

Chapter 3

Alternatives Considered

3.1. Introduction

This Chapter of the EIAR describes how the proposed road development was planned and designed through a staged process as is applied to all major road developments. This process has been informed by the Policy Context and Need for the Proposed Road Development, as described in Chapter 2.

The first step is to evaluate the case for making best use of the existing infrastructure in a 'Do-Nothing' or 'Do-Minimum' scenario. The conclusion of that assessment was that new transport capacity is necessary, as the upgrade of the existing routes would have significant environmental impacts in achieving the project objectives. The next step was to consider if the transport demand can be catered for by alternative modes such as a railway, or appropriate management of the existing road infrastructure. The outcome of that assessment determined that investment in a road is necessary to achieve the project objectives.

Planning for the new road commenced with the definition of the appropriate study area in which information about constraints was mapped. Potential alternative route corridors were identified in the study area, and these were compared in a multi-criteria assessment that selected a preferred route corridor. Further iterations then refined the route corridor with progressively greater precision and detail, until the most suitable route was identified for the proposed road development.

The Route Selection Report was published in June 2016 and made available for public viewing on the project website (www.foyneslimerick.ie). The full report is available as background information to this EIAR and is summarised in this chapter.

3.2. Legislative Requirements

Article 5(d) of Directive 2011/92/EU (as amended by Directive 2014/52/EU), provides that the information to be provided by the developer shall include:

“a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment”.

That requirement has been transposed into Irish law by Section 50(2) of the Roads Act, 1993 (as substituted by Regulation 4 of the European Union (Roads Act, 1993) (Environmental Impact Assessment (Amendment)) Regulations, 2019 which require an EIAR to contain *“a description of the reasonable alternatives studied by the Road Authority or the Authority, as the case may be, which are relevant to the proposed road development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the proposed road development on the environment”.*

3.3. Project Appraisal Guidelines

In accordance with the Transport Infrastructure Ireland (TII) *Project Appraisal Guidelines* which implement the Department of Transport, Tourism and Sport's

(DTTaS) *Guidelines on a Common Appraisal Framework for Transport Projects and Programmes* (2016), the following alternatives are considered:

1. Base Case:
 - Do-Nothing or Do-Minimum
2. Do-Something including:
 - Alternative Modes
 - Management Options
 - Investment Options

3.3.1 Base Case

The Base Case represents the minimum intervention, and acts as the baseline against which alternatives and options are appraised.

Do-Nothing

The Do-Nothing scenario, as the name implies, is an assessment of the *status quo*. This has been described in some detail in Chapter 2 (Sections 2.3 and 2.4).

The 10km length of the M20 and the N21 Dual Carriageway between Attyflin and Rossbrien meets the objectives of the TEN-T Core Network for a motorway or express road and requires no improvement for the purposes of the proposed road development to upgrade the access to Shannon-Foynes Port. It is therefore excluded from further consideration in this chapter of the EIAR.

Neither the existing N69 between Foynes and Limerick nor the N21 Single Carriageway between Rathkeale and Adare meet the required TEN-T standards for the following reasons:

1. Both roads contain significant sections of sub-standard alignment, pass through urban areas and have frequent frontage access. These sections of road would not be appropriate for any of the TEN-T road classifications; motorway, express road or conventional strategic road.
2. The significant number of direct accesses onto the rural sections of both the N69 and N21 are inappropriate for a TEN-T road.
3. The relevant sections of the N69 and the N21 contain long lengths with limited overtaking opportunities which lead to delays, increased risk of dangerous overtaking manoeuvres, and a poor safety record.
4. Accident statistics reveal that, in the 9-year period from 2008 to 2015, the N69 between Foynes and Limerick had 1 fatal collision and 4 serious collisions. During this same time period the N21 between Rathkeale and Attyflin had 5 fatal collisions and 11 serious collisions.
5. The traffic flow on the N21 between Adare and Rathkeale was over 14,000 vehicles per day AADT in 2017, which exceeded the current design capacity of the single carriageway road of 11,600 AADT by over 20%. As a result, there is considerable congestion and delay through the village of Adare at peak periods as described in Chapter 5 of this EIAR.

The Do-Nothing scenario would result in increased adverse effects on the environment through the increase of traffic through towns and villages with worsening congestion in Adare village. This would continue to have adverse environmental effects in terms of air quality, greenhouse gases and noise pollution with congestion in the towns and

villages along the existing routes including Adare in particular, increasing significantly into the future and having significant adverse impacts on residents along the route.

In summary, it is concluded that a 'Do-Nothing' scenario for the existing road network will not meet the TEN-T requirements for the required connection between Foynes and the TEN-T Core road network at Limerick City. Furthermore, without improvement, the existing road network will result in unacceptable further increases in traffic delays and poor safety record along the N69 and N21, which is contrary to the relevant local, national, and regional planning policies. On this basis the 'Do-Nothing' scenario is not a feasible option for further consideration.

Do-Minimum

The Do-Minimum scenario investigated the potential to replace or upgrade the existing infrastructure to meet TEN-T requirements and the predicted demands for the next 30 years.

Essentially, this scenario would involve upgrades to the existing roads. In the context of the poor alignment and restricted width of the existing roads there would be significant realignment would be required, and considerable intrusion into properties fronting existing roads.

The Do Minimum online improvement of this road, to meet TEN-T requirements, would require removing existing direct accesses onto the mainline route with very extensive lengths of associated new local access roads often parallel to the mainline and linked to a small number of controlled junctions, with the mainline at typically 2km intervals. This would not be feasible without very significant property acquisition, much of it adjacent to the existing road, impacts on local residences, businesses, and agricultural enterprises, and environmental impacts along the route.

The traffic volumes predicted for an online Do-Minimum Scenario are outlined in Chapter 5 of this EIAR. The existing noise levels experienced by properties along the N69 and N21 are in excess of 60dB with the base year traffic flows. With traffic flows set to increase into the future as outlined by the Do-Minimum traffic scenario in Chapter 5, these noise levels will increase into the future also. The noise and vibration assessment contained in Chapter 12 has assessed the approximate change in noise levels between the Do Minimum and Do Something scenarios using the traffic volumes calculated for the wider road network. The greatest reduction in noise levels will be experienced along sections of the N69 between Foynes and Askeaton and along the N21 between Rathkeale and Adare and a major positive impact will be experienced at existing noise sensitive properties along these roads and within the villages of Croagh and Adare. A count of properties within a 50m buffer of the existing roads within the study area has found that 153 properties are located adjacent to the N69 between Askeaton and the M7 west of Limerick, 52 properties are located between Foynes and Askeaton on the N69 and 72 properties are located along the N21 between Rathkeale and Adare. These properties, in addition to those within the towns and villages along the N69 and N21 will be subject to increasing noise impacts as a result of the predicted traffic levels for the Do-Minimum scenario as detailed in Chapters 5 Traffic Analysis and 12 Noise and Vibration without the proposed development in place.

The upgrade of the existing N69 would have the potential to impact on a number of designated sites, due to its location in the groundwater catchment of the Askeaton Fen Complex Special Area of Conservation (SAC) (site code: 002279), and its crossing of the River Maigue which is part of the Lower River Shannon SAC (site code: 002165) and River Shannon and River Fergus Estuaries Special Protection Area (SPA) (site

code: 004077). It is also in close proximity to the Curraghchase Woods SAC (site code: 000174) the Barrigone SAC (site code: 000432), the Churchfield inlet (designated under the Lower River Shannon SAC), and the River Shannon and River Fergus Estuaries SPA (site code: 004077).

A further complication would result from the requirement to provide for local accesses and the need to accommodate slow-speed traffic, such as agricultural vehicles, on the route if it were on-line, which is fundamentally incompatible with a motorway or express road standard, as required for the TEN-T Core Network.

It is, therefore, considered that an online upgrade of the N69, as part of a Do-Minimum alternative, will not meet the requirements of a TEN-T route and will have significant impacts on the sensitive environmental receptors along the existing routes. Thus, a new off-line route is considered the most appropriate option.

On the N21 corridor, the key problem is the significant traffic congestion at Adare, which means that a bypass road is necessary over a length of approx. 6km. Similarly, a bypass is required at Croagh Village between Adare and Rathkeale, over a length of approx. 3km, where there is a 60 km/h speed limit, with traffic calming. Of the remaining distance between these villages and the Rathkeale Bypass, there are potentially 5km of the existing N21 road crossing rural areas in two short sections of 3km and 2km that might potentially be suitable for retention in use or upgraded on-line. However, as described in Chapter 5, the high traffic volumes along the N21 corridor will require a dual carriageway road as a minimum, with a motorway being the most suitable road type. In this context the existing road will need to be retained for use by non-motorway traffic and, therefore, an entirely new road is necessary. Thus, the Do-Minimum Option is not feasible along the N21 corridor.

3.3.2 Alternative Modes

Alternative modes can include road, rail, bus, air, water and non-motorised alternatives which can be delivered and meet the objective of the development. However, in this case the TEN-T regulations require a high-quality road to be provided between Shannon-Foynes Port and the existing TEN-T Core Road network, primarily to cater for Heavy Goods Vehicles (HGVs). Non-motorised alternatives such as improved pedestrian or cycling facilities and air and water alternatives would not meet the TEN-T regulations for high-quality access by HGV traffic to Shannon-Foynes Port and can, therefore, be excluded from further consideration.

In parallel with the requirement for improved road access, the TEN-T regulations also require Shannon-Foynes Port to be connected to the core rail network. Iarnród Éireann and the Shannon-Foynes Port Company have assessed the potential reinstatement of the Foynes to Limerick Railway line as part of a separate study. A rail link to the port might accommodate certain large-volume movements of bulk goods from specific locations close to the national rail network. There are no such existing rail freight services in operation at present in the Limerick region, and the Shannon-Foynes Port Company has indicated that all of their current customers require road access to the port. The main cargo movements at present are imports of animal feed, fuels and construction materials, which are distributed widely across the region by road transport. Therefore, none of the existing and growing freight transport services from Shannon-Foynes Port could avail of the railway as an alternative to road transport due to logistical reasons and the dispersed nature of the distribution patterns across the region.

At some future stage there may be a particular suitably located customer who requires bulk product delivered by means of a bespoke logistics arrangement that could avail of the reinstated railway to Foynes, and such opportunities will remain under active on-going consideration by the Shannon-Foynes Port Company in collaboration with Iarnród Éireann. However, to be viable, such customers will likely require a direct rail connection to the rail network at their end of the route.

The Shannon-Foynes Port company is also currently planning to develop a container facility. In the event of the rail line being reinstated and further connections being made to suitable distribution centres within other regions of Ireland, there could be potential for container freight to be transported by rail from Shannon-Foynes Port to a central hub in the midlands for example. Such a facility could accommodate a portion of the freight traffic from the port, which would reduce the reliance on road transport.

However, even with the future potential for some share of freight traffic to transfer from road to rail, there will remain a large volume of freight traffic to be carried by road to and from Shannon-Foynes port. In addition, on the Limerick to Kerry route there will continue to be a significant volume of HGV traffic passing through Adare, for which there will need to be a bypass.

All of the route options proposed as part of the Foynes to Limerick Road have been developed so as to accommodate the future reopening of the railway line.

For the N21 corridor, there are existing good quality public transport services that serve the areas of west Limerick and Kerry.

The rail network provides services to Kerry from Cork, Limerick, Dublin and the rest of the country via changes at Mallow and elsewhere, with a 2-hourly frequency. This public transport service is not affected by the delays to traffic in Adare and is generally more reliable for journey time and similar duration as the road option for many trips.

Of greater relevance to the N21 corridor across Limerick and Kerry are the bus services, operated by Bus Éireann and the private operator Dublin Coach, which provide regional and national services, some of which stop in the towns and villages along the route, and others which run non-stop to Tralee and Killarney. These public transport services suffer delays due to the congestion in Adare and would provide a faster and more reliable service if a bypass were provided. Without an improvement to the N21 corridor, the capacity of the public transport services to compete with private car travel will remain constrained largely due to perceived poor reliability if buses cannot operate to their timetables properly.

3.3.3 Management Options

The Common Appraisal Framework (DTTaS, 2016, p. 19) states that

“Investment options will not always represent the most appropriate response to identified needs or objectives. Non-infrastructure options such as regulatory change, provision of improved information, changes to land use planning, bottleneck improvements, road safety works, fiscal or control measures, Intelligent Transport Systems or investment in other modes should always be considered before the major investment options are appraised”.

Local issues on the N69, such as bottlenecks or access issues, cannot be addressed through localised traffic management measures that would alleviate the existing deficiencies along the route and meet the objectives of the proposed road development.

The major issue on the N21 corridor is the traffic delay through Adare which is related to high volume of strategic traffic, including HGVs travelling south-westwards between Limerick and Tralee, Co Kerry, through the heritage village of Adare, with its very limited capacity to accommodate such traffic, and the absence of any feasible alternative diversion route to redirect the through traffic elsewhere. Management options such as the restriction of HGVs along the N21 or through the village of Adare would not be feasible as Shannon-Foynes Port is in operation 24 hours/day and the arrival and departure of large vessels is dependent on tide heights. The restriction of HGVs during certain hours in the aim of reducing congestion would have adverse effects on the operation of the Shannon-Foynes Port and, therefore, would not be feasible. As a result, the only feasible option for Adare is a major investment option through provision of a bypass road.

3.3.4 Investment Options

As there are no alternative modes or management options that would meet the objectives of the proposed road development, the focus of the Options Stage was placed on identifying investment options to meet those development objectives. Section 3.4 provides a summary of the investment options previously considered.

3.4. Project Background and Investment Options Considered

A series of modest scale online improvements to the N69 between Foynes and Limerick were identified in the TII National Secondary Roads Needs Study published in 2011. The study identified deficiencies within the individual lengths of the route and provided a range of proposals for dealing with these deficiencies. The N69 was identified as requiring improvements along most of its length with specific upgrades recommended between Foynes and Limerick as follows:

1. Foynes to Askeaton Bypass - Upgrade to Type 2 Single Carriageway;
2. Askeaton Bypass to Kilcornan - Upgrade to Type 2 Single Carriageway; and
3. West of Kilcornan to Mungret (with bypasses of Kilcornan, Kildimo & Clarina) - Upgrade to Type 1 Single Carriageway.

M20 Cork – Limerick Motorway

The M20 Cork to Limerick Project is an approx. 80km section of new motorway between Cork and Limerick. An application for approval of the project was submitted to An Bord Pleanála (ABP) in 2010 however, due to a lack of funding, the application for approval was withdrawn in 2011.

N21 Adare Bypass

The previous Adare Bypass scheme involved a Type 2 Dual Carriageway bypass south of Adare, connecting to the proposed M20 Route at its eastern end over a length of approx. 8.5km. The scheme was refused planning by ABP in October 2012, on the basis that it constituted isolated development, citing the withdrawal of the M20 Cork to Limerick Motorway scheme as the primary reason for refusal.

N21 Abbeyfeale to Adare

This proposed project involved the upgrading of a 45km section of the existing N21 from just west of Abbeyfeale to just west of Adare, and incorporated bypasses for the towns of Abbeyfeale and Newcastle West. The constraints study and initial route selection for this project were undertaken prior to 2014. However, the project was suspended along with several other projects in the state due to the lack of available government funding.

3.5. Study Area & Constraints Study

The objective of the Constraints Study was to identify the nature and extent of relevant significant constraints within a defined study area relevant to the provision of a suitable road between Shannon-Foynes Port and the motorway network in the vicinity of Limerick. In the context of the TEN-T requirements for both the Core Network to Foynes and the Comprehensive Network requirements for improvement of the N21 between Attyflin and Abbeyfeale, the study area needed to be sufficiently extensive to enable evaluation of potential combined routes for both purposes.

For the proposed Terminal HGV Service Area at Foynes a localised study area was defined for consideration of suitable alternative site locations, described in Section 3.9.12.

The constraints identified were mapped to facilitate the design of a number of feasible route options to avoid those constraints, where possible. The constraints gathering exercise comprised a desktop study, with the extent and the nature of certain constraints verified by means of windshield or walkover surveys. Further constraints identified during the subsequent public consultation and through submissions received from members of the public and statutory bodies were also included.

3.5.1 Defining the Constraints Study Area

The aim of the initial investigation to scope out the constraints study area was to identify an area large enough for all potentially feasible route options. Plate 3.1 shows the extent of the study area.

The study area extends 17km from south of the existing N21 through to the Shannon estuary in the north and 26km from west of Foynes to the Limerick Southern Ring road in the east. It measures 472km². The principal settlements within the study area are Foynes, Askeaton, Rathkeale, Croagh, Adare, Patrickswell, Kildimo, Clarina and Mungret. The study area is located adjacent to Limerick City. A summary of the key constraints identified is provided in Section 3.5.3 below.



3.5.2 Public Consultation – Constraints Study

The Constraints Study is the initial step in the route selection process and, at this stage, the public is made aware of the proposal to develop a number of route corridor options leading to the selection of a Preferred Route Corridor. This enables early public participation before the project advances to the stage of route corridor options assessment. Due to very large study area and the high number of significant constraints for this project, the Constraints Study period was lengthy and extended over a full year from March 2014 to March 2015, by which stage initial route corridors had been identified.

Limerick City and County Council undertook a public consultation publicity campaign during the Constraints Study phase of the proposed road development to raise awareness of the project amongst members of the public and to make them aware of the proposal to develop a number of route options leading to the selection of a Preferred Route Corridor. The following measures were employed at Constraints Study stage:

1. Direct Contact with Elected Representatives

On the 14th of July, 2014, a letter was issued to Councillors of Limerick City and County Council, informing the representatives of the study area and process.

2. Press Coverage

On the 15th of July, 2014, a press release was issued, which appeared in local newspapers, including the Limerick Leader on the 21st of July, 2014.

3. Electronic Media

A website for the proposed road development (www.foyneslimerick.ie) was established, which went live to the public on the 15th of July, 2014. The website has been periodically updated with the latest information on the progress of the proposed road development. During the Constraints Study stage of the project, the website contained the study area, as outlined in Plate 3.1, a description of the project, and contact details to allow members of the public to engage with the Project Team.

3.5.3 Key Constraints Identified

Geology / Hydrology / Hydrogeology

The geological, hydrological and hydrogeological study indicated particular areas of fen to be a considerable constraint to the selection of a suitable route for the proposed new road.

Ecology

There are a number of European Sites (i.e. SACs and SPAs) and proposed Natural Heritage Areas (pNHAs) designated for ecology within the study area, including the following:

- Lower River Shannon SAC;
- River Shannon and River Fergus Estuaries SPA;
- A large woodland complex at Curraghchase Woods SAC which supports a hibernation site of the Lesser Horseshoe Bat (*Rhinolophus hipposideros*), a species listed in Annex II of the EU Habitats Directive;
- The Askeaton Fen Complex SAC, which includes a number of individual sites scattered to the north and south of the N69. The fens occur in basins between undulating hills in an otherwise intensive agricultural landscape. In addition to

the designated fens, the supporting streams and ground surrounding them also need to be considered for potential impacts; and

- Barrigone SAC; and
- A number of pNHAs also require consideration.

These Natura 2000 sites are illustrated in Plate 3.2 (see Fig. 3.3 of Volume 3 for A3 version).

Non-designated areas of woodland, turlough and scrub with potential high ecological value also occur along the course of the River Ahacronane in the townlands of Deelish and Creeves (Shanagolden), and in the vicinity of the Askeaton Fen Complex to the west of Curraghchase. The River Deel and the River Ahacronane will both require bridge crossings for any new road with due consideration given to both the potential for direct impacts on aquatic habitats and species and for indirect impacts on the Lower River Shannon SAC / River Shannon and River Fergus Estuaries SPA.

One of the principal ecological constraints is the crossing of the River Maigue, either within or upstream of the Lower River Shannon SAC. Any crossing has to be delivered in a manner which does not adversely affect the integrity of this site.

Archaeology, Architecture and Cultural Heritage

The Constraints Study found that there is a large cultural heritage resource within the area, with numerous sites of architectural, archaeological and cultural heritage significance identified. This had an important bearing on the route options considered for the proposed road development.

Noise & Vibration

Within the study area, the majority of noise sensitive locations identified - namely residences, schools, churches and health centres - are located within the towns and villages. These locations, whilst considered to be noise sensitive in nature, are for the most part exposed to a range of existing noise sources, predominately road traffic noise from existing roads. In addition, noise sensitive locations set back from existing high levels of noise were considered more sensitive given the lower existing noise environment which they currently experience. These included equine holdings, residential dwellings and amenity areas in quiet, rural settings.



Air Quality & Climate

With regard to air quality, the largest number of sensitive receptors within the study area are located along the N69 and N21, in particular at Rathkeale, Askeaton, Adare and on the outskirts of Limerick City. There are also villages at Patrickswell, Foynes and Pallaskenry and smaller population centres at Mungret, Clarina, Kildimo, Shanagolden and Croagh. With respect to air quality impacts on ecology, the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA, are located in the northern part of the study area. Other designated areas within the study area include the Askeaton Fen Complex, Curraghchase Woods, Barrigone and Tory Hill SACs and a number of pNHAs, including Adare Woodlands.

Agriculture

In terms of agriculture in the study area, land use is almost entirely pastoral, and predominantly beef related. There is a dairy sector comprising dairy farms operating at or in some cases significantly above the national average dairy farm size. There is also a strong equine industry in Limerick and the study area is well represented by Limerick Racecourse, equestrian centres and several prominent stud farms and horse training enterprises.

Landscape & Visual

The landscape within the study area is rolling to undulating and pastoral, with hills to the western edge and south of the study area, which are part of the Mullaghareirk Mountains. There are numerous rivers, lakes and streams in the area, as well as several wooded areas.

Conclusion for Constraints Study

The information collected during the Constraints Study was wide ranging and comprehensive and provided a sound basis for the development of route options. The development of route corridor options was significantly influenced by the desire to avoid the large number and widely distributed constraints that occupy large parts of the study area, especially in the central section between Askeaton, Rathkeale and Adare, in and around Curraghchase Forest Park, and the extensive complex of fens, as illustrated in Plate 3.3.

Collection of constraints-related data continued through the Route Selection Stage and beyond, concentrating on the route corridors and eventually on the Preferred Route corridor, when it was identified.



3.6.1 Route Assessment

Stage 1

Stage 2

Stage 1 Assessment

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1. Stage 1A
Definition of 1km broad route corridors and an initial sift of these corridors to identify any corridors that could be excluded from further consideration;
2. Stage 1B
Definition of 300m route corridor options and comparison of these corridors in groups to determine the best option between common points; and
3. Stage 1C
Selection of the shortlisted Route Corridor Options for presentation at the Public Consultation.

3.6.2 Alternative Route Corridor Options - Stage 1A

3.6.2.1 Initial Constraints

In developing the initial broad route corridors, cognisance was taken of significant constraints in the study area, and consideration was given to corridors previously identified for other schemes that could be incorporated into the development of a route between Foynes and Limerick.

Significant constraints that informed the development of the initial corridors included, but were not limited to, the following:

1. Designated Sites and elements thereof, including:
 - a. The River Maigue within the Lower River Shannon SAC;
 - b. Curraghchase Forest Park and Curraghchase Woods SAC;
 - c. The Askeaton Fen Complex SAC;
 - d. Barrigone SAC (limestone pavements and grasslands);
 - e. Adare Woodlands pNHA; and
 - f. River Shannon and River Fergus Estuaries SPA.
2. Existing National Roads including the N69, N21, N18 and N20 / M20 and important Regional Roads;
3. Towns and villages along the N69, including Foynes, Askeaton, Kilcornan, Kildimo, Clarina and Mungret;
4. Towns and villages along the N21 and M20, including Rathkeale, Croagh, Adare, Patrickswell, and Dooradoyle, and the Business Park at Raheen;
5. Other villages, including Pallaskenry, Shanagolden, Creeves, Ballysteen and Cappagh;
6. The Foynes Limerick Rail Line; and
7. Commercial industries.

3.7. Definition of Route Corridors

Following on from the examination of the initial constraints identified, initial broad route corridors were developed which could be used to develop feasible routes for the proposed road development, as shown in Plate 3.4. These corridors are labelled A to G and, in several cases, consist of a combination routes connected by variant links. There are four primary west-to-east corridors from north to south:

- Corridor G, close to the coastline of the River Shannon Estuary;
- Corridor H, generally parallel to the N69;

- Corridor J, generally parallel to the Foynes to Limerick Railway Line and north of the N21; and
- Corridor K, generally parallel to and south of the N21, with variant Corridor L passing south of Rathkeale.

The other Links, A to F, generally form north-south connections between the west-east corridors. The corridors selected were approx. 1km in width so as to generate sufficient scope for later development of routes, noting that on closer examination of more detailed constraints information, other options may emerge outside of these broad route corridors.

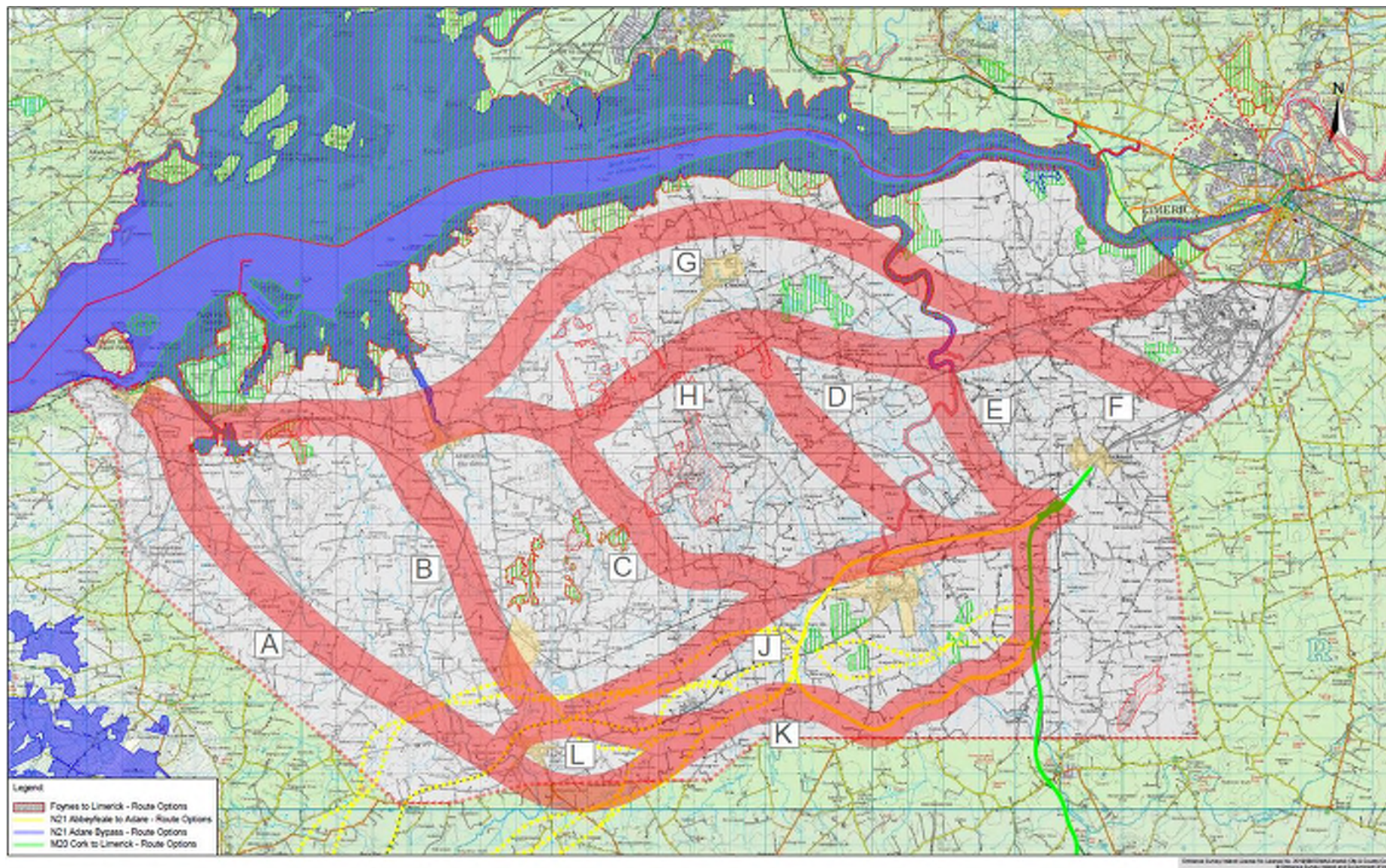


Plate 3.4 Broad Route Corridor Options – Stage 1A (see Fig. 3.2 of Volume 3 for A3 version)

3.7.1 Comparison of Alternative Route Options

3.7.1.1 Stage 1A Assessment

In order to assess the initial broad route corridors in terms of preference, and to potentially eliminate unsuitable corridors from further detailed assessment at an early stage, the initial corridors were assessed under the headings of Engineering, Environment and Economy, as described in the Route Selection Report, published in June 2016.

On the basis of the Stage 1A assessment, selected options were carried through to the next phase, while those that could be discounted were eliminated from further assessment. At this stage, the broad corridor options of G and E were discounted from further consideration.

Corridor G, the most northerly route and closest to the River Shannon Estuary, had low preference under all three assessment headings of Engineering, Environment and Economy. When compared to Corridor H, generally parallel to the existing N69 road, this corridor requires a significantly wider crossing of the River Maigue floodplain over a length of nearly 2km, compared to 1km near Ferrybridge further south. Environmentally this option had a low preference in terms of impacts on archaeology and cultural heritage, agronomy, landscape and visual characteristics and impacted Pallaskenry Agricultural College. When compared to Corridor H, the additional length of this route means that this option fared poorly. As a result, Corridor G was discounted relative to Corridor H.

Corridor E, a variant of Corridor H linking southward from near Kildimo to the N21 east of Adare, also had a low preference under the three assessment headings. The corridor passes through an area of floodplain and Lower River Shannon SAC, associated with the River Maigue over a length of 2km and, as a result, had a low preference in terms of Engineering and Environment, in terms of ecology, geology and hydrology. The cost of construction in the floodplain means this option had a low economic preference. On the basis of low preferences under all three headings of Engineering, Environment and Economy, and when compared to adjacent north-south links of D and F, Corridor E was discounted from further consideration.

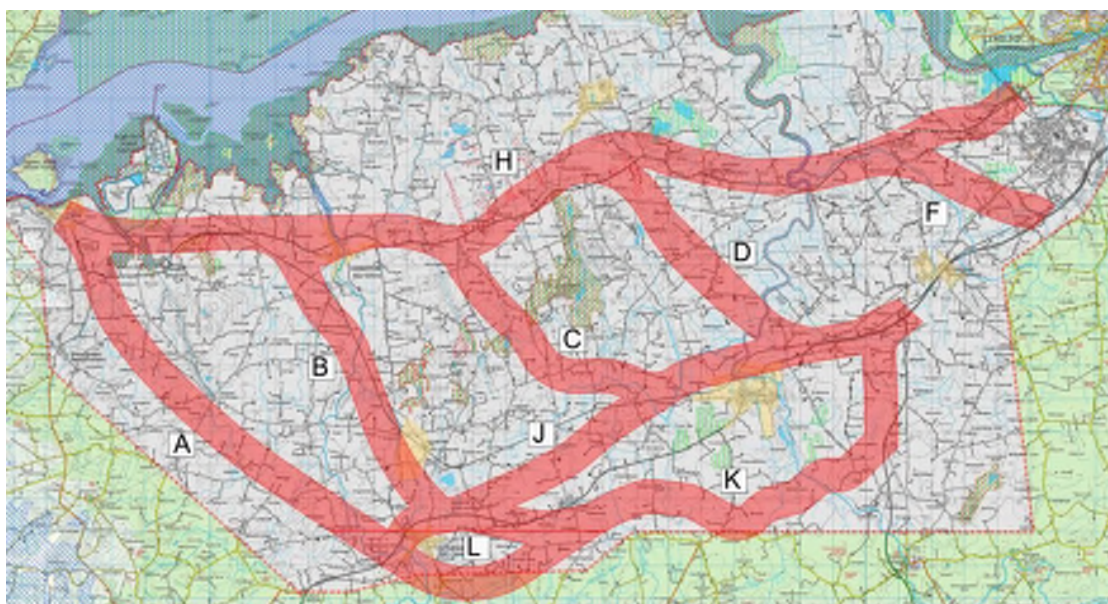


Plate 3.5 Broad Route Corridor Options brought forward from Stage 1A

3.7.1.2 Stage 1B Assessment

The aim of the Stage 1B Assessment was to identify, where possible, the best route corridor option within each of the initial broad route corridors carried forward from Stage 1A, through a process of elimination. For this process, 300m wide route corridor options were identified within the 1km broader corridors, taking all known constraints into account. During this process, some of the route corridor options fell outside the initial broad corridors examined at Stage 1A. At the same time, other feasible route corridor options were identified as a result of geometric refinement, taking a more detailed examination of constraints into account.

A preferred single option within each of the initial broad corridors was identified, except for corridors A, J and K, where multiple options remained. These options were then taken through to Stage 1C for further consideration.

Like Stage 1A, the assessment was undertaken in accordance with the TII *Project Management Guidelines* (2010), under the headings of Engineering, Environment and Economy. The assessment compared route corridor options between common points in groups of two or more, and those which could be eliminated based on the comparison exercise were discounted from further consideration.

3.7.1.3 Stage 1C Assessment

The aim of the Stage 1C Assessment was to short-list a group of route corridor options which would be brought forward for public consultation. Generally, the assessment consisted of a further phase of the comparison of paired or grouped corridor option alternatives between common points.

Broad route corridor K which followed the route of the 2010 proposal for an N21 Adare Bypass, was examined and discounted from further consideration for the proposed road development. This was based on an additional length of over 2.5km (25% over the section around the village) of road compared to the northern bypass options around Adare, now under consideration with broad route corridor J. Alternatively, a southern bypass of Adare would avoid crossing the River Maigue, where it falls within the Lower River Shannon SAC. However, for a northern bypass of Adare, the potential impacts on the SAC at the River Maigue can be avoided through provision of a clear-spanning bridge over the river and avoidance of specific habitats such as alluvial woodland. A southern bypass of Adare would add considerable additional travel distance for all traffic on the N21 corridor and to Shannon-Foynes Port compared to a northern bypass and would require two further junctions to tie in with the N21 and N20. The longer length of new road would significantly increase the construction costs, journey length and journey times, such that the Benefit to Cost Ratio for a southern bypass of Adare is significantly lower than for a northern bypass. On this basis, the northern Corridor Option J was determined to be considerably better than Option K, which was therefore eliminated from further consideration.

At the end of the Stage 1 route selection process, four distinct corridors were identified and brought forward to public consultation stage (Plate 3.6). These are described and assessed in the following section.

3.7.1.4 Stage 2 Appraisal

The Stage 1 Appraisal resulted in the number of route corridor options being refined to four. These four options were assessed with regard to the recommendations of TII *Project Management Guidelines* (2010, p. 115) as follows:

Stage 2

“After Stage 1, carry out a Project Appraisal of these routes using the Project Appraisal Matrix (comprising the 5 Common Appraisal Criteria of Economy, Safety, Environment, Accessibility & Social Inclusion and Integration).”

The five common Appraisal Criteria are as set out in the DTTaS *Guidelines on a Common Appraisal Framework for Transport Projects & Programmes* and enable the selection of a Preferred Route Corridor.

The Stage 2 Options Appraisal consisted of the following:

1. Definition of Route Corridor Options;
2. Public Consultation (March 2015);
3. Appraisal of Route Corridor Options and Selection of Preferred Route Corridor; and
4. Public Display (December 2015).

