Appendix C. Junction Strategy Assessment

ATKINS
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SYSTRA

N25 Waterford to Glenmore

Junction Assessment Technical Note

Kilkenny County Council

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1. Introduction

1.1. Overview

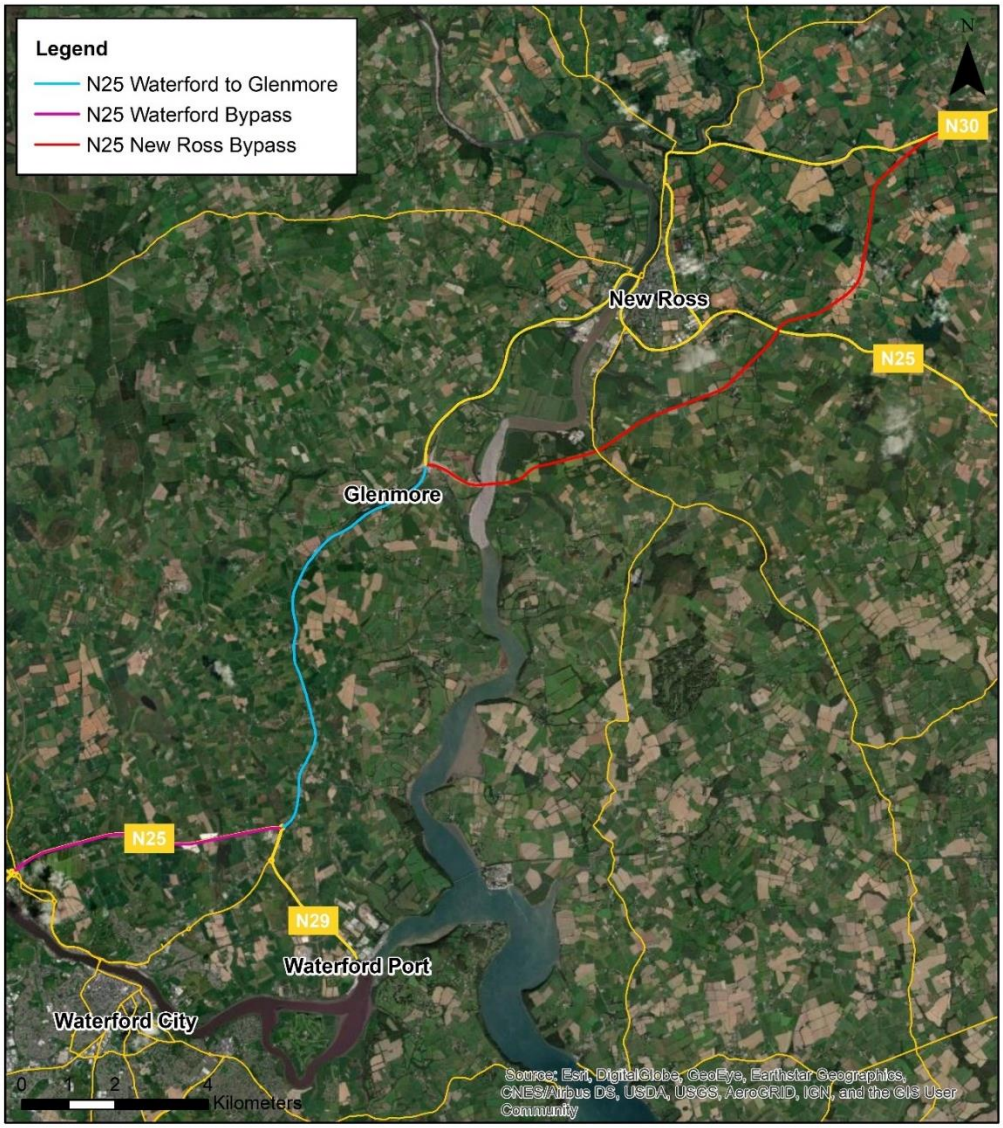
The purpose of this technical note is to outline the high-level economic appraisal of different junction options and types considered to inform Phase 2 Route Selection of the N25 Glenmore to Waterford Scheme. The junction options were assessed using outputs from the N25 Local Area Model, the development of which is outlined in the Traffic Modelling Report. This note considers only the economic benefits of the provision of different junction options. There will be likely safety and environmental factors and impacts that should also be considered.

