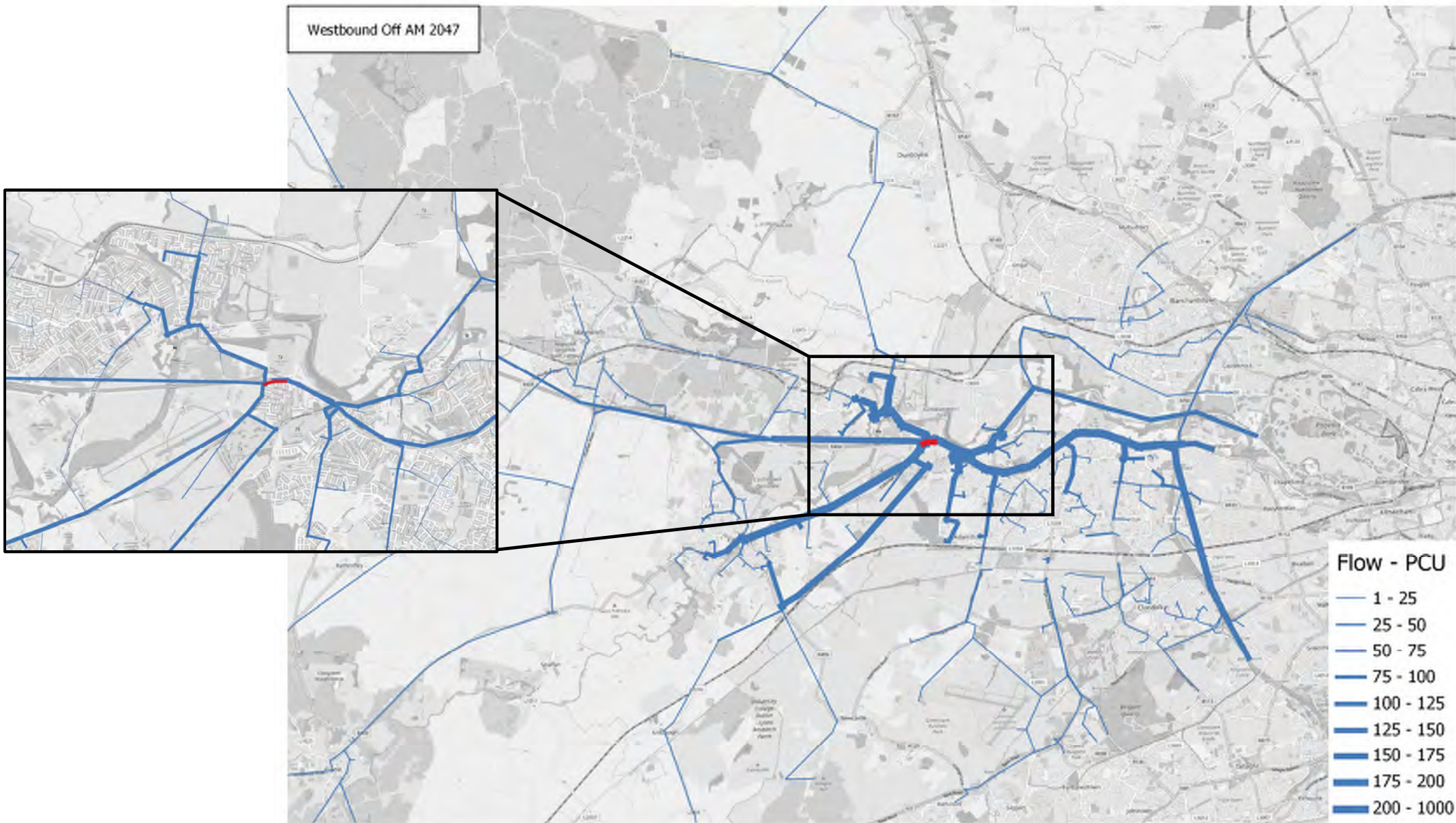
Eastbound On AM 2047



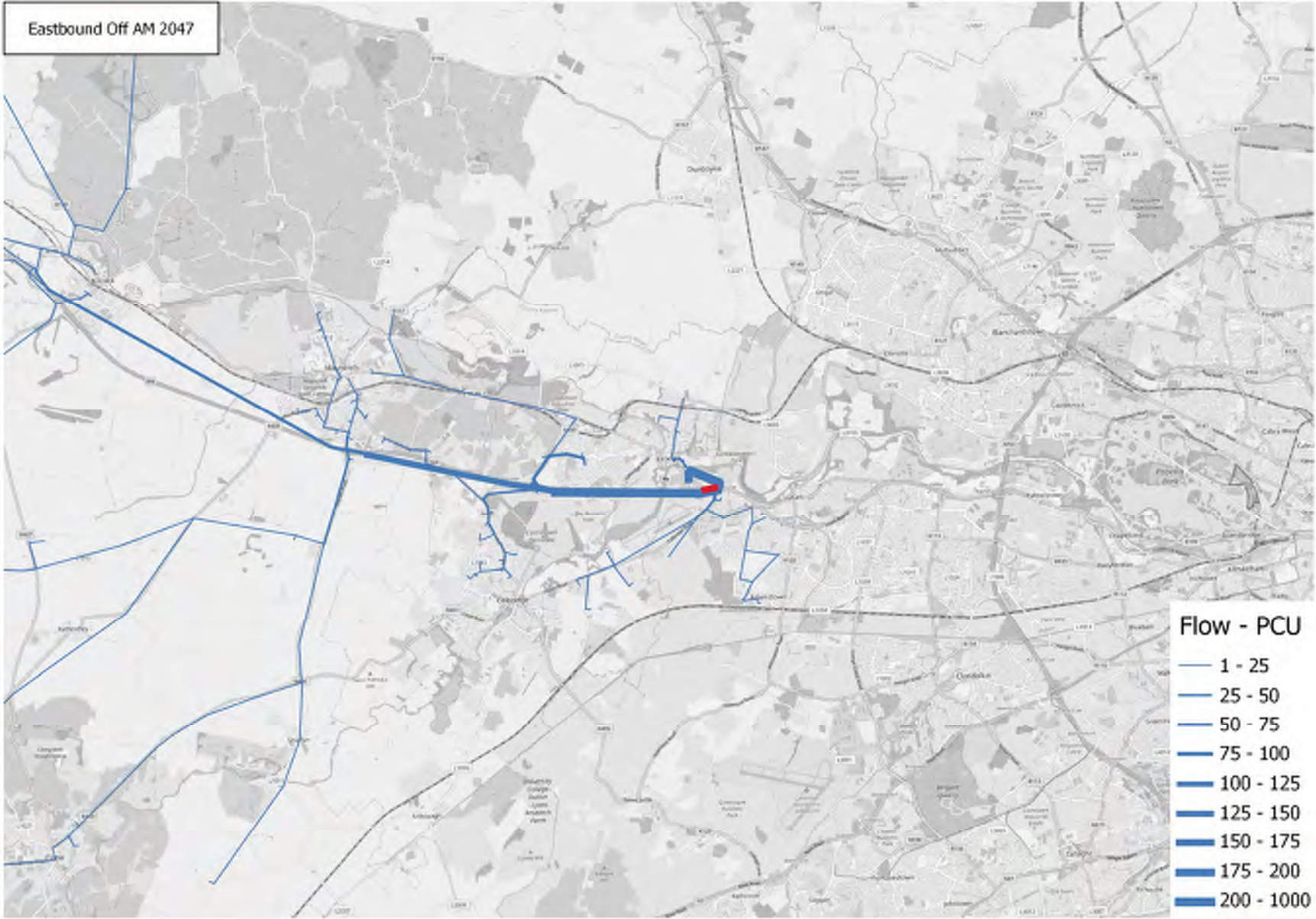
Westbound Off AM Base

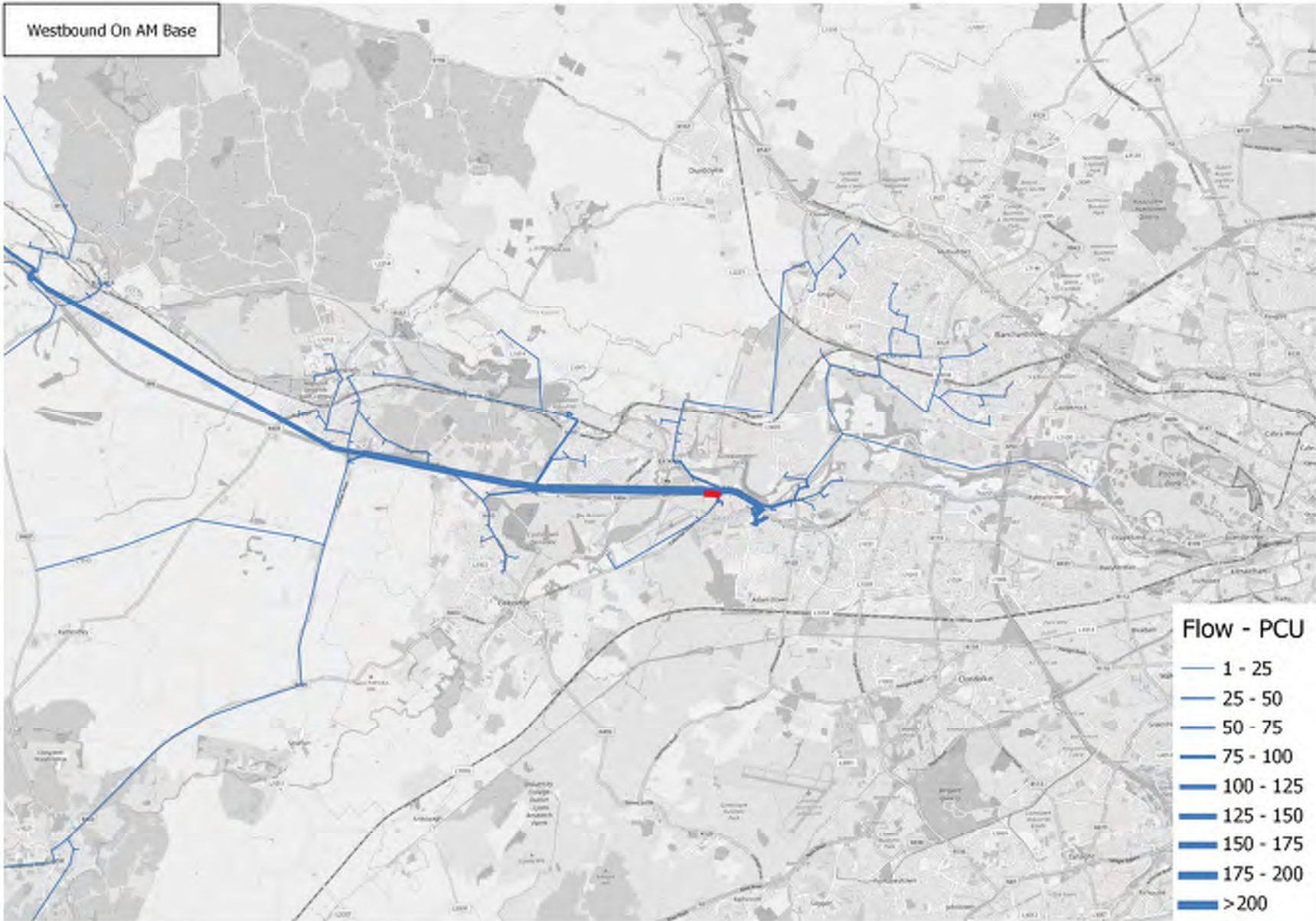


Westbound Off AM 2047

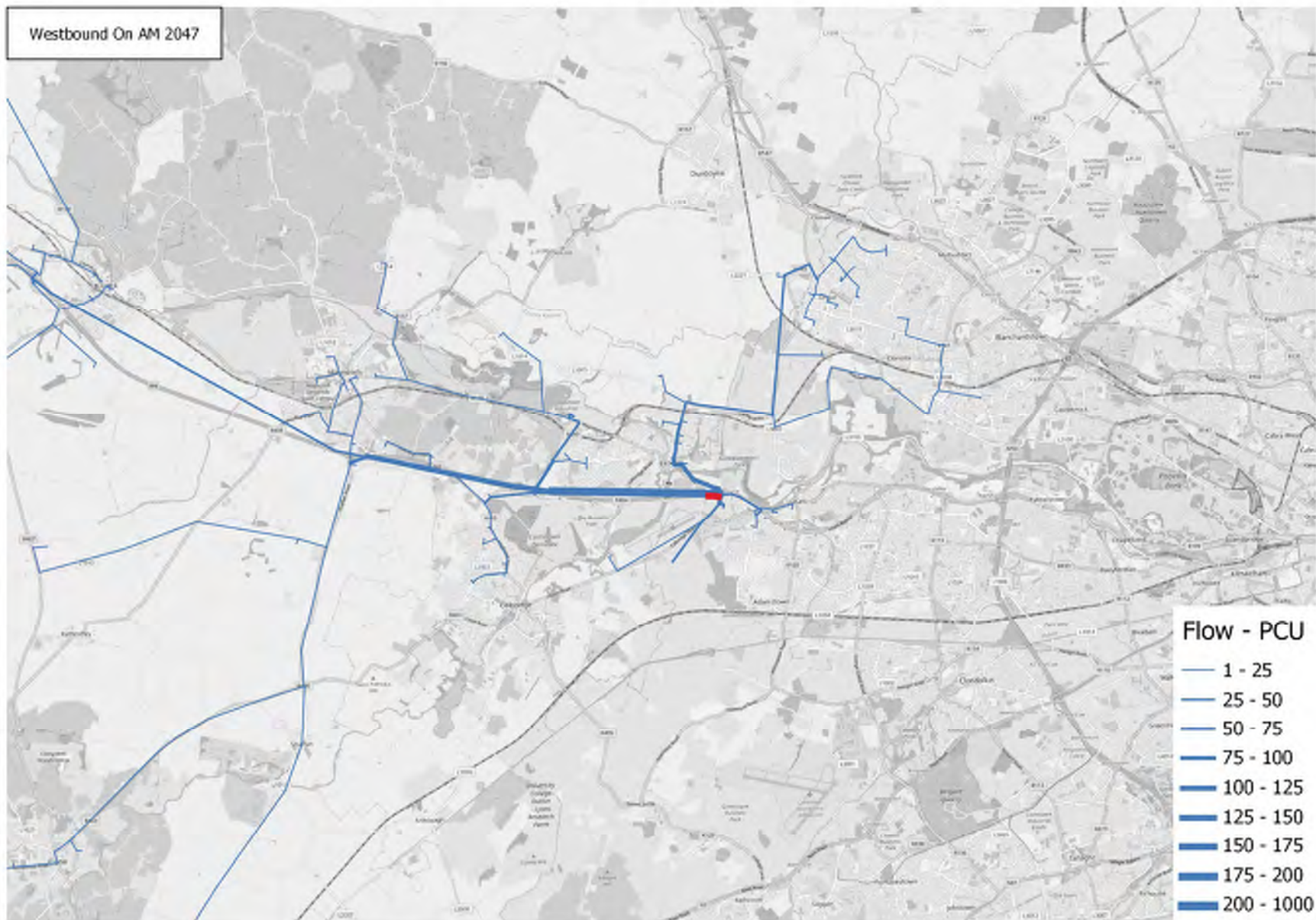








Westbound On AM 2047



Question:

What are the traffic volumes diverging at Junction 4a – from both the M4/N4 and the R148 - Leixlip?



SYSTRA



CONFIDENCE MOVES THE WORLD



MAYNOOTH TO LEIXLIP PROJECT

Appendix 6.4B

Stage 2 PAM

Junction 7 LINSIG and LAM Modelling

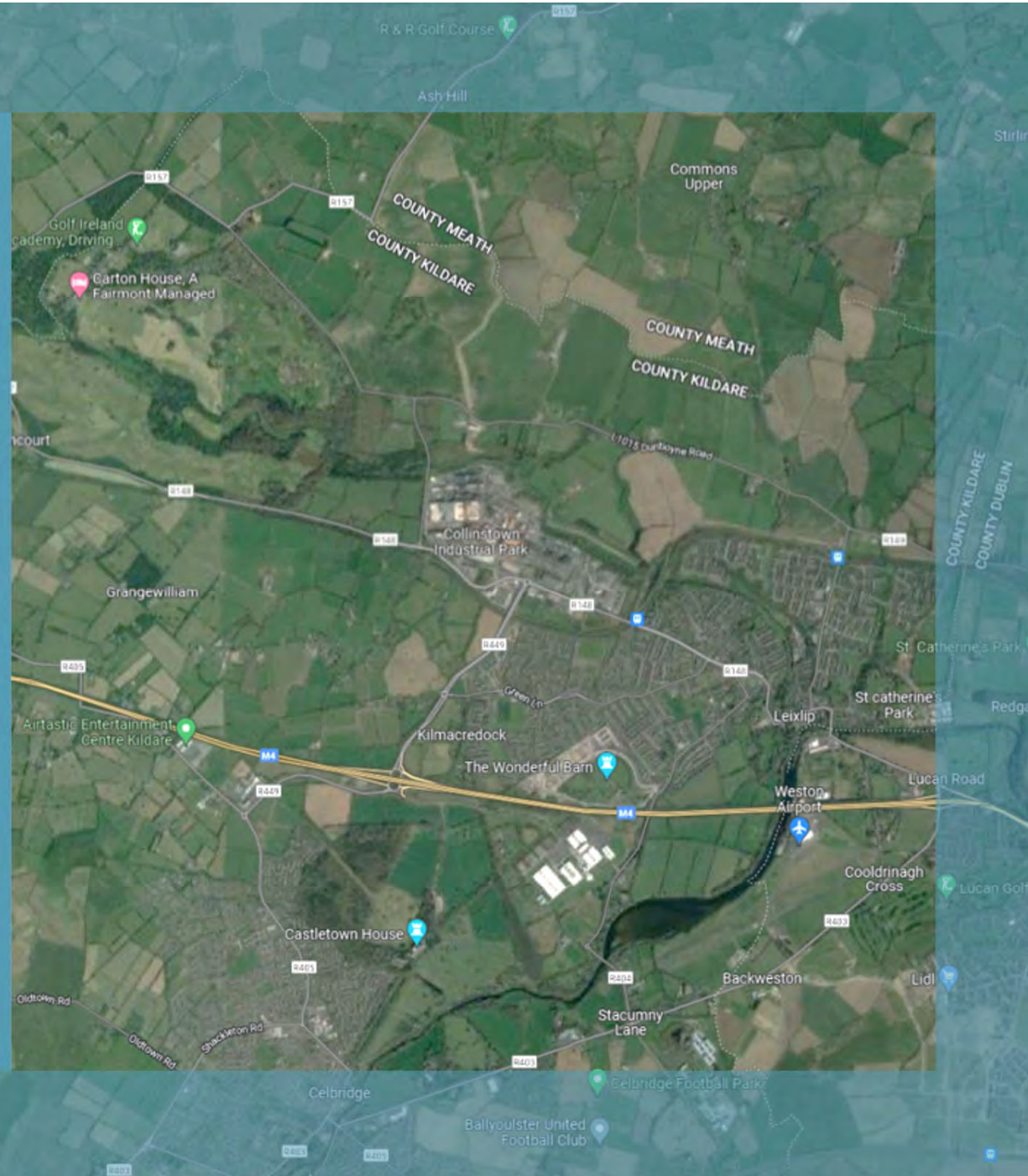
M4/N4

Stage 2 PAM Transport Analysis

Junction 7 Option 1 & Option 2 LINSIG and LAM Testing

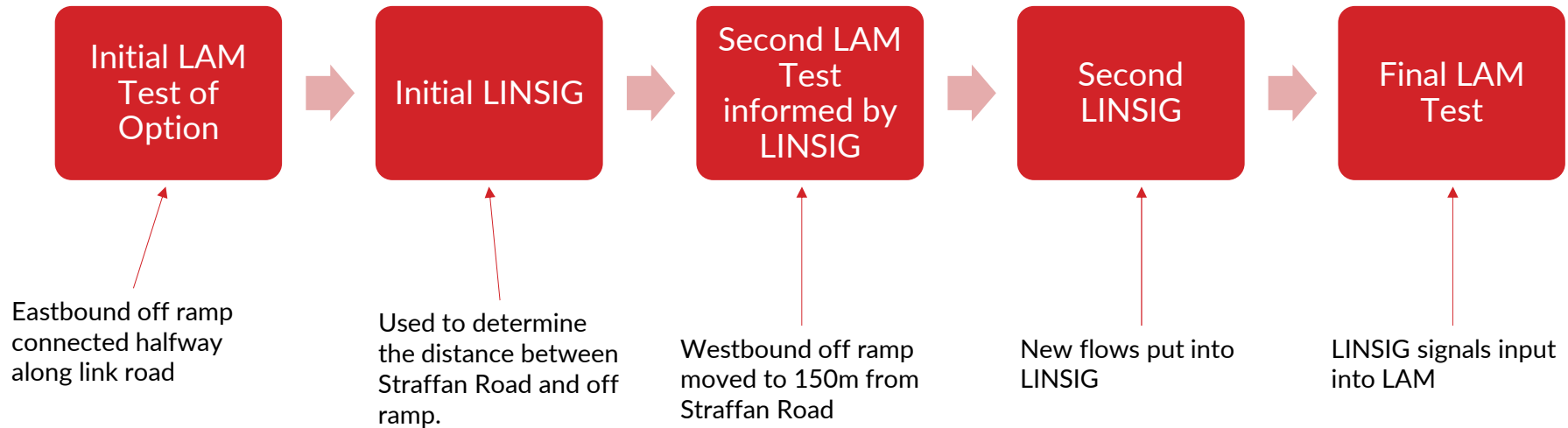
17/07/2023

SYSTRA

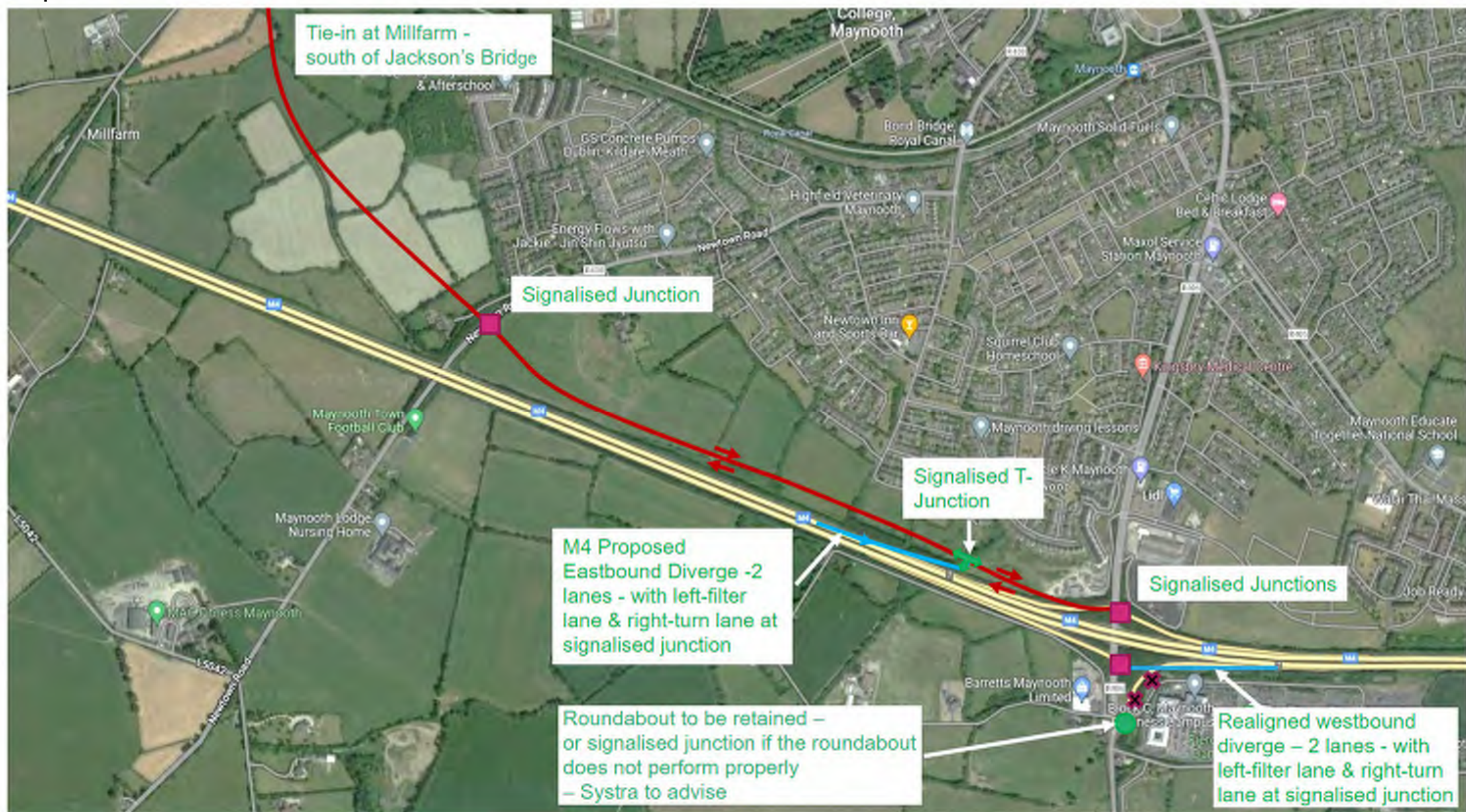


Junction 7 - Option 1

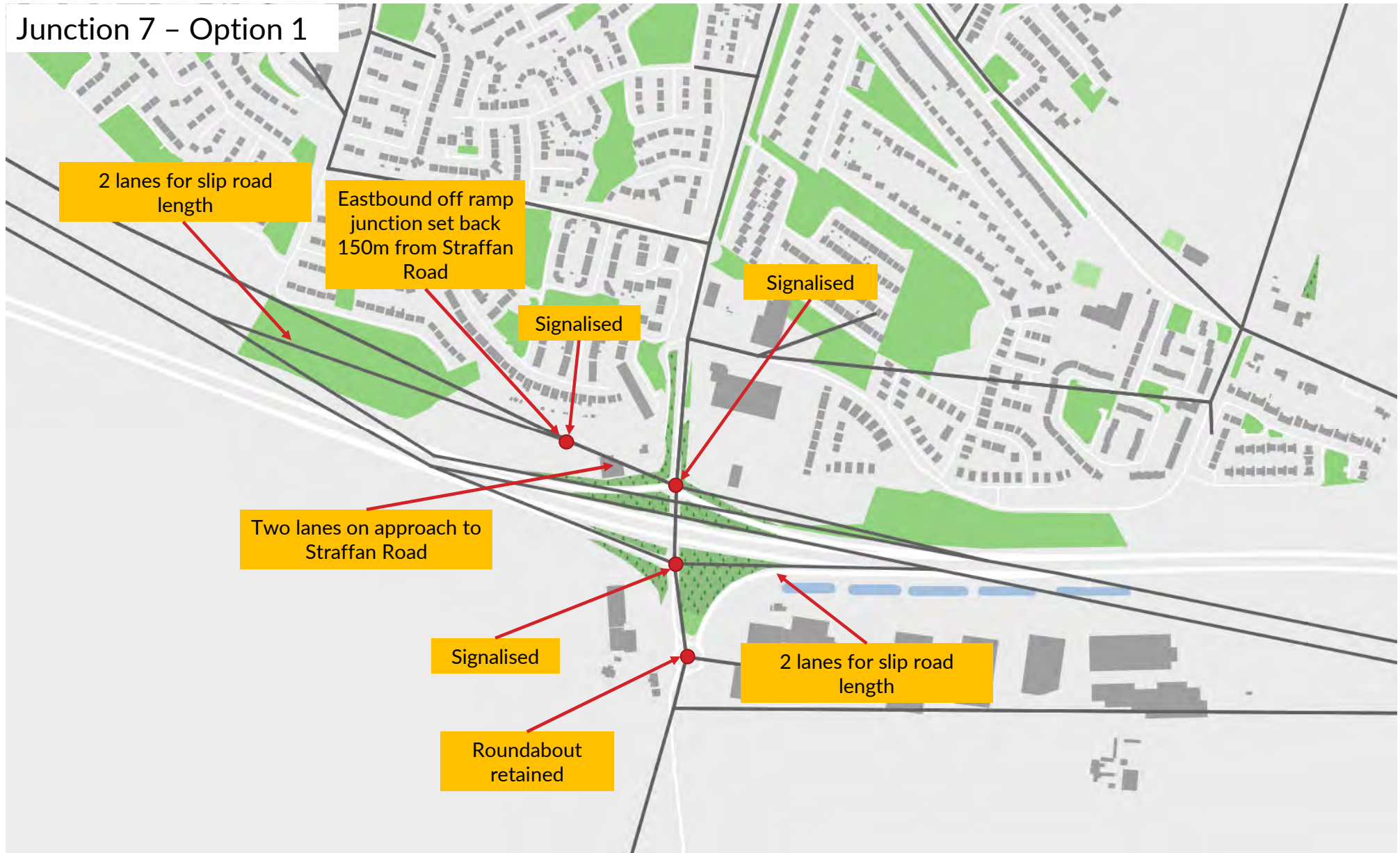
Approach taken to assess Option 1



Option 1



Junction 7 - Option 1



AM - Junction 7 Option 1

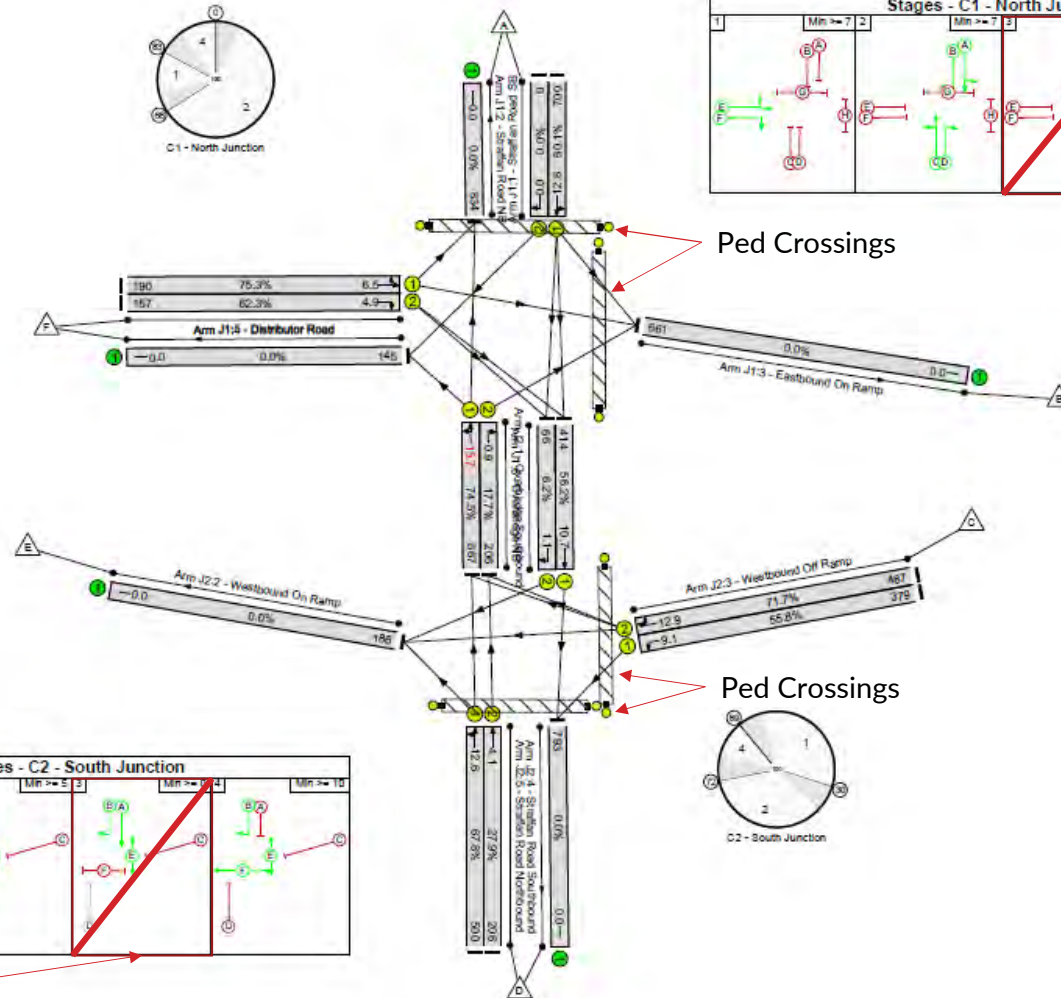
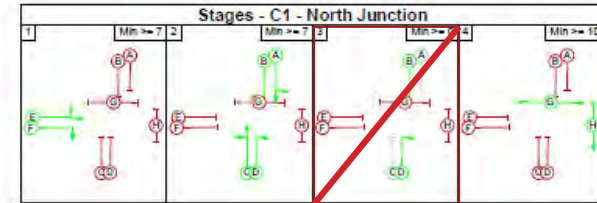
J1 - North Junction
 PRC: 19.5 %
 Total Traffic Delay: 12.8 pcu/h
 Ave. Route Delay Per Ped: 0.0 s/Ped
 Controller: 1



Spare capacity and North and South junction in AM using cycle time of 100s.

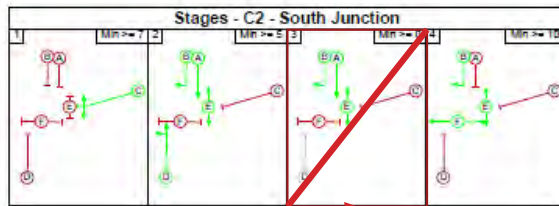
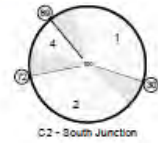
PRC of North Junction - 19.5%

PRC of South Junction - 25.5%



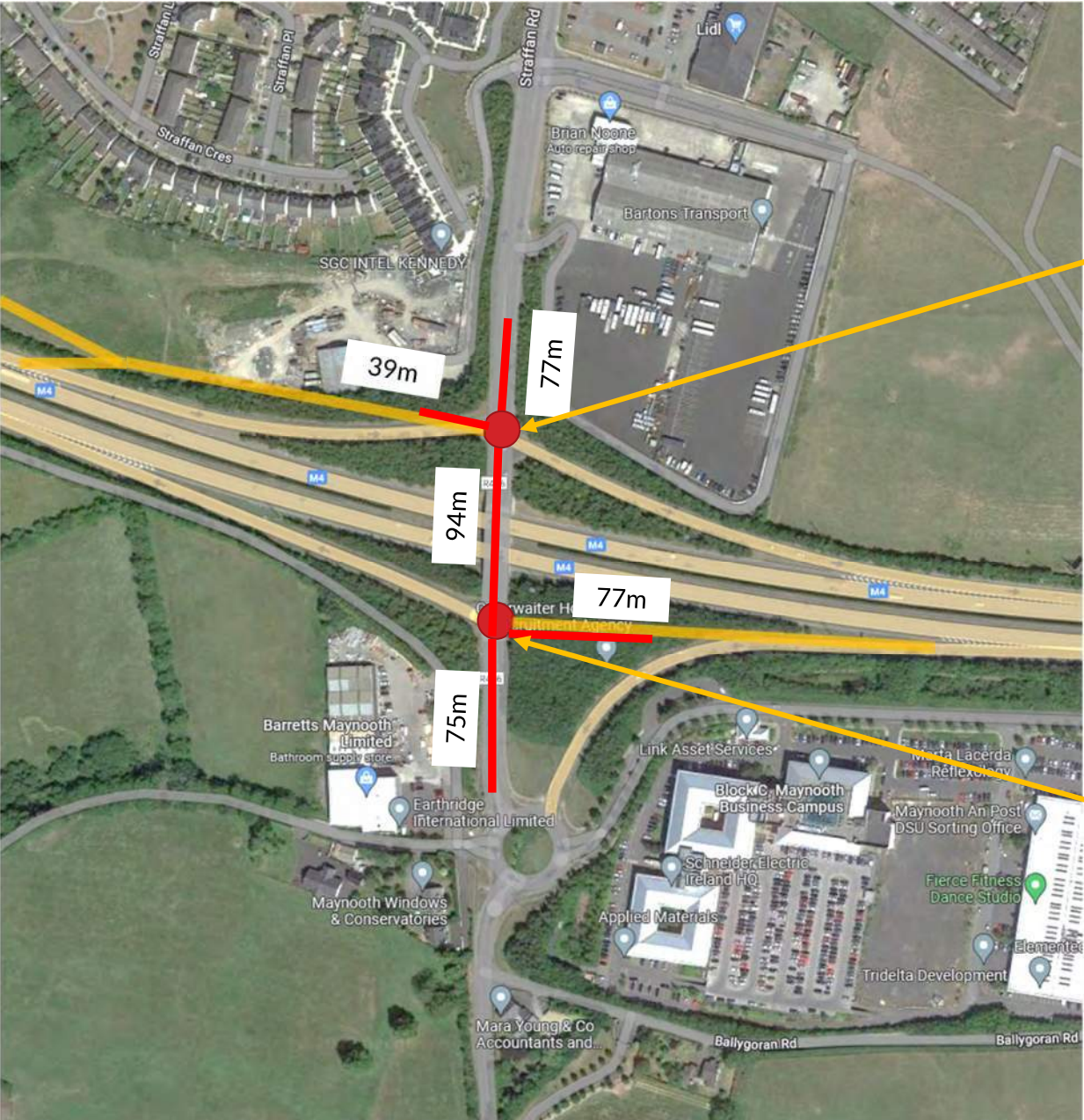
Dedicated right turn phase not required for North Junction

J2 - South Junction
 PRC: 25.5 %
 Total Traffic Delay: 18.8 pcu/h
 Ave. Route Delay Per Ped: 0.0 s/Ped
 Controller: 2



Dedicated right turn phase combined with Ped Crossing for Southern Junction

AM Peak Hour Average Queue Lengths



No major queuing on link road back to eastbound off ramp

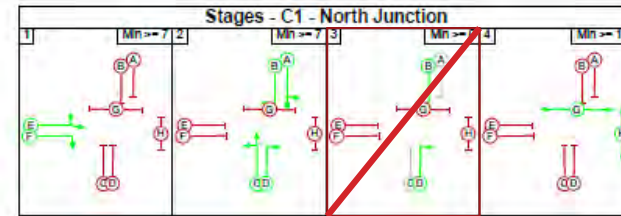
Northbound traffic queuing on overbridge backs up into Southern Junction.

PM – Junction 7 Option 1



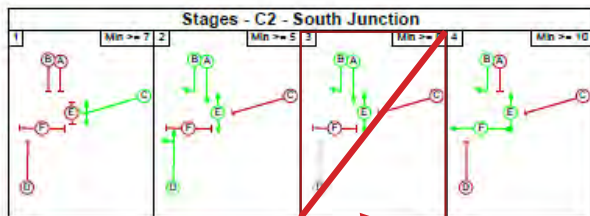
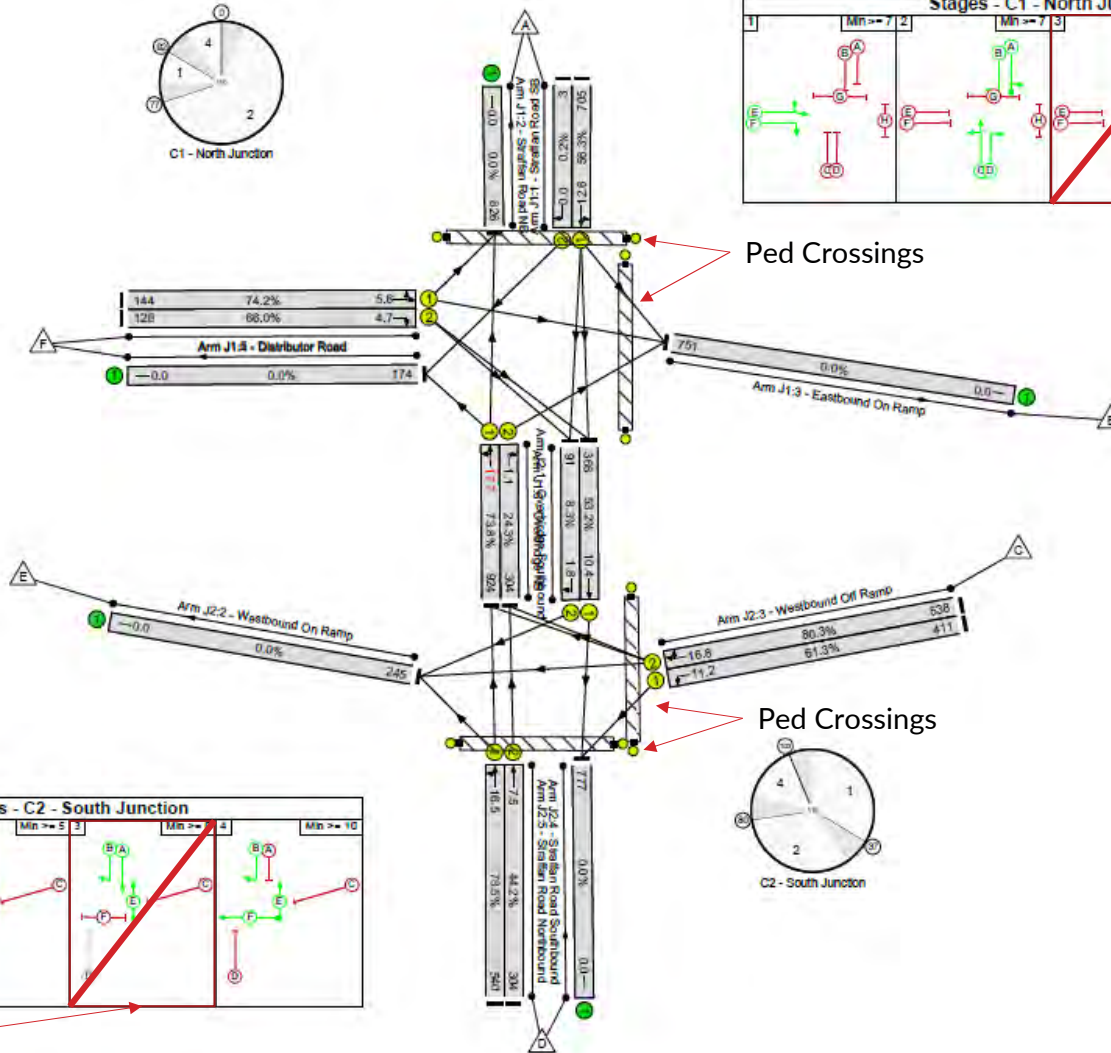
Spare capacity and North and South junction in PM using cycle time of 110s.

PRC of North Junction – 21.3%
 PRC of South Junction – 12.1%



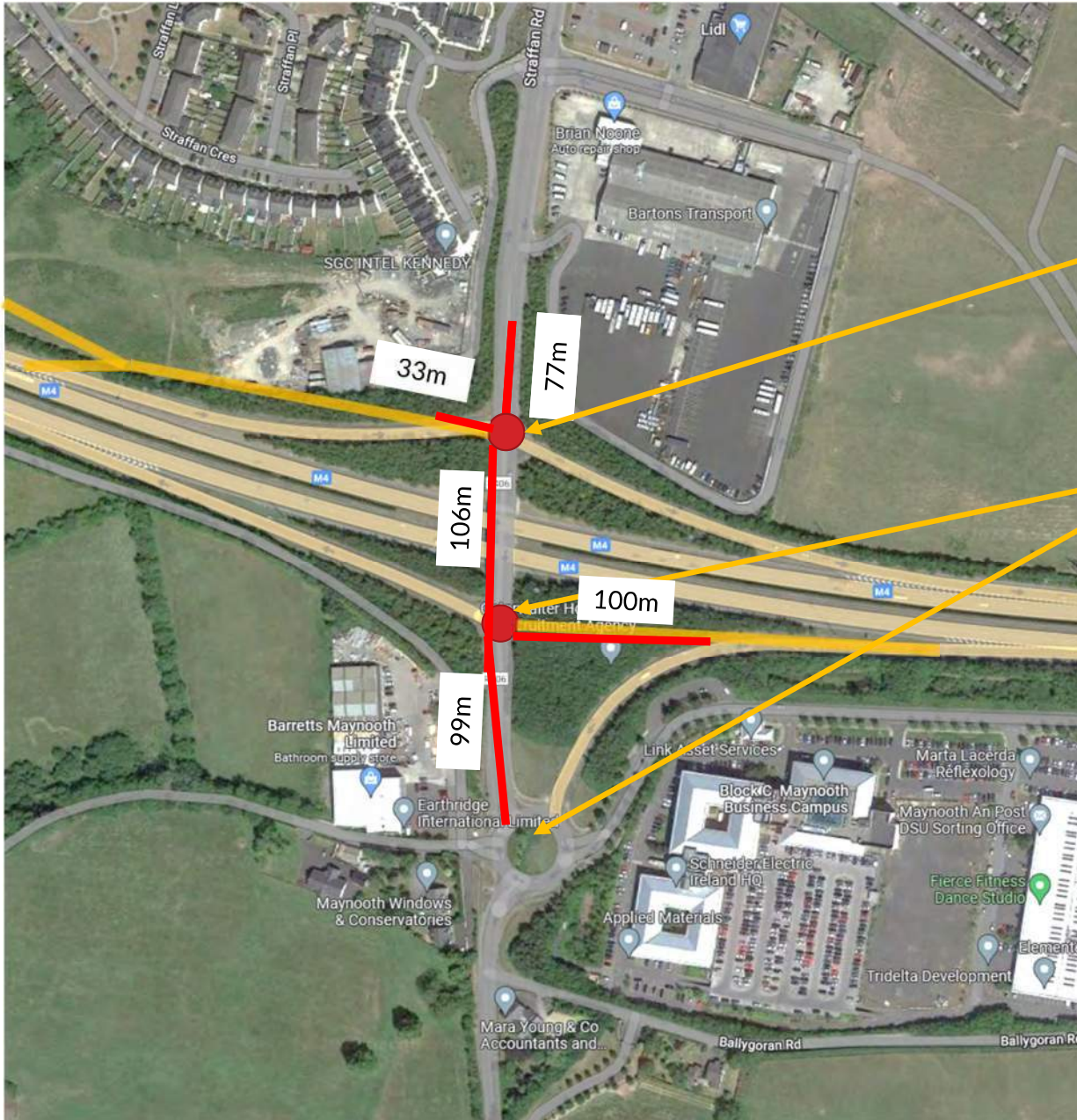
Ped Crossings

Dedicated right turn phase not required for North Junction



Dedicated right turn phase combined with Ped Crossing for Southern Junction

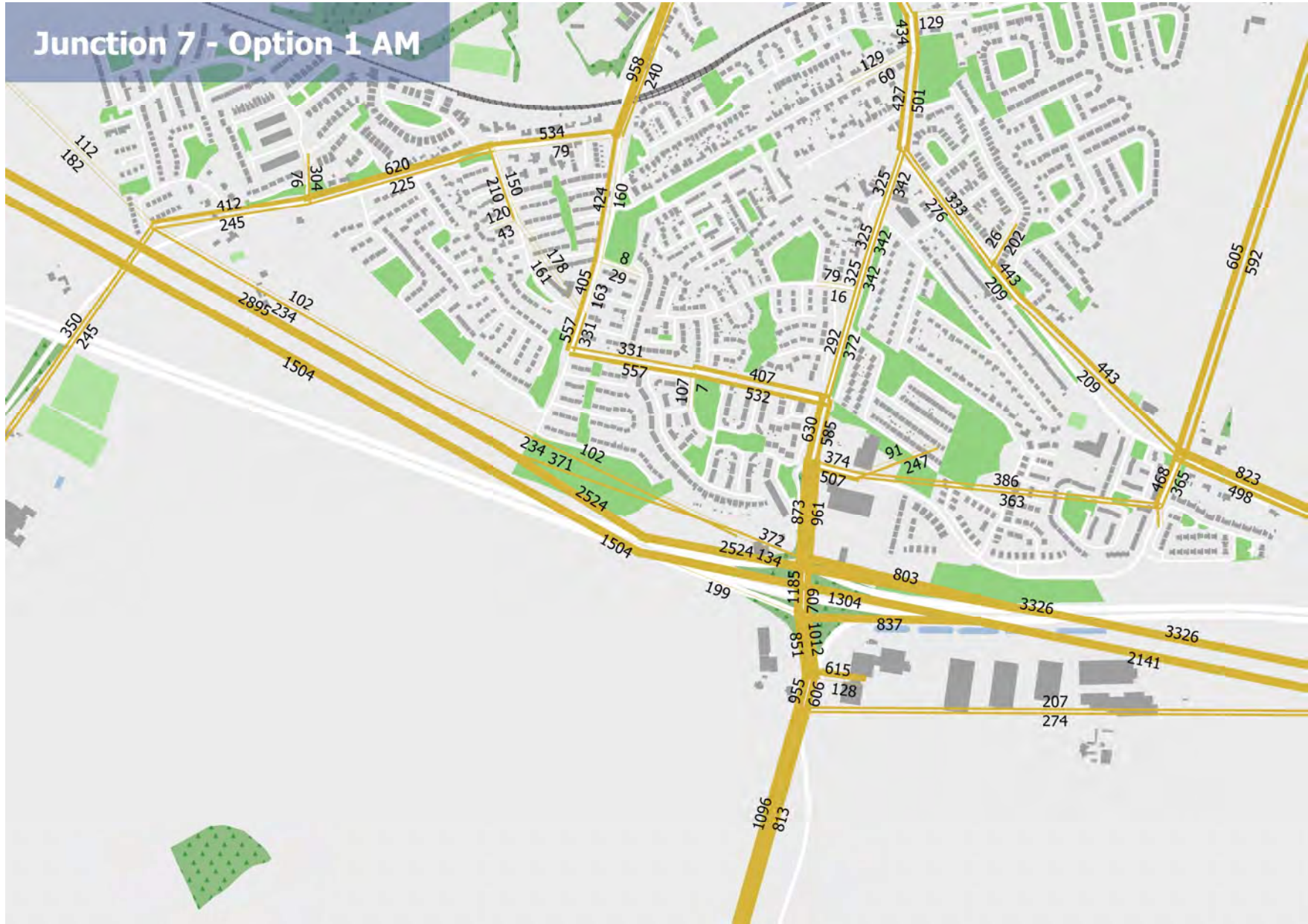
PM Peak Hour Average Queue Lengths



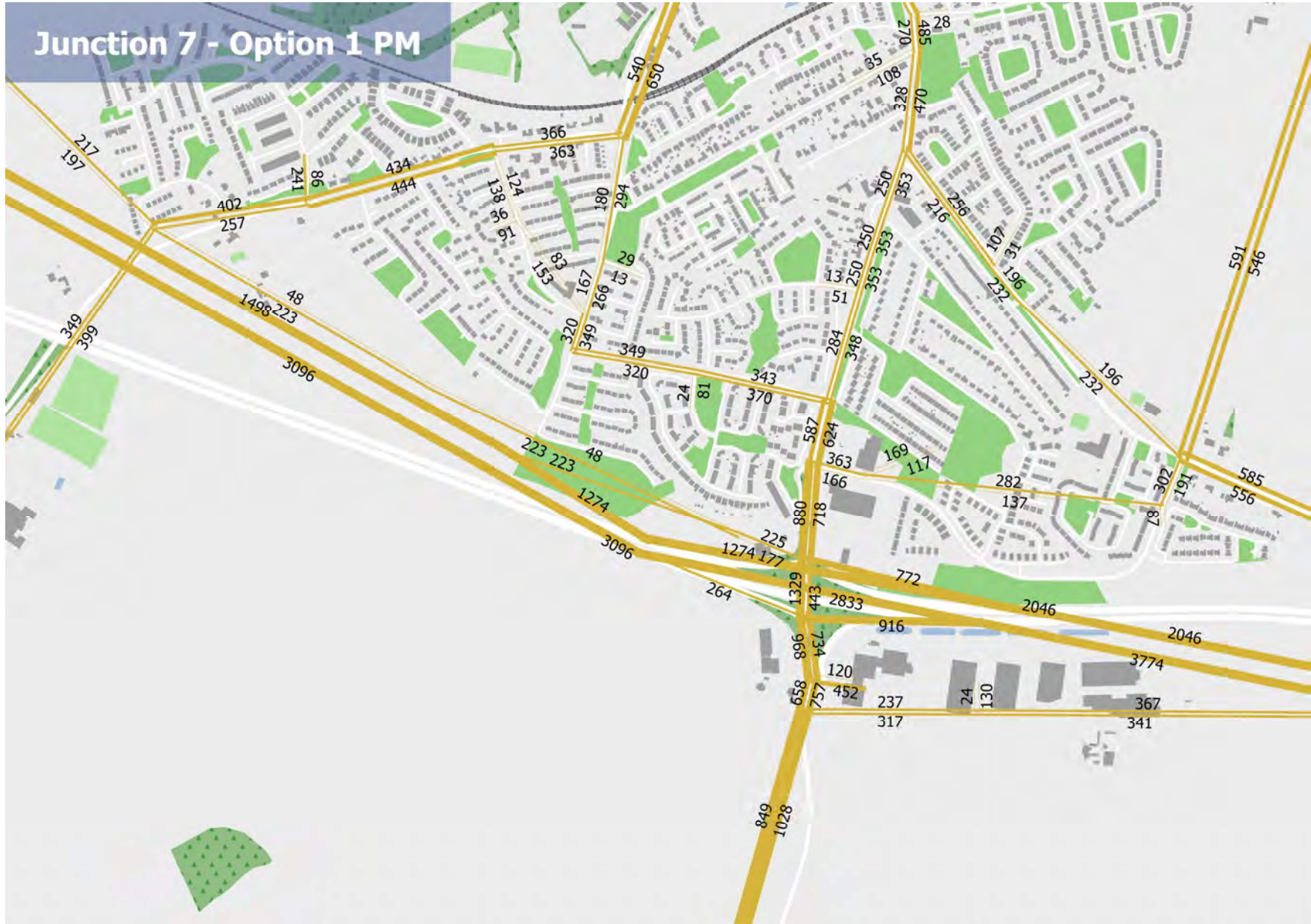
No major queuing on link road back to eastbound off ramp

Northbound traffic queuing on overbridge backs up through Southern Junction and to the edge of the roundabout at the business park.