3.7.2 Stage 2 Route Corridor Options

The four shortlisted route corridor options resulting from the Stage 1 Assessment were as follows:

1. Route Corridor Option 1 (Red)
Closely followed the current N69 diverting south at Clarina to tie in with the M20 Raheen Junction (J3)
2. Route Corridor Option 2 (Blue)
Closely followed the N69 before heading south of Rincullia and closely following the Foynes – Limerick Rail line to Rathkeale. From Rathkeale, it ran to the north of the rail line to Adare, bypassing Adare to the north and tying into the N21 before the M20/N20 Attyflin Junction (J5)
3. Route Corridor Option 3 (Orange)
Closely followed the N69 before heading south of Rincullia and closely following the Foynes – Limerick Rail line to Rathkeale. From Rathkeale, it ran along the existing N21 before heading in a north easterly direction, bypassing Adare to the north and tying into the N21 before the M20/N20 Attyflin Junction (J5)
4. Route Corridor Option 4 (Green)
Closely followed the N69 through to Kilcornan and heading south, along the western edge of Curraghchase, tying in with a Northern Bypass of Adare at Curraghbeg crossing the River Maigue and tying into the N21 before the M20/N20 Attyflin junction (J5). In addition, a link was provided in a south westerly direction from Curraghbeg to tie in with the existing N21 at Garraunboy.

These 300m wide route corridor options are shown in Plate 3.6. These options were presented at the Public Consultation in March 2015.

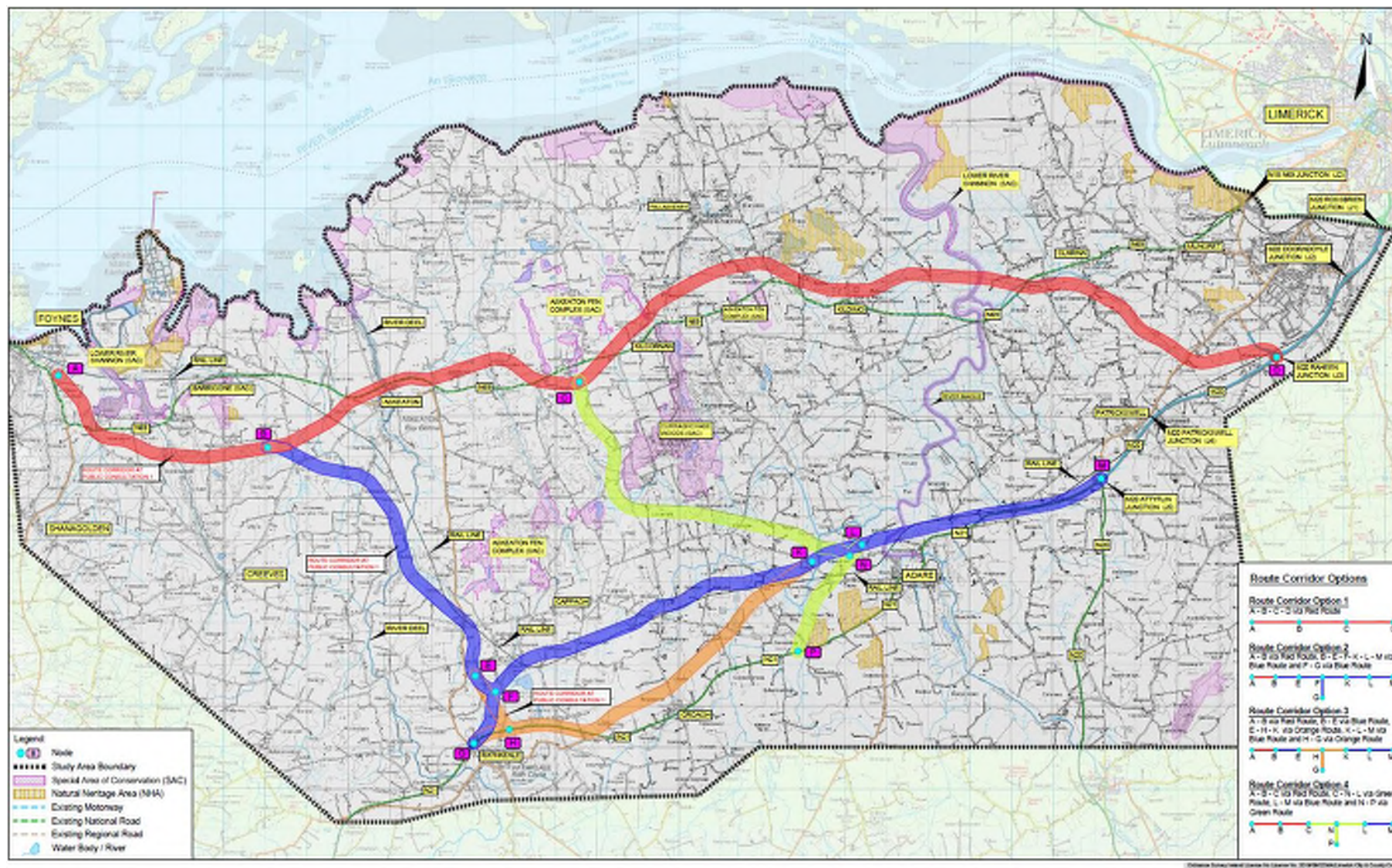


Plate 3.6 300m Wide Route Corridor Options – Public Consultation – March 2015 (see Figures 3.3 to 3.7 of Volume 3 for A3 versions of the proposed corridors)

3.7.2.1 Public Consultation for Route Corridor Options – March 2015

The 300m wide route corridor options that emerged from the Stage 1 assessment were presented to the public at Public Consultation events held at the South Court Hotel in Limerick on 10th March 2015 and at the Flying Boat & Maritime Museum in Foynes on the 11th March 2015.

In order to raise public awareness for that public consultation, Limerick City and County Council organised a publicity campaign which included:

- Newspaper Advertisements published in the Limerick Leader on 7th, 21st and 28th March 2015;
- Radio advertisements on Live 95FM from the 9th to the 11th March 2015;
- A project website (www.foyneslimerick.ie) to provide additional information including drawings; and,
- Notices on the Limerick City and County Council website and Twitter feed.

Brochures with comment sheets enclosed were available at these events. Brochures provided information on the proposed road development and the Route Corridor Options. Comments and observations in relation to the Route Corridor Options were invited from the public and the submission deadline was extended from the Friday 27th March 2015 for a further two weeks until the 10th April 2015 due to the high level of interest. Letters were also issued by ROD-AECOM in March and April 2015 to a list of consultees, requesting any comments or information that would inform the Constraints Gathering and Route Selection phase of the proposed road development.

Approx. 700 people attended the two days of public consultation and over 1000 submissions were received from the public in relation to the four Route Corridor Options displayed. Subsequent to the public consultation events, all requests from members of the public for individual meetings were facilitated. The concerns raised by the public in their submissions covered a broad spectrum of subjects. However, dominant amongst these were the potential impacts on agriculture, commercial businesses, equestrian holdings, ecology, archaeology and cultural heritage and hydrology / hydrogeology.

Most submissions related to impacts on farms and land. These were largely concerned with diminution in the value of land and property. A large number of submissions were also concerned with archaeological and cultural heritage. Community severance and the removal of access routes (i.e. to family members living elsewhere in the area or to community / commercial facilities) were issues raised in a large proportion of submissions. A number of submissions showed support for the road bypassing of Adare and highlighted the subsequent benefits that would result from the removal of the existing significant traffic congestion in the village, which is an important tourist destination at a regional and national level, due to the high concentration of cultural heritage sites that form a major attraction for visitors.

3.7.3 Refinement of Route Corridor Options

As part of the Stage 2 Corridor Assessment, further environmental assessments were carried out along the Route Corridor Options presented at the Public Consultation. The purpose of these assessments was to identify specific issues likely to affect the selection of a Preferred Route Corridor.

For ease of definition, various potential combinations of route segments and nodes were identified at points of overlap between various route corridor options. These

environmental assessments coupled with findings from the public consultation led to the adoption of four changes to the route corridor options as follows:

1. Nodes A – B at Craggs;
2. Nodes B – E at Milltown;
3. Nodes B – Q at the Askeaton Bypass; and
4. Nodes E – H at Rathkeale.

Node A – B at Craggs (Route Corridor Options 1, 2, 3 and 4)

At the western end of the route nearest Foynes, there is very little scope for route options in the confined area between the high ground to the southwest and the Shannon Estuary to the north-east, where there is an inlet at Churchfield Creek that extends quite far south towards the existing N69 road at Robertstown.

During ecological field surveys, an extensive section of alluvial woodland was identified along the Ahacronane River, to the south-west of the Barrigone SAC. While this habitat is not within a designated Special Area for Conservation (SAC) or a Natural Heritage Area (NHA), it is an Annex 1 Habitat designated for protection under the Habitats Directive and it was considered that impacts on it should be avoided. Options to the north and south of the initial corridor were investigated and based on the assessments, the option of moving the corridor approx. 350m to the north was considered to be the preferred option when the balance of the various impacts was considered. This change is common to all four Route Corridor Options 1 to 4. Plate 3.7 shows the previous corridor along with the revised corridor.

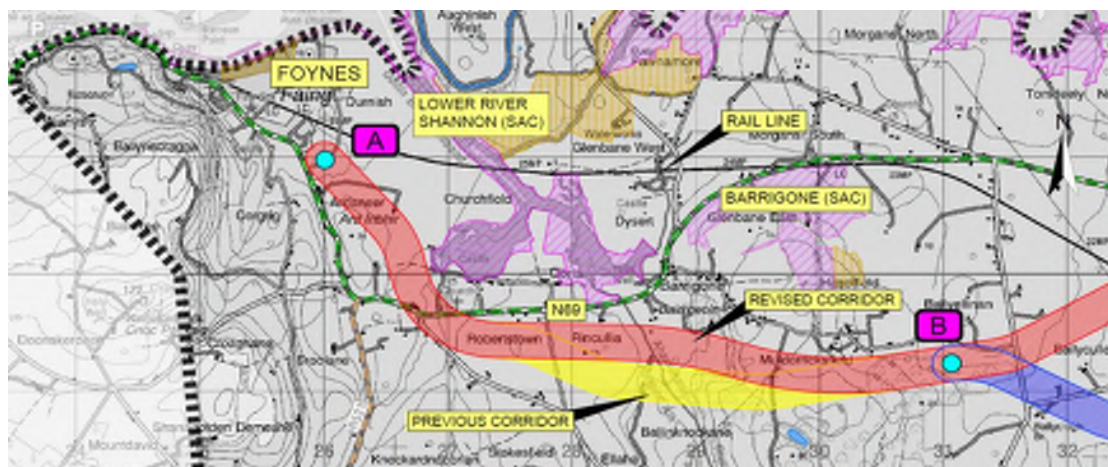


Plate 3.7 Revised Route Corridor between Nodes A and B at Craggs

Node B – E at Milltown (Route Corridor Options 2 and 3)

During the Stage 2 Assessment, further archaeological appraisal was carried out of the recorded Cashel in the townland of Milltown (RMP LI020-004001), located to the west of the River Deel. The assessment concluded that the site possessed a significant landscape setting. This was the only site within the study area identified to be designated with a Preservation Order under National Monuments Legislation. In addition, a further possible enclosure was identified to the immediate east of the Cashel (directly under the route corridor), which may be an associated significant feature. Therefore, consideration was given to possible alternative route corridors that could reduce the impact on the setting of the Cashel in question. Any direct impacts on potential associated features were considered both east and west of the Cashel site to determine the preferred alternative to the original route corridor.

A revised alignment for the route corridor approx. 250m to the east of the initial corridor was selected as having the least impact on the Cashel setting. This change is common to Route Corridor Options 2 and 3. Plate 3.8 below shows the previous corridor along with the revised corridor.

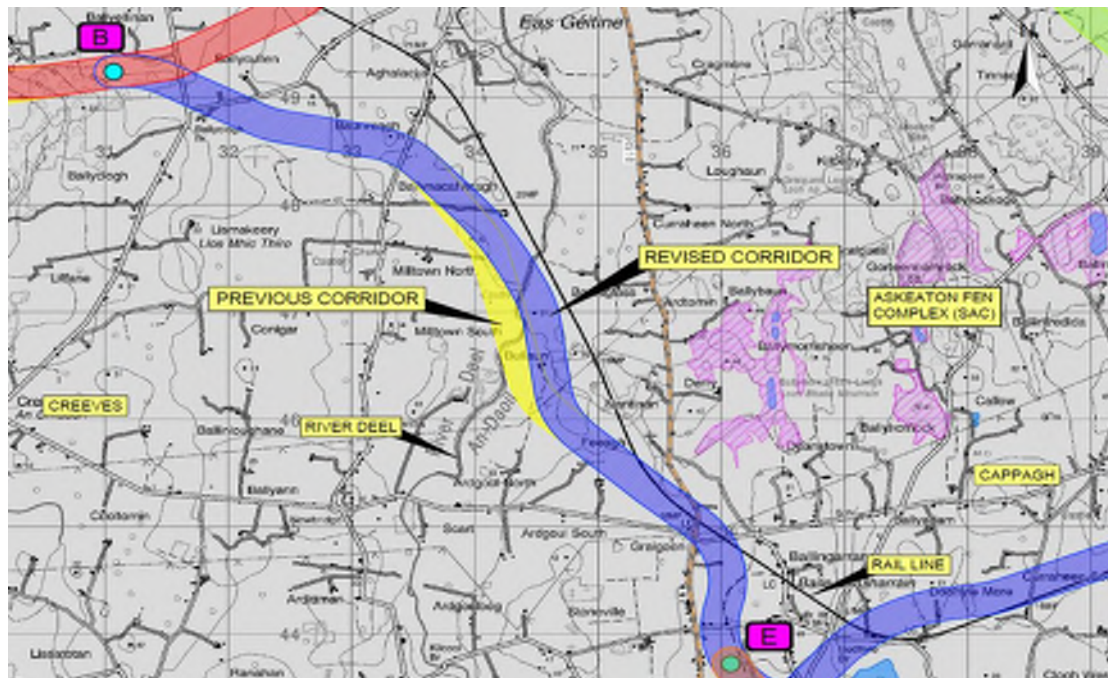


Plate 3.8 Revised Route Corridor between Nodes B and E at Milltown

Node B - Q at the Askeaton Bypass (Route Corridor Options 1, 2, 3 and 4)

This link was included as part of Route Corridor Options 1 and 4. Plate 3.10 shows the common link from Node B to Node Q at the start of the existing Askeaton Bypass.

Arising from the public consultation and on investigation of the potential junction strategy it was determined that a link from Node B to a new Node at Q on the Askeaton Bypass would be required as part of the route corridors for Options 2 and 3 to provide connectivity between the industrial centres in the vicinity of Askeaton and the new road. At the same time this link provides a longer improved section of road along the N69 corridor, resulting in improved safety and economic benefits to the overall road network when compared to not providing this link. Plate 3.10 shows the link from Node B to Node Q at Askeaton, which was included within Route Option 2, as shown in Plate 3.12.

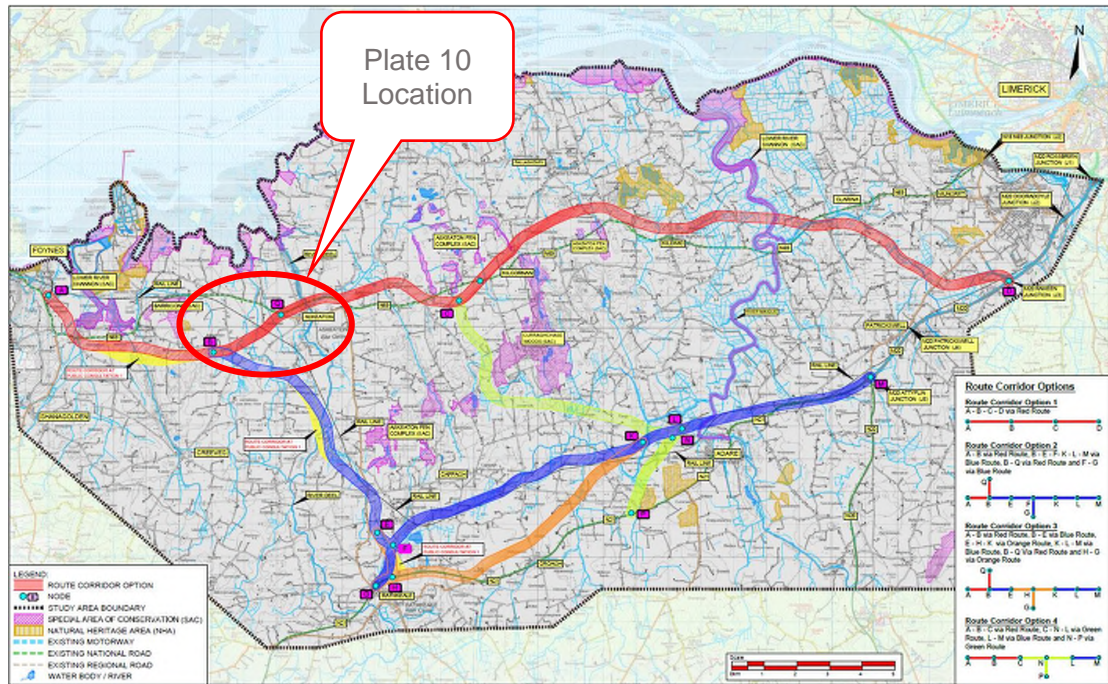


Plate 3.9 Extended Route Corridor between Nodes B and Q at the Askeaton Bypass

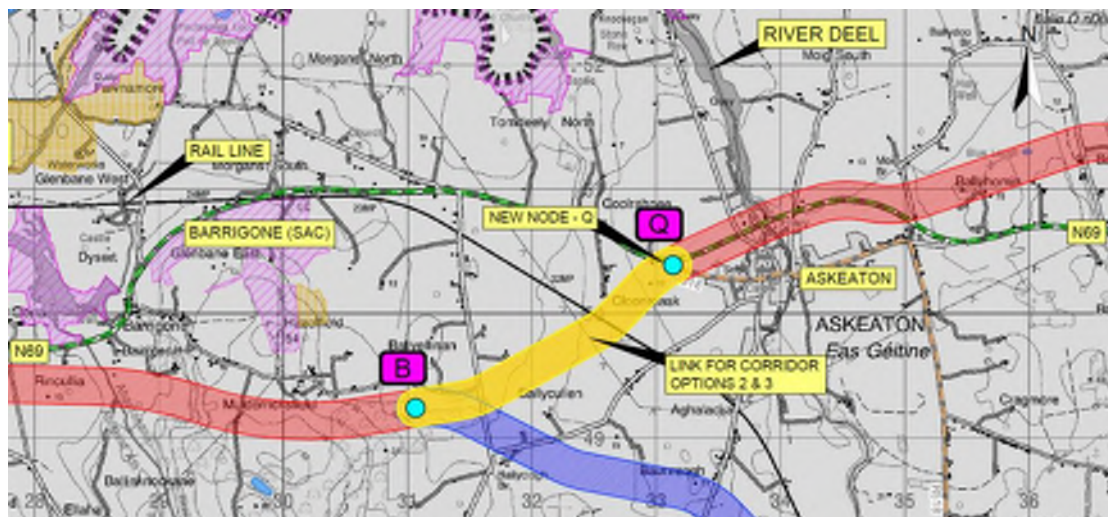


Plate 3.10 Extended Route Corridor between Nodes B and Q at the Askeaton Bypass

Node E – H at Rathkeale (Route Corridor Option 3)

From the public consultation and the development of a potential junction strategy for the route, it was determined that Route Corridor Option 3 from Node E towards Node H would need to be moved by up to 100m to the west. This was to provide a suitable junction for the route while simultaneously further avoiding land provided for future expansion of the cemetery to the northeast of Rathkeale, adjacent to the L1203 local road. This change applies only to Route Corridor Option 3. The previous corridor together with the revised corridor is shown in Plate 3.11. Plate 3.12 shows the extent of the revised corridors.

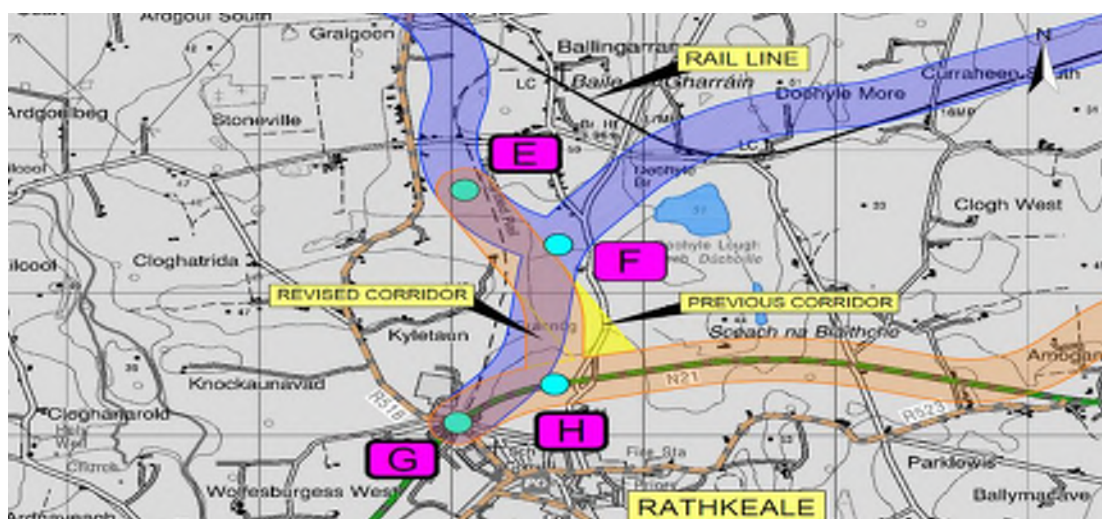


Plate 3.11 Revised Route Corridor between Nodes E and H at Rathkeale



3.7.4 Description of Route Corridor Options

The four revised route corridor options are assessed and appraised in this section (Plate 3.12). It should be noted for clarity that these nodes describe the various route corridor options and do not represent the location of proposed junctions.

3.7.4.1 Route Corridor Option 1 (Red)

Route Corridor Option 1 passes between the nodes of A, B, C and D and is approx. 33km long. It closely follows the existing N69 alignment. A full online upgrade of the N69 was not considered feasible for the reasons discussed in Section 3.3.1 (Do-Minimum scenario). Plate 3.13 shows the extent of Route Corridor Option 1.

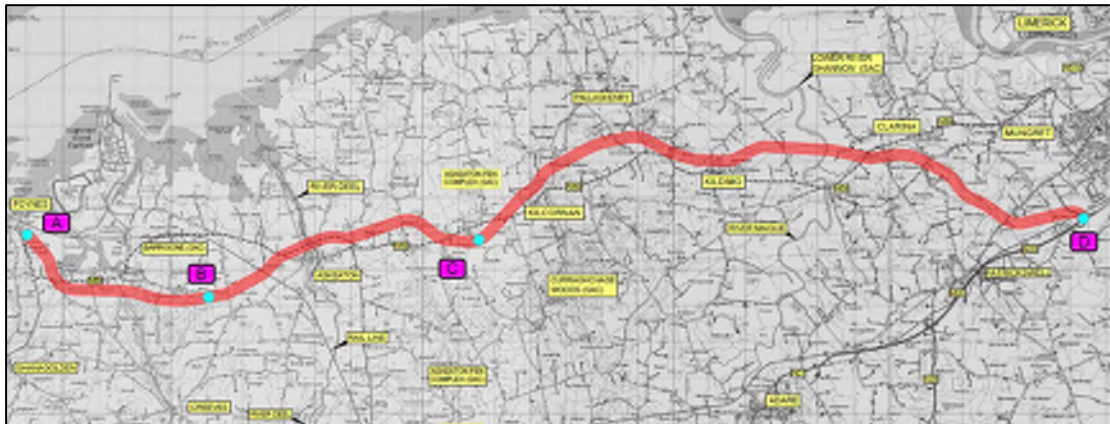


Plate 3.13 Route Corridor Option 1 (Red) (See Figure 3.9 in Volume 3 for A3 version)

Nodes A to B

Route Corridor Option 1 commences at Node A, which is located just south of Shannon-Foynes port, on the Shannon-Foynes Port Access road. Here the route heads in a south-easterly direction, meeting the N69 in the townland of Sroolane North. From here, the route turns to head in an easterly direction south of the current N69 at Barrigone, meeting the Ahacronane River and going through the townlands of Robertstown, Rincullia, Craggs and Muldericksfield to Node B. Node B is located in the townland of Ballyclogh, approx. 3km south-west of Askeaton.

Node B to C

From Node B, the route travels in a north easterly direction, almost immediately meeting the L1220 local road, and then meeting the Foynes – Limerick rail line before following the route of the existing N69 Askeaton Bypass. The route continues along the existing N69 Askeaton bypass for approx. 1.8km, crossing the River Deel before veering away from the existing national road and running to the north. In the townland of Ballyengland Lower, the route turns to head in a south easterly direction before meeting the N69 again to arrive at Node C. This node is located in the townland of Ballyvogue, south of the N69 and approx. 2km west of the entrance to Curraghchase Forest Park off the N69.

Node C to D

From Node C, the route option travels north-eastwards and meets the N69 for the third time. It then passes to the north of Kilcornan village, keeping north of Curraghchase and south of Pallaskenry, before turning in a south-easterly direction past Dromore Lough and through the townland of Bolane to a location north of Kildimo (New). The road continues eastwards, crossing the River Maigue approx. 1km north of the Ferrybridge on the N69, then crossing the Barnakyle River and the N69 for the fourth

time. The route continues to the south of Clarina before veering in a south-easterly direction away from the N69. The route then follows the Barnakyle River before crossing it and joining in with the R510 Regional Road and M20 at Raheen (Junction 3) at Node D.

3.7.4.2 Route Corridor Option 2 (Blue)

Route corridor option 2 links nodes A, B, Q, E, F, G, K, L and M and is approx. 36.4km. This route option connects Shannon-Foynes Port to Limerick and bypasses Rathkeale and Adare. It connects to the existing M20 at Attyflin (Junction 5). Plate 3.14 shows the extent of Route Corridor Option 2.

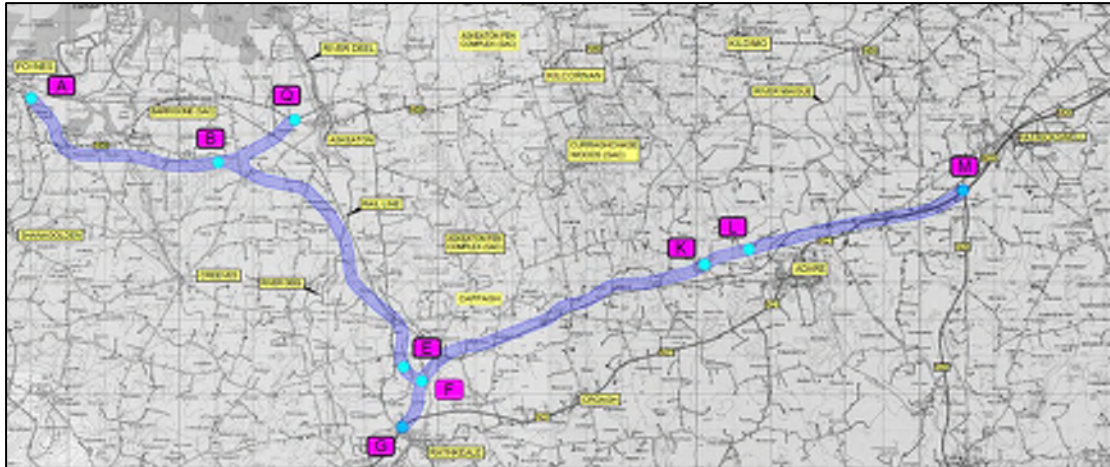


Plate 3.14 Route Corridor Option 2 (Blue) (See Figure 3.10 in Volume 3 for A3 version)

Node A to B

The route commences at Node A, which is located just south of Shannon-Foynes port, on the Shannon-Foynes Port Access road. Here the route heads in a south-easterly direction, meeting the N69 in the townland of Sroolane North. From here the route turns to head in an easterly direction south of the current N69 at Barrigone meeting the Ahacronane River and going through the townlands of Robertstown, Rincullia, Craggs and Muldericksfield to Node B. Node B is located in the townland of Ballyclogh, approx. 3km south-west of Askeaton.

Node B to Q

This section provides a link from the route corridor to the existing N69 bypass of Askeaton at Node Q.

Node B to E

From here, the route travels in a south-easterly direction towards Rathkeale. It then heads towards the Foynes - Limerick rail line before turning in a more southerly direction to follow the route of the rail line crossing the River Deel, adjacent to the townland of Milltown South. Continuing southwards, the route meets the R518 Askeaton - Rathkeale Regional Road near the Foynes - Limerick rail line before arriving at Node E. Node E is located in the townland of Ballingarrane near a section of dismantled rail line that linked Listowel to the Foynes - Limerick rail line.

Node E to F

This short section of route connects the section of the route between Foynes and Rathkeale to the Adare to Rathkeale section at Node F, in the vicinity of the townlands of Ballingarrane and Kyletaun to the north of Rathkeale.

Node G to F

The Rathkeale to Adare Section of this route option commences at Node G which is located at the existing N21 / R518 Holy Cross Junction on the N21 Rathkeale Bypass. The route heads in a north easterly direction to Node F.

Node F to K

From Node F, the route travels in a north-easterly direction, meeting a couple of local roads as it approaches the Foynes – Limerick rail line. The route crosses to the north of the rail line and travels parallel to it until Node K. The route meets a number of local roads, including the L6022, L1203, L6023, L8027, L8029, L1421, L8032, L8024 and L1422 as well as crossing over the Clonshire River at two locations. Node K is located to the west of the Greanagh River in the townland of Tuogh.

Node K to L

From Node K, the route bridges over the Greanagh River and meets Station Road, Adare before arriving at Node L to the east.

Node L to M

Almost immediately after Node L, the route bridges over both the River Maigue (Lower River Shannon SAC) and the Foynes – Limerick rail line. The Limerick – Foynes rail line is now north of the route with the existing N21 and Adare village to the south. The route then connects back onto the existing N21 and follows the existing N21 over a length of approx. 2.8km through to Node M, located at the M20 / N21 Junction (J5) at Attyflin.

3.7.4.3 Route Corridor Option 3 (Orange)

Route Corridor Option 3 links nodes A, B, Q, E, H, G, K, L and M and is approx. 35km long. It is largely the same as Route 2, apart from the sections from Node E to K between Rathkeale and Adare. Plate 3.15 shows the extent of Route Corridor Option 3.

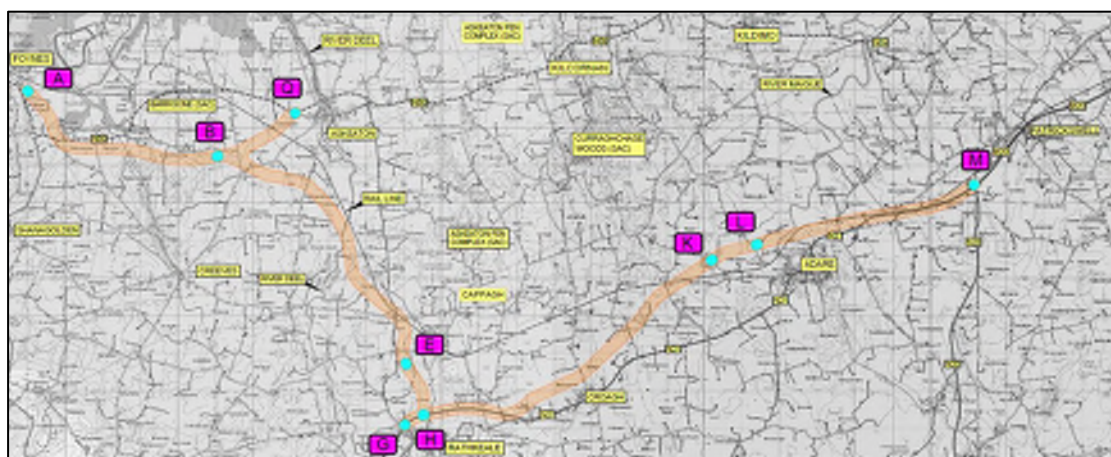


Plate 3.15 Route Corridor Option 3 (Orange) (See Figure 3.11 in Volume 3 for A3 version)

Node A to B

This route commences at Node A, which is located just south of Shannon-Foynes port, on the Shannon-Foynes Port Access road. Here the route heads in a south-easterly direction, meeting the N69 in the townland of Sroolane North. From here, the route turns to head in an easterly direction south of the current N69 at Barrigone, meeting the Ahacronane River and going through the townlands of Robertstown, Rincullia,

Craggs and Muldericksfield to Node B. Node B is located in the townland of Ballyclogh, approx. 3km south-west of Askeaton.

Node B to Q

This section provides a link from the route corridor to the existing N69 bypass of Askeaton at Node Q.

Node B to E

From here the route travels in a south easterly direction towards Rathkeale. It then heads towards the Foynes - Limerick rail line before turning in a more southerly direction to follow the route of the rail line crossing the River Deel, adjacent to the townland of Milltown South. Continuing southwards, the route meets the R518 Askeaton - Rathkeale Regional Road near the Foynes - Limerick rail line before arriving at Node E. Node E is located in the townland of Ballingarrane near a section of dismantled rail line that linked Listowel to the Foynes - Limerick rail line.

Node E to H

The link starts at Node E, located in the townland of Ballingarrane near the dismantled rail line that linked Listowel to the Foynes - Limerick rail line, and finishes at Node H, located along the existing N21 Rathkeale Bypass.

Node G to H

The Rathkeale to Adare Section of the route commences at Node G which is located at the existing N21 / R518 Holy Cross Junction on the N21 Rathkeale Bypass. The route heads in an easterly direction along the existing N21 to Node H.

Node H to K

The length of the route between Nodes H and K extends from north of Rathkeale through to a location north west of Adare over a distance of approx. 9km. From Node H this section of route runs along the existing N21 Rathkeale Bypass corridor before diverging to head in a north easterly direction west of the N21/R523 Regional Road junction. The route passes to the north of Croagh village before crossing the Clonshire River and the townlands of Clonshire More, Gortnagrour and Clonshire Beg. The route then crosses the Foynes - Limerick rail line in the townlands of Clonshire Beg and Rower More and extends to Node K located to the west of the Greanagh River.

Node K to L

From Node K, the route bridges over the Greanagh River and meets Station Road, Adare, before arriving at Node L to the east.

Node L to M

Almost immediately after Node L, the route bridges over both the River Maigue (Lower River Shannon SAC) and the Foynes – Limerick rail line. The Limerick – Foynes rail line is now north of the route with the existing N21 and Adare village to the south. The route then connects back onto the existing N21 and follows the existing N21 over a length of approx. 2.8km through to Node M, located at the M20 / N21 Junction (J5) at Attyflin.

3.7.4.4 Route Corridor Option 4 (Green)

Route Corridor Option 4 links nodes A, B, C, N, P, L and M and is approx. 32km long. Plate 3.16 shows the extent of Route Corridor Option 4.



Plate 3.16 Route Corridor Option 4 (Green) (See Figure 3.12 in Volume 3 for A3 version)

Node A to B

Route Corridor Option 4 commences at Node A, which is located just south of Shannon-Foynes port, on the Shannon-Foynes Port Access road. Here the route heads in a south-easterly direction, meeting the N69 in the townland of Sroolane North. From here the route turns to head in an easterly direction south of the current N69 at Barrigone, meeting the Ahacronane River and going through the townlands of Robertstown, Rincullia, Craggs and Muldericksfield to Node B. Node B is located in the townland of Ballyclogh, approx. 3km south-west of Askeaton.