Junction locations & design outlined in this note are indicative only and are subject to change during the next phase of the road design process. These changes may include elimination of junction proposals developed for this Phase 2 assessment. The junction strategy for the emerging preferred route option will also be considered and assessed in more depth as part of the Phase 3 design and appraisal.

1.1.1. Project Description

The N25 forms a vital link in the national road network connecting Cork at one end to the port of Rosslare at the other end, with a link to Waterford City from the N25 between these locations. It provides access to 4 of the country's major ports, Cork, Waterford, New Ross and Rosslare. It also provides access to 2 airports, Cork and Waterford. The extents of the N25 corridor under consideration is as illustrated on Figure 1.1 below.

Figure 1.1 Project Extents



There are a significant number of accesses onto the existing N25 from both local roads and private property. The existing road connects to the N25 Waterford Bypass and recently opened New Ross Bypass via two at grade roundabouts built as part of construction of these separate schemes.

1.1.2. Project Background

The planning, design and appraisal of the N25 Waterford to Glenmore originally commenced in 2007 with the Constraints Report issued in 2008 and the Phase 2 PAG Deliverables including Route Selection report finalised in 2011. This work was undertaken by Tramore House Regional Design Office (THDRO) on behalf of Kilkenny County Council (KCC).

The project was recommenced in 2019 with Phase 1 of the project completed in early 2021. The updated Phase 2 deliverables are currently being prepared, including the Phase Traffic Modelling Report and Cost Benefits Analysis Report, along with the revised Route Selection Report.

2. Existing N25 Junctions

2.1. Existing Side Road Traffic Volumes

The existing N25 has a significant number of local road junctions and private access points along its length. Figure 2.1 illustrates the location of all side road junctions along the existing N25 surveyed as part of the Local Area Model Development. This excludes private property accesses and some minor access road. Table 2.1 on the following page outlines the estimated AADT along each of these roads. As shown, the traffic volumes along the existing side roads are very low with the highest estimated AADT just 410.