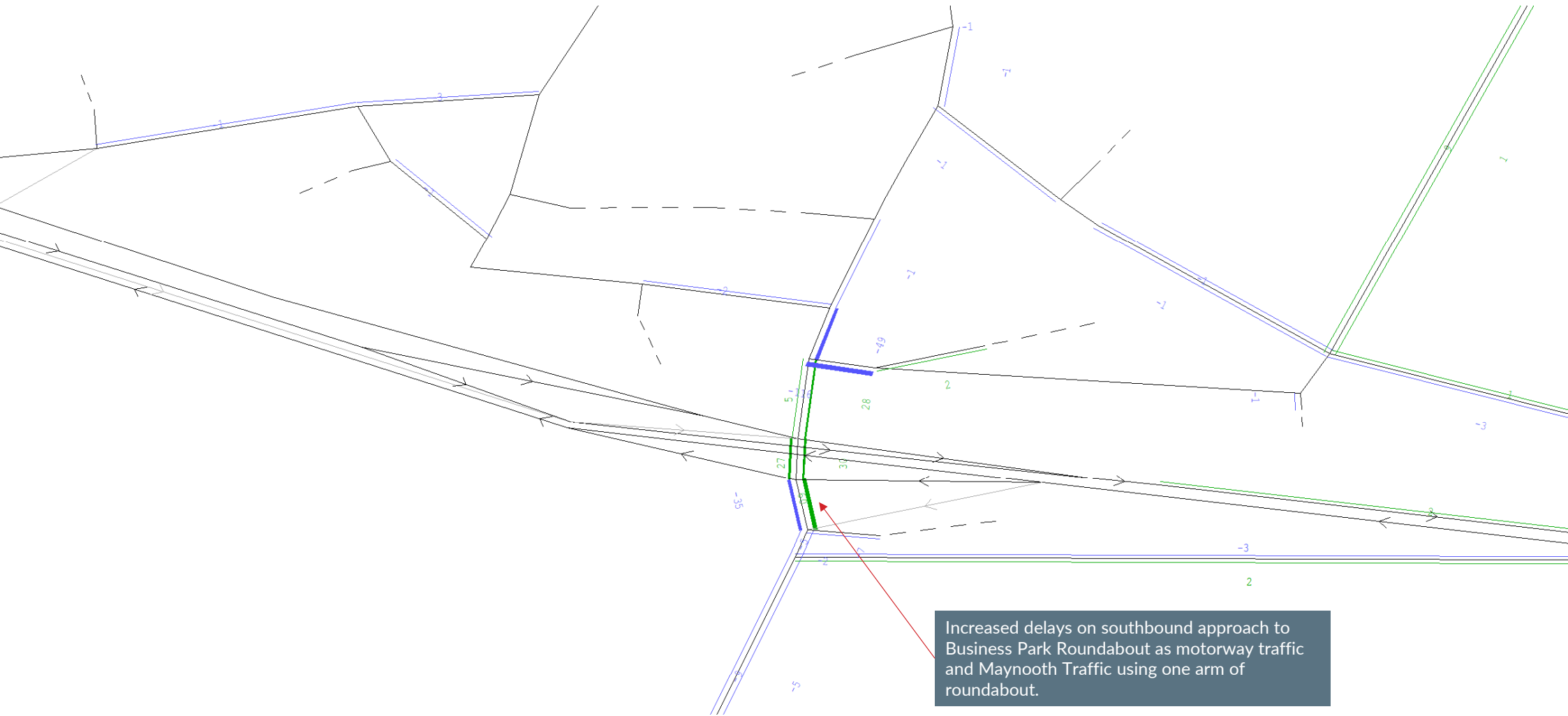
Junction 7 - Option 1 AM



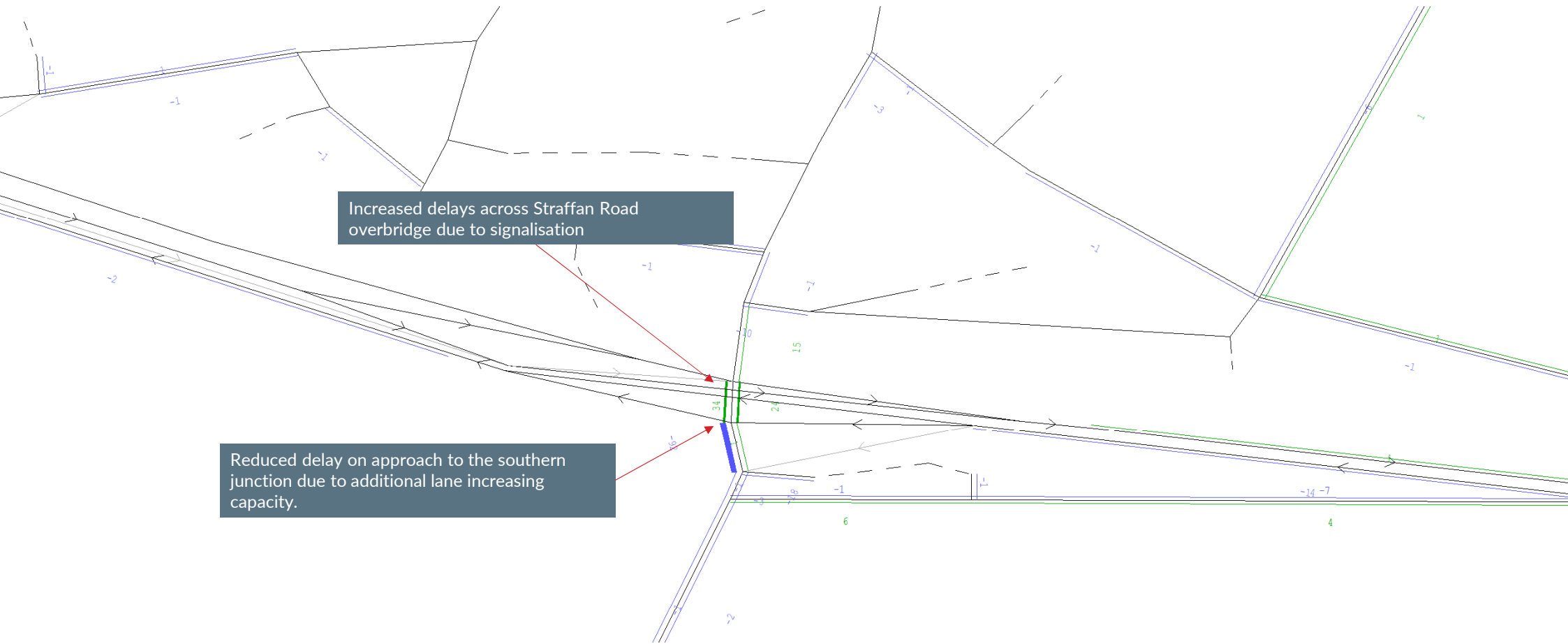
Junction 7 - Option 1 PM



AM – Junction 7 Option 1



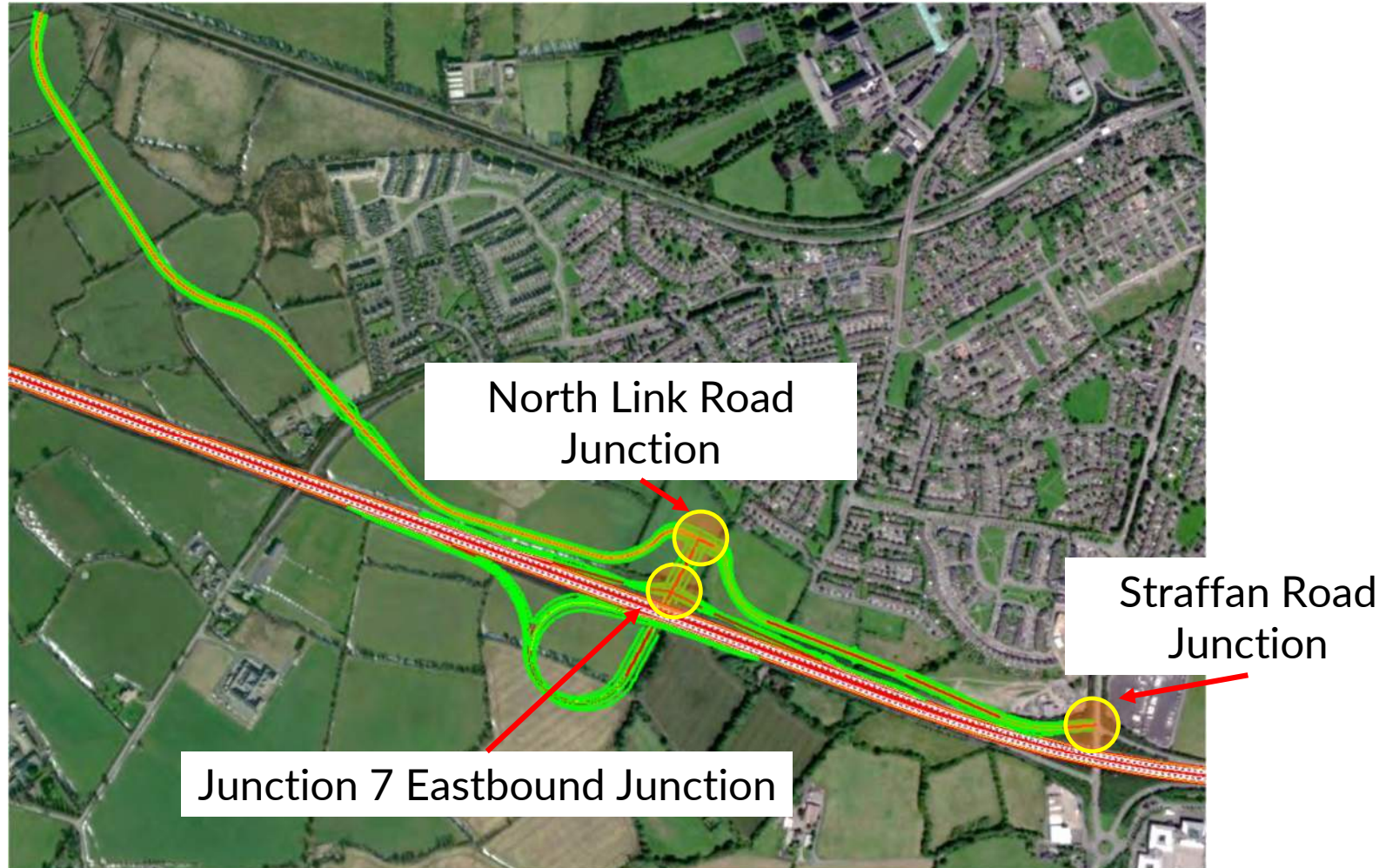
PM - Junction 7 Option 1



Junction 7 Option 2

Option 2

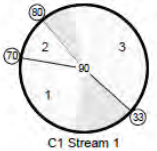
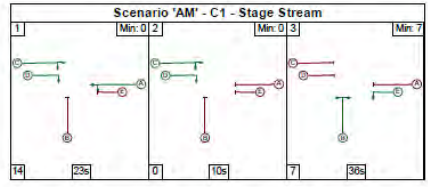
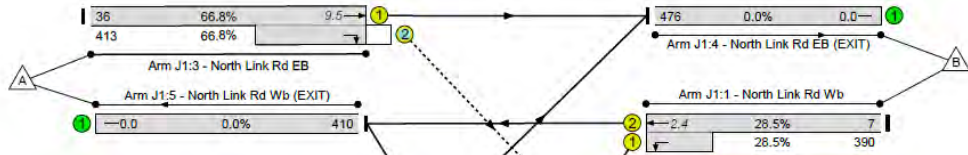
Junctions tested in LINSIG





J1: North Link Rd Junction
 PRC: 34.8 %
 Total Traffic Delay: 9.7 pcuHr
 Controller: 1

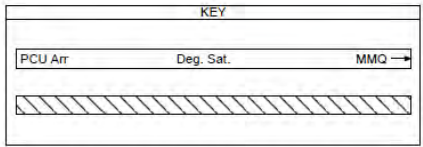
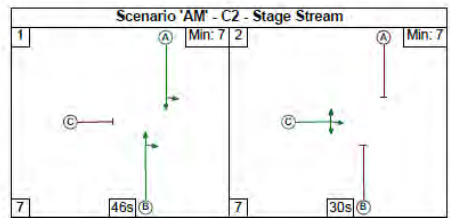
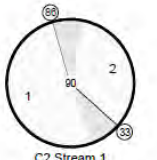
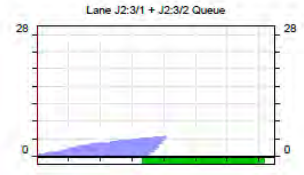
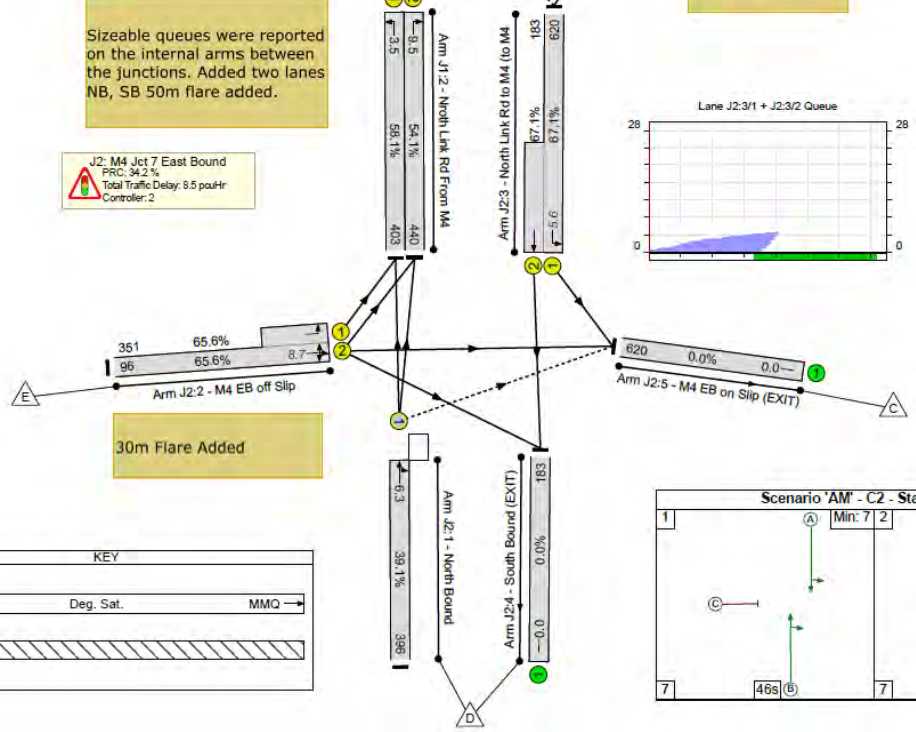
No Pedestrian facilities included.
 50m Flare added



Sizeable queues were reported on the internal arms between the junctions. Added two lanes NB, SB 50m flare added.

J2: M4 Jct 7 East Bound
 PRC: 34.2 %
 Total Traffic Delay: 8.5 pcuHr
 Controller: 2

30m Flare Added

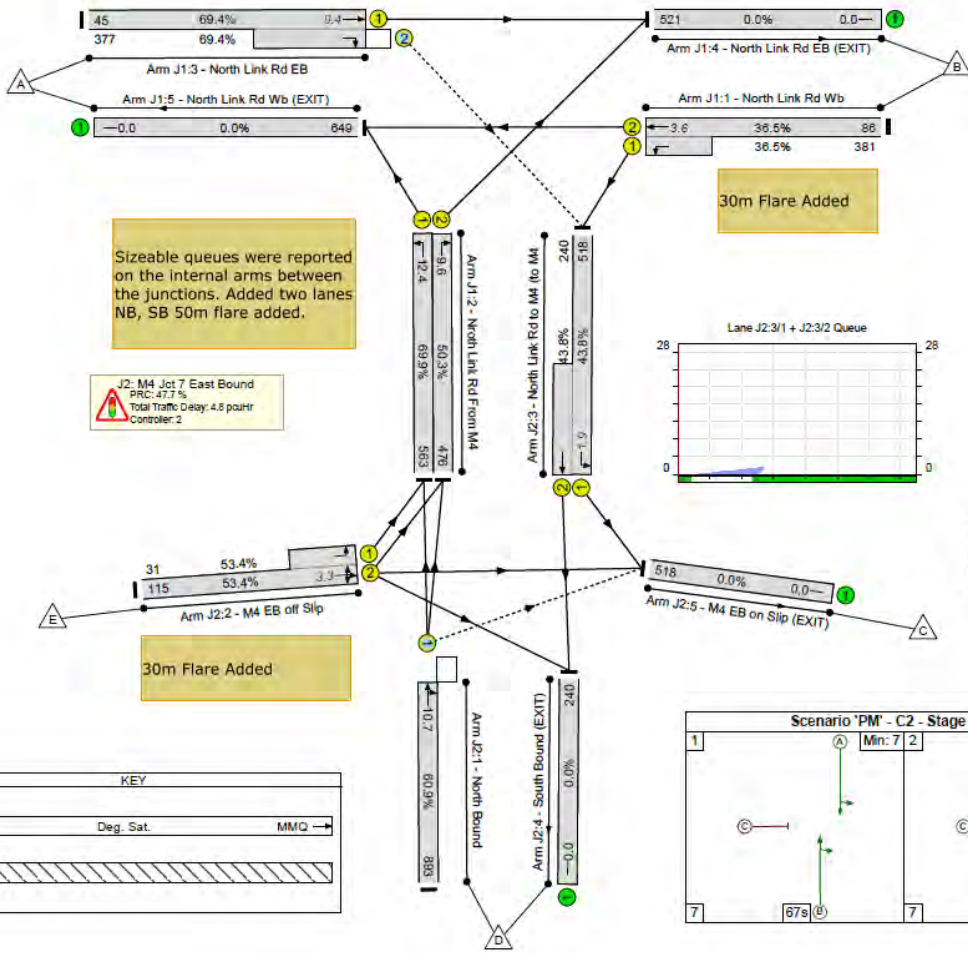


Project Name		
M4 Jct 7		
Company		
SYSTRA		
Address		
Author	Date	Scale
AH	12 Jan 2023	NTS
Project Location		
Project Title		
EB Slip Roads and North Link Road, AM		
Drawing Title		
FileName		
M4 Jct 7 EB Jct and North Link Rd_002 .Isig3x		



J1: North Link Rd Junction
 PRC: 28.6 %
 Total Traffic Delay: 11.9 pcuHr
 Controller: 1

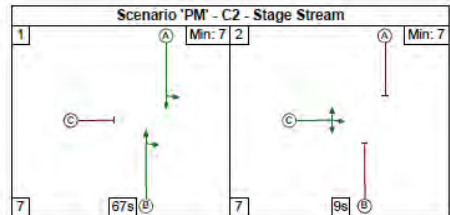
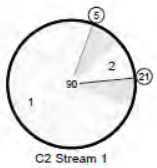
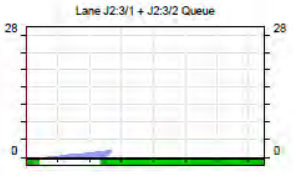
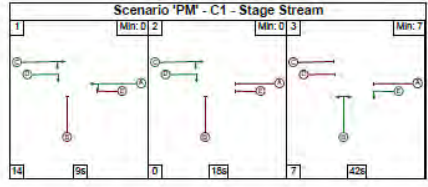
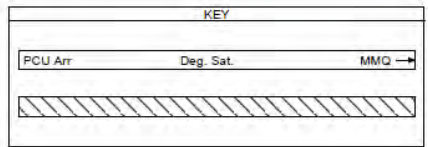
No Pedestrian facilities included.
 50m Flare added



Sizeable queues were reported on the internal arms between the junctions. Added two lanes NB, SB 50m flare added.

J2: M4 Jct 7 East Bound
 PRC: 47.7 %
 Total Traffic Delay: 4.8 pcuHr
 Controller: 2

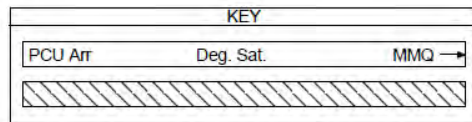
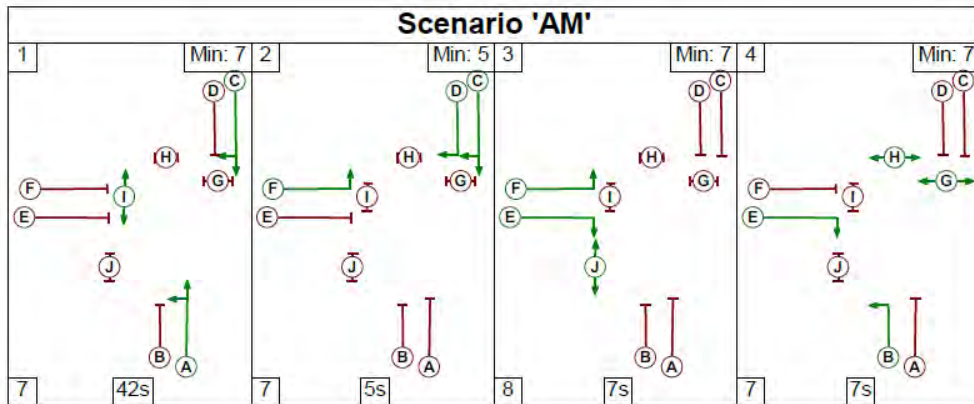
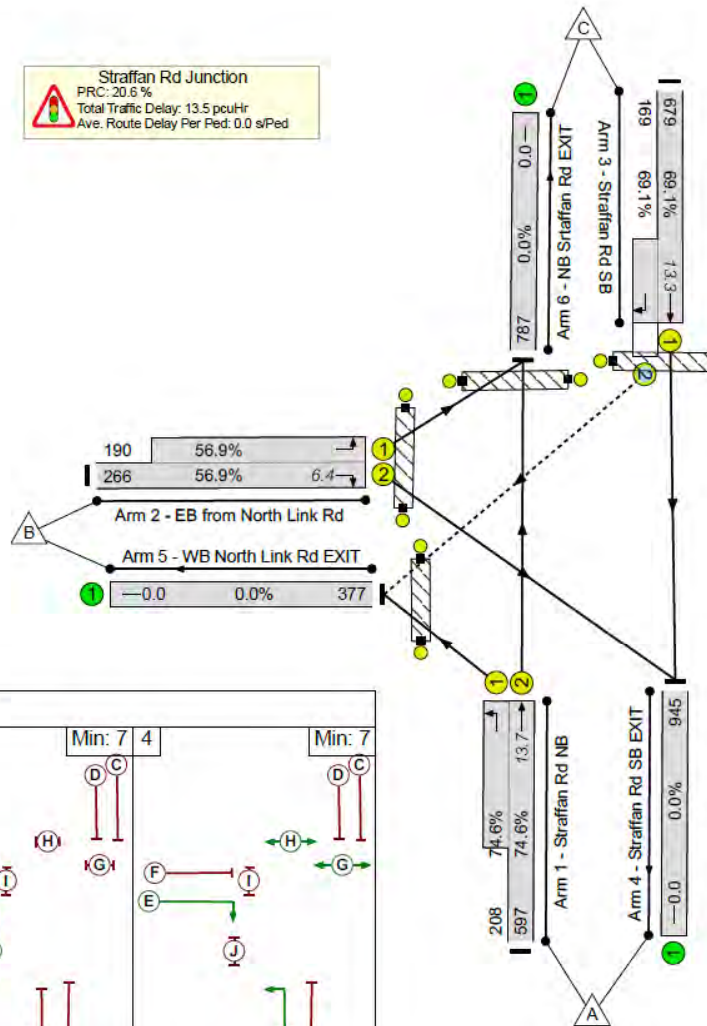
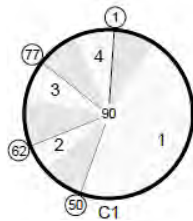
30m Flare Added



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M4 Jct 7		
Company		
SYSTRA		
Address		
Author	Date	Scale
AH	12 Jan 2023	NTS
Project Location		
Project Title		
EB Slip Roads and North Link Road, PM		
Drawing Title		
FileName		
M4 Jct 7 EB Jct and North Link Rd_002 .lsg3x		



Straffan Rd Junction
 PRC: 20.6 %
 Total Traffic Delay: 13.5 pcuHr
 Ave. Route Delay Per Ped: 0.0 s/Ped

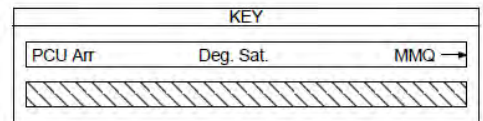
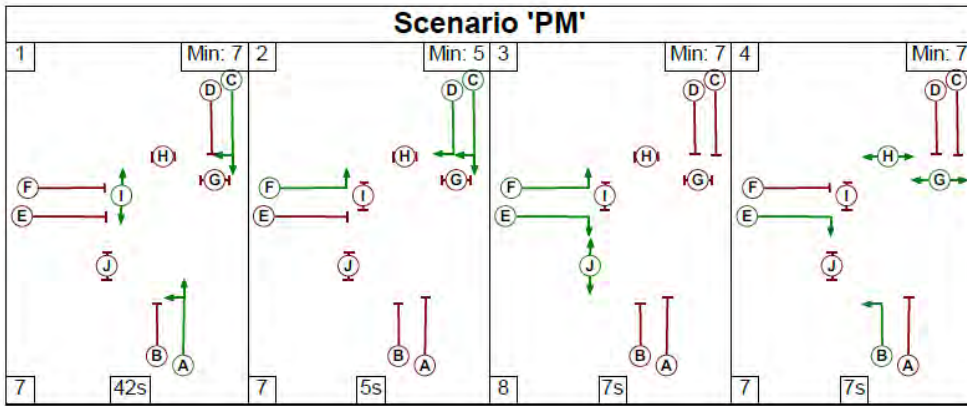
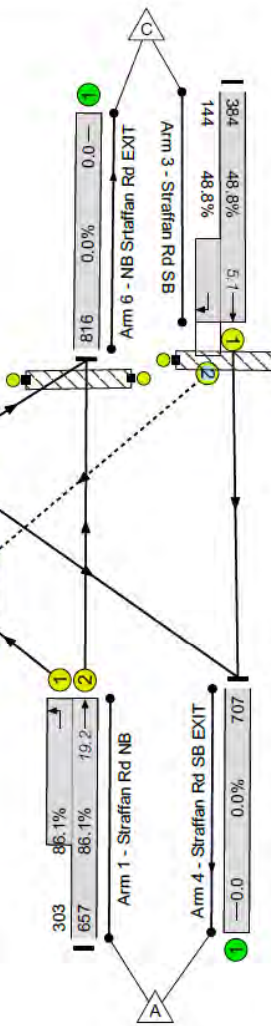
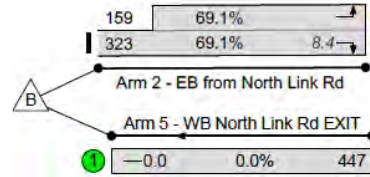
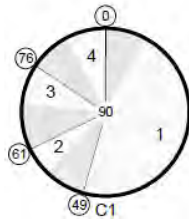


Project Name		
M4 Jct 7		
Company		
SYSTRA		
Address		
Author	Date	Scale
AH	16 Jan 2023	NTS
Project Location		
Project Title		
Straffan Rd Junction, AM		
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Network Layout		
FileName		
Straffan Rd Jct_003.lsg3x		





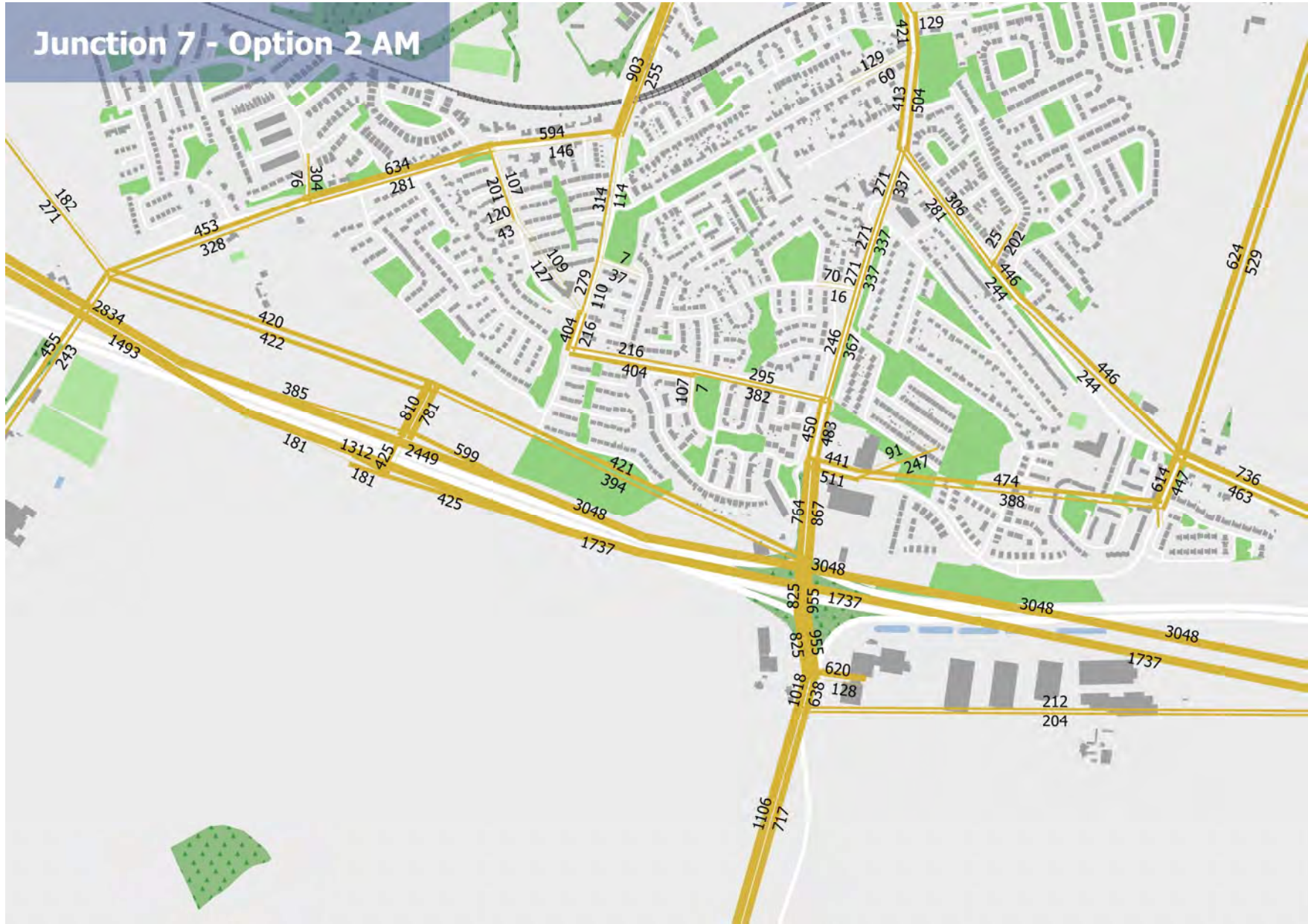
Straffan Rd Junction
 PRC: 4.5 %
 Total Traffic Delay: 14.9 pcuHr
 Ave. Route Delay Per Ped: 0.0 sPed



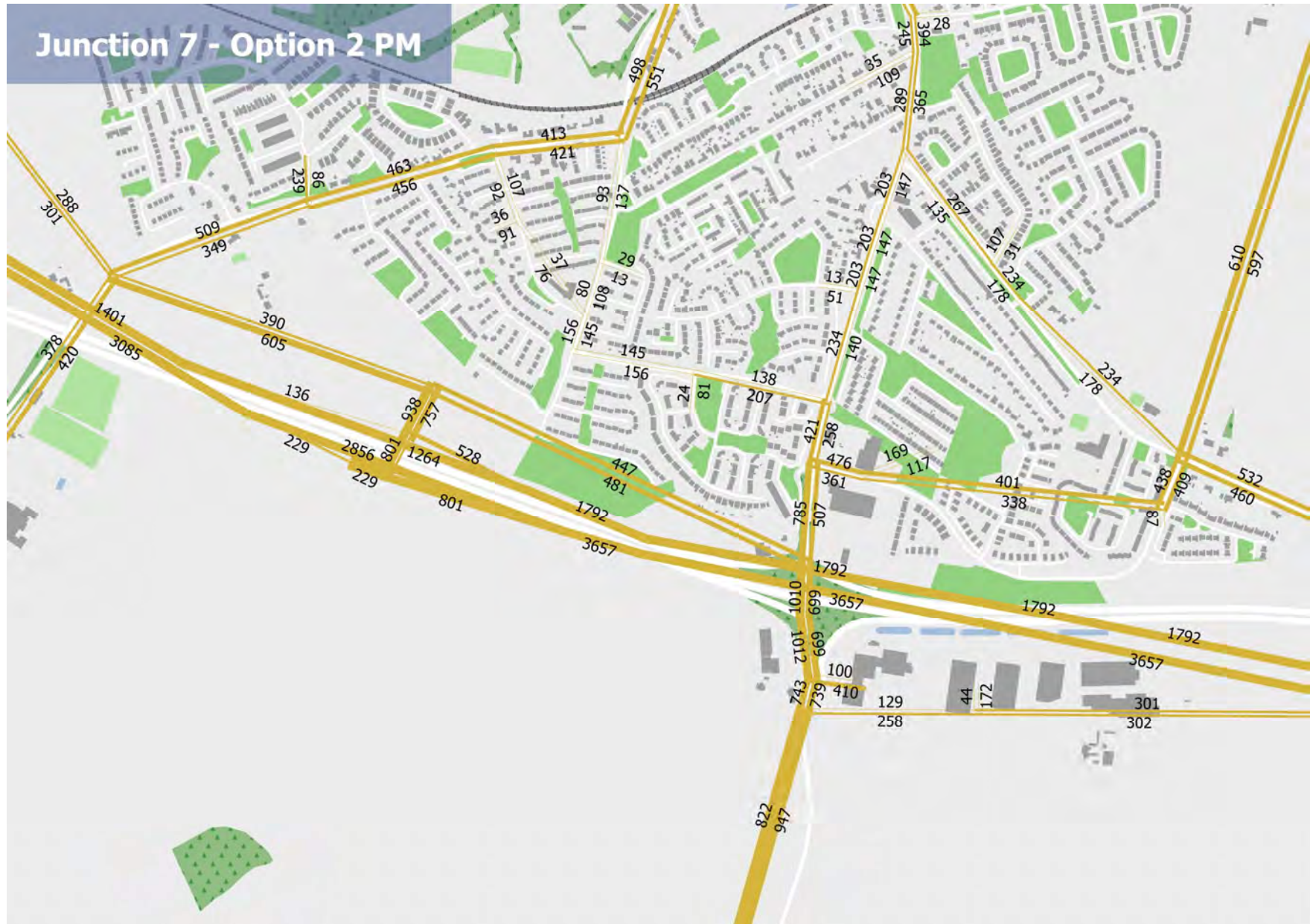
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Company			SYSTRA
Address			
Author	Date	Scale	
AH	16 Jan 2023	NTS	
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FileName			Straffan Rd Jct_003.lsg3x



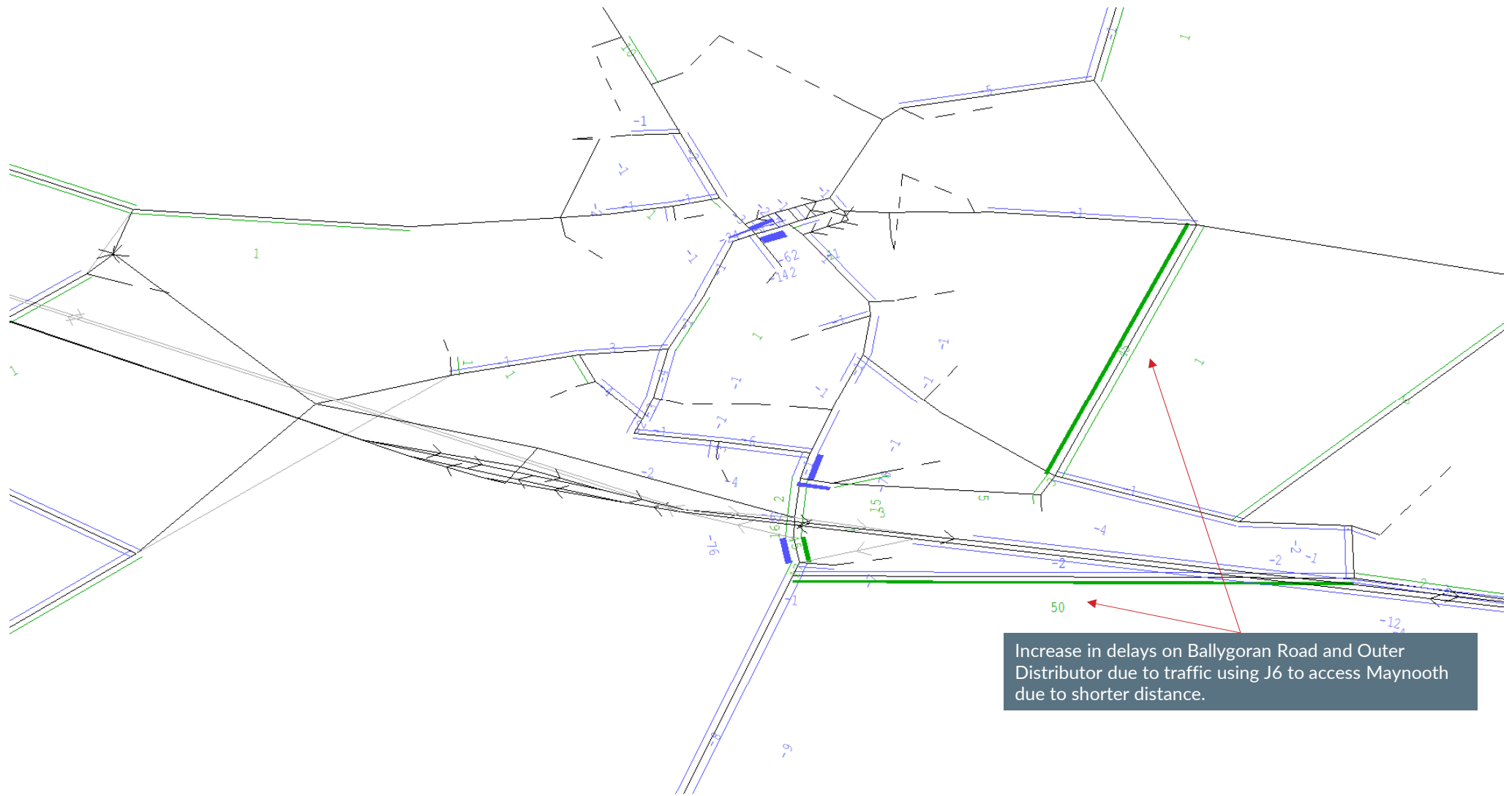
Junction 7 - Option 2 AM



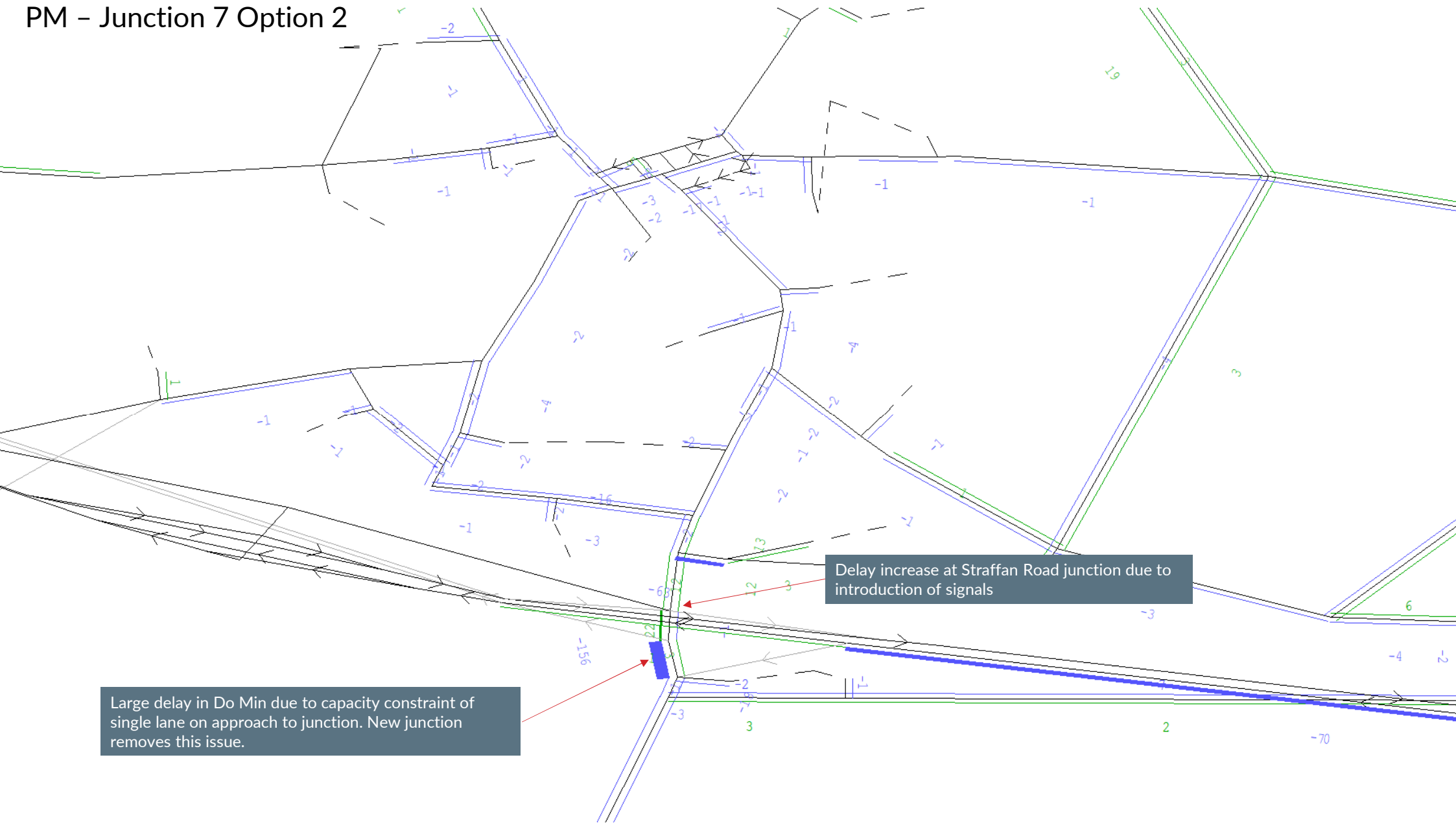
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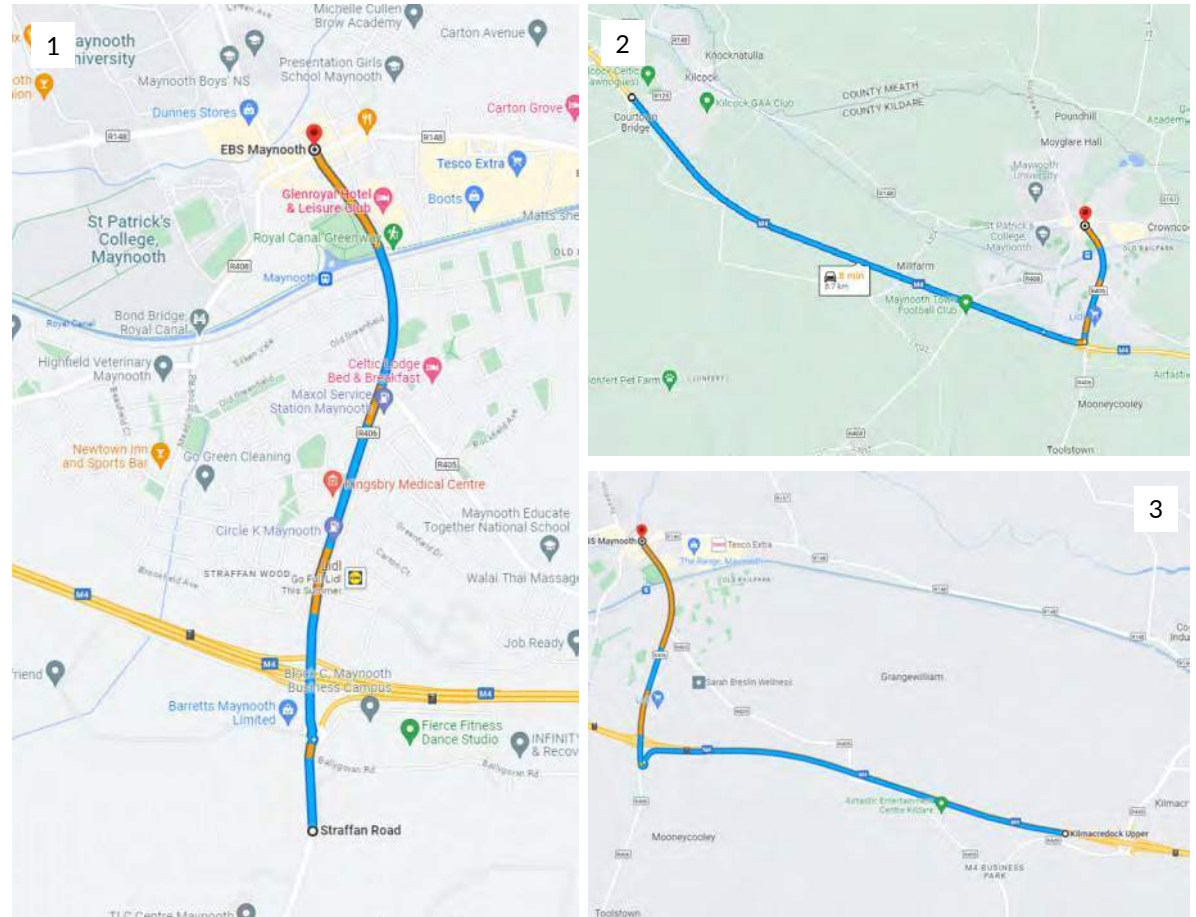
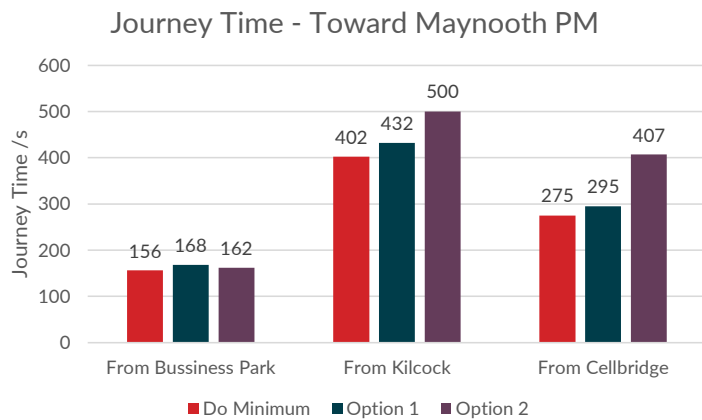
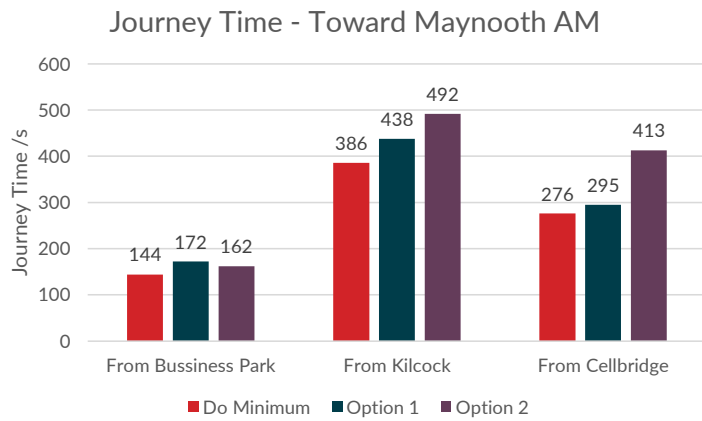


AM - Junction 7 Option 2

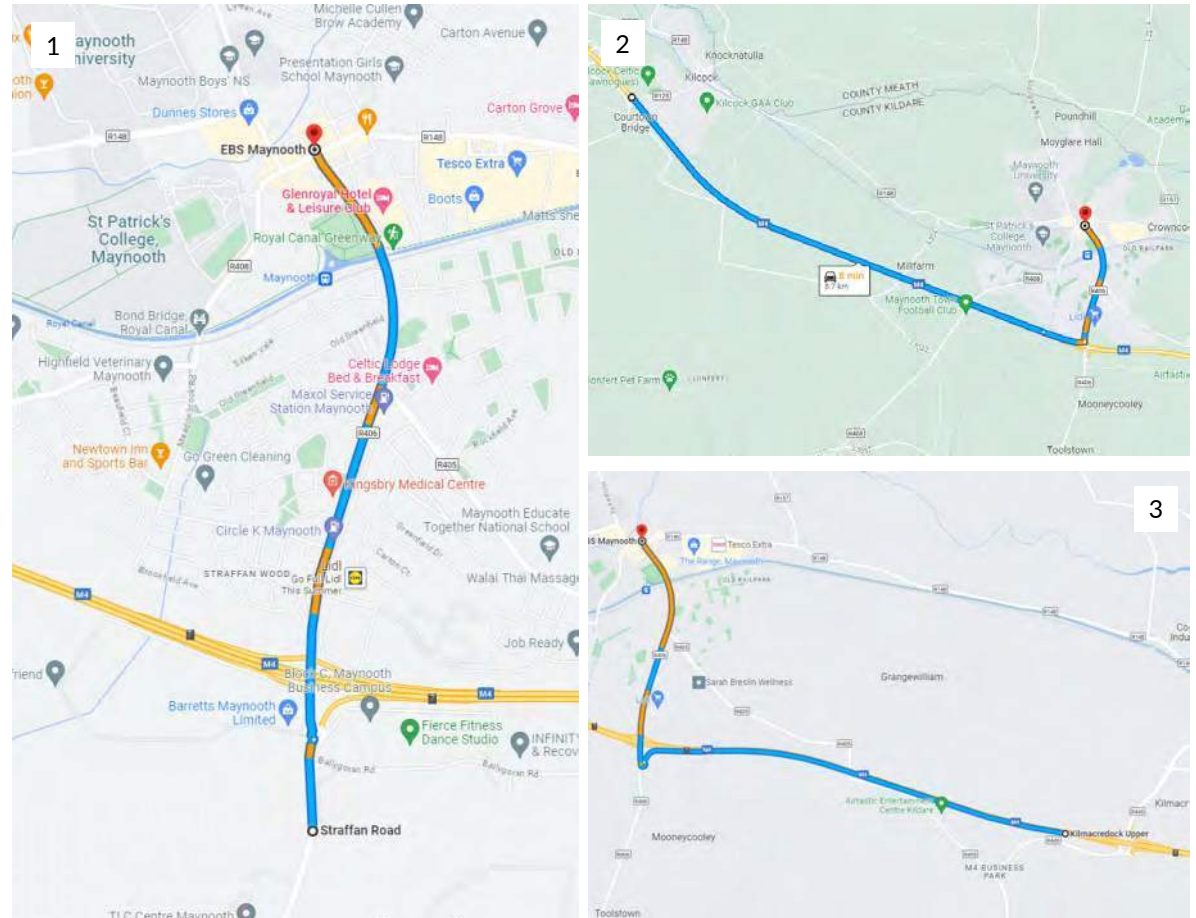
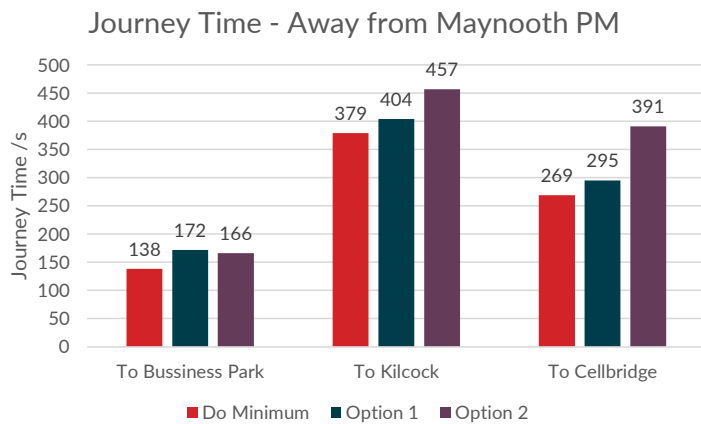
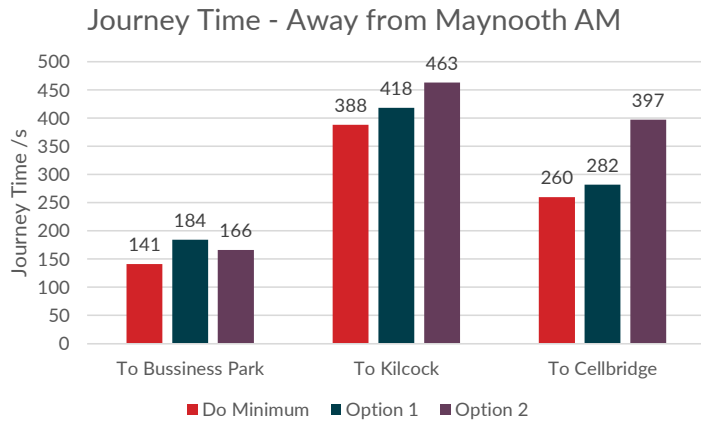


PM - Junction 7 Option 2

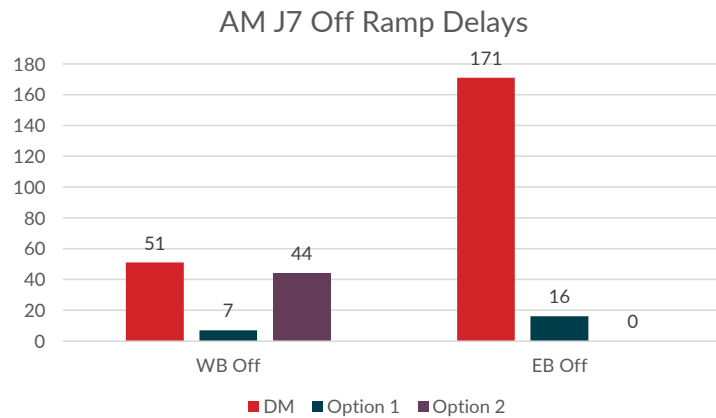




Option 2 provides faster access from the Business Park to Maynooth Town Centre, but slower access to the town from the motorway due to additional distance.

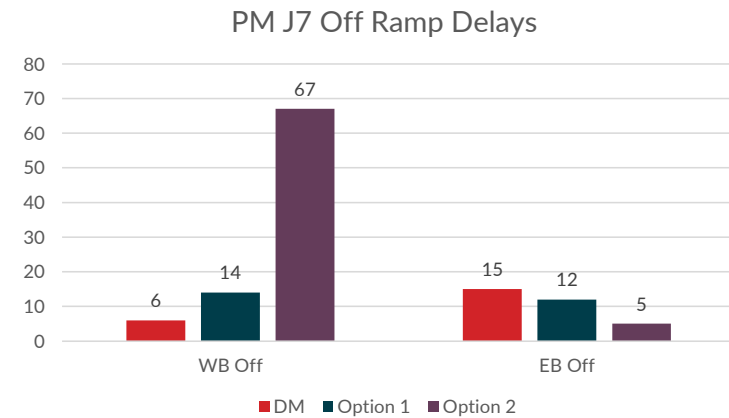


Option 2 provides faster access from the Business Park to Maynooth Town Centre, but slower access to the town from the motorway due to additional distance.



Delays on the Westbound Off Ramp improve with both Option 1 and Option 2, but Option 1 provides the largest improvement.

In the AM, DM delays on the EB off ramp are very high on approach to the Business Park Roundabout, this is reduced by both Option 1 and 2.



Delay on the Westbound Off ramp are increased with both options; however, Option 2 has a significant increase over the Do Minimum.

On the Eastbound offramp Delays are reduced with both options, with Option 2 providing the largest reduction.

	Option 1	Option 2
Straffan Road	Increased crossing time southbound on Straffan Bridge due to introduction of signals. Northbound, delays are reduced due to increased capacity from Business Park Roundabout. Queuing across bridge in Northbound direction during AM and PM peak.	Increased crossing time southbound on Straffan Bridge due to introduction of signals. Northbound, delays are reduced due to reduced traffic from Business Park Roundabout.
Business Park Access	Southbound delays exist at the roundabout due to increased traffic on Straffan Road arm.	Southbound delays are slightly lower than Option 1 as some Business Park traffic uses Ballygoran Road rather than motorway.
Motorway Junction Slips	Reduces off ramp delays when compared to Do Minimum with the exception of the Westbound Offramp in the PM.	Reduces Eastbound off ramp delays but has limited impact on Westbound AM delays and increases PM delays.
Summary	Option 1 retains access at the existing location which maintains existing trip lengths. While LINSIG modelling suggests the junction can handle the increase in traffic to 2047 with the redesign, it does struggle in the Northbound direction with queuing back across the bridge.	Option 2 removes the capacity issues on the Straffan Road bridge, however it increases the distance that Eastbound motorway traffic needs to travel to access Maynooth Town Centre and the Business Park. This leads to some traffic to use the local roads.

Summary

Neither option comes out as a clear winner on modelling grounds, as such both should be tested in TUBA and COBALT as neither can be ruled out on the LAM modelling alone.

SYSTRA



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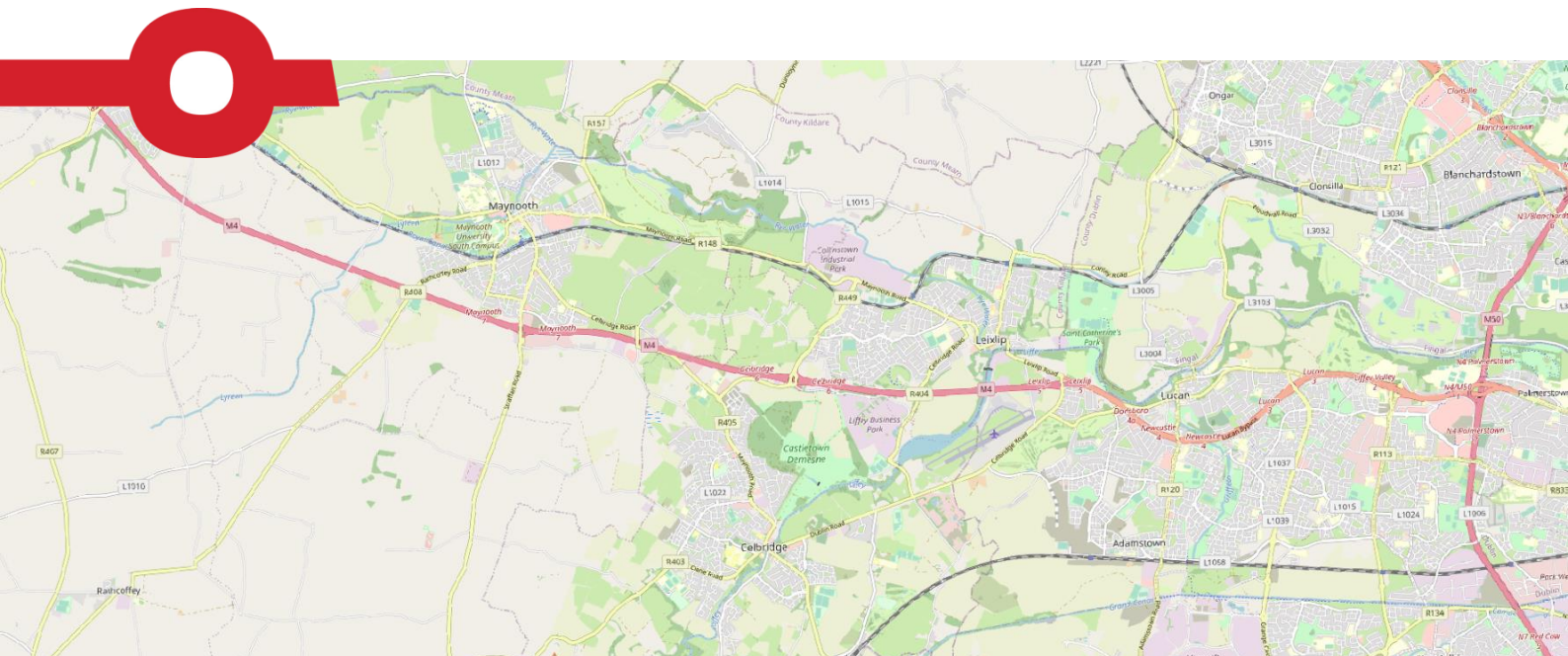


MAYNOOTH TO LEIXLIP PROJECT

Appendix 6.4C

Transport Modelling Report (TMR)

MAYNOOTH TO LEIXLIP PROJECT - TRANSPORT MODELLING REPORT



MAYNOOTH TO LEIXLIP PROJECT

TRANSPORT MODELLING REPORT

IDENTIFICATION TABLE

Project	Maynooth to Leixlip Project
Type of document	Transport Modelling Report
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Reference number	IE01T23A69
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	Checked by	Andrew Archer	Business Director	08/09/2023	
	Approved by			DD/MM/YY	
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	Checked by	Andrew Archer	Business Director	17/04/2024	
	Approved by			DD/MM/YY	

TABLE OF CONTENTS

1.	INTRODUCTION	7
1.1	BACKGROUND	7
1.2	PURPOSE OF THIS REPORT	8
1.3	STUDY AREA	9
1.4	EXISTING CONDITIONS	9
1.5	MODELLING OVERVIEW	11
1.6	DATA COLLECTION	12
1.7	METHODOLOGY OVERVIEW	12
1.8	REPORT STRUCTURE	12
2.	MODEL DEVELOPMENT	14
2.1	EASTERN REGIONAL MODEL (ERM) OVERVIEW	14
2.2	LAM DEVELOPMENT	15
2.3	MODEL AREA	16
2.4	MODEL TIME PERIODS	16
2.5	MODEL SOFTWARE	17
2.6	NETWORK DEVELOPMENT	17
2.7	ZONE SYSTEM DEVELOPMENT	18
2.8	PRIOR MATRIX DEVELOPMENT	20
3.	MODEL CALIBRATION AND VALIDATION	21
3.1	OVERVIEW OF THE CALIBRATION AND VALIDATION PROCESS	21
3.2	COVID-19 PANDEMIC	21
3.3	CALIBRATION STEPS	22
3.4	MODEL CALIBRATION RESULTS	23
3.5	TRIP MATRIX CALIBRATION	24
4.	MODEL VALIDATION	25
4.1	INTRODUCTION	25
4.2	JOURNEY TIME VALIDATION	25
4.3	CALIBRATION AND VALIDATION SUMMARY	29
5.	FUTURE YEAR MODEL DEVELOPMENT	30
5.1	POPULATION AND EMPLOYMENT FORECASTS	30

5.2	FUTURE YEAR MATRIX DEVELOPMENT	31
5.3	FUTURE YEAR MATRIX TOTALS	32
5.4	ANNUAL AVERAGE DAILY TRAFFIC	32
6.	STAGE 1 - PRELIMINARY OPTIONS ASSESSMENT MODELLING	34
6.1	CORRIDOR OPTIONS	35
6.2	JUNCTION 5 OPTIONS	37
6.3	JUNCTION 7 OPTIONS	37
6.4	RESULTS	40
7.	STAGE 2 - PROJECT APPRASIAL MATRIX MODELLING	44
7.1	OVERVIEW	44
7.2	JUNCTION 5 MODELLING	44
7.3	JUNCTION 6 MODELLING	51
7.4	JUNCTION 7 MODELLING	57
8.	COST BENEFIT ANALYSIS	70
8.1	OVERVIEW	70
8.2	CBA ASSUMPTIONS	71
8.3	SAFETY BENEFITS	74
8.4	TUBA RESULTS SUMMARY	76
8.5	CBA RESULTS SUMMARY	78
	APPENDIX A – COUNTS	79
	APPENDIX B – COST ESTIMATES	82
	JUNCTION 7 - OPTION 1 COST ESTIMATE	92

LIST OF FIGURES

Figure 1.1	Transport Study Area and Study Area	8
Figure 2.1	M4/N4 LAM Development Methodology	15
Figure 2.2	LAM Model Area	16
Figure 2.3	M4/N4 Road Network	18
Figure 2.4	ERM Zone System with zones relevant to the LAM area highlighted.	19
Figure 2.5	M4/N4 Refined Zone System	20
Figure 4.1	Journey Time Routes	26
Figure 6.1	Option 2A and 2B cross sections	35
Figure 6.2	Option 3A and 3B cross sections	36
Figure 6.3	Alignment of proposed parallel road between R404 and Maynooth	36
Figure 6.4	Junction 5 Options	37
Figure 6.5	Option 2.1.1	38
Figure 6.6	Option 3.1.2	38
Figure 6.7	Option 3.3.1	39
Figure 6.8	Option 3.4.1	39
Figure 6.9	Option 4.1.1	40
Figure 7.1	Junction 5	45
Figure 7.2	Junction 5 Option 1 Layout	46
Figure 7.3	Junction 5 diverge delays (seconds on average per vehicle over the hour) - AM	47
Figure 7.4	Junction 5 diverge delays (seconds on average per vehicle over the hour) – PM	48
Figure 7.5	Journey Time Route	49
Figure 7.6	Junction 5 Impact on M5 delays (seconds on average per vehicle over the hour)	50
Figure 7.7	Junction 6	51
Figure 7.8	Route between residential area and schools	52
Figure 7.9	Junction 6 Delays (seconds) - AM	53
Figure 7.10	Junction 6 Delays (seconds on average per vehicle over the hour) -PM	54
Figure 7.11	Journey Time Route	55
Figure 7.12	Average delays experienced per vehicle across the hour in seconds on the M4/N4	56
Figure 7.13	Junction 7	57
Figure 7.14	Southern Distributor Road	58
Figure 7.15	Junction 7 Option 1	59
Figure 7.16	AM Peak Hour queuing.	60
Figure 7.17	PM Peak hour queuing	61
Figure 7.18	Junction 7 Option 2	63
Figure 7.19	Journey Time Route	64
Figure 7.20	Delay in seconds per vehicle across the hour along M4	65
Figure 7.21	Junction 7 AM Delays (seconds on average per vehicle over the hour)	66
Figure 7.22	Junction 7 PM Delays in seconds on average per vehicle over the hour	67
Figure 7.23	Delays in seconds on average per vehicle over the hour in Maynooth	68

LIST OF TABLES

Table 1.1	Observed AADT	9
Table 1.2	Peak Times	11

Table 3.1	Calibration Criteria	23
Table 3.2	Model GEH Results	23
Table 3.3	Link and Turn: Individual Flows (PCUs)	24
Table 3.4	Trip Length Analysis – Coincidence Ratios	24
Table 4.1	Journey Time Validation	26
Table 4.2	Journey Time Validation – AM Peak	27
Table 4.3	Journey Time Validation – Inter-Peak	27
Table 4.4	Journey Time Validation – PM Peak	28
Table 5.1	M4/N4 Study Area Population Forecasts	31
Table 5.2	Matrix Totals 2047 Design Year	32
Table 5.3	AADT 2047 Expansion Factors	33
Table 5.4	AADT Flows on M4/N4	33
Table 6.1	Description of Impact Measure Thresholds	42
Table 6.2	AM and PM peak combined summary	43
Table 7.1	Journey Time comparison (minutes)	49
Table 7.2	Journey Time comparison in minutes	55
Table 7.3	Journey Time comparison (minutes)	64
Table 8.1	Cost Benefit Analysis	70
Table 8.2	Car Fleet Fuel Type Split	71
Table 8.3	Forecast Change in Car Fleet Fuel Type Split	71
Table 8.4	Fuel Costs	71
Table 8.5	Capital Costs - Option Comparison Estimate (September 2023 prices)	72
Table 8.6	PAG Maintenance Costs 2011	73
Table 8.7	O&M Costs	73
Table 8.8	Discounted Safety Benefits (2011 Values) (€'000)	74
Table 8.9	Change in Collisions	75
Table 8.10	Casualty Change by Severity	76
Table 8.11	Cost Benefit Analysis Summary (€ '000)	76
Table 8.12	Cost Benefit Analysis Summary Table (€'000)	78

1. INTRODUCTION

1.1 Background

The M4/N4 Motorway and National primary route is a strategic 11km route linking the corridors of the M6, to Galway and the west, and the N4, to Sligo and the northwest, to Dublin and the M50 via the major commuting towns of Maynooth, Celbridge, Leixlip and Lucan.