Node B to C

From Node B, the route travels in a north-easterly direction, almost immediately meeting the L1220 local road, and then meeting the Foynes – Limerick rail line, before following the route of the existing N69 Askeaton Bypass. The route continues along the existing N69 Askeaton Bypass for approx. 1.8km, crossing the River Deel before veering away from the existing national road and running to the north. In the townland of Ballyengland Lower, the route turns to head in a south-easterly direction, before meeting the N69 again to arrive at Node C. This node is located in the townland of Ballyvogue, south of the N69 and approx. 2km west of the entrance to Curraghchase Forest Park off the N69.

Node C to N

From Node C, the route passes southwards west of Curraghchase Woods before turning to head in a south easterly-direction towards Adare, travelling south of Curraghchase Woods and tying into a northern bypass of Adare at Node N.

Node P to N

Node P is located along the existing N21 in the townland of Garraunboy, approx. 3km south-west of the centre of Adare. From Node P, the route heads in a north-easterly direction through the townlands of Clonshire Beg, Rower Beg and Rower More. The route then meets the Blackabbey Road and Foynes - Limerick rail line before reaching Node N in the townland of Kilknockan.

Node N - L

This section connects the sections from C to N and P to N to Section L to M and is located in the townlands of Kilknockan, Curraghbeg and Islandea, north of the Foynes - Limerick rail line and meeting the Station Road, Adare.

Node L to M

Almost immediately after Node L, the route bridges over both the River Maigue (Lower River Shannon SAC), and the Foynes – Limerick rail line. The Limerick – Foynes rail line is now north of the route with the existing N21 and Adare village to the south. The route then connects back onto the existing N21 and follows the existing N21 through to Node M (in common with Route Options 2 and 3), located at the M20 / N21 Junction (J5) at Attyflin.

3.7.5 Corridor Assessment - Stage 2

In accordance with the TII *Project Management Guidelines* (2010), the comparison of the four route corridor options was carried out using the five Common Appraisal Criteria of (1) Environment, (2) Economy, (3) Safety, (4) Accessibility & Social Inclusion and (5) Integration. The route corridor option assessments were undertaken in line with the TII *Project Appraisal Guidelines*, which follow guidance provided within the DTTaS *Common Appraisal Framework*. Each of the assessment criteria is then further divided into a number of different sub-criteria, detailed below.

Environment

The Environmental Assessment was carried out under the following sub-headings:

1. Noise and Vibration
2. Air Quality
3. Landscape and Visual
4. Agriculture & Agronomy
5. Non-Agricultural Properties
6. Ecology
7. Archaeology, Built Heritage and Cultural Heritage
8. Hydrogeology
9. Hydrology
10. Soils, Geology and Waste

Economy

1. Economic Benefit (COBA - Efficiency and Effectiveness)
2. Transport Reliability
3. Wider Economic Impacts
4. Funding Impacts

Safety

Under the heading of safety, the overall benefit of the proposed road development is assessed in terms of reduction in traffic collisions and an improved road environment. All of the options will offer an improvement on the existing road network, but the route options which result in the largest transfer of vehicles from the existing road network to newer, safer roads will have the greatest benefit in terms of traffic safety.

Accessibility & Social Inclusion

The objective of the proposed road development under the Accessibility and Social Inclusion criterion is to avoid any impact on vulnerable groups and at the same time meet the objectives of revitalising disadvantaged geographic areas.

Integration

In terms of integration, the proposed road development was assessed in terms of compatibility with various policies under the following headings:

1. Transport Integration
2. Land Use Integration
3. Geographical Integration
4. Integration with other Government Policies.

Scoring System

Each of the sub-criteria was given a score on a seven-point scale, as follows:

1. Major Negative
2. Moderately Negative
3. Minor Negative
4. Neutral
5. Slightly Positive
6. Moderately Positive
7. Highly Positive

All of these assessments are summarised in an assessment matrix (Table 3.1), which was used as the basis for selection of the Preferred Route Corridor, and is outlined in the following Section.

3.7.5.1 Route Corridor Option Assessment Matrix

The above assessments are drawn together in the route corridor option assessment matrix, as presented in Table 3.1, below. The summation of the scores under each of the five appraisal criteria shows that Route Corridor Options 2 and 3 achieve equal scoring, each obtaining a total of 93, compared to 89 for Option 4, and 77 for Option 1.

As a check, an additional analysis was carried out of the preferences identified under each of the assessment criteria applied. This is presented in Table 3.2, below.

The following is noted:

- Route Corridor Option 3 is the Preferred option under the Environmental heading, achieving five “Preferred” and five “Intermediate” ratings under the sub-headings considered. Unlike Route Corridor Options 1 and 4, Options 2 and 3 avoid the Askeaton Fen Complex and the Curraghchase Woods SAC by passing to the southwest and south of these sites.
- Under the Economy heading, Route Corridor Options 2 and 3 achieve joint “Preferred” rating overall.
- Similarly, under the headings of Safety, and Accessibility and Social Inclusion, Route Corridor Options 2 and 3 achieve a joint “Preferred” rating overall.
- Route Corridor Options 2, 3 and 4 achieve joint “Preferred” rating under the Integration heading.

The preference assessment is presented in overall summary form at the end of Table 3.2 and confirmed Route Corridor Option 3 and 2 in 1st and 2nd position respectively with Route Corridor Option 4 in 3rd position and Route Corridor Option 1 in 4th position. Based on this approach Route Corridor Option 3 is identified as the preferred route corridor.

The option to upgrade the N69 adjacent to the existing route, in the form of Route Corridor Option 1 was found to be the least favoured option. The environmental impacts from Option 1 would be more likely to be significant compared to the other options and was found to be the Least Preferred Option with predictions of Major Effects not only for Ecology but for a number of the criteria listed below in Tables 3.1 and 3.2. The location of the Option 1 travels between sections of the Askeaton Fen Complex and is in very close proximity to the Curraghchase Woods SAC.

Table 3.1 Route Corridor Option Assessment Matrix

	Option 1		Option 2		Option 3		Option 4	
Environment								
Noise and Vibration	Moderately Negative	2	Moderately Negative	2	Moderately Negative	2	Moderately Negative	2
Air Quality	Minor Negative	3	Slightly Positive	5	Neutral	4	Neutral	4
Landscape & Visual	Major Negative	1	Moderately Negative	2	Moderately Negative	2	Moderately Negative	2
Agriculture	Moderately Negative	2	Major Negative	1	Major Negative	1	Moderately Negative	2
Impact on Properties (Non Agricultural)	Moderately Negative	2	Moderately Negative	2	Moderately Negative	2	Moderately Negative	2
Ecology	Major Negative	1	Moderately Negative	2	Moderately Negative	2	Major Negative	1
Archaeology & Cultural Heritage	Major Negative	1	Major Negative	1	Major Negative	1	Major Negative	1
Hydrogeology	Major Negative	1	Moderately Negative	2	Moderately Negative	2	Major Negative	1
Hydrology	Minor Negative	3	Major Negative	1	Moderately Negative	2	Minor Negative	3
Soils, Geology and Waste	Major Negative	1	Moderately Negative	2	Moderately Negative	2	Major Negative	1
Sub-Total	17		20		20		19	
Economy								
Economic Benefit (COBA - Efficiency and Effectiveness)	Major Negative	1	Slightly Positive	5	Slightly Positive	5	Slightly Positive	5
Funding Impacts	Neutral	4	Neutral	4	Neutral	4	Neutral	4
Transport Reliability	Moderately Positive	6	Highly Positive	7	Highly Positive	7	Highly Positive	7
Wider Economic Benefits	Moderately Positive	6	Highly Positive	7	Highly Positive	7	Highly Positive	7
Sub-Total	17		23		23		23	
Safety								
Collision reduction	Neutral	4	Highly Positive	7	Highly Positive	7	Moderately Positive	6
Security	Slightly Positive	5	Highly Positive	7	Highly Positive	7	Moderately Positive	6
Sub-Total	9		14		14		12	
Accessibility and Social Inclusion								
Impact on Vulnerable Groups	Neutral	4	Neutral	4	Neutral	4	Neutral	4
Impact on deprived geographic areas	Neutral	4	Slightly Positive	5	Slightly Positive	5	Neutral	4
Sub-Total	8		9		9		8	
Integration								
Transport Integration	Highly Positive	7	Highly Positive	7	Highly Positive	7	Highly Positive	7
Land Use Integration	Slightly Positive	5	Moderately Positive	6	Moderately Positive	6	Moderately Positive	6
Geographical Integration	Highly Positive	7	Highly Positive	7	Highly Positive	7	Highly Positive	7
Integration with Other Government Policies	Highly Positive	7	Highly Positive	7	Highly Positive	7	Highly Positive	7
Sub-Total	26		27		27		27	
Summary of Scores								
Environment	17		20		20		19	
Economy	17		23		23		23	
Safety	9		14		14		12	
Accessability and Social Inclusion	8		9		9		8	
Integration	26		27		27		27	
Overall	77		93		93		89	

Table 3.2 Route Corridor Option Preference Matrix

	Route Corridor Option 1	Route Corridor Option 2	Route Corridor Option 3	Route Corridor Option 4
Environment				
Noise and Vibration	Least Preferred	Intermediate	Preferred	Least Preferred
Air Quality	Least Preferred	Preferred	Intermediate	Intermediate
Landscape & Visual	Least Preferred	Preferred	Intermediate	Intermediate
Agriculture	Preferred	Least Preferred	Intermediate	Preferred
Impact on Properties (Non Agricultural)	Least Preferred	Preferred	Intermediate	Intermediate
Ecology	Least Preferred	Intermediate	Preferred	Least Preferred
Archaeology & Cultural Heritage	Least Preferred	Intermediate	Preferred	Intermediate
Hydrogeology	Least Preferred	Intermediate	Preferred	Least Preferred
Hydrology	Preferred	Least Preferred	Intermediate	Preferred
Soils, Geology and Waste	Least Preferred	Preferred	Preferred	Intermediate
Ranking	4	2	1	3
Economy				
Economic Benefit (COBA - Efficiency and Effectiveness)	Least Preferred	Preferred	Preferred	Preferred
Funding Impacts	Intermediate	Intermediate	Intermediate	Intermediate
Transport Reliability	Least Preferred	Preferred	Preferred	Preferred
Wider Economic Benefits	Least Preferred	Preferred	Preferred	Intermediate
Ranking	4	1	1	3
Safety				
Collision reduction	Least Preferred	Preferred	Preferred	Intermediate
Security	Least Preferred	Preferred	Preferred	Intermediate
Ranking	4	1	1	3
Accessibility and Social Inclusion				
Impact on Vulnerable Groups	Intermediate	Intermediate	Intermediate	Intermediate
Impact on deprived geographic areas	Intermediate	Preferred	Preferred	Intermediate
Ranking	4	1	1	3
Integration				
Transport Integration	Preferred	Preferred	Preferred	Preferred
Land Use Integration	Intermediate	Preferred	Preferred	Preferred
Geographical Integration	Preferred	Preferred	Preferred	Preferred
Integration with Other Government Policies	Preferred	Preferred	Preferred	Preferred
Ranking	4	1	1	1
Overall Summary				
	Route Corridor Option 1	Route Corridor Option 2	Route Corridor Option 3	Route Corridor Option 4
Environment	Least Preferred	Intermediate	Preferred	Intermediate
Economy	Least Preferred	Preferred	Preferred	Intermediate
Safety	Least Preferred	Preferred	Preferred	Intermediate
Accessibility and Social Inclusion	Least Preferred	Preferred	Preferred	Least Preferred
Integration	Least Preferred	Preferred	Preferred	Preferred
Ranking	4	2	1	3

It is noted that one of the two methodologies adopted (Table 3.1 above) identified Route Corridor Options 2 and 3 as equal preferred solutions based on numerical scoring within a 7-point scale, while the second methodology, utilising a simple 3-step ranking system (Table 3.2 above), resulted in Route Corridor Option 3 being preferred. On account of the closeness of the result it was considered that further examination of the assessment carried out in Table 3.1 was warranted, using the seven-point scoring system.

Table 3.1 shows that the only areas of difference between Route Corridor Options 2 and 3 occur under the environmental assessment headings considered. It will be noted that Route Corridor Options 2 and 3 follow a common route apart from the sections which diverge between Node E (Ballingarrane) and Node K (Tuogh). In order to investigate the differences between these particular sections of route in more detail, a separate assessment was carried out by the Project Design Team with input from the various environmental specialists (as listed in Chapter 1) under each of the key environmental sub-headings. This assessment is described in the following paragraphs, and the results are presented in Table 3.3.

Table 3.3 Localised Comparison of Options 2 and 3 – Environmental Criteria

	Route Corridor Option 2		Route Corridor Option 3	
Environment				
Noise and Vibration	Moderately Negative	2	Minor Negative	3
Air Quality	Moderately Negative	2	Moderately Negative	2
Landscape & Visual	Moderately Negative	2	Moderately Negative	2
Agriculture	Major Negative	1	Major Negative	1
Impact on Properties (Non Agricultural)	Moderately Negative	2	Major Negative	1
Ecology	Moderately Negative	2	Minor Negative	3
Archaeology & Cultural Heritage	Moderately Negative	2	Minor Negative	3
Hydrogeology	Moderately Negative	2	Minor Negative	3
Hydrology	Moderately Negative	2	Minor Negative	3
Soils, Geology and Waste	Minor Negative	3	Moderately Negative	2
Sub-Total	20		23	

Based on the comparison carried out as summarised in Table 3.3, Route Corridor Option 3 is preferred over Route Corridor Option 2 when the divergent sections between Node E (Ballingarrane) and K (Tuogh) are examined in more detail with exclusion of the long common sections (reflected in a score of 23 for Option 3 as compared to 20 for Option 2).

The principal reasons for the preference for Option 3 relate to slightly lower potential impacts in respect of Noise and Vibration, due to fewer receptors in close proximity, and lower potential impacts on Ecology, Hydrogeology and Hydrology, as the route is further away from the numerous sensitive sites in the Askeaton Fen Complex SAC. Route 3 also scored slightly better in terms of potential impacts on Archaeology & Cultural Heritage. On the other hand, Option 3 scored slightly worse in terms of impacts on Properties (non-agricultural) and on Soils, Geology and Waste.

3.8. Confirmation of the Preferred Route Corridor

The preferred route corridor is shown in Plate 3.17. Following on from the public consultation and the route selection process which identified the preferred route corridor, a public display was held on the 1st and 2nd of December 2015. The objectives of this display were to:

1. Present the preferred route corridor to the public;
2. Invite comments / feedback on the preferred route corridor;
3. Further inform the public of the process and the programme for the project;
4. Gather local information, including on land ownership; and
5. Address questions / concerns from the public, where possible.

The public display events were held at two venues, the South Court Hotel in Limerick on the 1st December 2015, and the Flying Boat & Maritime Museum in Foynes on the 2nd December 2015. A publicity campaign was undertaken by the Mid West National Road Design Office (MWNRO) and Limerick City and County Council prior to the public display, which included advertisements in the Limerick Leader and Limerick Post for two weeks previous to the consultation, while advertisements were also broadcast on Limerick 95FM, and on Limerick City and County Council's Twitter feed and website. Immediately before the public display event took place, the MWNRO issued a letter to all known property owners within the preferred route corridor. This letter advised of the upcoming public display events. It also offered private meetings with the property owners to allow for adequate explanation of the proposed road development proposals and to discuss concerns that the property owners might have had. Approx. 600 people attended the public display events over the 2 days.

The display information comprised: aerial photography of the proposed road development showing the Preferred Route Corridor, Ordnance Survey mapping showing the Route Corridor Options and Plans showing the Preferred Route Corridor. All attendees were offered copies of the information brochure. Anybody wishing to make written comments was invited to do so by the closing date, which was extended from 15th January 2016 to 29th January 2016. Approx. 370 submissions were subsequently received from individuals and community groups.

During the display events, dialogue between staff engaged on the project and members of the public was encouraged. Many of these conversations provided useful local information that was not always apparent from available mapping. This process also yielded vital information on agricultural holdings and other matters, such as boundaries, water courses, habitats and other landscape features.

The themes of the comments received on the preferred route corridor were varied. However, they were often reflective of the submissions received following the March 2015 Public Consultation. The following subjects were predominant:

- The effect of severance and land loss upon dairy and beef enterprises
- the sensitivity of horses to noise and their tendency to react unpredictably to same;
- people's attachment to cultural heritage sites within or close to the route corridor;
- the need for consideration of a junction in the vicinity of Croagh Village;
- loss of business due to altered trade patterns;
- the effects of local road closures;

- implications for human health of altered living environments;
- loss of family property; and
- effects on local flora and fauna.

The comments and feedback were reviewed and considered by the Project Team including the relevant specialists in advance of finalising their assessment. Further refinements of the preferred route corridor were made in response to the submissions received, where appropriate, and these are described in the next sections.

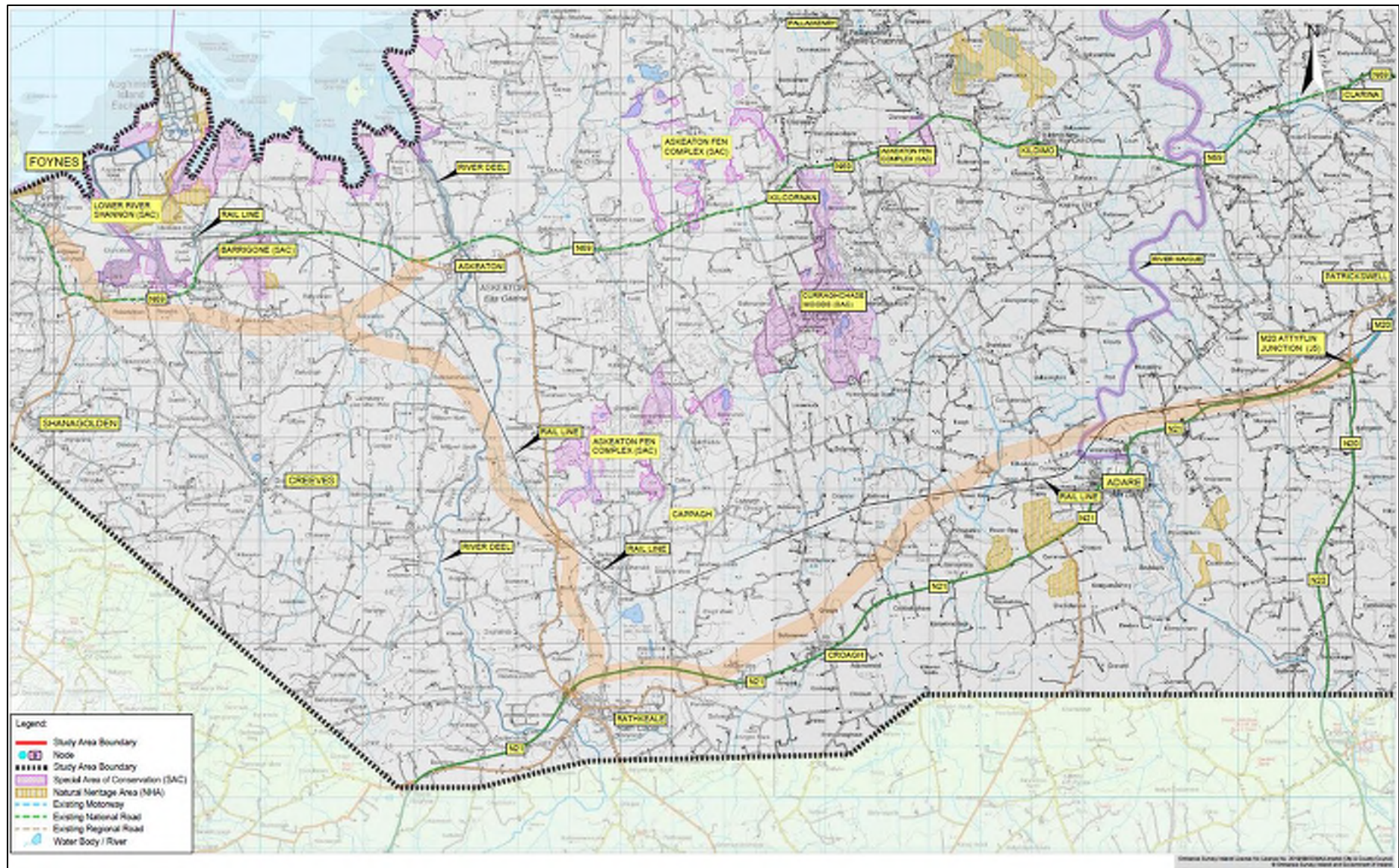


Plate 3.17 300m wide Preferred Route Corridor – Public Display – December 2015 (See Figure 3.13 in Volume 3 for A3 version)

3.9. Route Development

3.9.1 Design Update – September 2016

Following on from the publication of the Route Selection Report in June 2016, further design development was undertaken by the Project Team, including the design and environmental specialists. A design update was published in September 2016, outlining a provisional 100m wide corridor within which the final road alignment for this proposed road development was likely to be developed. A letter was issued to all impacted property owners / landowners and to those who had registered an interest in the proposed road development notifying them of the design update. Plates 3.18 – 3.22 illustrate the further development of the route as more locally detailed information was obtained, and in response to issues raised in the public consultations. These drawings were made available to view at the MWNRDO and for download from the proposed road development project website (www.foyneslimerick.ie).

In September 2016, the design update established that the provisional 100m wide corridor lay predominantly within the 300m wide Preferred Route Corridor (Orange). However, following detailed consideration and further design development, the proposed preferred route corridor diverged at a number of locations, as described below, from the orange route in order to avoid and minimise adverse impacts. Provisional junction locations were also identified and are shown as red shaded areas in Plates 3.18 – 3.21.

Three amendments resulted in the provisional 100m wide corridor falling outside of the Preferred Route Corridor (Orange) shown at the public display in December 2015 and in the Route Selection Report:

- A. Moving the corridor by up to 400m outside of the preferred route corridor to minimise impacts on Ballycullen House Demesne through the townlands of Ballyclogh, Ballycullen, Lismakeery and Ballynacagheragh (Plate 3.19);
- B. Moving the corridor by up to 150m outside of the preferred route corridor to minimise impacts on the existing road and rail infrastructure through the townlands of Graigeen and Ballingarrane (Plate 3.20);
- C. Moving the corridor by up to 200m outside of the preferred route corridor to minimise impacts on agronomy through the townlands of Amogan Beg, Clogh East and Ballycannon (Plate 3.21).

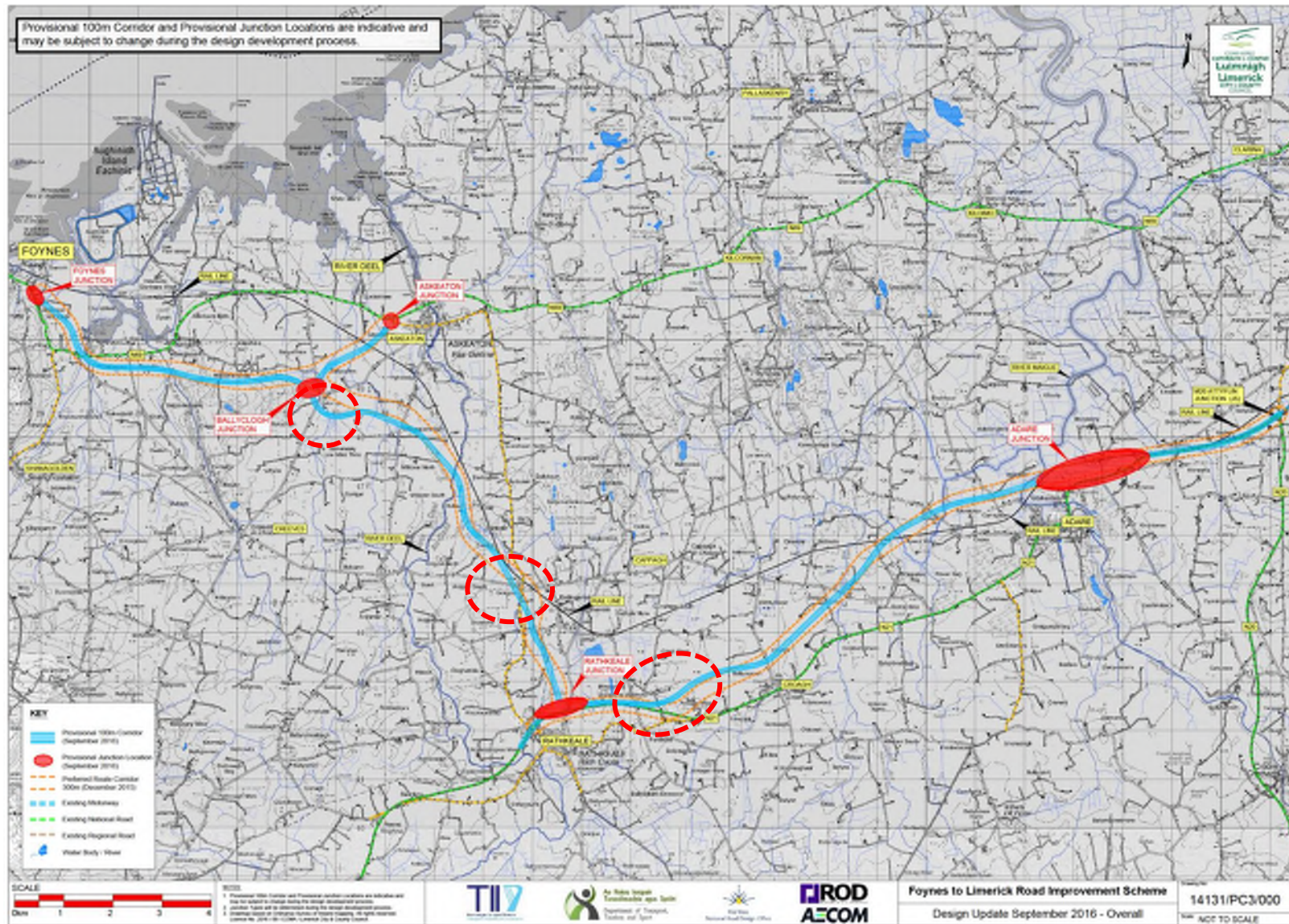


Plate 3.18 Provisional 100m corridor (September 2016) (Locations of route variations circled in red). (See Figure 3.14 in Volume 3 for A3 version)

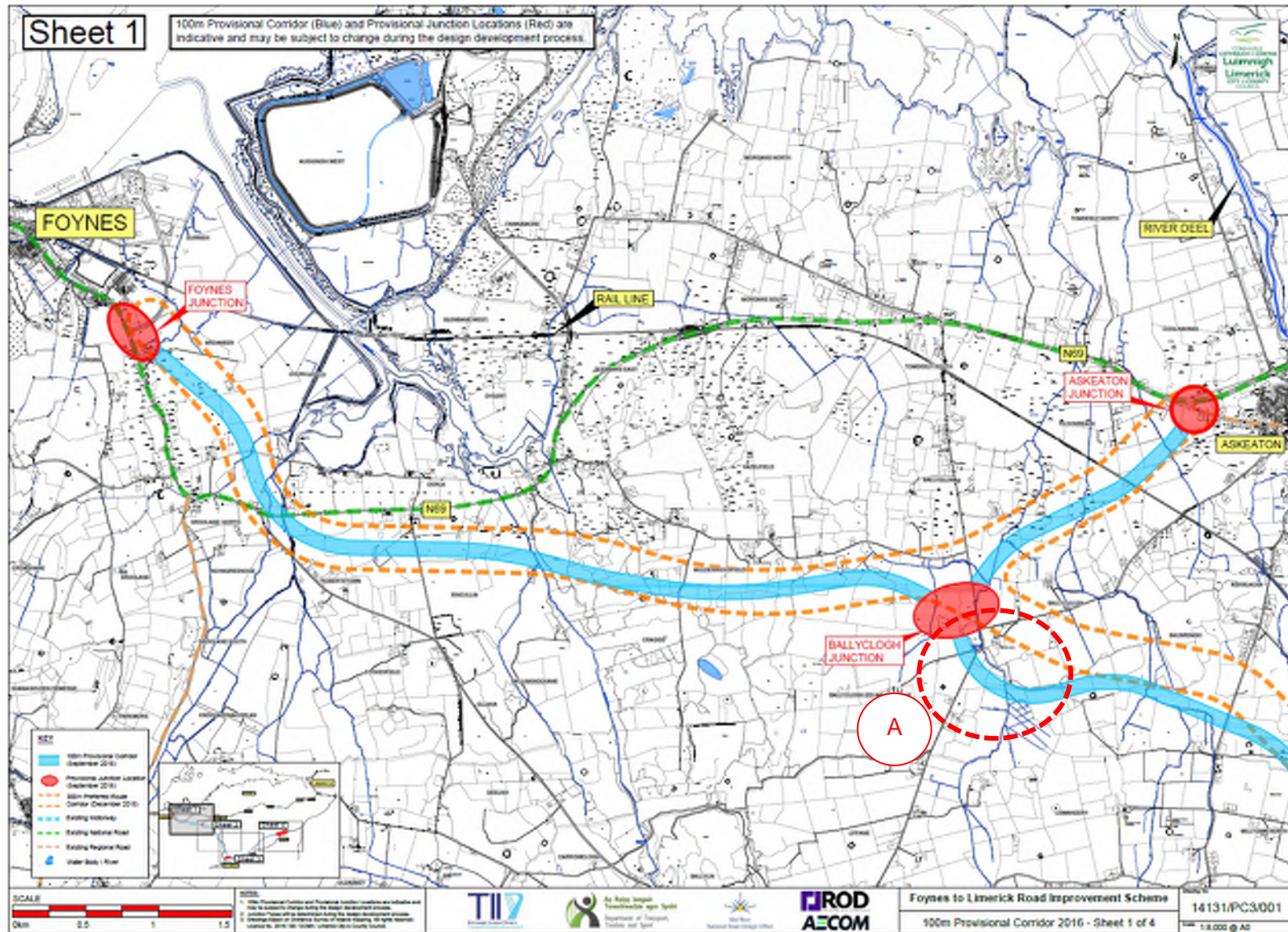


Plate 3.19 Design Update September 2016 – Sheet 1 of 4 (See Figure 3.15 in Volume 3 for A3 version) (Location of route variation circled in red).

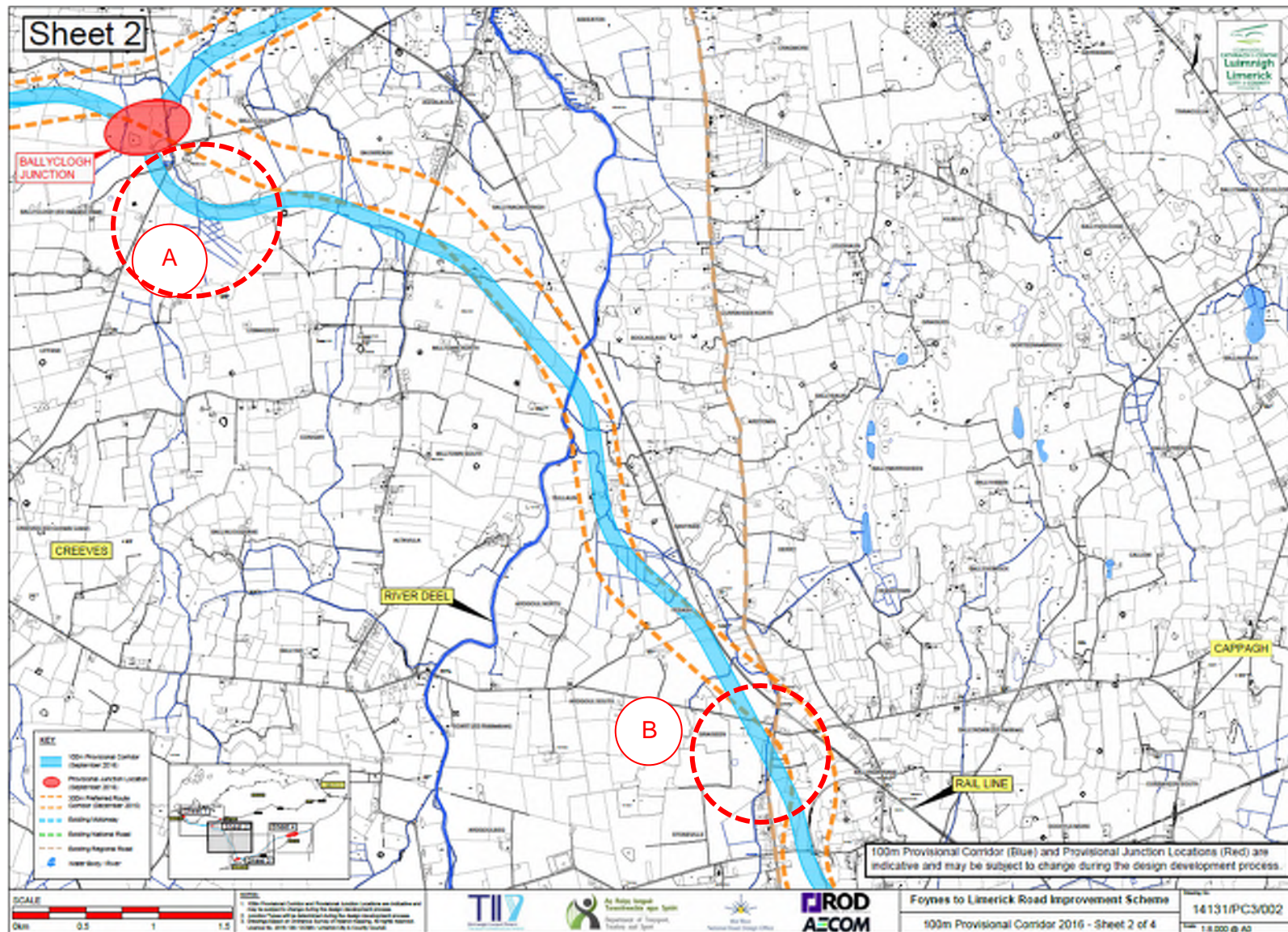


Plate 3.20 Design Update September 2016 – Sheet 2 of 4 (See Figure 3.16 in Volume 3 for A3 version) (Locations of route variations circled in red).