Figure 2.1 Existing N25 Side Roads

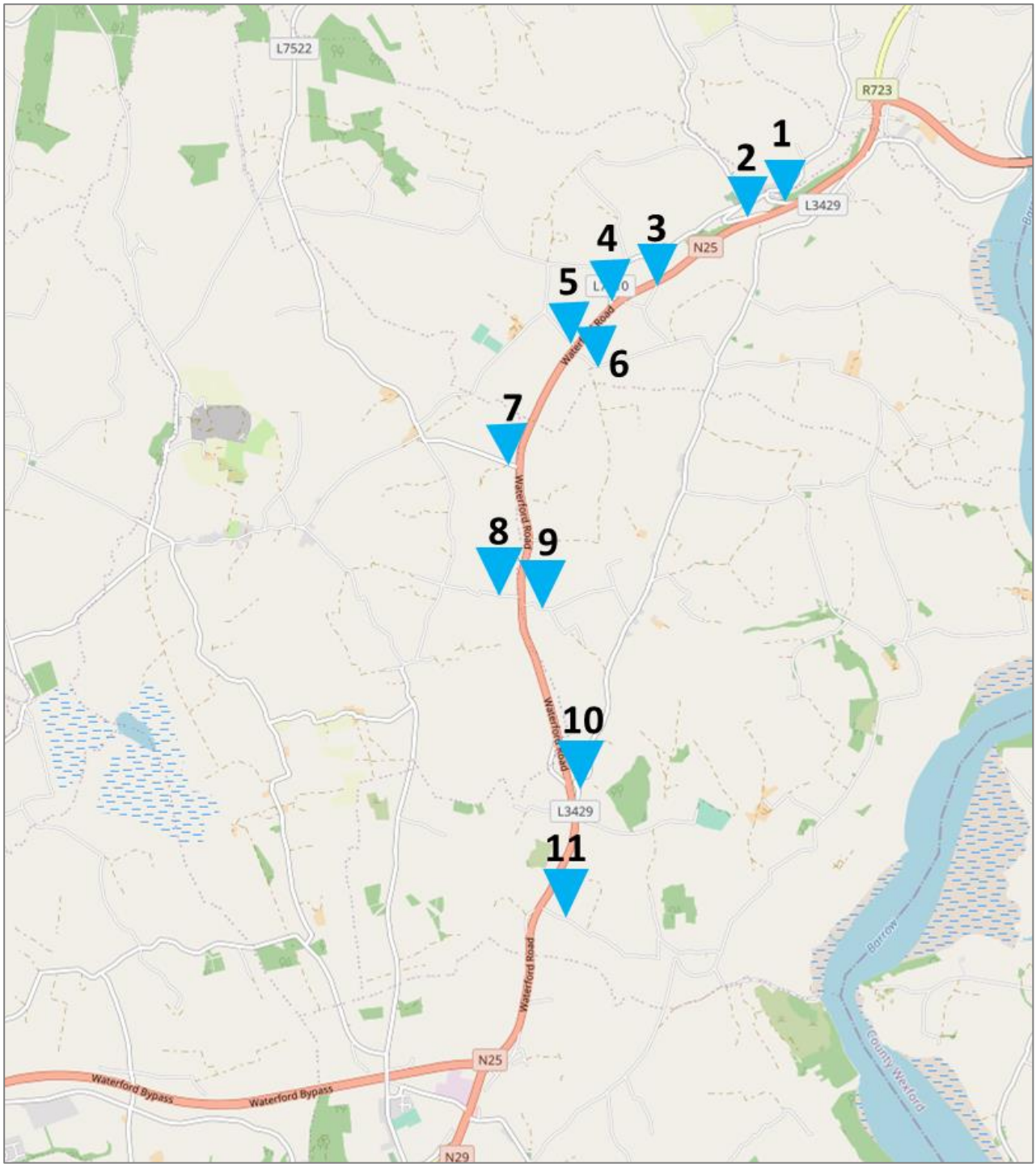


Table 2-1 Existing N25 Side Roads

Location	Road	Estimated AADT*
1	L7510	163
2	L7510	173
3	L7517	137
4	L7510	302
5	L7518	283
6	L7518	347
7	L7522	399
8	L7469	147
9	L7523	47
10	L3429	282
11	L7470	410

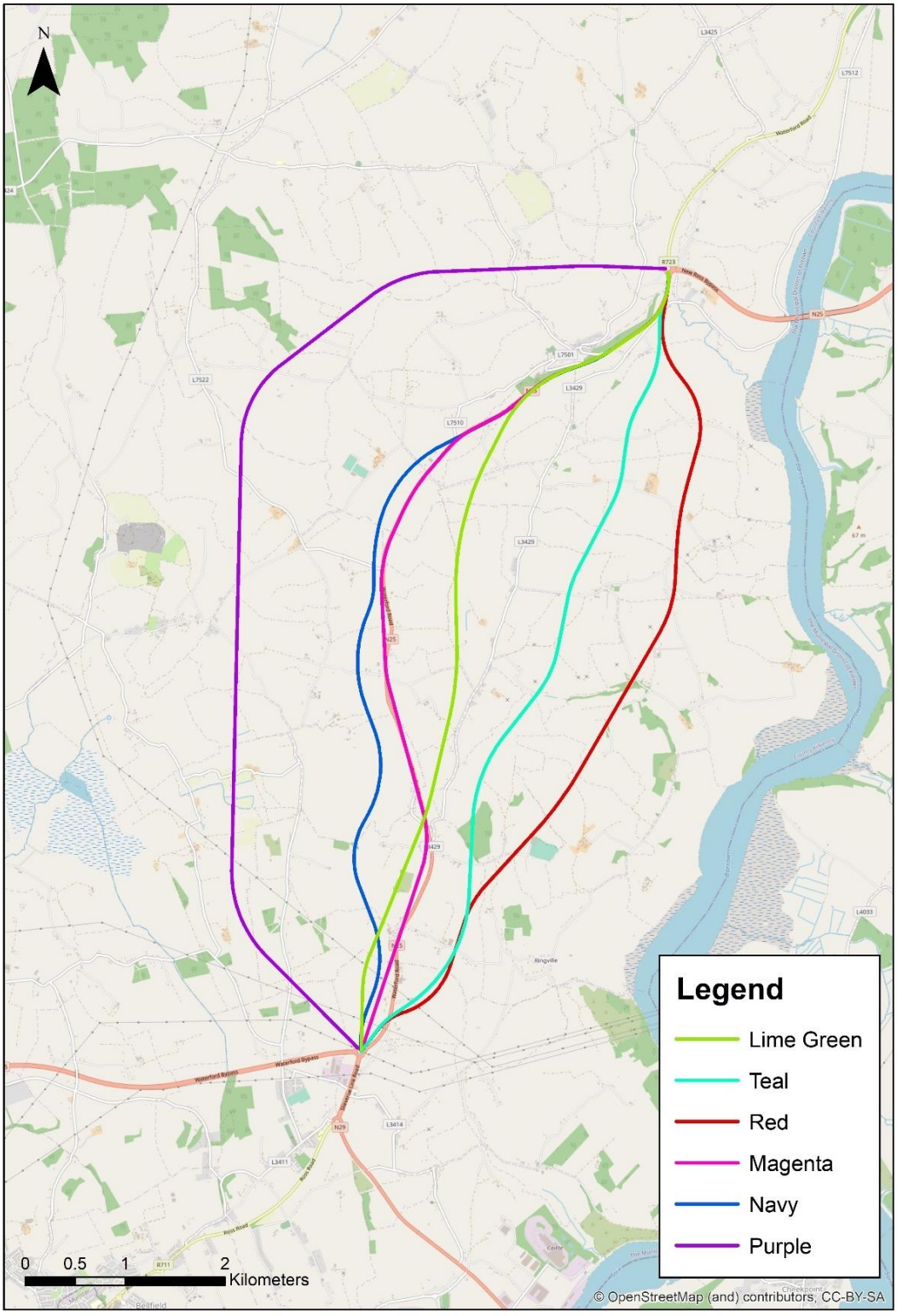
**Estimated from 2019 12 Hour Junction Turning Count*