Being located along the Maynooth rail corridor and bordered by the M4/N4, Maynooth and Leixlip have the capacity to support population and employment growth with Maynooth identified as an important town in the Regional, Spatial and Economic Strategy (RSES) within the Greater Dublin Area (GDA).

The M4/N4 corridor itself is of strategic importance for both private transport as well as freight movement and forms part of the Trans-European Network for Transport (TEN-T). The road commences as a multi-lane national road at the M50 and is classified as a motorway from Junction 5 Leixlip to Junction 11 where the road transitions into the N4, serving the northwest toward Sligo, and the M6, serving Galway and the west.

The focus of this study is on the corridor between Leixlip and Maynooth, including Junction 5 Leixlip, Junction 6 Celbridge and Junction 7 Maynooth. These junctions have seen significant growth in the previous decade with average annual daily traffic (AADT) increasing by 19% between Junction 6 and Junction 8 between 2013 and 2019. The increased growth in close proximity to the motorway has applied additional pressure on the road, with the primary mode of choice for the area being private car.

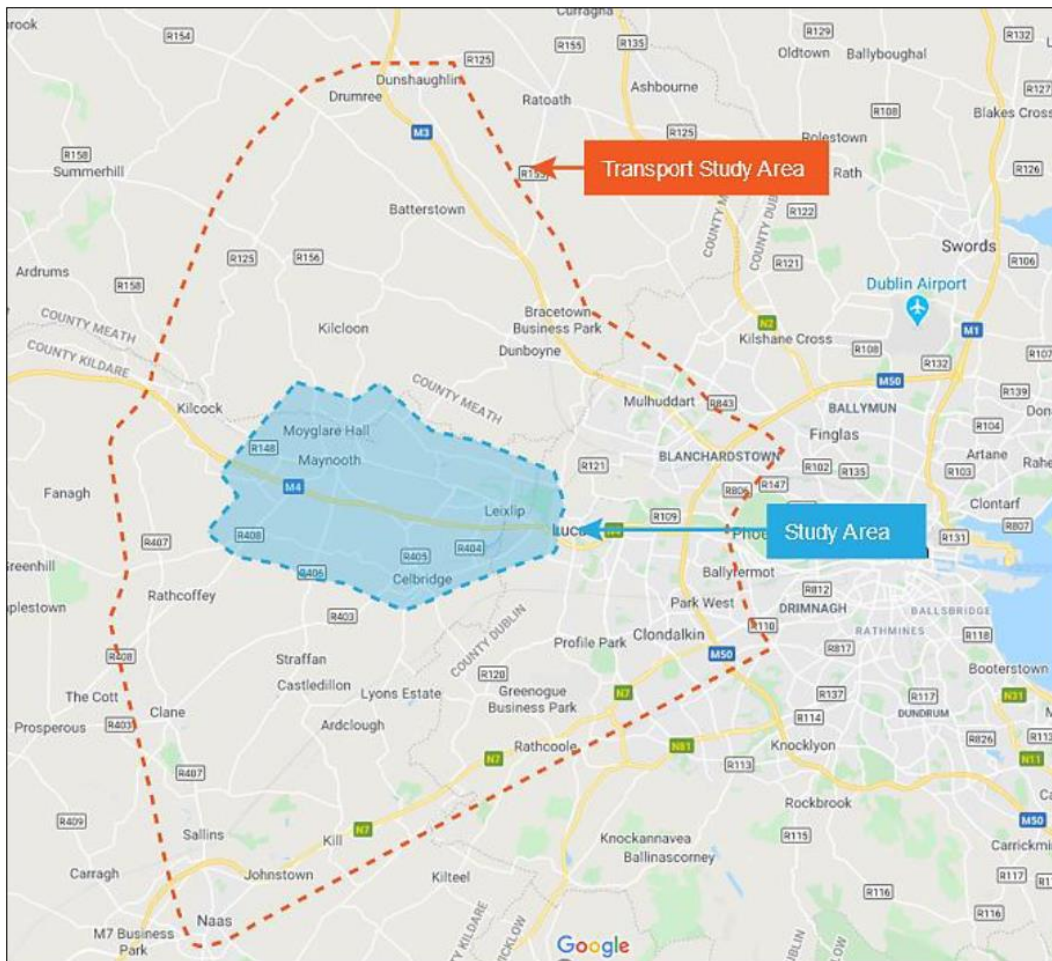


Figure 1.1 Transport Study Area and Study Area

It is considered that the existing M4/N4 is economically inefficient and detracts from the development and growth of the region. Consequently, the key objectives of this project are to provide a reliable, safe, and sustainable transport solution for the M4/N4 corridor between Kilcock and Leixlip. This would assist in encouraging local, regional, national, and international development to balance regional development.

1.2 Purpose of this Report

Arup is the lead consultant on this project with SYSTRA acting as sub-consultant and undertaking the Project Appraisal, including the transport modelling elements, of the project.

This report describes the traffic modelling work undertaken by SYSTRA for the purpose of informing the selection of a Preferred Transport Option during the Options Selection Phase (TII PAG Phase 2).

1.3 Study Area

A study area has been defined for the project, within which transportation options will be identified and assessed based on certain Key Performance Indicators (KPIs) to determine a preferred transport option(s). The study area includes:

- 18km of the N4/M4 motorway between Lucan and Kilcock.
- Three junctions; Junction 5 Leixlip, Junction 6 Celbridge and Junction 7 Maynooth.
- The villages of Lucan, Leixlip, Maynooth and Kilcock.

1.4 Existing Conditions

Annual Average Daily Traffic

Transport Infrastructure Ireland's (TII) Traffic Count Data website presents information on traffic volume and composition obtained via a network of traffic counters embedded in the road surface. Using this database, Annual Average Daily Traffic (AADT) volumes for the existing M4/N4 and surrounding area for the year 2019 were obtained from TII Traffic Monitoring Units (TMU). Table 1.1 shows AADT values at these locations in 2019.

Table 1.1 Observed AADT

TMU LOCATION	AADT (2019)	HGV (%)
TME 05 - M3 between Junction 6 and 7, Dunshaughlin	23,518	7.5%
TME 01 - M3 between Junction 4 and 5, Paddingstown	46,978	5.2%
TME 02 - M3 Junction 5 north-side ramps (M3 Parkway)	3,196	4.7%
TME 03 - M3 between Junction 5 and 7, M3 Parkway	25,475	7.2%
TME 04 - M3 Junction 6 north-side ramps (Johnstown Rd)	2,967	4.1%
M4 between Junction 6 (Celbridge) and Junction 7 (Maynooth)	62,827	5.3%
M4, Maynooth, West Co. Kildare	48,010	9.0%
M50 between Junction 9 (N7/M50 Red Cow) and Junction 10 (Ballymount)	155,506	3.5%
M50 between Junction 6 (N3/M50) and Junction 7 (N04/M50, Castleknock)	169,391	8.8%

TMU LOCATION	AADT (2019)	HGV (%)
M50 between Junction 7 (N4/M50) and Junction 9 (N7/M50 Red Cow)	168,608	6.3%
N3 between Junction 2 (Blanchardstown) and Junction 3 (Clonsilla)	91,486	3.5%
N3 between Junction 3 (Clonsilla) and Junction 4 (Clonee)	70,338	4.1%
N4 between Junction 3 (Newcastle) and Junction 4 (Lucan)	92,407	4.1%
N4 between Junction 1 (N4/M50) and Junction 2 (Liffey Valley)	115,462	4.0%
N7 between Junction 1a (Newlands Cross) and Junction 2 (Kingswood)	115,141	6.7%
N7 between Junction 1 M50 and Junction 1a Newlands Cross (R113)	115,025	7.8%
N7 Westbound between Junction 5 (Athgoe) and Junction 6 (Castlewarden)	94,756	9.4%
N7 between Junction 7 (Kill) and Junction 8 (Johnstown, Kill)	87,848	7.6%
R147 (Old N3) between Blackbull and Dunshaughlin, Co. Meath	10,179	2.6%

Analysis of Traffic Profiles

Average weekday traffic flow profiles, extracted from the TII TMUs are shown in Table 1.1. This figure shows that the AM peak occurs between 08:00 – 09:00 and the PM peak occurs between 17:00 – 18:00. The Inter Peak is lower than both AM and PM peaks, but there is steady build-up of trips occurring from 10:00am onwards toward the PM peak. This illustrates that the road is well utilised throughout the day, with a considerable portion of demand being unrelated to commuter traffic.

Table 1.2 shows when AM, IP and PM peak occur. Peak hours on the M3 motorway happen with a delay of 15 minutes compared to all other locations, with most occurring at 7:45 and 16:45. In the M50 location, between Junction 6 (N3/M50) and Junction 7 (N04/M50, Castleknock), it had a different PM peak at 16:15.

Table 1.2 Peak Times

NUMBER OF TMU COUNTERS	AM	IP	PM
5	07:45	13:00	16:45
13	07:45	13:00	16:45
1	07:45	13:00	16:15

1.5 Modelling Overview

Eastern Regional Model – Multi-Modal Demand Modelling

Given the nature of the transport options being tested and the potential for these scenarios to result in modal shift, at the commencement of the project it was decided that the National Transport Authority's (NTA) Eastern Regional Model (ERM) should be used to assess each of the proposed options for the following reasons:

- It is a regional model covering the entire Greater Dublin Area and is therefore capable of assessing the regional impacts (as well as local impacts) likely to arise from a project of this scale.
- It provides a detailed representation of the urban environment within Dublin City and along the M4/N4 corridor.
- It provides a detailed representation of the public transport network and services and can predict demand on the different public transport services within the regions.
- It provides a representation of all major transport modes including active modes (walking and cycling) and includes accurate mode-choice modelling of residents.
- It is comprised of a variable demand model which provides a detailed representation of travel demand on the network broken down by journey purpose, mode of travel, person types, user classes and socio-economic classes. This demand is modelled at a granular (Census Small Area) level within the ERM and is critical for modelling transport demand within a mix of urban and rural areas such as the M4/N4 corridor. The ERM also provides a prediction of changes in trip destination in response to changing traffic conditions, transport provision and/or policy.

1.5.1 M4/N4 Local Area Model (LAM) – Highway Modelling

While the ERM achieves an excellent level of highway calibration, the highway element of the ERM lacks sufficient detail and calibration along the M4/N4 corridor to meet the required guidelines for model development as outlined in TII PAG Unit 5.1 *Construction of Transport Models*. Therefore, an M4/N4 Local Area Traffic Model (M4/N4 LAM) was developed and used to assess the traffic impacts of the options tested. The M4/N4 LAM has been calibrated and validated to Base Year (2021) conditions using existing traffic survey data along the M4/N4 corridor, obtained from a number of sources.

1.6 Data Collection

A review of existing traffic survey data available for the model area was initially undertaken using the NTA count database, any pre-existing M4/N4 model data (where available) and TII counter data.

The development of the LAM required the collection of a significant amount of traffic survey data to inform the model calibration and validation. It was originally planned to carry out a comprehensive data collection exercise in April/May of 2021 to help inform the development of this LAM. However, given the travel restrictions imposed by the government in relation to the Covid-19 pandemic, and associated reduction in traffic flows, it was not possible to carry out meaningful (representative of typical travel patterns) traffic surveys in April/May 2021 to inform the development of a LAM for the project. Therefore, a LAM was developed using existing survey data in the study area. This LAM has been used for the Phase 2 appraisal of various options.

Prior to the commencement of the Phase 3 appraisal, it will be necessary to carry out a comprehensive data collection exercise in the study area during a period with no travel restrictions. This data would then be used to carry out a full recalibration of the LAM in advance of the Phase 3 appraisal of the emerging preferred option(s).

1.7 Methodology Overview

Over the course of the Phase 2 assessment, the project has evolved significantly. As a result, modelling has been divided into two stages;

- Stage 1 – High level assessment of impacts on the M4/N4 and wider area as a whole and intended to rationalise the number of options taken forward for a more detailed assessment; and
- Stage 2 – More detailed model assessment of options from Stage 1 to refine the option and understand the impacts on the M4/N4 junctions and surrounding road network.

In addition to the modelling assessment, a review of regional rail improvement options was carried out. This examined and assessed improved access to the corridor from the west. Access to the corridor from the east was not reviewed as it has been reviewed as part of DART+, with improvements to the corridor planned.

1.8 Report Structure

1.8.1 The remaining chapters of this report are structured as follows:

- **Chapter 2 – Model Development:** describes the development of the base year Interim M4 LAM;
- **Chapter 3 – Model Calibration:** summarises the calibration results comparing them back to the surveyed traffic data;
- **Chapter 4 – Model Validation:** summarises the validation results;
- **Chapter 5 – Future Year Model Development:** sets out the development of the future year M4 LAM models for the project's opening and design years;

- **Chapter 6 – Preliminary Options Assessment Modelling:** looks at the high level modelling assessment of the junction and corridor options;
- **Chapter 7 – Project Appraisal Matrix Modelling:** Detailed assessment of the junction options carried forward from Chapter 5; and
- **Chapter 8 – Cost Benefit Analysis:** details the cost benefit analysis carried out on the preferred options.

2. MODEL DEVELOPMENT

The National Transport Authority's (NTA) Regional Modelling System (RMS) was used as a basis for the M4/N4 LAM development, providing initial network detail and demand matrices.

Further refinement was undertaken for the model area, and it was calibrated and validated to observed count data in-line with relevant guidelines. The NTA RMS comprises of the following three main components:

- The National Demand Forecasting Model (NDFM);
- 5 Regional Models (Including the Eastern Regional Model (ERM)); and
- A suite of appraisal modules.

The NDFM takes input attributes such as land use data and population and estimates the total quantity of daily travel demand produced by, and attracted to, each of the 18,488 Census Small Areas in Ireland.

2.1 Eastern Regional Model (ERM) Overview

The ERM is a strategic multi-modal transport model representing travel by all the primary surface modes – including, walking and cycling (active modes), and travel by car, bus, rail, tram, light goods and heavy goods vehicles. The model broadly covers the Leinster province of Ireland including the counties of Dublin, Wicklow, Kildare, Meath, Louth, Wexford, Carlow, Laois, Offaly, Westmeath, Longford, Cavan and Monaghan.

Destination and mode choice parameters within the ERM have been calibrated using two main sources: Census 2016 Place of Work, School or College - Census of Anonymised Records (2011 POWSCAR), and the Irish National Household Travel Survey (2017 NHTS). The NTA's RMS is the most sophisticated modelling tool available for assessing complex multi-modal movements within an urban context. This provides a consistent framework for transport assessment.

The ERM is comprised of the following key elements:

- **Trip End Integration:** The Trip End Integration module converts the 24-hour trip ends output by the NDFM into the appropriate zone system and time period disaggregation for use in the Full Demand Model (FDM);
- **The Full Demand Model (FDM):** The FDM processes travel demand, carries out mode and destination choice, and outputs origin-destination travel matrices to the assignment models. The FDM and assignment models run iteratively until an equilibrium between travel demand and the cost of travel is achieved; and
- **Assignment Models:** The Road, Public Transport, and Active Modes assignment models receive the trip matrices produced by the FDM and assign them in their respective transport networks to determine route choice and the generalised cost for each origin and destination pair.

Therefore, the ERM is the ideal tool to use as a basis for the development of the M4/N4 LAM, and to estimate the multi-modal impact of transport projects within the model area. In addition, it provides the platform to forecast future trip demand and distribution.

2.2 LAM Development

The methodology for developing the M4/N4 LAM from the RMS is illustrated in Figure 2.1 below.

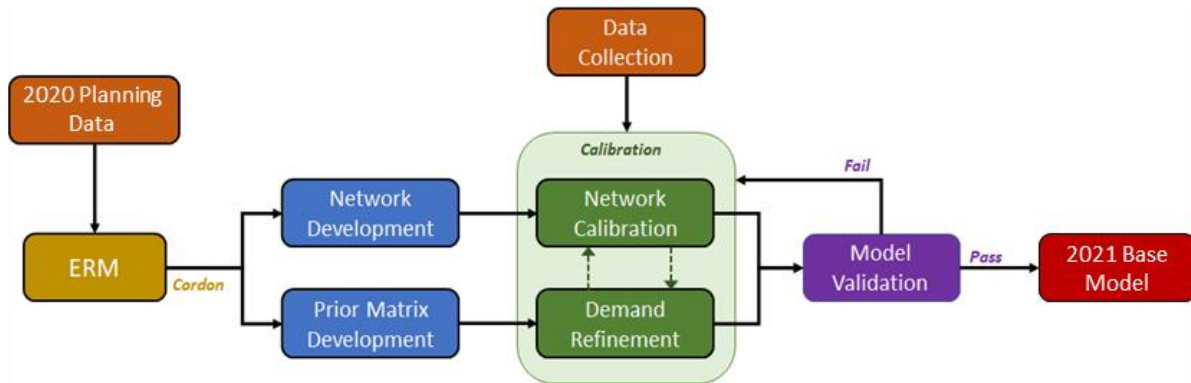


Figure 2.1 M4/N4 LAM Development Methodology

In summary:

- **2020 ERM Run:** 2016 Census planning data for population, employment and education was reviewed within the model area and updated where appropriate to 2020. This data was passed through the NDFM to generate base year demand which was run in the NTA's ERM.
- **ERM Cordon:** The 2020 ERM road assignment was cordoned to extract the initial network and traffic matrix covering the LAM extents (Figure 2.2).
- **Network and Prior Matrix Development:** The initial ERM cordoned road network was reviewed in greater detail for the study area for items including junction configuration, network speeds, links not included in the ERM etc. The zone system from the ERM was disaggregated where necessary to provide a more accurate representation of traffic loading onto the road network.
- **Data Collection:** Traffic data including link counts, junction turning counts and journey time information was collected and used to calibrate and validate the LAM.
- **Calibration:** Calibration is the process of adjusting the model to better represent observed data. This is normally undertaken in two steps:
 - **Network Calibration:** adjustments to the road network based on observations extracted from traffic survey data e.g., altering turning capacities at junctions, updating link speeds etc.; and
 - **Demand Refinement:** adjustments to the prior matrix to better represent observed travel movements from count data.

The M4/N4 LAM was calibrated in-line with Transport Infrastructure Ireland's (TII) Project Appraisal Guidelines (PAG) and the UK Department for Transport (DfT) Transport Analysis Guidance (TAG).

- **Validation:** Validation is the assessment of the validity of the calibrated model, and its robustness in representing observed traffic conditions. Calibration and

validation are an iterative process. If the results of the validation checks are unsatisfactory, then adjustments will be made as required in order to achieve a better representation of reality. The M4/N4 LAM was validated in-line with TII and DfT TAG guidance.

2.3 Model Area

The area to be analysed in detail in the M4/N4 LAM is illustrated in Figure 2.2 and was identified through a detailed review of all major transport infrastructure within the study area. This essentially represents the extents of the area of influence of the M4/N4 transport corridor.

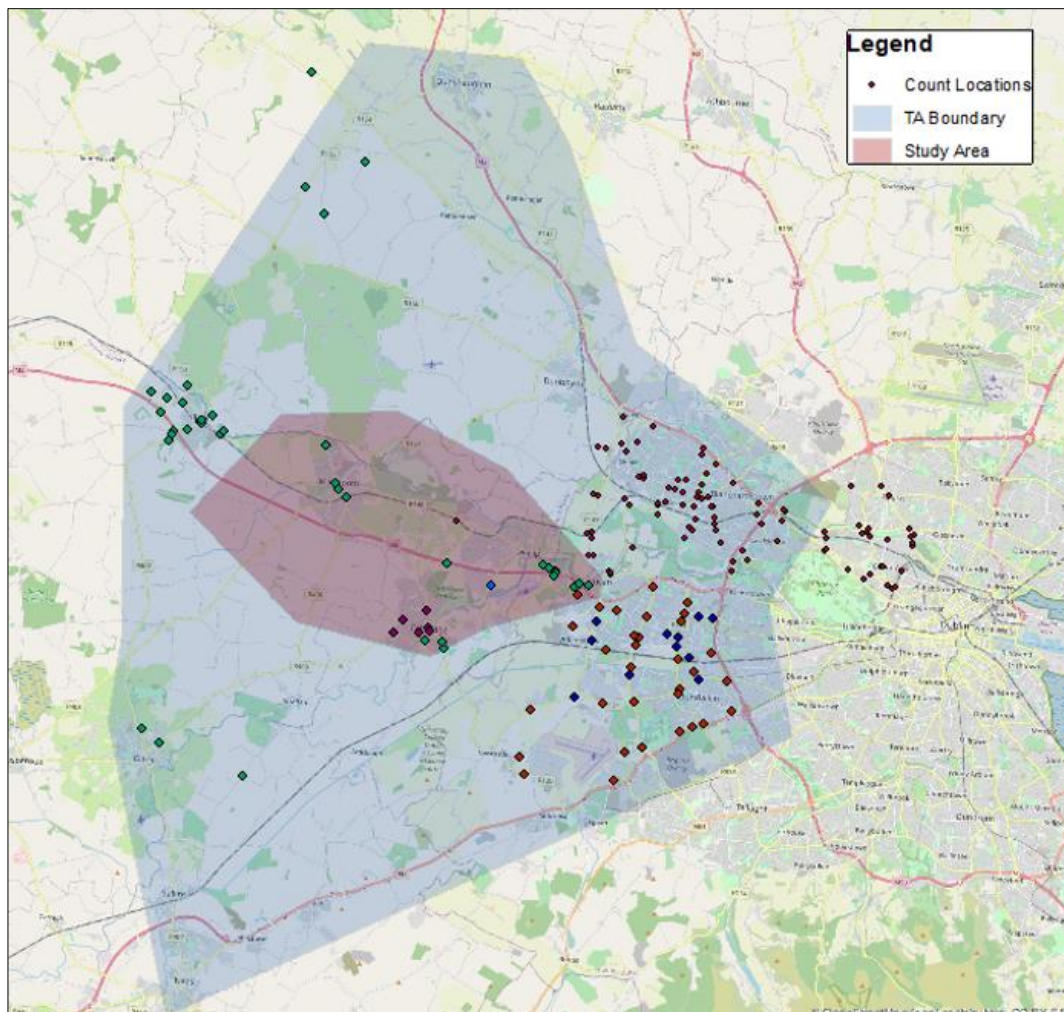


Figure 2.2 LAM Model Area

2.4 Model Time Periods

The M4/N4 LAM uses a specific hour within each peak period to represent traffic flow. These peak hours can then be factored up to a full peak period using a Period to Hour factor derived from count data.

The M4/N4 LAM was developed; calibrated, and validated to represent the following peak hours:

- AM Morning peak period: 08:00 to 09:00;
- PM Evening peak period: 17:00 to 18:00; and
- Average Interpeak Hour: 1 hour taken from average of 13:00-16:00.

2.5 Model Software

The model software used to develop the M4/N4 LAM is the SATURN (Simulation Assignment of Traffic to Urban Road Networks) suite of transportation modelling programs.

2.6 Network Development

As mentioned previously, the NTA's ERM was utilised as a base for generating the road network for the M4/N4 LAM.

The base ERM network was developed from the HERE mapping layer, from Here Technologies, which provides a detailed GIS representation of all national primary, national secondary, regional and local roads in Ireland.

The M4/N4 LAM road network, extracted from a cordon of the ERM, is illustrated in Figure 2.3 below. A detailed review was undertaken of all model coding in the study area using digital mapping systems such as Google Earth to ensure it represented, as accurately as possible, the existing road network. This included aspects such as network speed limits, availability of bus lanes, junction layouts, pedestrian crossing points etc.

As part of the regional model development process for the NTA, a review of traffic modelling processes was undertaken, which generated a best practice approach for coding road networks, including:

- Standardised turning saturation flows at junctions;
- Standardised speeds used on different types of road;
- The use of flares for turns at junctions with sufficient space etc.

This best practice approach was utilised to generate the detailed traffic network for the M4/N4 LAM, reviewing existing link detail and adding junction detail to the ERM network to enhance the modelled road network and better represent localised access points for traffic.

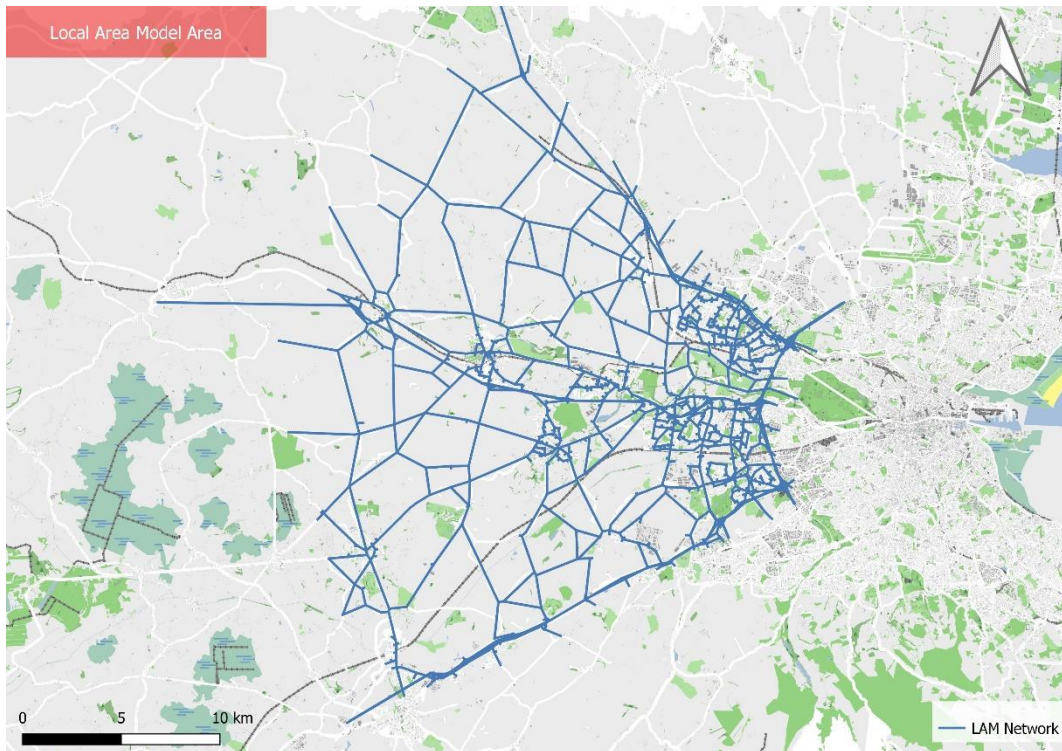


Figure 2.3 M4/N4 Road Network

As illustrated in the figure above, the ERM provides a detailed representation of all significant roads within the study area. To ensure full network coverage and route choice, all roads have been considered, from the national primary routes to minor residential streets.

2.7 Zone System Development

Similar to the road network described previously, the base M4/N4 LAM zone system was adopted from the ERM. The ERM zone system was developed using the Census Small Area Population Statistics (SAPS) and Place of Work, School or College Census of Anonymised Records (POWSCAR) to get detailed information on population, employment and education centres across the model area.

Other data sources such as MyPlan and Geo Directory are services offering information on planning. These were also used to obtain information on specific land use zoning and location of commercial developments. The following rules were then applied to generate the zone system:

- **Population, Employment and Education** – zones containing residential population, jobs and/or person in education over a certain threshold should be disaggregated to ensure an accurate representation of origin and destination demand loading points within the model;
- **Activity Levels** – the number of zones with activity levels that have very low or very high levels of trips should be minimised;

- **Intra-zonal Trips** – threshold values should be applied to the proportion of intra-zonal trips within each zone, to avoid an underestimation of flow, congestion and delay on the network;
- **Land Use** – zones should be created with homogeneous land use and socio-economic characteristics where possible;
- **Zone Size/Shape** – zone size and the regularity of zone shape should be considered in order to avoid issues with inaccurate representation of route choice;
- **Political Geography** – aggregate all zones to Electoral District level i.e. zone boundaries do not intersect ED boundaries; and
- **Special Generators/Attractors** – large generators/attractors of traffic such as Airports, Hospitals, shopping centres etc. should be allocated to separate zones.

The ERM zone system within the study area is illustrated in Figure 2.4.

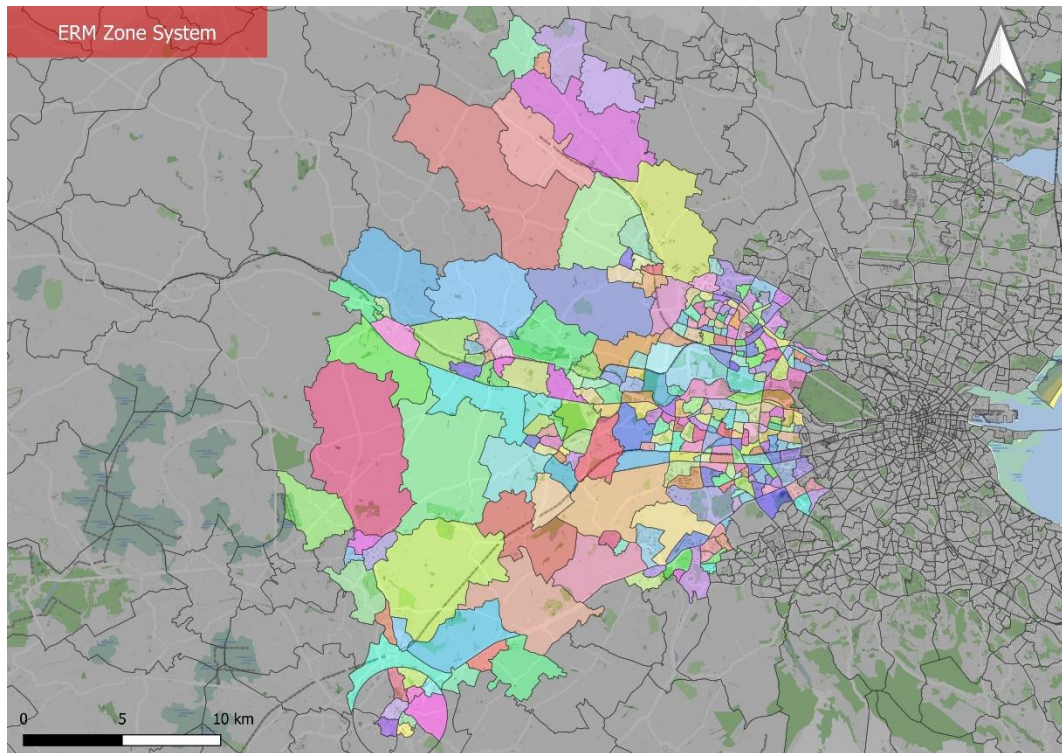


Figure 2.4 ERM Zone System with zones relevant to the LAM area highlighted.

In the parts of the study area close to Dublin City Centre, the ERM zones are represented in quite a high level of detail. As such, individual housing estates and key employers have been given their own zones. To the west of the study area, the ERM zones become larger and more aggregate in nature primarily due to the lower levels of activity (population and employment) in these areas.

A detailed review was undertaken of all ERM zoning and centroid connectors in the study area as part of the LAM development process. On foot of this review a number of edits were applied to the zone system in order to develop a zone system for the LAM and provide a more accurate representation of traffic loading onto the road network.

The refined zonal system developed for the study area is illustrated Figure 2.5. In total, 43 additional zones have been created through disaggregation of ERM zones, with 341 internal zones within the study area and 15 external zones representing the roads that enter the area of interest. This level of detail ensures that traffic loads accurately on the M4/N4 and the surrounding road network.

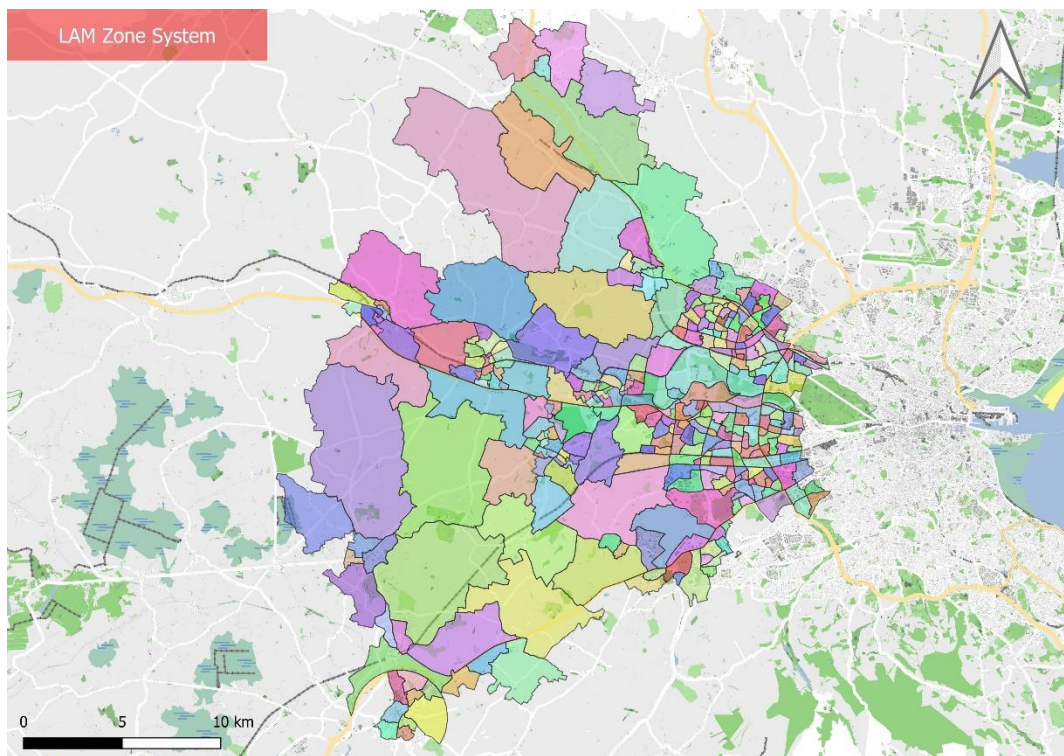


Figure 2.5 M4/N4 Refined Zone System

2.8 Prior Matrix Development

As noted previously, the Full Demand Model (FDM) carries out mode and trip destination choice for all zones within the ERM. The FDM has been calibrated using census data, and hence, provides a robust and accurate representation of trip distributions across the model network.

In order to generate prior matrices for the study area, a cordon was extracted from a 2021 run of the ERM. The cordon function within SATURN facilitates the extraction of trip matrices for a subset area of the ERM, whilst still maintaining route and destination choice from the full model.

A bespoke excel spreadsheet tool was created to disaggregate the cordoned ERM matrices to each of the 341 internal LAM zones. This tool used available data on population, employment, and education places at census small area level, to split trips to/from each ERM zone between the more detailed LAM zoning system. This allowed for a consistent split of demand within the study area, whilst maintaining consistency with the ERM matrix.

3. MODEL CALIBRATION AND VALIDATION

3.1 Overview of the Calibration and Validation Process

Once the Base Year prior matrix is created, calibration is used to improve agreement in the model between observed and modelled traffic characteristics. Generally, the components of the model that may be adjusted on the demand side are trip distribution and trip production and generation levels. This adjustment usually involves trip matrix estimation.

On the supply side (network), modelled junction and link characteristics may be altered if sufficient new information is available to justify changes to the existing network.

The M4/N4 LAM was calibrated and validated in accordance with Transport Infrastructure Ireland's (TII) Project Appraisal Guidelines (PAG) for National Roads Unit 5.1 – Construction of Transport Models. This is a widely accepted standard in Ireland that provides robust calibration and validation criteria to which certain types of highway models should adhere. Additionally, the M4/N4 LAM development has followed guidance from the UK's Department for Transport's Transport Analysis Guidance (TAG) unit M3-1, particularly in terms of matrix estimation controls.

The following sections of this chapter detail the calibration process undertaken to ensure that the Interim M4/N4 accurately reflects baseline conditions, including information on:

- Traffic Count Data;
- Calibration Steps;
- Matrix Estimation; and
- Calibration Statistics i.e. GEH.

3.2 Covid-19 Pandemic

The M4/N4 model was calibrated during the Covid-19 Pandemic, as such it was not possible to commission new traffic surveys. Due to the unprecedented and unpredictable nature of the pandemic no best practise approach was available for the calibration of models during this period.

As such, the M4/N4 model was calibrated to existing traffic survey data that could be acquired. This included the following sources:

- Maynooth Line Transport Study;
- NTA Clonburris LAM;
- TII Traffic Counters; and
- A selection of localised counts.

Journey time data was not available for the study area from other studies. Instead, journey time data was collected from Google Maps. This is discussed in more detail in the validation chapter.

3.3 Calibration Steps

As the M4/N4 was coded based on the ERM, the network coded was considered an accurate and up-to date representation of the existing road network. If required however, the following network model parameters were adjusted if there was clear reason for doing so:

- Junction type (Priority, Signalised, Roundabout);
- Road lengths;
- Signal timings;
- Link free flow travel speed;
- The number of approach lanes at each junction arm;
- Traffic lane width per junction approach, and the lane discipline adopted (including prohibited turns);
- Saturation flow through junctions;
- Assumed road capacities;
- Link based flow-delay relationships; and
- Zone connectors (connections to the network).

3.3.1 Trip Demand Adjustment (Matrix Estimation)

Trip demand was adjusted in line with count data, so that there was an improved agreement between counts and modelled flows. This adjustment was made through Matrix Estimation (ME). ME is the process in which the number of trips assigned along a model link is adjusted to match an observed total thus allowing the demand to be calibrated. ME was undertaken in SATURN using the SATME program.

3.3.2 Calibration Criteria: GEH Statistic

The GEH statistic is a measure that considers both absolute and proportional differences in flows. Thus, for high levels of flow a low GEH may only be achieved if the percentage difference in flow is small. For lower flows, a low GEH may be achieved even if the percentage difference is relatively large. GEH is formulated as:

$$GEH = \sqrt{\frac{(\text{observed} - \text{modelled})^2}{0.5 \times (\text{observed} + \text{modelled})}}$$

The reason for introducing such a statistic is the inability of either, the absolute difference, or the relative difference, to cope over a wide range of flows. For example, an absolute difference of 100 pcu/h may be considered a big difference if the flows are of the order of 100 pcu/h, but would be unimportant for flows in the order of several thousand pcu/h. Equally a 10% error in 100 pcu/h would not be important, whereas a 10% error in, for example, 3000 pcu/h might mean the difference between adding capacity to a road or not.

In general, the GEH parameter is less sensitive to the above statistical biases since an error of 20 in 100 would be roughly as bad as an error of 90 in 2,000, and both would have a GEH statistic of approximately 2.

The DMRB Volume 12a guidelines (Traffic Appraisal in Urban Areas) are a widely accepted standard in Ireland (with TII basing their guidelines on this document) that provides extremely robust validation criteria to which certain types of highway models should adhere. This document sets a guideline that 85% of links should have a GEH less than 5 (when measured in vehicles per hour) as shown in Table 3.1

Table 3.1 Calibration Criteria

CRITERIA	ACCEPTABILITY GUIDELINE
GEH < 5 for individual flows	> 85% of cases

Calibration Criteria: Individual Flows

In addition to the GEH Statistic, TII’s PAG (Unit 5.1 Table 5.1.3) lists the following hourly flows calibration criteria to be met in more than 85% of cases:

- where modelled flows are less than 700, the model flow should be within 100 vehicles of the count;
- where modelled flows are between 700 and 2700 the modelled flows should be within 15% of observed flows; and
- where modelled flows are greater than 2700 the modelled flows should be within 400 vehicles of the observed flows.

3.4 Model Calibration Results

Table 3.2 summarizes the GEH calibration results for the model after the matrix estimation process, for each of the three modelled time periods. All time periods pass the PAG criteria. The full list of GEH results for each traffic count location are presented in the accompanying calibration dashboards provided in Appendix A.

Table 3.2 Model GEH Results

GEH	AM	INTER-PEAK	PM
GEH < 5	87%	97%	93%
GEH < 10	98%	99%	99%
Overall Average GEH	2.54	1.39	1.85

Table 3.3 summarises the flow calibration results for the model after the matrix estimation process, for each of the three modelled time periods. The full list of flow calibration results for each traffic count location are presented in the accompanying calibration dashboards provided in Appendix A.

The figures demonstrate that a good calibration has been achieved in the model for the morning, evening and inter peak periods in accordance with TII PAG criteria.

Table 3.3 Link and Turn: Individual Flows (PCUs)

GEH	AM	INTER-PEAK	PM
Flows	90%	94%	94%

Again, these figures demonstrate that a good level of calibration has been achieved in the model for the morning, evening and inter peak periods.

3.5 Trip Matrix Calibration

A further calibration step recommended by TII’s PAG Unit 5.4 is to compare trip length distributions for the prior and post calibrated matrices to ensure they have not been distorted to any great extent by the matrix estimation process. SATME can sometimes generate increased short distance trips to match count information, thus distorting the profile of trip making on the network.

TII’s PAG Unit 5.4 suggests that the coincidence ratio¹ should be used to compare trip length distributions before and after estimation, with a desirable range between 0.7 and 1.0.

A coincidence ratio can be used to compare two distributions by examining the ratio of the total area of those distributions that coincide. The coincidence ratio is defined as:

$$CR = \frac{\sum\{Min (TLDs, TLDf)\}}{\sum\{Max (TLDs, TLDf)\}}$$

Where TLDs is the source trip length frequency and TLD is the final trip length frequency. A desirable range for the coincidence ratio is between 0.7 and 1.0 where a ratio of 1.0 suggests an identical distribution.

0 below outlines the coincidence ratios for each of the calibrated time periods developed.

Table 3.4 Trip Length Analysis – Coincidence Ratios

MEASURE OF FIT	AM	INTER PEAK	PM
Coincidence Ratio	0.77	0.75	0.70

The coincidence ratios suggest that, while there has been some changes in trip lengths, the changes made during matrix estimation are within acceptable limits.

¹ The coincidence ratio is a calculation used to examine the how well the total area under different distributions coincide, with a value of 1 representing an identical distribution.

4. MODEL VALIDATION

4.1 Introduction

Under normal circumstances the robustness of the model would be checked against a validation set of count and journey time data. However, the limited count data available required the use of all counts for the calibration process to ensure sufficient confidence in the model area. As such, journey times only were used for the validation process.

4.2 Journey Time Validation

Journey time surveys were not undertaken for this project due to the constraints of the Covid-19 Pandemic. Attempts were made to source data from other projects, but these provided incomplete routes, or routes outside the model study area.

As such, journey times for these routes were extracted from Google, specifying the time of day of travel as the midpoint of the period and specifying a Wednesday in late September 2019. These routes are shown in Figure 4.1 below.

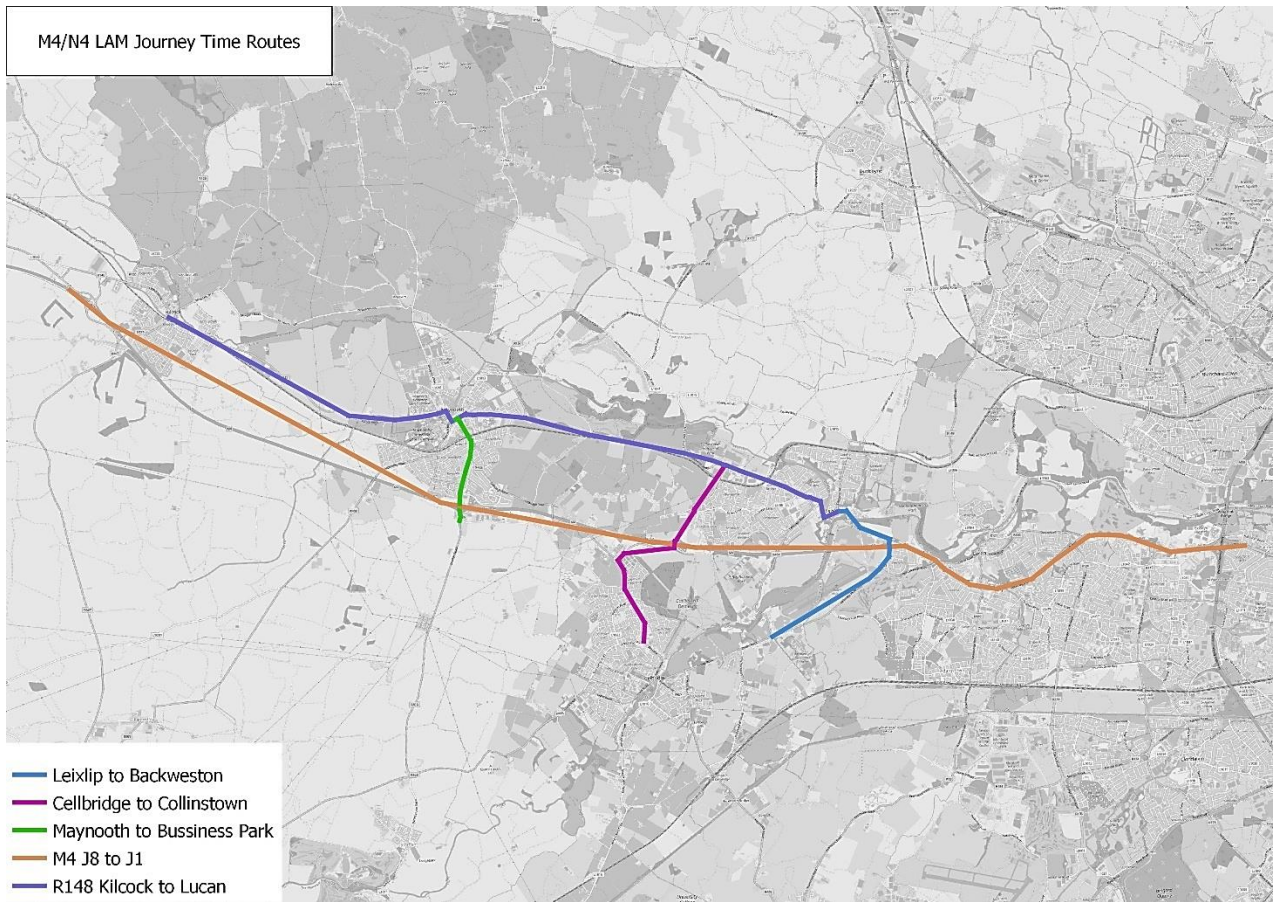


Figure 4.1 Journey Time Routes

TII’s PAG (Unit 5.2 Table 5.2.2 and 5.2.3) advises that modelled journey times should be within 15% of the observed time (or 60 seconds if higher) in more than 85% of routes. Table 4.1 outlines the overall results. The results show an excellent match to TII guidelines, satisfying the PAG criteria for all time periods. A detailed breakdown is provided for each time period.

Table 4.1 Journey Time Validation

PAG CRITERIA	AM	PM	INTER PEAK
Route Totals	90%	90%	90%
Pass	✓	✓	✓

4.2.1 AM Journey Time Validation

The journey time results in Table 4.2 indicate a good correlation between modelled and observed journey times in the AM peak with 9 routes falling within 15% of the observed journey times as per the PAG criteria.

Table 4.2 Journey Time Validation – AM Peak

ROUTE	OBSERVED (SECONDS)	MODELLED (SECONDS)	DIFFERENCE (%)	PASS
Kilcock to Lucan	1080	1207.56	-12%	Yes
Lucan to Kilcock	1080	1080.26	0%	Yes
Maynooth to Business Park	180	244.95	-36%	No*
Business Park to Maynooth	240	250.79	-4%	Yes
Celbridge to Collinstown	360	392.62	-9%	Yes
Collinstown to Celbridge	360	329.2	9%	Yes
Backweston to Leixlip	300	315.61	-5%	Yes
Leixlip to Backweston	300	305.54	-2%	Yes
J8 Kilcock to J1 M50	900	967	7%	Yes
J1 M50 to J8 Kilcock	960	966	3%	Yes

*The model meets the recommended criteria of 85% of routes within 15% or 60 seconds of the observed journey time. The Maynooth to Business Park which operates 65 seconds slower than observed. While all efforts were made to achieve a 100% match to journey times, changes to align this route with observed times resulted in lower validation results on other routes and within the count validation. The overall validation is within recommended criteria and as such considered acceptable.

4.2.2 Inter-Peak JT Validation

The journey time results in Table 4.3 indicate a good correlation between modelled and observed journey times in the Inter peak with 9 routes falling within 15% of the observed journey times as per the PAG criteria.

Table 4.3 Journey Time Validation – Inter-Peak

ROUTE	OBSERVED (SECONDS)	MODELLED (SECONDS)	DIFFERENCE (%)	PASS/FAIL
Kilcock to Lucan	1200	1099.29	8%	Yes

ROUTE	OBSERVED (SECONDS)	MODELLED (SECONDS)	DIFFERENCE (%)	PASS/FAIL
Lucan to Kilcock	1440	1058.25	27%	No
Maynooth to Business Park	240	230.81	4%	Yes
Business Park to Maynooth	240	220.75	8%	Yes
Celbridge to Collinstown	360	326.65	9%	Yes
Collinstown to Celbridge	360	332.95	8%	Yes
Backweston to Leixlip	300	313.93	-5%	Yes
Leixlip to Backweston	300	296.85	1%	Yes
J8 Kilcock to J1 M50	840	873	4%	Yes
J1 M50 to J8 Kilcock	840	880	5%	Yes

4.2.3 PM Peak JT Validation

The journey time results in Table 4.4 indicate a good correlation between modelled and observed journey times in the PM peak.

Table 4.4 Journey Time Validation – PM Peak

ROUTE	OBSERVED (SECONDS)	MODELLED (SECONDS)	DIFFERENCE (%)	PASS/FAIL
Kilcock to Lucan	1200	1133.81	6%	Yes
Lucan to Kilcock	1200	1235.94	-3%	Yes
Maynooth to Business Park	240	318.37	-33%	No
Business Park to Maynooth	240	218.14	9%	Yes
Celbridge to Collinstown	360	345.13	4%	Yes

Collinstown to Celbridge	480	439.42	8%	Yes
Backweston to Leixlip	420	346.47	18%	No
Leixlip to Backweston	300	297.53	1%	Yes
J8 Kilcock to J1 M50	1020	882	-14%	Yes
J1 M50 to J8 Kilcock	1140	983	-14%	Yes

4.3 Calibration and Validation Summary

The previous two chapters provide an overview of the calibration and validation of the M4/N4 LAM. In summary:

- It was not possible to collect new survey data for the calibration of the LAM due to the COVID-19 Pandemic, as such data has been collated from other project and sources.
- The M4/N4 LAM has a good match to available count data and meets the PAG criteria for model calibration and validation.
- Trip lengths have been shortened by matrix estimation but are within the acceptable criteria.
- Journey time validation shows a good match against journey time routes assessed within all three time periods within specified criteria.

It is important to note that this model has been calibrated for Phase 2 of the M4/N4 assessment. At the time of calibration and validation data was not available due to the COVID-19 Pandemic. It is recommended that the model be re-calibrated with new survey data when the project progresses to Phase 3.

5. FUTURE YEAR MODEL DEVELOPMENT

A detailed approach to forecasting travel demand has been adopted for the Maynooth to Leixlip Project in order to capture the planned growth in population and employment at a local level for all settlements in the study area. The future growth in travel demand for the M4/N4 LAM has been carried out in accordance with the Zone Based Growth approach described in TII PAG Unit 5.3 *Travel Demand Projections* using the NTA's Future Year Eastern Regional Model (ERM).

The ERM future year travel demand is based on forecasts of population, employment and education data as defined by the National Transport Authority at the Census Small Area level. The National Demand Forecasting Model converts this forecast planning data to trip forecasts (in total productions and attractions per zone) for input to the Eastern Regional Model. The travel demand for the assessment years for this project (opening year of 2032, design year of 2047) have been derived by linear interpolation of the NTA's 2026 and 2040 National Planning Framework reference scenarios.

Annualised external (external to the M4/N4 LAM) growth rates have been calculated by cordoning the modelled study area from the future year ERM models. Internal (zones within the M4/N4 LAM) growth rates have been based on the ERM zonal growth rates between base year and future year. This internal growth was proportionally applied to the LAM zones based on base year proportions of employment and population, or in accordance with relevant planning information (Development Plans, Local Area Plans, etc.) where appropriate.

A single growth scenario has been adopted for this phase of the project appraisal in order to compare the different options against each other on an equal basis.

5.1 Population and Employment Forecasts

The National Planning Framework (NPF) 2040 has been published as a guide to the high-level strategic planning and development of Ireland over the next 20+ years. The NPF, and newly published National Development Plan 2021-2030 (NDP), provide a single policy to guide strategic development and infrastructure investment at a national level. The NPF and NDP also set the context for each of Ireland's three regional assemblies to develop their regional and spatial strategies taking account of, and co-ordinating, local authority County and City Development Plans in a manner that will ensure National, Regional and Local plans align.

Given the statutory basis of the NPF, the population forecasts developed for this project align with those set out in the NPF.

A land use spreadsheet, including demographic (population, employment, etc.) forecasts, has been developed by the NTA for input into the National Demand Forecasting Model (NDFM).

The NDFM converts this forecast planning data to trip forecasts (in total origins and destinations per zone) for input into the ERM. During the development of these land use spreadsheets, the population targets from the NPF were distributed geographically among the Census Small Areas most likely to experience population growth under existing policy. The population forecasts developed for the model study area for the NPF growth scenario are summarised in Table 5.1.

AREA	2016	2032	2047
M4/N4 LAM Extent	74,937	79,809	88,689
Dublin City (inside M50)	35,696	40,092	47,850
Maynooth	16,234	20,235	23,989
Leixlip	17,095	18,882	22,229
Celbridge	20,812	22,659	26,150
Clane	7,600	8,035	8,840

Table 5.1 M4/N4 Study Area Population Forecasts

Similar to the population forecasts, the land use spreadsheets developed by the NTA include a set of employment forecasts for each Census Small Area. These assumptions are aligned with the NPF population forecasts and also incorporate any relevant local and regional policy.

5.2 Future Year Matrix Development

As discussed above, the forecast year matrices have been based on growth between the base and future year cordons from the ERM. The cordon models have 313 zones (including externals) as per Figure 2.4 Figure 2.3 and include demand from NPF planning data forecasts. Upon producing these cordon models, the demand was disaggregated to the LAM zones (356 in total), which resulted in a set of trip end growth factors compared to the base year cordons. These growth factors were applied to existing base year matrices (which is calibrated and validated to a local level) to give future year trip ends.

5.3 Future Year Matrix Totals

A comparison of the peak hour trip matrix totals for the 2021 Base Year and 2047 Design Year scenarios are outlined in Table 5.2, in terms of PCUs (Passenger Car Units). A PCU is a unit of measurement used in transport modelling that represents the space a single car would occupy. Larger vehicles, such as buses and goods vehicles consist of several PCU depending on size (eg Car = 1 PCU, HGV = 2.5 PCU, Bus = 3 PCU).

TIME PERIOD	UNIT	2021	2032	% GROWTH
AM Peak	PCUs	82,849	109,677	32%
Inter-Peak	PCUs	58,367	79,237	36%
PM Peak	PCUs	79,633	98,743	24%

Table 5.2 Matrix Totals 2047 Design Year

5.4 Annual Average Daily Traffic

The Annual Average Daily Traffic (AADT) flow is defined as the two-way volume of traffic using the road during a year, divided by the number of days in the year. To estimate the AADT using Peak Hour Model outputs, factors were developed that allowed extrapolation of peak hour traffic flows to AADT.

TII PAG recommends a daily flow profile is generated for the weekday for which the short period traffic counts have been collated. In this case the short period data will be peak hour model outputs. The peak hour models have been developed to represent the “average weekday”, therefore, a daily profile for the average weekday was generated using data gathered from the TII traffic counter for 2021.

Data from the automatic traffic counters was then classified into Peak (comprising AM Peak and/or PM Peak) and Inter Peak periods. In performing this task, the following bands were used.

- AM Peak Period: The period from 06:00 to 10:00
- PM Peak Period: The period from 16:00 to 20:00
- Inter Peak Period: The period from 20:00 to 06:00 and 10:00 to 16:00

To estimate the flow for a defined period (e.g. the AM peak) from the short period count, the procedure is as follows:

$$AM_x = \left(\frac{Q_x}{Q_{PTC}} \right) \times AM_{PTC}$$

Where:

- AM_x = Annual Average AM Peak (06:00 – 10:00) traffic flow at location x
- AM_{PTC} = Annual Average AM Peak (06:00 – 10:00) traffic flow at Permanent Traffic Counter
- Q_x = Short Period AM Peak traffic flow
- Q_{PTC} = Short Period AM Peak traffic flow at Permanent Counter, this should relate to same Short Period as Q_x

The same process is applied to the Inter Peak (IP) and PM peaks and the result for all periods (AM Peak, PM Peak and Inter Peak) is aggregated to give a value of AADT as follows:

$$AADT_x = (AM_x) + (IP_x) + (PM_x)$$

The above calculations were performed for TII counter TMU M04 015 located between Junction 6 Celbridge and Junction 7 Maynooth. Similarly, this analysis provided a relationship between the short period count (i.e. Modelled Peak Hour) and the Peak Period (e.g. AM Peak of 06:00-10:00) at each site and for each time period (AM_x , IP_x and PM_x). The expansion factors calculated by time period and user class are shown in Table 5.3.

TIME PERIOD	LIGHT VEHICLE	HEAVY VEHICLE
AM	2.94	3.10
IP	6.00	6.00
PM	2.89	2.38

Table 5.3 AADT 2047 Expansion Factors

The forecast AADT flows on the road network extracted from the model for the 2047 Design Year are presented in Table 5.4.