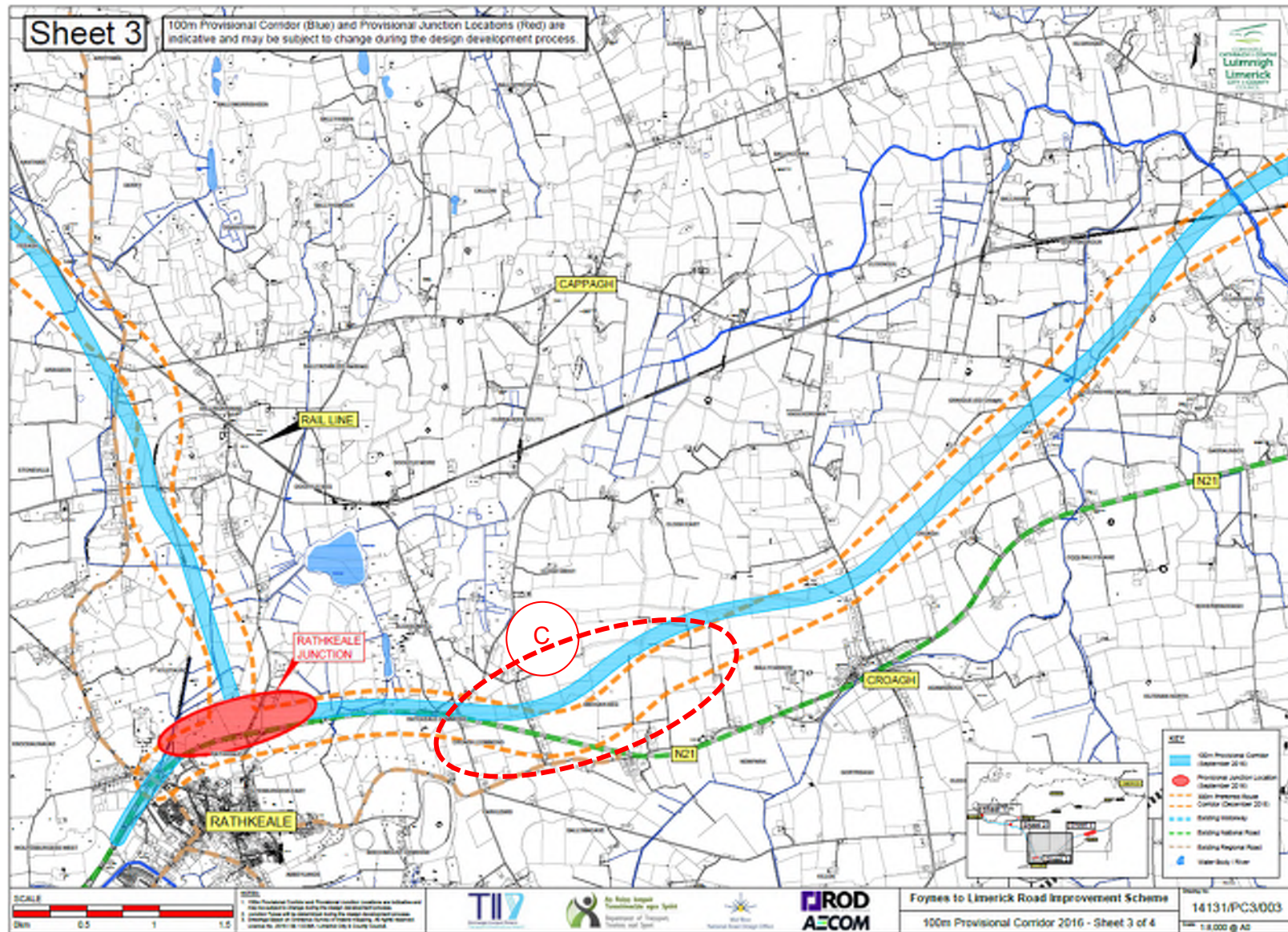


Plate 3.21 Design Update September 2016 – Sheet 3 of 4 (See Figure 3.17 in Volume 3 for A3 version) (Location of route variation circled in red).

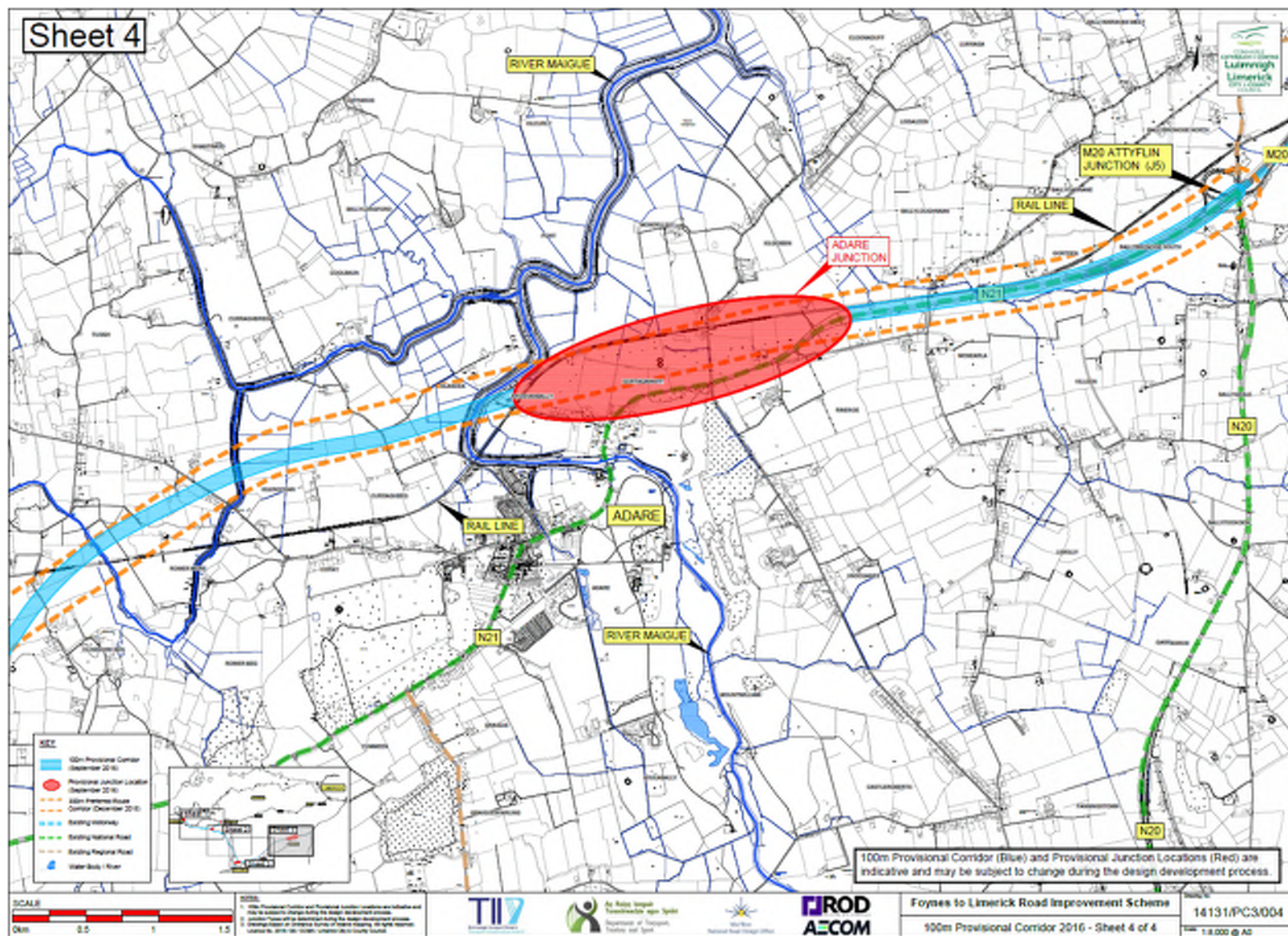


Plate 3.22 Design Update September 2016 – Sheet 4 of 4 (See Figure 3.18 in Volume 3 for A3 version)

3.9.2 Design Update – Corridor Options between Blossomhill and Ballycannon – March 2017

Further consideration of the localised constraints over a 2km section in the Blossomhill and Ballycannon area between Rathkeale and Croagh, together with feedback received from the public following the September 2016 Design Update publication, identified the need for adaptation of the proposed route corridor in this section. Two further localised corridor options were developed to minimise the impacts on farm holdings, residential properties, soft ground, archaeology and ecology. These two localised route options (pink and green), along with the September 2016 corridor (blue) in this vicinity, were published for consideration in March 2017. The proposals for the options being considered were made available for viewing at the Mid West National Road Design Office and for download at the project website (www.foyneslimerick.ie). These localised corridor options are shown in Plate 3.23. All property owners / landowners within this area of investigation were notified by letter of this proposed location specific route variation.

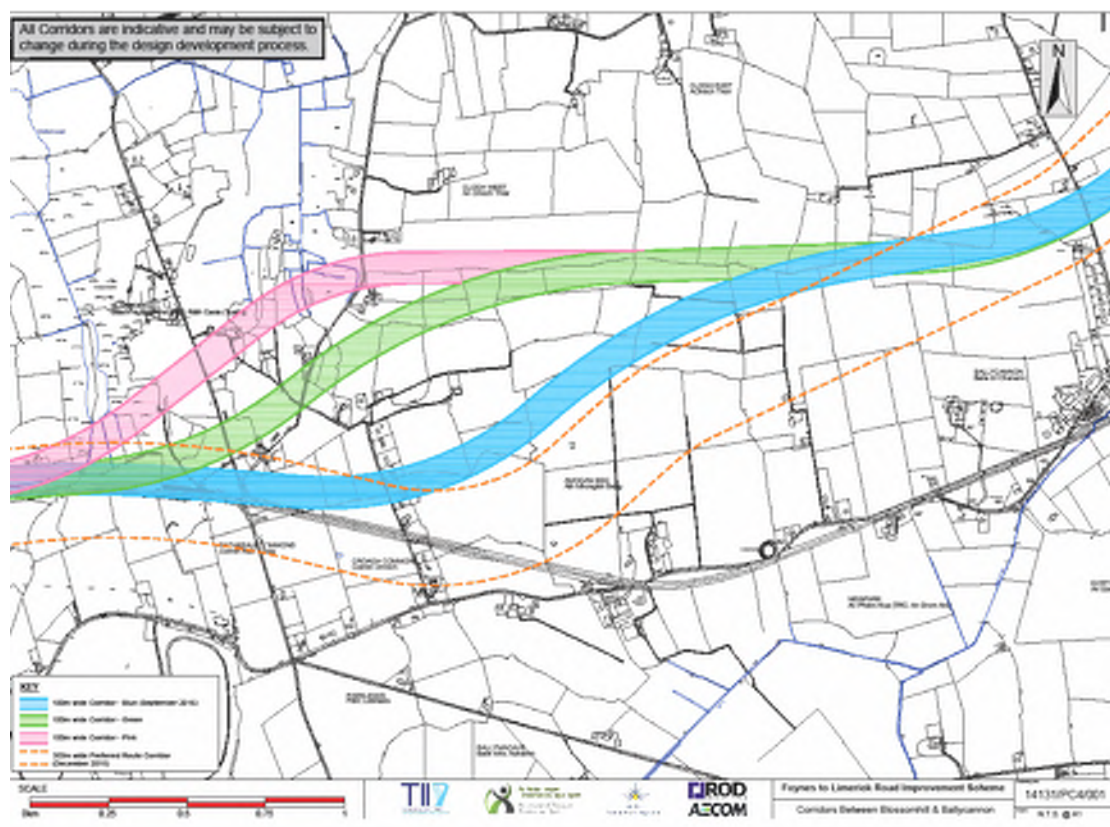


Plate 3.23 100m Corridor Options Between Blossomhill & Ballycannon

3.9.3 Design Update – June 2017

Following the public display of the provisional 100m corridor in September 2016, further design work, environmental surveys and ground investigation surveys were also progressed along the entire route of the proposed road development. A provisional 80m wide corridor was developed along with provisional junction layouts which were published in June 2017.

The provisional 80m wide corridor, as shown in Plate 3.24, lies predominantly within the previous provisional 100m wide corridor. However, it diverged slightly at a number of locations following design development and consultation feedback. Drawings showing the provisional 80m wide corridor, indicative junction layouts and two junction

options for Croagh were made available for viewing at the Mid West National Road Design Office and for download at the project website (www.foyneslimerick.ie).

Provision of a junction in the vicinity of Croagh village was not initially proposed when the junction strategy for the proposed road development was prepared early in the project planning and design process, as the village is a small settlement with a population in the order of 300 people. However, in response to a motion adopted by the elected representatives of Limerick City and County Council in October 2016, a socio-economic assessment was undertaken to consider the costs and potential benefits of an additional junction at Croagh.

The Junction Needs Study determined that the provision of an additional junction in the vicinity of Croagh would result in a positive benefit for Croagh and its environs. A catchment area with a population of 1,600 people in Croagh village and the surrounding rural area, extending north-westward to Cappagh and south-westwards towards Ballingarry, would benefit from more direct access to the proposed motorway by avoiding the need to pass through Adare. An economic evaluation found that the Benefit to Cost Ratio for the junction would be slightly positive, which means that the additional investment cost would be less than the value of the benefits that would be derived. On this basis, further study was undertaken to identify options for the location of the additional junction and to select the most suitable location.

Following a sifting process, two locations were considered as the most preferable locations for a junction, one to the east and one to the west of the village. An option with a junction directly north of the village, on the L-1421 Cappagh Road, was discounted due to impacts that were expected to arise as a result of upgrades to the local road network and impacts on roads within the village of Croagh itself.

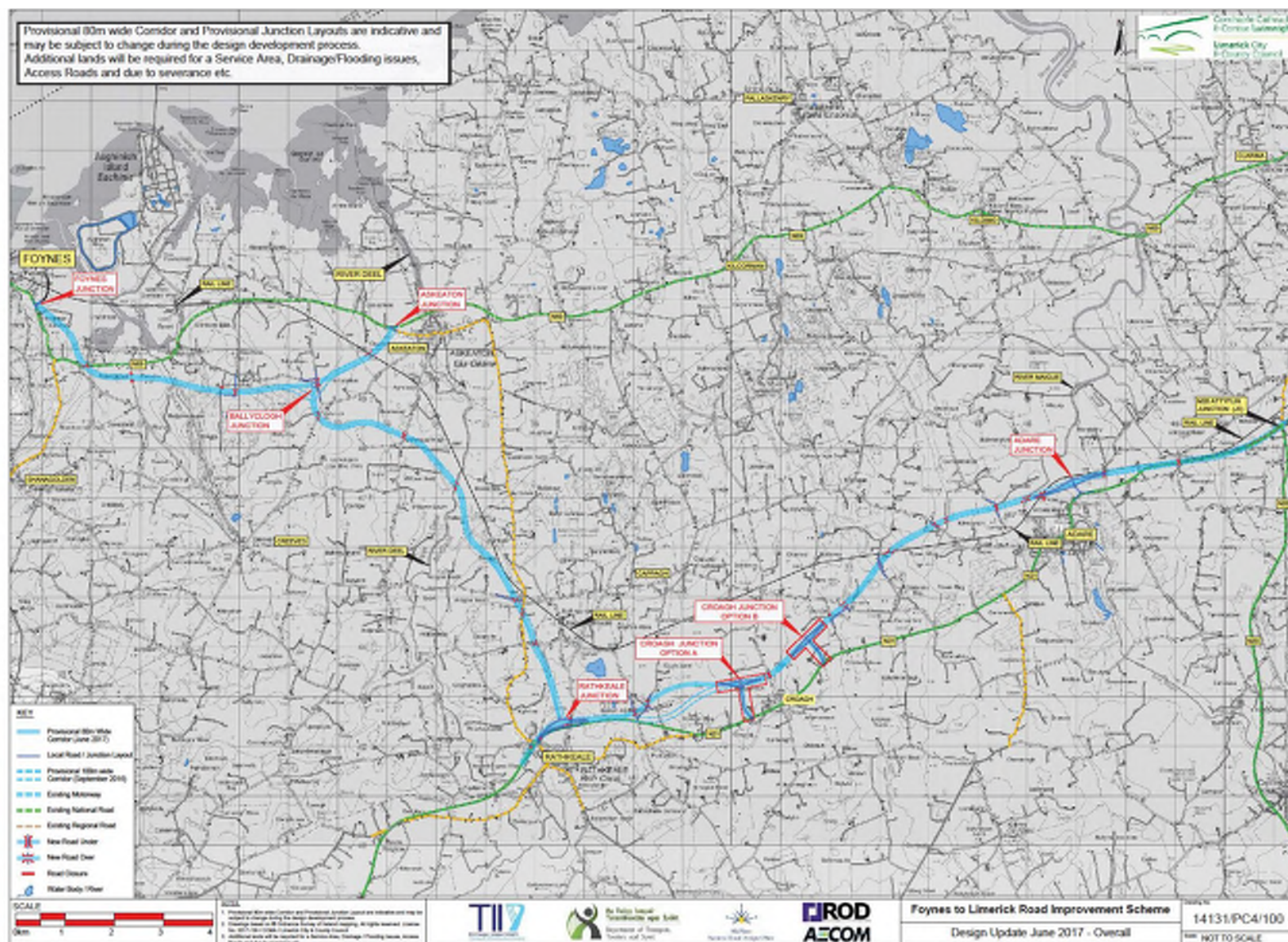


Plate 3.24 Design Update - June 2017 (See Figure 3.19 in Volume 3 for A3 version)

The two selected junction locations - Option A, to the west of Croagh, and Option B, to the East of Croagh - were presented as part of the update to the public for the proposed road development in June 2017, and are shown in Plate 3.25.

A detailed study was undertaken of the three alternative route corridors between Blossomhill and Ballycannon as outlined above in section 3.9.2. The following conclusions were drawn:

- The blue option has the greatest impact on a small residential community at Amogan Beg and also on farm holdings to the east of these houses.
- The green option has a lesser impact on agriculture and community than the blue option. It would impact on a potential archaeological enclosure. It avoids two vernacular settlements, as well as waterlogged and deep soft ground to the north.
- The pink option avoids the impacts on agriculture associated with the green option, but is less favourable in terms of ecology, affecting a fen area linked to a small lake at Blossomhill. It would also cross deep soft ground, which would give rise to difficulties during foundation construction.

Accordingly, the Green Option was selected as the preferred option by the Project Team.

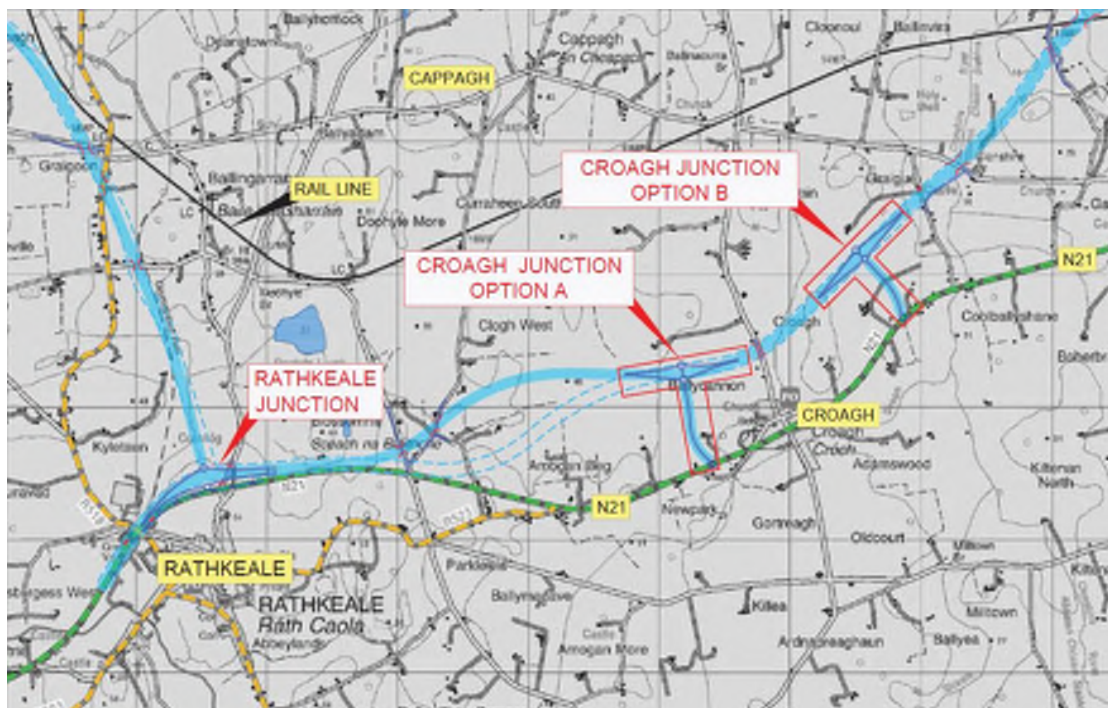


Plate 3.25 Options for Junction at Croagh - June 2017 (see Figure 3.20 of Volume 3 for A3 version)

The Provisional 80m Corridor and Provisional Croagh Junction Locations were described in these drawings dated June 2017 as being indicative and subject to change during the remaining design development process and are shown in Plate 3.25.

A letter was issued to all impacted property owners / landowners, including to those in the vicinity of the two provisional Croagh Junction options, notifying them of the design update.

3.9.4 Design Update October 2017 – Preferred Croagh Junction (East)

Following the June 2017 Design Update and further consultation with interested parties and further assessment, a multi-criteria assessment of the two Croagh junction location options found that both were generally equivalent in terms of environmental impacts. However, it was concluded that the location on the eastern side of the village would be preferable on the basis of operational considerations (i.e. by being closer to the main desire line for traffic travelling to and from the Limerick City direction). It would also be closer to the mid-way point along the section of motorway between Adare and Rathkeale, which would provide more consistent junction spacing. The eastern option for the junction location will provide for more flexible maintenance operations and opportunities for emergency closures of this section of the road with traffic being able to divert to the existing N21 if required. Option B (East of Croagh) was selected as the preferred option for a Junction at Croagh, as shown in Plate 3.26.

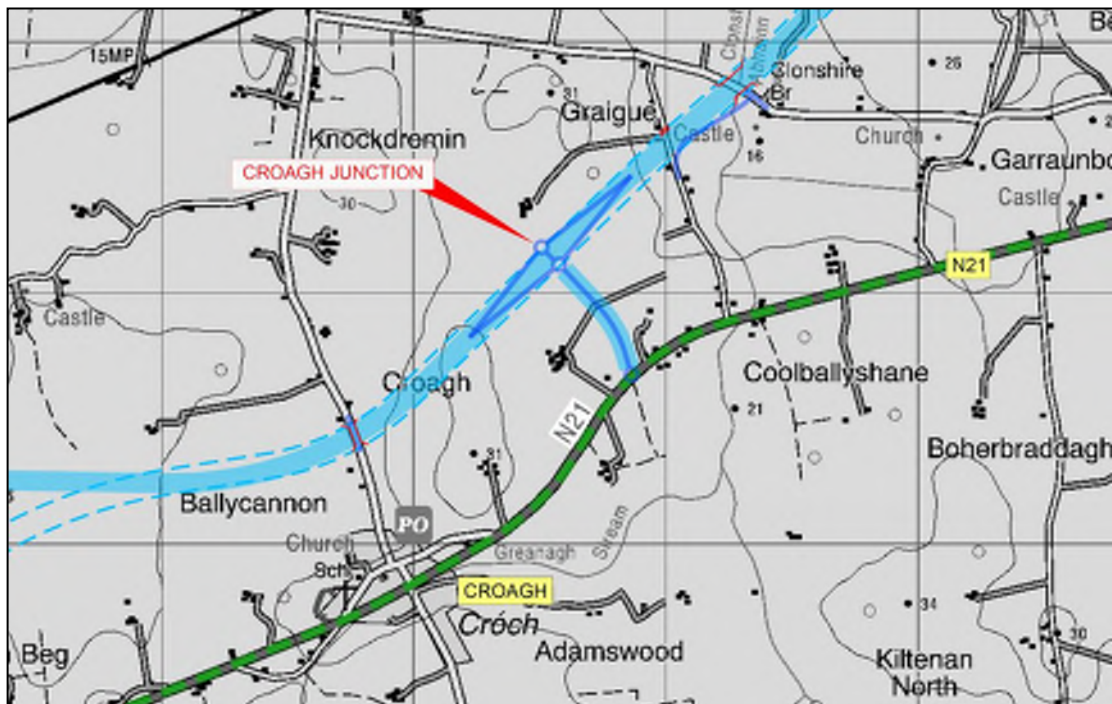


Plate 3.26 Design Update - October 2017 – Croagh Junction (East)

A letter was issued to all concerned property owners / landowners and to those in the vicinity of the two Croagh Junction options notifying them of the design update which confirmed the selected junction location.

3.9.5 Design Update – May 2018

In early May 2018, the fifth design update was published. Plates 3.27 – 3.35 illustrate the proposed layout and footprint of the proposed road development in detail, as follows:

- Proposed Mainline, side road realignments, bridges and junction designs as well as whether the road is in cut or on fill;
- Proposed Access arrangements, indicative land-take lines, watercourse diversions and location of drainage ponds etc.;
- Area under consideration for the provision of a HGV Rest Area in the vicinity of Shannon-Foynes Port, with a number of possible site locations.

The Design Update drawings were indicative and potentially subject to change during the further design refinement process with additional lands possibly being required for drainage purposes, etc.

A letter was issued to all impacted property owners / landowners and to those who had registered an interest in the proposed road development notifying them of the design update. The drawings were also made available for download from the project website: (www.foyneslimerick.ie)

Further submissions were received from members of the public and landowners and these were evaluated and taken into consideration in the design finalisation process.