3. Junction Options Considered

3.1. Route Options

In total, there are 6 route options being considered as part of the Stage ii Route Options Assessment. Each of the routes is shown below in Figure 3.1. There are 5 offline options and 1 online upgrade option (magenta route). Further information on the modelling of the route options can be found in Section 5 of the traffic modelling report.

Figure 3.1 Stage II Route Options



3.2. Junction Options

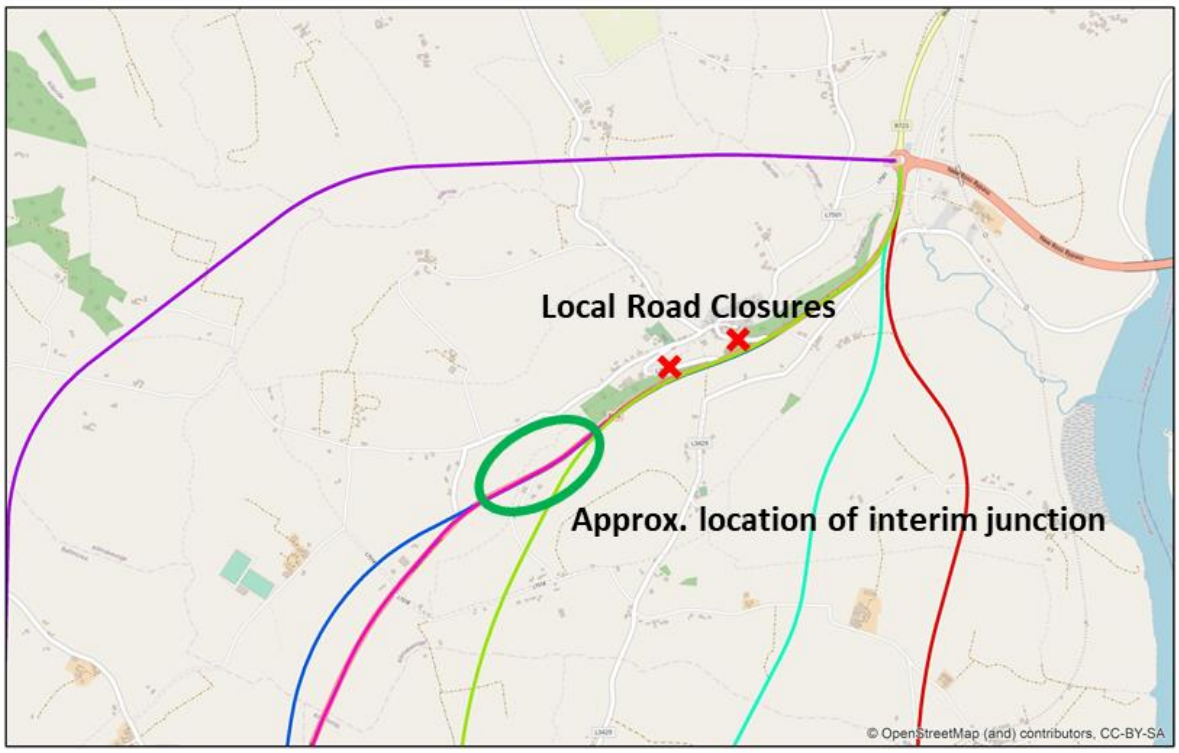
3.2.1. Interim Junction Options

As outlined in Section 2, the traffic volumes along the existing N25 side roads are low and there are no links of strategic importance between the tie ins with New Ross and Waterford Bypasses. It is therefore proposed to limit the number of interim junctions as far as possible to improve the safety and efficiency and also to limit the cost of construction of the proposed route options.