LOCATION	AADT	% HGV
M4 West of J7	53,679	8.2%
M4 Between J7 and J6	69,801	7.5%
M4 Between J6 and J5	77,656	7.0%
M4 East of J5	86,507	7.0%

Table 5.4 AADT Flows on M4/N4

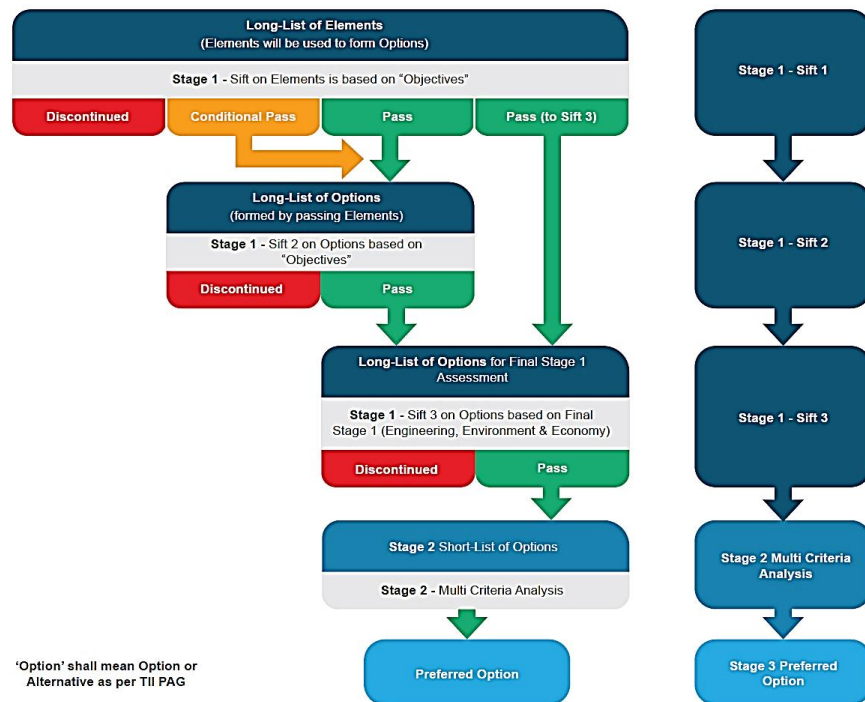
6. STAGE 1 - PRELIMINARY OPTIONS ASSESSMENT MODELLING

The Stage 1 Preliminary Options Assessment (POA) modelling was undertaken to support the wider Stage 1 POA decision making and options sifting. This section covers the testing of the initial options within the local area model (LAM) looking at the following key performance indicators (KPIs);

- Change in flow;
- Volume over capacity change; and
- Vehicle delay change.

These KPIs were measured for each link in the model area with the impacts recorded as negligible, minor, moderate or major for each link. These results were then looked at holistically for the modelled area. The scoring categories for this section are shown in Table 6.1 later in this chapter.

A process flow chart was prepared and utilised for the development and assessment of options. The process flow chart is illustrated below.



The modelling done in this section is to support the POA Sift 3. Not all options were modelled at this stage, and the modelling was used to support the wider process. The options in this chapter are divided into 3 groupings:

- Corridors – looking at measures along the mainline of the M4/N4;
- Junction 5 – interventions at Junction 5 Leixlip of the M4/N4;
- Junction 6 – signalisation interventions; and
- Junction 7 – interventions at Junction 7 Maynooth of the M4/N4.

6.1 Corridor Options

A total of four corridor option were tested in the LAM:

- 2A – Bus Facility Eastbound and Westbound for extent of the corridor with an additional lane for general traffic provided in the Westbound direction;
- 2B – Same as 2A with an additional parallel road from R404 Leixlip to Maynooth;
- 3A - Bus Facility Eastbound and Westbound for extent of the corridor with an additional lane for general traffic provided in both directions; and
- 3B - Same as 3A with an additional parallel road from R404 Leixlip to Maynooth.

Cross-sections for these options are shown in Figure 6.1 and Figure 6.2 below.

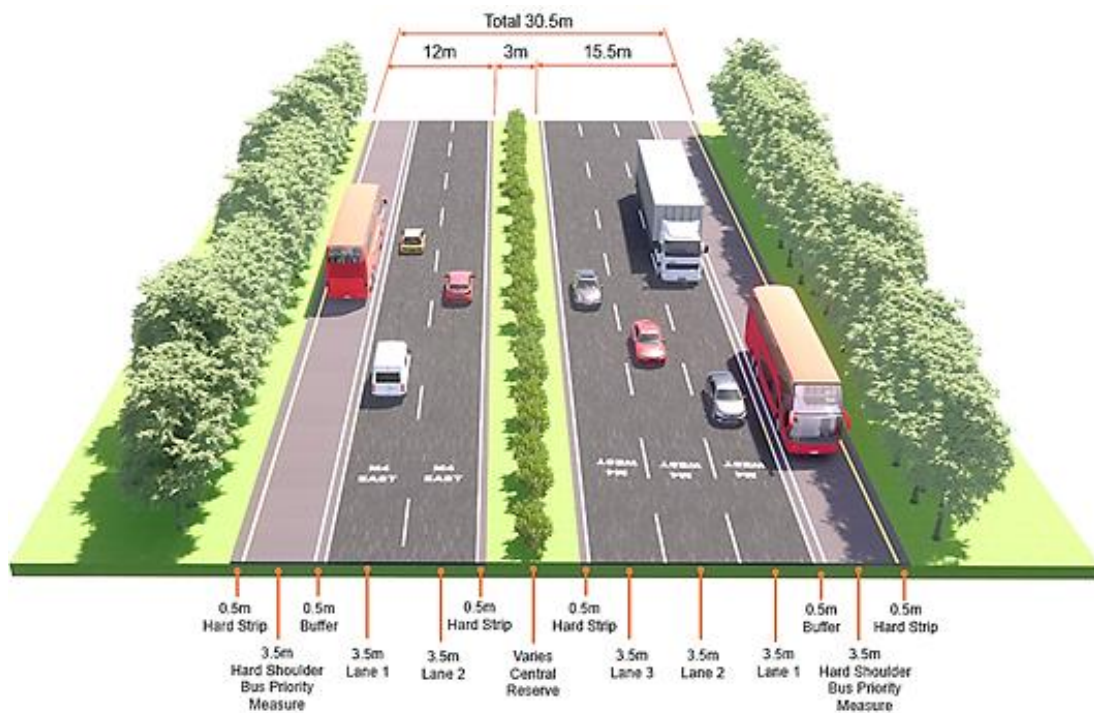


Figure 6.1 Option 2A and 2B cross sections

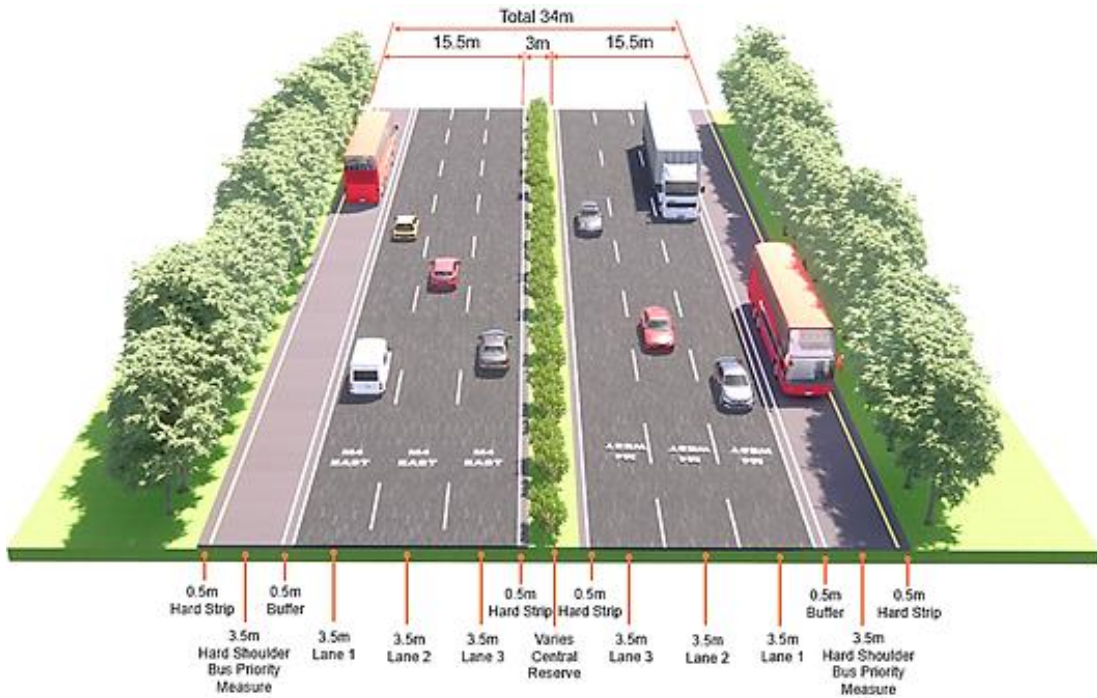


Figure 6.2 Option 3A and 3B cross sections

The alignment for the parallel road is shown in Figure 6.3 below.

Corridor Option 2 (A and B)



Figure 6.3 Alignment of proposed parallel road between R404 and Maynooth

6.2 Junction 5 Options

2 options were tested for Junction 5 Leixlip, with both options converting the existing junction to an overbridge;

- 2.1 – New junction west of the Liffey; and
- 2.2 – New junction east of the Liffey and west of existing junction.

Locations of the new proposed junctions are shown in Figure 6.4 below;

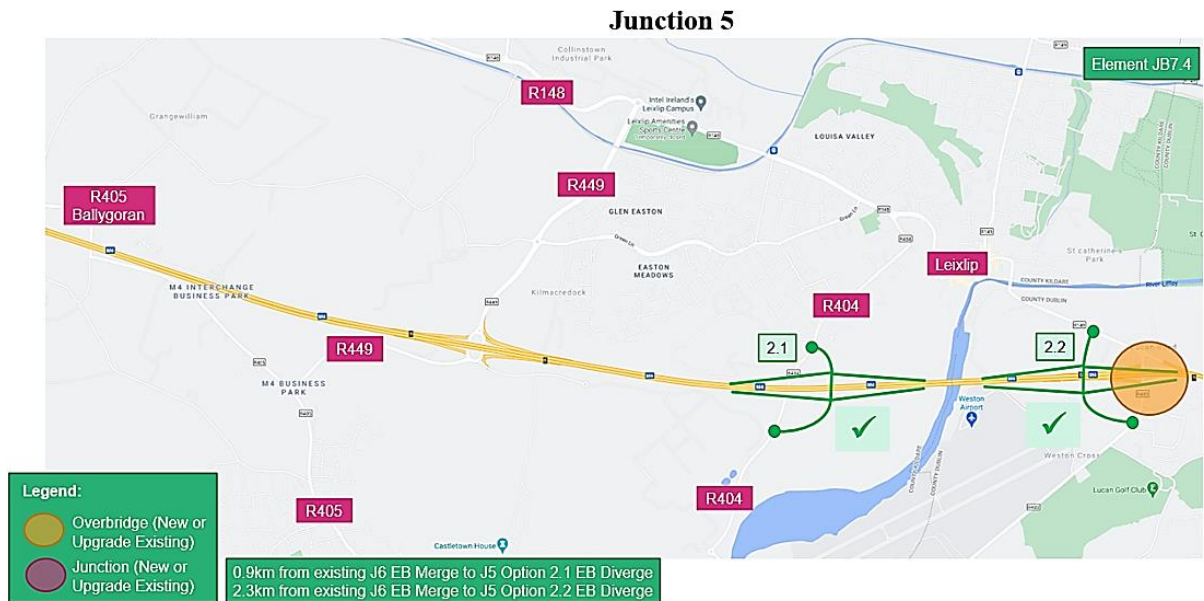


Figure 6.4 Junction 5 Options

6.3 Junction 7 Options

Five options were tested for Junction 7 Maynooth:

- 2.1.1 – Upgrade existing junction and provide a second junction to the west of Maynooth
- 3.1.2 – Provide two new junctions, one to the west of Maynooth and one to the east, existing junction to be converted to an overbridge;
- 3.3.1 – Provide two new junctions, one to the west of Maynooth and one to the east, existing junction to be converted to an overbridge;
- 3.4.1 - Provide two new junctions, one west of Millfarm and a second between the R408 Newtown Road and the R406 Straffan Road, existing junction to be converted to an overbridge; and
- 4.1.1 – Provide one new junction to the west of the existing junction with the existing junction converted to overbridge.

These options are shown in Figure 6.5 to Figure 6.9 below.

J7 - Option 2.1.1 – Upgrade Existing Junction & Provide 2nd Junction (Standard 2km)

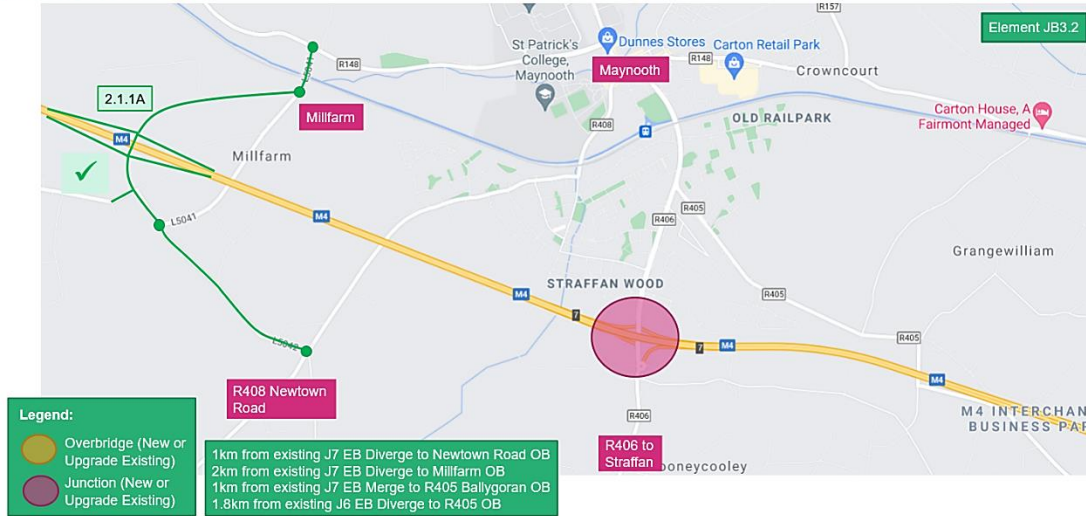


Figure 6.5 Option 2.1.1

J7 - Option 3.1.2 - Provide 2 New Junctions & Convert Existing to Overbridge (Relaxation 1km)



Figure 6.6 Option 3.1.2

J7 - Option 3.3.1 - Provide 2 New Junctions & Convert Existing to Overbridge (Standard 2km or Relaxation 1km)

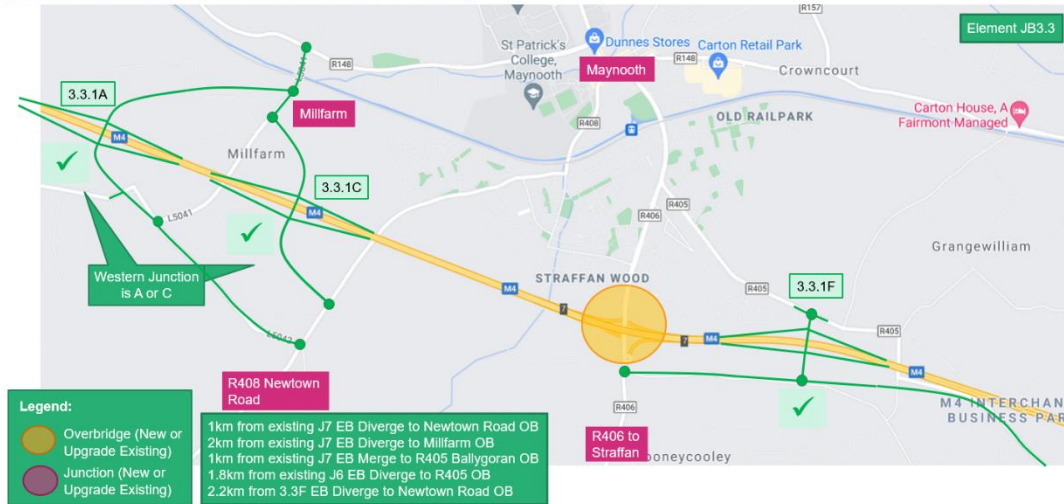


Figure 6.7 Option 3.3.1

J7 - Option 3.4.1 - Provide 2 New Junctions & Convert Existing to Overbridge (Standard 2km or Relaxation 1km)



Figure 6.8 Option 3.4.1

J7 - Option 4.1.1 - Provide 1 New Junction & Convert Existing to Overbridge



Figure 6.9 Option 4.1.1

6.4 Results

As mentioned earlier in this chapter, these results are based on the links within the LAM being put in Negligible, Minor, Moderate and Major impact groupings as set out in Table 6.1. The total number of beneficial and adverse changes are then counted and the ratio between the two taken as a score. These results are provided in Table 6.2 on the following page.

Where a positive or negative impact is recorded for multiple KPIs on the same link, only the highest is taken in the scoring. For example; if a link scores a moderate positive change in flow, and a major positive change in delay, then the links scores as a major positive change.

6.4.1 Corridor Options

Of the four options tested, the two options that had the parallel link road between the R404 and Maynooth performed worse than the counterpart options without the link road. This was due to the wider ranging impacts caused by the addition of the link road, with more links registering minor to major impacts.

Option 3A which includes an additional lane in each direction scored highest overall across the tested metrics.

Option 3A – Additional traffic lanes in both the eastbound and westbound directions with bus priority measures performs best out of the options tested from a transport modelling perspective. However, as the time savings are limited (34 seconds), it is not justified to take forward Option 3A to Stage 2. For further details regarding the full appraisal process, refer to Chapter 5 Stage 1 POA of Volume A and Appendix 5.5 Stage 1 Traffic and Transport Analysis of Volume C of the Options Report. In addition, both Options 2B and 3B, which include parallel roads, are ruled out and are not justified to take forward.

6.4.2 Junction 5 Options

Option 2.2, a new junction east of the Liffey and west of existing junction, performed best. However, while the ratio between Adverse and Beneficial is positive, the number of links affected with adversal benefits is high.

Option 2.2 – A new junction east of the Liffey and west of the existing junction performs best.

6.4.3 Junction 7 Options

Of the five scenarios tested for Junction 7, none had a ratio of beneficial to adverse impacts less than 1.

From the two options which included a new eastern junction, proximity to Junction 6 appears to increase the number of negatively affected links within the model, with Option 3.3.1 scoring better than Option 3.1.2.

Option 2.1.1 – A new junction to the west of Maynooth and improvement of the existing junction performed best out of the options tested.

Table 6.1 Description of Impact Measure Thresholds

Description of Impact Measure Thresholds

Impact Measure	No Change*	Impact	Negligible	Minor	Moderate	Major
Actual Flow (% change)	0% difference between "with" and "without" scheme	Adverse	Between +2% and +10%	Between +10% and +30%	Between +30% and +60%	Greater than +60%
		Beneficial	Between -2% and -10%	Between -10% and -30%	Between -30% and -60%	Less than -60%
Volume over Capacity (v/c) Threshold Change	0% difference between "with" and "without" scheme	Adverse	v/c <80% in both "with" and "without" scheme scenarios but v/c increases from "without" scheme scenario	Scheme causes link to go from v/c <80% to v/c 80-90%	Scheme causes link to go from v/c <90% to v/c 90-100%	Scheme causes link to go from v/c <100% to v/c >100%
		Beneficial	v/c <80% in both "with" and "without" scheme scenarios but v/c decreases from "without" scheme scenario	Scheme causes link to go from v/c 80-90% to v/c <80%	Scheme causes link to go from v/c 90-100% to v/c <90%	Scheme causes link to go from v/c >100% to v/c <100%
Volume over Capacity (% point change)	0% difference between "with" and "without" scheme	Adverse	Between +2% and +5%	Between +5% and +10%	Between +10% and +15%	Greater than +15%
		Beneficial	Between -2% and -5%	Between -5% and -10%	Between -10% and -15%	Less than -15%
Total Vehicle Hours Delay (% change)	0% difference between "with" and "without" scheme	Adverse	Between +2% and +10%	Between +10% and +30%	Between +30% and +60%	Greater than +60%
		Beneficial	Between -2% and -10%	Between -10% and -30%	Between -30% and -60%	Less than -60%

* Practical limit of change set to account for model noise. Change of between +2% and -2% is "no change".

Table 6.2 AM and PM peak combined summary

AM + PM Peak Combined Summary		Corridor				Junction 5		Junction 7				
		2A	2B	3A	3B	2.1	2.2	2.1.1	3.1.2	3.3.1	3.4.1	4.1.1
Total number of unique links exhibiting a "Major" impact	Adverse	8	30	11	32	45	41	22	72	69	46	46
	Beneficial	12	24	24	34	39	58	49	102	119	110	73
	Ratio Beneficial to Adverse	1.5	0.8	2.2	1.1	0.9	1.4	2.2	1.4	1.7	2.4	1.6
Total number of unique links exhibiting a "Moderate" or "Major" impact	Adverse	14	54	15	60	85	68	38	147	140	102	107
	Beneficial	23	45	37	56	79	90	129	224	253	221	153
	Ratio Beneficial to Adverse	1.6	0.8	2.5	0.9	0.9	1.3	3.4	1.5	1.8	2.2	1.4
Total number of unique links exhibiting a "Minor", "Moderate" or "Major" impact	Adverse	64	162	55	149	184	157	130	363	359	265	252
	Beneficial	71	184	78	210	219	238	331	468	537	462	348
	Ratio Beneficial to Adverse	1.1	1.1	1.4	1.4	1.2	1.5	2.5	1.3	1.5	1.7	1.4

7. STAGE 2 - PROJECT APPRASIAL MATRIX MODELLING

7.1 Overview

Following completion of Stage 1 Preliminary Options Assessment (POA), additional modelling was undertaken to support Stage 2 Project Appraisal Matrix (PAM) both directly through the measurement of KPIs, and indirectly, through the provision of AADTs.

Additional modelling in this section is focused on the Junctions with:

- Two options carried forward for Junction 5, both involving optimisations and improvements to the existing junction,
- One option for Junction 6; and
- Two options for Junction 7.

The details of the options are outlined in the individual sections below.

This section of the report looks at these options in more detail, with a focus on the junctions and the modelling done to support the Stage 2 PAM.

7.2 Junction 5 Modelling

7.2.1 Overview

Junction 5 is the primary junction serving Leixlip, sitting to the east of the town. The location of the junction is constrained by the River Liffey to the west and Junction 4a to the east which serves west Lucan.

The eastbound diverge joins the R403 at an unsignalized priority junction, while the westbound diverge merges onto the Leixlip Road and joins the R403 at a signalised junction. This signalised junction also provides access to the westbound access ramp.

The eastbound merge is accessed through the roundabout between the R148 and R403 and follows a non-standard design with 2-way traffic allowed for the 100m to allow access to the houses located along the merge.

The junction is shown in Figure 7.1 below with the 3 key consecutive junctions highlighted.

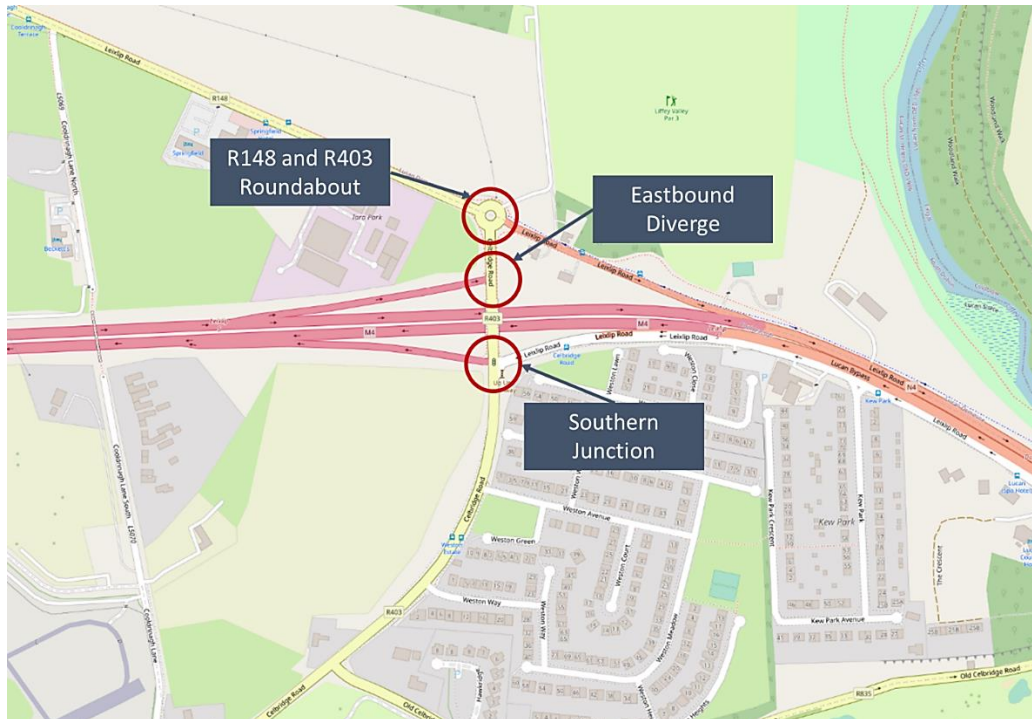


Figure 7.1 Junction 5

The current configuration creates barriers to pedestrian movement across the junction due to the uncontrolled crossing at the eastbound diverge. This uncontrolled crossing is the primary focus of the modelling exercises at this junction.

With this in mind, the options for Junction 5 looks to address the uncontrolled crossing at the eastbound diverge, while also improving the junction's overall operational efficiency.

7.2.1.1 Options for Assessment

Two options were developed, aimed at improving Junction 5:

- Option 1 - Redesign of the roundabout between the R403 and R148 with realignment of the eastbound diverge to connect to new roundabout; and
- Option 2 - Signalisation of the Eastbound Diverge where it joins the R403.

Option 1 is shown Figure 7.2 below.

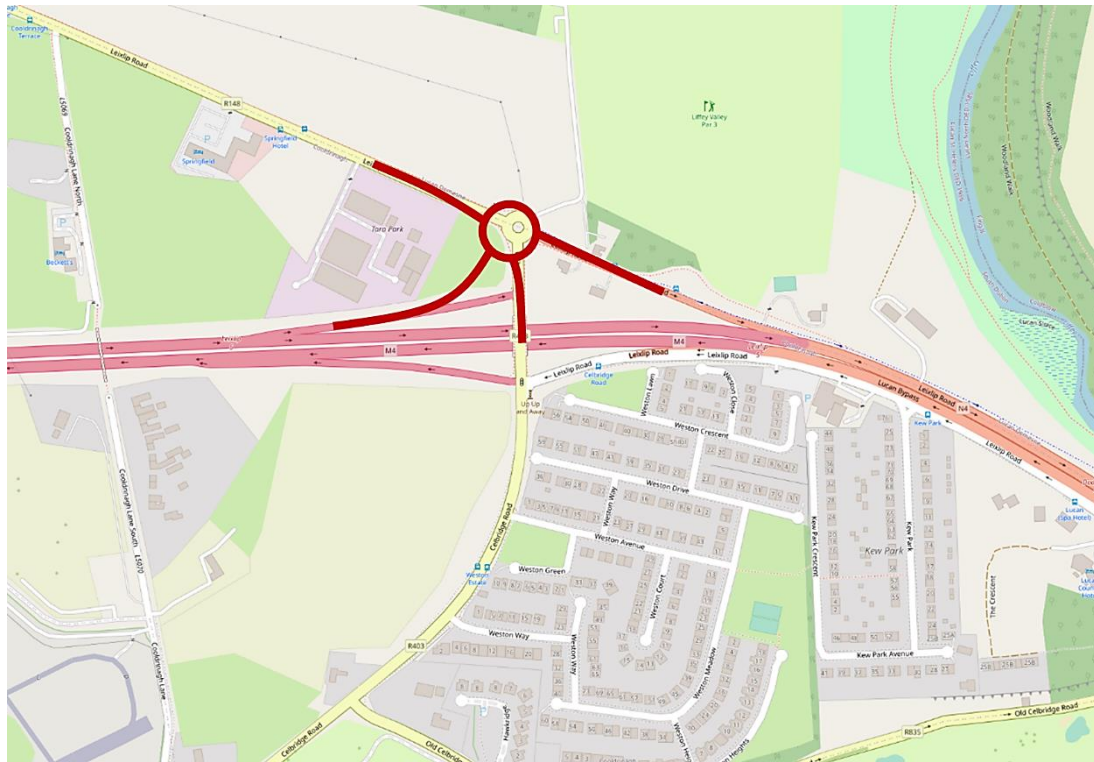


Figure 7.2 Junction 5 Option 1 Layout

7.2.2 Junction 5 Option Comparison

To compare the options, several factors were considered;

- The function of the junction from a pedestrian perspective;
- The impact of the junction improvements on the M4/N4; and
- The impact of the junction improvements on junction performance for accessing and leaving the M4/N4.

Both options do not allow for any rerouting or redistribution of traffic, as such the focus of the assessment is on the junction and the M4/N4, rather than wider impacts.

To assess these factors, several KPIs were compared for the two scenarios, and against the Do Minimum scenario;

- Level of Service (LOS) assessment of the junction for pedestrian crossings;
- Delays and journey times along the M4/N4; and
- Delays at the junction.

7.2.2.1 Level of Service (LOS) Assessment

The LOS assessment is a means by which the quality of uncontrolled pedestrian crossings can be graded. The process takes into account the traffic volumes on the arms, the width of the crossings and the sight lines.

The assessment of Junction 5 found that the uncontrolled crossing on the eastbound diverge scored an F, the lowest score, which is defined as “Exceeds tolerance. High likelihood of pedestrian risk taking.”

Option 1 would be able to increase the LOS scoring of the junction through the design process by increasing sight lines and ensuring a safer crossing distance. Option 2, with a controlled signalised crossing, would remove the safety issues associated with an uncontrolled crossing.

7.2.2.2 Junction Impacts

Changing the junction design would lead to changes in how the junction operates, the KPI used to assess this for this project is the delay on the junction, in particular delay on the eastbound and westbound diverges which are shown in Figure 7.3 and Figure 7.4 below.

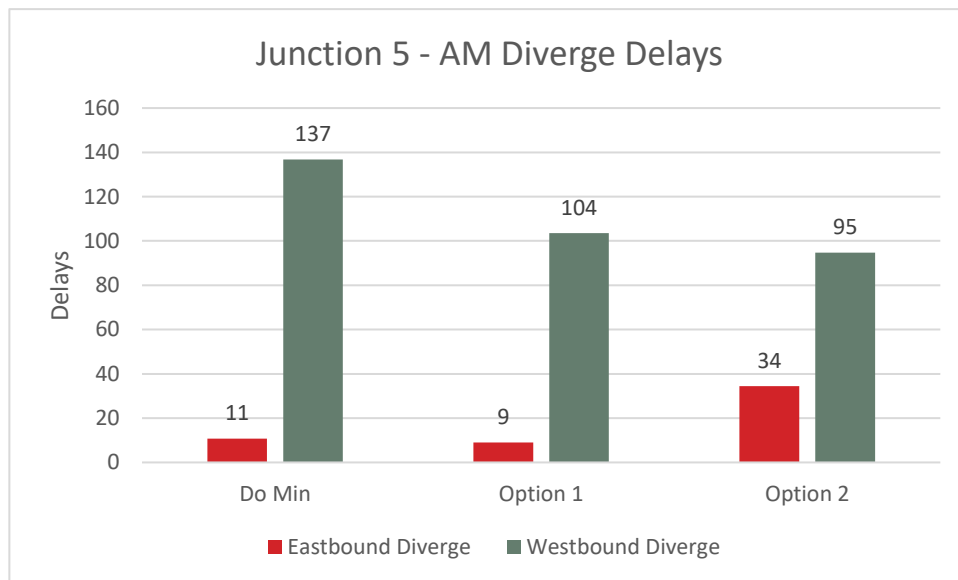


Figure 7.3 Junction 5 diverge delays (seconds on average per vehicle over the hour) - AM

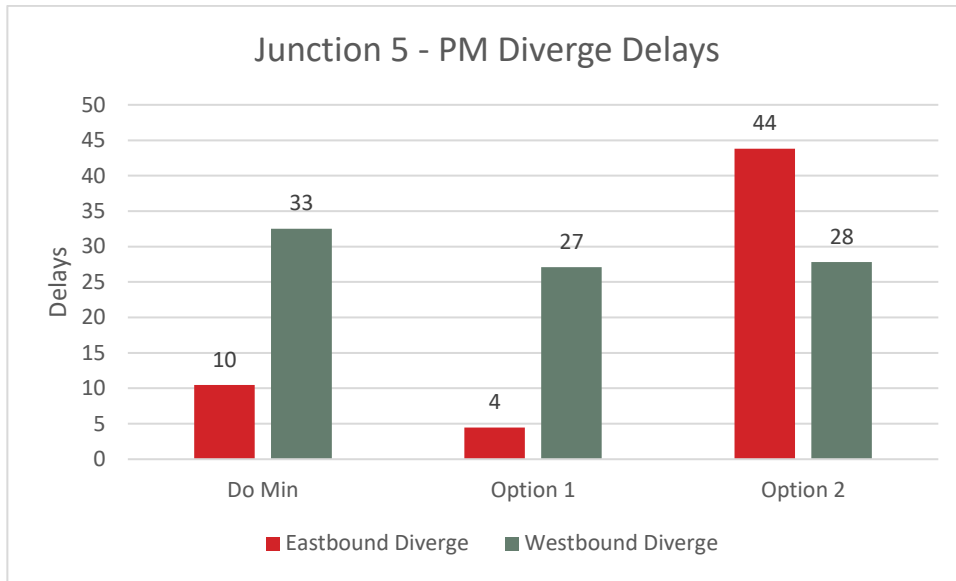


Figure 7.4 Junction 5 diverge delays (seconds on average per vehicle over the hour) – PM

Comparing each Option with the Do-Minimum as follows:

Option 1 leads to a reduction of delay of 33 seconds on the westbound diverge in the AM, while the eastbound diverge changes are negligible. In the PM, Option 1 has minimal impact with a reduction of 6 seconds on the eastbound diverge and 6 seconds on the westbound.

Option 2, signalisation of the eastbound diverge, leads to increased delay in the AM on eastbound diverge of 23 seconds due to wait time for the signals, however, Option 2 reduces the delay on the westbound diverge by 42 seconds, due to an increase in gaps in traffic afforded by the signalisation of the junction to the north. In the PM, there is minimal impact on the westbound diverge but increased delays on the eastbound diverge by 34 seconds due to signal times.

7.2.2.3 M4/N4 Impacts

Journey time comparisons for the M4 eastbound and westbound are provided in Table 7.1 below. These routes were measures between Junction 8 and Junction 4a as shown in Figure 7.5 below.



Figure 7.5 Journey Time Route

Table 7.1 Journey Time comparison (minutes)

	EASTBOUND		WESTBOUND	
	AM	PM	AM	PM
Do Min	10.6	9.4	9.3	11.8
Option 1	10.6	9.5	9.3	12.0
Option 2	10.6	9.5	9.3	12.0

The Junction 5 options have minimal impact on the M4/N4 journey times, with both options having a negligible impact in the AM, and a 16 and 17 second increase in delays along the mainline in the PM, when compared with Do-Minimum. This increase in delay is shown in Figure 7.6 below.

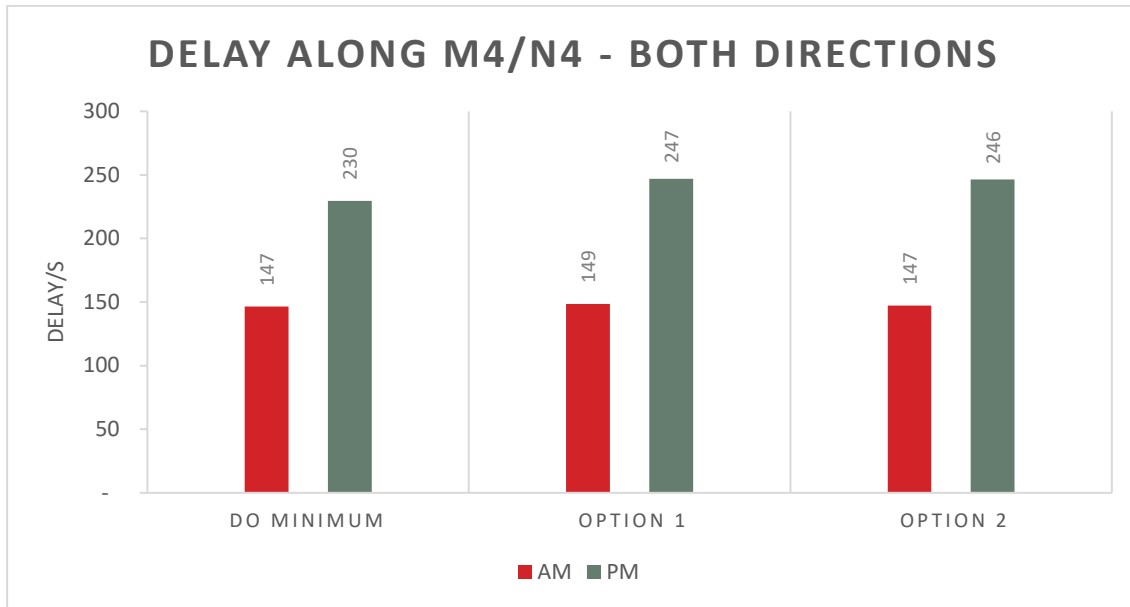


Figure 7.6 Junction 5 Impact on M5 delays (seconds on average per vehicle over the hour)

Summary

Of the two options tested, Option 2, signalisation of the eastbound diverge, would provide a greater level of pedestrian safety due to the removal of the uncontrolled crossing while Option 1 would retain an uncontrolled crossing of the Eastbound diverge and the R403. These uncontrolled crossings can be designed to have a higher scoring LOS but would not be as safe as a controlled crossing.

Both options have a negligible impact on the mainline M4/N4 with a maximum of 16 seconds additional journey time in the PM between Junction 4a and Junction 8 as a result of the options.

At the junction, Option 1 provides benefits to the eastbound diverge, while Option 2 causes increased delay on the eastbound diverge due to the introduction of signals. However, Option 2 provides a greater reduction in delay at the westbound diverge than Option 1.

In addition to the benefits modelled, signalisation of the eastbound diverge at Junction 5 would allow the signals north and south of the bridge to be synchronised. This was not analysed in the Stage 2 modelling, however if Option 2 is carried forward to Phase 3 or carried forward through alternative measures, micro-sim modelling of the junction would be advised due to the proximity of the signals.

7.3 Junction 6 Modelling

7.3.1 Overview

Junction 6 is the primary junction serving Celbridge. The junction is designed as a high capacity gyratory operating as a roundabout with priority junctions at all of the access points. In addition, slip roads are provided for traffic moving southbound to join the eastbound M4 toward Dublin, and from the westbound diverge to the Kildare Innovation Campus on Barnhill Road.

Junction 6 is shown in Figure 7.7 below.

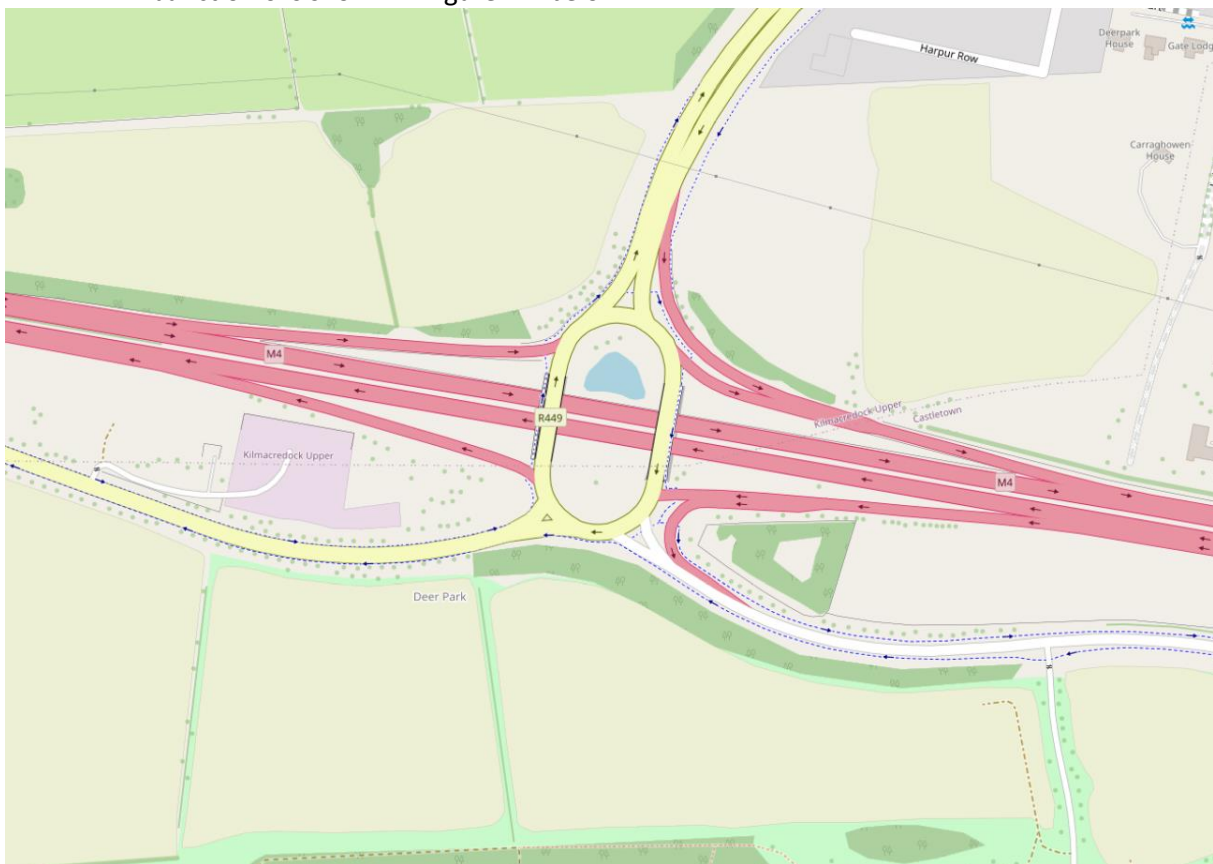


Figure 7.7 Junction 6

While the junction can accommodate high traffic volumes, it creates a significant barrier to active travel movement across the junction moving between the residential development to the northeast of the junction, and schools to the southwest. The route between the two locations crosses the M4 at Junction 6 as shown in Figure 7.8 below.

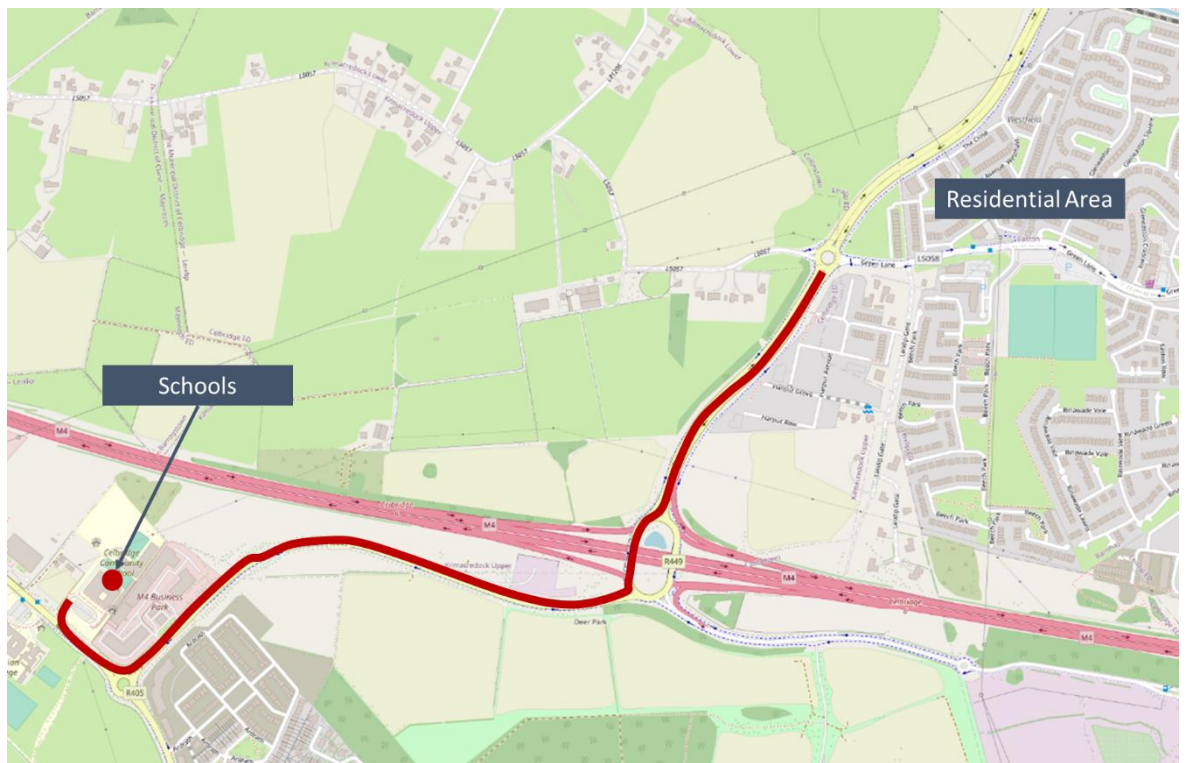


Figure 7.8 Route between residential area and schools

With this in mind, the option for Junction 6 looked to address the uncontrolled crossings at the junction.

7.3.2 Junction 6 Analysis

The option for improving Junction 6 was tested taking into account the following factors:

- The function of the junction from a pedestrian perspective;
- The impact of the junction improvements on the M4/N4; and
- The impact of the junction improvements on junction performance for accessing and leaving the M4.

To assess these factors several KPIs were used to compare against the Do-Minimum scenario:

- Level of Service (LOS) assessment of the junction for pedestrian crossings;
- Delays and journey times along the M4/N4; and
- Delays at the junction.

7.3.2.1 LOS assessment

The LOS assessment is a means by which the quality of uncontrolled pedestrian crossings can be graded. The process takes into account the traffic volumes on the arms, the width of the crossings and the sight lines.

The findings of this assessment was that the crossings performed poorly with all crossings scoring an F, defined as “Exceeds tolerance. High likelihood of pedestrian risk taking.”,

with the exception of the crossing for the westbound entrance ramp which scored a C, “Delay noticeable to pedestrians.”

Signalisation of the junction would remove these uncontrolled crossing points and create a safer path across the junction.

7.3.2.2 Delays

The following compares the Do-Minimum versus the signalisation option. Delays on Junction 6 are shown in Figure 7.9 below covering the arms accessing the gyratory.

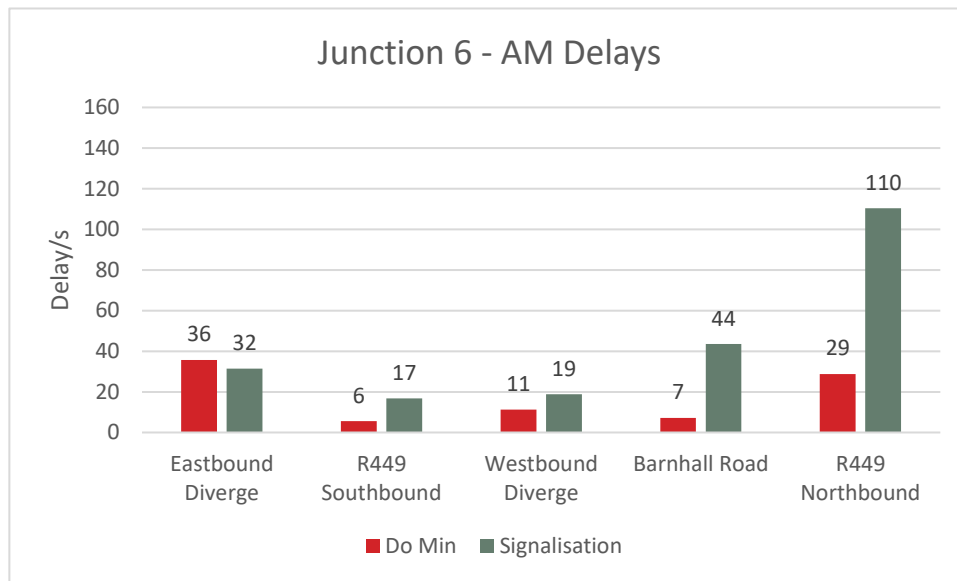


Figure 7.9 Junction 6 Delays (seconds) - AM

In the AM, the introduction of signals leads to a substantial increase in delays on the R449 northbound from Celbridge. This is due to the junction operating at 80% capacity in the 2047 Do Minimum, with the introduction of signals the junction operates at 98% capacity due to the reduction in capacity through the junction as a result of red time.

Additional delay increases are observed on other arms; however these are due to the wait time at signals and not capacity constraints at the junction.

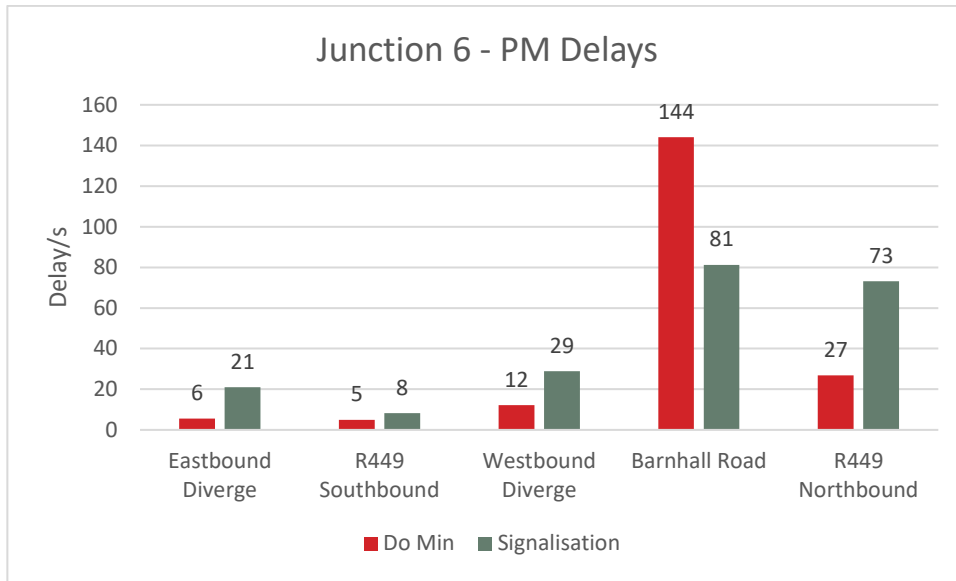


Figure 7.10 Junction 6 Delays (seconds on average per vehicle over the hour) -PM

In the PM, the average delays experienced per vehicle across the hour from the Kildare Innovation Campus are reduced compared to the Do Minimum by 63 seconds. Delays on the diverges does not significantly change.

However, the average delays experienced per vehicle across the hour increase on the gyratory on approach to the westbound diverge junction by 17 seconds, and by 46 seconds on the R449 Northbound approach. These delays are the same cause as the AM delays with the junction nearing capacity in 2047.

The signals applied in this exercise have been optimised using SATURN within the model. It would be recommended that if this option were carried forward to Phase 3 or picked up through alternative assessment that the signalisation be further assessed through a micro-sim model to refine signal times.

Delays impacts on the M4/N4 mainline are shown in Figure 7.12 below.

Journey time comparisons for the M4 eastbound and westbound are provided in Table 7.1 below. These routes were measures between Junction 8 and Junction 4a as shown in Figure 7.5 below.



Figure 7.11 Journey Time Route

Table 7.2 Journey Time comparison in minutes

	EASTBOUND		WESTBOUND	
	AM	PM	AM	PM
Do Min	10.6	9.4	9.3	11.8
Option 1	10.6	9.5	9.3	11.6

Signalisation of Junction 6 has a minimal impact on journey times on the M4/N4 in both directions, with the only notable change being a decrease in journey times westbound in the PM by 12 seconds.

The change in delay from the signalisation of Junction 6 is shown in Figure 7.6 below.

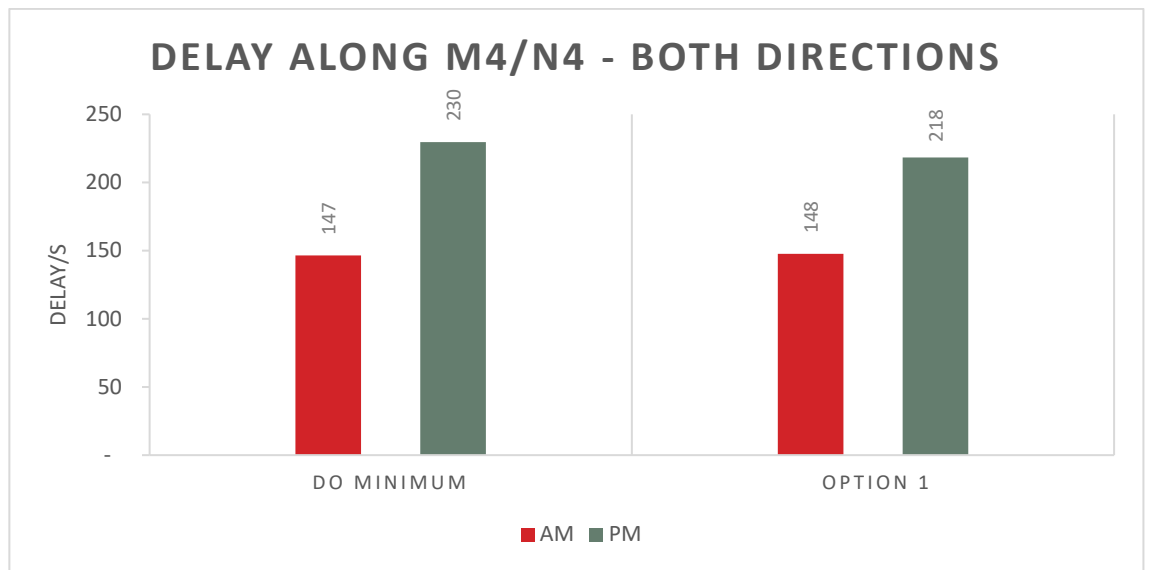


Figure 7.12 Average delays experienced per vehicle across the hour in seconds on the M4/N4

Overall, delays in both directions along the M4/N4 with the signalisation of Junction 6 are minimal.

7.3.3 Summary

The addition of signals at Junction 6 addresses the issue of poor pedestrian facilities at the gyratory by providing controlled signalised crossings. This would provide a safer active connection between the residential area northeast of the M4 and the schools to the southwest of the M4.

The signalisation of Junction 6 does not impact the function of the M4/N4 between Junction 5 and Junction 7, with negligible differences in delays across both directions and peak hours.

This signalisation does however lead to increased delays on most arms on the gyratory in the AM and PM, with the greatest increase on the R449 northbound entry. This arm of the junction operates close to capacity in 2047, and the addition of signals leads to increased delays.

An exception to this is the Barnhill Road arm, which sees substantial reduction in delay from adding signals allowing traffic movements to be controlled and allow traffic out from Barnhill Road.

7.4 Junction 7 Modelling

7.4.1 Overview

Junction 7 is the primary junction serving Maynooth, with both the eastbound merge and diverge and the westbound merge, joining the Straffan Road via an unsignalized junction. The westbound diverge joins the Straffan Road at a roundabout that also serves as the primary access to the Maynooth Business Campus.

The junction, along with the key junctions, is shown in Figure 7.13 below.



Figure 7.13 Junction 7

Two options have been considered to improve the function of the junction in the design year;

- Improvement of the existing junction; and
- New junction to the west and convert the existing to an overbridge.

Both options assume the inclusion of a southern distributor road connecting Straffan Road to Newtown Road, and onto Millfarm Road, as shown in Figure 7.14 below.



Figure 7.14 Southern Distributor Road

The options modelled in this stage for Junction 7 are described in more detail below.

7.4.2 Option 1 – Improve Existing Junction

Option 1 would improve the existing Junction 7 by realigning two of the slip roads and providing signalised junctions. The design of the improved junction is shown in Figure 7.15 below.

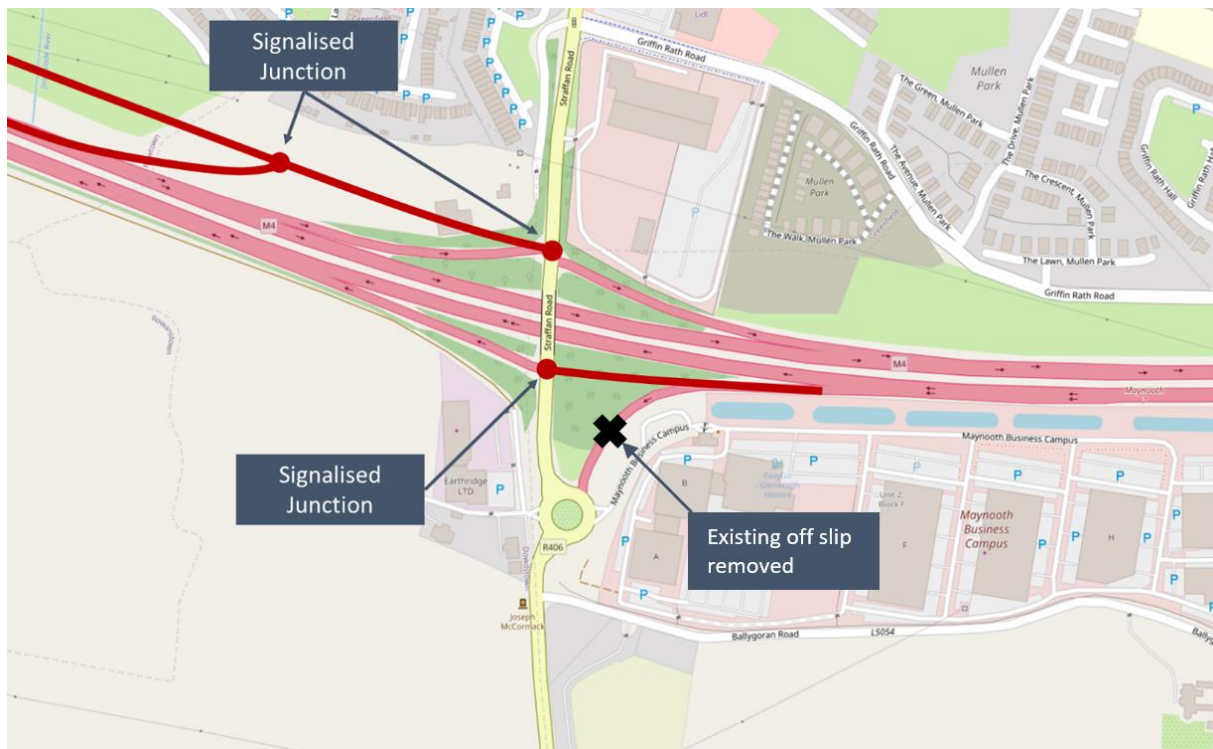


Figure 7.15 Junction 7 Option 1

This option would include the following:

- Realignment of the westbound diverge to join the Straffan Road opposite the westbound merge. This would mean closing the existing access onto the southern roundabout. This westbound diverge would be two lanes;
- Signalisation of the westbound merge / diverge junction with a long flare added to Straffan Road approach from roundabout;
- Realignment of the eastbound diverge to join the Maynooth Outer Orbital Route, with two lanes connecting between the diverge and Straffan Road;
- Signalisation of the junction of the eastbound diverge and the Maynooth Outer Orbital Route; and
- Signalisation of the junction of the Maynooth Outer Orbital Route and the Straffan Road.

Due to the proximity of the north and south junction at the Straffan Bridge, the two junctions were considered part of the same controlled signal and modelled as such in LINSIG.

7.4.2.1 Position of Eastbound Diverge

The position of the eastbound diverge, connecting the M4 to the Maynooth Outer Orbital Route was determined through an iterative modelling process using LINSIG and SATURN to determine flows and queue lengths between the diverge and the Straffan Road Junction.

Initial modelling in the LAM placed the junction halfway between the Straffan Road and the Newtown Road. Testing showed a maximum average queue length at the Straffan Road junction of 39m.