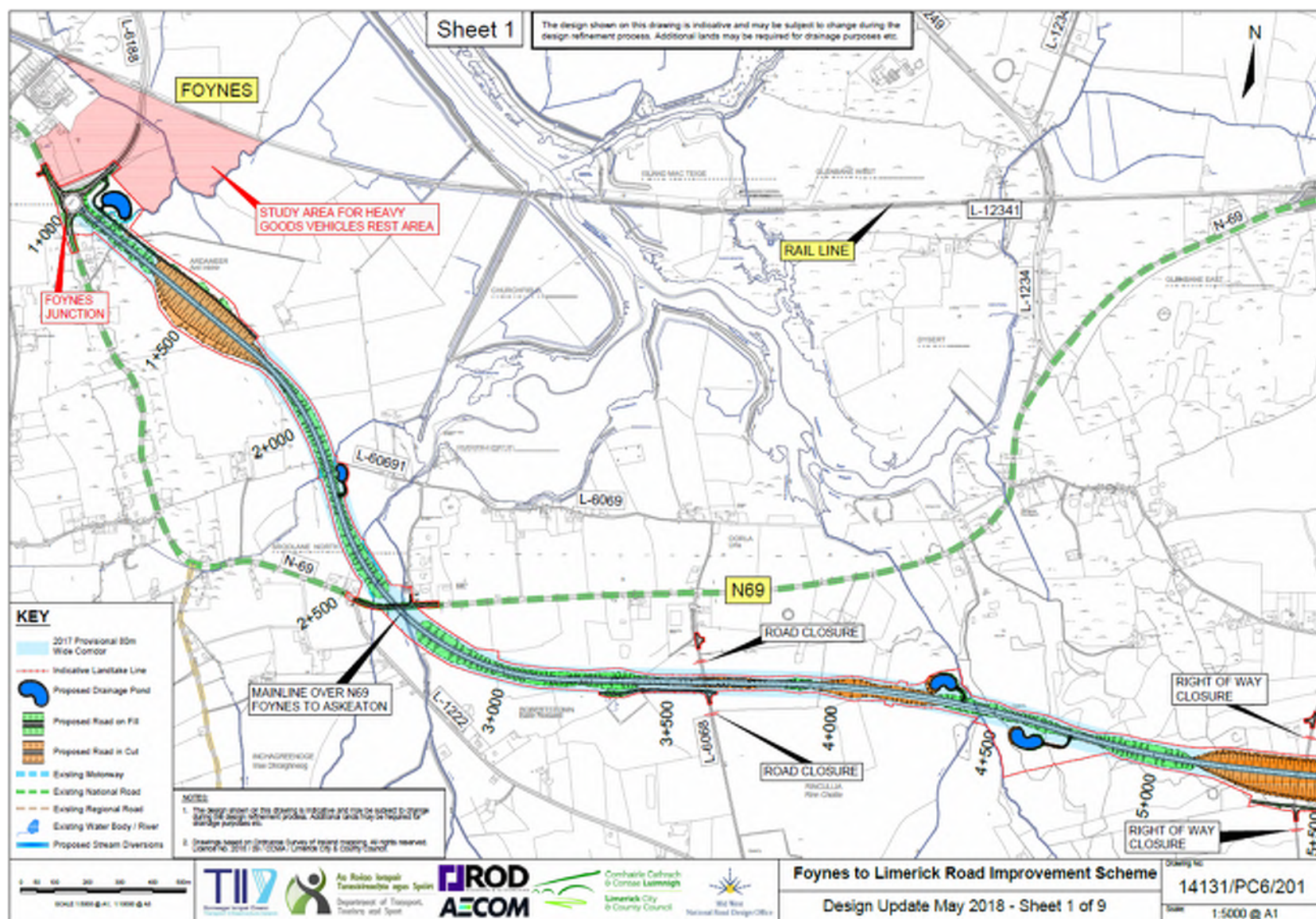


Plate 3.27 Design Update - May 2018 Sheet 1

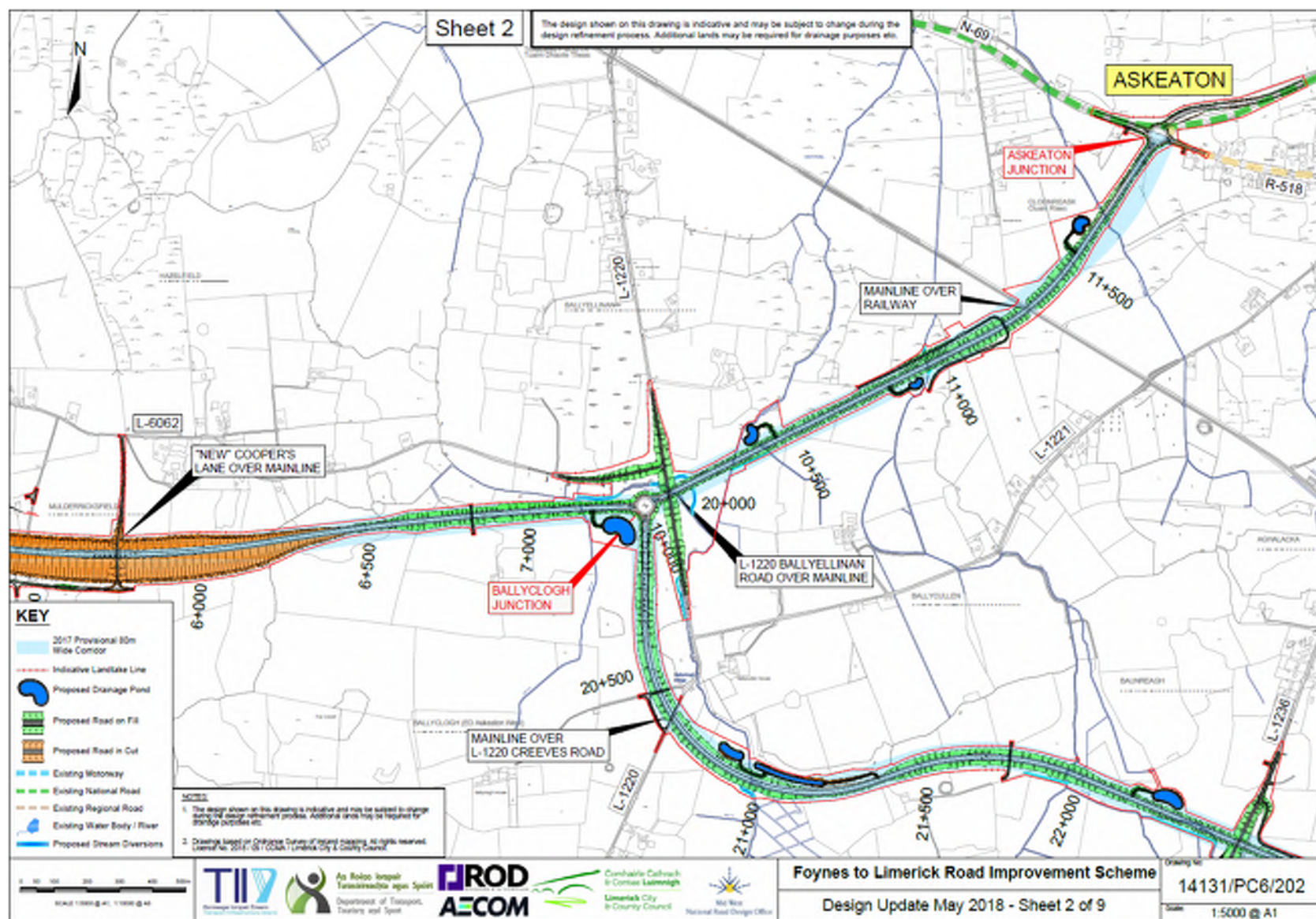


Plate 3.28 Design Update - May 2018 Sheet 2

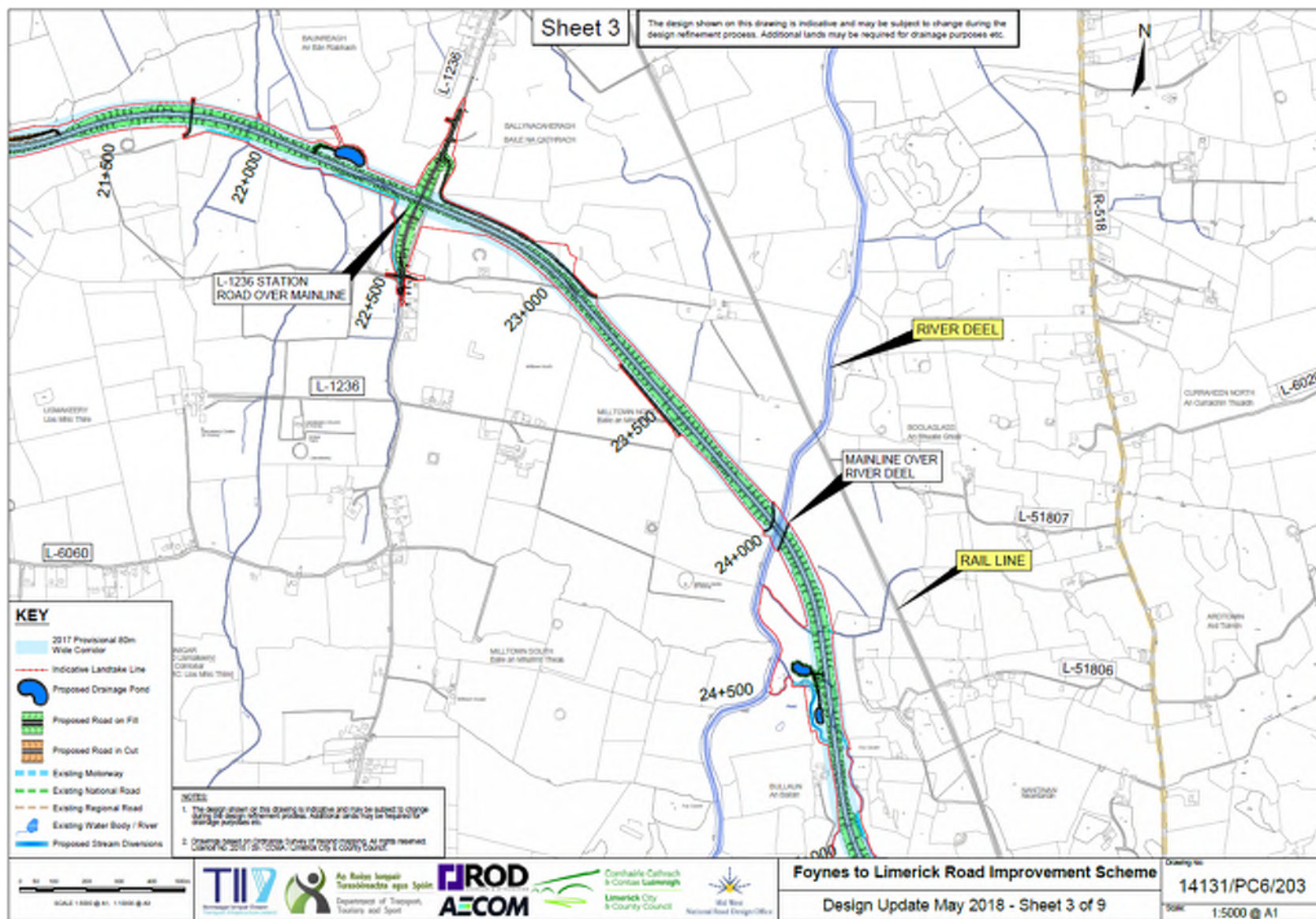


Plate 3.29 Design Update - May 2018 Sheet 3



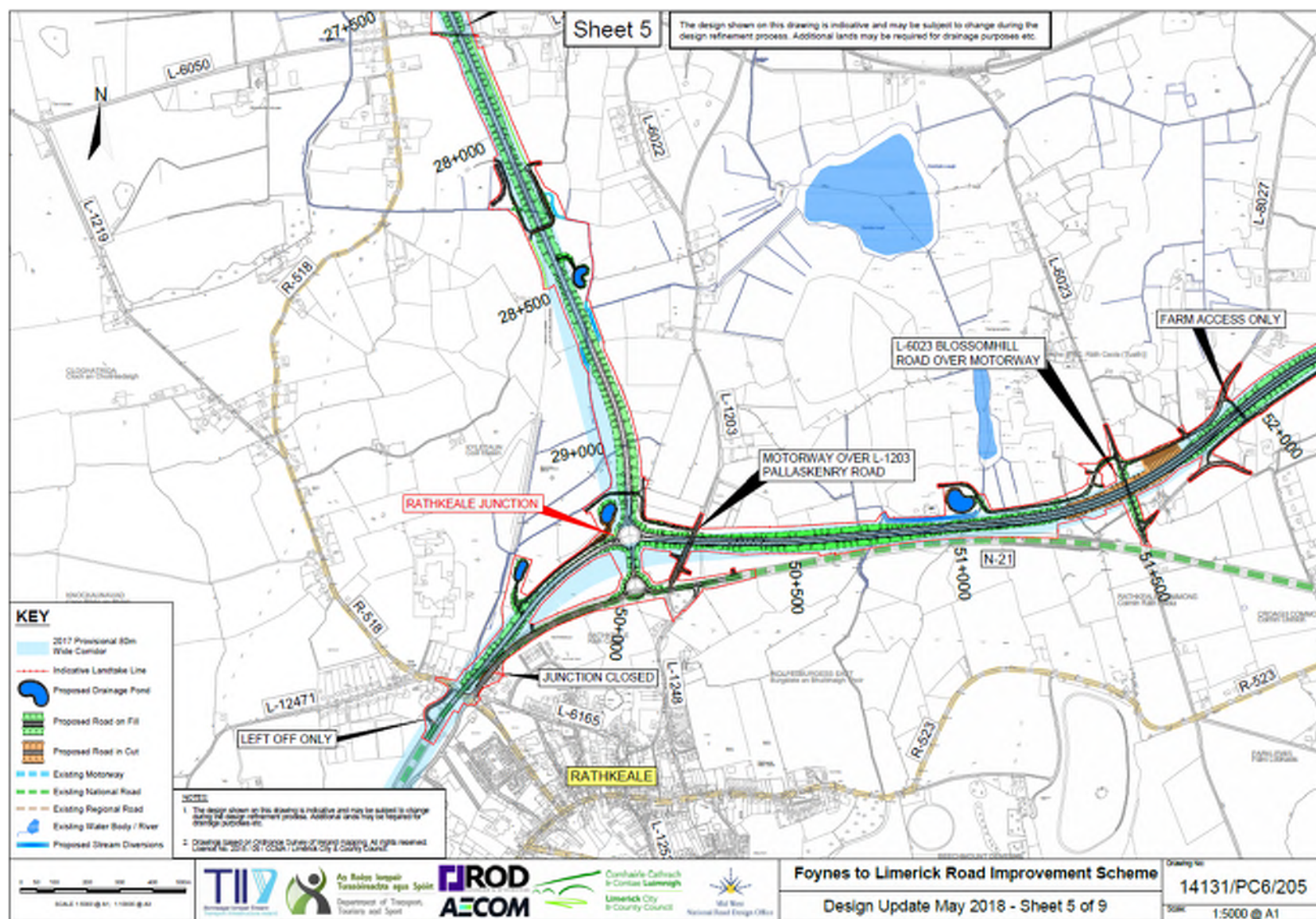


Plate 3.31 Design Update - May 2018 Sheet 5

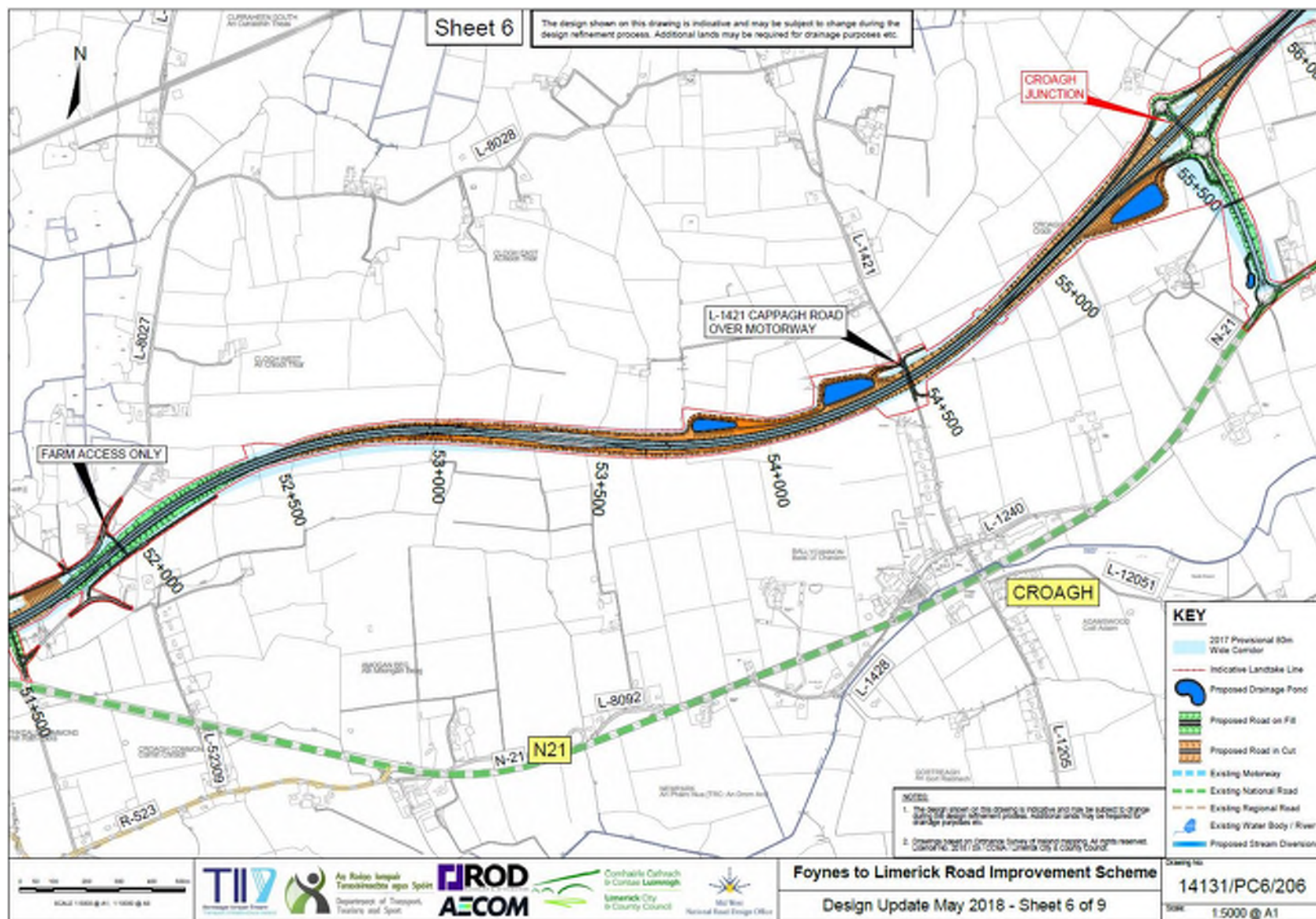


Plate 3.32 Design Update - May 2018 Sheet 6

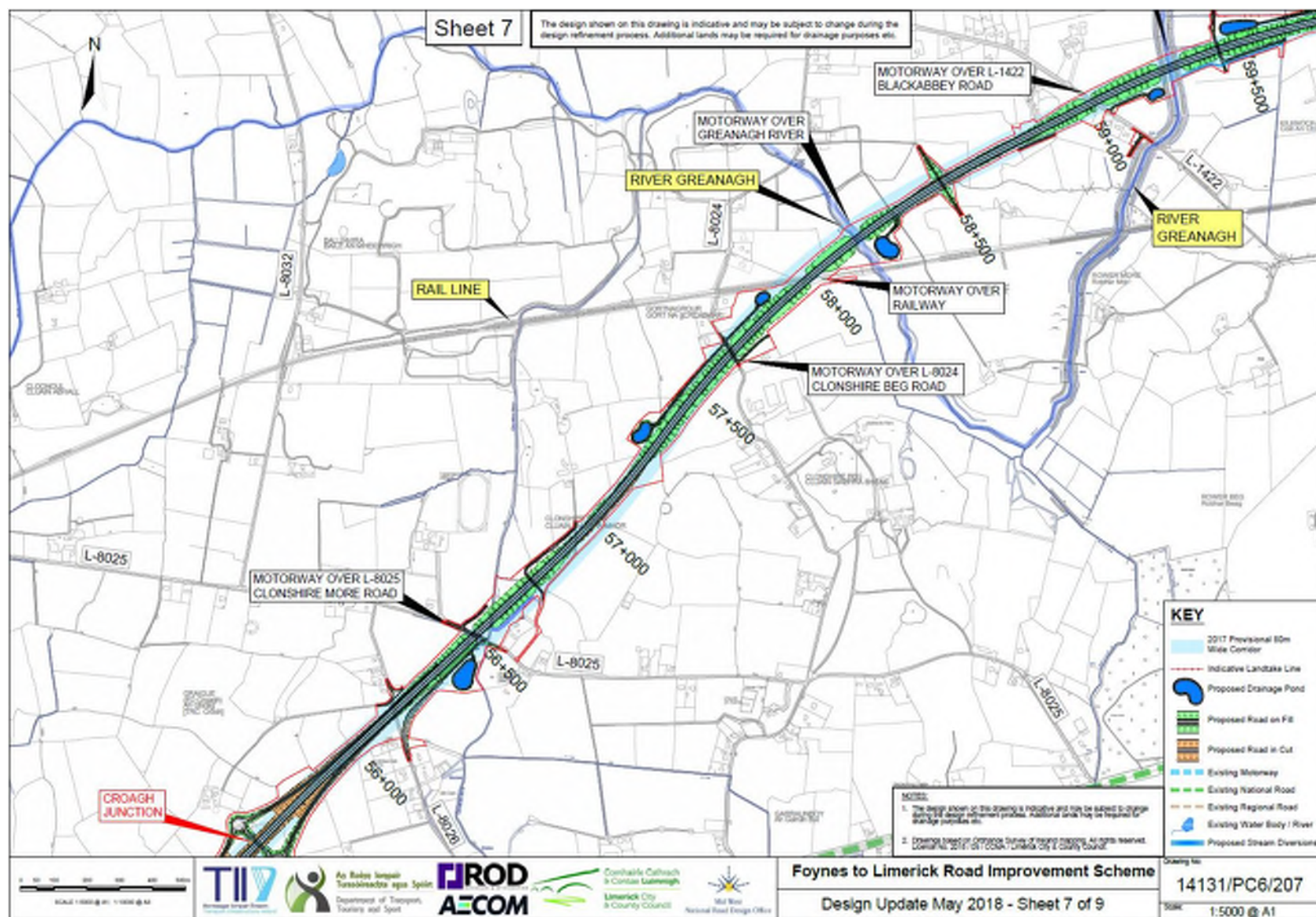


Plate 3.33 Design Update - May 2018 Sheet 7

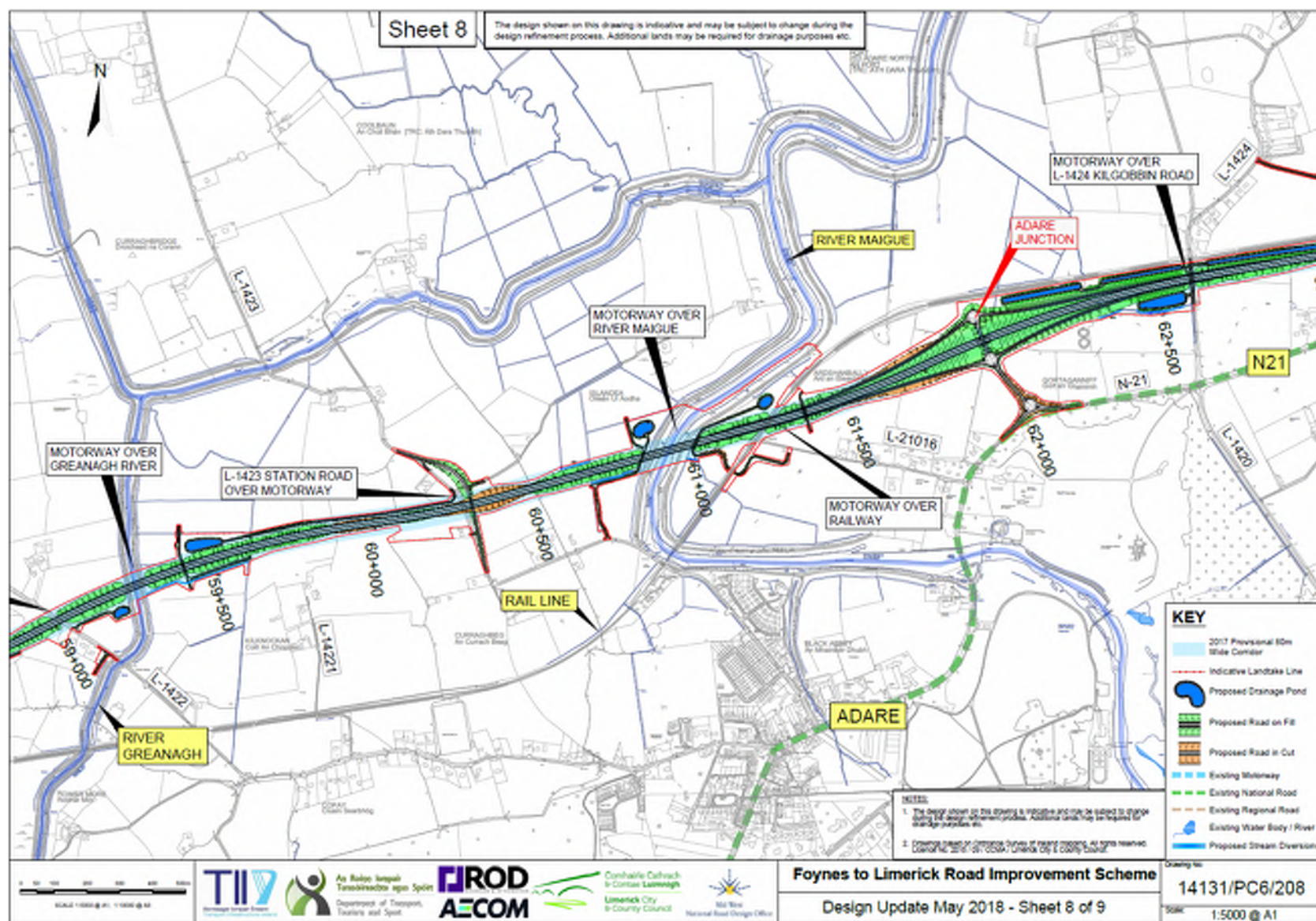


Plate 3.34 Design Update - May 2018 Sheet 8

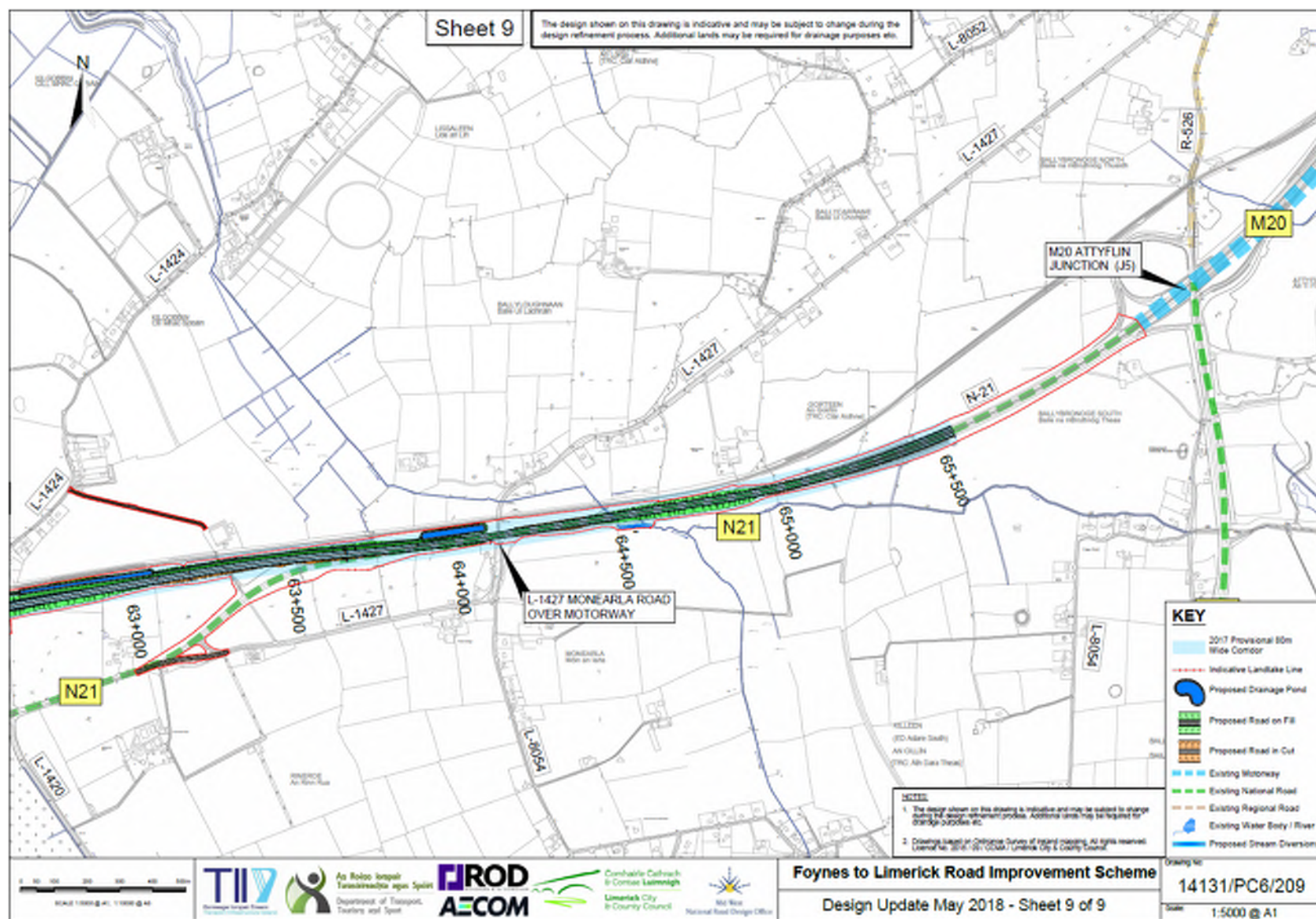


Plate 3.35 Design Update - May 2018 Sheet 9

3.9.6 Final Design Update – November 2018

Following the May 2018 update, further work on design refinement was progressed along the entire route of the proposed road development, including the identification of all lands necessary to construct the proposed road development. The main changes related to the selection of the HGV Rest Area at Shannon-Foynes Port and arising from ongoing discussions with affected landowners, various minor alterations were made to access routes and accommodation proposals, etc., to reduce the impact on properties and agricultural lands as far as possible.

Drawings were made available for viewing at the MWNRDO, and to download from the project website (www.foyneslimerick.ie). See Plates 3.36 – 3.44, below.

At this stage, the design of the proposed road was generally fixed, and preparation of the Environmental Impact Assessment Report (EIAR) was commenced.

Ongoing discussions with the landowners continued throughout 2019 to finalise the land take and accommodation works.