For the purple, teal and red route there is no interim junctions proposed as there is limited interaction between these route options and the existing N25. All current access points on the existing N25 will be maintained. The Navy, Magenta and Lime Green Routes have also been assessed with no interim junctions. However, these routes have also been modelled with one interim junction where each option ties into the existing N25 south of Glenmore as the existing L7510 accesses will need to be closed to facilitate the online upgrade of the N25 north of these tie ins.

This interim junction has been assessed as a both a compact junction and roundabout. Compact junctions are suitable where the major road AADT is between 12,500-30,000 AADT and where there is very low flow on the minor road. As discussed in Phase 2 Traffic Modelling Report for the scheme the AADT of the Magenta, Lime Green and Navy routes varies between 15,300 & 16,000 in the design year of 2045. Roundabouts are more suited to an even balance of flows on major and minor roads. Figures 3.2 outlines the indicative location of the interim junction and the proposed road closures.

Figure 3.2 Indicative Interim Junction Location



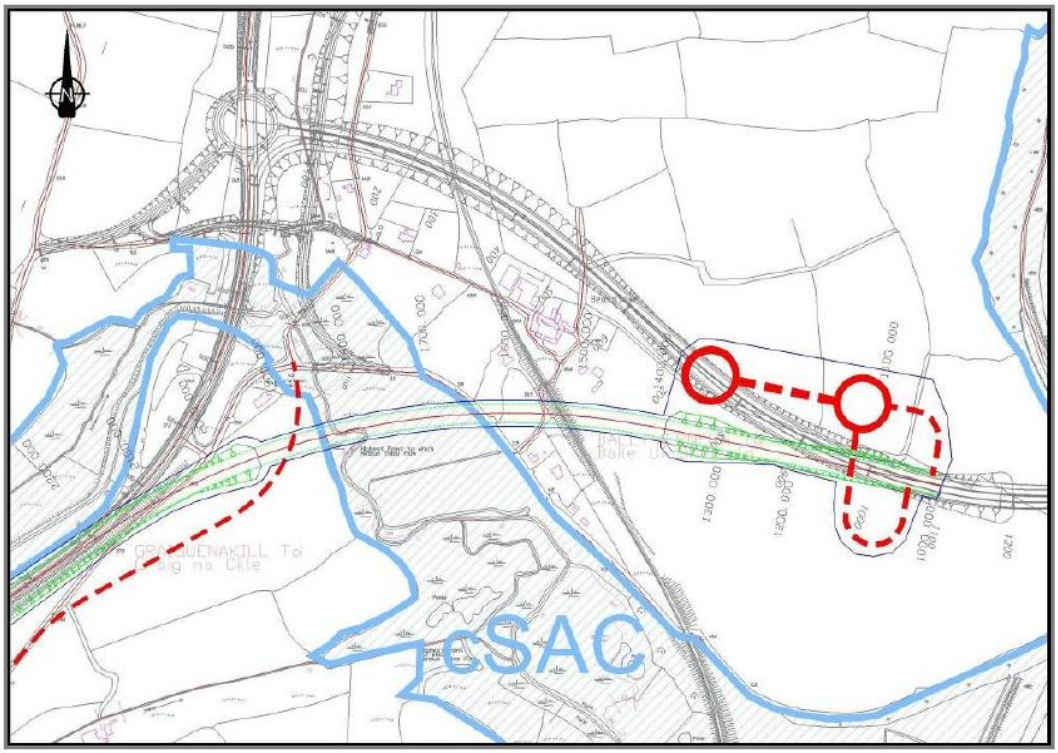
3.2.1.1. Local Access Requirements

Current TII guidance advises that 'the creation of any additional access point from new development or the generation of increased traffic from existing accesses to national roads' should be avoided. Therefore, there will be no access points onto the proposed N25 Waterford to Glenmore Scheme except at junctions or where there is a requirement for emergency access.