39m was considered too short of a distance between the two junctions and would effectively move the eastbound diverge junction into the Straffan Road junction. As such, for modelling, the junction was set back by 150m to allow for sufficient clearance between the junctions, while also keeping the eastbound diverge junction close to the existing junction.

Peak hour queues are shown in Figure 7.16 and Figure 7.17 below.



Figure 7.16 AM Peak Hour queuing.

In the AM peak hour, average queuing from the northern junction extends back to the southern junction, this however does not lead to significant delays at the southern junction, as the volume of traffic queuing clears each cycle. Average queuing from the

southern junction does not extend back beyond the Straffan Road Roundabout, containing the queuing to the motorway junction.

Queuing on the westbound diverge is not sufficient to lead to delays on the M4.

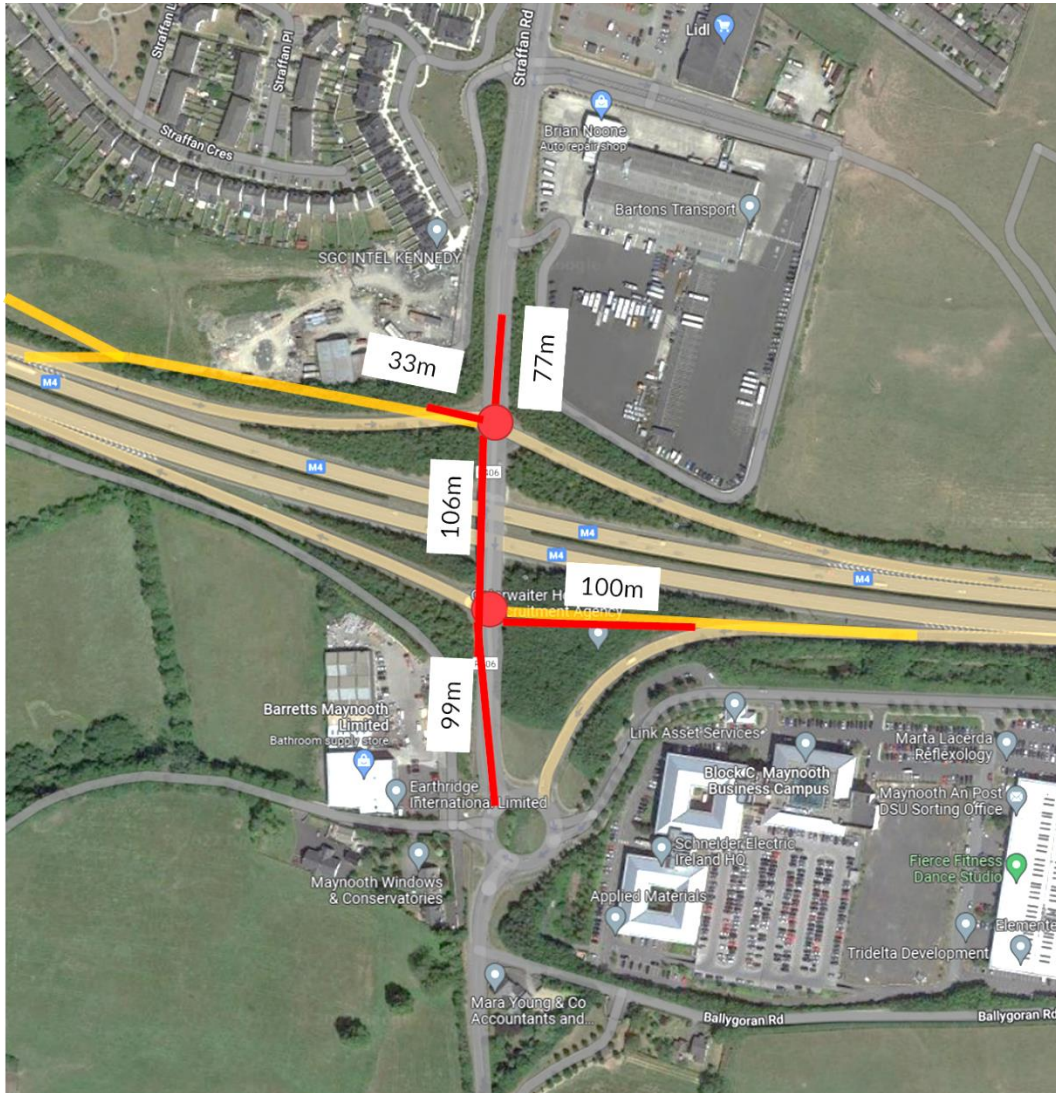


Figure 7.17 PM Peak hour queuing

Average queues in the PM peak hour are more substantial than those in the AM peak hour, with queuing across the overbridge extending back through the Southern Junction. This would mean traffic waiting to cross the bridge could be held at the southern junction due to the signals at the northern junction. This queuing across the bridge results in further queuing south of the southern junction reaching the Straffan Road Roundabout.

This will impact traffic leaving the Maynooth Business Campus in the PM peak via the roundabout, however no notable delays were noted in the SATURN LAM. However, further development of this option could include the signalisation of the roundabout to control flow from the Maynooth Business Campus onto the Straffan Road northbound to avoid any blockage at the Straffan Road Roundabout.

Queuing on the westbound diverge in the PM does not reach back to the M4 mainline and would not lead to delays on the M4 as a result.

Option 2 – New Junction West of the Existing Junction

Multiple configurations were considered for the new junction with modelling undertaken to help determine the optimum configuration. This modelling was divided into two streams of work; the first looking at a trumpet versus diamond design for the junction, and the second looking at the requirement for a southern link road connecting between Newtown Road and Straffan Road.

The outcome of the modelling was:

- The trumpet design was the optimum configuration design for the junction due to the free flow nature of the junction; and
- There is insufficient demand for the southern link road to justify its inclusion.

The junction configuration carried forward from this modelling was a trumpet with no southern link road connection and is shown in Figure 7.18 below.



Figure 7.18 Junction 7 Option 2

7.4.3 Option Comparison

To compare the options, several factors were considered:

- Impact on the M4/N4 mainline;
- Impact on junction performance;
- Impacts on Maynooth.

To assess these factors several KPIs were compared for the two options, and against the Do Minimum:

- Delays and journey times along the M4/N4;
- Delays at the junction;
- Delays within Maynooth; and
- Journey times to the centre of Maynooth using the junction.

7.4.3.1 M4/N4 Impacts

Journey time comparisons for the M4 eastbound and westbound are provided in Table 7.3 below. These routes were measures between the Junction 8 and Junction 4a as shown in Figure 7.19 below.



Figure 7.19 Journey Time Route

Table 7.3 Journey Time comparison (minutes)

	EASTBOUND		WESTBOUND	
	AM	PM	AM	PM
Do Min	10.6	9.4	9.3	11.8
Option 1	10.6	9.5	9.2	11.5
Option 2	10.4	9.4	9.1	10.7

Option 1 provides negligible change in journey times eastbound in the PM. In the westbound direction there is a minor benefit in the PM of a reduction of 0.3 minutes.

Option 2 provides minor benefits eastbound with a reduction of 0.2 minutes for the AM and no difference in the PM. In the westbound direction, it offers much greater benefits than Option 1, with a reduction of 1.1 minutes in the PM.

Figure 7.20 and Figure 7.23, below, show the total delays along the M4/N4 between Junction 8 and Junction 4a, and delays within Maynooth for AM and PM peaks.

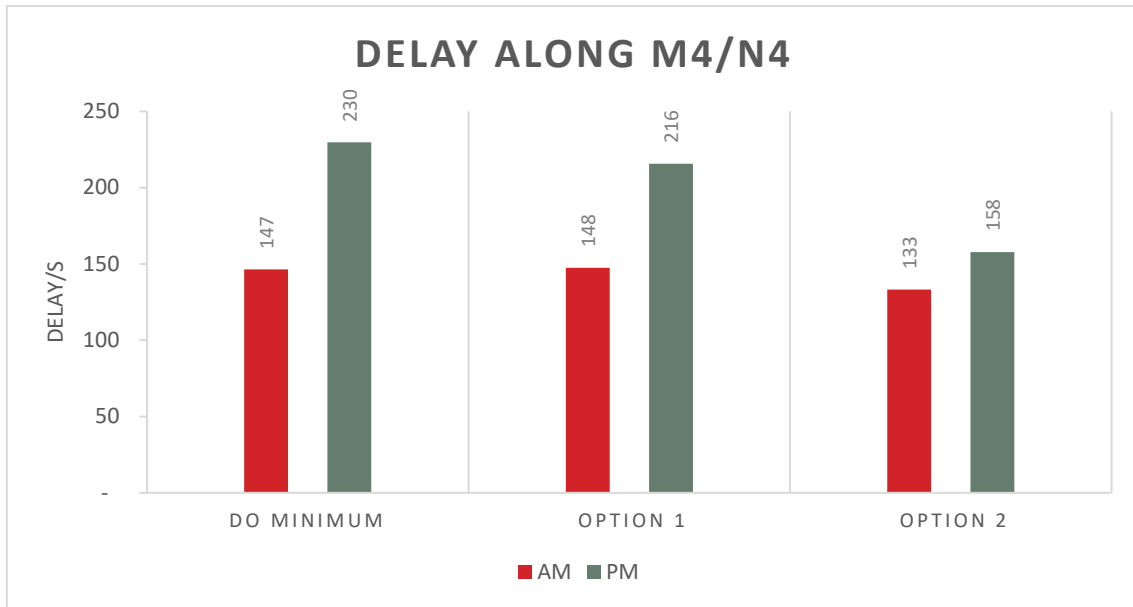


Figure 7.20 Delay in seconds per vehicle across the hour along M4

Along the M4/N4 both options have benefit, with Option 2 providing the greatest benefit with a reduction of 72 seconds in the PM. This is due to relieving pressure at Junction 7 but is also the result of some westbound traffic leaving the M4 at Junction 6 Celbridge. This is due to Junction 7 being located further west, creating longer trips for some movements to the east of Maynooth and the Maynooth Business Campus.

Option 1 does not see the same route choice changes and as such does not have as high a level of reduction of delay.

7.4.3.2 Junction Impacts

Delays at the Straffan Road Overbridge and, the eastbound and westbound diverges of the existing and revised junctions, are shown Figure 7.21 and Figure 7.22 below.

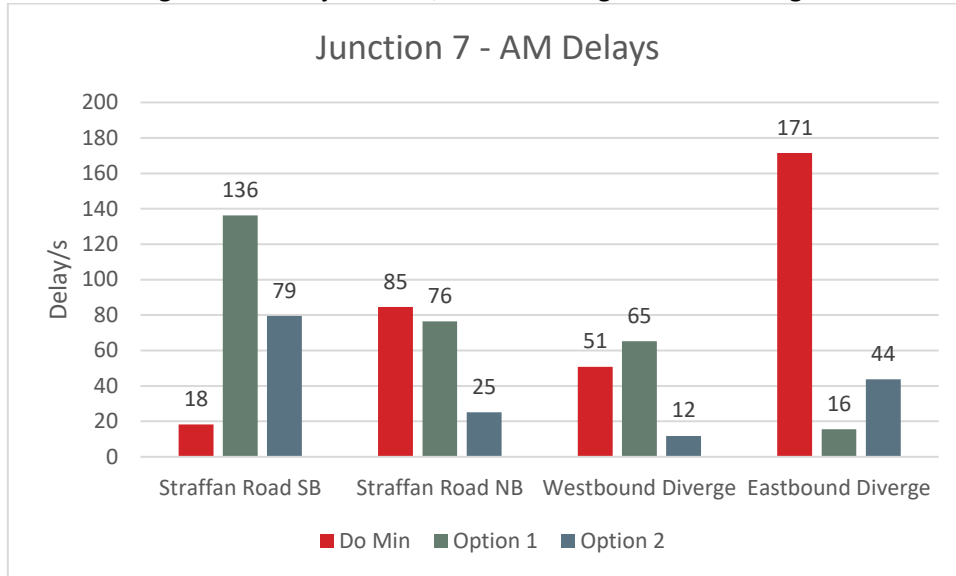


Figure 7.21 Junction 7 AM Delays (seconds on average per vehicle over the hour)

In the AM, the greatest negative impact is from Option 1 on the Straffan Road Overbridge southbound where there is a substantial increase in delay. This is the result of the introduction of signals at the northern junction, also evident by the delay increase with Option 2. Due to the high level of flow moving from the motorway onto the Straffan Road during the AM peak, wait times between green phases on this movement is high.

The greatest benefit in the AM is from Option 1 on the eastbound diverge, which has a substantial reduction in delays due to it no longer being reliant on a priority junction.

However, overall Option 2 provides more consistent delay reductions with only 1 part of the junction seeing increased delays over the Do Minimum.

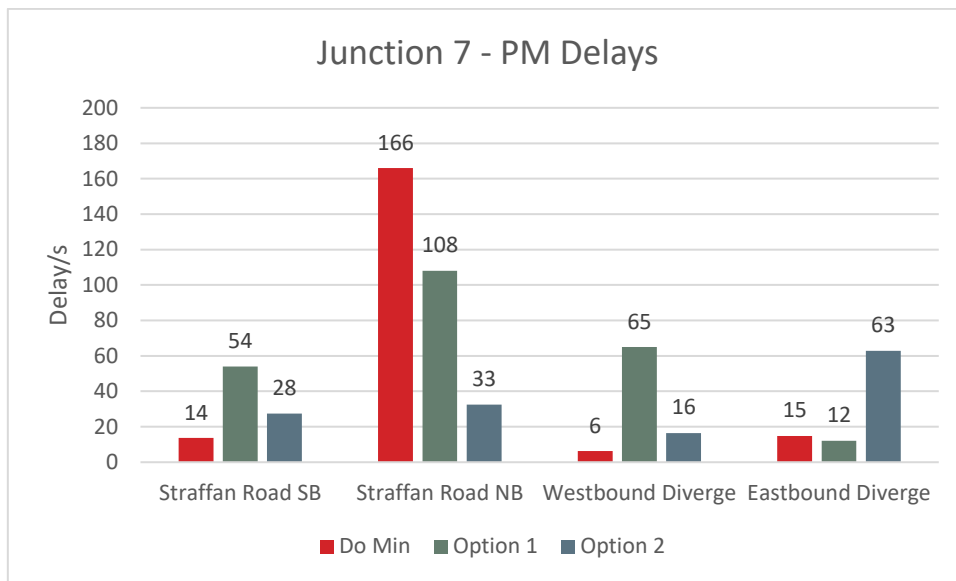


Figure 7.22 Junction 7 PM Delays in seconds on average per vehicle over the hour

In the PM, Option 1 again contributes to an increase in delays on the Straffan Road southbound but provides substantial benefits to the Straffan Road northbound due to the additional capacity at the southern junction. Option 2 however, provides even greater benefits to the Straffan Road northbound due to the relocation of traffic to the new junction.

Option 1 does contribute to increased delays at the westbound diverge, this is due to signal times and balancing of green time in favour of north and south moving traffic.

Option 2 sees a notable increase in delays on the eastbound diverge in the PM, due to the signal timings on the new junction that favour movements from the southern distributor road due to higher traffic volumes.

Overall, Option 2 provides greater reductions in delays across the junction with the exception of delay increases on the eastbound diverge.

7.4.3.3 Impact on Maynooth

Total delays in Maynooth are shown in Figure 7.23 below. These delays are a sum of all link delays within Maynooth and the immediate surrounding area.

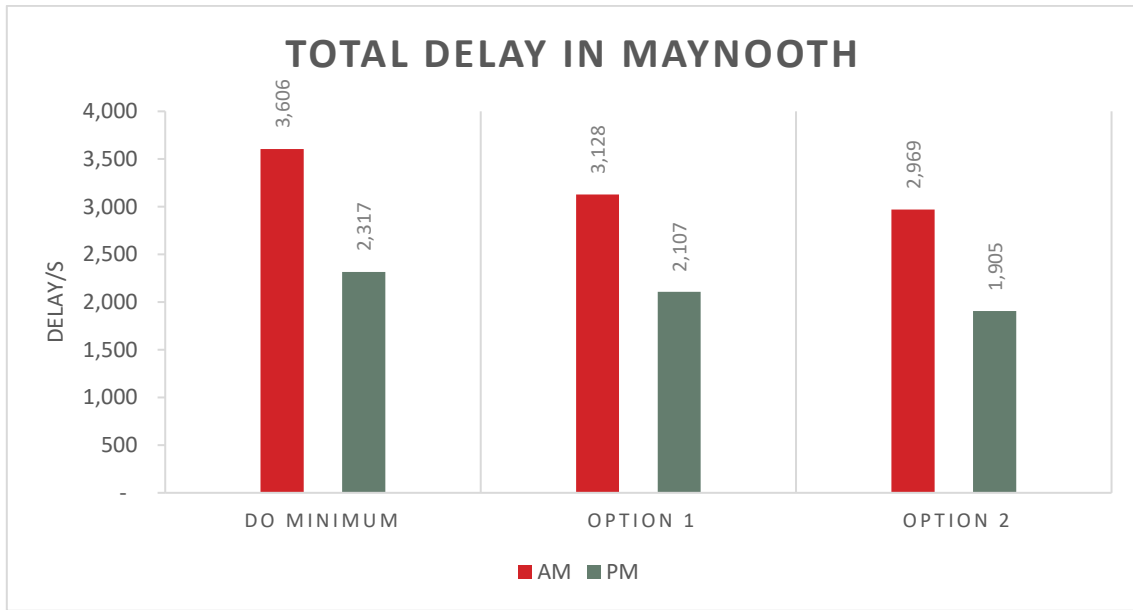


Figure 7.23 Delays in seconds on average per vehicle over the hour in Maynooth

Delay in Maynooth is reduced in the AM by both scenarios, with Option 2 providing the greatest reduction of 630 seconds across the network. This benefit in Option 2 is related to the positioning of the new junction, which removes pressure from Straffan Road and provides improved access to Maynooth University and west Maynooth, removing trips from the town centre.

Option 1 also includes the link road which provides access to the university, however, trips to Maynooth University and west Maynooth are divided across the Maynooth Outer Orbital Route which results in a lower level of benefit in the AM.

In the PM, Option 2 provides the greatest benefit to the town as traffic returning to Maynooth from Dublin, and along the Straffan Road, do not interact with one another at the Straffan Road Bridge.

In the PM, Option 1 results in smaller reduction in delays for the same reason as described for the AM.

7.4.4 Summary

Both options tested for Junction 7 provide benefits to the M4/N4 and Maynooth with Option 2 providing greater delay reductions. However, Option 2 was noted to cause some rerouting to parallel routes due to its location further west of the existing junction. This mostly affected traffic from the east looking to access Maynooth town centre or Maynooth Business Campus as these journeys increased in length. The location of this junction, however, does mean traffic from Dublin to Maynooth and Maynooth to Dublin has a longer distance to travel.

While Option 1 does not increase journey distances from the east, delays across the Straffan Road Overbridge increase southbound in Option 1 due to the introduction of signals and prioritisation of traffic from the M4. Due to the high level of traffic demand from the south, this causes queuing across the Straffan Road Overbridge in both time



periods. However, the position of the junction means trips from Dublin to Maynooth and Maynooth to Dublin are not increased in length.

Both options have been taken forward for assessment through cost benefit analysis in the next chapter.

8. COST BENEFIT ANALYSIS

8.1 Overview

This section covers the Cost Benefit Analysis carried out for the options assessment for the Maynooth to Leixlip Project.

Before carrying out a CBA, the options were assessed to determine the value of carrying out the CBA for the purpose of options selection. This is shown in Table 8.1 below.

Table 8.1 Cost Benefit Analysis

OPTION	CBA	REASON
Corridor Option 1A	Yes	Preferred corridor option for a PT only scheme.
Corridor Option 2A	Yes	Preferred corridor option for a combined PT and road scheme.
Corridor Option 3A*	Yes	Corridor option showed some positive benefits during initial assessment.
Junction 5 Option 1	No	Realignment of the eastbound diverge and improvements of the R403/R148 roundabout is discounted through the modelling analysis showing that it was unnecessary.
Junction 5 Option 2	No	Signalising the eastbound diverge is a minor intervention and would not justify testing in TUBA and COBALT.
Junction 6 Option 1	No	There is only one option at this location - signalising the junction. This is a minor intervention and would not justify testing in TUBA and COBALT.
Junction 7 Option 1	Yes	Improvements to the existing junction are required to accommodate traffic increases to 2047, while not the preferred option from modelling, Option 1 improves both the M4/N4 mainline and the local area and is still considered a viable option.
Junction 7 Option 2	Yes	Preferred option from modelling, this option involves a large construction project that would incur significant costs as such it needs to be tested against Option 1 through the CBA.

*Corridor Option 3A was excluded at the Stage 1 assessment but has been included here for context and to cross reference with other results.

This CBA assessment for Phase 2 (Options Selection) of the project was undertaken using the TUBA v1.9.8 cost benefit analysis programme. The latest TII economic parameters file was used with all figures discounted back to a base year of 2011. A variable discount rate was used with 4% applied for appraisal years 1-30 (and 3.5% for years 31-60 – which were assessed in order to calculate a residual value for the main 30-year appraisal). As such, the analysis has been carried out in accordance with TII PAG Unit 6.3: Guidance on Using

TUBA (September 2017) and with reference to TII PAG Unit 6.11 National Parameter Values Sheets (March 2021).

During the completion of this CBA, TAF (Transport Appraisal Framework) has been published to replace CAF (Common Appraisal Framework). As this work was already under way it has been completed using CAF parameters. Any future work for Phase 3 and beyond should transition to TAF.

8.2 CBA Assumptions

8.2.1 Input Parameters

All general parameters such as value of time, value of time growth rates, discount rates, fuel cost changes, fuel consumption, vehicle operating costs fuel/non fuel, trip purpose distribution, tax rates, change in tax rates, vehicle occupancy rates, vehicle proportions and collision rates were taken from the TII Unit 6.11 National Parameters Value Sheets in the Project Appraisal Guidelines (updated in March 2021 with new values of time).

Fleet fuel type proportions are shown in Table 8.2. The forecast’s changes to fleet fuel type were taken from the Transport Appraisal Guidance (TAG) as set out in Table 8.3. Data on fuel costs, duty and VAT is provided in Table 8.4. These are TII mandated values and have been taken from the TII’s standard economic file in the Downloads section of the TII Publications website under section PE-PAG-02022_Unit 6.3.

Table 8.2 Car Fleet Fuel Type Split

YEAR	PETROL	DIESEL
2011	69.9%	30.1%

Table 8.3 Forecast Change in Car Fleet Fuel Type Split

START YEAR	END YEAR	VEHICLE TYPE	% CHANGE PETROL	% CHANGE DIESEL
2012	2015	1 – Car	-2.6422	5.4373
2016	2020	1 – Car	0.4732	-0.8198
2021	2025	1 – Car	-0.6619	1.1497
2026	2030	1 – Car	-0.8836	1.3894

Table 8.4 Fuel Costs

FUEL TYPE	RESOURCE COST (CENTS / L)	DUTY (CENTS / L)	VAT (%)	CARBON (GRAMS / L)
Petrol	63.00	57.62	21.0	2230
Diesel	70.00	46.57	21.0	2562

8.2.2 Project Costs – Capital Costs

The Option Cost Estimates are set out in Table 8.5 in September 2023 prices. The cost was prepared based on the base costs of construction, supervision, archaeology, advance works, public transport connectivity/ asset renewal, land & property, and planning & design. A breakdown of the project cost estimates is presented in Appendix B.

Table 8.5 Capital Costs - Option Comparison Estimate (September 2023 prices)

OPTION/ MODEL ID	COSTS	MOOR COSTS
Corridor – Option 1	€30.94m	-
Corridor – Option 2	€44.18m	-
Corridor – Option 3	€57.49m	-
Junction 7 – Option 1	€8.01m	€19.89m
Junction 7 – Option 2	€25.09m	€16.92m

8.2.3 Project Costs – Maintenance Costs

The default maintenance costs by road type in TII PAG Unit 6.11, shown in **Error! Reference source not found.**

Table 8.6 PAG Maintenance Costs 2011

ROAD TYPE	ANNUAL COST (€1,000/KM/YEAR)
Standard 2 lane with Hard Shoulder	€18.614
2+1 with Central Reserve	€30.493
2+1 without central reserve	€18.614
Dual Carriageway/ Motorway	€42.371

Maintenance costs for the junction options have been calculated based on the 10km length provided in the costings and split evenly between Standard 2 lane with Hard Shoulder and Dual Carriageway/Motorway. For corridor options, the costs have been calculated by applying Dual Carriageway/Motorway to the full 8.3km scheme length provided in the costings.

O&M costs for both corridor and junction options is shown in Table 8.7 below for the full 60 years.

Table 8.7 O&M Costs

OPTION	60 YEAR O&M COST (€'000)	60 YEAR O&M PRESENT VALUE (€'000)
Junction Options	€18,296	€3,891
Corridor Options	€21,101	€4,487

8.2.4 Residual Value

For major transport projects, the residual value is a measure of the net present value (NPV) of the infrastructure over a specified period beyond the 30-year appraisal period. In this case a residual value period of 30 years (beyond that standard 30-year appraisal period) has been applied based on the guidance in chapter 14 of TII PAG Unit 6.1: Guidance on Conducting CBA (October 2016). As per the guidance the residual value has been taken as the capital cost of the options, discounted to 2011. The residual value of each option is included in the final CBA results.

8.3 Safety Benefits

8.3.1 Overview

TUBA software does not calculate costs associated with collisions and casualty severity. Therefore, an assessment of potential safety benefits has been undertaken using the COBALT-Ireland (COst and Benefit to Accidents – Light Touch), a computer program designed to undertake the analysis of the impact on accidents as part of economic appraisal for a road project.

8.3.2 Methodology

The COBALT-Ireland assessment is based on a comparison of collisions by severity and associated costs across an identified network in ‘Without-Scheme’ and ‘With-Scheme’ forecasts, using details of link characteristics, collision rates, casualty costs and projected traffic volumes. This process was undertaken using the opening year (2032) and the design year (2047) traffic models and collision costs for the entire 30-year appraisal period from 2032 to 2062 were calculated. The latest available COBALT-Ireland version has been used to undertake the safety appraisal and the input parameters are aligned with TII PAG Unit 6.11 (March 2021).

8.3.3 Monetised Safety Benefits

The monetised results of the safety assessment are presented in Table 8.8. The results show the discounted safety benefits in 2011 prices for the 30-year appraisal period.

When reviewing the COBALT-Ireland outputs it is necessary to consider how the software calculates benefits. The software uses a relatively simplistic approach whereby collisions are calculated on the basis of an assumed collision rate which varies across a very minimal range of link types. Of most relevance to the M4/N4 is that dual carriageways (COBALT link type 4) assume lower collision and casualty rates compared to the single carriageways (COBALT link type 2).

It should be noted that as a PT only scheme, Corridor Option 1 does not have any recorded costs or benefits within the road safety assessment.

Table 8.8 Discounted Safety Benefits (2011 Values) (€'000)

OPTION/ MODEL ID	WITHOUT SCHEME (€'000)	WITH SCHEME (€'000)	DISCOUNTED SAFETY BENEFITS (€'000)
Corridor Option 1	290,517	290,517	0
Corridor Option 2	290,517	290,641	-124

OPTION/ MODEL ID	WITHOUT SCHEME (€'000)	WITH SCHEME (€'000)	DISCOUNTED SAFETY BENEFITS (€'000)
Corridor Option 3	290,517	292,312	-1,794
Junction 7 Option 1	290,517	290,351	166
Junction 7 Option 2	290,517	289,696	822

8.3.4 Collision and Casualty Reduction

Table 8.9 below shows the forecast impact on collisions. Note that collision numbers refer to the M4/N4 LAM modelled area as a whole and not just the M4/N4 road.

Table 8.9 Change in Collisions

SCENARIO / OPTION	COLLISIONS	COLLISIONS CHANGE
Do Minimum	8,151.4	0.0
Corridor Option 1	8,151.4	0.0
Corridor Option 2	8154.4	3.4
Corridor Option 3	8154.4	40.9
Junction 7 – Option 1	8,149.5	-1.9
Junction 7 - Option 2	8,132.9	-18.5

Table 8.10 below shows the forecast impact on casualties by severity (fatal, serious, slight) as output by COBALT-Ireland for the 30-year appraisal period. Note that casualty numbers refer to the M4/N4 LAM modelled area as a whole and not just the M4/N4 road.

Table 8.10 Casualty Change by Severity

SCENARIO / OPTION	FATAL	SERIOUS	SLIGHT
Corridor Option 1	0	0	0
Corridor Option 2	0.1	0	4.8
Corridor Option 3	55.9	1.7	0.6
Junction 7 – Option 1	-0.1	-0.2	-3.1
Junction 7 – Option 2	-0.4	-0.9	-26.5

8.4 TUBA Results Summary

8.4.1 Overview

Cost Benefit Analysis (CBA) forms one element of the appraisal process for transport infrastructure projects. The TUBA program compares the “Do-Minimum” scenario (i.e. not to progress with the project but implement the planned and committed projects within the study area) with a number of “Do-Something” Options to determine what benefits result from each option.

The results of the Cost Benefit Analysis from TUBA are presented below (see Appendix C for the TUBA economic parameters file). The results take into consideration project safety (COBALT-Ireland) benefits, as well as residual value.

8.4.2 CBA Results

The benefits of the options are outlined in Table 8.11 over a 30 year appraisal period, in 2011 prices.

Table 8.11 Cost Benefit Analysis Summary (€ '000)

SCENARIO	CORRIDOR OPTION 1	CORRIDOR OPTION 2	CORRIDOR OPTION 3	JUNCTION 7 OPTION 1	JUNCTION 7 OPTION 2
Consumer User Benefits	€ 8,337	€ 14,630	€ 12,487	€ 3,024	-€ 286
Business User Benefits	€ 275	€ 12,624	€ 11,511	€ 6,690	€ 4,035
Indirect Tax Revenues	€ 0	€ 0	€ 0	€ 0	€ 0

SCENARIO	CORRIDOR OPTION 1	CORRIDOR OPTION 2	CORRIDOR OPTION 3	JUNCTION 7 OPTION 1	JUNCTION 7 OPTION 2
Greenhouse Gases	€0	€ 97	€ 3	€ 117	€ 16
Safety Benefits	€ 0	-€ 124	-€ 1,794	€ 166	€ 822
Residual Value	€ 15,335	€ 21,894	€28,490	€ 14,835	€ 22,394
Present Value of Benefits (PVB)	€ 23,947	€ 49,121	€ 50,697	€ 24,832	€ 26,981
Present Value of Costs (PVC)	€ 16,463	€ 23,022	€ 28,494	€ 15,664	€ 23,223
Net Present Value (NPV)	€ 8,608	€ 27,223	€ 22,202	€ 9,168	€ 3,758
Benefit to Cost Ratio (BCR)	1.56	2.24	1.78	1.59	1.16

8.5 CBA Results Summary

The Economic Assessment has been undertaken using TUBA in accordance with the TII Project Appraisal Guidelines. The assessment has calculated Benefit to Cost Ratio (BCR) values over a 30-year appraisal period (inclusive of residual value) based on the estimated costs for the Options. A summary of the results for each option is provided in Table 8.12.

Table 8.12 Cost Benefit Analysis Summary Table (€'000)

SCENARIO	PVB	PVC	NPV	BCR
Corridor – Option 1	€ 23,947	€ 16,463	€ 8,608	1.56
Corridor – Option 2	€ 49,121	€ 23,022	€ 27,223	2.24
Corridor – Option 3	€ 50,697	€ 28,494	€ 22,202	1.78
J7 - Option 1	€ 24,832	€ 15,664	€ 9,168	1.59
J7 - Option 2	€ 26,981	€ 23,223	€ 3,758	1.16

Both junction options achieved similar benefits, but higher costs for the development of a new junction results in a lower BCR for Option 2.

For the corridor, Option 1 has lower benefits due to impacts being confined to PT, while Option 2 has greater impacts as it includes both benefits for PT and road users. Corridor Option 3 has very small additional benefits over Option 2 which are insufficient to offset the increased cost of the scheme resulting in a lower BCR.

The cost benefit analysis forms part of only one of the six CAF criteria, Economy. The other five criteria are discussed in Chapter 6 Stage 2 Project Appraisal Matrix and Chapter 7 Stage 3 Preferred Option and PABS, of the Options Report - Volume A Main Report.

APPENDIX A – COUNTS

ID	Location	AM GEH	LT GEH	PM GEH
1	300497 Maynooth Line Transport Study	0.83	7.60	0.99
2	300497 Maynooth Line Transport Study	3.04	4.37	0.73
3	300497 Maynooth Line Transport Study	3.46	0.05	0.12
4	300497 Maynooth Line Transport Study	0.04	0.11	1.96
5	300497 Maynooth Line Transport Study	3.47	0.59	0.32
6	300497 Maynooth Line Transport Study	1.31	0.86	0.41
7	300497 Maynooth Line Transport Study	1.98	4.26	0.09
8	300497 Maynooth Line Transport Study	0.05	2.29	3.79
9	300497 Maynooth Line Transport Study	2.10	0.04	0.22
10	300497 Maynooth Line Transport Study	2.90	0.44	0.69
11	300497 Maynooth Line Transport Study	2.90	1.32	4.02
12	300497 Maynooth Line Transport Study	3.49	2.55	8.09
13	300497 Maynooth Line Transport Study	1.48	0.24	4.16
14	300497 Maynooth Line Transport Study	11.62	2.60	3.54
15	300497 Maynooth Line Transport Study	4.29	0.25	2.59
16	300497 Maynooth Line Transport Study	2.47	0.15	0.78
17	300497 Maynooth Line Transport Study	4.91	0.56	3.74
18	300497 Maynooth Line Transport Study	1.82	0.18	0.16
19	300497 Maynooth Line Transport Study	0.56	2.61	4.03
20	300497 Maynooth Line Transport Study	3.63	3.09	5.76
21	300497 Maynooth Line Transport Study	2.83	0.02	0.19
22	300497 Maynooth Line Transport Study	0.93	2.48	4.01
23	300497 Maynooth Line Transport Study	0.57	0.02	0.43
24	300497 Maynooth Line Transport Study	0.79	0.98	1.49
25	300497 Maynooth Line Transport Study	1.23	0.02	0.14
26	300497 Maynooth Line Transport Study	1.34	0.01	0.33
27	300497 Maynooth Line Transport Study	0.01	0.07	0.20
28	300497 Maynooth Line Transport Study	1.03	0.04	0.11
29	300497 Maynooth Line Transport Study	0.55	0.27	0.09
30	300497 Maynooth Line Transport Study	5.98	1.08	0.27
31	300497 Maynooth Line Transport Study	5.42	2.20	4.21
32	300497 Maynooth Line Transport Study	2.04	1.41	1.45
33	300497 Maynooth Line Transport Study	2.87	4.27	2.29
34	300497 Maynooth Line Transport Study	8.41	3.40	2.96
35	300497 Maynooth Line Transport Study	3.23	0.00	5.46
36	300497 Maynooth Line Transport Study	1.33	1.11	5.39
37	300497 Maynooth Line Transport Study	1.88	0.05	0.63
38	300497 Maynooth Line Transport Study	7.97	0.15	1.20
39	300497 Maynooth Line Transport Study	0.01	0.02	0.00
40	300497 Maynooth Line Transport Study	0.22	0.00	0.07
41	300497 Maynooth Line Transport Study	0.05	0.03	0.03
42	300497 Maynooth Line Transport Study	0.01	0.05	0.02
43	R120 Adamstown Road between N4 and Esker Drive	0.91	0.38	2.41
44	R120 Adamstown Road between N4 and Esker Drive	4.99	0.08	0.78

ID	Location	AM GEH	LT GEH	PM GEH
45	Millstream Road between L1027 Old Cornmill Road and Dodsborough Road	2.50	0.03	2.61
46	Millstream Road between L1027 Old Cornmill Road and Dodsborough Road	5.40	1.29	0.65
47	L1006 Station Road between M50 and Palmerstown Woods	0.28	2.25	1.82
48	L1006 Station Road between M50 and Palmerstown Woods	4.99	0.61	0.02
49	R134 Nangor Road between L5704 Park West Avenue and L1035	4.89	0.83	0.30
50	R134 Nangor Road between L5704 Park West Avenue and L1035	2.14	0.63	2.01
51	L1019 Monastery Road between L1033 Woodford Hill and Mount Talbot	2.42	4.05	2.57
52	L1019 Monastery Road between L1033 Woodford Hill and Mount Talbot	0.17	0.16	1.34
53	Hazelwood Crescent between Green Isle Road and Hazelwood Lane	5.56	0.10	0.86
54	Hazelwood Crescent between Green Isle Road and Hazelwood Lane	0.81	0.59	1.98
55	Boot Road between South Of Commons Road and Rockfield Drive	3.95	2.08	2.16
56	Boot Road between South Of Commons Road and Rockfield Drive	0.27	1.47	1.63
57	R113 Fonthill Road South between N7 and L5260 Caldbeck Way	2.91	0.87	0.38
58	R113 Fonthill Road South between N7 and L5260 Caldbeck Way	7.64	1.17	1.44
59	R120 College Lane between 6033 Tay Lane and Newcastle Boulevard	5.61	4.00	1.62
60	R120 College Lane between 6033 Tay Lane and Newcastle Boulevard	1.32	4.21	2.00
61	Barney's Lane between North of N7 and Business Park Roundabout	12.09	2.13	1.88
62	Barney's Lane between North of N7 and Business Park Roundabout	5.03	2.25	0.91
63	L23001 Baldonnell Road between L2006 Barney's Lane and R136 Grange Castle Road	5.77	3.52	1.34
64	L23001 Baldonnell Road between L2006 Barney's Lane and R136 Grange Castle Road	0.43	0.05	2.53
65	L1058 Adamstown Avenue between R120 Adamstown Road and R136 Grange Castle Road	3.48	0.05	3.90
66	L1058 Adamstown Avenue between R120 Adamstown Road and R136 Grange Castle Road	1.12	1.23	1.67
67	L1011 Old Esker Lane between L1009 Esker Drive and L1015 Griffeen Road	3.62	0.51	0.06
68	L1011 Old Esker Lane between L1009 Esker Drive and L1015 Griffeen Road	4.81	0.22	0.38
69	L1026 Ninth Lock Road between R134 Nangor Road and L1006 Station Road	2.33	3.49	3.60
70	L1026 Ninth Lock Road between R134 Nangor Road and L1006 Station Road	1.62	4.01	4.10
71	R134 Nangor Road between L2001 Baldonnell Road and R136 Grange Castle Road	2.55	0.17	1.18
72	R134 Nangor Road between L2001 Baldonnell Road and R136 Grange Castle Road	0.25	0.18	1.30
73	L6003 Aylmer Road between R120 Main Street and College Road	0.48	0.21	1.58
74	L6003 Aylmer Road between R120 Main Street and College Road	3.59	0.99	2.20
75	R120 Peamount Road between L6032 Loughtown Road and L60322 Peamount Lane	4.40	4.17	1.74
76	R120 Peamount Road between L6032 Loughtown Road and L60322 Peamount Lane	0.11	0.95	14.83
77	L1030 Tandy's Lane (local Road)	1.57	1.87	2.21
78	L1030 Tandy's Lane (local Road)	3.54	0.55	2.06
79	R136 Grangecastle Road between R134 New Nangor Road and L1059 Tomas Omar Way	3.87	0.82	3.62
80	R136 Grangecastle Road between R134 New Nangor Road and L1059 Tomas Omar Way	4.06	2.19	2.13
81	R113 Fonthill Road North between R833 Coldcut Road and L1024 Ronanstown Road	5.99	0.99	1.44

ID	Location	AM GEH	LT GEH	PM GEH
82	R113 Fonthill Road North between R833 Coldcut Road and L1024 Ronanstown Road	3.98	5.14	2.54
83	R113 Fonthill Road North between L1059 Tomas Omar Way and R134 Nangor Road	6.46	9.46	5.76
84	R113 Fonthill Road North between L1059 Tomas Omar Way and R134 Nangor Road	5.39	15.68	7.71
85	R835, Lucan	3.53		1.64
86	R835, Lucan	4.28		1.05
87	TME 05 M03 Jn06 to Jn07	0.06	2.49	1.71
88	TME 05 M03 Jn06 to Jn07	2.42	3.68	1.23
89	TME 01 M03 Jn04 to Jn05	0.81	1.27	2.26
90	TME 01 M03 Jn04 to Jn05	1.36	0.22	1.92
91	TME 02 M03 Jn05 North-side Ramps	2.51	0.45	0.94
92	TME 02 M03 Jn05 North-side Ramps	0.39	0.61	2.00
93	TME 03 M03 Jcn05 to Jcn06	0.58	3.04	2.46
94	TME 03 M03 Jcn05 to Jcn06	3.18	0.10	1.45
95	TME 04 M03 Jnc06 North-side Ramps	0.30	1.88	0.47
96	TME 04 M03 Jnc06 North-side Ramps	0.02	0.41	0.01
97	M04 Between Jn06 Celbridge and Jn07 Maynooth	2.02	0.41	0.33
98	M04 Between Jn06 Celbridge and Jn07 Maynooth	0.25	0.16	0.31
99	M04, Maynooth, West Co. Kildare	0.38	0.84	1.71
100	M04, Maynooth, West Co. Kildare	2.08	1.28	0.31
101	M50 Between Jn09 N07/M50 Red Cow and Jn10, Blimnt	0.85	0.00	2.39
102	M50 Between Jn09 N07/M50 Red Cow and Jn10, Blimnt	0.00	0.02	0.02
103	M50 Btwn Jn06 N03/M50 & Jn07 N04/M50, Castleknock	3.57	0.90	5.62
104	M50 Btwn Jn06 N03/M50 & Jn07 N04/M50, Castleknock	1.30	0.73	3.14
105	M50 Between Jn07 N04/M50 and Jn09 N07/M50 Red Cow	1.27	0.28	1.24
106	M50 Between Jn07 N04/M50 and Jn09 N07/M50 Red Cow	2.71	0.32	0.91
107	N03 Between Jn02 Blanchardstown & Jn03 Clonsilla	2.55	0.57	0.91
108	N03 Between Jn02 Blanchardstown & Jn03 Clonsilla	2.87	0.84	2.37
109	N03 Between Jn03 Clonsilla and Jn04 Clonee	3.04	0.67	3.02
110	N03 Between Jn03 Clonsilla and Jn04 Clonee	8.88	1.88	1.95
111	N04 Between Jn03 Newcastle and Jn04 Lucan, Lucan	0.69	0.17	0.74
112	N04 Between Jn03 Newcastle and Jn04 Lucan, Lucan	6.58	0.84	0.77
113	N04 Between Jn01 N4/M50 and Jn02 Liffey Valley	2.33	2.08	2.13
114	N04 Between Jn01 N4/M50 and Jn02 Liffey Valley	1.37	1.20	0.45
115	N07 Between Jn01a Newlands Cross&Jn02 Kingswood	1.11	0.44	0.47
116	N07 Between Jn01a Newlands Cross&Jn02 Kingswood	1.91	0.53	0.00
117	N07 Between Jn01 M50&Jn1a Newlands Cross (R113)	2.61	0.65	0.37
118	N07 Westbound Btwn Jn05 Athgoe&Jn06 Castletwarden	1.89	2.84	0.07
119	N07 Westbound Btwn Jn05 Athgoe&Jn06 Castletwarden	0.72	1.95	1.25
120	N07 Btwn Jn07 Kill and Jn08 Johnstown, Kill	0.62	0.01	0.19
121	N07 Btwn Jn07 Kill and Jn08 Johnstown, Kill	0.26	0.34	0.57
122	R148	1.96	0.79	1.31
123	R148	0.87	0.89	3.08
124	R403	0.41	0.03	7.69
125	R403	0.09	0.24	0.05
126	Turnings	0.05	0.36	0.41
127	Turnings	0.17	0.39	0.17



APPENDIX B – COST ESTIMATES

Corridor Option 1 Costs

Maynooth to Leixlip Project		16/03/2023			S3-P01	
Phase 2 Stage 2: Project Appraisal Matrix (PAM)		Corridor Option 1				
Arup		The information presented is Private and Confidential				
1	Main Construction Contract (See attached for breakdown presented to Level 2 detail)	Quantity	Unit	Rate €	Total €	
	a	Site Clearance	Various	Ha	Various	€31,116
	b	Fencing	Various	m	Various	€144,000
	c	Safety Barriers and Pedestrian Guardrails	Various	m	Various	€898,200
	d	Drainage and Service Ducts	Various	km	460,000	€2,493,300
	e	Earthworks	Various	m ³	Various	€167,327
	f	Pavement	Various	Various	Various	€7,868,964
	g	Kerbs, Footways and Paved Areas	Various	Various	Various	€207,775
	h	Traffic Signs & Roadmarkings	Various	Various	Various	€568,472
	j		Various	Various	Various	€0
	k	Lighting and Electrical	Various	Various	Various	€137,630
	l	Landscaping and Environmental	Various	Various	Various	€229,384
	m	Structures	Various	Various	Various	€828,000
	n	Accommodation Works	Various	Various	Various	€83,110
p	Statutory Authorities & Utilities	Various	Various	Various	€831,100	
q	Any Other Obligations and Liabilities of the Contractor	Various	Various	Various	€831,100	

	r	Dual Carraigeway Widening	-	km	-	€0
	s	Preliminaries	Various	Various	Various	€3,063,896
Total Base Cost for Main Construction Contract (Excluding VAT)						€18,383,374
Add Project Specific Risk Contingency				20	%	€3,676,675
Sub-Total exclusive of VAT						€22,060,049
Add VAT at				13.5	%	€2,978,107
Total MCC Base Cost plus Project Specific Risk Contingency and VAT						€25,038,156

2 Land and Property - All-In Costs						
			Quantity	Unit	Rate €	Total €
	a	Land & Property (refer individual breakdown sheets for corridor)	Various	Various	Various	€0
Total Base Cost for Land and Property						€0
Add Project Specific Risk Contingency				10	%	€0
Add VAT at				0	%	€0
Total L&P Base Cost plus Project Specific Risk Contingency						€0

3 Planning and Design						
Provision based on % of MCC Base Cost & Actual Costs where known				5	%	€1,251,908
Add Project Specific Risk Contingency				10	%	€125,191
Add VAT at				23	%	€287,939
Total P&D Base Cost plus Project Specific Risk Contingency						€1,665,037

4 Archaeology						
Provision based on per hectare rate applied to total greenfield area						€200,000
Add Project Specific Risk Contingency				10	%	€20,000
Add VAT at				18.3	%	€36,600
Total Archaeology Base Cost plus Project Specific Risk Contingency						€256,600

5 Advance Works and Other Contracts						
Provision based on % of MCC Base Cost & Actual Costs where known				2.5	%	€625,954
Add Project Specific Risk Contingency				10	%	€62,595
Add VAT at				13.5	%	€84,504

Total Advance Works and Other Contracts Base Cost plus Project Specific Risk Contingency				€773,053
6 Main Contract Supervision (Employer's Costs)				
	Provision based on % of MCC Base Cost & Actual Costs where known	5	%	€1,251,908
	Add Project Specific Risk Contingency	10	%	€125,191
	Add VAT at	23	%	€287,939
Total MC Supervision (Employer's Costs) Base Cost plus Project Specific Risk Contingency				€1,665,037
7 Walking/Cycling/Asset Renewal (Provision to be subject to the approval of the TII Regional Manager)				
	Provision based on percentage of Main Construction Contract Base Cost	5	%	€1,251,908
	Add Project Specific Risk Contingency	10	%	€125,191
	Add VAT at	13.5	%	€169,008
Total Residual Network Base Cost plus Project Specific Risk Contingency				€1,546,106
TOTAL LEVEL 2 ESTIMATE INCLUSIVE OF VAT				€30,943,990
	Mainline Length	8.3	km	Rate per km €3,723,257
N.B.	Figures above are INCLUSIVE of VAT unless otherwise specified. Figures above are EXCLUSIVE of provision for Inflation - base date to be stated if different from date of estimate. Total base costs to include for ALL qualifying costs under each cost heading. Refer to the NRA Cost Management Manual for information on coverage and format of back-up. See attached Budget Assumptions Sheet for Further Scheme Information.			

Corridor Option 2 Costs

Maynooth to Leixlip Project		16/03/2023			S3-P01
Phase 2 Stage 2: Project Appraisal Matrix (PAM)		Corridor Option 2			
Arup		The information presented is Private and Confidential			
1	Main Construction Contract (See attached for breakdown presented to Level 2 detail)	Quantity	Unit	Rate €	Total €
	a Site Clearance	Various	Ha	Various	€31,116
	b Fencing	Various	m	Various	€144,000
	c Safety Barriers and Pedestrian Guardrails	Various	m	Various	€898,200
	d Drainage and Service Ducts	Various	km	460,000	€2,908,850
	e Earthworks	Various	m ³	Various	€352,691
	f Pavement	Various	Various	Various	€9,911,815
	g Kerbs, Footways and Paved Areas	Various	Various	Various	€207,775
	h Traffic Signs & Roadmarkings	Various	Various	Various	€568,472
	j	Various	Various	Various	€0
	k Lighting and Electrical	Various	Various	Various	€137,630
	l Landscaping and Environmental	Various	Various	Various	€229,384
	m Structures	Various	Various	Various	€3,948,000
	n Accommodation Works	Various	Various	Various	€249,330
p Statutory Authorities & Utilities	Various	Various	Various	€831,100	
q Any Other Obligations and Liabilities of the Contractor	Various	Various	Various	€831,100	

	r	Dual Carraigeway Widening	-	km	-	€0
	s	Preliminaries	Various	Various	Various	€4,249,893
Total Base Cost for Main Construction Contract (Excluding VAT)						€25,499,356
Add Project Specific Risk Contingency				20	%	€5,099,871
Sub-Total exclusive of VAT						€30,599,227
Add VAT at				13.5	%	€4,130,896
Total MCC Base Cost plus Project Specific Risk Contingency and VAT						€34,730,123

2 Land and Property - All-In Costs						
	a		Quantity	Unit	Rate €	Total €
		Land & Property (refer individual breakdown sheets for corridor)	Various	Various	Various	€1,000,000
Total Base Cost for Land and Property						€1,000,000
Add Project Specific Risk Contingency				10	%	€100,000
Add VAT at				0	%	€0
Total L&P Base Cost plus Project Specific Risk Contingency						€1,100,000

3 Planning and Design						
Provision based on % of MCC Base Cost & Actual Costs where known				5	%	€1,736,506
Add Project Specific Risk Contingency				10	%	€173,651
Add VAT at				23	%	€399,396
Total P&D Base Cost plus Project Specific Risk Contingency						€2,309,553

4 Archaeology						
Provision based on per hectare rate applied to total greenfield area						€400,000
Add Project Specific Risk Contingency				10	%	€40,000
Add VAT at				18.3	%	€73,200
Total Archaeology Base Cost plus Project Specific Risk Contingency						€513,200

5 Advance Works and Other Contracts						
Provision based on % of MCC Base Cost & Actual Costs where known				2.5	%	€868,253
Add Project Specific Risk Contingency				10	%	€86,825
Add VAT at				13.5	%	€117,214

Total Advance Works and Other Contracts Base Cost plus Project Specific Risk Contingency				€1,072,293
6 Main Contract Supervision (Employer's Costs)				
	Provision based on % of MCC Base Cost & Actual Costs where known	5	%	€1,736,506
	Add Project Specific Risk Contingency	10	%	€173,651
	Add VAT at	23	%	€399,396
Total MC Supervision (Employer's Costs) Base Cost plus Project Specific Risk Contingency				€2,309,553
7 Walking/Cycling/Asset Renewal (Provision to be subject to the approval of the TII Regional Manager)				
	Provision based on % of MCC Base Cost & Actual Costs where known	5	%	€1,736,506
	Add Project Specific Risk Contingency	10	%	€173,651
	Add VAT at	13.5	%	€234,428
Total Residual Network Base Cost plus Project Specific Risk Contingency				€2,144,585
TOTAL LEVEL 2 ESTIMATE INCLUSIVE OF VAT				€44,179,307
	Mainline Length	8.3	km	Rate per km €5,315,763
N.B.	Figures above are INCLUSIVE of VAT unless otherwise specified. Figures above are EXCLUSIVE of provision for Inflation - base date to be stated if different from date of estimate. Total base costs to include for ALL qualifying costs under each cost heading. Refer to the NRA Cost Management Manual for information on coverage and format of back-up. See attached Budget Assumptions Sheet for Further Scheme Information.			

Corridor Option 3 Costs

Maynooth to Leixlip Project		04/03/2022			S3-P01
Phase 2 Stage 1: Option Comparison Estimates		Corridor Option 3			
Arup		The information presented is Private and Confidential			
1	Main Construction Contract (See attached for breakdown presented to Level 2 detail)	Quantity	Unit	Rate €	Total €
a	Site Clearance	Various	Ha	Various	€31,116
b	Fencing	Various	m	Various	€144,000
c	Safety Barriers and Pedestrian Guardrails	Various	m	Various	€898,200
d	Drainage and Service Ducts	Various	km	460000	€3,324,400
e	Earthworks	Various	m ³	Various	€639,277
f	Pavement	Various	Various	Various	€11,954,735
g	Kerbs, Footways and Paved Areas	Various	Various	Various	€207,775
h	Traffic Signs & Roadmarkings	Various	Various	Various	€568,472
j		Various	Various	Various	€0
k	Lighting and Electrical	Various	Various	Various	€137,630
l	Landscaping and Environmental	Various	Various	Various	€229,384
m	Structures	Various	Various	Various	€7,068,000
n	Accommodation Works	Various	Various	Various	€415,550
p	Statutory Authorities & Utilities	Various	Various	Various	€831,100
q	Any Other Obligations and Liabilities of the Contractor	Various	Various	Various	€831,100
r	Dual Carraigeway Widening	-	km	-	€0

	s	Preliminaries	Various	Various	Various	€5,456,148
Total Base Cost for Main Construction Contract (Excluding VAT)						€32,736,888
Add Project Specific Risk Contingency				20	%	€6,547,378
Sub-Total exclusive of VAT						€39,284,265
Add VAT at				13.5	%	€5,303,376
Total MCC Base Cost plus Project Specific Risk Contingency and VAT						€44,587,641
2 Land and Property - All-In Costs						
		Quantity	Unit	Rate €	Total €	
	a	Land & Property (refer individual breakdown sheets for corridor)	Various	Various	Various	€2,000,000
Total Base Cost for Land and Property						€2,000,000
Add Project Specific Risk Contingency				10	%	€200,000
Add VAT at				0	%	€0
Total L&P Base Cost plus Project Specific Risk Contingency						€2,200,000
3 Planning and Design						
Provision based on % of MCC Base Cost & Actual Costs where known				5	%	€2,229,382
Add Project Specific Risk Contingency				10	%	€222,938
Add VAT at				23	%	€512,758
Total P&D Base Cost plus Project Specific Risk Contingency						€2,965,078
4 Archaeology						
Provision based on per hectare rate applied to total greenfield area						€500,000
Add Project Specific Risk Contingency				10	%	€50,000
Add VAT at				18.3	%	€91,500
Total Archaeology Base Cost plus Project Specific Risk Contingency						€641,500
5 Advance Works and Other Contracts						
Provision based on % of MCC Base Cost & Actual Costs where known				2.5	%	€1,114,691
Add Project Specific Risk Contingency				10	%	€111,469
Add VAT at				13.5	%	€150,483
Total Advance Works and Other Contracts Base Cost plus Project Specific Risk Contingency						€1,376,643

6 Main Contract Supervision (Employer's Costs)				
	Provision based on % of MCC Base Cost & Actual Costs where known	5	%	€2,229,382
	Add Project Specific Risk Contingency	10	%	€222,938
	Add VAT at	23	%	€512,758
Total MC Supervision (Employer's Costs) Base Cost plus Project Specific Risk Contingency				€2,965,078
7 Walking/Cycling/Asset Renewal (Provision to be subject to the approval of the TII Regional Manager)				
	Provision based on % of MCC Base Cost & Actual Costs where known	5	%	€2,229,382
	Add Project Specific Risk Contingency	10	%	€222,938
	Add VAT at	13.5	%	€300,967
Total Residual Network Base Cost plus Project Specific Risk Contingency				€2,753,287
TOTAL LEVEL 2 ESTIMATE INCLUSIVE OF VAT				€57,489,228
	Mainline Length	8.3	km	Rate per km €6,917,246
N.B.	<p>Figures above are INCLUSIVE of VAT unless otherwise specified. Figures above are EXCLUSIVE of provision for Inflation - base date to be stated if different from date of estimate. Total base costs to include for ALL qualifying costs under each cost heading. Refer to the NRA Cost Management Manual for information on coverage and format of back-up. See attached Budget Assumptions Sheet for Further Scheme Information.</p>			

Junction 7 - Option 1 Cost Estimate

Maynooth to Leixlip Project		17/08/2023		S0-P01	
Phase 2 Stage 2: Project Appraisal Matrix (PAM)		Junction 7 Option 1			
Arup		The information presented is Private and Confidential			
1	Main Construction Contract (See attached for breakdown presented to Level 2 detail)	Quantity	Unit	Rate €	Total €
	a Site Clearance	Various	Ha	Various	€50,000
	b Fencing	Various	m	Various	€91,819
	c Safety Barriers and Pedestrian Guardrails	Various	m	Various	€153,161
	d Drainage and Service Ducts	Various	km	460000	€353,004
	e Earthworks	Various	m ³	Various	€254,834
	f Pavement	Various	Various	Various	€566,355
	g Kerbs, Footways and Paved Areas	Various	Various	Various	€141,202
	h Traffic Signs & Roadmarkings	Various	Various	Various	€131,788
	j	Various	Various	Various	€0
	k Lighting and Electrical	Various	Various	Various	€37,654
	l Landscaping and Environmental	Various	Various	Various	€56,481
	m Structures	Various	Various	Various	€0
	n Accommodation Works	Various	Various	Various	€56,481
p Statutory Authorities & Utilities	Various	Various	Various	€376,537	
q Any Other Obligations and Liabilities of the Contractor	Various	Various	Various	€376,537	

	r	Dual Carraigeway Widening	-	km	-	€0
	s	Preliminaries	Various	Various	Various	€529,170
Total Base Cost for Main Construction Contract (Excluding VAT)						€3,175,022
Add Project Specific Risk Contingency				20	%	€635,004
Sub-Total exclusive of VAT						€3,810,026
Add VAT at				13.5	%	€514,354
Total MCC Base Cost plus Project Specific Risk Contingency and VAT						€4,324,380
2 Land and Property - All-In Costs						
			Quantity	Unit	Rate €	Total €
	a	Land & Property (refer individual breakdown sheets for corridor)	Various	Various	Various	
Total Base Cost for Land and Property						€2,106,700
Add Project Specific Risk Contingency				10	%	€210,670
Add VAT at				0	%	€0
Total L&P Base Cost plus Project Specific Risk Contingency						€2,317,370
3 Planning and Design						
Provision based on % of MCC Base Cost & Actual Costs where known				5	%	€216,219
Add Project Specific Risk Contingency				10	%	€21,622
Add VAT at				23	%	€49,730
Total P&D Base Cost plus Project Specific Risk Contingency						€287,571
4 Archaeology						
Provision based on per hectare rate applied to total greenfield area						€200,000
Add Project Specific Risk Contingency				10	%	€20,000
Add VAT at				18.3	%	€36,600
Total Archaeology Base Cost plus Project Specific Risk Contingency						€256,600
5 Advance Works and Other Contracts						
Provision based on % of MCC Base Cost & Actual Costs where known				2.5	%	€108,109
Add Project Specific Risk Contingency				10	%	€10,811
Add VAT at				13.5	%	€14,595

Total Advance Works and Other Contracts Base Cost plus Project Specific Risk Contingency			€133,515
6 Main Contract Supervision (Employer's Costs)			
Provision based on % of MCC Base Cost & Actual Costs where known	5	%	€216,219
Add Project Specific Risk Contingency	10	%	€21,622
Add VAT at	23	%	€49,730
Total MC Supervision (Employer's Costs) Base Cost plus Project Specific Risk Contingency			€287,571
7 Walking/Cycling/Asset Renewal (Provision to be subject to the approval of the TII Regional Manager)			
Provision based on percentage of Main Construction Contract Base Cost	7.5	%	€324,328
Add Project Specific Risk Contingency	10	%	€32,433
Add VAT at	13.5	%	€43,784
Total Residual Network Base Cost plus Project Specific Risk Contingency			€400,546
TOTAL LEVEL 2 ESTIMATE INCLUSIVE OF VAT			€8,007,553
Mainline Length	10.0	km	Rate per km €800,755
N.B.	Figures above are INCLUSIVE of VAT unless otherwise specified. Figures above are EXCLUSIVE of provision for Inflation - base date to be stated if different from date of estimate. Total base costs to include for ALL qualifying costs under each cost heading. Refer to the NRA Cost Management Manual for information on coverage and format of back-up. See attached Budget Assumptions Sheet for Further Scheme Information.		