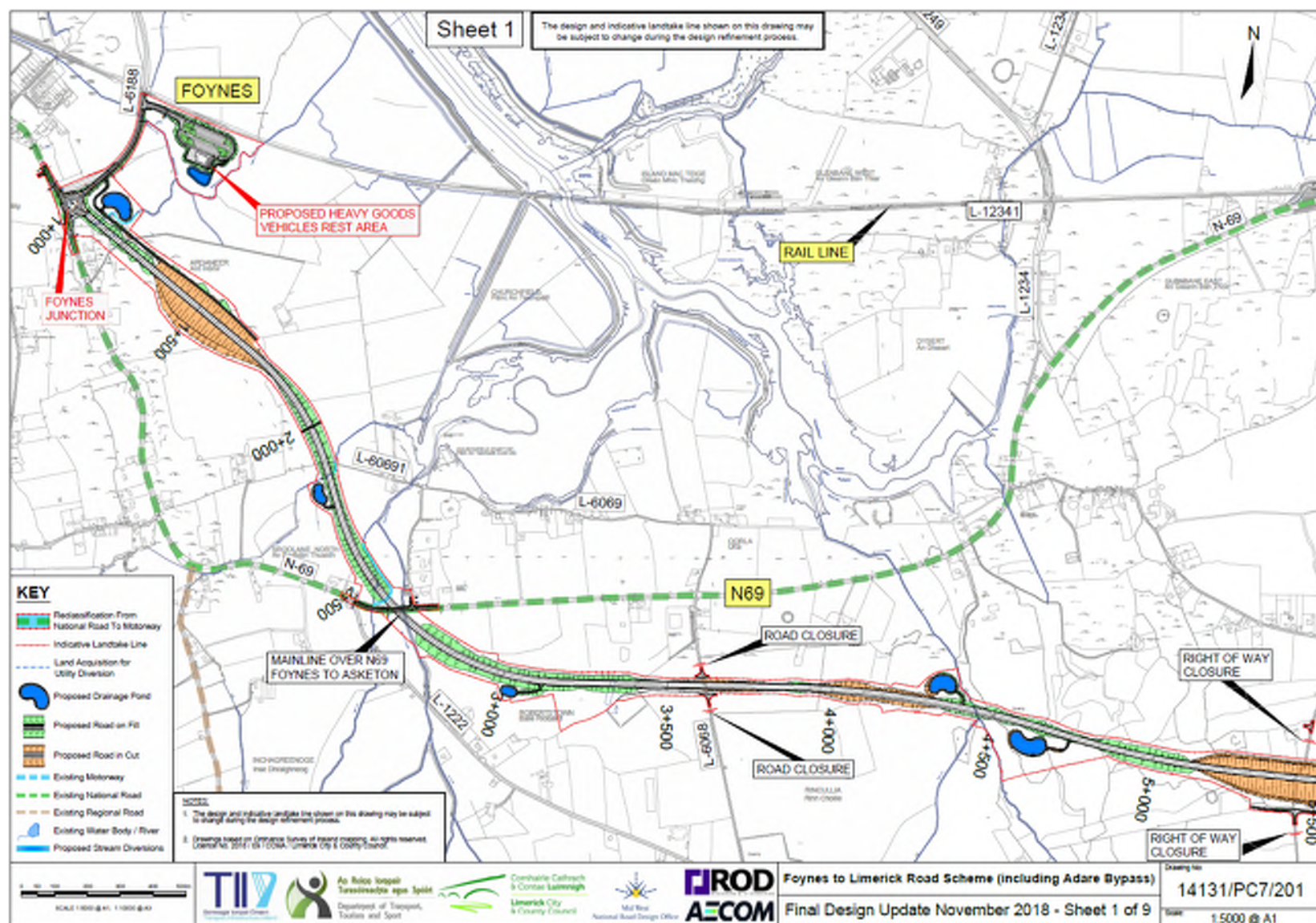


Plate 3.36 Design Update – November 2018 Sheet 1

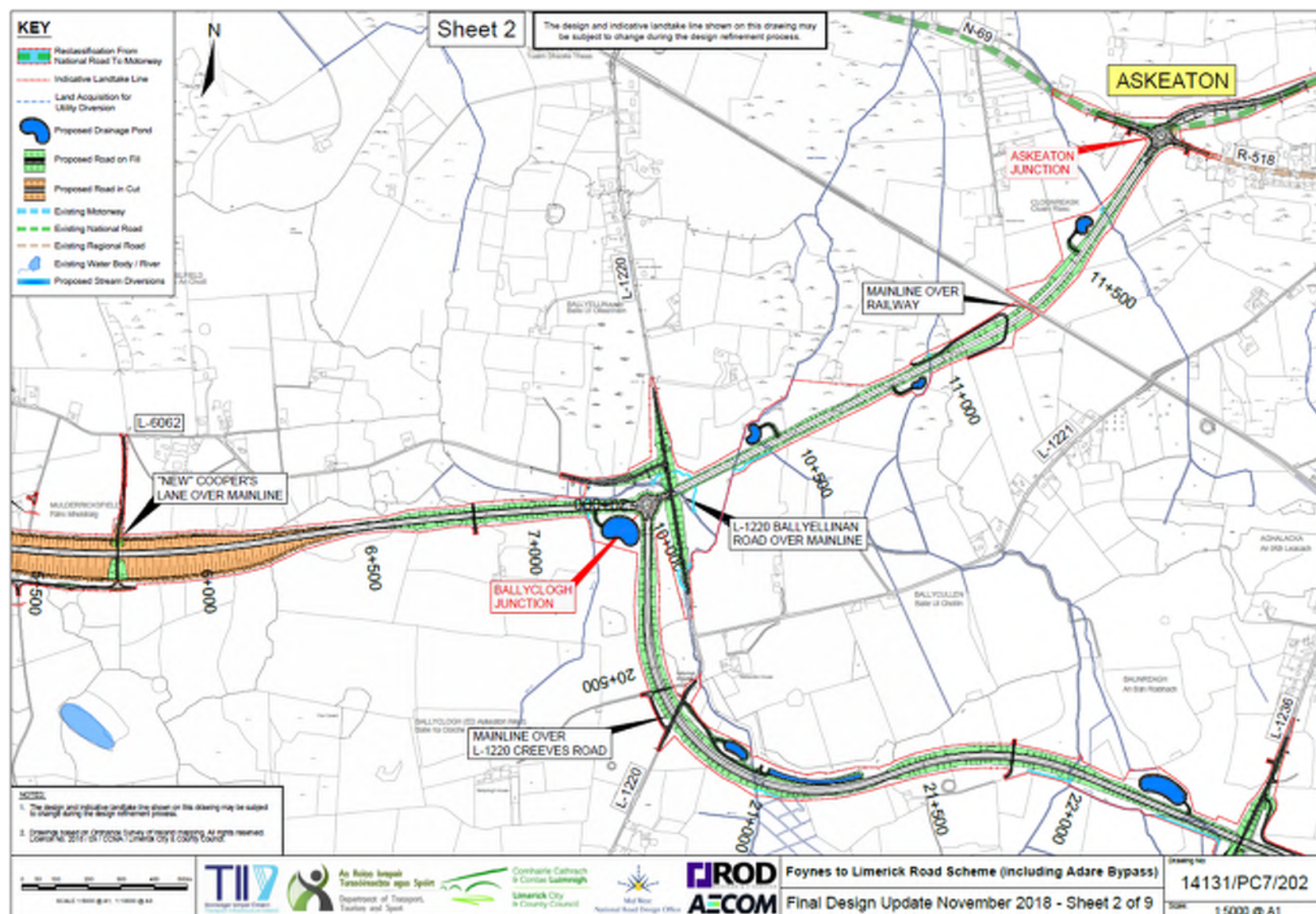


Plate 3.37 Design Update – November 2018 Sheet 2





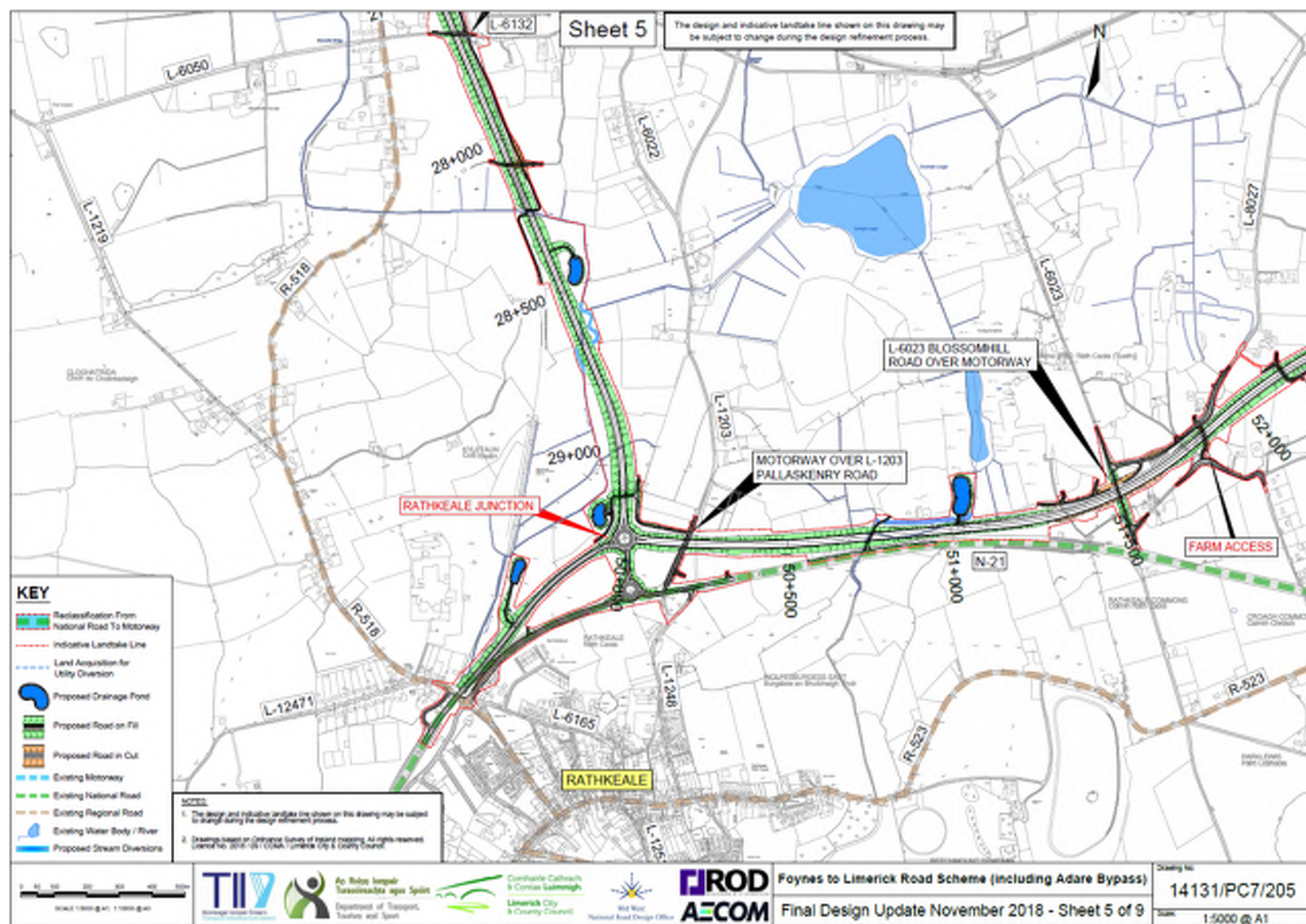


Plate 3.40 Design Update – November 2018 Sheet 5

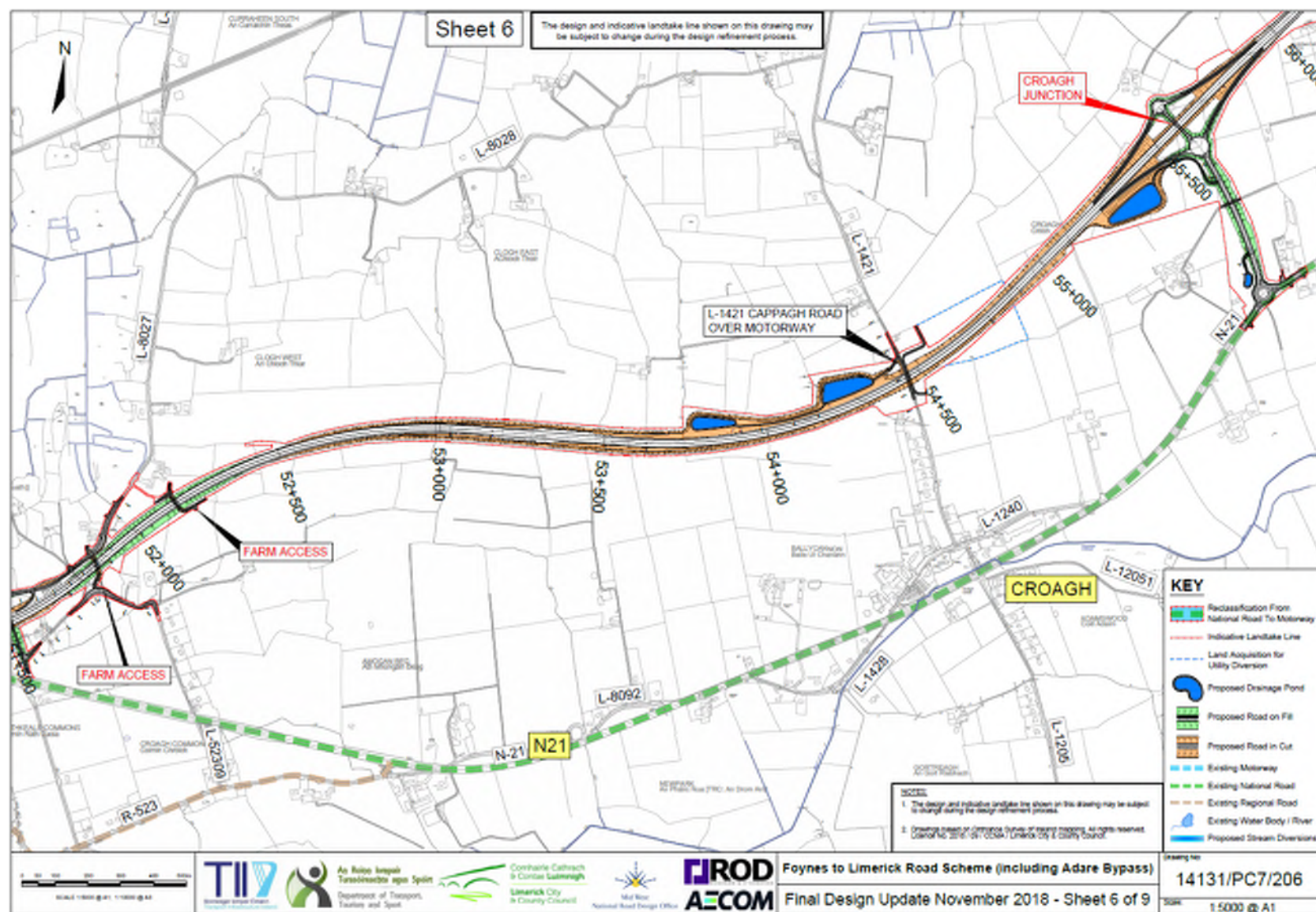


Plate 3.41 Design Update – November 2018 Sheet 6

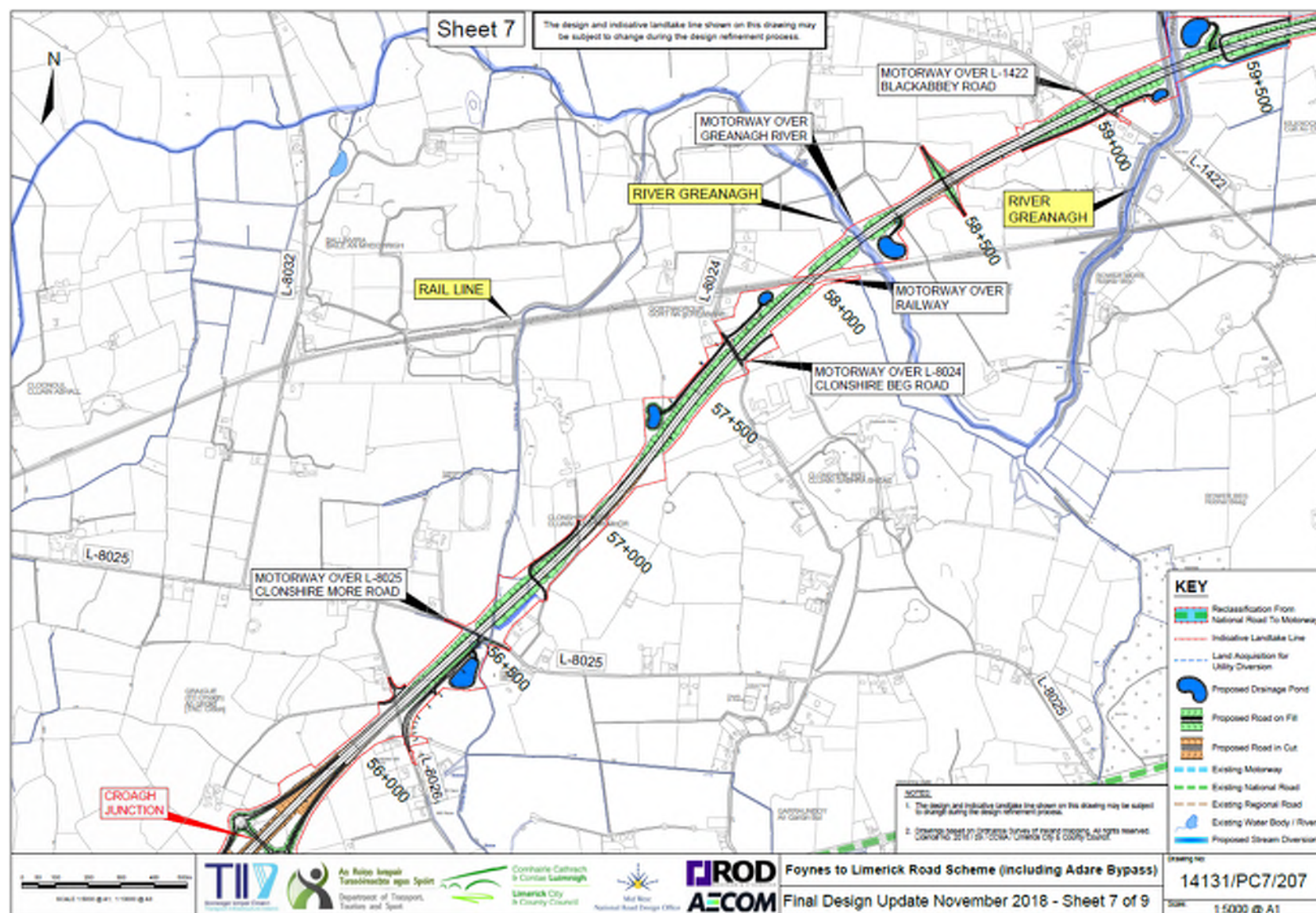


Plate 3.42 Design Update – November 2018 Sheet 7



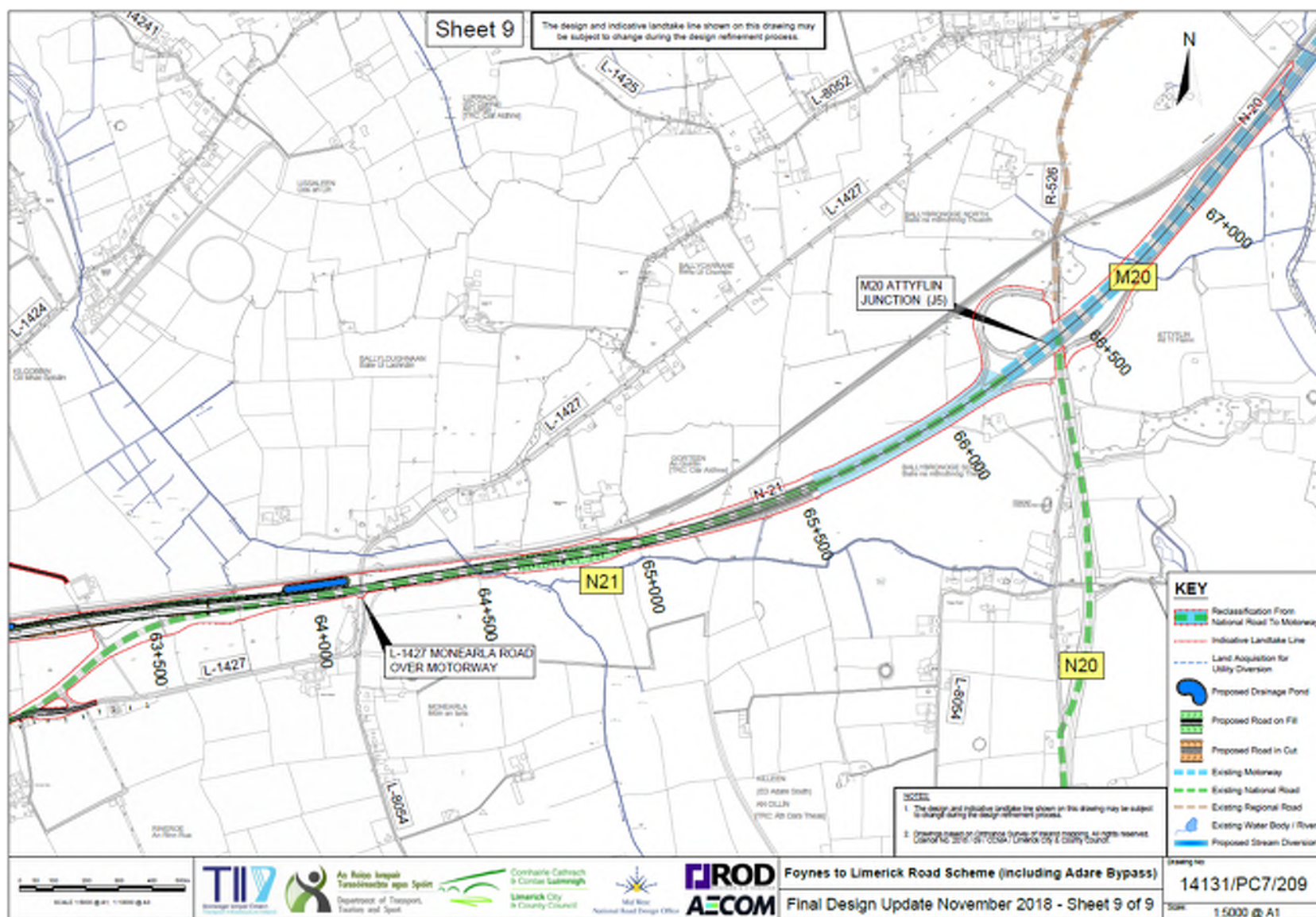


Plate 3.44 Design Update – November 2018 Sheet 9

3.9.7 Design Alternatives Considered Throughout the Design Process

3.9.7.1 Selection of Preferred Cross Section

As required under the TII Project Management Guidelines an incremental analysis of the carriageway type was undertaken to inform the selection of the cross-section for the proposed road development as part of the design process. As part of the incremental analysis an assessment of the operating capacity of the Foynes to Rathkeale section of the proposed road development was undertaken. The Volume/Capacity (V/C) Ratio was undertaken for Section A (Foynes to Ballyclogh), Section B (Ballyclogh to Askeaton) and Section C (Ballyclogh to Rathkeale).

The V/C Ratio assessment based on Annual Average Weekday Traffic (AAWT) volumes found that Section A (Foynes to Ballyclogh) of the proposed road could potentially be operating at up to 95% of its capacity as a Type 1 Single Carriageway between Monday and Friday in the high growth traffic scenario. Providing a new road that may be operating close to its capacity after only 15 years of its operational life would not be best practice and therefore the case for a Type 2 Dual Carriageway cross section for Section A can be made on capacity grounds.

The V/C Ratio assessment found that a Type 1 Single Carriageway would have ample capacity to cater for the projected demand on Section B (Ballyclogh to Askeaton) of the proposed road development. As such no further consideration was required in relation to the preferred cross section (i.e. Type 1 Single) for Section B.

From a V/C Ratio perspective, Section C if delivered as a Type 1 Single Carriageway would have the capacity to cater for the projected demand. However, the unusually high proportion of HGV traffic on this section (>25%) raises concerns over the operating capacity, safety and reliability if delivered as a Type 1 Single Carriageway. The additional cost of providing the Type 2 Dual Carriageway on Section C was found to be marginal and provided a number of benefits including:

- Additional Safety Benefits;
- Journey Time Reliability and Quality Benefits;
- Future Proofing Access to a Tier 1 Port;
- Continuity of Cross Section between Shannon - Foynes Port and the M21 at Rathkeale; and
- Wider Government Policy.

On the basis of the above points, a Type 2 Dual Carriageway cross section was selected as the preferred cross section between Foynes and Rathkeale. Further information is provided in Chapter 5 Traffic Analysis of this EIAR.

3.9.7.2 Alternatives Considered at Interfaces with other Motorways, National, Regional and Local Roads

The proposed road development will consist of a motorway and a protected, generally required to be segregated from other elements of the public road network and free from direct accesses from private lands along the route. Grade-separation with a bridge is required at the interfaces with other roads for operational, safety and strategic function reasons. Options, therefore, arise for the arrangement at each interface point as to whether the proposed new road will pass over or under the other road, which may remain in its current location, or could be realigned vertically, or horizontally, or both, as appropriate to the local constraints. In a small number of cases, an existing road may be severed by the proposed road development, where grade-separation is not appropriate, and a suitable alternative connection is available. In this section, the

context at each interface with another road is described and the design options that were considered in relation to these are explained. In some cases, where the proposed road crosses another national road or a regional road, the possibility of providing a junction was considered, and this is described for those locations.

In Chapter 4, there is discussion of where farm underpasses are proposed to provide connectivity for farm operations across the proposed road corridor.

The proposed road development will interface with other roads as follows:

- One Motorway M20 at Attyflin
- One National Primary Road, N21, at Rathkeale, Croagh, Adare and Monearla
- One National Secondary Road, N69, at Shannon-Foynes Port Access Road, Robertstown (1.5km southeast of Foynes) and at Askeaton (N69/R518)
- One Regional Road R518, at Graigeen 2km north of Rathkeale;
- 8 Local Roads between Foynes and Rathkeale (and 1 private road); and
- 12 Local Roads between Rathkeale and Attyflin.

3.9.7.3 Junctions on the Proposed TEN-T Roads

The proposed road development will be connected to the rest of the National Road Network at 6 junction locations, as follows, based on strategic connectivity considerations in the context of the function of the proposed road development within the TEN-T Core and Comprehensive Networks:

- a) N69 East of Foynes at the Shannon-Foynes Port Access Road;
- b) N69 West of Askeaton;
- c) N21 at Rathkeale;
- d) N21 at Croagh;
- e) N21 at Adare; and
- f) M20 at Attyflin, Patrickswell.

A further junction is being provided at Ballyclogh to allow connectivity to the N69 at Askeaton.

3.9.7.4 Bridges for Other Road Crossings

As the proposed road will be either a Motorway or an Express Road (see Chapter 2 Section 2.2.1 for a description of an Express Road under the TEN-T Regulations), the general arrangement at intersections with other roads will be grade-separation with a bridge to carry the new road over or under the other road, as best suits the topography, the overall route alignment and other specific constraints. At each location, various alternative configurations were considered before selection of the most suitable arrangement. A total of 15 bridges will be provided for national, regional and local roads intersecting the proposed road development and 1 private road access will be relocated.

3.9.7.5 Potential Additional Junctions on the Proposed TEN-T Roads

Consideration was given to two potential additional junctions, one at the intersection with the N69 National Road at Robertstown, and the other at the R518 Regional Road at Graigeen. However, in both cases the intersection points are located within 2 km or less from one of the strategic junctions as described above. The assessment concluded that it would not be appropriate to provide additional junctions in such close proximity at these locations, as to do so would potentially reduce the strategic

functionality of the proposed road development by the provision of too many junctions that could potentially impede the main through traffic flows if the junctions were in the form of roundabouts. For the alternative of fully grade-separated junctions the additional costs and land take would be very significant for the very small traffic flows that would be accommodated, and this would not be justified in economic terms or by reason of the resultant environmental impacts.

In the case of Robertstown on the N69, the crossing point is located 0.6km east of the R521 Regional Road from Foynes to Newcastlewest via the village of Shanagolden, as may be seen on Plate 3.35. Traffic to-and-from this regional road and the proposed road development will gain access via the Foynes Junction 1.1km further north, which will involve a minor additional journey distance of 2km compared to if direct access were available at Robertstown.

Grade-Separation Crossing of N69 at Robertstown (Ch. 2+600)

At Robertstown, various potential alternative road and junction configurations were considered, including realignment of the existing N69 over the proposed new road (rather than having the new road carried on a high embankment over the N69, as proposed). There are several significant constraints at this location including:

- The valley of the Robertstown River, which is 3m lower than the existing N69 road at the bridge, and which floods extensively;
- Two clusters of houses in close proximity to the proposed crossing point;
- A church; and
- Two local road junctions on the N69, close to the crossing point.



Plate 3.45 Potential Alternative Road Layout at Robertstown (Clusters of houses circled in red)

The alternative option for the crossing point would require extensive realignment of the N69 southward and away from Robertstown Church to pass under the proposed Foynes to Rathkeale Section on a lower embankment, then cross the Robertstown River 200m south of the existing bridge and connect with Local Road L-1222 on the western side to the east of the existing bridge over the Robertstown River. The existing L-1222 is a narrow road with a 4m wide carriageway that would require upgrade to

6.0m plus hard strips to accommodate the realigned N69 over a length of 600m westward.

This alternative would not shorten the new bridge required over the river and floodplain, which would be at a lower level. Considerable community severance would arise due to closure of the existing N69 which would require pedestrians to divert for a distance of 1.2km. Additional farm severance would arise for the lands east of the Robertstown River due to the diversion of the N69. Access to the church and houses, as shown in Plate 3.45, from the west would become longer via the diversion route. The advantage of this alternative would be to lower the proposed road embankment at Robertstown by 7m. On balance, it was concluded that the alternative layout would compare poorly with the originally proposed arrangement at Robertstown.

Grade-Separation Crossing of R518 at Graigeen (Ch. 27+000)

At Graigeen, there are three road crossings within a 1km length of the proposed road as shown in Plate 3.46. There is extensive housing development along the R518 Regional Road and the L-6132 Doohyle Road to the southeast. The Doohyle Stream is a significant local watercourse that runs parallel to the R518 a short distance to the west of the R518. All of these factors ruled out the possibility of the proposed new road passing underneath the other roads, and the assessment concluded that the only viable option is for the new road to be carried on an embankment over the existing roads at this location.

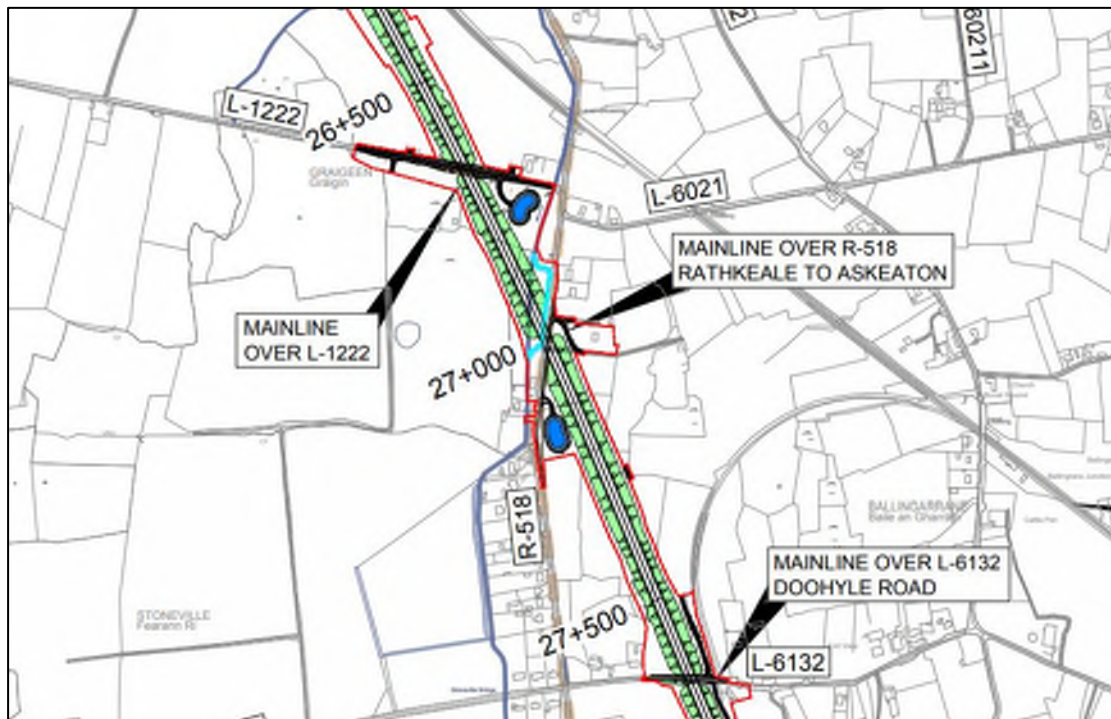


Plate 3.4626 Proposed Road Layout at Graigeen (as per November 2018 Design Update)

3.9.7.6 Local Road Crossings, Closures and Diversions

The proposed road development will include 16 new crossings of local roads. Bridges will be provided at 13 of these 16 crossing points to maintain the integrity of the local road network. A further bridge will be provided on a private access road which is to be relocated at Cooper's Lane in Mulderricksfield in Section A as described in Chapter 4 Description of the Development.

For three of the 16 local roads, the proposed road will involve road closure and diversion of traffic to another bridge crossing nearby. For most local roads in the western part of the proposed road development, the terrain is at a low elevation with numerous watercourse crossings. It is, therefore, not feasible to put either road in cuttings which could not be drained and therefore the only available option is for one road to cross the other on embankment.

The details of the proposed road development at each crossing point are described in Chapter 4 Description of the Proposed Road Development.

Road Closure at Rincullia (L-6068 at Ch 3+600)

The L-6068 is a single-track local road that links the N69 between Robertstown and Barrigone to the L-1222 Creeves Road 0.9km to the south. As shown in Plate 3.47, the proposed Foynes to Rathkeale Section will cross the local road at-grade, and if this road were to remain open it would require vertical realignment over a length of 600m and an over-bridge to span across the new road at a cost of over €2m. This road provides access to a small number of fields and there is an alternative access route available nearby via the N69/L-1222 junction 1km to the west which would entail a detour of up to 2km for the worst affected property. The additional cost to retain this road link is not justified and therefore it is proposed to close this road.

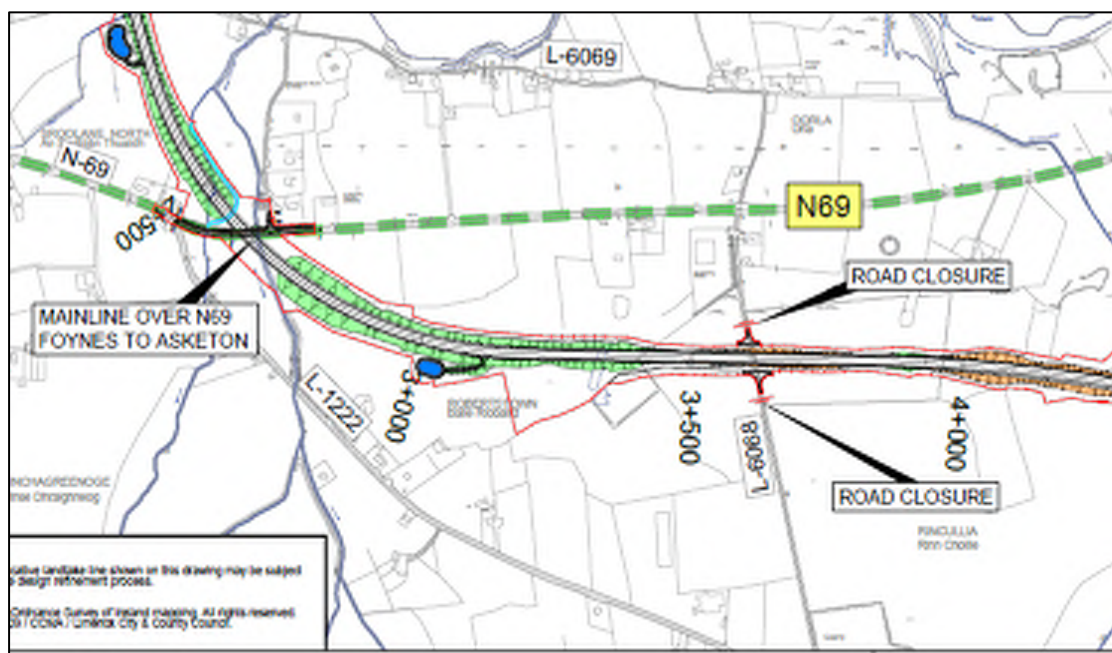


Plate 3.47 Proposed Closure of Local Road L-6068 at Rincullia (as per November 2018 Design Update)

Grade-Separation at Ballyclogh (L-1220 Ballyellinan Road, Ch 10+050)

The L-1220 crossing will be located just 100m east of the proposed Ballyclogh Roundabout on the Foynes to Askeaton section of the proposed road development as shown in Plate 3.48. The most economical design for this location is for the three arms of the proposed road development to be close to ground level and for the local road to be realigned vertically to pass over the proposed new road on a bridge. This will also entail realignment of the L-6062 road to Mulderricksfield, which joins the L-1220 at a junction 70m north of the proposed bridge.

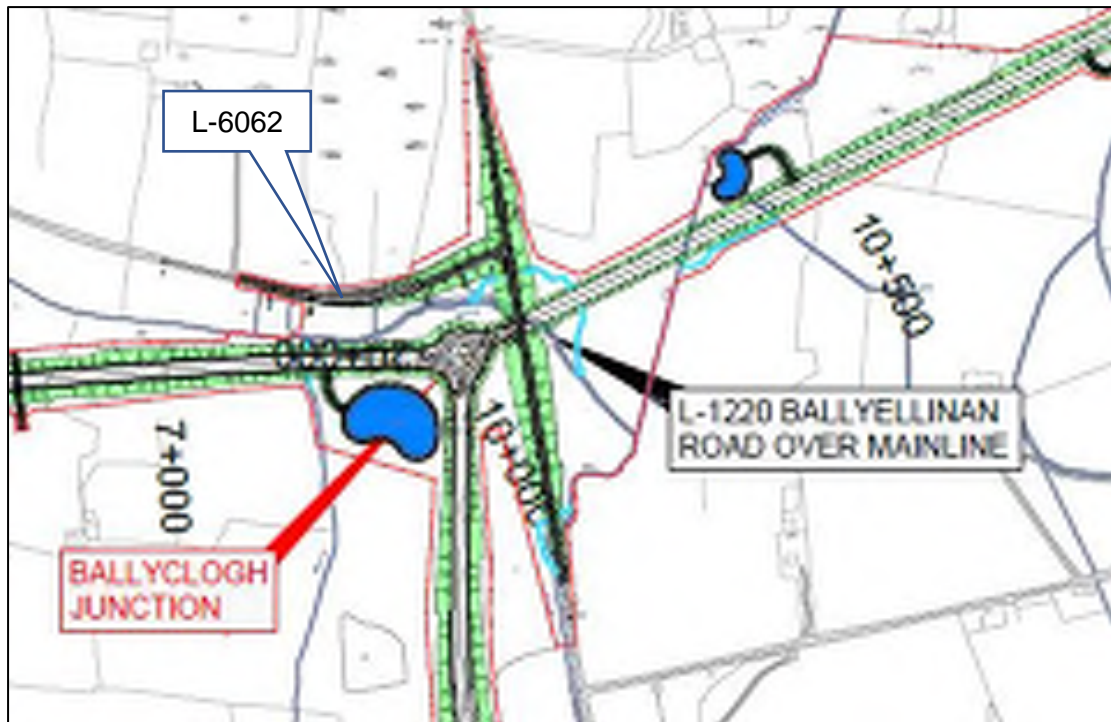


Plate 3.48 Proposed Realignment of Local Road L-1220 & L-6062 at Ballyellinan (as per November 2018 Design Update)

Grade-Separation at Ballyclogh (L-1220 Creeves Road, Ch 20+700)

There is a second crossing required on the L-1220, 0.7km to the south of the previous crossing at the Ballyellinan Road, as shown in Plate 3.49.

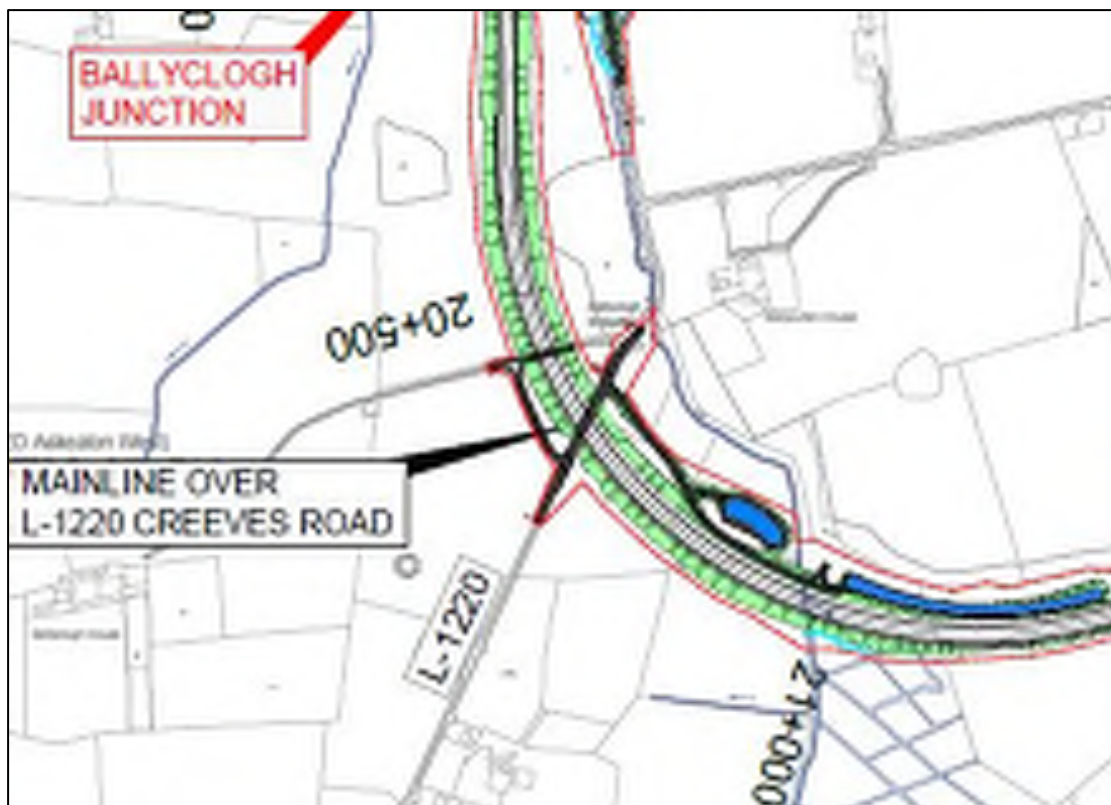


Plate 3.49 Bridge Proposed over Local Road L-1220 at Ballyclogh (as per November 2018 Design Update)

Unlike the situation to the north, the context at the L-1220 Creeves Road crossing is considerably more constrained due to proximity to Ballyclogh Bridge 120m to the north, where the L-1220 crosses over the Lismakeery Stream, as shown in Plate 3.50.



Plate 3.50 Ballyclogh Bridge on L-1220 Creeves Road

There are bends in the existing alignment of the L-1220 at the minor river bridge, which is located at the western boundary of Ballycullen House. To realign the L-1220 vertically at this location would have significant local impacts at Ballyclogh Bridge, and also on the Lismakeery Stream, and on numerous mature trees which would have to be felled to accommodate the road, resulting in a very negative impact on the landscape setting. To lift the proposed Foynes to Rathkeale Section over the L-1220 at this location will suit the drainage of the proposed road in this flat and low-lying location. Therefore, the proposed crossing arrangement is for the new road to bridge over the local road, which will not be realigned.

Grade-Separation at Ballynacaheragh (L-1236 Station Road, Askeaton, at Ch 22+500)

To minimise the need for fill material for the proposed new dual carriageway road it is proposed to realign the L-1236 vertically and horizontally to cross above the proposed Foynes to Rathkeale Section of the proposed road development on an over-bridge. The proposed realignment just to the west of the existing road will enable the local road to remain open during construction until the alternative link and bridge are completed. This also suits the drainage of the new road. There are no constraints associated with this arrangement.

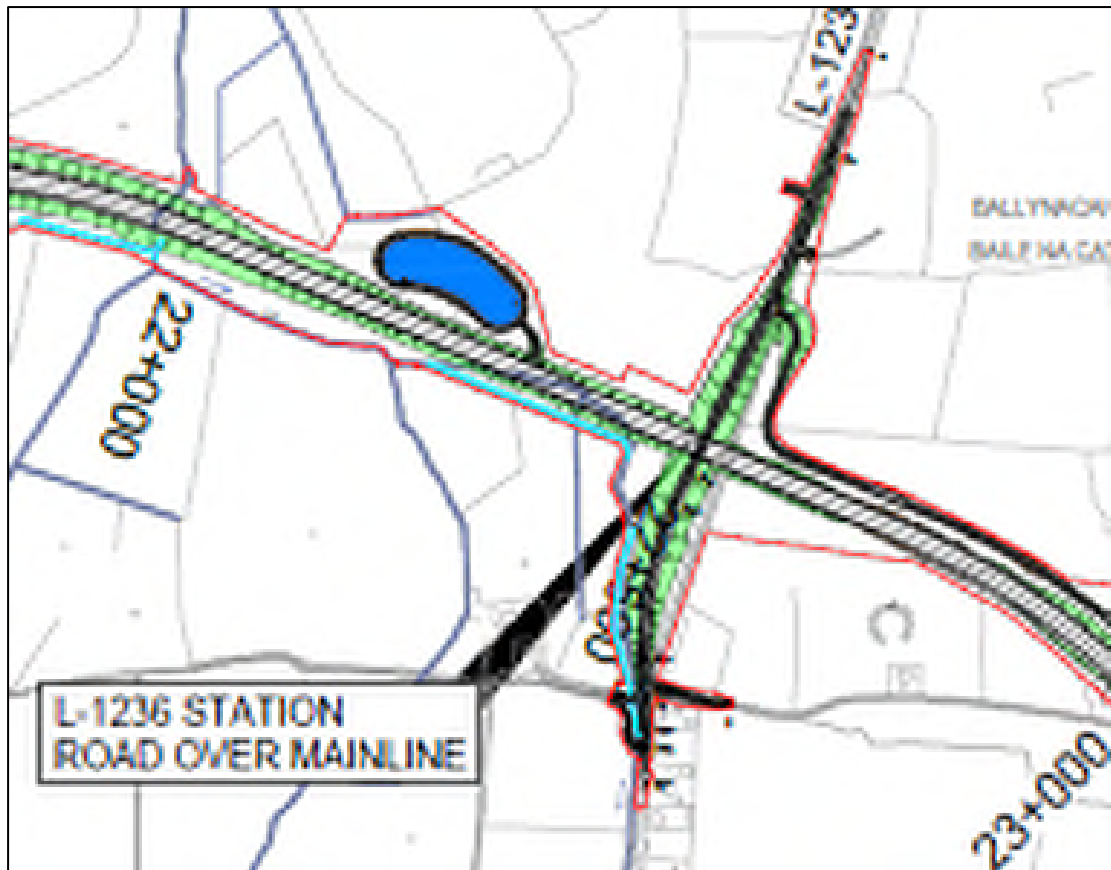


Plate 3.51 Proposed Realignment for Bridge on Local Road L-1236 at Ballynacaheragh (as per November 2018 Design Update)

Grade-Separation at Creeves Road, Graigeen (L-1222, at Ch 26+650)

As noted for the R518 crossing earlier, there are numerous constraints in the Graigeen area, and it was determined that it is best for the proposed Foynes to Rathkeale Section to span over the L-1222 Creeves Road on an under-bridge at this location.

Grade-Separation at Doohyle Road, Graigeen (L-6132 at Ch 27+650)

Similarly, there are numerous constraints in the Doohyle Road area and it was also determined that it is best for the proposed Foynes to Rathkeale Section to span over the L-6132 Doohyle Road on a bridge at this location.

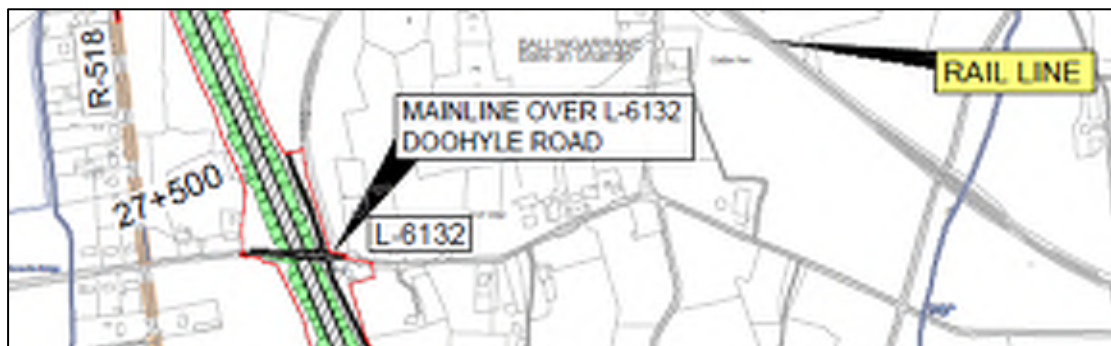


Plate 3.52 Bridge Proposed over Local Road L-6132 at Graigeen (as per November 2018 Design Update)

Grade-Separation at Pallaskenry Road, Rathkeale (L-1203 at Ch 50+100)

The L-1203 Rathkeale to Pallaskenry road currently passes underneath the N21 Rathkeale Bypass, which is on a small embankment. It was therefore considered appropriate to provide a similar arrangement where the proposed M21 Motorway will cross this local road and therefore no other suitable alternative was available at this location.



Plate 3.53 Bridge Proposed over Local Road L-1203 at Rathkeale (as per November 2018 Design Update)

Grade-Separation at Blossomhill Road and Clogh Road (L-6023 at Ch 51+500 & L-8027 at Ch 51+800)

Blossomhill Road (L-6023) climbs up a small hill to the north of the existing junction on the N21 Rathkeale Bypass. It is a natural fit for the proposed M21 Motorway to pass underneath the local road at this location.

The Clogh Road (L-8027) branches off the Blossomhill Road just 70m north of the existing junction on the N21 Rathkeale Bypass and extends in a north-easterly direction on level ground. To grade-separate this local road at the crossing of the proposed Foynes to Limerick Road, consideration was given to the provision of an over-bridge as shown in Plate 3.55.

This alternative arrangement for the L-8027 would require vertical realignment over a length of 600m and an over-bridge to span across the new road at a cost of over €2m. It is considerably more economical for this local road to be connected westward over a distance of 300m to the L-6023 Blossomhill Road, for alternative access with little detour. Such an arrangement would reduce the impacts on most of the lands along the L-8027 to the north of the proposed motorway. It was determined that the additional cost and disruption to lands required to provide a bridge for this local road link is not justified and, therefore, it is proposed instead to provide alternative links for the adjoining local roads on either side of the proposed motorway. Two farm underpasses will also be provided to facilitate convenient access for the lands on either side of the motorway at the crossing point of the old road.