3.2.2. Northern Junction Option

The orientation of the New Ross Bypass Scheme to the existing N25 and the Special Area of conservation makes the provision of a free-flow mainline with standard grade separated junction difficult to facilitate due the space requirements needed. However, a grade separated option similar to that shown in Figure 3.3 has been modelled for each of route options. This would require a viaduct over the special area of conservation.

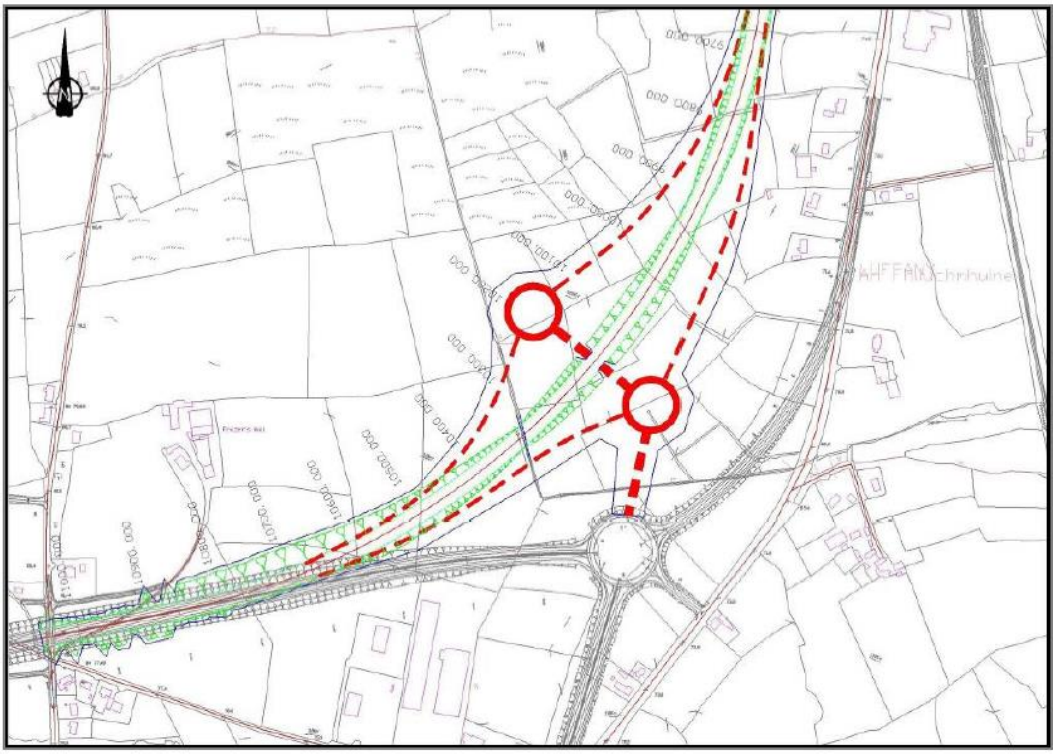
Figure 3.3 Alternative Northern Junction



3.2.3. Southern Junction Options

The orientation and acute angle of the Waterford Bypass Scheme to the line of the route options make the provision of a free-flow mainline with a grade separated junction difficult to facilitate. However, a grade separated option similar to that shown in Figure 3.4 has been modelled for each option.

Figure 3.4 Alternative Southern Junction



4. Junction Assessment

4.1. Overview

As the traffic volumes and therefore incremental change in benefits as a result of the junction change for each route is similar, the results for just one route, the Lime Green, are presented here. The time savings and resultants benefits for each option modelled have been calculated against the option with no interim junctions and with the northern and southern junctions as per the existing roundabout arrangement. The change in benefits is therefore entirely driven by the change of junction type. The options modelled are outlined in Table 4-2 for clarity. The junctions were not modelled cumulatively as there is limited or no interaction between them.

Table 4-1 Scenarios Assessed

Scenario	Description
Reference Case	No interim junctions between the Waterford and New Ross Bypass and Northern and Southern Tie ins as per existing roundabout arrangements.
Interim Roundabout	Interim Roundabout Junction connecting existing N25 for route options online sections. Northern and Southern Tie ins as per existing roundabout arrangements.
Interim Compact Junction	Interim Compact Junction connecting existing N25 for route options online sections. Northern and Southern Tie ins as per existing roundabout arrangements.
Northern Grade Separated Junction	Grade Separated Junction with viaduct over SAC connecting route options with N25 New Ross Bypass, as per Figure 3.3.
Southern Grade Separated Junction	Grade Separated Junction with mainline connecting route options with N25 Waterford Bypass and Spur to existing N29 roundabout, as per Figure 3.4.