Maynooth to Leixlip Project		17/08/2023		S0-P01	
Phase 2 Stage 2: Project Appraisal Matrix (PAM)					MOOR Option 1
Arup			The information presented is Private and Confidential		
1 Main Construction Contract (See attached for breakdown presented to Level 2 detail)					
		Quantity	Unit	Rate €	Total €
a	Site Clearance	Various	Ha	Various	€50,000
b	Fencing	Various	m	Various	€261,300
c	Safety Barriers and Pedestrian Guardrails	Various	m	Various	€435,870
d	Drainage and Service Ducts	Various	km	460000	€1,004,586
e	Earthworks	Various	m3	Various	€385,773
f	Pavement	Various	Various	Various	€2,628,188
g	Kerbs, Footways and Paved Areas	Various	Various	Various	€401,835
h	Traffic Signs & Roadmarkings	Various	Various	Various	€375,046
k	Lighting and Electrical	Various	Various	Various	€107,156
l	Landscaping and Environmental	Various	Various	Various	€160,734
m	Structures	Various	Various	Various	€0
n	Accommodation Works	Various	Various	Various	€160,734
p	Statutory Authorities & Utilities	Various	Various	Various	€535,779
q	Any Other Obligations and Liabilities of the Contractor	Various	Various	Various	€535,779
s	Preliminaries	Various	Various	Various	€1,408,556
Total Base Cost for Main Construction Contract (Excluding VAT)					€8,451,334
Add Project Specific Risk Contingency			20	%	€1,690,267
Sub-Total exclusive of VAT					€10,141,601
Add VAT at			13.5	%	€1,369,116
Total MCC Base Cost plus Project Specific Risk Contingency and VAT					€11,510,718
2 Land and Property - All-In Costs					
		Quantity	Unit	Rate €	Total €
a	Land & Property (refer individual breakdown sheets for corridor)	Various	Various	Various	
Total Base Cost for Land and Property					€2,598,203
Add Project Specific Risk Contingency			10	%	€259,820
Add VAT at			0	%	€0
Total L&P Base Cost plus Project Specific Risk Contingency					€2,858,023
3 Planning and Design					
Provision based on % of MCC Base Cost & Actual Costs where known			5	%	€575,536
Add Project Specific Risk Contingency			10	%	€57,554
Add VAT at			23	%	€132,373
Total P&D Base Cost plus Project Specific Risk Contingency					€765,463

4 Archaeology			
Provision based on per hectare rate applied to total greenfield area			€2,000,000
Add Project Specific Risk Contingency	10	%	€200,000
Add VAT at	18.3	%	€366,000
Total Archaeology Base Cost plus Project Specific Risk Contingency			€2,566,000
5 Advance Works and Other Contracts			
Provision based on % of MCC Base Cost & Actual Costs where known	2.5	%	€287,768
Add Project Specific Risk Contingency	10	%	€28,777
Add VAT at	13.5	%	€38,849
Total Advance Works and Other Contracts Base Cost plus Project Specific Risk Contingency			€355,393
6 Main Contract Supervision (Employer's Costs)			
Provision based on % of MCC Base Cost & Actual Costs where known	5	%	€575,536
Add Project Specific Risk Contingency	10	%	€57,554
Add VAT at	23	%	€132,373
Total MC Supervision (Employer's Costs) Base Cost plus Project Specific Risk Contingency			€765,463
7 Walking/Cycling/Asset Renewal (Provision to be subject to the approval of the TII Regional Manager)			
Provision based on percentage of Main Construction Contract Base Cost	7.5	%	€863,304
Add Project Specific Risk Contingency	10	%	€86,330
Add VAT at	13.5	%	€116,546
Total Residual Network Base Cost plus Project Specific Risk Contingency			€1,066,180
TOTAL LEVEL 2 ESTIMATE INCLUSIVE OF VAT			€19,887,240

Junction 7 - Option 2 Cost Estimate

Maynooth to Leixlip Project	17/08/2023	S0-P01
Phase 2 Stage 2: Project Appraisal Matrix (PAM)		Junction 7 Option 2

Arup	The information presented is Private and Confidential
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	Main Construction Contract (See attached for breakdown presented to Level 2 detail)		Quantity	Unit	Rate €	Total €
	1	a	Site Clearance	Various	Ha	Various
	b	Fencing	Various	m	Various	€255,691
	c	Safety Barriers and Pedestrian Guardrails	Various	m	Various	€426,514
	d	Drainage and Service Ducts	Various	km	460,000	€983,023
	e	Earthworks	Various	m3	Various	€1,210,842
	f	Pavement	Various	Various	Various	€972,190
	g	Kerbs, Footways and Paved Areas	Various	Various	Various	€393,209
	h	Traffic Signs & Roadmarkings	Various	Various	Various	€366,995
	j		Various	Various	Various	€0
	k	Lighting and Electrical	Various	Various	Various	€104,856
	l	Landscaping and Environmental	Various	Various	Various	€157,284
	m	Structures	Various	Various	Various	€2,662,500
	n	Accommodation Works	Various	Various	Various	€157,284
	p	Statutory Authorities & Utilities	Various	Various	Various	€1,048,558
	q	Any Other Obligations and Liabilities of the Contractor	Various	Various	Various	€1,048,558
	r	Dual Carraigeway Widening	-	km	-	€0
	s	Preliminaries	Various	Various	Various	€1,967,501

Total Base Cost for Main Construction Contract (Excluding VAT)					€11,805,004	
Add Project Specific Risk Contingency		20	%		€2,361,001	
Sub-Total exclusive of VAT					€14,166,005	
Add VAT at		13.5	%		€1,912,411	
Total MCC Base Cost plus Project Specific Risk Contingency and VAT					€16,078,416	
2	Land and Property - All-In Costs		Quantity	Unit	Rate €	Total €
	a	Land & Property (refer individual breakdown sheets for corridor)	Various	Various	Various	
Total Base Cost for Land and Property						€4,209,200
Add Project Specific Risk Contingency		10	%			€420,920
Add VAT at		0	%			€0
Total L&P Base Cost plus Project Specific Risk Contingency					€4,630,120	
3	Planning and Design					
Provision based on % of MCC Base Cost & Actual Costs where known		5	%		€803,921	
Add Project Specific Risk Contingency		10	%		€80,392	
Add VAT at		23	%		€184,902	
Total P&D Base Cost plus Project Specific Risk Contingency					€1,069,215	
4	Archaeology					
Provision based on per hectare rate applied to total greenfield area					€200,000	
Add Project Specific Risk Contingency		10	%		€20,000	
Add VAT at		18.3	%		€36,600	
Total Archaeology Base Cost plus Project Specific Risk Contingency					€256,600	
5	Advance Works and Other Contracts					
Provision based on % of MCC Base Cost & Actual Costs where known		2.5	%		€401,960	
Add Project Specific Risk Contingency		10	%		€40,196	
Add VAT at		13.5	%		€54,265	
Total Advance Works and Other Contracts Base Cost plus Project Specific Risk Contingency					€496,421	

6 Main Contract Supervision (Employer's Costs)				
	Provision based on % of MCC Base Cost & Actual Costs where known	5	%	€803,921
	Add Project Specific Risk Contingency	10	%	€80,392
	Add VAT at	23	%	€184,902
Total MC Supervision (Employer's Costs) Base Cost plus Project Specific Risk Contingency				€1,069,215
7 Walking/Cycling/Asset Renewal (Provision to be subject to the approval of the TII Regional Manager)				
	Provision based on percentage of Main Construction Contract Base Cost	7.5	%	€1,205,881
	Add Project Specific Risk Contingency	10	%	€120,588
	Add VAT at	13.5	%	€162,794
Total Residual Network Base Cost plus Project Specific Risk Contingency				€1,489,263
TOTAL LEVEL 2 ESTIMATE INCLUSIVE OF VAT				€25,089,249
	Mainline Length	10.0	km	Rate per km
				€2,508,925
N.B.	<p>Figures above are INCLUSIVE of VAT unless otherwise specified.</p> <p>Figures above are EXCLUSIVE of provision for Inflation - base date to be stated if different from date of estimate.</p> <p>Total base costs to include for ALL qualifying costs under each cost heading.</p> <p>Refer to the NRA Cost Management Manual for information on coverage and format of back-up.</p> <p>See attached Budget Assumptions Sheet for Further Scheme Information.</p>			

Maynooth to Leixlip Project		17/08/2023		S0-P01	
Phase 2 Stage 2: Project Appraisal Matrix (PAM)					MOOR Option 2
Arup			The information presented is Private and Confidential		
1	Main Construction Contract (See attached for breakdown presented to Level 2 detail)	Quantity	Unit	Rate €	Total €
a	Site Clearance	Various	Ha	Various	€50,000
b	Fencing	Various	m	Various	€262,343
c	Safety Barriers and Pedestrian Guardrails	Various	m	Various	€437,611
d	Drainage and Service Ducts	Various	km	460,000	€1,008,599
e	Earthworks	Various	m3	Various	€386,137
f	Pavement	Various	Various	Various	€2,242,290
g	Kerbs, Footways and Paved Areas	Various	Various	Various	€403,440
h	Traffic Signs & Roadmarkings	Various	Various	Various	€376,544
k	Lighting and Electrical	Various	Various	Various	€107,584
l	Landscaping and Environmental	Various	Various	Various	€161,376
m	Structures	Various	Various	Various	€0
n	Accommodation Works	Various	Various	Various	€161,376
p	Statutory Authorities & Utilities	Various	Various	Various	€537,919
q	Any Other Obligations and Liabilities of the Contractor	Various	Various	Various	€537,919
s	Preliminaries	Various	Various	Various	€1,334,627
Total Base Cost for Main Construction Contract (Excluding VAT)					€8,007,764
Add Project Specific Risk Contingency			20	%	€1,601,553
Sub-Total exclusive of VAT					€9,609,317
Add VAT at			13.5	%	€1,297,258
Total MCC Base Cost plus Project Specific Risk Contingency and VAT					€10,906,575
2	Land and Property - All-In Costs	Quantity	Unit	Rate €	Total €
a	Land & Property (refer individual breakdown sheets for corridor)	Various	Various	Various	
Total Base Cost for Land and Property					€2,689,715
Add Project Specific Risk Contingency			10	%	€268,972
Add VAT at			0	%	€0
Total L&P Base Cost plus Project Specific Risk Contingency					€2,958,687
3	Planning and Design				
Provision based on % of MCC Base Cost & Actual Costs where known			5	%	€545,329
Add Project Specific Risk Contingency			10	%	€54,533
Add VAT at			23	%	€125,426
Total P&D Base Cost plus Project Specific Risk Contingency					€725,287

4 Archaeology			
Provision based on per hectare rate applied to total greenfield area			€200,000
Add Project Specific Risk Contingency	10	%	€20,000
Add VAT			
at	18.3	%	€36,600
Total Archaeology Base Cost plus Project Specific Risk Contingency			€256,600
5 Advance Works and Other Contracts			
Provision based on % of MCC Base Cost & Actual Costs where known	2.5	%	€272,664
Add Project Specific Risk Contingency	10	%	€27,266
Add VAT			
at	13.5	%	€36,810
Total Advance Works and Other Contracts Base Cost plus Project Specific Risk Contingency			€336,741
6 Main Contract Supervision (Employer's Costs)			
Provision based on % of MCC Base Cost & Actual Costs where known	5	%	€545,329
Add Project Specific Risk Contingency	10	%	€54,533
Add VAT			
at	23	%	€125,426
Total MC Supervision (Employer's Costs) Base Cost plus Project Specific Risk Contingency			€725,287
7 Walking/Cycling/Asset Renewal (Provision to be subject to the approval of the TII Regional Manager)			
Provision based on percentage of Main Construction Contract Base Cost	7.5	%	€817,993
Add Project Specific Risk Contingency	10	%	€81,799
Add VAT			
at	13.5	%	€110,429
Total Residual Network Base Cost plus Project Specific Risk Contingency			€1,010,222
TOTAL LEVEL 2 ESTIMATE INCLUSIVE OF VAT			€16,919,398

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MAYNOOTH TO LEIXLIP PROJECT

Appendix 7.1

PABS Corridors



MAYNOOTH TO LEIXLIP PROJECT

Corridor

Project Appraisal Balance Sheet (PABS)

Project Appraisal Balance Sheet

Part A: Project Context



Date	01/11/2023
Version No.	D01

Project Title	Maynooth to Leixlip Project
PRS Reference Number	KE-18-16505
Project Phase	Phase 2: Option Selection
National Roads Office	Kildare National Roads Office
TII Project Manager	Obey Mhondera

Project Description
 The Maynooth to Leixlip Project is an integrated and connected multi-modal holistic transport project aimed at assessing the needs of the M4/N4 mainline corridor and junctions from Junction 5 Leixlip to Junction 7 Maynooth in terms of operational efficiency and safety. It seeks to identify and assess interventions that would improve the operational efficiency and safety of the transport corridor in a sustainable manner.

Scheme Cost €m (OCE)	€30.9m - Preferred Corridor Option
What Are The Likely Sources of Non-Exchequer Funding	TBC
TII Growth Scenario	TII Central Growth

Appraisal Team Author	Joshua Noon, Gerard Hall
Design Team Reviewer	Zita Langenbach, Stephen Barry, Gerard Hall
TII Engineering Inspector	Winston Douglas
External Auditor	Dan Brennan / Derek Brady (TII)

Modelling Base Year	2021
Scheme Opening Year	2032
Reference Number of Nearest TII Traffic Monitoring Unit(s)	TMU M04 020.0W, TMU M04 015.0E, TMU N04 000.0E

Note - This PABS should be completed with reference to the latest version of TII PAG Unit 7.1. Users should always check that the correct version is followed prior to undertaking the PABS.

Air Quality & Climate	Climate - Carbon Dioxide (CO ₂)						Quantitative Statement Parameter				
	Tonnes of CO ₂ produced in the Reference Case Scenario?						N/A				
	Tonnes of CO ₂ produced in the Do Something Scenario?						N/A				
	Ratio of CO ₂ produced in Do Something Scenario to Reference Case Scenario						N/A				
	Greenhouse Gasses						Monetised Benefits (€m)				
	Value of change in emissions						N/A				
	Significance Criteria				Substantial Beneficial	Moderate Beneficial	Slight Beneficial	Negligible	Slight Adverse	Moderate Adverse	Substantial Adverse
	Number of Sensitive Locations Experiencing Impacts That Are:				0	0	0	0	104	0	0
	Index of Overall Change in Exposure				Large Negative Index	Medium Negative Index	Small Negative Index	Small Positive Index	Medium Positive Index	Large Positive Index	
	Nitrogen Dioxide (NO ₂)				○	○	●	○	○	○	
Particulate Matter (PM ₁₀)				○	○	●	○	○	○		
Quantitative Statement		Qualitative Statement									
Neutral		It is not possible to develop a quantitative statement for the operational phase carbon as detailed traffic modelling with the TII REM tool was not undertaken as part of Phase 2.									

Noise & Vibration	Sensitive Receptors						Quantitative Statement Parameter			
	Number of Sensitive Receptors Requiring Mitigation (i.e. the three conditions have been satisfied) Per Kilometre						0			
	Number of Sensitive Receptors Requiring Mitigation (i.e. the three conditions have been satisfied), But It Is Not Feasible To Mitigate Noise To The Required Level Per Kilometre						0			
	Quantitative Statement		Qualitative Statement							
Neutral		It is not possible to develop a quantitative statement for the number of sensitive receptors requiring mitigation as detailed noise models of the Reference Case and Do Something Scenarios have not been undertaken as part of Phase 2. Indicative results from noise modelling of options indicate that up to 22 NSL's within 50m of the centreline however none are likely to require noise mitigation. The assessment has concluded the operation of a new bus priority measures in the eastbound and westbound directions result in a negligible change in traffic noise levels at the modelled NSLs compared to the Do Minimum scenario. At NSLs further from the road edge, outside of the model extent, the change in noise level will also be negligible.								

Waste	Unacceptable Material						Quantitative Statement Parameter No. (m ³)			
	Quantity Of Unacceptable Material Class U1 To Be Disposed Of Off Site?						Not currently known.			
	Quantity Of Unacceptable Material Class U2 To Be Disposed Of Off Site?						Not currently known.			
	Quantity Of Unacceptable Material and Contaminated Land/Hazardous Waste To Be Left In Situ?						Not currently known.			
	Quantitative Statement		Qualitative Statement							
Slightly Negative		Earthworks volumes in the waste assessment relate to bulk material only and they have not been classified into material types for Phase 2. The preferred corridor option may result in approx. 16,000m ³ of fill material.								

Project Appraisal Balance Sheet

Part B: Environment



Landscape & Visual Amenity (incl. Light)	Landscape & Visual Amenity (incl. Light)	Profound Positive	Significant Positive	Moderate Positive	Slightly Positive	Imperceptible	Slightly Negative	Moderate Negative	Significant Negative	Profound Negative	
	Number of Impacts That Are:	0	0	0	0	0	5	0	0	0	
		National Landscape Designation / Listing			County Landscape Designation / Listing			Other Areas of Significant Landscape Value/Amenity			
	Number of Profound / Significant Impacts On Sites Of:	1			0			0			
	Quantitative Statement	Qualitative Statement									
Moderately Negative	The preferred option is not expected to have significant landscape and visual effects. There is potential for moderate negative effects on some receptors such as Griffin Rath Manor and the Wonderful Barn and environs due to removal of roadside vegetation, as well as lesser effects on some other surrounding receptors.										

Biodiversity - Flora & Fauna	Impact on Ecological Receptors	International Importance	National Importance	County Importance	Local Importance (Higher value)	Local Importance (Lower value)
	Number of Significant Positive Impacts On Ecological Receptors Of:	0	0	0	0	0
	Number of Significant Negative Impacts On Ecological Receptors Of:	0	0	0	11	0
	Quantitative Statement	Qualitative Statement				
	Slightly Negative	The preferred option impacts on the River Liffey, the Kilmacredock Upper and nine additional ecological sites of local importance (higher value) all of which consist of treelines and narrow woodland bands lining the existing M4/N4 roadway. These impacts contribute to the quantitative statement of Slightly Negative.				

Agriculture	Impact on Agriculture Holdings	Significant Positive Impact	Moderate Positive Impact	Slightly Positive Impact	Imperceptible Impact	Slightly Negative Impact	Moderate Negative Impact	Significant Negative Impact	Profound Negative Impact	
	Impacts On An Agricultural Holdings That Are:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	Quantitative Statement	Qualitative Statement								
	Neutral	The number of impacts are not applicable as this assessment was based on a comparative analysis of each option under the criteria, farm type and size, farm buildings and yards/facilities, severance and viability. Impact assessments on individual agricultural constraints will be undertaken during Phase 3.								

Non-Agricultural Properties	Impact on Non-Agriculture Properties	Significant Positive Impact	Moderate Positive Impact	Slightly Positive Impact	Imperceptible Impact	Slightly Negative Impact	Moderate Negative Impact	Significant Negative Impact	Profound Negative Impact	
	Number of Impacts That Are:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	Quantitative Statement	Qualitative Statement								
	Slightly Negative	The number of impacts are not applicable as this assessment was based on a comparative analysis of each option under a range of sub-criteria - including potential impacts on infrastructure and property. No residential properties are potentially impacted. There are three business parks adjacent to the preferred option. There is potentially one impact to a 110kV electrical line, and two impacts to gas mains. Monetary compensation will be agreed for loss of land, buildings and other injurious affection, where necessary. The individual impacts of all properties impacted directly or indirectly will be assessed during Phase 3.								

Architectural Heritage	Impact on Architectural Heritage	Significant Positive Impact	Moderate Positive Impact	Slightly Positive Impact	Imperceptible Impact	Slightly Negative Impact	Moderate Negative Impact	Significant Negative Impact	Profound Negative Impact	
	Number of Impacts That Are:	0	0	0	0	0	0	0	0	
	Number of Impacts On Sites Of National Importance That Are:	0	0	0	0	0	0	0	0	
	Quantitative Statement	Qualitative Statement								
	Neutral	The preferred option will not result in any negative direct or indirect impacts upon the architectural heritage.								

Project Appraisal Balance Sheet

Part B: Environment



Archaeological & Cultural Heritage	Impact on Archaeological & Cultural Heritage	Significant Positive Impact	Moderate Positive Impact	Slightly Positive Impact	Imperceptible Impact	Slightly Negative Impact	Moderate Negative Impact	Significant Negative Impact	Profound Negative Impact
	Number of Impacts That Are:	0	0	0	0	0	0	0	0
	Number Of Impacts On Sites Of National Importance That Are:	0	0	0	0	0	0	0	0
	Quantitative Statement	Qualitative Statement							
Neutral	There are no impacts on sites of national importance.								

Soils & Geology	Soils & Geology	Profound Positive	Significant Positive	Moderate Positive	Slightly Positive	Imperceptible	Slightly Negative	Moderate Negative	Significant Negative	Profound Negative
	Number of Impacts That Are:	0	0	0	0	0	0	0	0	0
	Quantitative Statement	Qualitative Statement								
	Neutral	The preferred option is considered to have a minor or slightly negative impact on the soils and geology. Further assessments will be undertaken during Phase 3 to further characterise the soils and geology attributes and level of impact that the project has on these.								

Hydrology	Hydrology	Profound Positive	Significant Positive	Moderate Positive	Slightly Positive	Imperceptible	Slightly Negative	Moderate Negative	Significant Negative	Profound Negative
	Number of Impacts That Are:	0	0	0	0	3	0	0	0	0
	Quantitative Statement	Qualitative Statement								
	Neutral	There are three main features within the preferred option - the River Lyreen and its tributary, the Meadowbrook, the River Liffey and its tributary the Kilmacredock Upper and the Leixlip Reservoir. The preferred option results in a Not Significant or Neutral magnitude of impact on all three features. Further assessments will be undertaken during Phase 3 when the design and potential mitigation measures, including the drainage design will be developed further.								

Hydrogeology	Hydrogeology	Profound Positive	Significant Positive	Moderate Positive	Slightly Positive	Imperceptible	Slightly Negative	Moderate Negative	Significant Negative	Profound Negative
	Number of Impacts That Are:	0	0	0	0	0	0	0	0	0
	Quantitative Statement	Qualitative Statement								
	Neutral	The preferred option is considered to have a not significant or neutral impact on hydrogeology. There are no karst, aquifer classifications, groundwater sources, groundwater flooding areas or habitats identified.								

Overall Scale of Impact	Amended Scale of Impact
Neutral	

Project Appraisal Balance Sheet



Part C: Safety, Physical Activity, Economy, Accessibility and Social Inclusion and Integration Input Sheet

		Total Collision Reduction	Casualty Reduction			Value Of Accident Reduction (€m)				
			Fatal	Serious	Minor					
Safety	Collision Reduction	What is the Collision/Casualty Reduction Over 30 Years?	N/A	N/A	N/A	€ 0.0				
		Quantitative Statement	Qualitative Statement							
		Slightly Positive	A qualitative appraisal has been undertaken to comparatively assess the preferred option with respect to collision reduction. The preferred option would provide hard shoulder bus priority measures, which would aim to promote a modal shift towards public transport and therefore would have the potential to reduce the number of private vehicles on the M4/N4, therefore decreasing collision frequency.							
	Security		Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive
		What is the Expected Impact Of The Project On The Security Of Road Users?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement							
	Moderately Positive	Security of road users would be improved for the preferred option and is scored positively in this regard. The preferred option would provide hard shoulder bus priority measures, which would aim to promote a modal shift towards public transport and thus reduce the number of private vehicles on the M4/N4, decreasing collision frequency. The hard shoulder bus priority measures would be designed to current TII Standards. It would also include amendments to the current configuration of the N4 eastbound carriageway between Junction 5 and Junction 4A.								
	Safety - Overall Scale of Impact		Safety - Amended Scale of Impact							
	Moderately Positive									
	Physical Activity	Ambience		Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive
What is the expected impact of the project upon journey ambience?			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quantitative Statement			Value of Benefit (€m)	Qualitative Statement						
Neutral		At this stage in the option selection process, it is not possible to fully quantify the impacts of the options across each of the Physical Activity sub-criteria.								
Absenteeism			Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive
		What is the impact of the project on absenteeism?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Value of Benefit (€m)	Qualitative Statement						
Neutral		At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.								
Reduced Health Risk			Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive
		What is the impact of the project on the reduction in relative risk for cyclists and walkers?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Quantitative Statement	Value of Benefit (€m)	Qualitative Statement							
Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.									
Physical Activity - Overall Scale of Impact		Physical Activity - Amended Scale of Impact								
Neutral										

Project Appraisal Balance Sheet

Part C: Safety, Physical Activity, Economy, Accessibility and Social Inclusion and Integration Input Sheet



		Consumer (€m)	Business (€m)	Other (€m)	Indirect Tax (€m)	Residual Value (€m)	Total Benefits (€m)			
Economy	Efficiency and Effectiveness	What Are The Benefits Of The Scheme?	€ 8.3	€ 0.3	€ 0.0	€ 0.0	€ 15.3	€ 23.9		
		Quantitative Statement								
		It has been demonstrated that the bus priority measures of the preferred option, deliver a positive BCR value, resulting in significant benefits to transport users along the M4/N4 corridor. As part of an overall transport multi-modal solution, the preferred option prioritises person throughput over vehicle throughput and will ultimately enhance the overall transportation capacity along the M4/N4 corridor.								
	Wider Economic Impacts	What Impact Will The Project Have On....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive
		Increase Competition In Markets?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Lead To Efficiencies In Clustering Of Economic Activity? (Agglomeration Benefits)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Attract Inward Investment?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Expand Local Labour Supply?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Contribute To Urban Regeneration	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement							
Slightly Positive		<p>The preferred option may enhance market accessibility, fostering economic competition, efficiency, employment, and consumer choice. This is most likely to be successfully achieved through a combination of transport measures, including the addition of bus priority measures on the M4/N4 corridor and junction improvements, supplemented by strategic demand management. The preferred option is therefore considered to be slightly positive.</p> <p>The preferred option may improve connectivity at a local and regional level, enhancing links between markets within the study area, the Greater Dublin Area (GDA) and wider export markets via improved access to other key transport infrastructure. The provision of an enhanced bus service in the region, will also present significant benefits in strengthening market linkages at a local and regional level. The preferred option is therefore considered to be slightly positive.</p> <p>The improvements in transport infrastructure proposed within the preferred option may act as a catalyst for attracting inward investment into the study area, fostering sustainable, long-term development. By enhancing connectivity within the study area and beyond, the attractiveness of the region to investors across many sectors, including tourism, is likely to increase – where existing chronic congestion issues would otherwise stymie sustainable development. The preferred option therefore ranked as slightly positive.</p> <p>The delivery of the Maynooth to Leixlip Project would ensure strengthened linkages between key labour and employment markets both within the study area and the greater Dublin region. Improvements in journey time and journey time reliability would encourage and support investment, tourism, and employment, and enhance the economic prospects within the study area. The preferred option is therefore ranked as slightly positive.</p> <p>The regeneration of urban areas is not an overriding objective of the project.</p>								
Funding Impacts	What Impact Will The Project Have On....	Don't Know / NA	None	< 10%	10%-30%	> 30%				
	What Percentage Of Non-Exchequer Funding Is The Project Expected To Receive?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
	Quantitative Statement	Qualitative Statement								
Slightly Negative	The future funding mechanism for the Maynooth to Leixlip Project is not known at this stage. As the M4/N4 corridor forms part of the Comprehensive TEN-T network and provides a strategically important link to from the west and northwest to Dublin and Dublin Port, there may be potential to secure non-exchequer EU funding.									
Economy - Overall Scale of Impact		Economy - Amended Scale of Impact								
Slightly Positive										

Project Appraisal Balance Sheet

Part C: Safety, Physical Activity, Economy, Accessibility and Social Inclusion and Integration Input Sheet



Accessibility and Social Inclusion	Deprived Areas	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Area Based Childhood Programme?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Rural Social Scheme?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
Neutral		The preferred option is seen as minor or slightly positive. Overall, under both sub-headings, the preferred option would offer positives in respect of improved accessibility for deprived areas, whilst noting that the occurrence of deprivation in the study area is relatively low.									
Accessibility and Social Inclusion	Vulnerable Groups	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Access To Employment or Vital Infrastructure?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
		Neutral		The preferred option is seen as minor or slightly positive. Overall, under both sub-headings, the preferred option would offer positives in respect of improved accessibility for deprived areas, whilst noting that the occurrence of deprivation in the study area is relatively low.							
Accessibility & Social Inclusion - Overall Scale of Impact		Accessibility & Social Inclusion - Amended Scale of Impact									
Neutral											

Project Appraisal Balance Sheet

Part C: Safety, Physical Activity, Economy, Accessibility and Social Inclusion and Integration Input Sheet



Integration	Transport Integration	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Connectivity of the Strategic Road Network?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
		Connectivity Between Transport Modes?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
		Sustainable Transport Networks?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Access to Other Transport Infrastructure Such As Ports and Airports?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
	Moderately Positive	The preferred option would facilitate improved user comfort levels, safety, and vehicular movements. The preferred option may facilitate improvements to the operational efficiency of the M4/N4. The preferred option is ranked as moderately positive.									
	Land Use Integration	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Objectives of Local and County Development Plans?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
		Strategic Connectivity for High Value Trips?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Urban Sprawl?		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Quantitative Statement		Qualitative Statement									
Moderately Positive		The preferred option is ranked moderately positive as their measures would support local development plans and strategic connectivity, particularly bus services.									
Geographic Integration	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive		
	Cross Border Connectivity?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		
	The Trans European Transport network?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		
	Quantitative Statement	Qualitative Statement									
	Slightly Positive	The preferred option has good alignment with the key policy objectives of sustainable mobility, compact growth and enhanced regional accessibility and ranked minor or slightly positive									
Other Government Policy Integration	How Will This Project Impact On The Wider Objectives of.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive		
	Moderately Positive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>		
	Quantitative Statement	Qualitative Statement									
Moderately Positive	The preferred option would aim to provide a safer and more accessible transport network that would promote more sustainable transport modes. The proposed measures have been assessed against the NIFTI intervention hierarchy which aims to maintain, optimise, and improve existing assets before adding new infrastructure.										
Integration - Overall Scale of Impact		Integration - Amended Scale of Impact									
Moderately Positive											

Project Appraisal Balance Sheet

Part D: PABS Summary Table



Project Title		PRS Reference Number	KE-18-16505	Project Description				Scheme Cost (€m)	Date	
Maynooth to Leixlip Project		Modelling Base Year	2021	The Maynooth to Leixlip Project is an integrated and connected multi-modal holistic transport project aimed at assessing the needs of the M4/N4 mainline corridor and junctions from Junction 5 Leixlip to Junction 7 Maynooth in terms of operational efficiency and safety. It seeks to identify and assess interventions that would improve the operational efficiency and safety of the transport corridor in a sustainable manner.				€30.9m - Preferred Corridor Option	01/11/2023	
		Scheme Opening Year	2032							
Criteria	Quantitative Statement	Summary of Keys Impacts (Qualitative Assessment)			Quantitative Assessment				Monetised (€m over 30 yrs)	
Environment	Air Quality and Climate	Neutral	It is not possible to develop a quantitative statement for the operational phase carbon as detailed traffic modelling with the TIIP REM tool was not undertaken as part of Phase 2.			Additional CO ₂ (Tonnes) N/A Ratio of CO ₂ Do-Min/Do-Some N/A Index of Overall Change in Exposure NO ₂ Small Negative Index Index of Overall Change in Exposure PM ₁₀ Small Negative Index Sub Ben. Mod Ben Sli Ben. Negligible Sli Adv. Mod Adv. Sub Adv. 0 0 0 0 104 0 0				Value of Change in Emissions (€m) N/A
	Noise and vibration	Neutral	Do Something Scenarios have not been undertaken as part of Phase 2. Indicative results from noise modelling of options indicate that up to 22 NSL's within 50m of the motorway bus lanes are likely to require noise mitigation. The assessment has concluded the operation of a new bus priority measure in the preferred option may result in approx. 16,000m ³ of fill material.			No. of Sensitive Locations Experiencing Impacts That Are: No. of Sensitive Receptors Requiring Mitigation 0 No. of Sensitive Receptors Requiring Mitigation (Not Feasible) 0				
	Waste	Slightly Negative	Earthworks volumes in the waste assessment relate to bulk material only and they have not been classified into material types for Phase 2. The preferred corridor option may result in approx. 16,000m ³ of fill material.			Unacceptable Material/Contaminated Land/Hazardous Waste to be ... Disposed of Off Site U1 [m ³] U2 [m ³] Left in Situ [m ³ land waste] Not currently known. PP Sig P Mod P Sli P I Sli N Mod N Sig N PN 0 0 0 0 0 5 0 0 0 0				
	Landscape & Visual Amenity (incl. Light)	Moderately Negative	The preferred option is not expected to have significant landscape and visual effects. There is potential for some impacts on sites of national importance.			National 1 County 0 Other 0 II NI CI LI(H) LI(L) Number of Positive Impacts 0 0 0 0 0 Number of Negative Impacts 0 0 0 11 0				
	Biodiversity, Flora & Fauna	Slightly Negative	The preferred option impacts on the River Liffey, the Kilmacredock Upper and nine additional ecological sites of local importance (higher value) all of which consist of treelines and narrow woodland bands lining the existing M4/N4 roadway. These impacts contribute to the quantitative statement of Slightly Negative.			Impact on Agricultural Holdings that are: Sig P Mod P Sli P I Sli N Mod N Sig N PN N/A N/A N/A N/A N/A N/A N/A N/A				
	Agriculture	Neutral	The number of impacts are not applicable as this assessment was based on a comparative analysis of each option under the criteria, farm type and size, farm buildings and yards/facilities, severance and viability. Impact assessments on individual agricultural constraints will be undertaken during Phase 3.			Impact on Non-Agricultural Properties Sig P Mod P Sli P I Sli N Mod N Sig N PN N/A N/A N/A N/A N/A N/A N/A N/A				
	Non-Agricultural Properties	Slightly Negative	The number of impacts are not applicable as this assessment was based on a comparative analysis of each option under a range of sub-criteria - including potential impacts on infrastructure and property. No residential properties are potentially impacted. There are three business parks adjacent to the preferred option. There is potentially one impact to a 110kV electrical line, and two impacts to gas mains. Monetary compensation will be agreed for loss of land, buildings and other injurious affection, where necessary. The individual impacts of all properties impacted directly or indirectly will be assessed during Phase 3.			Number Of Impacts That Are: PP Sig P Mod P Sli P I Sli N Mod N Sig N PN 0 0 0 0 0 0 0 0 0 0				
	Architectural Heritage	Neutral	The preferred option will not result in any negative direct or indirect impacts upon the architectural heritage.			Number Of Impacts That Are: PP Sig P Mod P Sli P I Sli N Mod N Sig N PN 0 0 0 0 0 0 0 0 0 0				
	Archaeological and Cultural Heritage	Neutral	There are no impacts on sites of national importance.			Number Of Impacts That Are: PP Sig P Mod P Sli P I Sli N Mod N Sig N PN 0 0 0 0 0 0 0 0 0 0				
	Soils & Geology	Neutral	The preferred option is considered to have a minor or slightly negative impact on the soils and geology. Further assessments will be undertaken during Phase 3 to further characterise the soils and geology attributes and level of impact that the project has on these.			Number Of Impacts That Are: PP Sig P Mod P Sli P I Sli N Mod N Sig N PN 0 0 0 0 0 0 0 0 0 0				
	Hydrology	Neutral	There are three main features within the preferred option - the River Lyreen and its tributary, the Meadowbrook, the River Liffey and its tributary the Kilmacredock Upper and the Leixlip Reservoir. The preferred option results in a Not Significant or Neutral magnitude of impact on all three features. Further assessments will be undertaken during Phase 3 when the design and potential mitigation measures, including the drainage design will be developed further.			Number Of Impacts That Are: PP Sig P Mod P Sli P I Sli N Mod N Sig N PN 0 0 0 0 3 0 0 0 0 0				
	Hydrogeology	Neutral	The preferred option is considered to have a not significant or neutral impact on hydrogeology. There are no karst, aquifer classifications, groundwater sources, groundwater flooding areas or habitats identified.			Number Of Impacts That Are: PP Sig P Mod P Sli P I Sli N Mod N Sig N PN 0 0 0 0 0 0 0 0 0 0				
Safety	Collision Reduction	Slightly Positive	A qualitative appraisal has been undertaken to comparatively assess the preferred option with respect to collision reduction. The preferred option would provide hard shoulder bus priority measures, which would aim to promote a modal shift towards public transport and therefore would have the potential to reduce the number of private vehicles on the M4/N4, therefore decreasing collision frequency.			Collision Reduction Over 30 Years Collisions Casualties Fatal Serious Minor N/A N/A N/A N/A N/A				Value of Change (€m) €0.0
	Security	Moderately Positive	Security of road users would be improved for the preferred option and is scored positively in this regard. The preferred option would provide hard shoulder bus priority measures, which would aim to promote a modal shift towards public transport and thus reduce the number of private vehicles on the M4/N4, decreasing collision frequency. The hard shoulder bus priority measures would be designed to current TIIP Standards. It would also include amendments to the current configuration of the N4 eastbound carriageway between Junction 5 and Junction 4A.							
Physical Activity	Ambience	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the options across each of the Physical Activity sub-criteria.							€0.0
	Absenteeism	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.							€0.0
	Reduced Health Risk	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.							€0.0
Economy	Transport Efficiency and Effectiveness		It has been demonstrated that the bus priority measures of the preferred option, deliver a positive BCR value, resulting in significant benefits to transport users along the M4/N4 corridor. As part of an overall transport multi-modal solution, the preferred option prioritises person throughput over vehicle throughput and will ultimately enhance the overall transportation capacity along the M4/N4 corridor.							Commute €8.3 Business €0.3 Other €0.0 Value of Change €23.9 Indirect Tax €0.0 Res. Value €15.3
	Wider Economic Impact	Slightly Positive	The preferred option may enhance market accessibility, fostering economic competition, efficiency, employment, and consumer choice. This is most likely to be successfully achieved through a combination of transport measures, including the addition of bus priority measures on the M4/N4 corridor and junction improvements, supplemented by strategic demand management. The preferred option is therefore considered to be slightly positive. The preferred option may improve connectivity at a local and regional level, enhancing links between markets within the study area, the Greater Dublin Area (GDA) and wider export markets via improved access to other key transport infrastructure. The provision of an enhanced bus service in the region, will also present significant benefits in strengthening market linkages at a local and regional level. The preferred option is therefore considered to be slightly positive. The improvements in transport infrastructure proposed within the preferred option may act as a catalyst for attracting inward investment into the study area, fostering sustainable, long-term development. By enhancing connectivity within the study area and beyond, the attractiveness of the region to investors across many sectors, including tourism, is likely to increase – where existing chronic congestion issues would otherwise stymie sustainable development. The preferred option therefore ranked as slightly positive. The delivery of the Maynooth to Leixlip Project would ensure strengthened linkages between key labour and employment markets both within the study area and the greater Dublin region. Improvements in journey time and journey time reliability would encourage and support investment, tourism, and employment, and enhance the economic prospects within the study area. The preferred option is therefore ranked as slightly positive. The regeneration of urban areas is not an overriding objective of the project.			Slightly Positive				
	Funding	Slightly Negative	The future funding mechanism for the Maynooth to Leixlip Project is not known at this stage. As the M4/N4 corridor forms part of the Comprehensive TEN-T network and provides a strategically important link to from the west and northwest to Dublin and Dublin Port, there may be potential to secure non-exchequer EU funding.			Expected Percentage of Non-Exchequer Funding Slightly Negative				
Accessibility and Social Inclusion	Deprived Geographic Areas	Neutral	The preferred option is seen as minor or slightly positive. Overall, under both sub-headings, the preferred option would offer positives in respect of improved accessibility for deprived areas, whilst noting that the occurrence of deprivation in the study area is relatively low.			Impact on Deprived Areas Neutral				
	Vulnerable Groups	Neutral	The preferred option is seen as minor or slightly positive. Overall, under both sub-headings, the preferred option would offer positives in respect of improved accessibility for deprived areas, whilst noting that the occurrence of deprivation in the study area is relatively low.			Impact on Access to Employment or Vital Infrastructure Neutral				
Integration	Transport Integration	Moderately Positive	The preferred option would facilitate improved user comfort levels, safety, and vehicular movements. The preferred option may facilitate improvements to the operational efficiency of the M4/N4. The preferred option is ranked as moderately positive.			Moderately Positive				
	Land-Use Integration	Moderately Positive	The preferred option is ranked moderately positive as their measures would support local development plans and strategic connectivity, particularly bus services.			Moderately Positive				
	Geographical Integration	Slightly Positive	The preferred option has good alignment with the key policy objectives of sustainable mobility, compact growth and enhanced regional accessibility and ranked minor or slightly positive			Slightly Positive				
	Integration with Other Government Policies	Moderately Positive	The preferred option would aim to provide a safer and more accessible transport network that would promote more sustainable transport modes. The proposed measures have been assessed against the NIFTI intervention hierarchy which aims to maintain, optimise, and improve existing assets before adding new infrastructure.			Moderately Positive				
Overall Scale of Impact	Environmental	Neutral	Economy	Slightly Positive	Summary of Benefits					
	Safety	Moderately Positive	Accessibility & Social	Neutral	Present Value of Benefits (PVB)	€23.9	Net Present Value (NPV)	€7.5		
	Physical Activity	Neutral	Integration	Moderately Positive	Present Value of Costs (PVC)	€16.5	Benefit to Cost Ratio (BCR)	1.45		



MAYNOOTH TO LEIXLIP PROJECT

Appendix 7.2

PABS Junction 7



MAYNOOTH TO LEIXLIP PROJECT

Junction 7 Maynooth Project Appraisal Balance Sheet (PABS)

Project Appraisal Balance Sheet



Part A: Project Context

Date	01/11/2023
Version No.	D01

Project Title	Maynooth to Leixlip Project
PRS Reference Number	KE-18-16505
Project Phase	Phase 2: Option Selection
National Roads Office	Kildare National Roads Office
TII Project Manager	Obey Mhondera

Project Description
 The Maynooth to Leixlip Project is an integrated and connected multi-modal holistic transport project aimed at assessing the needs of the M4/N4 mainline corridor and junctions from Junction 5 Leixlip to Junction 7 Maynooth in terms of operational efficiency and safety. It seeks to identify and assess interventions that would improve the operational efficiency and safety of the corridor in a sustainable manner.

Scheme Cost €m (OCE)	€27.9m - Preferred Junction 7 Option
What Are The Likely Sources of Non-Exchequer Funding	TBC
TII Growth Scenario	TII Central Growth

Appraisal Team Author	Joshua Noon, Gerard Hall
Design Team Reviewer	Zita Langenbach, Stephen Barry, Gerard Hall
TII Engineering Inspector	Winston Douglas
External Auditor	Dan Brennan / Derek Brady (TII)

Modelling Base Year	2021
Scheme Opening Year	2032
Reference Number of Nearest TII Traffic Monitoring Unit(s)	TMU M04 020.0W, TMU M04 015.0E, TMU N04 000.0E

Note - This PABS should be completed with reference to the latest version of TII PAG Unit 7.1. Users should always check that the correct version is followed prior to undertaking the PABS.

Air Quality & Climate	Climate - Carbon Dioxide (CO ₂)				Quantitative Statement Parameter						
	Tonnes of CO ₂ produced in the Reference Case Scenario?				NA						
	Tonnes of CO ₂ produced in the Do Something Scenario?				NA						
	Ratio of CO ₂ produced in Do Something Scenario to Reference Case Scenario				NA						
	Greenhouse Gasses				Monetised Benefits (€m)						
	Value of change in emissions				NA						
	Significance Criteria				Substantial Beneficial	Moderate Beneficial	Slight Beneficial	Negligible	Slight Adverse	Moderate Adverse	Substantial Adverse
	Number of Sensitive Locations Experiencing Impacts That Are:				0	0	0	0	0	0	0
	Index of Overall Change in Exposure				Large Negative Index	Medium Negative Index	Small Negative Index	Small Positive Index	Medium Positive Index	Large Positive Index	
	Nitrogen Dioxide (NO ₂)				○	○	●	○	○	○	
Particulate Matter (PM ₁₀)				○	○	●	○	○	○		
Quantitative Statement		Qualitative Statement									
Neutral		It is not possible to develop a quantitative statement for the operational phase carbon as detailed traffic modelling with TII REM tool was not undertaken as part of Phase 2.									

Noise & Vibration	Sensitive Receptors		Quantitative Statement Parameter
	Number of Sensitive Receptors Requiring Mitigation (i.e. the three conditions have been satisfied) Per Kilometre		0
	Number of Sensitive Receptors Requiring Mitigation (i.e. the three conditions have been satisfied), But It Is Not Feasible To Mitigate Noise To The Required Level Per Kilometre		0
	Quantitative Statement		Qualitative Statement
Slightly Negative		It is not possible to develop a quantitative statement for the number of sensitive receptors requiring mitigation as detailed noise models of the Reference Case and Do Something Scenarios have not been undertaken as part of Phase 2. Indicative results from noise modelling of options indicate that up to 8 NSL's within 50m of the centreline however 0 are likely to require noise mitigation.	

Waste	Unacceptable Material		Quantitative Statement Parameter No. (m ³)
	Quantity Of Unacceptable Material Class U1 To Be Disposed Of Off Site?		Not currently known.
	Quantity Of Unacceptable Material Class U2 To Be Disposed Of Off Site?		Not currently known.
	Quantity Of Unacceptable Material and Contaminated Land/Hazardous Waste To Be Left In Situ?		Not currently known.
	Quantitative Statement		Qualitative Statement
Slightly Negative		Earthworks volumes in the waste assessment relate to bulk material only and they have not been classified into material types for Phase 2. The preferred Junction 7 option may result in 27,000m ³ of cut, 24,000m ³ of fill resulting in a balance of 3,000m ³ .	

Project Appraisal Balance Sheet

Part B: Environment



Landscape & Visual Amenity (incl. Light)	Landscape & Visual Amenity (incl. Light)	Profound Positive	Significant Positive	Moderate Positive	Slightly Positive	Imperceptible	Slightly Negative	Moderate Negative	Significant Negative	Profound Negative
	Number of Impacts That Are:	0	0	0	0	0	0	0	0	0
		National Landscape Designation / Listing			County Landscape Designation / Listing			Other Areas of Significant Landscape Value/Amenity		
	Number of Profound / Significant Impacts On Sites Of:	0			0			1		
	Quantitative Statement	Qualitative Statement								
Highly Negative	Impacts are limited to the north side of the existing M4. Although a section of the proposed road infrastructure would be closer to residential properties on the southern edge of Maynooth their lower elevation results in less wide-ranging effects due to the presence of existing screening hedgerows and built form. This option directly impacts on an amenity area.									

Biodiversity - Flora & Fauna	Impact on Ecological Receptors	International Importance	National Importance	County Importance	Local Importance (Higher value)	Local Importance (Lower value)
	Number of Significant Positive Impacts On Ecological Receptors Of:	0	0	0	0	0
	Number of Significant Negative Impacts On Ecological Receptors Of:	0	0	3	3	0
	Quantitative Statement	Qualitative Statement				
	Slightly Negative	Potential County Level Impacts on three watercourses, namely – Gragadder, Lyreen and Taghadoe, as well as 3 areas of narrow woodland/treeline Local Importance (Higher value). Some are associated with the planted boundary of the existing M4 and the tie in at Junction 7, whilst others associated with either side of the proposed L5041 and Newtown road crossings.				

Agriculture	Impact on Agriculture Holdings	Significant Positive Impact	Moderate Positive Impact	Slightly Positive Impact	Imperceptible Impact	Slightly Negative Impact	Moderate Negative Impact	Significant Negative Impact	Profound Negative Impact	
	Impacts On An Agricultural Holdings That Are:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	Quantitative Statement	Qualitative Statement								
	Neutral	The number of impacts are not applicable as this assessment was based on a comparative analysis of each option under the criteria, farm type and size, farm buildings and yards/facilities, severance and viability. Impact assessments on individual agricultural constraints will be undertaken during Phase 3.								

Non-Agricultural Properties	Impact on Non-Agriculture Properties	Significant Positive Impact	Moderate Positive Impact	Slightly Positive Impact	Imperceptible Impact	Slightly Negative Impact	Moderate Negative Impact	Significant Negative Impact	Profound Negative Impact	
	Number of Impacts That Are:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	Quantitative Statement	Qualitative Statement								
	Moderately Negative	The number of impacts are not applicable as this assessment was based on a comparative analysis of each option under a range of sub-criteria - including potential impacts on infrastructure and property. There is one residential properties and three business parks adjacent to the preferred option. There is potentially one impact to a 110kV electrical line, and no impacts to gas mains. Monetary compensation will be agreed for loss of land, buildings and other injurious affection, where necessary. The individual impacts of all properties impacted directly or indirectly will be assessed during Phase 3.								

Architectural Heritage	Impact on Architectural Heritage	Significant Positive Impact	Moderate Positive Impact	Slightly Positive Impact	Imperceptible Impact	Slightly Negative Impact	Moderate Negative Impact	Significant Negative Impact	Profound Negative Impact	
	Number of Impacts That Are:	0	0	0	0	0	0	0	0	
	Number of Impacts On Sites Of National Importance That Are:	0	0	0	0	0	0	0	0	
	Quantitative Statement	Qualitative Statement								
	Slightly Negative	Indirect moderate negative impact on Jackson's Bridge (BH1). Indirect slight negative impacts on CH5 and 6. Direct impacts on AAP1-2 that may be moderate to very significant negative (if archaeological remains are present). Greenfield areas required that may contain previously unrecorded archaeological remains. Potential for direct negative impacts that may be moderate to profound negative (if archaeological remains are present).								

Project Appraisal Balance Sheet

Part B: Environment



Impact on Archaeological & Cultural Heritage		Significant Positive Impact	Moderate Positive Impact	Slightly Positive Impact	Imperceptible Impact	Slightly Negative Impact	Moderate Negative Impact	Significant Negative Impact	Profound Negative Impact
Archaeological & Cultural Heritage	Number of Impacts That Are:	0	0	0	0	0	0	0	0
	Number Of Impacts On Sites Of National Importance That Are:	0	0	0	0	0	0	0	0
	Quantitative Statement	Qualitative Statement							
	Slightly Negative	Indirect moderate negative impact on Jackson's Bridge (BH1). Indirect slight negative impacts on CH5 and 6. Direct impacts on AAP1-2 that may be moderate to very significant negative (if archaeological remains are present). Greenfield areas required that may contain previously unrecorded archaeological remains. Potential for direct negative impacts that may be moderate to profound negative (if archaeological remains are present).							

Soils & Geology		Profound Positive	Significant Positive	Moderate Positive	Slightly Positive	Imperceptible	Slightly Negative	Moderate Negative	Significant Negative	Profound Negative
Soils & Geology	Number of Impacts That Are:	0	0	0	0	0	0	0	0	0
	Quantitative Statement	Qualitative Statement								
	Neutral	The preferred option is considered to have a moderately negative impact on the soils and geology								

Hydrology		Profound Positive	Significant Positive	Moderate Positive	Slightly Positive	Imperceptible	Slightly Negative	Moderate Negative	Significant Negative	Profound Negative
Hydrology	Number of Impacts That Are:	0	0	0	0	1	0	0	0	0
	Quantitative Statement	Qualitative Statement								
	Neutral	The works at the Eastbound Diverge have hydrological connection to the Joan Slade River, a tributary of the Lyreen River. The Lyreen River is a hydrologically connected to the Rye Water Valley SAC. Imperceptible pollution risk expected during construction or operation. The M4 motorway between J7 and J8 floods for the 1% AEP and the Eastbound Diverge may be impacted. The increase in the impervious surface is very small. Imperceptible increase in flood risk to the works and elsewhere.								

Hydrogeology		Profound Positive	Significant Positive	Moderate Positive	Slightly Positive	Imperceptible	Slightly Negative	Moderate Negative	Significant Negative	Profound Negative
Hydrogeology	Number of Impacts That Are:	0	0	0	0	0	0	0	0	0
	Quantitative Statement	Qualitative Statement								
	Neutral	The preferred option is considered to have a neutral impact on hydrogeology. There are no karst, aquifer classifications, groundwater sources, groundwater flooding areas or habitats identified. The preferred option fenceline intercepts areas of groundwater flooding between R408 and Jackson Bridge however not significant.								