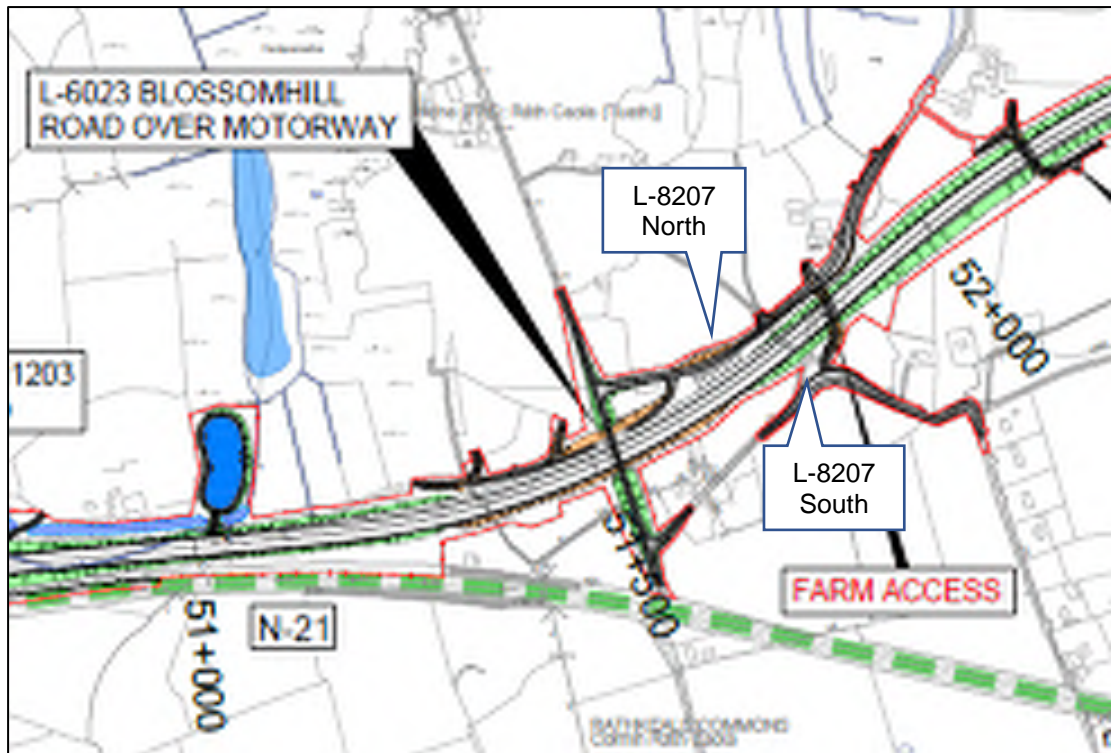


Plate 3.54 Bridge Proposed for Local Road L-6023 at Blossomhill and Realignments of Local Road L-8027 to Clogh West (as per November 2018 Design Update)

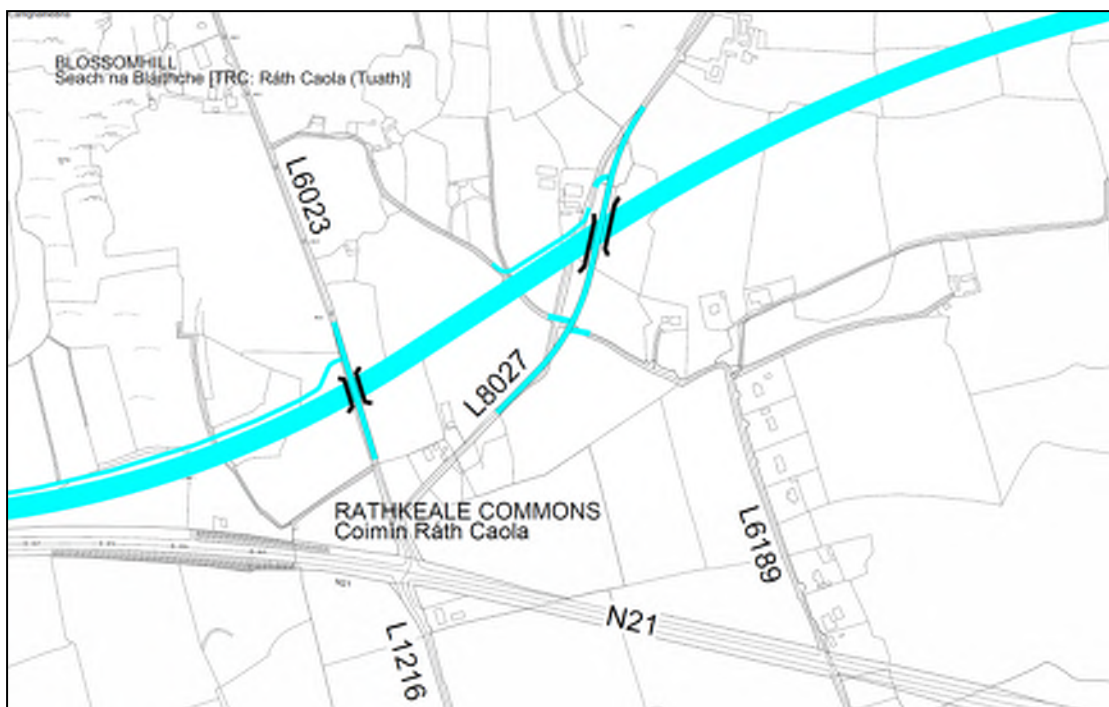


Plate 3.55 Potential Alternative Road Layout for L-8027 Clogh Road

Grade-Separation at Croagh to Cappagh Road (L-1421 at Ch 54+450)

The proposed M21 Motorway will be in cutting of 7m depth at this crossing and it is a natural fit for the proposed Foynes to Limerick Road to pass underneath this local road. Therefore, it was not necessary to consider an alternative arrangement at this crossing point.

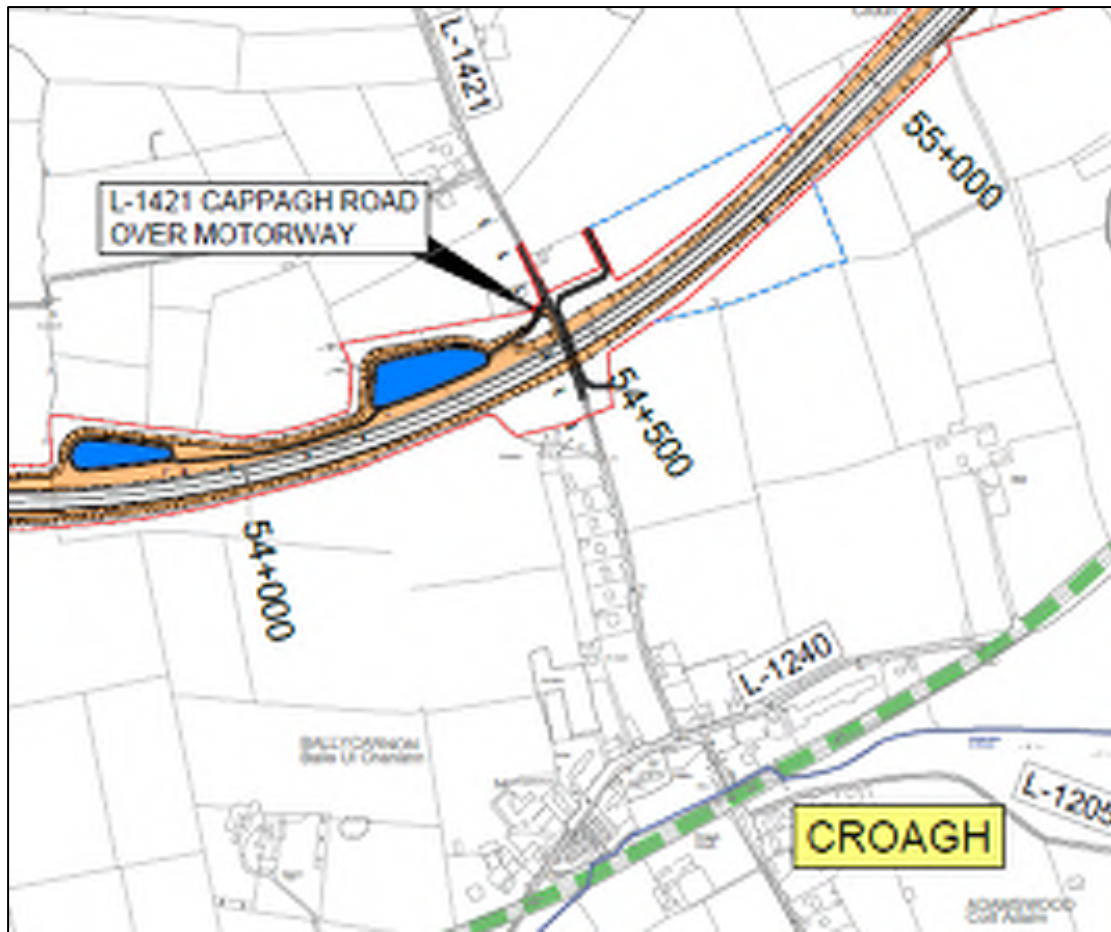


Plate 3.56 Bridge Proposed on Local Road L-1421 at Croagh (as per November 2018 Design Update)

Grade-Separation at Clonshire More (L-8026 at Km Ch 56+200 & L-8025 at Ch 56+500)

The proposed road development will cross two local roads L-8026 and L-8025 in close succession just east of the Croagh Junction. The terrain at this location is low-lying along the course of the Clonshire River, which the proposed road will cross at a location just 70m north of the L-8025 crossing. The proposed road will be on embankment at this location, to cross both the river and the local road adjoining. The vertical alignment of the motorway falls eastward at the minimum desirable gradient of 0.5% to drain satisfactorily from the cutting in the Croagh area towards the outfall at the Clonshire River. Therefore, the motorway will meet the L-8026 road at or near existing ground level.

Plate 3.57 shows extensive housing along the L-8026 road with a gap of a little over 100m, through which the motorway will pass, as highlighted by the star.

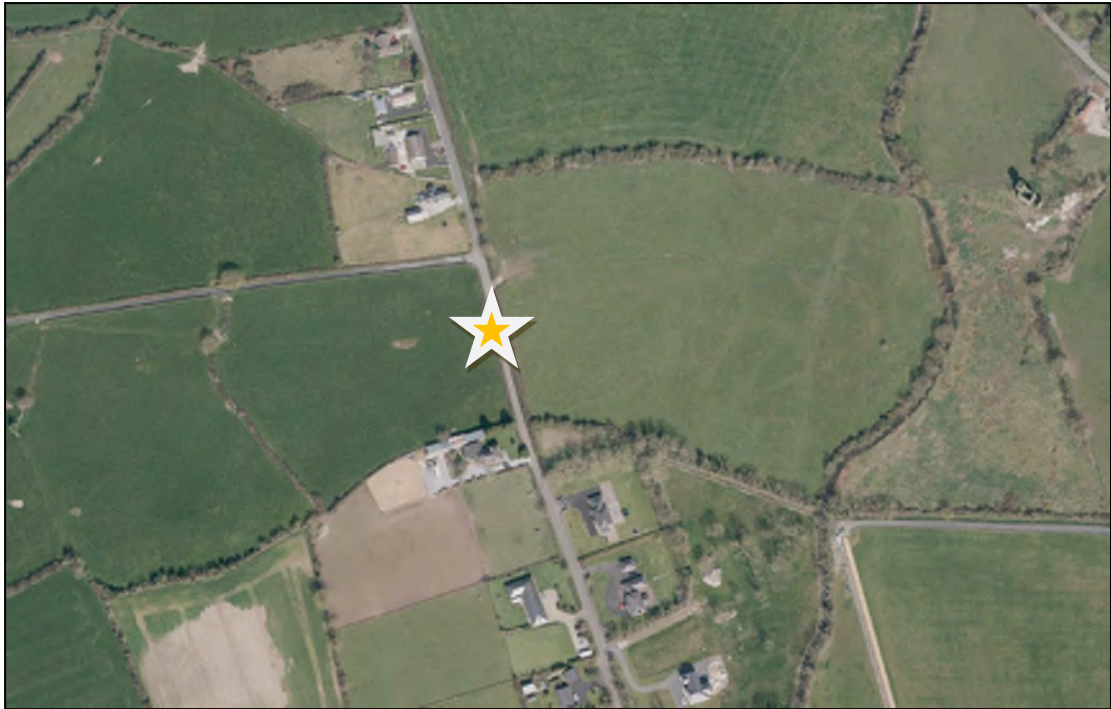


Plate 3.57 Housing along L-8026 at Clonshire More

Consideration was given to the possible provision of an over-bridge for Local Road L-8026 at this crossing point as shown in Plate 3.58. However, this would have required vertical and horizontal realignment of the local road over a length of 700m with impacts on several houses adjoining. It was concluded that a more suitable arrangement would be to provide a new 400m long link road to connect the L-8026 eastward to the L-8025 parallel to the proposed motorway on the southern side. Plate 3.61 shows a step in the design process where this solution is outlined (see Chapter 4 for final design). This will require a 1km detour for local trips by car. To shorten the detour distance for pedestrians and cyclists an underpass with a footpath connection will be provided 150m east of the existing L-8026 road, which will involve a 300m detour.



Plate 3.58 Potential Alternative Road Layout for L-8026 at Clonshire More

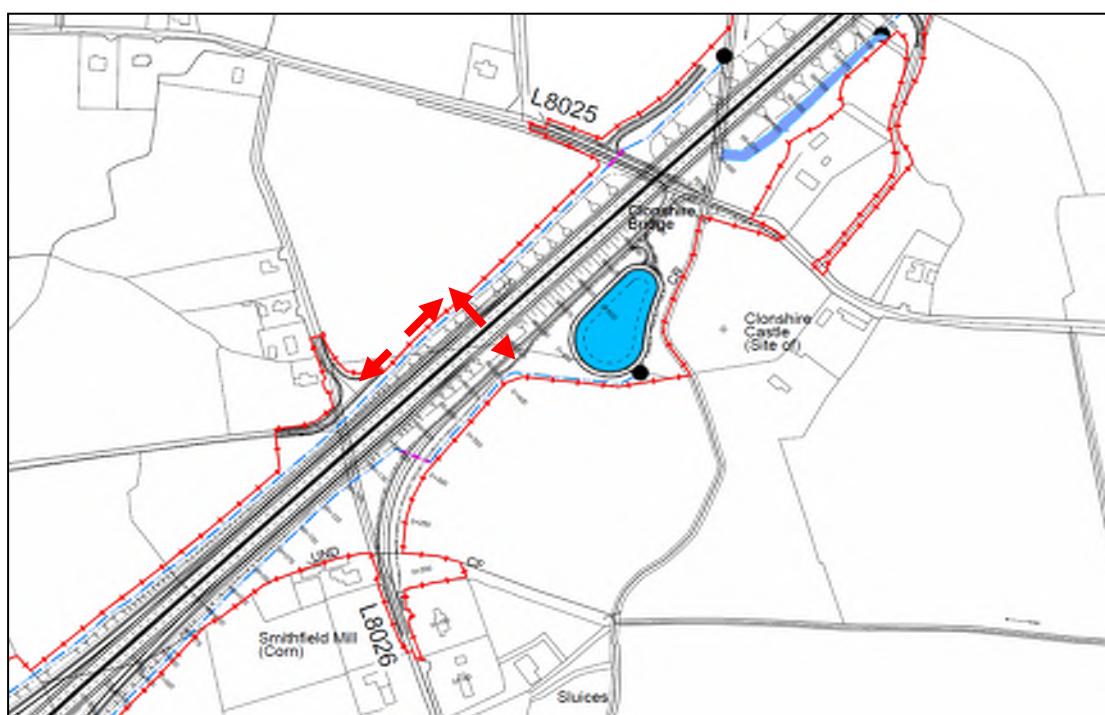


Plate 3.59 Proposed Road Link from L-8026 to L-8025 at Clonshire More (indicative design with footpath and underpass connection shown as red arrows. Refer to Figure 4.18 in Volume 3 for the final design)

Grade-Separation at Gortnagrour (L-8024 Clonshire Beg Road at Ch 57+650)

The proposed road will cross Local Road L-8024 at 300m south of the railway crossing at Gortnagrour. The vertical alignment of the proposed motorway will be on embankment at the railway bridge, and therefore will also be on embankment at the crossing of the L-8024. Therefore, it is a natural fit for the proposed M21 Motorway to pass above this local road which will remain unchanged at the under-bridge. A crossing of the local road over the motorway was also considered. However, due to the motorway being designed on embankment to cross over the railway approx. 300m east of the L-8024, the height that the local road would have to achieve was found to necessitate an excessive embankment.

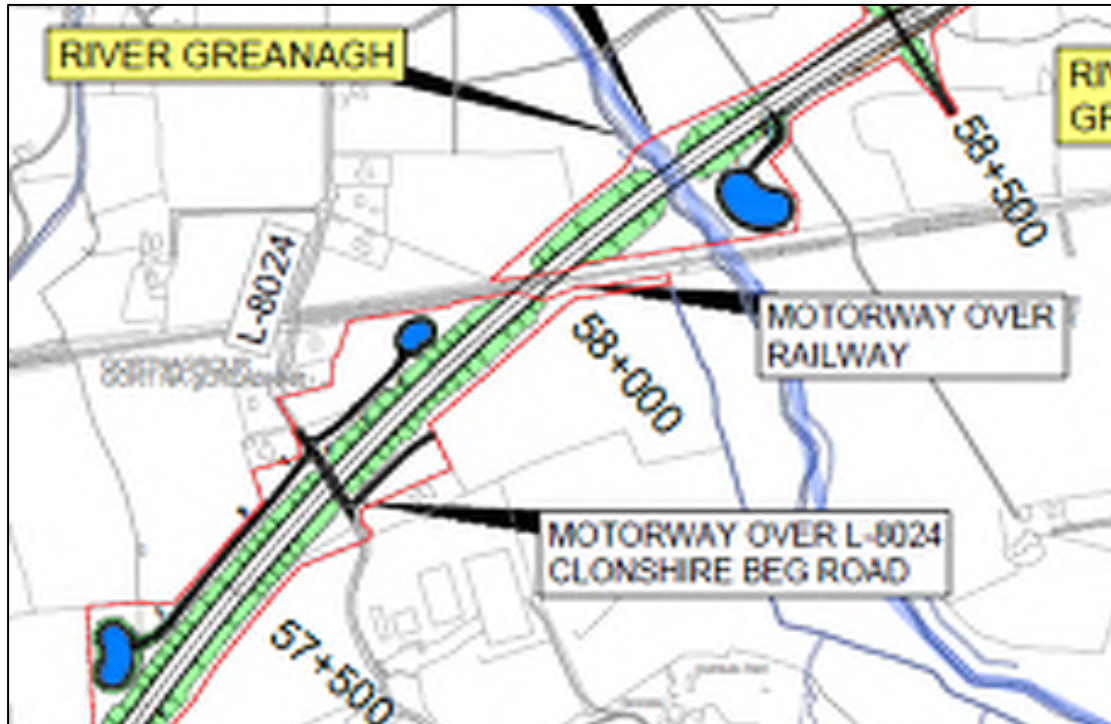


Plate 3.60 Proposed Option to Bridge over Local Road L-8024 at Gortnagrour (as per the November 2018 Design Update)

Grade-Separation at Blackabbey Road (L-1422 at Ch 59+000)

The proposed motorway will cross Local Road L-1422 at 200m west of the River Greanagh. The vertical alignment of the proposed motorway will be on embankment at the river bridge, and therefore will also be on embankment at the crossing of the L-1422. Therefore, it is a natural fit for the proposed M21 Motorway to pass above this local road which will remain unchanged at the under-bridge as shown in Plate 3.61.



Plate 3.61 Proposed Crossing at Blackabbey Road L-1422 (as per November 2018 Design Update)

An alternative arrangement was considered for the local road to cross over the motorway instead of underneath it as shown in Plate 3.62. This alternative arrangement would require horizontal and vertical realignment of the local road over a length of 600m with significant impact on the lands to the east of Blackabbey Road. It would also require a new bridge over the River Greanagh for the L-1422 just to the north of the existing river bridge. It was concluded that the proposed road with the motorway crossing over Blackabbey Road at an under-bridge is a more suitable arrangement.



Plate 3.62 Potential Alternative Crossing at Blackabbey Road L-1422

Grade-Separation at Station Road, Adare (L-1423 at Ch. 60+300)

The proposed M21 Motorway meets Local Road L-1423 at existing ground level just before entering a cutting in a small hill immediately to the east of the local road. There is a sharp bend in the local road just north of the proposed motorway crossing point, and there are two houses in close proximity to the crossing on the western side of the local road, one to the north of the crossing and one to the south. In addition, the vertical alignment of the local road descends steeply in the northward direction at the crossing with a low point just north of the crossing. It is a natural fit to the terrain for the local road to be realigned horizontally to the east, moving away from the houses and raised to cross over the proposed M21 Motorway on an over-bridge. Therefore, no alternative arrangement was considered at this crossing point.

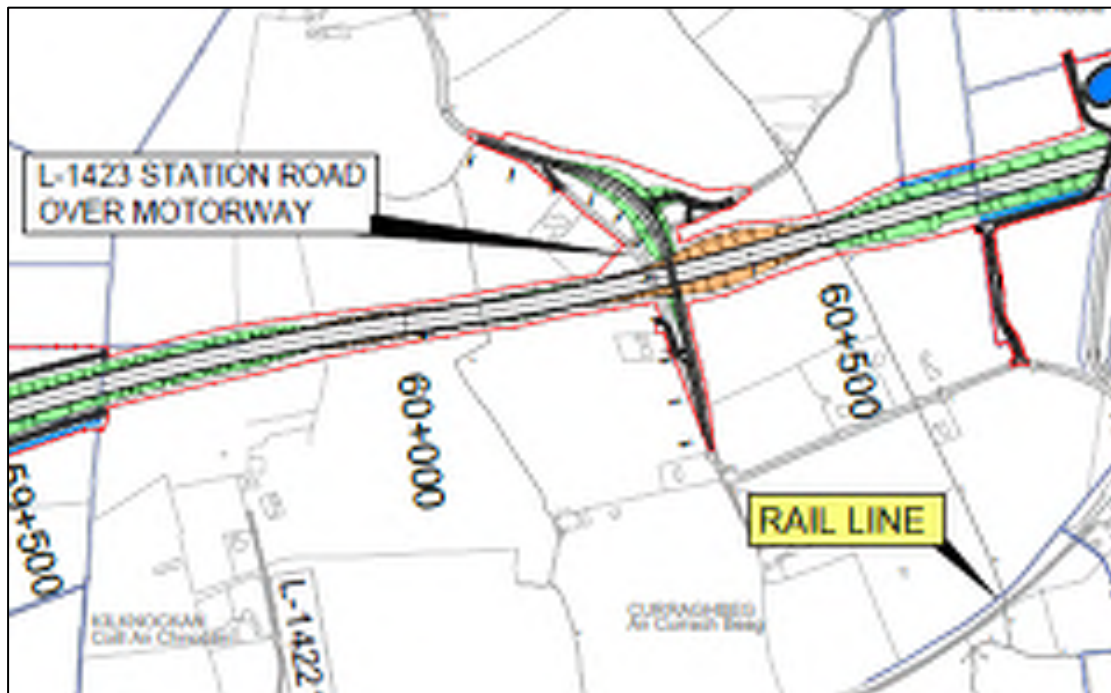


Plate 3.63 Proposed Realignment and Bridge on Local Road L-1423 at Adare (as per the November 2018 Design Update)

Grade-Separation at Kilgobbin Road (L-1424 at Ch 62+600)

Kilgobbin Road (L-1424) is located east of Adare and extends 350m northward from the Lantern Lodge Roundabout on the N21 to meet the Limerick to Foynes Railway Line at a level crossing. The proposed M21 Motorway will cross over the L-1424 immediately south of the level crossing. The existing ground level at this location is at a low elevation of just 5.5mOD, which is close to flood level from the River Maigue nearby. Due to the proximity to the railway level crossing there can be no change to the existing local road at this location and therefore no alternative arrangement was considered at this crossing point.



Plate 3.64 Railway Level Crossing at Kilgobbin Road L-1424

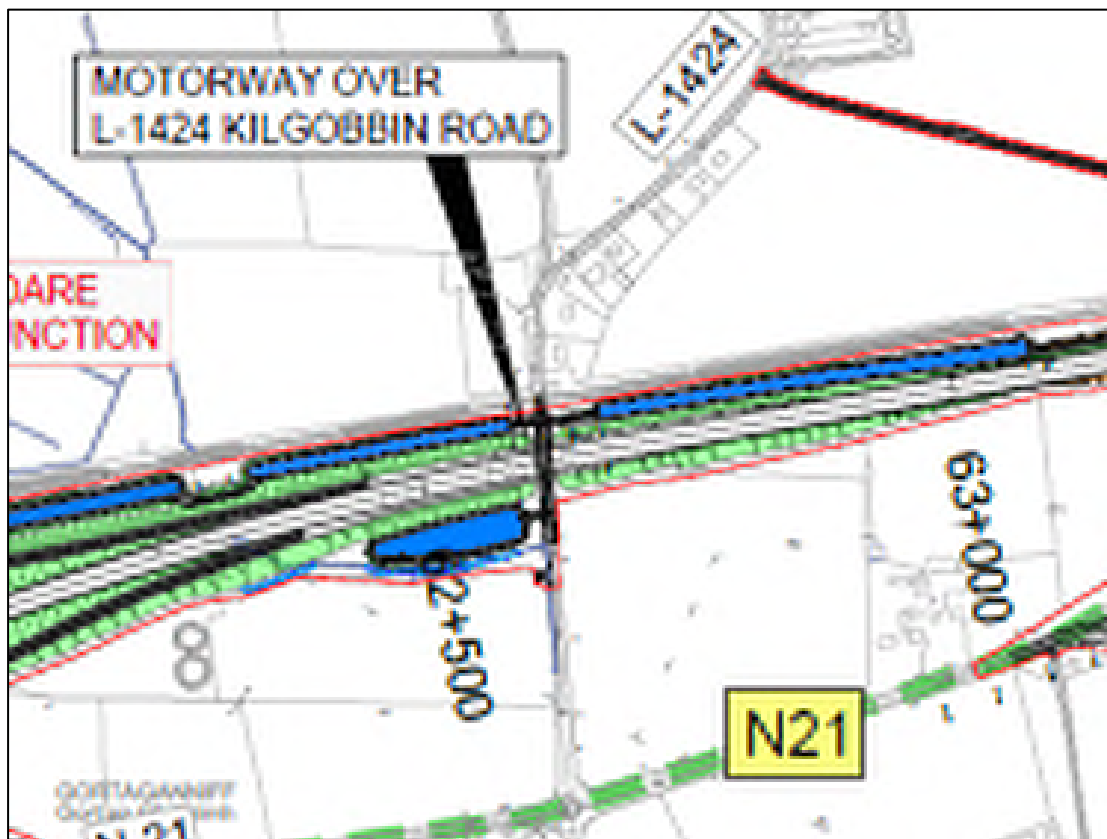


Plate 3.65 Proposed Bridge over L-1424 Kilgobbin Road (as per the November 2018 Design Update)

3.9.8 Rathkeale Junction Alternatives

At Rathkeale Junction, the proposed TEN-T Road will diverge from the M21 Motorway from Limerick and head northwards towards Foynes. This section of the route will be a dual carriageway protected road that will form part of the TEN-T Core Network, whereas the existing N21 will continue as a single carriageway westward from the Rathkeale Junction towards Kerry and will be part of the TEN-T Comprehensive Network. A suitable junction is therefore required at Rathkeale that can cater for

several road connections and safely manage the transition from high-speed motorway to lower speed single carriageway roads.

Potential Future Upgrade of the N21 West of Rathkeale

The potential for future upgrade of the existing N21 route west of Rathkeale requires consideration as the N21 is part of the EU TEN-T Comprehensive Network, which is required to be upgraded by 2050. As part of this proposed road development, the section of the N21 from Rathkeale to Adare will be upgraded to Motorway standard. Current traffic volumes on the N21 west of Rathkeale already exceed the capacity of a single carriageway road at this location and it is likely that a dual carriageway or motorway will be provided through west County Limerick on this corridor at some future stage. As was described in Chapter 2, advance planning previously undertaken for a potential Adare to Abbeyfeale Road Improvement Scheme, but that study was never completed beyond the stage of identifying three short-listed route corridors. At the time of writing there are no formal proposals for road improvements west of Rathkeale on the N21 corridor. However, it is prudent and consistent with the objective of future-proofing the proposed road development to ensure that the Foynes to Limerick Road does not preclude the potential for a future dual carriageway continuation westward. On this basis, the planning for the Rathkeale Junction has provided for potential future grade-separation.

Road Connections at Rathkeale

The Rathkeale Junction will be located where several roads already connect on the N21 Rathkeale Bypass as well as catering for the new roads proposed in this road development. The various required connections are as follows:

1. New M21 Motorway from Limerick;
2. New Foynes to Rathkeale Section;
3. N21 West;
4. R518 South to Rathkeale;
5. R518 North to Askeaton;
6. Old N21 East (Croagh direction); and
7. L-1203 Rathkeale to Pallaskenry road.

Local and regional road connections to be retained separately to the proposed TEN-T Network are as follows:

1. Existing N21 Rathkeale Bypass as a relief road for Rathkeale town centre;
2. R518 Askeaton Road link towards Croagh on the existing N21; and
3. L-1203 Rathkeale to Pallaskenry road for access to the cemetery just north of the N21 bypass and the locality to the north.

Closure of any of the above connections would result in local traffic mixing with long-distance national route traffic which is undesirable in operational and safety terms.

Retention of the Existing N21 Rathkeale Bypass

The absorption of the existing N21 Rathkeale Bypass within the proposed M21 Motorway would result in additional traffic being directed through Rathkeale town centre, which is undesirable in terms of the amenity for the local population and businesses. The town centre streets are very narrow and unsuited to large traffic flows, with pinch points where opposing traffic flows must give way in turn to pass. Therefore, design options that did not retain the existing Rathkeale Bypass separate to the

proposed motorway were precluded at an early stage in the design development process.

Existing N21 / R518 Holy Cross Junction

The proposed road will require modification to the existing compact grade-separated junction on the N21 Rathkeale Bypass on the R518 Regional Road to Askeaton, as shown in Plate 3.66. This junction is located 0.7km to the southwest of the proposed new M21 Rathkeale Junction. It will be necessary for road safety reasons to close 3 of the 4 links of this junction and to relocate these links eastwards to the new junction. The one movement to be retained is for the eastbound left-off exit from the N21 to the R518, as shown in green on Plate 3.66. Alternatives were considered that included retention of more of the existing connections at this junction as outlined in the following paragraphs, but these were eliminated on the basis of road safety in the context of the high volumes of through traffic travelling at high speeds on the N21.



Plate 3.66 Existing N21/R518 Holy Cross Junction at Rathkeale with proposed changes. (Retained movement shown in green and prohibited in red)

Alternative Layouts Considered for Rathkeale Junction

The following alternative arrangements were considered for the Rathkeale Junction:

- Option A. Grade-Separated Junction with Single Carriageway;
- Option B. Grade-Separated Junction with Dual Carriageway;
- Option C. Terminal Roundabout.

Options A and B would provide full grade-separation for the N21 through the Rathkeale Junction, with the mainline to pass above the connector road within the junction, which would provide the highest level of traffic capacity. A major consideration in such an arrangement is how to safely terminate the motorway dual carriageway and transition to a single carriageway. In these options the proposed new road would converge with the existing N21 road at the R518 under-bridge. From there westward, the existing N21 accommodates one field access along the northern side of the road in the 0.9km

long section to the River Deel Bridge. West of that bridge, over the 2.8km length as far as Reens, there are 7 at-grade junctions with local roads, and the R523 Regional Road between Rathkeale and Ardagh to the west, as well as various field accesses. Motorway Designation with the associated traffic restrictions would terminate at the proposed Rathkeale Junction so as to cater for the use by all types of traffic on the road from there westwards.

Option A. Rathkeale Grade-Separated Junction with Single Carriageway

Option A for Rathkeale Junction, would involve the M21 Motorway tapering from dual carriageway to single carriageway through the junction, either through a lane-drop or a fast-lane taper (similar to the arrangement at Junction 17 on the N4 Mullingar Bypass as shown in Plate 3.67).



Plate 3.67 Example of Transition from Dual Carriageway to Single Carriageway at N4 Junction 17 in Mullingar

This option would involve a difficult arrangement for the westbound slip ramp merge onto the N21 at Rathkeale since a merge onto a single lane dual carriageway road is not permitted in the relevant design standard for road safety reasons. The main concern with this option is how to properly and safely manage the transition for drivers from high-speed motorway conditions to a lower-speed single carriageway. It was concluded that Option A would not be safe in this regard due to the many at-grade junctions and field accesses in quick succession over a short distance west of the River Deel and this detailed assessment therefore concluded that this option would be eliminated from further consideration.

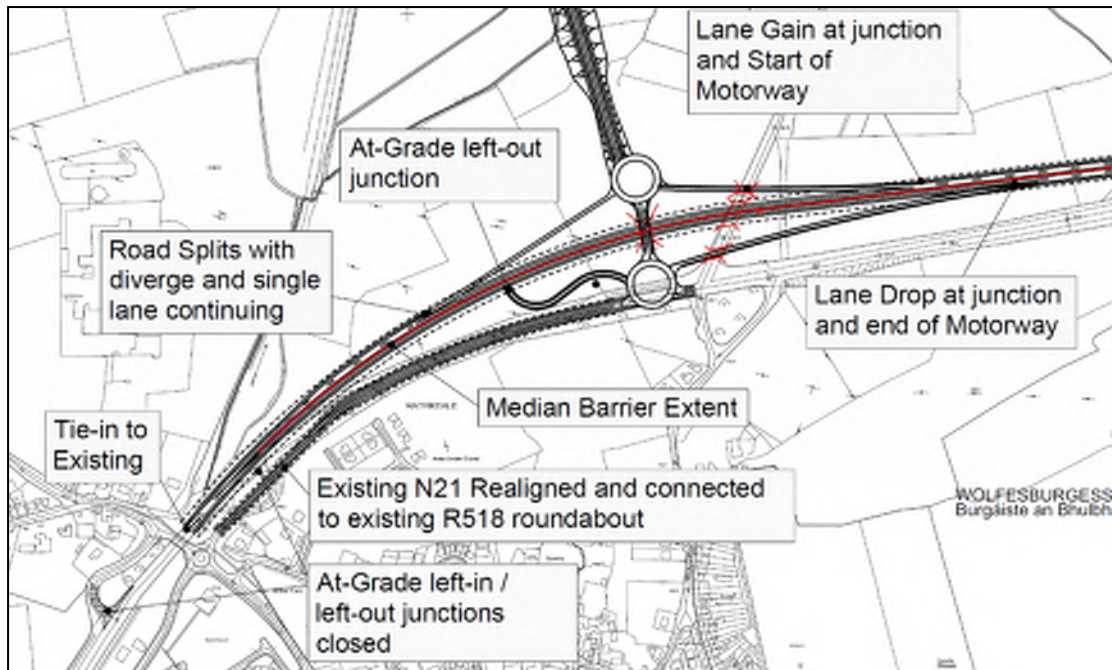


Plate 3.68 Junction Option A at Rathkeale

Option B. Rathkeale Grade-Separated Junction with Dual Carriageway

Option B at Rathkeale Junction was largely similar to Option A, but with the 2-lane dual carriageway carried westward for at least 2km and up to 4km to terminate at a roundabout for the transition to the single carriageway N21 at a number of possible locations west of the River Deel Bridge between Castlematrix and Reens.