The benefits have been estimated based on the modelled time savings by vehicle type (light and heavy vehicles) for the forecast year of 2030, 2045 and 2060. A value of time was then applied to these vehicle time savings based on the values contained within TII's Project Appraisal Guidelines Unit 6.11 – National Parameters Values Sheet to calculate the monetised time savings. The split between journey purpose was also taken from Unit 6.11. The benefits were estimated for a 30- year appraisal period and are discounted at 4% yearly. The cost for each junction type was based on the average estimated cost for junctions by type as outlined in Table 4.2. An additional cost of €40m was assumed for the construction of the viaduct required over the special area of conservation to facilitate the Northern grade separated junction.

Table 4-2 Cost by Junction Type

Junction Type	Average Cost (€m)
Grade Separated Junction	4.0
Grade Separated Compact Junction	2.5
Roundabouts on Single Carriageways	0.56
Roundabouts on Type 2 Dual Carriageways	1.35

This is intended as high-level appraisal to inform the preliminary junction strategy for the Phase 2 Route Options. It does not account for safety, residual benefits or environmental and engineering feasibility. The final Cost-Benefit Analysis of the Phase 2 Route Options to be undertaken when costs for the route options are developed will account for safety and residual benefits.

4.2. Interim Junction Option

As outlined 2 different interim junctions have been assessed, a roundabout and compact junction and compared to the reference case with no interim junction. The roundabout option for the interim junction performs poorly reducing travel times for mainline traffic when compared against the reference case. The mainline traffic which

was previously free flow now must pass through the interim roundabout resulting in travel time disbenefits despite decreased journey times for local traffic.

However, the compact interim junction delivers overall journey time benefits compared to the reference case. Based on an approximate cost of €2.5m this results in Benefit-Cost ratio of 1.428 when compared to the option with no interim junction, as outlined in Table 4.3. This delivers reasonable value for money.

Table 4-3 Interim Junction Option Assessment Results

	Roundabout	Compact Junction
Estimated Journey Time Benefits	-2,553,542	3,571,040
Estimated Cost	1,350,000	2,500,000
Preliminary BCR	-1.89	1.428

4.3. Northern Junction Option

Whilst the grade separated junction between the N25 Glenmore to Waterford and N25 New Ross Bypass does deliver some journey time benefits, as outlined in Table 4.3, they do not offset the significant cost of providing a viaduct to enable the mainline connection over the SAC. Overall, the junction has an estimated BCR of 0.12 which is considered very poor value for money. There are likely also significant environmental impacts to be considered as a result of the construction through the SAC.

Table 4-4 Northern Junction Option Assessment Results

Estimated Journey Time Benefits	5,246,995
Estimated Cost	44,000,000
Preliminary BCR	0.119

4.4. Southern Junction Option

The southern grade separated junction results in overall journey time disbenefits and thus a negative BCR. This is due to the traffic patterns at this junction. Currently approximately 50% of demand on the existing N25 travels to/from the N29. This traffic experiences delays with a grade separated junction due to the longer travel path to the upgraded route. This delay does not outweigh the benefits for mainline traffic travelling between the N25 and N25 Waterford Bypass. The more even balance of flows across this junction is more suited to roundabout junction type.

Table 4-5 Southern Junction Option Assessment Results

Estimated Journey Time Benefits	-2,808,939
Estimated Cost	4,000,000
Preliminary BCR	-0.702

5. Recommendations

Based on the results of the assessment outlined in Section 4 it is recommended that an interim compact junction is provided for the Navy, Lime Green and Magenta route options. This is based on the time savings and journey time benefits resulting from the inclusion of the interim junction which have been shown to exceed the cost of the provision of the junction, resulting in a BCR of 1.428. No interim junction is recommended for the Purple, Teal and Red as they have limited interactions with the existing N25 mainline and all current accesses will remain open.

Based on the low, or negative, preliminary BCRs for grade separated junctions at the Northern and Southern Tie In with the New Ross and Waterford Bypasses respectively it is recommended that the route options connect to the existing roundabouts and grade separated junctions are not provided.

The provision of an interim junction and the junction types will need to be further assessed in Phase 3 for the preferred Route Option as part of the Phase 3 Junction Strategy.

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