Overall Scale of Impact	Amended Scale of Impact
Slightly Negative	

Project Appraisal Balance Sheet



Part C: Safety, Physical Activity, Economy, Accessibility and Social Inclusion and Integration Input Sheet

Safety	Collision Reduction		Total Collision Reduction	Casualty Reduction			Value Of Accident Reduction (€m)			
		What is the Collision/Casualty Reduction Over 30 Years?	N/A	Fatal	Serious	Minor				
			0.1	0.2	3.1	€ 0.2				
		Quantitative Statement	Qualitative Statement							
		Slightly Positive	As outlined in TII PAG, the Stage 2 safety appraisal typically makes reference to the forecast reduction in vehicle collision and the associated safety benefits that would accrue from each option. Collision forecasts presented in the CBA comprise of a COBALT analysis, which uses details of road cross section, collision rates, casualty costs and projected traffic volumes to derive a monetised safety benefit as a result of the interventions delivered by the options. The preferred option removes vulnerable road users from the main carriageway and vehicular traffic, reducing the potential for collisions between road users.							
	Security		Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive
		What is the Expected Impact Of The Project On The Security Of Road Users?	○	○	○	○	○	●	○	○
		Quantitative Statement	Qualitative Statement							
	Slightly Positive	Security of road users would be improved for the preferred option. The preferred option would provide enhanced vulnerable road user facilities, which would aim to promote a modal shift towards sustainable transport and thus reduce the number of private vehicles within the surrounding area, decreasing collision frequency.								
Safety - Overall Scale of Impact		Safety - Amended Scale of Impact								
Slightly Positive										

Physical Activity	Ambience		Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive
		What is the expected impact of the project upon journey ambience?	○	○	○	○	●	○	○	○
			Quantitative Statement	Value of Benefit (€m)	Qualitative Statement					
		Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.							
	Absenteeism		Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive
		What is the impact of the project on absenteeism?	○	○	○	○	●	○	○	○
			Quantitative Statement	Value of Benefit (€m)	Qualitative Statement					
		Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.							
	Reduced Health Risk		Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive
		What is the impact of the project on the reduction in relative risk for cyclists and walkers?	○	○	○	○	●	○	○	○
		Quantitative Statement	Value of Benefit (€m)	Qualitative Statement						
	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.								
Physical Activity - Overall Scale of Impact		Physical Activity - Amended Scale of Impact								
Slightly Positive										

Project Appraisal Balance Sheet



Part C: Safety, Physical Activity, Economy, Accessibility and Social Inclusion and Integration Input Sheet

		Consumer (€m)	Business (€m)	Other (€m)	Indirect Tax (€m)	Residual Value (€m)	Total Benefits (€m)				
Efficiency and Effectiveness	What Are The Benefits Of The Scheme?	€ 3.0	€ 6.7	€ 0.3	€ 0.0	€ 14.8	€ 24.8				
	Quantitative Statement										
Economy	Wider Economic Impacts	What Impact Will The Project Have On....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Increase Competition In Markets?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		Lead To Efficiencies In Clustering Of Economic Activity? (Agglomeration Benefits)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Attract Inward Investment?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Expand Local Labour Supply?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Contribute To Urban Regeneration	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Quantitative Statement		Qualitative Statement								
	Neutral		<p>The preferred option may enhance market accessibility, fostering economic competition, efficiency, employment, and consumer choice. This is most likely to be successfully achieved through a combination of transport measures, including the addition of a dedicated public transport lane on the M4/N4 corridor and road improvements, supplemented by strategic demand management. The preferred option is therefore considered to be slightly positive.</p> <p>The preferred option may improve connectivity at a local and regional level, enhancing links between markets within the study area, the Greater Dublin Area (GDA) and wider export markets via improved access to other key transport infrastructure. The provision of an enhanced bus service in the region, will also present significant benefits in strengthening market linkages at a local and regional level. The preferred option is therefore considered to be slightly positive.</p> <p>The improvements in transport infrastructure proposed within the preferred option may act as a catalyst for attracting inward investment into the study area, fostering sustainable, long-term development. By enhancing connectivity within the study area and beyond, the attractiveness of the region to investors across many sectors, including tourism, is likely to increase – where existing chronic congestion issues would otherwise stymie sustainable development. The preferred option therefore ranked as slightly positive.</p> <p>The delivery of the Maynooth to Leixlip Project would ensure strengthened linkages between key labour and employment markets both within the study area and the greater Dublin region. Improvements in journey time and journey time reliability would encourage and support investment, tourism, and employment, and enhance the economic prospects within the study area. The preferred option is therefore ranked as slightly positive.</p> <p>The regeneration of urban areas is not an overriding objective of the project. Thus, the preferred option considered neutral in this regard.</p>								
	Funding Impacts	What Impact Will The Project Have On....	Don't Know / NA	None	< 10%	10%-30%	> 30%				
		What Percentage Of Non-Exchequer Funding Is The Project Expected To Receive?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Quantitative Statement		Qualitative Statement									
Slightly Negative		The future funding mechanism for the Maynooth to Leixlip Project is not known at this stage. As the M4/N4 corridor forms part of the Comprehensive TEN-T network and provides a strategically important link to from the west and northwest to Dublin and Dublin Port, there may be potential to secure non-exchequer EU funding.									
Economy - Overall Scale of Impact		Economy - Amended Scale of Impact									
Slightly Positive											

Project Appraisal Balance Sheet

Part C: Safety, Physical Activity, Economy, Accessibility and Social Inclusion and Integration Input Sheet



Accessibility and Social Inclusion	Deprived Areas	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Area Based Childhood Programme?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
		Rural Social Scheme?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
		Moderately Positive	The preferred option is seen as moderately positive. Overall, under both sub-headings, the preferred option would offer positives in respect of improved accessibility for deprived areas, whilst noting that the occurrence of deprivation in the study area is relatively low.								
	Vulnerable Groups	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Access To Employment or Vital Infrastructure?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	
		Quantitative Statement	Qualitative Statement								
		Moderately Positive	The preferred option is seen as moderately positive. Overall, under both sub-headings, the preferred option would offer positives in respect of improved accessibility for deprived areas, whilst noting that the occurrence of deprivation in the study area is relatively low.								
		Accessibility & Social Inclusion - Overall Scale of Impact		Accessibility & Social Inclusion - Amended Scale of Impact							
Moderately Positive											

Project Appraisal Balance Sheet

Part C: Safety, Physical Activity, Economy, Accessibility and Social Inclusion and Integration Input Sheet



Integration	Transport Integration	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Connectivity of the Strategic Road Network?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Connectivity Between Transport Modes?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
		Sustainable Transport Networks?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Access to Other Transport Infrastructure Such As Ports and Airports?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
	Slightly Positive	The preferred option would facilitate improved user comfort levels, safety, and vehicular movements. The preferred option may facilitate improvements to the operational efficiency of the M4/N4. The preferred option is ranked as slightly positive.									
	Land Use Integration	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Objectives of Local and County Development Plans?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	
		Strategic Connectivity for High Value Trips?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	
Urban Sprawl?		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>		
Quantitative Statement		Qualitative Statement									
Moderately Positive		The preferred option is ranked moderately positive as their measures would support local development plans and strategic connectivity, particularly bus services.									
Geographic Integration	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive		
	Cross Border Connectivity?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		
	The Trans European Transport network?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		
	Quantitative Statement	Qualitative Statement									
	Slightly Positive	The preferred option has good alignment with the key policy objectives of sustainable mobility, compact growth and enhanced regional accessibility and ranked minor or slightly positive									
	Other Government Policy Integration	How Will This Project Impact On The Wider Objectives of.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
Moderately Positive		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>		
Quantitative Statement		Qualitative Statement									
Moderately Positive		The preferred option would aim to provide a safer and more accessible transport network that would promote more sustainable transport modes. The proposed measures have been assessed against the NIFTI intervention hierarchy which aims to maintain, optimise, and improve existing assets before adding new infrastructure.									
Integration - Overall Scale of Impact		Integration - Amended Scale of Impact									
Moderately Positive											

Project Appraisal Balance Sheet

Part D: PABS Summary Table



Project Title		PRS Reference Number	KE-18-16505	Project Description				Scheme Cost (€m)	Date			
Maynooth to Leixlip Project		Modelling Base Year	2021	The Maynooth to Leixlip Project is an integrated and connected multi-modal holistic transport project aimed at assessing the needs of the M4/N4 mainline corridor and junctions from Junction 5 Leixlip to Junction 7 Maynooth in terms of operational efficiency and safety. It seeks to identify and assess interventions that would improve the operational efficiency and safety of the corridor in a sustainable manner.				€27.9m - Preferred Junction 7 Option	01/11/2023			
Scheme Opening Year		2032										
Criteria	Quantitative Statement	Summary of Keys Impacts (Qualitative Assessment)				Quantitative Assessment				Monetised (€m over 30 yrs)		
Environment	Air Quality and Climate	Neutral	It is not possible to develop a quantitative statement for the operational phase carbon as detailed traffic modelling with TI REM tool was not undertaken as part of Phase 2.				Additional CO ₂ (Tonnes)				Value of Change in Emissions (€m)	
	Noise and vibration	Slightly Negative	It is not possible to develop a quantitative statement for the number of sensitive receptors requiring mitigation as detailed noise models of the Reference Case and Do Something Scenarios have not been undertaken as part of Phase 2. Indicative results from noise modelling of options indicate that up to 8 NSL's within 50m of the centreline however 0 are likely to require noise mitigation.				Ratio of CO ₂ Do-Min/Do-Some				NA	
	Waste	Slightly Negative	Earthworks volumes in the waste assessment relate to bulk material only and they have not been classified into material types for Phase 2. The preferred Junction 7 option may result in 27,000m ³ of cut, 24,000m ³ of fill resulting in a balance of 3,000m ³ .				Index of Overall Change in Exposure NO ₂				Small Negative Index	
	Landscape & Visual Amenity (incl. Light)	Highly Negative	Impacts are limited to the north side of the existing M4. Although a section of the proposed road infra				Index of Overall Change in Exposure PM ₁₀				Small Negative Index	
	Biodiversity, Flora & Fauna	Slightly Negative	Potential County Level Impacts on three watercourses, namely – Gragadder, Lyreen and Taghadoo, as well as 3 areas of narrow woodland/treeline Local Importance (Higher value). Some are associated with the planted boundary of the existing M4 and the tie in at Junction 7, whilst others associated with either side of the proposed L5041 and Newtown road crossings.				Sub Ben. Mod Ben. Sli Ben. Negligible Sli Adv. Mod Adv. Sub Adv.				0 0 0 0 0 0 0	
	Agriculture	Neutral	The number of impacts are not applicable as this assessment was based on a comparative analysis of each option under the criteria, farm type and size, farm buildings and yards/facilities, severance and viability. Impact assessments on individual agricultural constraints will be undertaken during Phase 3.				No. of Sensitive Receptors Requiring Mitigation				0	
	Non-Agricultural Properties	Moderately Negative	The number of impacts are not applicable as this assessment was based on a comparative analysis of each option under a range of sub-criteria - including potential impacts on infrastructure and property. There is one residential properties and three business parks adjacent to the preferred option. There is potentially one impact to a 110kV electrical line, and no impacts to gas mains. Monetary compensation will be agreed for loss of land, buildings and other injurious affection, where necessary. The individual impacts of all properties impacted directly or indirectly will be assessed during Phase 3.				No. of Sensitive Receptors Requiring Mitigation (Not Feasible)				0	
	Architectural Heritage	Slightly Negative	Indirect moderate negative impact on Jackson's Bridge (BH1). Indirect slight negative impacts on CH5 and 6. Direct impacts on AAP1-2 that may be moderate to very significant negative (if archaeological remains are present). Greenfield areas required that may contain previously unrecorded archaeological remains. Potential for direct negative impacts that may be moderate to profound negative (if archaeological remains are present).				Unacceptable Material/Contaminated Land/Hazardous Waste to be ...					
	Archaeological and Cultural Heritage	Slightly Negative	Indirect moderate negative impact on Jackson's Bridge (BH1). Indirect slight negative impacts on CH5 and 6. Direct impacts on AAP1-2 that may be moderate to very significant negative (if archaeological remains are present). Greenfield areas required that may contain previously unrecorded archaeological remains. Potential for direct negative impacts that may be moderate to profound negative (if archaeological remains are present).				Disposed of Off Site					
	Soils & Geology	Neutral	The preferred option is considered to have a moderately negative impact on the soils and geology				PP Sig P Mod P Sli P I Sli N Mod N Sig N PN				0 0 0 0 0 0 0 0 0	
	Hydrology	Neutral	The works at the Eastbound Diverge have hydrological connection to the Joan Slade River, a tributary of the Lyreen River. The Lyreen River is a hydrologically connected to the Rye Water Valley SAC. Imperceptible pollution risk expected during construction or operation. The M4 motorway between J7 and J8 floods for the 1% AEP and the Eastbound Diverge may be impacted. The increase in the impervious surface is very small. Imperceptible increase in flood risk to the works and elsewhere.				U1 [m ²] U2 [m ²] Left in Situ [m ² land waste] Not currently known.					
	Hydrogeology	Neutral	The preferred option is considered to have a neutral impact on hydrogeology. There are no karst, aquifer classifications, groundwater sources, groundwater flooding areas or habitats identified. The preferred option feneline intercepts areas of groundwater flooding between R408 and Jackson Bridge however not significant.				National County Other				0 0 1	
Safety	Collision Reduction	Slightly Positive	As outlined in TI PAG, the Stage 2 safety appraisal typically makes reference to the forecast reduction in vehicle collision and the associated safety benefits that would accrue from each option. Collision forecasts presented in the CBA comprise of a COBAL T analysis, which uses details of road cross section, collision rates, casualty costs and projected traffic volumes to derive a monetised safety benefit as a result of the interventions delivered by the options. The preferred option removes vulnerable road users from the main carriageway and vehicular traffic, reducing the potential for collisions between road users.				Impact on Agricultural Holdings that are:					
	Security	Slightly Positive	Security of road users would be improved for the preferred option. The preferred option would provide enhanced vulnerable road user facilities, which would aim to promote a modal shift towards sustainable transport and thus reduce the number of private vehicles within the surrounding area, decreasing collision frequency.				Sig P Mod P Sli P I Sli N Mod N Sig N PN				N/A N/A N/A N/A N/A N/A N/A N/A	
Physical Activity	Ambience	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.				Impact on Non-Agricultural Properties					
	Absenteeism	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.				Sig P Mod P Sli P I Sli N Mod N Sig N PN				N/A N/A N/A N/A N/A N/A N/A N/A	
	Reduced Health Risk	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.				Sig P Mod P Sli P I Sli N Mod N Sig N PN				0 0 0 0 0 0 0 0 0	
Economy	Transport Efficiency and Effectiveness	0					Number Of Impacts That Are:				Value of Change (€m)	
	Wider Economic Impact	Neutral	The preferred option may enhance market accessibility, fostering economic competition, efficiency, employment, and consumer choice. This is most likely to be successfully achieved through a combination of transport measures, including the addition of a dedicated public transport lane on the M4/N4 corridor and road improvements, supplemented by strategic demand management. The preferred option is therefore considered to be slightly positive.				PP Sig P Mod P Sli P I Sli N Mod N Sig N PN				€3.0 €6.7 €0.3	
	Funding	Slightly Negative	The future funding mechanism for the Maynooth to Leixlip Project is not known at this stage. As the M4/N4 corridor forms part of the Comprehensive TEN-T network and provides a strategically important link to from the west and northwest to Dublin and Dublin Port, there may be potential to secure non-exchequer EU funding.				Number Of Impacts That Are:				€0.0 €14.8	
Accessibility and Social Inclusion	Deprived Geographic Areas	Moderately Positive	The preferred option is seen as moderately positive. Overall, under both sub-headings, the preferred option would offer positives in respect of improved accessibility for deprived areas, whilst noting that the occurrence of deprivation in the study area is relatively low.				Collision Reduction Over 30 Years					
	Vulnerable Groups	Moderately Positive	The preferred option is seen as moderately positive. Overall, under both sub-headings, the preferred option would offer positives in respect of improved accessibility for deprived areas, whilst noting that the occurrence of deprivation in the study area is relatively low.				Collisions Casualties Fatal Serious Minor				N/A 3.4 0.1 0.2 3.1	
Integration	Transport Integration	Slightly Positive	The preferred option would facilitate improved user comfort levels, safety, and vehicular movements. The preferred option may facilitate improvements to the operational efficiency of the M4/N4. The preferred option is ranked as slightly positive.				Expected Percentage of Non-Exchequer Funding					
	Land-Use Integration	Moderately Positive	The preferred option is ranked moderately positive as their measures would support local development plans and strategic connectivity, particularly bus services.				Slightly Negative					
	Geographical Integration	Slightly Positive	The preferred option has good alignment with the key policy objectives of sustainable mobility, compact growth and enhanced regional accessibility and ranked minor or slightly positive				Impact on Deprived Areas				Moderately Positive	
	Integration with Other Government Policies	Moderately Positive	The preferred option would aim to provide a safer and more accessible transport network that would promote more sustainable transport modes. The proposed measures have been assessed against the NIFTI intervention hierarchy which aims to maintain, optimise, and improve existing assets before adding new infrastructure.				Impact on Access to Employment or Vital Infrastructure				Moderately Positive	
Overall Scale of Impact	Environmental	Slightly Negative	Economy	Slightly Positive	Summary of Benefits				Present Value of Benefits (PVB) €24.8		Net Present Value (NPV) €9.2	
	Safety	Slightly Positive	Accessibility & Social	Moderately Positive	Present Value of Costs (PVC) €15.7				Benefit to Cost Ratio (BCR) 1.59			
	Physical Activity	Slightly Positive	Integration	Moderately Positive								



MAYNOOTH TO LEIXLIP PROJECT

Appendix 7.3

PABS Active Travel



MAYNOOTH TO LEIXLIP PROJECT

Active Travel

R408 Newtown Road

Project Appraisal Balance Sheet (PABS)

Project Appraisal Balance Sheet

Part A: Project Context



Date	02/11/2023
Version No.	D01

Project Title	Maynooth to Leixlip Project
PRS Reference Number	KE-18-16505
Project Phase	Phase 2: Option Selection
National Roads Office	Kildare National Roads Office
TII Project Manager	Obey Mhondera

Project Description
 The Maynooth to Leixlip Project is an integrated and connected multi-modal holistic transport project aimed at assessing the needs of the M4/N4 mainline corridor and junctions from Junction 5 Leixlip to Junction 7 Maynooth in terms of operational efficiency and safety. It seeks to identify and assess interventions that would improve the operational efficiency and safety of the corridor in a sustainable manner.

Scheme Cost €m (OCE)	€3.9m - Preferred R408 Active Travel Option
What Are The Likely Sources of Non-Exchequer Funding	TBC
TII Growth Scenario	TII Central Growth

Appraisal Team Author	Joshua Noon, Gerard Hall
Design Team Reviewer	Zita Langenbach, Stephen Barry, Gerard Hall
TII Engineering Inspector	Winston Douglas
External Auditor	Dan Brennan / Derek Brady (TII)

Modelling Base Year	2021
Scheme Opening Year	2032
Reference Number of Nearest TII Traffic Monitoring Unit(s)	TMU M04 020.0W, TMU M04 015.0E, TMU N04 000.0E

Note - This PABS should be completed with reference to the latest version of TII PAG Unit 7.1. Users should always check that the correct version is followed prior to undertaking the PABS.

Air Quality & Climate	Climate - Carbon Dioxide (CO ₂)						Quantitative Statement Parameter				
	Tonnes of CO ₂ produced in the Reference Case Scenario?						NA				
	Tonnes of CO ₂ produced in the Do Something Scenario?						NA				
	Ratio of CO ₂ produced in Do Something Scenario to Reference Case Scenario						NA				
	Greenhouse Gasses						Monetised Benefits (€m)				
	Value of change in emissions						NA				
	Significance Criteria				Substantial Beneficial	Moderate Beneficial	Slight Beneficial	Negligible	Slight Adverse	Moderate Adverse	Substantial Adverse
	Number of Sensitive Locations Experiencing Impacts That Are:				0	0	0	0	0	0	0
	Index of Overall Change in Exposure				Large Negative Index	Medium Negative Index	Small Negative Index	Small Positive Index	Medium Positive Index	Large Positive Index	
	Nitrogen Dioxide (NO ₂)				○	○	●	○	○	○	
	Particulate Matter (PM ₁₀)				○	○	●	○	○	○	
	Quantitative Statement		Qualitative Statement								
	Neutral		It is not possible to develop a quantitative statement for the operational phase carbon as detailed traffic modelling with TII REM tool was not undertaken as part of Phase 2.								

Noise & Vibration	Sensitive Receptors						Quantitative Statement Parameter			
	Number of Sensitive Receptors Requiring Mitigation (i.e. the three conditions have been satisfied) Per Kilometre						0			
	Number of Sensitive Receptors Requiring Mitigation (i.e. the three conditions have been satisfied), But It Is Not Feasible To Mitigate Noise To The Required Level Per Kilometre						0			
	Quantitative Statement		Qualitative Statement							
Neutral		It is not possible to develop a quantitative statement for the number of sensitive receptors requiring mitigation as detailed noise models of the Reference Case and Do Something Scenarios have not been undertaken as part of Phase 2. Indicative results from noise modelling of options indicate that up to 1 NSR's within 50m of the centreline however 0 are likely to require noise mitigation.								

Waste	Unacceptable Material						Quantitative Statement Parameter No. (m ³)			
	Quantity Of Unacceptable Material Class U1 To Be Disposed Of Off Site?						Not currently known.			
	Quantity Of Unacceptable Material Class U2 To Be Disposed Of Off Site?						Not currently known.			
	Quantity Of Unacceptable Material and Contaminated Land/Hazardous Waste To Be Left In Situ?						Not currently known.			
	Quantitative Statement		Qualitative Statement							
Moderately Negative		Earthworks volumes in the waste assessment relate to bulk material only and they have not been classified into material types for Phase 2. The preferred option may result in a required import of 2,400m ³								

Project Appraisal Balance Sheet

Part B: Environment



Landscape & Visual Amenity (incl. Light)	Landscape & Visual Amenity (incl. Light)	Profound Positive	Significant Positive	Moderate Positive	Slightly Positive	Imperceptible	Slightly Negative	Moderate Negative	Significant Negative	Profound Negative	
	Number of Impacts That Are:	0	0	0	0	0	0	1	0	0	
		National Landscape Designation / Listing			County Landscape Designation / Listing			Other Areas of Significant Landscape Value/Amenity			
	Number of Profound / Significant Impacts On Sites Of:	0			0			1			
	Quantitative Statement	Qualitative Statement									
Moderately Negative	The preferred option is not likely to notably impact on any residential receptors. The key impacts would be on Maynooth Town Football Club which is likely to experience significant construction effects. These effects are expected to be neutralised following reinstatement of any temporary land take areas and replacement of roadside planting.										

Biodiversity - Flora & Fauna	Impact on Ecological Receptors	International Importance	National Importance	County Importance	Local Importance (Higher value)	Local Importance (Lower value)
	Number of Significant Positive Impacts On Ecological Receptors Of:	0	0	0	0	0
	Number of Significant Negative Impacts On Ecological Receptors Of:	0	0	0	4	0
	Quantitative Statement	Qualitative Statement				
	Slightly Negative	Impacts on 4 areas of wooded vegetation, some motorway planting and established embankment wooded area. The proposed vegetation loss would likely result in greater overall loss of established screening vegetation.				

Agriculture	Impact on Agriculture Holdings	Significant Positive Impact	Moderate Positive Impact	Slightly Positive Impact	Imperceptible Impact	Slightly Negative Impact	Moderate Negative Impact	Significant Negative Impact	Profound Negative Impact	
	Impacts On An Agricultural Holdings That Are:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	Quantitative Statement	Qualitative Statement								
	Neutral	The number of impacts are not applicable as this assessment was based on a comparative analysis of each option under the criteria, farm type and size, farm buildings and yards/facilities, severance and viability. Impact assessments on individual agricultural constraints will be undertaken during Phase 3.								

Non-Agricultural Properties	Impact on Non-Agriculture Properties	Significant Positive Impact	Moderate Positive Impact	Slightly Positive Impact	Imperceptible Impact	Slightly Negative Impact	Moderate Negative Impact	Significant Negative Impact	Profound Negative Impact	
	Number of Impacts That Are:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	Quantitative Statement	Qualitative Statement								
	Slightly Negative	The number of impacts are not applicable as this assessment was based on a comparative analysis of each option under a range of sub-criteria - including potential impacts on infrastructure and property. There are no residential properties impacted although Maynooth Football Club would be impacted by the preferred option. There is potentially impact to 110kV electrical lines located to the south of the preferred option, and no impacts to gas mains. Monetary compensation will be agreed for loss of land, buildings and other injurious affection, where necessary. The individual impacts of all properties impacted directly or indirectly will be assessed during Phase 3.								

Architectural Heritage	Impact on Architectural Heritage	Significant Positive Impact	Moderate Positive Impact	Slightly Positive Impact	Imperceptible Impact	Slightly Negative Impact	Moderate Negative Impact	Significant Negative Impact	Profound Negative Impact	
	Number of Impacts That Are:	0	0	0	0	0	0	0	0	
	Number of Impacts On Sites Of National Importance That Are:	0	0	0	0	0	0	0	0	
	Quantitative Statement	Qualitative Statement								
	Neutral	The preferred option would not result in any negative direct or indirect impacts upon the archaeological, architectural or cultural heritage resource.								

Project Appraisal Balance Sheet

Part B: Environment



Archaeological & Cultural Heritage	Impact on Archaeological & Cultural Heritage	Significant Positive Impact	Moderate Positive Impact	Slightly Positive Impact	Imperceptible Impact	Slightly Negative Impact	Moderate Negative Impact	Significant Negative Impact	Profound Negative Impact
	Number of Impacts That Are:	0	0	0	0	0	0	0	0
Number Of Impacts On Sites Of National Importance That Are:	0	0	0	0	0	0	0	0	0
Quantitative Statement	Qualitative Statement								
Neutral	The preferred option would not result in any negative direct or indirect impacts upon the archaeological, architectural or cultural heritage resource.								

Soils & Geology	Soils & Geology	Profound Positive	Significant Positive	Moderate Positive	Slightly Positive	Imperceptible	Slightly Negative	Moderate Negative	Significant Negative	Profound Negative
	Number of Impacts That Are:	0	0	0	0	0	0	0	0	0
Quantitative Statement	Qualitative Statement									
Slightly Negative	The preferred option is considered to have a slightly negative impact on the soils and geology									

Hydrology	Hydrology	Profound Positive	Significant Positive	Moderate Positive	Slightly Positive	Imperceptible	Slightly Negative	Moderate Negative	Significant Negative	Profound Negative
	Number of Impacts That Are:	0	0	0	0	1	0	0	0	0
Quantitative Statement	Qualitative Statement									
Neutral	Possible hydrological connected to the Rye Water Valley SAC. Imperceptible pollution risk expected during construction or operation because of the M4 (flood level) and proposed overbridge.									

Hydrogeology	Hydrogeology	Profound Positive	Significant Positive	Moderate Positive	Slightly Positive	Imperceptible	Slightly Negative	Moderate Negative	Significant Negative	Profound Negative
	Number of Impacts That Are:	0	0	0	0	0	1	0	0	0
Quantitative Statement	Qualitative Statement									
Neutral	The preferred option is considered to have a not slightly negative impact on hydrogeology. There are no karst, aquifer classifications, groundwater sources, groundwater flooding areas or habitats identified.									

Overall Scale of Impact	Amended Scale of Impact
Slightly Negative	

Project Appraisal Balance Sheet



Part C: Safety, Physical Activity, Economy, Accessibility and Social Inclusion and Integration Input Sheet

		Total Collision Reduction	Casualty Reduction			Value Of Accident Reduction (€m)				
			Fatal	Serious	Minor					
Safety	Collision Reduction	What is the Collision/Casualty Reduction Over 30 Years?	NA	NA	NA	NA	NA			
		Quantitative Statement	Qualitative Statement							
		Moderately Positive	The preferred option would provide an opportunity to tie in to one of the key attractors in the area, Maynooth Town Football Club. It would be possible to provide access from the active travel structure directly into the football club thus reducing the interaction between vehicular traffic and active travel users therefore reducing the probability of collisions.							
	Security	What is the Expected Impact Of The Project On The Security Of Road Users?	○	○	○	○	○	○	●	○
		Quantitative Statement	Qualitative Statement							
		Moderately Positive	Security of road users would be improved for the preferred option. The preferred option would provide enhanced vulnerable road user facilities, which would aim to promote a modal shift towards sustainable transport and thus reduce the number of private vehicles within the surrounding area, decreasing collision frequency.							
	Safety - Overall Scale of Impact		Safety - Amended Scale of Impact							
	Moderately Positive									
Physical Activity	Ambience	What is the expected impact of the project upon journey ambience?	○	○	○	○	●	○	○	○
		Quantitative Statement	Value of Benefit (€m)	Qualitative Statement						
		Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.							
	Absenteeism	What is the impact of the project on absenteeism?	○	○	○	○	●	○	○	○
		Quantitative Statement	Value of Benefit (€m)	Qualitative Statement						
		Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.							
	Reduced Health Risk	What is the impact of the project on the reduction in relative risk for cyclists and walkers?	○	○	○	○	●	○	○	○
		Quantitative Statement	Value of Benefit (€m)	Qualitative Statement						
Neutral		At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.								
Physical Activity - Overall Scale of Impact		Physical Activity - Amended Scale of Impact								
Moderately Positive										

Project Appraisal Balance Sheet

Part C: Safety, Physical Activity, Economy, Accessibility and Social Inclusion and Integration Input Sheet



		Consumer (€m)	Business (€m)	Other (€m)	Indirect Tax (€m)	Residual Value (€m)	Total Benefits (€m)				
Economy	Efficiency and Effectiveness	What Are The Benefits Of The Scheme?	NA	NA	NA	NA	NA	NA			
		Quantitative Statement									
		NA									
	Wider Economic Impacts	What Impact Will The Project Have On....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Increase Competition In Markets?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		Lead To Efficiencies In Clustering Of Economic Activity? (Agglomeration Benefits)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		Attract Inward Investment?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		Expand Local Labour Supply?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		Contribute To Urban Regeneration	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		Quantitative Statement	Qualitative Statement								
	Neutral										
	Funding Impacts	What Impact Will The Project Have On....	Don't Know / NA	None	< 10%	10%-30%	> 30%				
What Percentage Of Non-Exchequer Funding Is The Project Expected To Receive?		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>					
Quantitative Statement		Qualitative Statement									
Slightly Negative		The future funding mechanism for the Maynooth to Leixlip Project is not known at this stage. As the M4/N4 corridor forms part of the Comprehensive TEN-T network and provides a strategically important link to from the west and northwest to Dublin and Dublin Port, there may be potential to secure non-exchequer EU funding.									
Economy - Overall Scale of Impact		Economy - Amended Scale of Impact									
Neutral											

Project Appraisal Balance Sheet

Part C: Safety, Physical Activity, Economy, Accessibility and Social Inclusion and Integration Input Sheet



Accessibility and Social Inclusion	Deprived Areas	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Area Based Childhood Programme?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Rural Social Scheme?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
	Slightly Positive	The preferred option is seen as slightly positive. Overall, under both sub-headings, the preferred option would offer positives in respect of improved accessibility for deprived areas, whilst noting that the occurrence of deprivation in the study area is relatively low.									
	Vulnerable Groups	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Access To Employment or Vital Infrastructure?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		Quantitative Statement	Qualitative Statement								
		Slightly Positive	The preferred option is seen as slightly positive. Overall, under both sub-headings, the preferred option would offer positives in respect of improved accessibility for deprived areas, whilst noting that the occurrence of deprivation in the study area is relatively low.								
	Accessibility & Social Inclusion - Overall Scale of Impact		Accessibility & Social Inclusion - Amended Scale of Impact								
Slightly Positive											

Project Appraisal Balance Sheet

Part C: Safety, Physical Activity, Economy, Accessibility and Social Inclusion and Integration Input Sheet



Integration	Transport Integration	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Connectivity of the Strategic Road Network?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
		Connectivity Between Transport Modes?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
		Sustainable Transport Networks?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
		Access to Other Transport Infrastructure Such As Ports and Airports?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
		Moderately Positive	The preferred option would facilitate improved user comfort levels, safety, and vehicular movements. The preferred option may facilitate improvements to the operational efficiency of the M4/N4. The preferred option is ranked as slightly positive.								
Integration	Land Use Integration	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Objectives of Local and County Development Plans?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Strategic Connectivity for High Value Trips?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Urban Sprawl?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
		Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.								
Integration	Geographic Integration	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Cross Border Connectivity?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		The Trans European Transport network?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
		Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.								
Integration	Other Government Policy Integration	How Will This Project Impact On The Wider Objectives of....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Neutral	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		Quantitative Statement	Qualitative Statement								
		Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.								
Integration - Overall Scale of Impact			Integration - Amended Scale of Impact								
Slightly Positive											

Project Appraisal Balance Sheet

Part D: PABS Summary Table



Project Title		PRS Reference Number	KE-18-16505	Project Description				Scheme Cost (€m)	Date				
Maynooth to Leixlip Project		Modelling Base Year	2021	The Maynooth to Leixlip Project is an integrated and connected multi-modal holistic transport project aimed at assessing the needs of the M4/N4 mainline corridor and junctions from Junction 5 Leixlip to Junction 7 Maynooth in terms of operational efficiency and safety. It seeks to identify and assess interventions that would improve the operational efficiency and safety of the corridor in a sustainable manner.				€3.9m - Preferred R408 Active Travel Option	02/11/2023				
		Scheme Opening Year	2032										
Criteria	Quantitative Statement	Summary of Keys Impacts (Qualitative Assessment)				Quantitative Assessment				Monetised (€m over 30 yrs)			
Environment	Air Quality and Climate	Neutral	It is not possible to develop a quantitative statement for the operational phase carbon as detailed traffic modelling with TII REM tool was not undertaken as part of Phase 2.				Additional CO ₂ (Tonnes)				Value of Change in Emissions (€m)		
	Noise and vibration	Neutral	It is not possible to develop a quantitative statement for the number of sensitive receptors requiring mitigation as detailed noise modelling of the preferred option was not undertaken. Indicative results from noise modelling of options indicate that up to 1 NSR's within 50m of the preferred option are likely to require noise mitigation.				Ratio of CO ₂ Do-Min/Do-Some				NA		
	Waste	Moderately Negative	Earthworks volumes in the waste assessment relate to bulk material only and they have not been classified into material types for Phase 2. The preferred option may result in a required import of 2,400m ³				Index of Overall Change in Exposure NO ₂				Small Negative Index		
	Landscape & Visual Amenities (incl. Light)	Moderately Negative	The preferred option is not likely to notably impact on any residential receptors. The key impacts will be on the landscape and visual amenities. The preferred option is not likely to notably impact on any residential receptors. The key impacts will be on the landscape and visual amenities.				Index of Overall Change in Exposure PM ₁₀				Small Negative Index		
	Biodiversity, Flora & Fauna	Slightly Negative	Impacts on 4 areas of wooded vegetation, some motorway planting and established embankment wooded area. The proposed vegetation loss would likely result in greater overall loss of established screening vegetation.				Sub Ben. Mod Ben. Sli Ben. Negligible Sli Adv. Mod Adv. Sub Adv.				0 0 0 0 0 0 0		
	Agriculture	Neutral	The number of impacts are not applicable as this assessment was based on a comparative analysis of each option under the criteria, farm type and size, farm buildings and yards/facilities, severance and viability. Impact assessments on individual agricultural constraints will be undertaken during Phase 3.				No. of Sensitive Receptors Requiring Mitigation				0		
	Non-Agricultural Properties	Slightly Negative	The number of impacts are not applicable as this assessment was based on a comparative analysis of each option under a range of sub-criteria - including potential impacts on infrastructure and property. There are no residential properties impacted although Maynooth Football Club would be impacted by the preferred option. There is potentially impact to 110kV electrical lines located to the south of the preferred option, and no impacts to gas mains. Monetary compensation will be agreed for loss of land, buildings and other injurious affection, where necessary. The individual impacts of all properties impacted directly or indirectly will be assessed during Phase 3.				No. of Sensitive Receptors Requiring Mitigation (Not Feasible)				0		
	Architectural Heritage	Neutral	The preferred option would not result in any negative direct or indirect impacts upon the archaeological, architectural or cultural heritage resource.				Unacceptable Material/Contaminated Land/Hazardous Waste to be ...						
	Archaeological and Cultural Heritage	Neutral	The preferred option would not result in any negative direct or indirect impacts upon the archaeological, architectural or cultural heritage resource.				Disposed of Off Site U1 [m ³] currently U2 [m ³] Not currently known. Left in Situ [m ³ land waste] Not currently known.						
	Soils & Geology	Slightly Negative	The preferred option is considered to have a slightly negative impact on the soils and geology				PP Sig P Mod P Sli P I Sli N Mod N Sig N PN				0 0 0 0 0 0 0 0 0		
	Hydrology	Neutral	Possible hydrological connected to the Rye Water Valley SAC. Imperceptible pollution risk expected during construction or operation because of the M4 (flood level) and proposed overbridge.				National County Other				0 0 1		
	Hydrogeology	Neutral	The preferred option is considered to have a not slightly negative impact on hydrogeology. There are no karst, aquifer classifications, groundwater sources, groundwater flooding areas or habitats identified.				II NI CI LI(H) LI(L)				0 0 0 4 0		
Safety	Collision Reduction	Moderately Positive	The preferred option would provide an opportunity to tie in to one of the key attractors in the area, Maynooth Town Football Club. It would be possible to provide access from the active travel structure directly into the football club thus reducing the interaction between vehicular traffic and active travel users therefore reducing the probability of collisions.				Impact on Agricultural Holdings that are:						
	Security	Moderately Positive	Security of road users would be improved for the preferred option. The preferred option would provide enhanced vulnerable road user facilities, which would aim to promote a modal shift towards sustainable transport and thus reduce the number of private vehicles within the surrounding area, decreasing collision frequency.				Sig P Mod P Sli P I Sli N Mod N Sig N PN				N/A N/A N/A N/A N/A N/A N/A N/A		
Physical Activity	Ambience	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.				Impact on Non-Agricultural Properties						
	Absenteeism	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.				Sig P Mod P Sli P I Sli N Mod N Sig N PN				N/A N/A N/A N/A N/A N/A N/A N/A		
	Reduced Health Risk	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.				Sig P Mod P Sli P I Sli N Mod N Sig N PN				0 0 0 0 0 0 0 0 0		
Economy	Transport Efficiency and Effectiveness	NA	NA				Number Of Impacts That Are:						
	Wider Economic Impact	Neutral	0				PP Sig P Mod P Sli P I Sli N Mod N Sig N PN				0 0 0 0 0 0 0 0 0		
	Funding	Slightly Negative	The future funding mechanism for the Maynooth to Leixlip Project is not known at this stage. As the M4/N4 corridor forms part of the Comprehensive TEN-T network and provides a strategically important link to from the west and northwest to Dublin and Dublin Port, there may be potential to secure non-exchequer EU funding.				Number Of Impacts That Are:						
Accessibility and Social Inclusion	Deprived Geographic Areas	Slightly Positive	The preferred option is seen as slightly positive. Overall, under both sub-headings, the preferred option would offer positives in respect of improved accessibility for deprived areas, whilst noting that the occurrence of deprivation in the study area is relatively low.				PP Sig P Mod P Sli P I Sli N Mod N Sig N PN				0 0 0 0 1 0 0 0 0		
	Vulnerable Groups	Slightly Positive	The preferred option is seen as slightly positive. Overall, under both sub-headings, the preferred option would offer positives in respect of improved accessibility for deprived areas, whilst noting that the occurrence of deprivation in the study area is relatively low.				Number Of Impacts That Are:						
Integration	Transport Integration	Moderately Positive	The preferred option would facilitate improved user comfort levels, safety, and vehicular movements. The preferred option may facilitate improvements to the operational efficiency of the M4/N4. The preferred option is ranked as slightly positive.				Collision Reduction Over 30 Years						
	Land-Use Integration	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.				Collisions Casualties Fatal Serious Minor				NA N/A NA NA NA		
	Geographical Integration	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.				Expected Percentage of Non-Exchequer Funding				Slightly Negative		
	Integration with Other Government Policies	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.				Impact on Deprived Areas				Slightly Positive		
Overall Scale of Impact	Environmental	Slightly Negative	Economy	Neutral	Summary of Benefits				Present Value of Benefits (PVB)		N/A		
	Safety	Moderately Positive	Accessibility & Social	Slightly Positive	Present Value of Costs (PVC)				€0		Net Present Value (NPV)		N/A
	Physical Activity	Moderately Positive	Integration	Slightly Positive	Benefit to Cost Ratio (BCR)				0.00				



MAYNOOTH TO LEIXLIP PROJECT

Active Travel

Junction 7 Maynooth

Project Appraisal Balance Sheet (PABS)

Project Appraisal Balance Sheet

Part A: Project Context



Date	02/11/2023
Version No.	D01

Project Title	Maynooth to Leixlip Project
PRS Reference Number	KE-18-16505
Project Phase	Phase 2: Option Selection
National Roads Office	Kildare National Roads Office
TII Project Manager	Obey Mhondera

Project Description
 The Maynooth to Leixlip Project is an integrated and connected multi-modal holistic transport project aimed at assessing the needs of the M4/N4 mainline corridor and junctions from Junction 5 Leixlip to Junction 7 Maynooth in terms of operational efficiency and safety. It seeks to identify and assess interventions that would improve the operational efficiency and safety of the corridor in a sustainable manner.

Scheme Cost €m (OCE)	€3.5m - Preferred Junction 7 Active Travel Option
What Are The Likely Sources of Non-Exchequer Funding	TBC
TII Growth Scenario	TII Central Growth

Appraisal Team Author	Joshua Noon, Gerard Hall
Design Team Reviewer	Zita Langenbach, Stephen Barry, Gerard Hall
TII Engineering Inspector	Winston Douglas
External Auditor	Dan Brennan / Derek Brady (TII)

Modelling Base Year	2021
Scheme Opening Year	2032
Reference Number of Nearest TII Traffic Monitoring Unit(s)	TMU M04 020.0W, TMU M04 015.0E, TMU N04 000.0E

Note - This PABS should be completed with reference to the latest version of TII PAG Unit 7.1. Users should always check that the correct version is followed prior to undertaking the PABS.

Air Quality & Climate	Climate - Carbon Dioxide (CO ₂)				Quantitative Statement Parameter				
	Tonnes of CO ₂ produced in the Reference Case Scenario?				NA				
	Tonnes of CO ₂ produced in the Do Something Scenario?				NA				
	Ratio of CO ₂ produced in Do Something Scenario to Reference Case Scenario				NA				
	Greenhouse Gasses				Monetised Benefits (€m)				
	Value of change in emissions				NA				
	Significance Criteria		Substantial Beneficial	Moderate Beneficial	Slight Beneficial	Negligible	Slight Adverse	Moderate Adverse	Substantial Adverse
	Number of Sensitive Locations Experiencing Impacts That Are:		0	0	0	0	0	0	0
	Index of Overall Change in Exposure		Large Negative Index	Medium Negative Index	Small Negative Index	Small Positive Index	Medium Positive Index	Large Positive Index	
	Nitrogen Dioxide (NO ₂)		○	○	●	○	○	○	
	Particulate Matter (PM ₁₀)		○	○	●	○	○	○	
	Quantitative Statement		Qualitative Statement						
Neutral		It is not possible to develop a quantitative statement for the operational phase carbon as detailed traffic modelling with TII REM tool was not undertaken as part of Phase 2.							

Noise & Vibration	Sensitive Receptors		Quantitative Statement Parameter
	Number of Sensitive Receptors Requiring Mitigation (i.e. the three conditions have been satisfied) Per Kilometre		0
	Number of Sensitive Receptors Requiring Mitigation (i.e. the three conditions have been satisfied), But It Is Not Feasible To Mitigate Noise To The Required Level Per Kilometre		0
	Quantitative Statement	Qualitative Statement	
Neutral	It is not possible to develop a quantitative statement for the number of sensitive receptors requiring mitigation as detailed noise models of the Reference Case and Do Something Scenarios have not been undertaken as part of Phase 2.		

Waste	Unacceptable Material		Quantitative Statement Parameter No. (m ³)
	Quantity Of Unacceptable Material Class U1 To Be Disposed Of Off Site?		Not currently known.
	Quantity Of Unacceptable Material Class U2 To Be Disposed Of Off Site?		Not currently known.
	Quantity Of Unacceptable Material and Contaminated Land/Hazardous Waste To Be Left In Situ?		Not currently known.
	Quantitative Statement	Qualitative Statement	
Slightly Negative	Earthworks volumes in the waste assessment relate to bulk material only and they have not been classified into material types for Phase 2. The preferred option may result in a required import of 400m3		

Project Appraisal Balance Sheet

Part B: Environment



Landscape & Visual Amenity (incl. Light)	Landscape & Visual Amenity (incl. Light)	Profound Positive	Significant Positive	Moderate Positive	Slightly Positive	Imperceptible	Slightly Negative	Moderate Negative	Significant Negative	Profound Negative	
	Number of Impacts That Are:	0	0	0	0	0	0	0	0	0	
		National Landscape Designation / Listing			County Landscape Designation / Listing			Other Areas of Significant Landscape Value/Amenity			
	Number of Profound / Significant Impacts On Sites Of:	0			0			0			
	Quantitative Statement	Qualitative Statement									
Moderately Negative	For the preferred option, Impacts are limited to loss of grassland and removal of roadside vegetation and trees. These effects are expected to be reduced following replacement planting.										

Biodiversity - Flora & Fauna	Impact on Ecological Receptors	International Importance	National Importance	County Importance	Local Importance (Higher value)	Local Importance (Lower value)
	Number of Significant Positive Impacts On Ecological Receptors Of:	0	0	0	0	0
	Number of Significant Negative Impacts On Ecological Receptors Of:	0	0	0	3	0
	Quantitative Statement	Qualitative Statement				
	Slightly Negative	Impacts on 3 areas of wooded vegetation, mostly established Junction embankment wooded area, some of which extends north and south along Straffan Road.				

Agriculture	Impact on Agriculture Holdings	Significant Positive Impact	Moderate Positive Impact	Slightly Positive Impact	Imperceptible Impact	Slightly Negative Impact	Moderate Negative Impact	Significant Negative Impact	Profound Negative Impact	
	Impacts On An Agricultural Holdings That Are:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	Quantitative Statement	Qualitative Statement								
	Neutral	The number of impacts are not applicable as this assessment was based on a comparative analysis of each option under the criteria, farm type and size, farm buildings and yards/facilities, severance and viability. Impact assessments on individual agricultural constraints will be undertaken during Phase 3.								

Non-Agricultural Properties	Impact on Non-Agriculture Properties	Significant Positive Impact	Moderate Positive Impact	Slightly Positive Impact	Imperceptible Impact	Slightly Negative Impact	Moderate Negative Impact	Significant Negative Impact	Profound Negative Impact	
	Number of Impacts That Are:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	Quantitative Statement	Qualitative Statement								
	Slightly Negative	The number of impacts are not applicable as this assessment was based on a comparative analysis of each option under a range of sub-criteria - including potential impacts on infrastructure and property. There are no residential properties impacted although Maynooth Business Campus would be impacted by the preferred option. There is potentially impact to 110kV electrical lines although these are seen as minimal, and no impacts to gas mains. Monetary compensation will be agreed for loss of land, buildings and other injurious affection, where necessary. The individual impacts of all properties impacted directly or indirectly will be assessed during Phase 3.								

Architectural Heritage	Impact on Architectural Heritage	Significant Positive Impact	Moderate Positive Impact	Slightly Positive Impact	Imperceptible Impact	Slightly Negative Impact	Moderate Negative Impact	Significant Negative Impact	Profound Negative Impact	
	Number of Impacts That Are:	0	0	0	0	0	0	0	0	
	Number of Impacts On Sites Of National Importance That Are:	0	0	0	0	0	0	0	0	
	Quantitative Statement	Qualitative Statement								
	Neutral	The preferred option would not result in any negative direct or indirect impacts upon the archaeological, architectural or cultural heritage resource.								

Project Appraisal Balance Sheet

Part B: Environment



Archaeological & Cultural Heritage	Impact on Archaeological & Cultural Heritage	Significant Positive Impact	Moderate Positive Impact	Slightly Positive Impact	Imperceptible Impact	Slightly Negative Impact	Moderate Negative Impact	Significant Negative Impact	Profound Negative Impact
	Number of Impacts That Are:	0	0	0	0	0	0	0	0
	Number Of Impacts On Sites Of National Importance That Are:	0	0	0	0	0	0	0	0
	Quantitative Statement	Qualitative Statement							
Neutral	The preferred option would not result in any negative direct or indirect impacts upon the archaeological, architectural or cultural heritage resource.								

Soils & Geology	Soils & Geology	Profound Positive	Significant Positive	Moderate Positive	Slightly Positive	Imperceptible	Slightly Negative	Moderate Negative	Significant Negative	Profound Negative
	Number of Impacts That Are:	0	0	0	0	0	0	0	0	0
	Quantitative Statement	Qualitative Statement								
	Slightly Negative	The preferred option is considered to have a slightly negative impact on the soils and geology								

Hydrology	Hydrology	Profound Positive	Significant Positive	Moderate Positive	Slightly Positive	Imperceptible	Slightly Negative	Moderate Negative	Significant Negative	Profound Negative
	Number of Impacts That Are:	0	0	0	0	1	0	0	0	0
	Quantitative Statement	Qualitative Statement								
	Neutral	Possible hydrological connected to the Rye Water Valley SAC. Imperceptible pollution risk expected during construction or operation because of the M4 (flood level) and proposed overbridge.								

Hydrogeology	Hydrogeology	Profound Positive	Significant Positive	Moderate Positive	Slightly Positive	Imperceptible	Slightly Negative	Moderate Negative	Significant Negative	Profound Negative
	Number of Impacts That Are:	0	0	0	0	0	0	0	0	0
	Quantitative Statement	Qualitative Statement								
	Neutral	The preferred option is considered to have a not slightly negative impact on hydrogeology. There are no karst, aquifer classifications, groundwater sources, groundwater flooding areas or habitats identified.								

Overall Scale of Impact	Amended Scale of Impact
Slightly Negative	

Project Appraisal Balance Sheet



Part C: Safety, Physical Activity, Economy, Accessibility and Social Inclusion and Integration Input Sheet

		Total Collision Reduction	Casualty Reduction			Value Of Accident Reduction (€m)				
			Fatal	Serious	Minor					
Safety	Collision Reduction	What is the Collision/Casualty Reduction Over 30 Years?	NA	NA	NA	NA	NA			
		Quantitative Statement	Qualitative Statement							
		Moderately Positive	The preferred option would provide an opportunity to tie into the key attractor in the area, the Maynooth Business Campus. It would be possible to provide access from the active travel facility into the campus thus reducing the interaction between vehicular traffic and active travel users therefore reducing the probability of collisions.							
	Security		Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive
		What is the Expected Impact Of The Project On The Security Of Road Users?	○	○	○	○	○	●	○	○
		Quantitative Statement	Qualitative Statement							
		Slightly Positive	For the preferred option, the security of active travel users would be improved due to the segregation created between active travel users and vehicular traffic							
	Safety - Overall Scale of Impact		Safety - Amended Scale of Impact							
	Moderately Positive									
	Physical Activity	Ambience		Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive
What is the expected impact of the project upon journey ambience?			○	○	○	○	●	○	○	○
Quantitative Statement			Value of Benefit (€m)	Qualitative Statement						
		Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.							
Absenteeism			Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive
		What is the impact of the project on absenteeism?	○	○	○	○	●	○	○	○
		Quantitative Statement	Value of Benefit (€m)	Qualitative Statement						
		Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.							
Reduced Health Risk			Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive
		What is the impact of the project on the reduction in relative risk for cyclists and walkers?	○	○	○	○	●	○	○	○
	Quantitative Statement	Value of Benefit (€m)	Qualitative Statement							
	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.								
Physical Activity - Overall Scale of Impact		Physical Activity - Amended Scale of Impact								
Moderately Positive										

Project Appraisal Balance Sheet

Part C: Safety, Physical Activity, Economy, Accessibility and Social Inclusion and Integration Input Sheet



		Consumer (€m)	Business (€m)	Other (€m)	Indirect Tax (€m)	Residual Value (€m)	Total Benefits (€m)				
Economy	Efficiency and Effectiveness	What Are The Benefits Of The Scheme?		NA	NA	NA	NA	NA	NA		
		Quantitative Statement									
		NA									
	Wider Economic Impacts	What Impact Will The Project Have On....		Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive
		Increase Competition In Markets?		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Lead To Efficiencies In Clustering Of Economic Activity? (Agglomeration Benefits)		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Attract Inward Investment?		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Expand Local Labour Supply?		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Contribute To Urban Regeneration		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement		Qualitative Statement							
	Neutral										
	Funding Impacts	What Impact Will The Project Have On....		Don't Know / NA	None	< 10%	10%-30%	> 30%			
What Percentage Of Non-Exchequer Funding Is The Project Expected To Receive?		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>					
Quantitative Statement		Qualitative Statement									
Slightly Negative		The future funding mechanism for the Maynooth to Leixlip Project is not known at this stage. As the M4/N4 corridor forms part of the Comprehensive TEN-T network and provides a strategically important link to from the west and northwest to Dublin and Dublin Port, there may be potential to secure non-exchequer EU funding.									
Economy - Overall Scale of Impact			Economy - Amended Scale of Impact								
Neutral											

Project Appraisal Balance Sheet

Part C: Safety, Physical Activity, Economy, Accessibility and Social Inclusion and Integration Input Sheet



Accessibility and Social Inclusion	Deprived Areas	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Area Based Childhood Programme?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Rural Social Scheme?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
	Slightly Positive	The preferred option is seen as slightly positive. Overall, under both sub-headings, the preferred option would offer positives in respect of improved accessibility for deprived areas, whilst noting that the occurrence of deprivation in the study area is relatively low.									
	Vulnerable Groups	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Access To Employment or Vital Infrastructure?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		Quantitative Statement	Qualitative Statement								
		Slightly Positive	The preferred option is seen as slightly positive. Overall, under both sub-headings, the preferred option would offer positives in respect of improved accessibility for deprived areas, whilst noting that the occurrence of deprivation in the study area is relatively low.								
	Accessibility & Social Inclusion - Overall Scale of Impact		Accessibility & Social Inclusion - Amended Scale of Impact								
Slightly Positive											

Project Appraisal Balance Sheet

Part C: Safety, Physical Activity, Economy, Accessibility and Social Inclusion and Integration Input Sheet



Integration	Transport Integration	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Connectivity of the Strategic Road Network?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
		Connectivity Between Transport Modes?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
		Sustainable Transport Networks?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
		Access to Other Transport Infrastructure Such As Ports and Airports?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
		Moderately Positive	The preferred option would facilitate improved user comfort levels, safety, and vehicular movements. The preferred option may facilitate improvements to the operational efficiency of the M4/N4. The preferred option is ranked as slightly positive.								
Integration	Land Use Integration	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Objectives of Local and County Development Plans?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Strategic Connectivity for High Value Trips?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Urban Sprawl?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
		Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.								
Integration	Geographic Integration	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Cross Border Connectivity?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		The Trans European Transport network?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
		Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.								
Integration	Other Government Policy Integration	How Will This Project Impact On The Wider Objectives of....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Neutral	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		Quantitative Statement	Qualitative Statement								
		Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.								
Integration - Overall Scale of Impact			Integration - Amended Scale of Impact								
Moderately Positive											

Project Appraisal Balance Sheet



Part D: PABS Summary Table

Project Title		PRS Reference Number	KE-18-16505	Project Description				Scheme Cost (€m)	Date			
Maynooth to Leixlip Project		Modelling Base Year	2021	The Maynooth to Leixlip Project is an integrated and connected multi-modal holistic transport project aimed at assessing the needs of the M4/N4 mainline corridor and junctions from Junction 5 Leixlip to Junction 7 Maynooth in terms of operational efficiency and safety. It seeks to identify and assess interventions that would improve the operational efficiency and safety of the corridor in a sustainable manner.				€3.5m - Preferred Junction 7 Active Travel Option	02/11/2023			
		Scheme Opening Year	2032									
Criteria	Quantitative Statement	Summary of Keys Impacts (Qualitative Assessment)				Quantitative Assessment				Monetised (€m over 30 yrs)		
Environment	Air Quality and Climate	Neutral	It is not possible to develop a quantitative statement for the operational phase carbon as detailed traffic modelling with TII REM tool was not undertaken as part of Phase 2.				Additional CO ₂ (Tonnes) N/A Ratio of CO ₂ Do-Min/Do-Some NA Index of Overall Change in Exposure NO ₂ Small Negative Index Index of Overall Change in Exposure PM ₁₀ Small Negative Index				Value of Change in Emissions (€m)	
	Noise and vibration	Neutral	It is not possible to develop a quantitative statement for the number of sensitive receptors requiring mitigation as detailed noise models of the Reference Case and Do Something Scenarios have not been undertaken as part of Phase 2.				Sub Ben. Mod Ben. Sli Ben. Negligible Sli Adv. Mod Adv. Sub Adv. 0 0 0 0 0 0 0				NA	
	Waste	Slightly Negative	Earthworks volumes in the waste assessment relate to bulk material only and they have not been classified into material types for Phase 2. The preferred option may result in a required import of 400m ³				No. of Sensitive Receptors Requiring Mitigation 0 No. of Sensitive Receptors Requiring Mitigation (Not Feasible) 0				Value of Change in Emissions (€m)	
	Landscape & Visual Amenity (incl. Light)	Moderately Negative	For the preferred option, Impacts are limited to loss of grassland and removal of roadside vegetation				Unacceptable Material/Contaminated Land/Hazardous Waste to be ... Disposed of Off Site U1 [m ³] U2 [m ³] Left in Situ [m ³ land] Not currently known. Not currently known. PP Sig P Mod P Sli P I Sli N Mod N Sig N PN 0 0 0 0 0 0 0 0 0 0					
	Biodiversity, Flora & Fauna	Slightly Negative	Impacts on 3 areas of wooded vegetation, mostly established Junction embankment wooded area, some of which extends north and south along Straffan Road.				National 0 County 0 Other 0 II NI CI LI(H) LI(L) Number of Positive Impacts 0 0 0 0 0 Number of Negative Impacts 0 0 0 3 0					
	Agriculture	Neutral	The number of impacts are not applicable as this assessment was based on a comparative analysis of each option under the criteria, farm type and size, farm buildings and yards/facilities, severance and viability. Impact assessments on individual agricultural constraints will be undertaken during Phase 3.				Impact on Agricultural Holdings that are: Sig P Mod P Sli P I Sli N Mod N Sig N PN N/A N/A N/A N/A N/A N/A N/A N/A					
	Non-Agricultural Properties	Slightly Negative	The number of impacts are not applicable as this assessment was based on a comparative analysis of each option under a range of sub-criteria - including potential impacts on infrastructure and property. There are no residential properties impacted although Maynooth Business Campus would be impacted by the preferred option. There is potentially impact to 110kV electrical lines although these are seen as minimal, and no impacts to gas mains. Monetary compensation will be agreed for loss of land, buildings and other injurious affection, where necessary. The individual impacts of all properties impacted directly or indirectly will be assessed during Phase 2.				Impact on Non-Agricultural Properties Sig P Mod P Sli P I Sli N Mod N Sig N PN N/A N/A N/A N/A N/A N/A N/A N/A					
	Architectural Heritage	Neutral	The preferred option would not result in any negative direct or indirect impacts upon the archaeological, architectural or cultural heritage resource.				Sig P Mod P Sli P I Sli N Mod N Sig N PN 0 0 0 0 0 0 0 0 0					
	Archaeological and Cultural Heritage	Neutral	The preferred option would not result in any negative direct or indirect impacts upon the archaeological, architectural or cultural heritage resource.				Sig P Mod P Sli P I Sli N Mod N Sig N PN 0 0 0 0 0 0 0 0 0					
	Soils & Geology	Slightly Negative	The preferred option is considered to have a slightly negative impact on the soils and geology				Number Of Impacts That Are: PP Sig P Mod P Sli P I Sli N Mod N Sig N PN 0 0 0 0 0 0 0 0 0					
	Hydrology	Neutral	Possible hydrological connected to the Rye Water Valley SAC. Imperceptible pollution risk expected during construction or operation because of the M4 (flood level) and proposed overbridge.				Number Of Impacts That Are: PP Sig P Mod P Sli P I Sli N Mod N Sig N PN 0 0 0 0 1 0 0 0 0					
	Hydrogeology	Neutral	The preferred option is considered to have a not slightly negative impact on hydrogeology. There are no karst, aquifer classifications, groundwater sources, groundwater flooding areas or habitats identified.				Number Of Impacts That Are: PP Sig P Mod P Sli P I Sli N Mod N Sig N PN 0 0 0 0 0 0 0 0 0					
Safety	Collision Reduction	Moderately Positive	The preferred option would provide an opportunity to tie into the key attractor in the area, the Maynooth Business Campus. It would be possible to provide access from the active travel facility into the campus thus reducing the interaction between vehicular traffic and active travel users therefore reducing the probability of collisions.				Collision Reduction Over 30 Years Collisions Casualties Fatal Serious Minor NA N/A NA NA NA					Value of Change (€m)
	Security	Slightly Positive	For the preferred option, the security of active travel users would be improved due to the segregation created between active travel users and vehicular traffic									NA
Physical Activity	Ambience	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.								€0.0	
	Absenteeism	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.								€0.0	
	Reduced Health Risk	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.								€0.0	
Economy	Transport Efficiency and Effectiveness	NA									Commute Business Other Value of Change NA NA NA NA	
	Wider Economic Impact	Neutral	0				Neutral				Indirect Tax Res. Value NA NA	
	Funding	Slightly Negative	The future funding mechanism for the Maynooth to Leixlip Project is not known at this stage. As the M4/N4 corridor forms part of the Comprehensive TEN-T network and provides a strategically important link to from the west and northwest to Dublin and Dublin Port, there may be potential to secure non-exchequer EU funding.				Expected Percentage of Non-Exchequer Funding Slightly Negative				€0.0	
Accessibility and Social Inclusion	Deprived Geographic Areas	Slightly Positive	The preferred option is seen as slightly positive. Overall, under both sub-headings, the preferred option would offer positives in respect of improved accessibility for deprived areas, whilst noting that the occurrence of deprivation in the study area is relatively low.				Impact on Deprived Areas Slightly Positive					
	Vulnerable Groups	Slightly Positive	The preferred option is seen as slightly positive. Overall, under both sub-headings, the preferred option would offer positives in respect of improved accessibility for deprived areas, whilst noting that the occurrence of deprivation in the study area is relatively low.				Impact on Access to Employment or Vital Infrastructure Slightly Positive					
Integration	Transport Integration	Moderately Positive	The preferred option would facilitate improved user comfort levels, safety, and vehicular movements. The preferred option may facilitate improvements to the operational efficiency of the M4/N4. The preferred option is ranked as slightly positive.				Moderately Positive					
	Land-Use Integration	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.				Neutral					
	Geographical Integration	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.				Neutral					
	Integration with Other Government Policies	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.				Neutral					
Overall Scale of Impact	Environmental	Slightly Negative	Economy	Neutral	Summary of Benefits				Present Value of Benefits (PVB)	N/A	Net Present Value (NPV)	N/A
	Safety	Moderately Positive	Accessibility & Social	Slightly Positive					Present Value of Costs (PVC)	€0	Benefit to Cost Ratio (BCR)	0.00
	Physical Activity	Moderately Positive	Integration	Moderately Positive								



MAYNOOTH TO LEIXLIP PROJECT

Active Travel

R405 Ballygoran

Project Appraisal Balance Sheet (PABS)

Project Appraisal Balance Sheet

Part A: Project Context



Date	02/11/2023
Version No.	D01

Project Title	Maynooth to Leixlip Project
PRS Reference Number	KE-18-16505
Project Phase	Phase 2: Option Selection
National Roads Office	Kildare National Roads Office
TII Project Manager	Obey Mhondera

Project Description
 The Maynooth to Leixlip Project is an integrated and connected multi-modal holistic transport project aimed at assessing the needs of the M4/N4 mainline corridor and junctions from Junction 5 Leixlip to Junction 7 Maynooth in terms of operational efficiency and safety. It seeks to identify and assess interventions that would improve the operational efficiency and safety of the corridor in a sustainable manner.

Scheme Cost €m (OCE)	€3.1m - Preferred R405 Active Travel Option
What Are The Likely Sources of Non-Exchequer Funding	TBC
TII Growth Scenario	TII Central Growth

Appraisal Team Author	Joshua Noon, Gerard Hall
Design Team Reviewer	Zita Langenbach, Stephen Barry, Gerard Hall
TII Engineering Inspector	Winston Douglas
External Auditor	Dan Brennan / Derek Brady (TII)

Modelling Base Year	2021
Scheme Opening Year	2032
Reference Number of Nearest TII Traffic Monitoring Unit(s)	TMU M04 020.0W, TMU M04 015.0E, TMU N04 000.0E

Note - This PABS should be completed with reference to the latest version of TII PAG Unit 7.1. Users should always check that the correct version is followed prior to undertaking the PABS.

Air Quality & Climate	Climate - Carbon Dioxide (CO ₂)				Quantitative Statement Parameter						
	Tonnes of CO ₂ produced in the Reference Case Scenario?				NA						
	Tonnes of CO ₂ produced in the Do Something Scenario?				NA						
	Ratio of CO ₂ produced in Do Something Scenario to Reference Case Scenario				NA						
	Greenhouse Gasses				Monetised Benefits (€m)						
	Value of change in emissions				NA						
	Significance Criteria				Substantial Beneficial	Moderate Beneficial	Slight Beneficial	Negligible	Slight Adverse	Moderate Adverse	Substantial Adverse
	Number of Sensitive Locations Experiencing Impacts That Are:				0	0	0	0	0	0	0
	Index of Overall Change in Exposure				Large Negative Index	Medium Negative Index	Small Negative Index	Small Positive Index	Medium Positive Index	Large Positive Index	
	Nitrogen Dioxide (NO ₂)				○	○	●	○	○	○	
	Particulate Matter (PM ₁₀)				○	○	●	○	○	○	
	Quantitative Statement		Qualitative Statement								
Neutral		It is not possible to develop a quantitative statement for the operational phase carbon as detailed traffic modelling with TII REM tool was not undertaken as part of Phase 2.									

Noise & Vibration	Sensitive Receptors		Quantitative Statement Parameter
	Number of Sensitive Receptors Requiring Mitigation (i.e. the three conditions have been satisfied) Per Kilometre		0
	Number of Sensitive Receptors Requiring Mitigation (i.e. the three conditions have been satisfied), But It Is Not Feasible To Mitigate Noise To The Required Level Per Kilometre		0
	Quantitative Statement	Qualitative Statement	
Neutral	It is not possible to develop a quantitative statement for the number of sensitive receptors requiring mitigation as detailed noise models of the Reference Case and Do Something Scenarios have not been undertaken as part of Phase 2.		