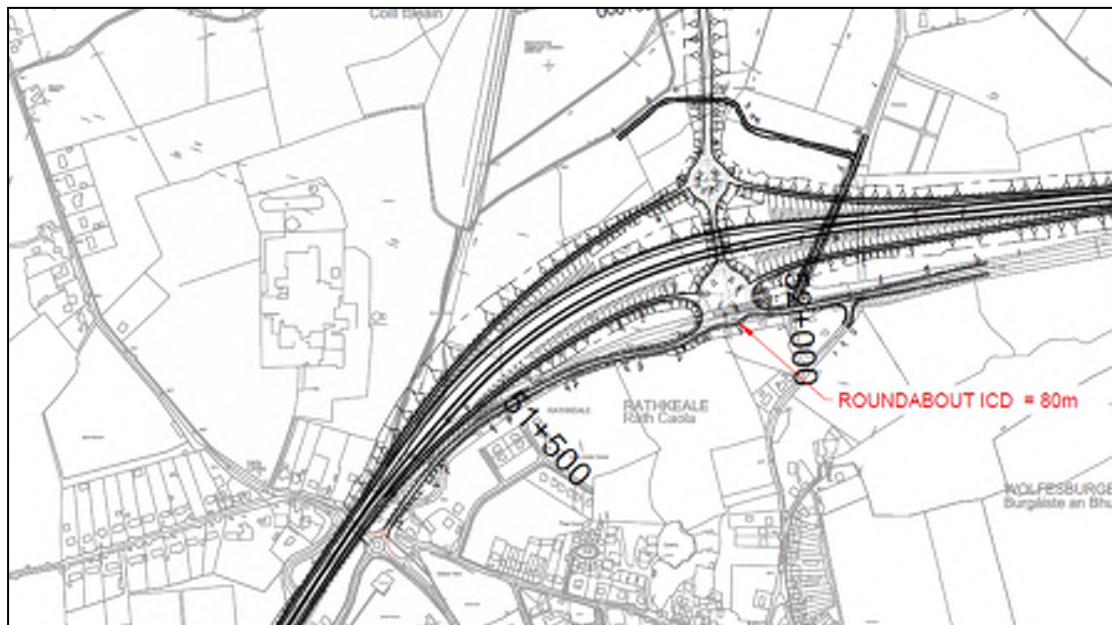


Plate 3.69 Junction Option B at Rathkeale

Option B would provide a satisfactory terminal for the M21 Motorway west of Rathkeale Junction in road safety terms. However, it would involve considerable additional cost to the proposed road development of €20 - 40 million for:

- 2 - 4km of additional dual carriageway;
- Widening of existing bridges over the R518 and the River Deel;

- Additional land take; and
- A large additional fill volume of over 0.5 million m³ for the grade separation at Rathkeale.

As it is, the proposed road development already entails a significant earthworks deficit. Accordingly, this assessment concluded that this proposal was considered premature pending further planning for an upgrade to the N21 westwards from Rathkeale.

Option C. Terminal Roundabout

For road safety reasons, a roundabout is the best terminal arrangement for the proposed M21 motorway at Rathkeale, which would be a common arrangement in both Options B and C. In terms of traffic capacity, the volume of traffic that will leave or join the M21 at Rathkeale is about 20% of the through traffic flow. Thus, the difference in traffic loading at the terminal roundabouts in Options B and C was found to be small, and therefore there would be more than sufficient capacity available in both options. On this basis, the assessment concluded that Option C was the most appropriate arrangement for the proposed Rathkeale Junction, as shown in Plate 3.70 (as per the November 2018 Design Update).

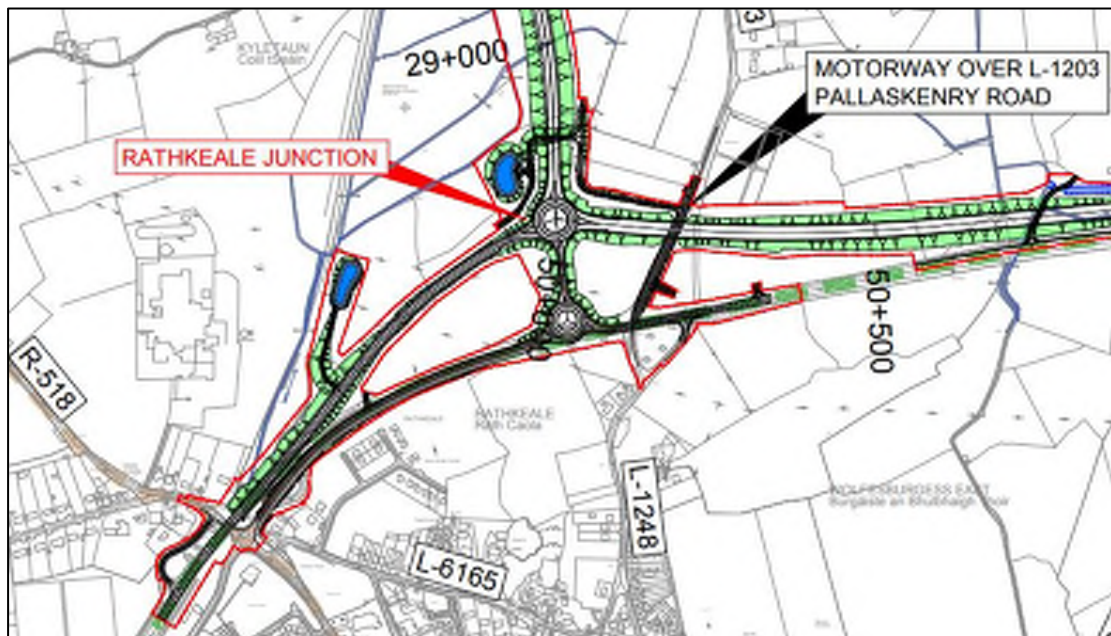


Plate 3.70 Proposed Junction Option C, at Rathkeale (as per November 2018 Design Update)

As may be seen in Plate 3.70, the proposed arrangement for Option C at Rathkeale is essentially the same as for Options A and B in terms of the relationship to the other connecting roads and the layout of the two roundabouts. Thus, the junction may be upgraded in the future for grade-separation to continue the N21 dual carriageway westward consistent with the objective of ensuring the futureproofing of the proposed road development. Option C also requires less landtake compared to the first two options.

3.9.9 Adare Junction Alternatives

Initially, a high-level assessment considered a wide range of possible junctions at Adare both east and west of the village, before it was determined that a single junction on the eastern side of the village would be most appropriate, on the basis of traffic demand weighting mainly towards Limerick.

A 2km zone was identified for the possible location of a junction to the east of Adare. The following considerations influenced the feasible options available for the Adare Junction:

1. Separation distance from the previously proposed M20 Junction to the east;
2. Existing road links including the N21 connection into Adare;
3. The existing railway level crossing on the L-1424 Kilgobbin Road; and
4. Significant archaeological sites in the vicinity (shown as purple circles on the following maps).

Future M20 Cork to Limerick Project

The Foynes to Limerick Road needs to make provision for the future M20 Motorway between Cork and Limerick for potential interaction between the two projects, where they are likely to connect in the vicinity of the existing M20 / N20 / N21 junction at Attyflin. In the previously proposed M20 scheme that was withdrawn from the planning process in 2011, the M20 was to connect with the N21 at a new junction about 1.5km west of Attyflin, from where it would generally follow the corridor of a former railway line southward towards the existing Croom Bypass.

The previously proposed M20 junction location could be retained in the expected new M20 Scheme, although the details of the layout cannot be fully anticipated at this time. Nevertheless, the proposed M21 Adare Junction needs to be sited far enough to the west to provide adequate separation of 2km between two separate junctions in accordance with the relevant design standard. This zone of separation extends to 0.5km west of the L-1424 Kilgobbin Road, as shown in Plate 3.71.

Thus, the proposed Foynes to Limerick Road is neither dependent on the future M20 road, nor does it potentially preclude that project. Rather, it is fully compatible with it since the proposed Adare Junction is sufficiently far west from Attyflin to provide adequate separation between two separate junctions.

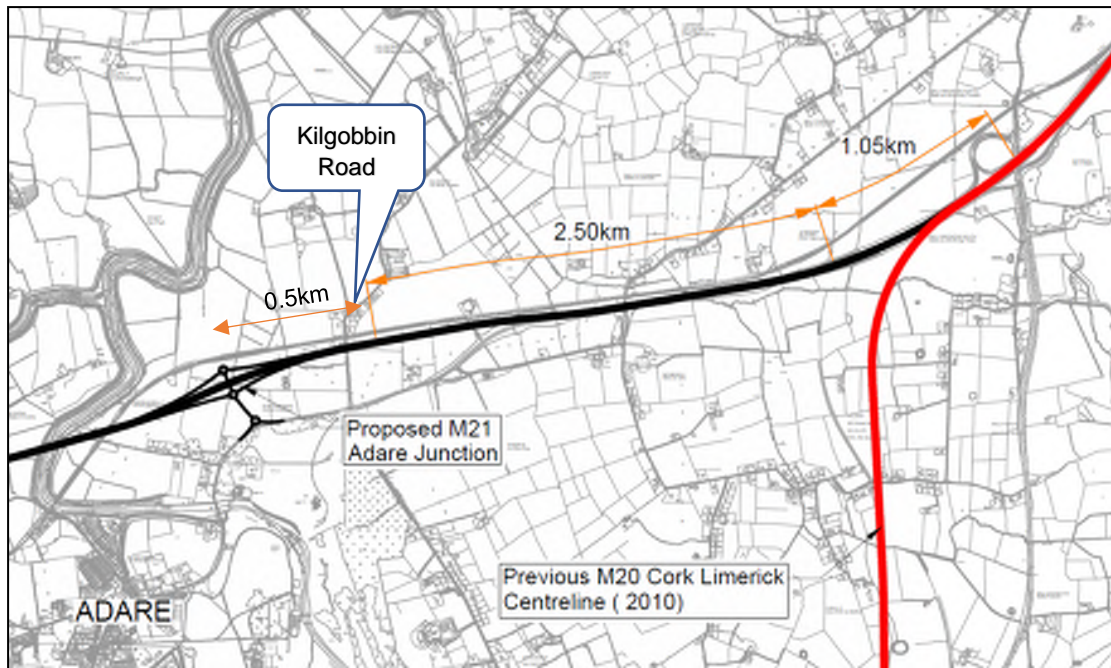


Plate 3.71 Separation Zone from previously proposed M20 Junction

Possible Adare Junction East of L-1424 Kilgobbin Road

Notwithstanding the requirement for 2km separation from a potential future M20 junction to the east near Attyflin, consideration was also given to an option for the Adare Junction where the existing N21 turns south-westward between Monearla Bridge to the east and the L-1424 Kilgobbin Road to the west as shown in Plate 3.72, below.

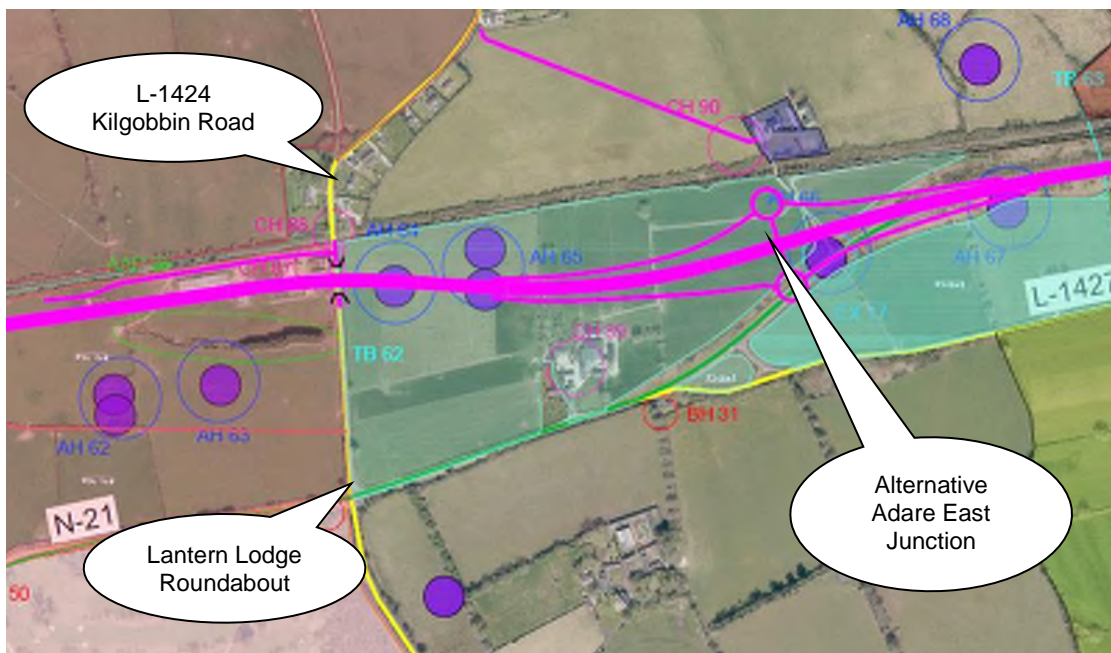


Plate 3.72 Potential Adare Junction East of L-1424 Kilgobbin Road
Archaeological features shown as purple circles.

An advantage of this option would be to retain the existing N21 for the link towards Adare through the Lantern Lodge Roundabout. This arrangement would require a relaxation from the relevant design standard for a reduced separation of 1km from the

future M20 junction. The impact of this option for the medium-sized dairy farm at this location would be major and the farm would be put out of operation. This option would also impact on four archaeological sites within the area including one conjoined site. This option was therefore eliminated from further consideration.

Possible Adare Junction at L-1424 Kilgobbin Road

If the Adare Junction were located on the L-1424 Kilgobbin Road, it could use the existing local road for the link towards Adare through the Lantern Lodge Roundabout. However, proximity to the existing railway level crossing on the Kilgobbin Road is a major constraint. In accordance with the relevant design standard, a separation distance of at least 50m is required between the level crossing and a proposed roundabout (on a non-national road) for safety reasons. On the Kilgobbin Road, this separation requirement would push the potential Adare Junction southward by this distance so as to be sited nearly midway along the 350m length of the L-1424, with the southern roundabout located 120m north of the Lantern Lodge Roundabout. Due to the obvious drawbacks of such junction arrangements and the impacts of the option for the farmlands adjoining, a layout drawing was not developed, but it may be envisaged by comparison with Plate 3.72, above. This option was therefore also eliminated from further consideration.

Adare Junction Option West of Kilgobbin Road

The final option considered for the location of the Adare Junction is 600m west of the L-1424 Kilgobbin Road at Gortaganniff as shown in Plate 3.73, below. This arrangement would involve a 150m long connector road to the existing N21, where a new roundabout would be provided at the bend in the road 0.5 km west of the Lantern Lodge Roundabout. The junction is sited to avoid as many as possible of the nearby archaeological sites, including two conjoined enclosures to the east. This option was selected as the most appropriate location for the Adare Junction and was brought forward into the design development stage.

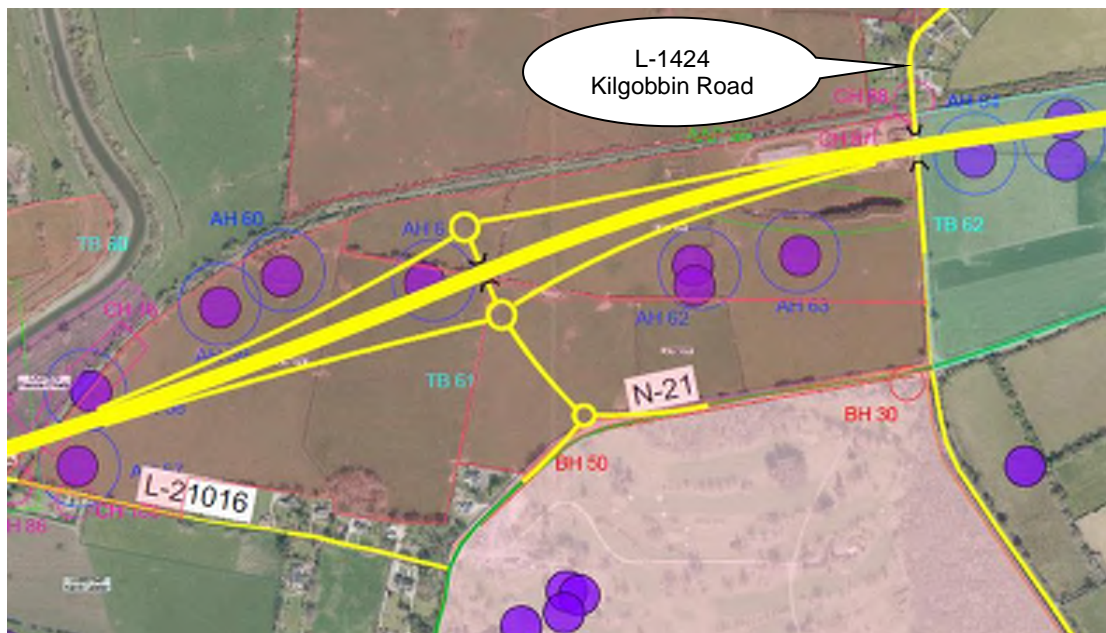


Plate 3.73 Outline of Potential Adare Junction West of L-1424 Kilgobbin Road
(Archaeological sites and features shown as purple circles)

Alternative Link Road to Lantern Lodge

Consideration was also given to an alternative arrangement for the link road towards Adare as shown in Plate 3.74. The perceived advantage of this alternative would be to direct traffic to Adare via the existing Lantern Lodge Roundabout, a minor landmark feature familiar to some drivers for orientation as the gateway to Adare village from the east. It was also perceived to provide a simpler and more direct access route towards a local hotel located 1.5 km to the south of the Lantern Lodge Roundabout on the L-1420 local road. However, the journey distance is exactly the same from the Adare Junction in either link road option, although the alternative proposal would involve one less roundabout.

This alternative layout would involve an additional 500m length of link road which would add €2m to the capital cost of the proposed road development. It would add a 1km additional travel distance to all traffic to and from Adare Village for which the environmental impact would be greater and the operational costs could accumulate to €15m over a 30-year assessment period. This would directly affect the local residents, businesses and visitors to the village. The net economic effect of the alternative proposal would therefore be a dis-benefit of €17m.

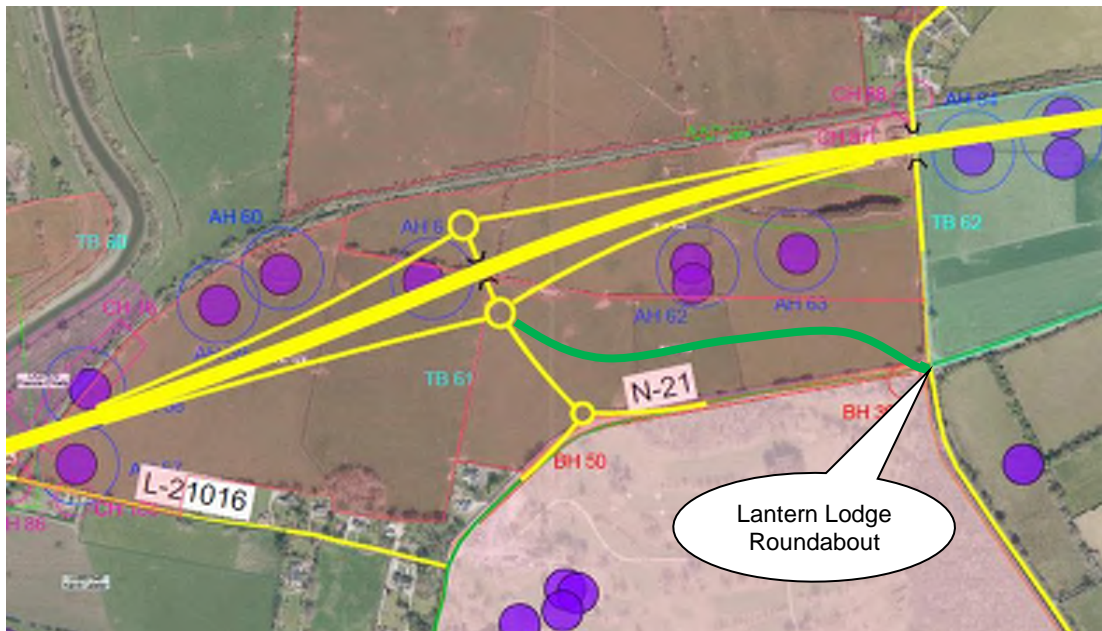


Plate 3.74 Potential Alternative Link to Adare Junction

Shown as a green line linking to the Lantern Lodge Roundabout.

Due to the significant direct economic dis-benefit of this proposal it was discounted from further consideration.

3.9.10 Terminal HGV Service Area

As required by TII Design Standard DN-GEO-03028 for *The Location and Layout of Service Areas* (2017), the proposed road development will provide a Type 1 (Terminal) Service Area for HGVs at Shannon-Foynes Port:

“Type 1 (Terminal) Service Area: A service area located in the vicinity of the terminal of a route, within or adjacent to a port or similar facility, designed to provide appropriate safe and secure parking for commercial vehicles. Terminal service areas will contain amenities and facilities to cater primarily for the needs of commercial traffic appropriate to the level of demand expected at the particular location subject to the approval of TII” (TII, 2017, p. 1).

Three potential sites for the HGV Service Area (A, B, and C) were assessed, as shown in Plate 3.75.

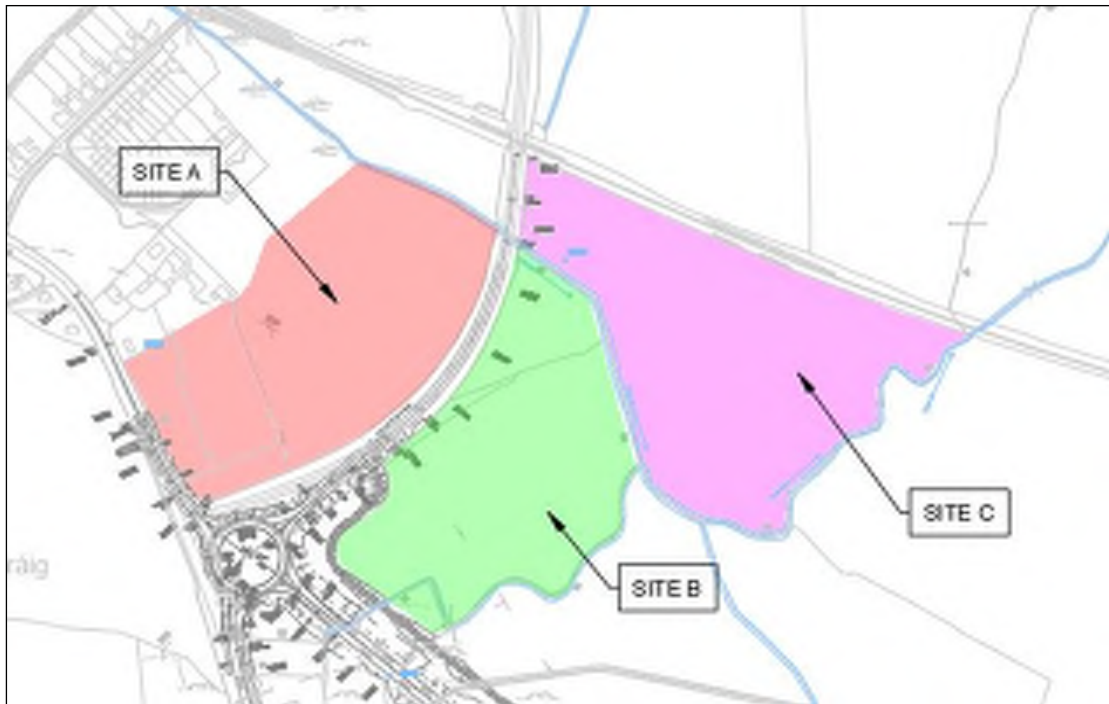


Plate 3.75 Shannon-Foynes Port Terminal Service Area: Alternative Sites

Site A could have adverse impacts on the adjoining housing in terms of noise and air quality from HGVs running their engines while parked. There is also a watercourse that crosses the site with potential for flooding. The flood storage capacity in this site is beneficial for the management of the drainage regime in the surrounding area, including adjoining residential developments.

Site B is the most low-lying of the three sites and is largely affected by flooding, which makes it the least suitable site.

Site C is generally on higher ground than the other two sites and does not have the same flood risk. It is also further removed from the nearby housing which will reduce the potential noise and air quality impacts associated with Site A.

Thus, Site C was selected on the basis of fewer impacts on nearby housing, flooding and biodiversity. This site is part of the lands of the Shannon-Foynes Port Company and is located immediately to the southeast of the port gateway.

To complement the proposed HGV Service Area, it is proposed to provide a footpath connection to Foynes village over a distance of 700m to the end of the existing footpath system. Provision of this path would allow HGV drivers to access services / facilities on Foynes Main Street via a short (1km; 10 – 12 minute) walk, without the need to drive into and find parking in the village.

3.9.11 River Bridges Design

The proposed Foynes to Limerick Road includes a large number of structures including:

- 9 Large River Bridges >20m span including Robertstown (included in bridge over the existing N69), River Deel, Clonshire River, River Greanagh A & B, and the River Maigue (204m); and
- 14 Small River Bridges: 2m to 15.5m span, which include accesses in several cases.

The bridges have all been designed to take into account the site locations for each structure, including the environmental constraints, and the function of the proposed structures. Structure designs have been recommended for each required crossing based on the site location, function, topography, vertical and horizontal alignments of the proposed road, cross-section requirements, existing services, and the geotechnical, hydrological, archaeological and environmental constraints of the location in question.

The river bridges in particular (and particularly the River Maigue Bridge) were designed based on the environmental constraints. All river bridges have been designed to be clear span with min. 1m bank clearances on either side as mitigation during design for biodiversity. All culverts have been designed to allow for the provision of natural bed material along their length. Piped culverts will be inverted to 300mm while box culverts will be inverted to 500mm. In some cases, it was determined to be preferable to provide 'bottomless' culverts in order to maintain the existing channel bed for reasons of aquatic ecology and this has been provided for in the arrangements of the relevant watercourse crossings.

River Maigue Crossing

The bridge structure crossing the River Maigue has been designed to clear span the River Maigue to avoid impacting on the riverbed, which is part of the Lower River Shannon SAC. The structure is a three-span steel-concrete composite, multi-girder bridge. The piled supports will be located on the existing flood berms which currently run adjacent to the river. Access tracks will be accommodated under the outermost spans.

The deck will be of composite construction consisting of steel plate girders and an in-situ reinforced concrete deck slab. The concrete piers are supported on piled foundations. The construction sequence as described in Chapter 4 has been developed between the project ecologist and the bridge engineers, in consultations with the National Parks and Wildlife Service (NPWS)¹ to avoid impacts on the SAC. Temporary sheet piling has been pulled back to the edge of the riverbank, as far as possible outside of the tidal mudflats, to avoid works in the intertidal zone of the river, with the requirement for a larger crane to be used due to the required set-back distance. This will fully protect the Qualifying Interest habitat within the SAC, 'Mudflats and sandflats not covered by seawater at low tide' [code: 1140].

3.10. Consultations

The Project Team has employed various means to facilitate and encourage public participation in the Route Selection stage of the proposed road development, including a number of public consultation events. A project specific website (www.foyneslimerick.ie) was set up to inform the public of project developments, on an ongoing basis, including providing notifications of upcoming public consultations, design updates. The website also acted as a repository of all published project

¹ The design of the River Maigue crossing and the proposed construction sequence was discussed with the NPWS at a series of meetings held during the planning and design of the proposed road development.

documents, which can be accessed and downloaded as required by members of the public and other stakeholders. This website also provides a communication facility to members of the public, who can submit comments or queries to the Project Team on an ongoing basis.

Public Consultations and Design Updates have aimed to involve the public in the development of the proposed road development from the earliest possible opportunity and to keep them informed of progress. The following sections describe the Public Consultations which have been undertaken throughout the development of the proposed road development as outlined in previous sections of this chapter.

A dedicated local liaison team was also assigned within the MWNDRDO in Lissanalta House in Dooradoyle, Limerick City during the Route Selection Phase and has been engaged on the project throughout the planning and design period. This team has held hundreds of individual meetings with people affected by the proposed road development, recording their concerns and explaining the proposals in detail. Through this local liaison team, a continuous communications channel has been available by phone, email and post correspondence over the 5 years since 2014. The minutes of these consultations have been reviewed by the Design Team and have provided valuable input as the project progressed through the sequential steps of the design process.

3.10.1 Constraints Study Public Consultation

The first public consultation which was undertaken in July 2014, displayed the Constraints Study. The aim of the public consultation was to inform the public of the proposal to develop a number of route options leading to the development of a Preferred Route Option.

In order to raise awareness of the proposed road development amongst members of the public, a publicity campaign was organised by Limerick City and County Council as described in Section 3.5.2.

3.10.2 Route Selection Process Public Consultation / Public Display

The Public Consultation held during the Route Selection Process is described in detail in Section 3.7.2.1. It presented the results of the Stage 1 Assessment. Four 300m wide route corridor options (see Plate 3.6), that emerged from the Stage 1 assessment, were presented to the public in Limerick on 10th March 2015 and at the Flying Boat & Maritime Museum in Foynes on the 11th March 2015. Approx. 700 people attended these events, and over 1000 submissions were subsequently received during the extended 30-day consultation period.

Letters were also issued by ROD-AECOM in March and April 2015 to a list of consultees, requesting any comments or information that would inform the Constraints Gathering and Route Selection phase of the proposed road development. A map of the initial Constraints study area, showing the Route Corridor options, was also attached. The 113 consultees included statutory and non-statutory bodies, communications operators, utility providers, local amenity providers, business providers, and local community groups. The results of the Stage 1 Assessment and the feedback from the Public Consultation Submissions were then processed and fed into the refinement of route corridors. Stage 2 of the Route Selection Process assessed the route Corridor Options and resulted in the selection of a Preferred Route Option.

3.10.3 Preferred Route Corridor Display

The Preferred Route Corridor (Plate 3.17) was presented to the public at two public display events, as described in detail in Section 3.8, held at the South Court Hotel in Limerick on the 1st December 2015 and the Flying Boat & Maritime Museum in Foynes on the 2nd December 2015. Approx. 600 people attended and were invited to make submissions before the extended deadline of 29th January 2016. This event also informed the public on the process and the programme for the project.

Consultation letters were also issued by Limerick City and County Council to 76 no. consultees, similar to those consulted in March and April 2015. These letters requested comments and / or information the consultees may have had in relation to any direct or indirect impacts arising from the Preferred Route. The letter informed the consultees that a Preferred Route Corridor had been selected and that the Design Team were entering into the Preliminary Design phase of the development.

The comments and feedback were reviewed and considered by the Project Team including the relevant specialists in advance of finalising their assessment. Further refinements of the preferred route corridor were made in response to the submissions received, as described in the earlier sections of this chapter.

3.10.4 Route Development Updates and Review

Following on from the Route Selection Stage, five Design Updates and one localised Corridor Options Review have been published following further design development undertaken by the design and environmental team during 2016, 2017 and 2018. These publications were made available for free download from the project website (www.foyneslimerick.ie) and / or available to view at the MWNRDO. The project website has a Contact section inviting messages or comments from the public, with a contact number and postal address also provided.

The design was refined and progressed through a series of six design updates over the period from Autumn 2016 to end 2018. At each stage, there was further engagement with the public and the landowners affected, with numerous submissions received and individual meetings held with the liaison team. This process of close and frequent engagement provided significant inputs to the Design Team as issues were identified and mostly resolved satisfactorily in the evolving project design. Specific provisions for farm and property accesses and associated accommodation works have been developed through this process.

Design Update No.1 - September 2016

In September 2016, the design update published the provisional 100m wide corridor, which lay predominantly within the 300m wide Preferred Route Corridor (Orange). Provisional junction locations were also identified and were shown as red shaded areas. (See Section 3.9.1 for more detail).

Design Update No.1 was presented to the Elected Members of Limerick City and County Council. Landowner meetings were also held in the MWNRDO following the publication of the Design Update and numerous submissions were received in person or by email, phone or post.

Corridor Options Review between Blossomhill and Ballycannon – March 2017

As a result of progressing the proposed road development, together with feedback received from the public from the September 2016 Design Update, two alternative corridor options for the 2km section between Blossomhill (Rathkeale) and Ballycannon

(Croagh) were published, along with the September 2016 (blue) corridor. Affected landowners were advised of the corridor options in March 2017 by Limerick City and County Council. See Section 3.9.2 for further details.

Design Update No.2 - June 2017

Following a detailed study of the three alternative route corridors between Blossomhill and Ballycannon, the Green Option was identified as the preferred option in the Design Update No.2 in June 2017.

A refined provisional 80m wide corridor was also published, including provisional junction layouts and some localised adjustments. Provisional crossing arrangements including proposed bridges or road diversions were identified for local roads along the full route.

During the consultation process following the September 2016 Design Update, submissions were received from members of the public, community groups, local businesses and elected representatives requesting consideration of an additional junction between Rathkeale and Adare. On 21st October 2016 a special meeting of Limerick City & County Council was convened to discuss the question of whether a junction should be provided on the proposed motorway at Croagh village roughly midway between the proposed junctions at Rathkeale and Adare East. A motion was passed calling for a study to be undertaken by the project Design Team to consider this possibility.

A socio-economic study undertaken by the Project Team assessed the provision of an additional junction as providing a Slightly Positive Benefit. The Junction Study concluded that the proposed road development would include a junction at Croagh subject to selection of a suitable location. Following evaluation of numerous possible locations, the best two potential locations for this junction were identified and included in the design update: Option A (West of Croagh) and Option B (East of Croagh).

Letters were issued by Limerick City and County Council in June 2017 to all potentially affected property owners with copies of the relevant maps, inviting them to attend a meeting with the Project Team. Letters were also issued to adjoining landowners and other interested persons, notifying them of the information available on the project website. The Design Team also gave a presentation to the Elected Members of Limerick City and County Council in June 2017. See Section 3.9.3 for further details.

Design Update No.3 - October 2017

The October 2017 design update announced Croagh Junction Option B (East of Croagh) as the preferred option following assessment and consideration of consultations with interested parties and the public. The Provisional 80m Corridor and Provisional Junction Locations remained indicative and subject to change during the design development process.

Letters were issued by Limerick City and County Council to land and property owners, nearby residents and other interested parties, notifying them of the preferred option for Croagh Junction. Further meetings were held with the Project Team, where requested. A presentation was given to the Elected Members of Limerick City and County Council by the Design Team in October 2017. See Section 3.9.4 for further details of the October 2017 Design Update.

Design Update No.4 - May 2018

In May 2018, the fourth design update was published, illustrating the proposed layout and footprint of the proposed road development in detail. Development drawings were published on the project website and over 500 letters were sent by Limerick City and County Council to property owners who would be affected, nearby property owners and interested parties informing them of the Design Update. A presentation was given to the Elected Representatives of Limerick City and County Council to detail the proposed road development and what is to follow in the next stages.

The Development drawings published in May 2018 can be seen in Plates 3.27 – 3.35, and include the following details:

- Proposed Mainline alignment, side road realignments, bridges and junction designs as well as whether the road was in cut or on fill;
- Proposed Access arrangements, indicative land-take lines, watercourse diversions and location of drainage ponds, etc.; and
- Area under consideration for the provision of a HGV Rest Area in the vicinity of Shannon-Foynes Port.

The Design Update drawings were indicative and potentially subject to change during the further design refinement process. See Section 3.9.5 for further details on the May 2018 Design Update.

Final Design Update No.5 - November 2018

Following development of all necessary provisions for accesses, farm underpasses and drainage attenuation ponds to define the full footprint of the proposed land acquisition for the proposed road development, as well as the selected site for the proposed HGV Service Area, the final design update drawings were made available to the public at the end of November 2018. As before, a briefing was provided for elected representatives, and notification letters were issued to all affected landowners and interested parties informing them of the Design Update.