Waste	Unacceptable Material		Quantitative Statement Parameter No. (m ³)
	Quantity Of Unacceptable Material Class U1 To Be Disposed Of Off Site?		Not currently known.
	Quantity Of Unacceptable Material Class U2 To Be Disposed Of Off Site?		Not currently known.
	Quantity Of Unacceptable Material and Contaminated Land/Hazardous Waste To Be Left In Situ?		Not currently known.
	Quantitative Statement	Qualitative Statement	
Slightly Negative	Earthworks volumes in the waste assessment relate to bulk material only and they have not been classified into material types for Phase 2. The preferred option may result in a required import of 800m3		

Project Appraisal Balance Sheet

Part B: Environment



Landscape & Visual Amenity (incl. Light)	Landscape & Visual Amenity (incl. Light)	Profound Positive	Significant Positive	Moderate Positive	Slightly Positive	Imperceptible	Slightly Negative	Moderate Negative	Significant Negative	Profound Negative	
	Number of Impacts That Are:	0	0	0	0	0	0	0	0	0	
		National Landscape Designation / Listing			County Landscape Designation / Listing			Other Areas of Significant Landscape Value/Amenity			
	Number of Profound / Significant Impacts On Sites Of:	0			0			0			
	Quantitative Statement	Qualitative Statement									
Slightly Negative	There are no nearby sensitive visual receptors and no significant visual effects are expected for the preferred option										

Biodiversity - Flora & Fauna	Impact on Ecological Receptors	International Importance	National Importance	County Importance	Local Importance (Higher value)	Local Importance (Lower value)
	Number of Significant Positive Impacts On Ecological Receptors Of:	0	0	0	0	0
	Number of Significant Negative Impacts On Ecological Receptors Of:	0	0	0	2	0
	Quantitative Statement	Qualitative Statement				
	Slightly Negative	Impacts on 2 areas of wooded vegetation, mostly established Junction embankment wooded area as well as some motorway verge grassland.				

Agriculture	Impact on Agriculture Holdings	Significant Positive Impact	Moderate Positive Impact	Slightly Positive Impact	Imperceptible Impact	Slightly Negative Impact	Moderate Negative Impact	Significant Negative Impact	Profound Negative Impact	
	Impacts On An Agricultural Holdings That Are:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	Quantitative Statement	Qualitative Statement								
	Neutral	The number of impacts are not applicable as this assessment was based on a comparative analysis of each option under the criteria, farm type and size, farm buildings and yards/facilities, severance and viability. Impact assessments on individual agricultural constraints will be undertaken during Phase 3.								

Non-Agricultural Properties	Impact on Non-Agriculture Properties	Significant Positive Impact	Moderate Positive Impact	Slightly Positive Impact	Imperceptible Impact	Slightly Negative Impact	Moderate Negative Impact	Significant Negative Impact	Profound Negative Impact	
	Number of Impacts That Are:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	Quantitative Statement	Qualitative Statement								
	Slightly Negative	The number of impacts are not applicable as this assessment was based on a comparative analysis of each option under a range of sub-criteria - including potential impacts on infrastructure and property. There are no residential properties impacted. A gas pipeline located at the R405/ Ballygoran View junction and UPC services located parallel to the R405 are evident. Monetary compensation will be agreed for loss of land, buildings and other injurious affection, where necessary. The individual impacts of all properties impacted directly or indirectly will be assessed during Phase 3.								

Architectural Heritage	Impact on Architectural Heritage	Significant Positive Impact	Moderate Positive Impact	Slightly Positive Impact	Imperceptible Impact	Slightly Negative Impact	Moderate Negative Impact	Significant Negative Impact	Profound Negative Impact	
	Number of Impacts That Are:	0	0	0	0	0	0	0	0	
	Number of Impacts On Sites Of National Importance That Are:	0	0	0	0	0	0	0	0	
	Quantitative Statement	Qualitative Statement								
	Neutral	The preferred option would not result in any negative direct or indirect impacts upon the archaeological, architectural or cultural heritage resource.								

Project Appraisal Balance Sheet

Part B: Environment



Archaeological & Cultural Heritage	Impact on Archaeological & Cultural Heritage	Significant Positive Impact	Moderate Positive Impact	Slightly Positive Impact	Imperceptible Impact	Slightly Negative Impact	Moderate Negative Impact	Significant Negative Impact	Profound Negative Impact
	Number of Impacts That Are:	0	0	0	0	0	0	0	0
Number Of Impacts On Sites Of National Importance That Are:	0	0	0	0	0	0	0	0	0
Quantitative Statement	Qualitative Statement								
Neutral	The preferred option would not result in any negative direct or indirect impacts upon the archaeological, architectural or cultural heritage resource.								

Soils & Geology	Soils & Geology	Profound Positive	Significant Positive	Moderate Positive	Slightly Positive	Imperceptible	Slightly Negative	Moderate Negative	Significant Negative	Profound Negative
	Number of Impacts That Are:	0	0	0	0	0	0	0	0	0
Quantitative Statement	Qualitative Statement									
Slightly Negative	The preferred option is considered to have a slightly negative impact on the soils and geology									

Hydrology	Hydrology	Profound Positive	Significant Positive	Moderate Positive	Slightly Positive	Imperceptible	Slightly Negative	Moderate Negative	Significant Negative	Profound Negative
	Number of Impacts That Are:	0	0	0	0	1	0	0	0	0
Quantitative Statement	Qualitative Statement									
Neutral	There would be no connection to the Rye Water Valley SAC. Imperceptible pollution risk expected during construction or operation because of the M4 level and proposed overbridge. Imperceptible increase in flood risk to the works.									

Hydrogeology	Hydrogeology	Profound Positive	Significant Positive	Moderate Positive	Slightly Positive	Imperceptible	Slightly Negative	Moderate Negative	Significant Negative	Profound Negative
	Number of Impacts That Are:	0	0	0	0	0	0	0	0	0
Quantitative Statement	Qualitative Statement									
Neutral	The preferred option is considered to have a not slightly negative impact on hydrogeology. There are no karst, aquifer classifications, groundwater sources, groundwater flooding areas or habitats identified.									

Overall Scale of Impact	Amended Scale of Impact
Neutral	

Project Appraisal Balance Sheet



Part C: Safety, Physical Activity, Economy, Accessibility and Social Inclusion and Integration Input Sheet

		Total Collision Reduction	Casualty Reduction			Value Of Accident Reduction (€m)				
			Fatal	Serious	Minor					
Safety	Collision Reduction	What is the Collision/Casualty Reduction Over 30 Years?	NA	NA	NA	NA	NA			
		Quantitative Statement	Qualitative Statement							
		Slightly Positive	The preferred option would require vulnerable road users to make a crossing movement on Ballygoran View which has no existing vulnerable road user facilities.							
	Security		Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive
		What is the Expected Impact Of The Project On The Security Of Road Users?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement							
		Slightly Positive	For the preferred option, the security of active travel users would be improved due to the segregation created between active travel users and vehicular traffic							
	Safety - Overall Scale of Impact		Safety - Amended Scale of Impact							
	Slightly Positive									
	Physical Activity	Ambience		Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive
What is the expected impact of the project upon journey ambience?			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quantitative Statement			Value of Benefit (€m)	Qualitative Statement						
		Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.							
Absenteeism			Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive
		What is the impact of the project on absenteeism?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Value of Benefit (€m)	Qualitative Statement						
		Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.							
Reduced Health Risk			Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive
		What is the impact of the project on the reduction in relative risk for cyclists and walkers?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Quantitative Statement	Value of Benefit (€m)	Qualitative Statement							
	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.								
Physical Activity - Overall Scale of Impact		Physical Activity - Amended Scale of Impact								
Moderately Positive										

Project Appraisal Balance Sheet

Part C: Safety, Physical Activity, Economy, Accessibility and Social Inclusion and Integration Input Sheet



		Consumer (€m)	Business (€m)	Other (€m)	Indirect Tax (€m)	Residual Value (€m)	Total Benefits (€m)				
Economy	Efficiency and Effectiveness	What Are The Benefits Of The Scheme?	NA	NA	NA	NA	NA	NA			
		Quantitative Statement									
		NA									
	Wider Economic Impacts	What Impact Will The Project Have On....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Increase Competition In Markets?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		Lead To Efficiencies In Clustering Of Economic Activity? (Agglomeration Benefits)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		Attract Inward Investment?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		Expand Local Labour Supply?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		Contribute To Urban Regeneration	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		Quantitative Statement	Qualitative Statement								
	Neutral										
	Funding Impacts	What Impact Will The Project Have On....	Don't Know / NA	None	< 10%	10%-30%	> 30%				
What Percentage Of Non-Exchequer Funding Is The Project Expected To Receive?		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>					
Quantitative Statement		Qualitative Statement									
Slightly Negative		The future funding mechanism for the Maynooth to Leixlip Project is not known at this stage. As the M4/N4 corridor forms part of the Comprehensive TEN-T network and provides a strategically important link to from the west and northwest to Dublin and Dublin Port, there may be potential to secure non-exchequer EU funding.									
Economy - Overall Scale of Impact		Economy - Amended Scale of Impact									
Neutral											

Project Appraisal Balance Sheet

Part C: Safety, Physical Activity, Economy, Accessibility and Social Inclusion and Integration Input Sheet



Accessibility and Social Inclusion	Deprived Areas	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Area Based Childhood Programme?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Rural Social Scheme?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
	Neutral	The preferred option is seen as neutral. Overall, under both sub-headings, the preferred option would offer positives in respect of improved accessibility for deprived areas, whilst noting that the occurrence of deprivation in the study area is relatively low.									
Accessibility and Social Inclusion	Vulnerable Groups	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Access To Employment or Vital Infrastructure?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
			Neutral	The preferred option is seen as neutral. Overall, under both sub-headings, the preferred option would offer positives in respect of improved accessibility for deprived areas, whilst noting that the occurrence of deprivation in the study area is relatively low.							
Accessibility & Social Inclusion - Overall Scale of Impact			Accessibility & Social Inclusion - Amended Scale of Impact								
Neutral											

Project Appraisal Balance Sheet

Part C: Safety, Physical Activity, Economy, Accessibility and Social Inclusion and Integration Input Sheet



Integration	Transport Integration	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Connectivity of the Strategic Road Network?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
		Connectivity Between Transport Modes?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
		Sustainable Transport Networks?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
		Access to Other Transport Infrastructure Such As Ports and Airports?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
		Moderately Positive	The preferred option would facilitate improved user comfort levels, safety, and vehicular movements. The preferred option may facilitate improvements to the operational efficiency of the M4/N4. The preferred option is ranked as slightly positive.								
Integration	Land Use Integration	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Objectives of Local and County Development Plans?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Strategic Connectivity for High Value Trips?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Urban Sprawl?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
		Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.								
Integration	Geographic Integration	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Cross Border Connectivity?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		The Trans European Transport network?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
		Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.								
Integration	Other Government Policy Integration	How Will This Project Impact On The Wider Objectives of....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Neutral	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		Quantitative Statement	Qualitative Statement								
		Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.								
Integration - Overall Scale of Impact			Integration - Amended Scale of Impact								
Slightly Positive											

Project Appraisal Balance Sheet



Part D: PABS Summary Table

Project Title		PRS Reference Number	KE-18-16505	Project Description				Scheme Cost (€m)	Date					
Maynooth to Leixlip Project		Modelling Base Year	2021	The Maynooth to Leixlip Project is an integrated and connected multi-modal holistic transport project aimed at assessing the needs of the M4/N4 mainline corridor and junctions from Junction 5 Leixlip to Junction 7 Maynooth in terms of operational efficiency and safety. It seeks to identify and assess interventions that would improve the operational efficiency and safety of the corridor in a sustainable manner.				€3.1m - Preferred R405 Active Travel Option	02/11/2023					
		Scheme Opening Year	2032											
Criteria	Quantitative Statement	Summary of Keys Impacts (Qualitative Assessment)				Quantitative Assessment				Monetised (€m over 30 yrs)				
Environment	Air Quality and Climate	Neutral	It is not possible to develop a quantitative statement for the operational phase carbon as detailed traffic modelling with TII REM tool was not undertaken as part of Phase 2.				Additional CO ₂ (Tonnes) N/A Ratio of CO ₂ Do-Min/Do-Some NA Index of Overall Change in Exposure NO ₂ Small Negative Index Index of Overall Change in Exposure PM ₁₀ Small Negative Index				Value of Change in Emissions (€m) NA			
	Noise and vibration	Neutral	It is not possible to develop a quantitative statement for the number of sensitive receptors requiring mitigation as detailed noise models of the Reference Case and Do Something Scenarios have not been undertaken as part of Phase 2.				Sub Ben. Mod Ben. Sli Ben. Negligible Sli Adv. Mod Adv. Sub Adv. 0 0 0 0 0 0 0				No. of Sensitive Receptors Requiring Mitigation 0 No. of Sensitive Receptors Requiring Mitigation (Not Feasible) 0			
	Waste	Slightly Negative	Earthworks volumes in the waste assessment relate to bulk material only and they have not been classified into material types for Phase 2. The preferred option may result in a required import of 800m ³				Unacceptable Material/Contaminated Land/Hazardous Waste to be ... Disposed of Off Site U1 [m ³] U2 [m ³] Left in Situ [m ³ land waste] Not currently known. PP Sig P Mod P Sli P I Sli N Mod N Sig N PN 0 0 0 0 0 0 0 0 0 0							
	Landscape & Visual Amenity (incl. Light)	Slightly Negative	There are no nearby sensitive visual receptors and no significant visual effects are expected for th				No. of Profound/Significant Impacts on Sites Of: National 0 County 0 Other 0							
	Biodiversity, Flora & Fauna	Slightly Negative	Impacts on 2 areas of wooded vegetation, mostly established Junction embankment wooded area as well as some motorway verge grassland.				Number of Positive Impacts 0 0 0 0 0 Number of Negative Impacts 0 0 0 2 0							
	Agriculture	Neutral	The number of impacts are not applicable as this assessment was based on a comparative analysis of each option under the criteria, farm type and size, farm buildings and yards/facilities, severance and viability. Impact assessments on individual agricultural constraints will be undertaken during Phase 3.				Impact on Agricultural Holdings that are: Sig P Mod P Sli P I Sli N Mod N Sig N PN N/A N/A N/A N/A N/A N/A N/A N/A							
	Non-Agricultural Properties	Slightly Negative	The number of impacts are not applicable as this assessment was based on a comparative analysis of each option under a range of sub-criteria - including potential impacts on infrastructure and property. There are no residential properties impacted. A gas pipeline located at the R405/ Ballygoran View junction and UPC services located parallel to the R405 are evident. Monetary compensation will be agreed for loss of land, buildings and other injurious affection, where necessary. The individual impacts of all properties impacted directly or indirectly will be assessed during Phase 3.				Impact on Non-Agricultural Properties Sig P Mod P Sli P I Sli N Mod N Sig N PN N/A N/A N/A N/A N/A N/A N/A N/A							
	Architectural Heritage	Neutral	The preferred option would not result in any negative direct or indirect impacts upon the archaeological, architectural or cultural heritage resource.				No. of Impacts That Are: 0 0 0 0 0 0 0 0 No. of Impacts on Sites of National Importance That Are: 0 0 0 0 0 0 0 0							
	Archaeological and Cultural Heritage	Neutral	The preferred option would not result in any negative direct or indirect impacts upon the archaeological, architectural or cultural heritage resource.				No. of Impacts That Are: 0 0 0 0 0 0 0 0 No. of Impacts on Sites of National Importance That Are: 0 0 0 0 0 0 0 0							
	Soils & Geology	Slightly Negative	The preferred option is considered to have a slightly negative impact on the soils and geology				Number Of Impacts That Are: PP Sig P Mod P Sli P I Sli N Mod N Sig N PN 0 0 0 0 0 0 0 0 0							
	Hydrology	Neutral	There would be no connection to the Rye Water Valley SAC. Imperceptible pollution risk expected during construction or operation because of the M4 level and proposed overbridge. Imperceptible increase in flood risk to the works.				Number Of Impacts That Are: PP Sig P Mod P Sli P I Sli N Mod N Sig N PN 0 0 0 0 1 0 0 0 0							
	Hydrogeology	Neutral	The preferred option is considered to have a not slightly negative impact on hydrogeology. There are no karst, aquifer classifications, groundwater sources, groundwater flooding areas or habitats identified.				Number Of Impacts That Are: PP Sig P Mod P Sli P I Sli N Mod N Sig N PN 0 0 0 0 0 0 0 0 0							
	Safety	Collision Reduction	Slightly Positive	The preferred option would require vulnerable road users to make a crossing movement on Ballygoran View which has no existing vulnerable road user facilities.				Collision Reduction Over 30 Years Collisions Casualties Fatal Serious Minor NA N/A NA NA NA				Value of Change (€m) NA		
Security		Slightly Positive	For the preferred option, the security of active travel users would be improved due to the segregation created between active travel users and vehicular traffic											
Physical Activity	Ambience	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.								€0.0			
	Absenteeism	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.								€0.0			
	Reduced Health Risk	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.								€0.0			
Economy	Transport Efficiency and Effectiveness	NA	NA								Commuter	Business	Other	Value of Change
	Wider Economic Impact	Neutral	0								NA	NA	NA	€0.0
	Funding	Slightly Negative	The future funding mechanism for the Maynooth to Leixlip Project is not known at this stage. As the M4/N4 corridor forms part of the Comprehensive TEN-T network and provides a strategically important link to from the west and northwest to Dublin and Dublin Port, there may be potential to secure non-exchequer EU funding.				Neutral Expected Percentage of Non-Exchequer Funding Slightly Negative				Indirect Tax NA		Res. Value NA	
Accessibility and Social Inclusion	Deprived Geographic Areas	Neutral	The preferred option is seen as neutral. Overall, under both sub-headings, the preferred option would offer positives in respect of improved accessibility for deprived areas, whilst noting that the occurrence of deprivation in the study area is relatively low.				Impact on Deprived Areas Neutral							
	Vulnerable Groups	Neutral	The preferred option is seen as neutral. Overall, under both sub-headings, the preferred option would offer positives in respect of improved accessibility for deprived areas, whilst noting that the occurrence of deprivation in the study area is relatively low.				Impact on Access to Employment or Vital Infrastructure Neutral							
Integration	Transport Integration	Moderately Positive	The preferred option would facilitate improved user comfort levels, safety, and vehicular movements. The preferred option may facilitate improvements to the operational efficiency of the M4/N4. The preferred option is ranked as slightly positive.				Moderately Positive							
	Land-Use Integration	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.				Neutral							
	Geographical Integration	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.				Neutral							
	Integration with Other Government Policies	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.				Neutral							
Overall Scale of Impact	Environmental	Neutral	Economy	Neutral					Summary of Benefits					
	Safety	Slightly Positive	Accessibility & Social	Neutral					Present Value of Benefits (PVB)		Net Present Value (NPV)		N/A	
	Physical Activity	Moderately Positive	Integration	Slightly Positive					Present Value of Costs (PVC)		Benefit to Cost Ratio (BCR)		0.00	



MAYNOOTH TO LEIXLIP PROJECT

Active Travel

Junction 6 Celbridge

Project Appraisal Balance Sheet (PABS)

Project Appraisal Balance Sheet

Part A: Project Context



Date	02/11/2023
Version No.	D01

Project Title	Maynooth to Leixlip Project
PRS Reference Number	KE-18-16505
Project Phase	Phase 2: Option Selection
National Roads Office	Kildare National Roads Office
TII Project Manager	Obey Mhondera

Project Description
 The Maynooth to Leixlip Project is an integrated and connected multi-modal holistic transport project aimed at assessing the needs of the M4/N4 mainline corridor and junctions from Junction 5 Leixlip to Junction 7 Maynooth in terms of operational efficiency and safety. It seeks to identify and assess interventions that would improve the operational efficiency and safety of the corridor in a sustainable manner.

Scheme Cost €m (OCE)	€5.0m - Preferred Junction 6 Active Travel Option
What Are The Likely Sources of Non-Exchequer Funding	TBC
TII Growth Scenario	TII Central Growth

Appraisal Team Author	Joshua Noon, Gerard Hall
Design Team Reviewer	Zita Langenbach, Stephen Barry, Gerard Hall
TII Engineering Inspector	Winston Douglas
External Auditor	Dan Brennan / Derek Brady (TII)

Modelling Base Year	2021
Scheme Opening Year	2032
Reference Number of Nearest TII Traffic Monitoring Unit(s)	TMU M04 020.0W, TMU M04 015.0E, TMU N04 000.0E

Note - This PABS should be completed with reference to the latest version of TII PAG Unit 7.1. Users should always check that the correct version is followed prior to undertaking the PABS.

Air Quality & Climate	Climate - Carbon Dioxide (CO ₂)						Quantitative Statement Parameter				
	Tonnes of CO ₂ produced in the Reference Case Scenario?						NA				
	Tonnes of CO ₂ produced in the Do Something Scenario?						NA				
	Ratio of CO ₂ produced in Do Something Scenario to Reference Case Scenario						NA				
	Greenhouse Gasses						Monetised Benefits (€m)				
	Value of change in emissions						NA				
	Significance Criteria				Substantial Beneficial	Moderate Beneficial	Slight Beneficial	Negligible	Slight Adverse	Moderate Adverse	Substantial Adverse
	Number of Sensitive Locations Experiencing Impacts That Are:				0	0	0	0	0	0	0
	Index of Overall Change in Exposure				Large Negative Index	Medium Negative Index	Small Negative Index	Small Positive Index	Medium Positive Index	Large Positive Index	
	Nitrogen Dioxide (NO ₂)				○	○	●	○	○	○	
Particulate Matter (PM ₁₀)				○	○	●	○	○	○		
Quantitative Statement		Qualitative Statement									
Neutral		It is not possible to develop a quantitative statement for the operational phase carbon as detailed traffic modelling with TII REM tool was not undertaken as part of Phase 2.									

Noise & Vibration	Sensitive Receptors		Quantitative Statement Parameter
	Number of Sensitive Receptors Requiring Mitigation (i.e. the three conditions have been satisfied) Per Kilometre		0
	Number of Sensitive Receptors Requiring Mitigation (i.e. the three conditions have been satisfied), But It Is Not Feasible To Mitigate Noise To The Required Level Per Kilometre		0
	Quantitative Statement	Qualitative Statement	
Neutral	It is not possible to develop a quantitative statement for the number of sensitive receptors requiring mitigation as detailed noise models of the Reference Case and Do Something Scenarios have not been undertaken as part of Phase 2.		

Waste	Unacceptable Material		Quantitative Statement Parameter No. (m ³)
	Quantity Of Unacceptable Material Class U1 To Be Disposed Of Off Site?		Not currently known.
	Quantity Of Unacceptable Material Class U2 To Be Disposed Of Off Site?		Not currently known.
	Quantity Of Unacceptable Material and Contaminated Land/Hazardous Waste To Be Left In Situ?		Not currently known.
	Quantitative Statement	Qualitative Statement	
Moderately Negative	Earthworks volumes in the waste assessment relate to bulk material only and they have not been classified into material types for Phase 2. The preferred option may result in a required import of 13,000m ³		

Part B: Environment

Landscape & Visual Amenity (incl. Light)	Landscape & Visual Amenity (incl. Light)	Profound Positive	Significant Positive	Moderate Positive	Slightly Positive	Imperceptible	Slightly Negative	Moderate Negative	Significant Negative	Profound Negative	
	Number of Impacts That Are:	0	0	0	0	0	0	0	0	0	
		National Landscape Designation / Listing			County Landscape Designation / Listing			Other Areas of Significant Landscape Value/Amenity			
	Number of Profound / Significant Impacts On Sites Of:	0			0			0			
	Quantitative Statement	Qualitative Statement									
Slightly Negative	There are no nearby sensitive visual receptors and no significant visual effects are expected for the preferred option										

Biodiversity - Flora & Fauna	Impact on Ecological Receptors	International Importance	National Importance	County Importance	Local Importance (Higher value)	Local Importance (Lower value)
	Number of Significant Positive Impacts On Ecological Receptors Of:	0	0	0	0	0
	Number of Significant Negative Impacts On Ecological Receptors Of:	0	0	0	2	0
	Quantitative Statement	Qualitative Statement				
	Slightly Negative	Impacts on 2 areas of wooded vegetation, mostly established Junction embankment wooded area as well as some motorway verge grassland.				

Agriculture	Impact on Agriculture Holdings	Significant Positive Impact	Moderate Positive Impact	Slightly Positive Impact	Imperceptible Impact	Slightly Negative Impact	Moderate Negative Impact	Significant Negative Impact	Profound Negative Impact
	Impacts On An Agricultural Holdings That Are:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Quantitative Statement	Qualitative Statement							
	Neutral	The number of impacts are not applicable as this assessment was based on a comparative analysis of each option under the criteria, farm type and size, farm buildings and yards/facilities, severance and viability. Impact assessments on individual agricultural constraints will be undertaken during Phase 3.							

Non-Agricultural Properties	Impact on Non-Agriculture Properties	Significant Positive Impact	Moderate Positive Impact	Slightly Positive Impact	Imperceptible Impact	Slightly Negative Impact	Moderate Negative Impact	Significant Negative Impact	Profound Negative Impact
	Number of Impacts That Are:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Quantitative Statement	Qualitative Statement							
	Slightly Negative	No residential, commercial or amenities would be impacted. BT services adjacent to the R449 to the north of the site may be impacted. Monetary compensation will be agreed for loss of land, buildings and other injurious affection, where necessary. The individual impacts of all properties impacted directly or indirectly will be assessed during Phase 3.							

Architectural Heritage	Impact on Architectural Heritage	Significant Positive Impact	Moderate Positive Impact	Slightly Positive Impact	Imperceptible Impact	Slightly Negative Impact	Moderate Negative Impact	Significant Negative Impact	Profound Negative Impact
	Number of Impacts That Are:	0	0	0	0	1	0	0	0
	Number of Impacts On Sites Of National Importance That Are:	0	0	0	0	0	0	0	0
	Quantitative Statement	Qualitative Statement							
	Slightly Negative	The preferred option would have a direct, negative, slight impact on fragmented demesne landscape associated with Castletown House (DL2).							

Archaeological & Cultural Heritage	Impact on Archaeological & Cultural Heritage		Significant Positive Impact	Moderate Positive Impact	Slightly Positive Impact	Imperceptible Impact	Slightly Negative Impact	Moderate Negative Impact	Significant Negative Impact	Profound Negative Impact
	Number of Impacts That Are:		0	0	0	0	1	0	0	0
	Number Of Impacts On Sites Of National Importance That Are:		0	0	0	0	0	0	0	0
	Quantitative Statement	Qualitative Statement								
Slightly Negative		The preferred option would have a direct, negative, slight impact on fragmented demesne landscape associated with Castletown House (DL2).								

Soils & Geology	Soils & Geology		Profound Positive	Significant Positive	Moderate Positive	Slightly Positive	Imperceptible	Slightly Negative	Moderate Negative	Significant Negative	Profound Negative
	Number of Impacts That Are:		0	0	0	0	0	0	0	0	0
	Quantitative Statement	Qualitative Statement									
	Slightly Negative		Junction 6 Celbridge is underlain entirely by poorly drained, mainly basic mineral soils, till derived from limestone subsoils and by the by the Lucan Formation.								

Hydrology	Hydrology		Profound Positive	Significant Positive	Moderate Positive	Slightly Positive	Imperceptible	Slightly Negative	Moderate Negative	Significant Negative	Profound Negative
	Number of Impacts That Are:		0	0	0	0	1	0	0	0	0
	Quantitative Statement	Qualitative Statement									
	Neutral		There would be no connection to the Rye Water Valley SAC. Imperceptible pollution risk expected during construction or operation because of the M4 level and proposed overbridge. Imperceptible increase in flood risk to the works.								

Hydrogeology	Hydrogeology		Profound Positive	Significant Positive	Moderate Positive	Slightly Positive	Imperceptible	Slightly Negative	Moderate Negative	Significant Negative	Profound Negative
	Number of Impacts That Are:		0	0	0	0	0	0	0	0	0
	Quantitative Statement	Qualitative Statement									
	Neutral		The preferred option is considered to have a not slightly negative impact on hydrogeology. There are no karst, aquifer classifications, groundwater sources, groundwater flooding areas or habitats identified.								

Overall Scale of Impact		Amended Scale of Impact	
Slightly Negative			

Project Appraisal Balance Sheet



Part C: Safety, Physical Activity, Economy, Accessibility and Social Inclusion and Integration Input Sheet

Safety	Collision Reduction		Total Collision Reduction	Casualty Reduction			Value Of Accident Reduction (€m)				
		What is the Collision/Casualty Reduction Over 30 Years?	NA	Fatal	Serious	Minor	NA				
		Quantitative Statement	Qualitative Statement								
	Moderately Positive	The preferred option would follow vulnerable road users' desire line from residential properties to key attractors to the south of the M4, including schools and commercial premises.									
Security	Security		Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		What is the Expected Impact Of The Project On The Security Of Road Users?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
	Moderately Positive	For the preferred option, the security of active travel users would be improved due to the segregation created between active travel users and vehicular traffic. In addition, the presence of dedicated vulnerable road user facilities on the primary desire line is seen as positive.									
Safety - Overall Scale of Impact			Safety - Amended Scale of Impact								
Moderately Positive											

Physical Activity	Ambience		Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		What is the expected impact of the project upon journey ambience?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Value of Benefit (€m)	Qualitative Statement							
	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.									
Absenteeism	Absenteeism		Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		What is the impact of the project on absenteeism?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Value of Benefit (€m)	Qualitative Statement							
	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.									
Reduced Health Risk	Reduced Health Risk		Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		What is the impact of the project on the reduction in relative risk for cyclists and walkers?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Value of Benefit (€m)	Qualitative Statement							
	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.									
Physical Activity - Overall Scale of Impact			Physical Activity - Amended Scale of Impact								
Moderately Positive											

Project Appraisal Balance Sheet

Part C: Safety, Physical Activity, Economy, Accessibility and Social Inclusion and Integration Input Sheet



			Consumer (€m)	Business (€m)	Other (€m)	Indirect Tax (€m)	Residual Value (€m)	Total Benefits (€m)				
		Efficiency and Effectiveness	What Are The Benefits Of The Scheme?	NA	NA	NA	NA	NA	NA	NA		
		Quantitative Statement										
		NA										
Economy		Wider Economic Impacts	What Impact Will The Project Have On....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Increase Competition In Markets?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		Lead To Efficiencies In Clustering Of Economic Activity? (Agglomeration Benefits)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		Attract Inward Investment?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		Expand Local Labour Supply?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		Contribute To Urban Regeneration	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		Quantitative Statement			Qualitative Statement							
		Neutral										
Funding Impacts		What Impact Will The Project Have On....	Don't Know / NA	None	< 10%	10%-30%	> 30%					
		What Percentage Of Non-Exchequer Funding Is The Project Expected To Receive?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>					
		Quantitative Statement			Qualitative Statement							
		Slightly Negative			The future funding mechanism for the Maynooth to Leixlip Project is not known at this stage. As the M4/N4 corridor forms part of the Comprehensive TEN-T network and provides a strategically important link to from the west and northwest to Dublin and Dublin Port, there may be potential to secure non-exchequer EU funding.							
Economy - Overall Scale of Impact			Economy - Amended Scale of Impact									
Neutral												

Project Appraisal Balance Sheet

Part C: Safety, Physical Activity, Economy, Accessibility and Social Inclusion and Integration Input Sheet



Accessibility and Social Inclusion	Deprived Areas	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Area Based Childhood Programme?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
		Rural Social Scheme?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
		Moderately Positive	The preferred option would provide improved access to services such as health, education and employment for vulnerable road users. In addition, the preferred would include enhanced accessibility to schools and commercial areas, because it would be directly on the desire line for vulnerable road users.								
Accessibility and Social Inclusion	Vulnerable Groups	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Access To Employment or Vital Infrastructure?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
		Moderately Positive	The preferred option would provide improved access to services such as health, education and employment for vulnerable road users. In addition, the preferred would include enhanced accessibility to schools and commercial areas, because it would be directly on the desire line for vulnerable road users.								
		Accessibility & Social Inclusion - Overall Scale of Impact			Accessibility & Social Inclusion - Amended Scale of Impact						
Moderately Positive											

Project Appraisal Balance Sheet

Part C: Safety, Physical Activity, Economy, Accessibility and Social Inclusion and Integration Input Sheet



Integration	Transport Integration	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Connectivity of the Strategic Road Network?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
		Connectivity Between Transport Modes?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
		Sustainable Transport Networks?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
		Access to Other Transport Infrastructure Such As Ports and Airports?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
		Moderately Positive	The preferred option would facilitate improved user comfort levels, safety, and vehicular movements. The preferred option may facilitate improvements to the operational efficiency of the M4/N4. The preferred option is ranked as slightly positive.								
Integration	Land Use Integration	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Objectives of Local and County Development Plans?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Strategic Connectivity for High Value Trips?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Urban Sprawl?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
		Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.								
Integration	Geographic Integration	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Cross Border Connectivity?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		The Trans European Transport network?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
		Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.								
Integration	Other Government Policy Integration	How Will This Project Impact On The Wider Objectives of.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Neutral	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		Quantitative Statement	Qualitative Statement								
		Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.								
Integration - Overall Scale of Impact			Integration - Amended Scale of Impact								
Moderately Positive											

Project Appraisal Balance Sheet

Part D: PABS Summary Table



Project Title		PRS Reference Number	KE-18-16505	Project Description				Scheme Cost (€m)	Date					
Maynooth to Leixlip Project		Modelling Base Year	2021	The Maynooth to Leixlip Project is an integrated and connected multi-modal holistic transport project aimed at assessing the needs of the M4/N4 mainline corridor and junctions from Junction 5 Leixlip to Junction 7 Maynooth in terms of operational efficiency and safety. It seeks to identify and assess interventions that would improve the operational efficiency and safety of the corridor in a sustainable manner.				€5.0m - Preferred Junction 6 Active Travel Option	02/11/2023					
		Scheme Opening Year	2032											
Criteria	Quantitative Statement	Summary of Keys Impacts (Qualitative Assessment)				Quantitative Assessment				Monetised (€m over 30 yrs)				
Environment	Air Quality and Climate	Neutral	It is not possible to develop a quantitative statement for the operational phase carbon as detailed traffic modelling with TII REM tool was not undertaken as part of Phase 2.				Additional CO ₂ (Tonnes)		#VALUE!		Value of Change in Emissions (€m) NA			
	Noise and vibration	Neutral	It is not possible to develop a quantitative statement for the number of sensitive receptors requiring mitigation as detailed noise models of the Reference Case and Do Something Scenarios have not been undertaken as part of Phase 2.				Ratio of CO ₂ Do-Min/Do-Some		NA					
							Index of Overall Change in Exposure NO ₂		Small Negative Index					
	Waste	Moderately Negative	Earthworks volumes in the waste assessment relate to bulk material only and they have not been classified into material types for Phase 2. The preferred option may result in a required import of 13,000m ³				Index of Overall Change in Exposure PM ₁₀		Small Negative Index					
							Sub Ben.	Mod Ben.	Sli Ben.	Negligible		Sli Adv.	Mod Adv.	Sub Adv.
	Landscape & Visual Amenity (incl. Light)	Slightly Negative	There are no nearby sensitive visual receptors and no significant visual effects are expected for th				No. of Sensitive Locations Experiencing Impacts That Are:		0	0		0		
							No. of Sensitive Receptors Requiring Mitigation		0					
	Biodiversity, Flora & Fauna	Slightly Negative	Impacts on 2 areas of wooded vegetation, mostly established Junction embankment wooded area as well as some motorway verge grassland.				No. of Sensitive Receptors Requiring Mitigation (Not Feasible)		0					
							Unacceptable Material/Contaminated Land/Hazardous Waste to be ...							
	Agriculture	Neutral	The number of impacts are not applicable as this assessment was based on a comparative analysis of each option under the criteria, farm type and size, farm buildings and yards/facilities, severance and viability. Impact assessments on individual agricultural constraints will be undertaken during Phase 3.				Disposed of Off Site	U1 [m ³ currently]	U2 [m ³ Not currently known.]	Left in Situ [m ³ land waste]		Not currently known.		
							PP	Sig P	Mod P	Sli P		I	Sli N	Mod N
	Non-Agricultural Properties	Slightly Negative	No residential, commercial or amenities would be impacted. BT services adjacent to the R449 to the north of the site may be impacted. Monetary compensation will be agreed for loss of land, buildings and other injurious affection, where necessary. The individual impacts of all properties impacted directly or indirectly will be assessed during Phase 3.				No. of Profound/Significant Impacts on Sites Of:		0	0		0		
							National		County			Other		
	Architectural Heritage	Slightly Negative	The preferred option would have a direct, negative, slight impact on fragmented demesne landscape associated with Castletown House (DL2).				Number of Positive Impacts		0	0		0		
Number of Negative Impacts							0	0	0	2	0			
Archaeological and Cultural Heritage	Slightly Negative	The preferred option would have a direct, negative, slight impact on fragmented demesne landscape associated with Castletown House (DL2).				Impact on Agricultural Holdings that are:								
						Sig P	Mod P	Sli P	I	Sli N	Mod N	Sig N	PN	
Soils & Geology	Slightly Negative	Junction 6 Celbridge is underlain entirely by poorly drained, mainly basic mineral soils, till derived from limestone subsoils and by the by the Lucan Formation.				Impact on Non-Agricultural Properties								
						Sig P	Mod P	Sli P	I	Sli N	Mod N	Sig N	PN	
Hydrology	Neutral	There would be no connection to the Rye Water Valley SAC. Imperceptible pollution risk expected during construction or operation because of the M4 level and proposed overbridge. Imperceptible increase in flood risk to the works.				Number Of Impacts That Are:								
						PP	Sig P	Mod P	Sli P	I	Sli N	Mod N	Sig N	PN
Hydrogeology	Neutral	The preferred option is considered to have a not slightly negative impact on hydrogeology. There are no karst, aquifer classifications, groundwater sources, groundwater flooding areas or habitats identified.				Number Of Impacts That Are:								
						PP	Sig P	Mod P	Sli P	I	Sli N	Mod N	Sig N	PN
Safety	Collision Reduction	Moderately Positive	The preferred option would follow vulnerable road users' desire line from residential properties to key attractors to the south of the M4, including schools and commercial premises.				Collision Reduction Over 30 Years				Value of Change (€m) NA			
	Security	Moderately Positive	For the preferred option, the security of active travel users would be improved due to the segregation created between active travel users and vehicular traffic. In addition, the presence of dedicated vulnerable road user facilities on the primary desire line is seen as positive.				Collisions	Casualties	Fatal	Serious		Minor		
Physical Activity	Ambience	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.								€0.0			
	Absenteeism	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.								€0.0			
	Reduced Health Risk	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.								€0.0			
Economy	Transport Efficiency and Effectiveness	NA	NA				Commute				Value of Change €0.0			
	Wider Economic Impact	Neutral	0				Business							
	Funding	Slightly Negative	The future funding mechanism for the Maynooth to Leixlip Project is not known at this stage. As the M4/N4 corridor forms part of the Comprehensive TEN-T network and provides a strategically important link to from the west and northwest to Dublin and Dublin Port, there may be potential to secure non-exchequer EU funding.				Other							
Accessibility and Social Inclusion	Deprived Geographic Areas	Moderately Positive	The preferred option would provide improved access to services such as health, education and employment for vulnerable road users. In addition, the preferred would include enhanced accessibility to schools and commercial areas, because it would be directly on the desire line for vulnerable road users.				Indirect Tax							
	Vulnerable Groups	Moderately Positive	The preferred option would provide improved access to services such as health, education and employment for vulnerable road users. In addition, the preferred would include enhanced accessibility to schools and commercial areas, because it would be directly on the desire line for vulnerable road users.				Res. Value							
Integration	Transport Integration	Moderately Positive	The preferred option would facilitate improved user comfort levels, safety, and vehicular movements. The preferred option may facilitate improvements to the operational efficiency of the M4/N4. The preferred option is ranked as slightly positive.				Impact on Deprived Areas							
	Land-Use Integration	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.				Moderately Positive							
	Geographical Integration	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.				Impact on Access to Employment or Vital Infrastructure							
	Integration with Other Government Policies	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.				Moderately Positive							
Overall Scale of Impact	Environmental	Slightly Negative	Economy	Neutral	Summary of Benefits				Present Value of Benefits (PVB)		N/A	Net Present Value (NPV)		N/A
	Safety	Moderately Positive	Accessibility & Social	Moderately Positive					Present Value of Costs (PVC)		N/A	Benefit to Cost Ratio (BCR)		N/A
	Physical Activity	Moderately Positive	Integration	Moderately Positive										



MAYNOOTH TO LEIXLIP PROJECT

Active Travel

Junction 5 Leixlip

Project Appraisal Balance Sheet (PABS)

Project Appraisal Balance Sheet

Part A: Project Context



Date	02/11/2023
Version No.	D01

Project Title	Maynooth to Leixlip Project
PRS Reference Number	KE-18-16505
Project Phase	Phase 2: Option Selection
National Roads Office	Kildare National Roads Office
TII Project Manager	

Project Description	The Maynooth to Leixlip Project is a project aimed at assessing the needs of the M4/N4 mainline corridor and junctions from Maynooth to Leixlip in terms of catering for future demand from a safety and operational efficiency perspective.
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Scheme Cost €m (OCE)	€3.3m - Preferred Junction 5 Active Travel Option
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What Are The Likely Sources of Non-Exchequer Funding	TBC
TII Growth Scenario	TII Central Growth

Appraisal Team Author	Gerard Hall/ Joshua Noon
Design Team Reviewer	Stephen Barry/ Gerard Hall
TII Engineering Inspector	Winston Douglas
External Auditor	Dan Brennan / Derek Brady (TII)

Modelling Base Year	2021
Scheme Opening Year	2032

Reference Number of Nearest TII Traffic Monitoring Unit(s)	TMU M04 020.0W, TMU M04 015.0E, TMU N04 000.0E
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Note - This PABS should be completed with reference to the latest version of TII PAG Unit 7.1. Users should always check that the correct version is followed prior to undertaking the PABS.
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Air Quality & Climate	Climate - Carbon Dioxide (CO ₂)					Quantitative Statement Parameter					
	Tonnes of CO ₂ produced in the Reference Case Scenario?					NA					
	Tonnes of CO ₂ produced in the Do Something Scenario?					NA					
	Ratio of CO ₂ produced in Do Something Scenario to Reference Case Scenario					NA					
	Greenhouse Gasses					Monetised Benefits (€m)					
	Value of change in emissions					NA					
	Significance Criteria				Substantial Beneficial	Moderate Beneficial	Slight Beneficial	Negligible	Slight Adverse	Moderate Adverse	Substantial Adverse
	Number of Sensitive Locations Experiencing Impacts That Are:				0	0	0	0	0	0	0
	Index of Overall Change in Exposure				Large Negative Index	Medium Negative Index	Small Negative Index	Small Positive Index	Medium Positive Index	Large Positive Index	
	Nitrogen Dioxide (NO ₂)				○	○	●	○	○	○	
	Particulate Matter (PM ₁₀)				○	○	●	○	○	○	
	Quantitative Statement		Qualitative Statement								
Neutral		It is not possible to develop a quantitative statement for the operational phase carbon as detailed traffic modelling with TII REM tool was not undertaken as part of Phase 2.									

Noise & Vibration	Sensitive Receptors		Quantitative Statement Parameter
	Number of Sensitive Receptors Requiring Mitigation (i.e. the three conditions have been satisfied) Per Kilometre		0
	Number of Sensitive Receptors Requiring Mitigation (i.e. the three conditions have been satisfied), But It Is Not Feasible To Mitigate Noise To The Required Level Per Kilometre		0
	Quantitative Statement	Qualitative Statement	
	Neutral	It is not possible to develop a quantitative statement for the number of sensitive receptors requiring mitigation as detailed noise models of the Reference Case and Do Something Scenarios have not been undertaken as part of Phase 2, however, the preferred option has 2 sensitive receptors. Long term, the impacts are neutral.	

Waste	Unacceptable Material		Quantitative Statement Parameter No. (m ³)
	Quantity Of Unacceptable Material Class U1 To Be Disposed Of Off Site?		Not currently known.
	Quantity Of Unacceptable Material Class U2 To Be Disposed Of Off Site?		Not currently known.
	Quantity Of Unacceptable Material and Contaminated Land/Hazardous Waste To Be Left In Situ?		Not currently known.
	Quantitative Statement	Qualitative Statement	
Neutral	Earthworks volumes in the waste assessment relate to bulk material only and they have not been classified into material types for Phase 2. The preferred option may result in a required import of 0m3		

Project Appraisal Balance Sheet

Part B: Environment



Landscape & Visual Amenity (incl. Light)	Landscape & Visual Amenity (incl. Light)	Profound Positive	Significant Positive	Moderate Positive	Slightly Positive	Imperceptible	Slightly Negative	Moderate Negative	Significant Negative	Profound Negative
	Number of Impacts That Are:	0	0	0	0	0	0	0	0	0
		National Landscape Designation / Listing			County Landscape Designation / Listing			Other Areas of Significant Landscape Value/Amenity		
	Number of Profound / Significant Impacts On Sites Of:	0			0			0		
	Quantitative Statement	Qualitative Statement								
Slightly Negative	There are no nearby sensitive visual receptors and no significant visual effects are expected for the preferred option									

Biodiversity - Flora & Fauna	Impact on Ecological Receptors	International Importance	National Importance	County Importance	Local Importance (Higher value)	Local Importance (Lower value)
	Number of Significant Positive Impacts On Ecological Receptors Of:	0	0	0	0	0
	Number of Significant Negative Impacts On Ecological Receptors Of:	0	0	0	4	0
	Quantitative Statement	Qualitative Statement				
	Slightly Negative	Impacts on 4 areas of wooded vegetation, mostly established Junction embankment wooded area as well as some motorway verge grassland.				

Agriculture	Impact on Agriculture Holdings	Significant Positive Impact	Moderate Positive Impact	Slightly Positive Impact	Imperceptible Impact	Slightly Negative Impact	Moderate Negative Impact	Significant Negative Impact	Profound Negative Impact	
	Impacts On An Agricultural Holdings That Are:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	Quantitative Statement	Qualitative Statement								
	Neutral	The number of impacts are not applicable as this assessment was based on a comparative analysis of each option under the criteria, farm type and size, farm buildings and yards/facilities, severance and viability. Impact assessments on individual agricultural constraints will be undertaken during Phase 3.								

Non-Agricultural Properties	Impact on Non-Agriculture Properties	Significant Positive Impact	Moderate Positive Impact	Slightly Positive Impact	Imperceptible Impact	Slightly Negative Impact	Moderate Negative Impact	Significant Negative Impact	Profound Negative Impact	
	Number of Impacts That Are:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	Slightly Negative	No residential, commercial or amenities impacted. A foul sewer crosses the preferred option. Monetary compensation will be agreed for loss of land, buildings and other injurious affection, where necessary. The individual impacts of all properties impacted directly or indirectly will be assessed during Phase 3.								

Architectural Heritage	Impact on Architectural Heritage	Significant Positive Impact	Moderate Positive Impact	Slightly Positive Impact	Imperceptible Impact	Slightly Negative Impact	Moderate Negative Impact	Significant Negative Impact	Profound Negative Impact	
	Number of Impacts That Are:	0	0	0	0	0	0	0	0	
	Number of Impacts On Sites Of National Importance That Are:	0	0	0	0	0	0	0	0	
	Quantitative Statement	Qualitative Statement								
	Neutral	The preferred option would not result in any negative direct or indirect impacts upon the archaeological, architectural or cultural heritage resource.								

Project Appraisal Balance Sheet

Part B: Environment



Archaeological & Cultural Heritage	Impact on Archaeological & Cultural Heritage	Significant Positive Impact	Moderate Positive Impact	Slightly Positive Impact	Imperceptible Impact	Slightly Negative Impact	Moderate Negative Impact	Significant Negative Impact	Profound Negative Impact
	Number of Impacts That Are:	0	0	0	0	0	0	0	0
Number Of Impacts On Sites Of National Importance That Are:	0	0	0	0	0	0	0	0	0
Quantitative Statement	Qualitative Statement								
Neutral	The preferred option would not result in any negative direct or indirect impacts upon the archaeological, architectural or cultural heritage resource.								

Soils & Geology	Soils & Geology	Profound Positive	Significant Positive	Moderate Positive	Slightly Positive	Imperceptible	Slightly Negative	Moderate Negative	Significant Negative	Profound Negative
	Number of Impacts That Are:	0	0	0	0	0	0	0	0	0
Quantitative Statement	Qualitative Statement									
Slightly Negative	Junction 5 Leixlip is underlain by made ground associated with the western limits of Lucan urban centre, underlain by till derived from limestone subsoils and the Lucan Formation.									

Hydrology	Hydrology	Profound Positive	Significant Positive	Moderate Positive	Slightly Positive	Imperceptible	Slightly Negative	Moderate Negative	Significant Negative	Profound Negative
	Number of Impacts That Are:	0	0	0	0	1	0	0	0	0
Quantitative Statement	Qualitative Statement									
Neutral	There would be no connection to the Rye Water Valley SAC. Imperceptible pollution risk expected during construction or operation because of the M4 level and proposed overbridge. Imperceptible increase in flood risk to the works.									

Hydrogeology	Hydrogeology	Profound Positive	Significant Positive	Moderate Positive	Slightly Positive	Imperceptible	Slightly Negative	Moderate Negative	Significant Negative	Profound Negative
	Number of Impacts That Are:	0	0	0	0	0	0	0	0	0
Quantitative Statement	Qualitative Statement									
Neutral	The preferred option is considered to have a not slightly negative impact on hydrogeology. There are no karst, aquifer classifications, groundwater sources, groundwater flooding areas or habitats identified.									

Overall Scale of Impact	Amended Scale of Impact
Neutral	

Project Appraisal Balance Sheet

Part C: Safety, Physical Activity, Economy, Accessibility and Social Inclusion and Integration Input Sheet



Safety	Collision Reduction		Total Collision Reduction	Casualty Reduction			Value Of Accident Reduction (€m)			
		What is the Collision/Casualty Reduction Over 30 Years?	NA	Fatal	Serious	Minor	NA			
		Quantitative Statement	Qualitative Statement							
	Moderately Positive	The preferred option would remove vulnerable road users for the existing overbridge to a dedicated active travel structure. This would result in a potential decrease in collisions								
Security	Security		Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive
		What is the Expected Impact Of The Project On The Security Of Road Users?	○	○	○	○	○	●	○	○
		Quantitative Statement	Qualitative Statement							
	Moderately Positive	For the preferred option, the security of active travel users would be improved due to the segregation created between active travel users and vehicular traffic								
Safety - Overall Scale of Impact			Safety - Amended Scale of Impact							
Moderately Positive										

Physical Activity	Ambience		Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive
		What is the expected impact of the project upon journey ambience?	○	○	○	○	●	○	○	○
		Quantitative Statement	Value of Benefit (€m)	Qualitative Statement						
	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.								
Absenteeism	Absenteeism		Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive
		What is the impact of the project on absenteeism?	○	○	○	○	●	○	○	○
		Quantitative Statement	Value of Benefit (€m)	Qualitative Statement						
	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.								
Reduced Health Risk	Reduced Health Risk		Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive
		What is the impact of the project on the reduction in relative risk for cyclists and walkers?	○	○	○	○	●	○	○	○
		Quantitative Statement	Value of Benefit (€m)	Qualitative Statement						
	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.								
Physical Activity - Overall Scale of Impact			Physical Activity - Amended Scale of Impact							
Moderately Positive										

Project Appraisal Balance Sheet

Part C: Safety, Physical Activity, Economy, Accessibility and Social Inclusion and Integration Input Sheet



		Consumer (€m)	Business (€m)	Other (€m)	Indirect Tax (€m)	Residual Value (€m)	Total Benefits (€m)			
Economy	Efficiency and Effectiveness	What Are The Benefits Of The Scheme?	NA	NA	NA	NA	NA	NA		
		Quantitative Statement								
		NA								
	Wider Economic Impacts	What Impact Will The Project Have On....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive
		Increase Competition In Markets?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Lead To Efficiencies In Clustering Of Economic Activity? (Agglomeration Benefits)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Attract Inward Investment?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Expand Local Labour Supply?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Contribute To Urban Regeneration	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement							
Neutral										
Funding Impacts	What Impact Will The Project Have On....	Don't Know / NA	None	< 10%	10%-30%	> 30%				
	What Percentage Of Non-Exchequer Funding Is The Project Expected To Receive?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
	Quantitative Statement	Qualitative Statement								
Slightly Negative		The future funding mechanism for the Maynooth to Leixlip Project is not known at this stage. As the M4/N4 corridor forms part of the Comprehensive TEN-T network and provides a strategically important link to from the west and northwest to Dublin and Dublin Port, there may be potential to secure non-exchequer EU funding.								
Economy - Overall Scale of Impact		Economy - Amended Scale of Impact								
Neutral										

Project Appraisal Balance Sheet

Part C: Safety, Physical Activity, Economy, Accessibility and Social Inclusion and Integration Input Sheet



Accessibility and Social Inclusion	Deprived Areas	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Area Based Childhood Programme?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
		Rural Social Scheme?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
	Slightly Positive	The preferred option would provide improved access to services such as health, education and employment for vulnerable road users.									
	Vulnerable Groups	What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
		Access To Employment or Vital Infrastructure?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
		Slightly Positive	The preferred option would provide improved access to services such as health, education and employment for vulnerable road users.								
	Accessibility & Social Inclusion - Overall Scale of Impact		Accessibility & Social Inclusion - Amended Scale of Impact								
Slightly Positive											

Project Appraisal Balance Sheet

Part C: Safety, Physical Activity, Economy, Accessibility and Social Inclusion and Integration Input Sheet



		What Impact Will The Project Have On.....	Don't Know / NA	Highly Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Highly Positive	
Integration	Transport Integration	Connectivity of the Strategic Road Network?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	
		Connectivity Between Transport Modes?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
		Sustainable Transport Networks?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
		Access to Other Transport Infrastructure Such As Ports and Airports?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
		Moderately Positive	The preferred option would facilitate improved user comfort levels, safety, and vehicular movements. The preferred option may facilitate improvements to the operational efficiency of the M4/N4. The preferred option is ranked as slightly positive.								
	Land Use Integration	Objectives of Local and County Development Plans?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Strategic Connectivity for High Value Trips?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Urban Sprawl?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
		Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.								
	Geographic Integration	Cross Border Connectivity?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		The Trans European Transport network?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Quantitative Statement	Qualitative Statement								
Neutral		At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.									
Other Government Policy Integration	How Will This Project Impact On The Wider Objectives of....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
	Quantitative Statement	Qualitative Statement									
	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.									
Integration - Overall Scale of Impact		Integration - Amended Scale of Impact									
Slightly Positive											

Project Appraisal Balance Sheet

Part D: PABS Summary Table



Project Title		PRS Reference Number	KE-18-16505	Project Description				Scheme Cost (€m)	Date	
Maynooth to Leixlip Project		Modelling Base Year	2021	The Maynooth to Leixlip Project is a project aimed at assessing the needs of the M4/N4 mainline corridor and junctions from Maynooth to Leixlip in terms of catering for future demand from a safety and operational efficiency perspective.				€3.3m - Preferred Junction 5 Active Travel Option	02/11/2023	
		Scheme Opening Year	2032							
Criteria	Quantitative Statement	Summary of Keys Impacts (Qualitative Assessment)			Quantitative Assessment				Monetised (€m over 30 yrs)	
Environment	Air Quality and Climate	Neutral	It is not possible to develop a quantitative statement for the operational phase carbon as detailed traffic modelling with TII REM tool was not undertaken as part of Phase 2.			Additional CO ₂ (Tonnes)		#VALUE!		Value of Change in Emissions (€m) NA
	Noise and vibration	Neutral	It is not possible to develop a quantitative statement for the number of sensitive receptors requiring mitigation as detailed noise models of the Reference Case and Do Something Scenarios have not been undertaken as part of Phase 2, however, the preferred option has 2 sensitive receptors. Long term, the impacts are neutral.			Ratio of CO ₂ Do-Min/Do-Some		NA		
	Waste	Neutral	Earthworks volumes in the waste assessment relate to bulk material only and they have not been classified into material types for Phase 2. The preferred option may result in a required import of 0m ³			Index of Overall Change in Exposure NO ₂		Small Negative Index		
	Landscape & Visual Amenity (incl. Light)	Slightly Negative	There are no nearby sensitive visual receptors and no significant visual effects are expected for th			Index of Overall Change in Exposure PM ₁₀		Small Negative Index		
	Biodiversity, Flora & Fauna	Slightly Negative	Impacts on 4 areas of wooded vegetation, mostly established Junction embankment wooded area as well as some motorway verge grassland.			Sub Ben. Mod Ben Sli Ben.		Negligible Sli Adv. Mod Adv. Sub Adv.		
	Agriculture	Neutral	The number of impacts are not applicable as this assessment was based on a comparative analysis of each option under the criteria, farm type and size, farm buildings and yards/facilities, severance and viability. Impact assessments on individual agricultural constraints will be undertaken during Phase 3.			No. of Sensitive Receptors Requiring Mitigation		0		
	Non-Agricultural Properties	Slightly Negative	No residential, commercial or amenities impacted. A foul sewer crosses the preferred option. Monetary compensation will be agreed for loss of land, buildings and other injurious affection, where necessary. The individual impacts of all properties impacted directly or indirectly will be assessed during Phase 3.			No. of Sensitive Receptors Requiring Mitigation (Not Feasible)		0		
	Architectural Heritage	Neutral	The preferred option would not result in any negative direct or indirect impacts upon the archaeological, architectural or cultural heritage resource.			Unacceptable Material/Contaminated Land/Hazardous Waste to be ...				
	Archaeological and Cultural Heritage	Neutral	The preferred option would not result in any negative direct or indirect impacts upon the archaeological, architectural or cultural heritage resource.			Disposed of Off Site		U1 [m ³] currently U2 [m ³] Not currently known. Left in Situ [m ³ land waste] Not currently known.		
	Soils & Geology	Slightly Negative	Junction 5 Leixlip is underlain by made ground associated with the western limits of Lucan urban centre, underlain by till derived from limestone subsoils and the Lucan Formation.			PP Sig P Mod P Sli P		I Sli N Mod N Sig N PN		
	Hydrology	Neutral	There would be no connection to the Rye Water Valley SAC. Imperceptible pollution risk expected during construction or operation because of the M4 level and proposed overbridge. Imperceptible increase in flood risk to the works.			Sig P Mod P Sli P		I Sli N Mod N Sig N PN		
	Hydrogeology	Neutral	The preferred option is considered to have a not slightly negative impact on hydrogeology. There are no karst, aquifer classifications, groundwater sources, groundwater flooding areas or habitats identified.			Sig P Mod P Sli P		I Sli N Mod N Sig N PN		
	Safety	Collision Reduction	Moderately Positive	The preferred option would remove vulnerable road users for the existing overbridge to a dedicated active travel structure. This would result in a potential decrease in collisions			Collisions		Casualties Fatal Serious Minor	
Security		Moderately Positive	For the preferred option, the security of active travel users would be improved due to the segregation created between active travel users and vehicular traffic			NA		N/A NA NA NA NA		
Physical Activity	Ambience	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.							€0.0
	Absenteeism	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.							€0.0
	Reduced Health Risk	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across each of the Physical Activity sub-criteria.							€0.0
Economy	Transport Efficiency and Effectiveness	NA	NA							Commute Business Other Value of Change NA NA NA
	Wider Economic Impact	Neutral	0							Indirect Tax Res. Value NA NA €0.0
Accessibility and Social Inclusion	Deprived Geographic Areas	Slightly Positive	The preferred option would provide improved access to services such as health, education and employment for vulnerable road users.							Expected Percentage of Non-Exchequer Funding Slightly Negative Impact on Deprived Areas Slightly Positive Impact on Access to Employment or Vital Infrastructure Slightly Positive
	Vulnerable Groups	Slightly Positive	The preferred option would provide improved access to services such as health, education and employment for vulnerable road users.							
Integration	Transport Integration	Moderately Positive	The preferred option would facilitate improved user comfort levels, safety, and vehicular movements. The preferred option may facilitate improvements to the operational efficiency of the M4/N4. The preferred option is ranked as slightly positive.							Summary of Benefits Present Value of Benefits (PVB) Net Present Value (NPV) Present Value of Costs (PVC) €0 Benefit to Cost Ratio (BCR) 0.00
	Land-Use Integration	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.							
	Geographical Integration	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.							
	Integration with Other Government Policies	Neutral	At this stage in the option selection process, it is not possible to fully quantify the impacts of the scheme options across all of the Integration sub-criteria.							
Overall Scale of Impact		Environmental	Neutral	Economy	Neutral					
		Safety	Moderately Positive	Accessibility & Social	Slightly Positive					
		Physical Activity	Moderately Positive	Integration	Slightly Positive					